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2009 Newsletter

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UPGRADE UPDATE: Complete!

Improvements to Rahway Valley Sewerage Authority Facilities are in Place

The Rahway Valley Sewerage Authority (RVSA) plant upgrade — an expansion and improvement project that has been ongoing since 2001 — is now complete. The completion of the project at the Central New Jersey wastewater treatment facility increases the RVSA's daily and maximum capacities for treating wastewater, enables the Authority to provide cleaner effluent (water discharged from the plant) and reduces environmental pollution.

Why Upgrade?

The history of improvements at RVSA

Prior to the upgrade, the RVSA's facility was capable of accommodating a maximum peak flow of 63 million gallons per day (MGD). Due to limited trunk sewer and wet weather treatment plant capacities, the RVSA had two Combined Sewer Overflows (CSOs) that were activated during extended rainfalls when peak flow was exceeded. These CSOs were necessary to relieve street flooding and water back-up into basements within the tributary municipalities.

In 1997, the New Jersey Department of Environmental Protection (NJDEP) revised the RVSA's Discharge Permit. The revisions required the Authority, by law, to increase the plant's capacity and stop the operation of Outfalls 003 and 004 as CSOs during heavy rainfalls, which had been in use as permitted Outfalls for many years. The revisions also required the RVSA to produce a higher-quality effluent than in the past. Failing to comply with the NJDEP requirements would result in steep, ongoing fines — non-compliance would become very expensive, very quickly.

The RVSA worked with the NJDEP to develop a Comprehensive Strategic Plan (CSP) for addressing the NJDEP's concerns. The goals of the CSP included:

- Increasing the plant's capacity from 63 MGD to accommodate wet weather flows of up to 105 MGD, by providing increased influent and effluent capabilities.
- Adding sand filters, an ultraviolet disinfection system, and other primary treatment facility enhancements to eliminate possible future violations of the permit's effluent limits.
- Closing Outfalls 003 and 004 located in Rahway, New Jersey.
- Construction of a gravity relief sewer to bring the excess wet weather flow from Outfall 004 to the treatment plant.

Upgrade Complete

This spring, the RVSA put the finishing touches on improvements at the plant. All of the planned upgrades have been implemented, meeting the goals of the CSP. In addition, the upgrade project included construction of a Sludge Drying/Co-Generation (Co-Gen) facility that is also fully constructed. Once operational, the RVSA can expect savings on electricity and sludge disposal costs.

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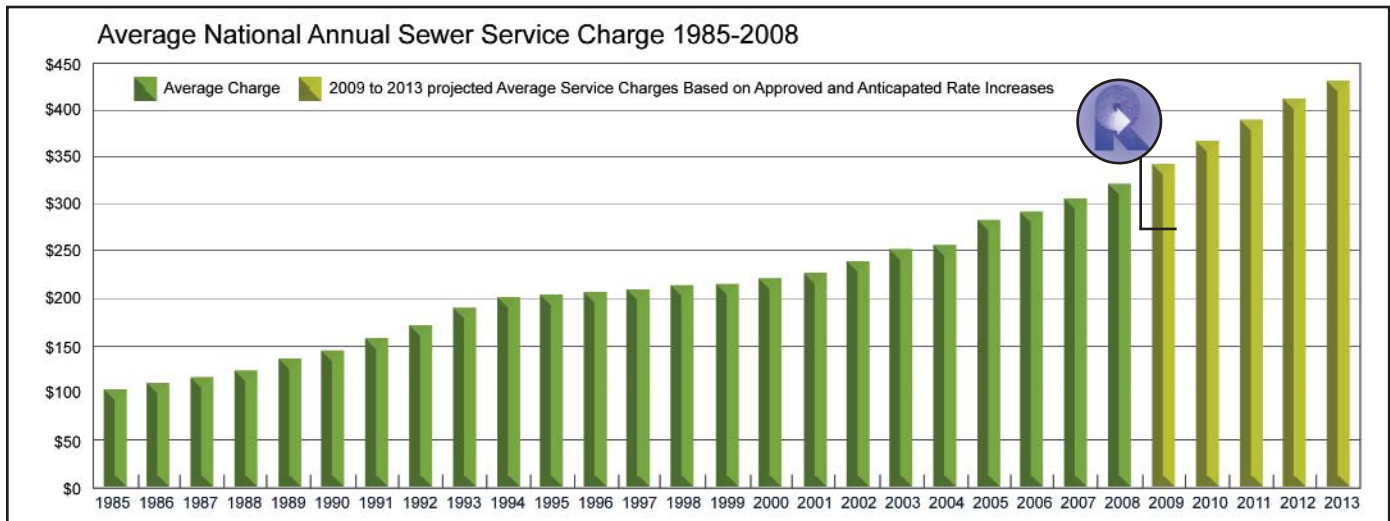
Learn more about the Rahway Valley Sewerage Authority at our Web site
<http://www.rahwayvalleysa.com>.

