



May 4, 2022

Site: ModWash
Wash Info: NCS (Tunnel)
Subject: Water Usage Information
To Whom It May Concern:

The PurWater Recovery System has been engineered and designed specifically with the Professional Car Wash Operator in mind and incorporates the same innovative, cutting edge technology the industry has come to expect from PurClean. Modular in design, the PurWater System platform provides a simplified approach that allows the system to be easily adapted to meet the needs and requirements of the targeted wash facility and eliminates the confusion typically associated with water recovery.

NCS– Tunnel

It is a commonly used number that you will lose 6 gallons to evaporation and carry out. Using 38.9 gallons total (reclaim, RO, RO reject and freshwater) per vehicle will put you at 75.99% reclaim which should be a good balance of wash quality and conservation. With your chemical applications and final rinse applications at 13.9 gallons per vehicle, all your undercarriage, and all cloth applications running on reclaimed water you will be at 7.9 gallons per vehicle going to sewer.

Water Use Per Vehicle

- ◆ evaporation and carry out 6 gallons
- ◆ chemical application and final rinse (RO, RO reject and freshwater) 13.9 gallons
- ◆ undercarriage and wash applications running on reclaim water 25 gallons
- ◆ at maximum going to sewer 7.9 gallons of reclaim water

Summary

- ◆ Total of 38.9 gallons of water used per vehicle
- ◆ 13.9 gallons of RO, RO reject and freshwater for chemistry
- ◆ 25 gallons of water for the wash / recycle
- ◆ 6 gallons of water lost to evaporation and carry out
- ◆ 7.9 gallons going to the sewer – calculates to 80.28% reclaim

Total Gallons to Sewer Daily (estimated at 500 cars per day count)

- ◆ 7.9 gallons per vehicle going to sewer (estimated 1000 cars per day) total to sewer per day 3,950 gallons

Total Gallons Freshwater, RO & Reject used (estimated at 500 cars per day count)

- ◆ 13.9 gallons per vehicle which includes freshwater, RO & RO Reject (estimated 1000 cars per day) total freshwater used per day is 6,950 gallons