Benefits of the RVSA Plant Upgrade

- ✓ Cleaner environment
- ✓ Compliant plant facility
- ✓ Increase plant capacity
- ✓ Self-sufficiency/independence from electric company (through use of Co-Gen)
- ✓ Maintain reasonable service area rates

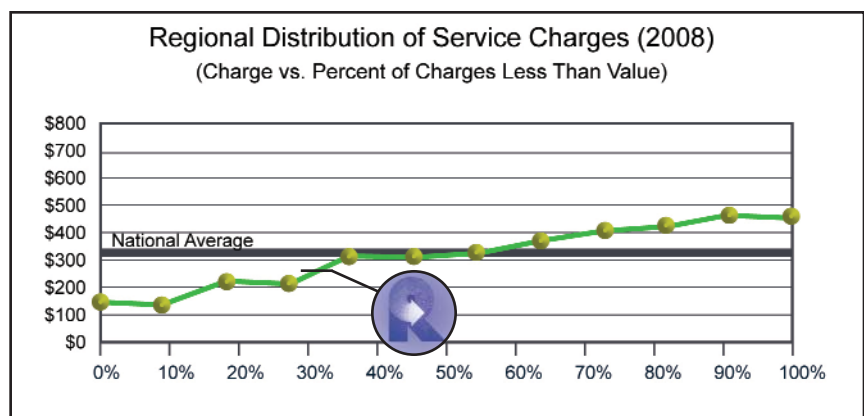
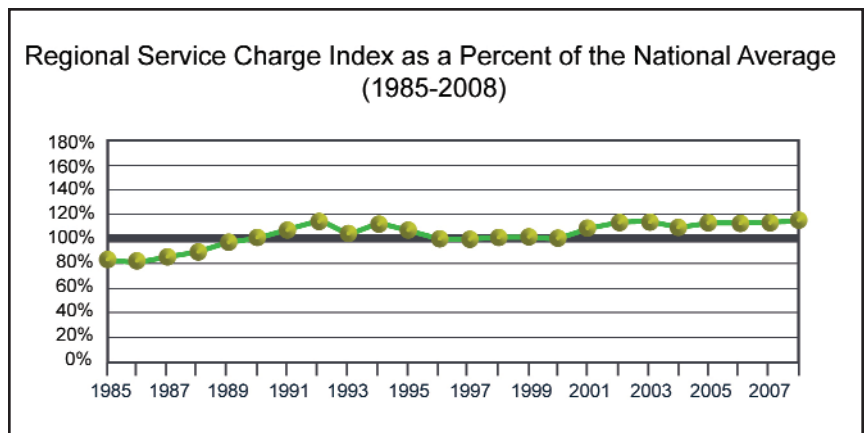
Cost of Wastewater Treatment

For vital environmental and health reasons, wastewater must go through a thorough, highly-regulated treatment process. It is imperative to the well-being of our communities and to the earth that the materials leaving wastewater treatment facilities meet certain standards and are environmentally safe. The cost for these important services varies nationwide because of a number of factors. Most wastewater treatment facilities base their service fees on system usage, as is the case with the RVSA. Currently, the average annual cost per residential user of the RVSA system is about \$260. About 50% of this yearly service fee is allocated to pay the annual debt service costs related to the plant upgrades. Despite this increase, the RVSA still remains well below the national average for annual sewer service charges (\$313.63 in 2008) and is among the lowest in the region.



National and Regional Averages for Annual Sewer Service Charges (1985-2008)

Year	National	Region 2
1985	\$102.75	\$87.74
1986	\$109.69	\$92.07
1987	\$115.51	\$103.02
1988	\$123.17	\$113.10
1989	\$133.65	\$130.73
1990	\$144.84	\$151.08
1991	\$157.88	\$171.40
1992	\$171.33	\$200.66
1993	\$188.12	\$202.08
1994	\$198.68	\$228.65
1995	\$203.22	\$221.16
1996	\$207.28	\$212.09
1997	\$209.49	\$213.84
1998	\$213.52	\$220.48
1999	\$215.61	\$228.57
2000	\$222.31	\$228.20
2001	\$229.63	\$255.85
2002	\$238.95	\$276.08
2003	\$249.44	\$286.70
2004	\$258.96	\$288.61
2005	\$281.23	\$321.74
2006	\$291.89	\$337.77
2007	\$304.47	\$351.17
2008	\$313.63	\$375.19



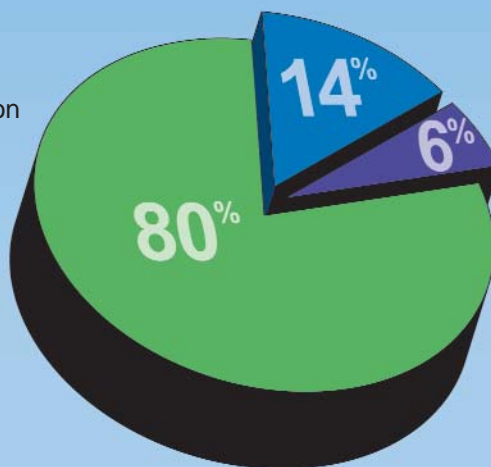
Source: National Association of Clean Water Agencies.

Capital Improvement Program

The chart below details where upgrades/improvements were made at the RVSA plant.

80% Comprehensive Strategic Plan (CSP)

- Five-year plan to design and construct treatment plant
- Major components of CSP:
 - Closure of CSOs 003 & 004
 - 30 MGD gravity relief sewer
 - 105 MGD influent pump station
 - Screening/aerated grit facilities
 - Primary treatment improvements/expansion
 - Secondary treatment improvements/expansion
 - Tertiary filtration
 - Ultraviolet disinfection
 - 105 MGD effluent pump station/cascade aeration
 - Rotary drum sludge thickening/odor control
 - SCADA (Supervisory Control And Data Acquisition)
 - Other improvements



14% Cogen/Sludge Drying

- Sludge volume reduction
- 6.2 MW power generation
- Cost savings: Electricity and sludge disposal costs
- Satisfies JCO requirement for emergency back-up power

6% Other Upgrades

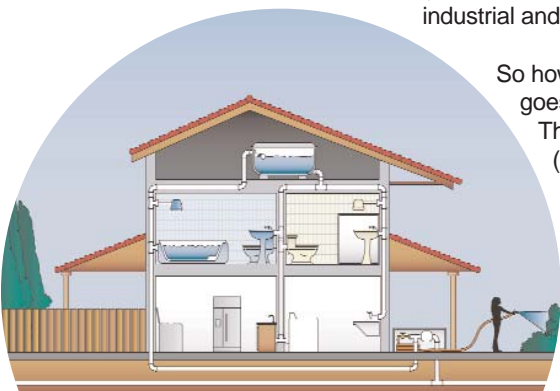
- Digesters
- Centrifuge
- Energy recovery units
- Service water system
- Interceptor sewer lining
- Conversion of Old Laboratory Building to Administration Building Annex

Where Does It Go?

The Wastewater Treatment Process at Rahway Valley Sewerage Authority

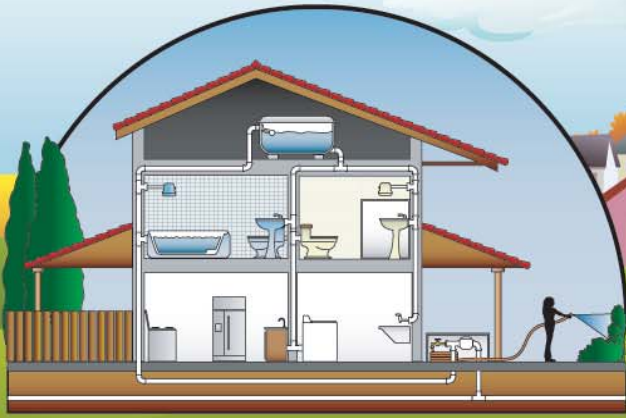
Did you ever wonder what happens when you flush your toilet or pour something down the drain?

Whenever material leaves your home — whether it be from flushing the toilet, taking a shower, washing the dishes or doing laundry — it doesn't just "go away." It needs to be cleaned before returning to the environment. All of these materials, called "wastewater," travel via the sewer system to a treatment plant for this purpose; RVSA serves more than 300,000 residents and 3,500 industrial and commercial customers in 14 communities in central New Jersey.