Best Regards,

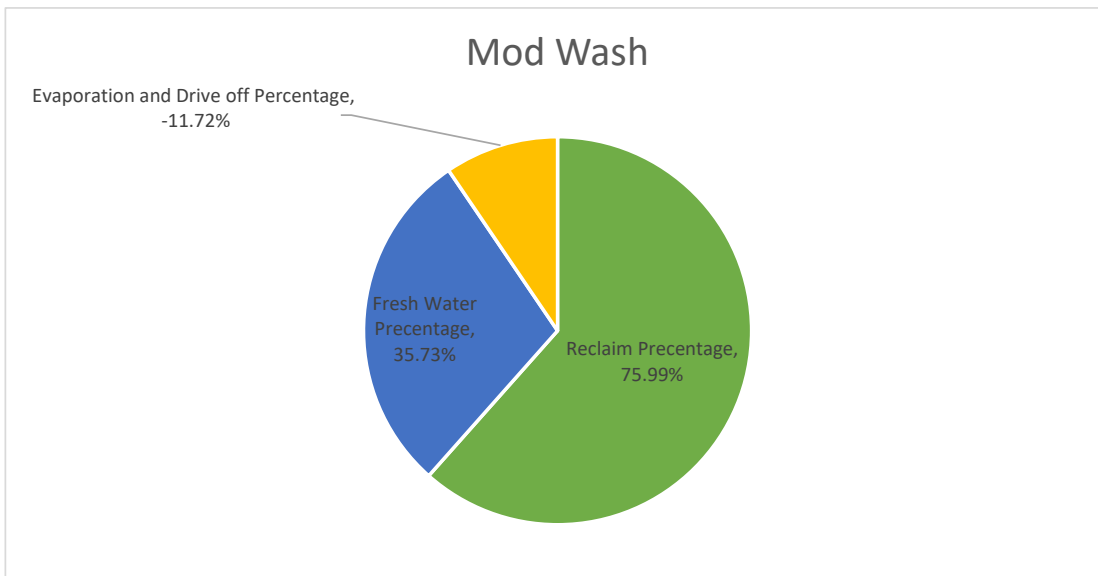
Steven Samudio

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PurClean

Mod Wash

Application	Gallons Used	Fresh/Reclaim
FOAMING APPLICATOR ARCH	1.5	Fresh
FOAMY CTA #1	0.3	Fresh
FOAMY CTA #2	0.3	Fresh
TOTAL BATH	0.6	Fresh
WRAP FOAMER #1	1	Fresh
WRAP AROUND WATER #1	4	Reclaim
TRIPLE POLISH	0.45	Fresh
MITTER #1	1.33	Reclaim
WRAP FOAMER #2	1	Fresh
WRAP AROUND WATER #2	4	Reclaim
TOTAL SHINE	0.2	Fresh
SFB21	1.33	Reclaim
UNDERCARRIAGE	1	Reclaim
OMNI TOP	6.67	Reclaim
OMNI SIDES	6.67	Reclaim
HOT WAX	0.9	Fresh
807 MITTER	1.33	Fresh
SFB28	1.33	Fresh
WATERFALL	0.53	Fresh
TOTAL SEAL	0.6	Fresh
LP MIRROR RINSE	1	Fresh
DRYING AGENT	1.33	Fresh
SEALER WAX	0.2	Fresh
FINAL RINSE	1.33	Fresh

Total	38.9
Evaporation and Drive Off Gallons	-6.0
Fresh Water Usage Gallons	13.90
Reclaim Water Usage Gallons	25.0
Reclaim Percentage	75.99%
Fresh Water Percentage	35.73%
Evaporation and Drive off Percentage	-11.72%
	100.00%





June 18, 2018

**Reclaim Effluent Quality Estimate for
PurWater Reclaim Systems**

Vehicles will attract contaminants predicated on the region of the country, and the roads traveled. These contaminants will consist of soil, road film, tree sap, bird droppings, pollen, insects, oil, and greases. Depending on if the region has snow and ice, then whatever will stick in the snow and ice will also stick to the vehicle. Snow and ice removal materials, which include but are not limited to sand, salt, liquid magnesium chloride which is often applied with a molasses to help it adhere to the road can and will stick to your vehicle as well. All of these contaminants will wash from the vehicle and will end up in the water reclamation tanking system.

The PurWater Reclaim System consists of two primary components ... the underground reclaim tank(s) and the above ground PurWater unit. The below ground tanks are normally supplied by a local concrete vault vendor, with their capacity and lay-out per PurWater specifications. The primary purpose of the reclaim system is to provide quality water to the wash so that the water can be re-used within the wash and still provide a clean car. The re-use of the water allows the operator to minimize the amount of incoming fresh water to the wash and the amount that is discharged from the wash. The reclaim system is not designed to meet a specific effluent quality of the discharge, although in many cases the water discharged from the system goes directly to sewer or a leach field.

As the primary purpose of the PurWater Reclaim System is to provide quality water for re-use within the wash, the system is designed to separate settleable solids (typically sand, grit) and free oils from the water going to the wash. These solids and oils can affect the wash quality, and increase the maintenance on wash pumps, piping, and nozzles. The large settleable solids (60-70 micron and larger) are settled within the underground tanks prior to entering the above ground PurWater unit. The PurWater unit uses high efficiency cyclones to remove down to 5 micron settleable solids prior to the wash. The solids-laden water from the PurWater unit is re-introduced into the reclaim water at the front end of the underground tanks, where some solids settle and some continue with the water phase to be re-treated or go out with the effluent. The free oils (60-70 micron and larger) float to the surface within the underground tanks and are trapped within the tanks. Accumulated settleable solids and free oils are periodically (normally every 3-6 months) removed from the reclaim system by pumping out the underground tanks and replacing with fresh water.

Some amount of water is continuously discharged from the reclaim system in order to satisfy the water balance for the wash. The volume of discharge is dependent on the amount of fresh water used by the wash, less any water that is lost to evaporation and carry-out. Depending upon local municipal requirements, the discharge can be sent directly to sewer or to a leach field, or may require additional treatment before final discharge. As each municipality will have its own discharge requirements, it is important to understand what contaminants the PurWater Reclaim System can and cannot affect.