So how does it work at the RVSA plant? When wastewater enters the treatment plant, it first goes through a screening process and a grit removal process at the "Headworks" facility. These processes — considered "preliminary treatment" — remove debris/trash and grit (sand, gravel, etc.) from the wastewater. This is important because debris and grit can interfere with the proper operation of the plant. The material that is removed from the wastewater at the Headworks facility is then disposed of at a landfill.

Next, the wastewater is pumped through settling tanks. This is considered "primary treatment." These tanks serve to remove some (about 30%) of the heavy organic solids and floatable solids (scum) from the flow. The organic solids are pumped to the gravity thickener tanks for thickening (see "Solids" on next page), and the floatable solids are collected and disposed of at a landfill. [continued on next page](#)



Wastewater comes from household drains, commercial businesses, and extraneous infiltration/inflow.

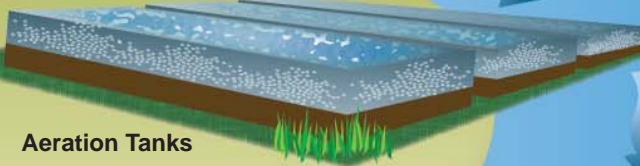


Head Works Facility (Screening Process/Grit Removal)

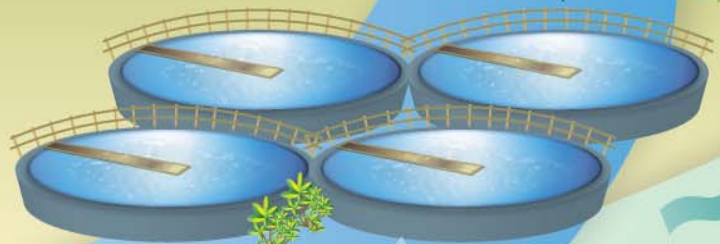


Debris and Grit Removed from Site

Primary Treatment System

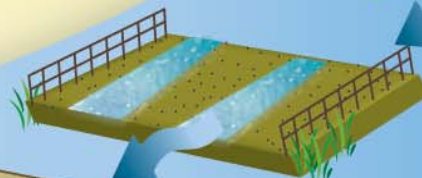


Aeration Tanks



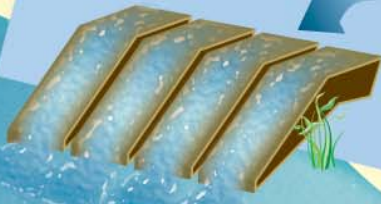
Secondary Treatment (Clarifies)

Sand Filters (Polishing)



Ultraviolet Disinfection

Effluent Pumping and Cascade Aeration



Arthur Kill

The then reme bene

Gravity

As a byproduct of the process, methane gas is produced, which is used by the RVSA to heat the plant and to fuel engine/generators and provide power to the facility in conjunction with the local utility.



Wastewater Treatment (continued)

Following primary treatment, the wastewater is pumped into aeration tanks and then flows by gravity to the final settling tanks and final clarifiers. This is considered "secondary treatment." The RVSA's secondary treatment system is a biological activated sludge process — a process in which air is bubbled through the wastewater combined with organisms. This causes a "biological floc," or the clumping of fine particles, and reduces/removes the organic content of the sewage. The biological solids (sludge) wasted from this process are pumped to the gravity thickener tanks for thickening (see "Solids" below).

After secondary treatment, the clarified treated wastewater goes through "tertiary treatment" — a final sand filtering, or polishing, process where residual suspended material and bacteria is trapped. The remaining wastewater then flows by gravity to be disinfected by exposure to ultraviolet (UV) light. The UV light disrupts the DNA of any remaining bacteria, viruses, or other pathogens and makes it incapable of reproduction. The use of UV light - instead of chemicals - in the disinfection of wastewater is considered a healthier option for the environment. Water treated with UV light has no negative effects on organisms that later consume it. The disinfected wastewater — called "effluent" — is released into the Arthur Kill, either by gravity or with the help of pumps.

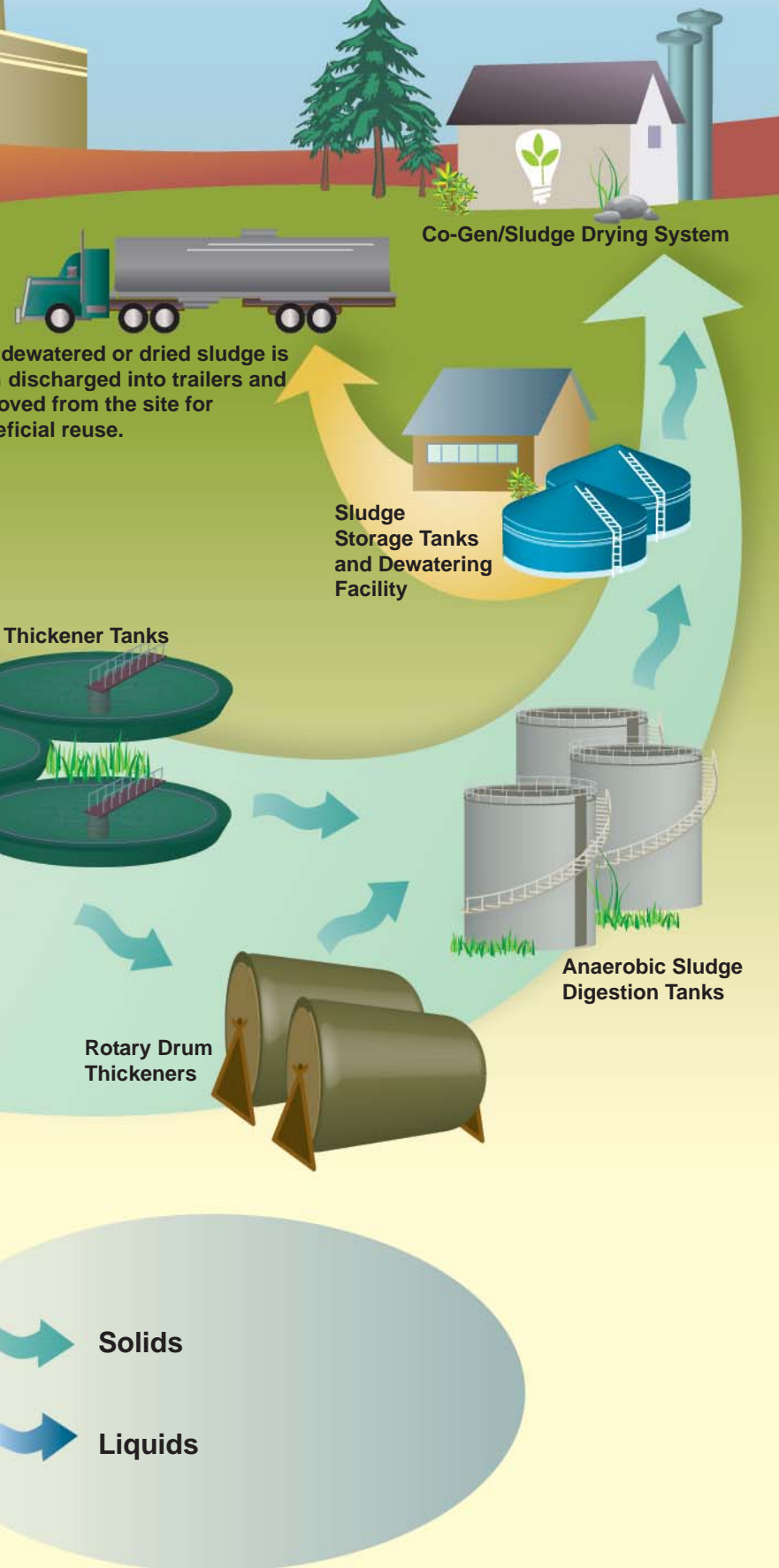
Solids

The sludges removed from primary and secondary treatment are first pumped to the gravity thickener tanks and/or rotary drum thickeners. These processes serve to concentrate the combined sludges through the removal of water.

Following the thickening processes, the sludge is pumped to anaerobic digestion tanks. Anaerobic digestion is a bacterial process that is carried out in the absence of oxygen. This process serves to biologically stabilize the sludge. It also dramatically reduces the total sludge mass, and inactivates pathogenic (disease causing) micro-organisms. Methane gas is produced as a byproduct of the process, and the RVSA uses this gas to operate the Co-Generation (Co-Gen)/sludge drying facility. Energy produced by the Co-Gen facility is used to heat the plant, fuel engines/generators, and provide power to the facility in conjunction with the local power utility.

After anaerobic digestion, the sludge is pumped to the sludge storage tanks and then to the dewatering facility. At the dewatering facility, the sludge is mixed with a polymer and then pumped to one or more mechanical dewatering devices (centrifuges) for the further removal of water from the sludge. The RVSA is able to achieve a dewatered sludge of approximately 25% total solids through the use of these mechanical dewatering devices. The final step in the processing of solids is drying at the Co-Gen/sludge drying facility. This step helps reduce the sludge quantities going off site by creating a drier, less bulky byproduct.