The PurWater Reclaim system uses two processes to reduce contaminant loading. The first is physical separation using centrifugal force (the cyclones) and gravity settling (the reclaim tanks). Physical separation will directly affect the amount of free oil & grease (FOG) and total suspended solids (TSS) left in the discharge water, and indirectly affect the BOD / COD level as it removes oil & grease. The second process is chemical, oxidation using ozone. Ozone will affect the bacterial count, BOD / COD, total suspended solids (primarily bacterial), and some dissolved oils and chemicals. From field testing and experience, the PurWater Reclaim system has been shown to produce effluent qualities as follows:

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Total Suspended Solids (TSS): 15-100 ppm
Free Oil & Grease (FOG): 10-25 ppm
BOD: 15-50 ppm

TSS, FOG, and BOD are typically the main concerns by municipalities receiving an effluent from a car wash. Given the type of processes used by the PurWater Reclaim system, there is no effect on total dissolved solids (TDS), pH, or temperature. There may also be little to no effect on certain chemicals dissolved in the water, emulsified or dissolved oils, and non-settleable solids.

The above effluent qualities are going to be similar for other types of systems that incorporate physical separation (plate separators, screen / bag filters, media filters, etc.) and chemical oxidation. Biological processes, when operating properly, may produce lower TSS, FOG, and BOD levels than the above, but still will not affect dissolved minerals and some dissolved chemicals in the water.

The above effluent quality estimates are based on normal contaminant loadings seen by car washes. The estimates are not a guarantee of performance. The estimated discharge quality from the PurWater Reclaim System may or may not be acceptable for direct discharge to sewer or a leach field. Local authorities and municipalities should be consulted to determine whether additional treatment is required to meet discharge permits.

If you have any questions or comments on the above, please contact our Sacramento office.

Sincerely,

Teresa Borchard

Teresa Borchard
Director of Technical Sales and Project Management
New Wave Industries
PurClean / PurWater



PurWater Reclaim System Design

The PurWater Reclaim System consists of two primary components the underground reclaim tank(s) and the above ground PurWater unit. The below ground tanks are normally supplied by a local concrete vault vendor, with their capacity and lay-out per PurWater specifications. (See attached drawing.) The primary purpose of the reclaim system is to provide quality water to the wash so that the water can be re-used within the wash and still provide a clean car. The re-use of the water allows the operator to minimize the amount of incoming fresh water to the wash and the amount that is discharged from the wash. The reclaim system is not designed to meet a specific effluent quality of the discharge, although in many cases the water discharged from the system goes directly to sewer or a leach field.

As the primary purpose of the PurWater Reclaim System is to provide quality water for re-use within the wash, the system is designed to separate settleable solids (typically sand, grit) and free hydrocarbons, from fat oil and greases, from the water going to the wash. These solids and hydrocarbons can affect the wash quality, and increase the maintenance on wash pumps, piping, and nozzles. The large settleable solids are settled within the underground tanks prior to entering the above ground PurWater unit. The free hydrocarbons float to the surface within the underground tanks and are trapped within the tanks. Accumulated settleable solids and free hydrocarbons are periodically (normally every 6-12 months) removed from the reclaim system by pumping out the underground tanks and replacing with fresh water. **This is a recommendation only; local regulations may require more frequent service.**

There are two factors we use in determining the size of the reclaim tanks for use with our PurWater Reclaim Units. The first consideration is the size of solid particle we want to separate within the reclaim tanks and the second consideration is how often we treat the water in the tanks using the continuous recirculation. The following will provide details on both of these factors:

- 1) Particle Removal: In the reclaim tank system, we are typically looking to remove solid particles between 60 – 75 microns in size. This ensures large particles are not going through the PurWater unit, which can cause excessive wear and / or plugging. Also, the size of the tanks needed for this removal allows for a relatively large volume for a sludge layer to build so that tanks do not need frequent clean-out. Particle size removal is determined by Stoke’s Law:

$$V (R/S) = (g \times (\text{Rho1} - \text{Rho2}) \times D^2) / 18 \text{ Nu}$$

Where:

V (R/S) = Rise or Settling Velocity of a Particle (cm / sec)

g = Acceleration by Gravity (cm / sec²)

Rho1 = Density of Medium (g / cm³)

Rho2 = Density of Particle (g / cm³)

D = Particle Diameter (cm)

Nu = Viscosity of Medium (g / cm / sec)

We assume a water temperature of 68 DegF, which provides a water density of 1.0 g / cm³ and a viscosity of 1 cp (0.01 g / cm / sec). The solids density we use is 1.2 g / cm³, which is typically the lighter solids (silt) found in car washes. The acceleration of gravity is 980 cm / sec².