The dewatered/dried sludge is then discharged into trailers for transport to sites where it is beneficially reused (i.e., in agricultural applications, for the reclamation of strip mining sites, or as landfill cover material).



Around the RVSA Plant

Wastewater enters the plant as raw sewage and is discharged as clean effluent and sludge. Getting through the process is complicated and requires a wealth of specialized machinery. It might look like something out of a science fiction movie, but the facilities and equipment at RVSA's plant play a very real and important role in safeguarding the environment. Here are just some of the sights you might see on a tour of RVSA's facilities.



Odor Control System (OCS) at the Headworks facility (where preliminary treatment takes place). The OCS conditions the exhaust air leaving the facility.



Coarse Screens at the Headworks facility. These are used to remove larger debris from the wastewater before primary treatment.



Fine Screens at the Headworks facility. These are used to remove smaller debris — following Coarse Screens — from the wastewater before primary treatment.



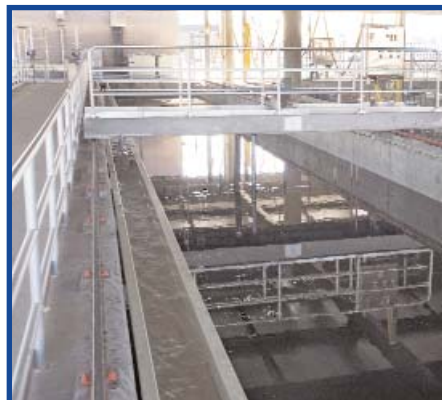
Influent (raw sewage) following the screening process. From here the wastewater goes through the main pumps to the settling tanks for primary treatment.



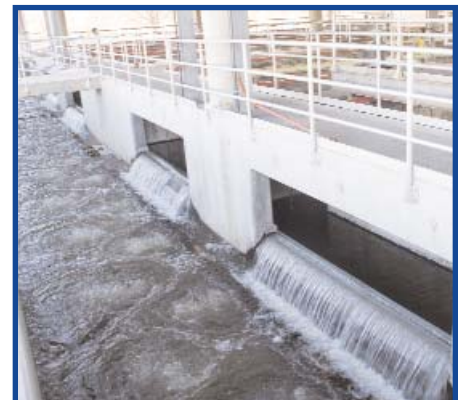
Main influent sewage pumps. Each pump can process 27MGD. Four are in "operations" mode and one is a standby pump.



Final Clarifier (settling tank). This is considered "secondary treatment." Four clarifiers were rebuilt as part of the upgrade and two new ones were added.



Effluent Sand (Polishing) Filters. This is the final removal process, considered "tertiary treatment."



Effluent leaving the sand filtering process. From here it will flow by gravity to be disinfected before discharge.



Ultraviolet Disinfection Facilities. UV lamps are underground; final effluent is exposed to UV light to essentially disrupt the DNA of any remaining bacteria.



Effluent Screw pumps. There are four — each capable of pumping 35MGD. The final effluent flows to the Arthur Kill on its own; pumps are only activated during heavy rain or high tide.



A Motor Control Center (MCC) in the Co-Generation/ Sludge Drying Facility.



The Co-gen facility has four “Caterpillar gensets.” Each is capable of producing 1.55 megawatts (MW) for a total of 6.2MW of potential power.



Exhaust stacks from the gensets at the Co-Gen Facility. Each stack incorporates a “silencer,” which essentially acts like a muffler.



Dewatering centrifuges prior to the sludge drying facility. The centrifuges spin the sludge to mechanically remove as much water as possible.



The end process, or sludge drying, for sludges before they are hauled off site. The drier the product is, the less it weighs, and thus, the less it costs to remove.

Learn more about the RVSA at www.rahwayvalleysa.com





1050 East Hazelwood Avenue
Rahway, New Jersey 07065

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Sewer: The 'Bargain' Utility

Sewer vs. other utility costs

\$224.17 - average total monthly energy cost in RVSA service area*
(gas/oil/electric/other)

\$21.67 - average monthly sewer charge
(\$260 on average for entire year)

*according to the Concil for Community and Economic Research Cost of Living Index

Rahway Valley Sewerage Authority

1050 East Hazelwood Avenue, Rahway, New Jersey 07065

Phone: 732-388-0868 • Fax: 732-382-0774

Web site: www.rahwayvalleysa.com