For a 60 micron (0.006 cm) particle, the settling velocity is 0.039 cm / sec, or 0.93 in / min. For a 75 micron (0.0075 cm) particle, the settling velocity is 0.061 cm / sec, or 1.45 in / min. We now use these velocities to determine the tank volume.

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We typically recommend using a tank that is 11 ft long (I.D.) by 5 ft wide (I.D.) with a 4.5 ft water depth. We allow for 1 foot at the bottom to be sludge accumulation, so we assume a solids particle must travel a maximum of 3.5 feet (42 in) to be removed. This leaves us with approximately 1440 gallons per tank of working volume (excluding the sludge layer).

For example, we will assume the maximum flow to the reclaim unit is 90 gpm (our PW300 series). To remove 60 micron particles, it will take a working tank volume of 4065 gallons (90 gpm x 42 in travel distance / 0.93 in per minute settling velocity), or 2.8 tanks (4065 gallons / 1440 gallons per tank of working volume). To remove 75 micron particles, it will take a working tank volume of 2606 gallons, or 1.8 tanks. We typically recommend using three tanks for this flow rate.

- 2) Treatment Frequency: One of the functions of the PurWater system is to continuously recirculate water through the reclaim tanks to provide odor control and to keep the water in the tanks from going stagnant. We recommend treating the entire reclaim tank working volume at least 2-3 times per day. On average, the PurWater unit recirculates water at 12 gpm. Using three tanks (per our example above), the entire working volume will be treated every 6 hours (3 tanks x 1440 gallons per tank / 12 gpm), or 4 times per day. This treatment frequency is well within our guidelines.

Some amount of water is continuously discharged from the reclaim system in order to satisfy the water balance for the wash. The volume of discharge is dependent on the amount of fresh water used by the wash, less any water that is lost to evaporation and carry-out. The discharge is sent to a separate, customer supplied wastewater treatment device, or directly to sewer or a leach field. The PurWater Reclaim System does not treat or affect minerals or chemicals dissolved in the water, emulsified or dissolved oils, non-settleable solids, the BOD / COD content, pH, or temperature of the water that is discharged.

The second component of the reclaim system is the above ground treatment system, which further removes solids from the reclaim water so that it is acceptable for the high pressure pumps and nozzles within the wash. The PurWater reclaim unit has a suction pump that brings water up from the reclaim tank to be treated. The pump speed is controlled by a Variable Frequency Drive (VFD) to either continuously recirculate water (low speed) or to provide water to the wash (high speed). Several pump speeds can be programmed into the VFD to meet various or multiple demands. The PurWater unit uses high efficiency cyclones to remove down to 5 micron settleable solids prior to the wash. The cyclones create nearly 1000 G's of centrifugal force to obtain this fine particle separation. The treated (cleaned) water is sent to the wash and / or back to the reclaim tank as part of its continual recirculation mode. The solids-laden water from the PurWater unit is re-introduced into the reclaim water at the front end of the underground tanks, where some solids settle and some continue with the water phase to be re-treated or go out with the effluent.

The above ground reclaim system also has the function of providing odor control for the reclaim water. Reclaim water is a great environment for growing bacteria which can create plugging and odor problems. Typically, anaerobic bacteria (bacteria that grow in the absence of oxygen) will grow beneath the settled solids in the reclaim water tank. This type of bacteria produces hydrogen sulfide which produces an odor similar to rotten eggs. To control this bacterial growth, the PurWater reclaim system continuously recirculates water through the tanks to keep the water moving so that it does not go septic. The PurWater system also incorporates one of three odor control devices to further keep the bacterial growth in check. The first method uses an Air Sparger, which brings in air as the recirculation water passes through it. This puts oxygen in the water stream and helps control the anaerobic bacteria. The second method adds an enzyme into the recirculation water, plus uses the Air Sparger. The enzyme breaks down the dissolved organic material in the water, which takes away the bacteria's food source to keep their population controlled. The third method used is the addition of ozone, which is a powerful disinfectant similar to chlorine. The ozone kills the bacteria to provide a nearly bacteria free water. Also, ozone oxidizes dyes in the water, so it will remove the color created by wash chemicals (i.e. triple foams).

Attached are spec sheets and drawings of typical underground reclaim tanks and PurWater reclaim systems. If you have any questions or comments on the above, please contact our Sacramento office.

Sincerely,

Teresa Borchard

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PurClean/PurWater