A Trip Down the Drain

by Joe Van Meter, K-16

Have you ever wondered why CMA staff ask for information about your septic tanks, specifically, the last time you had them pumped? There's a good reason for that question, and this article will present important background information to explain why ignoring your septic system could eventually cost you money; OR, it could potentially cause dire consequences to you and your neighbors. This could include contamination of CMA's water supply, CMA paying significant environmental compliance fines, or a potential shut-down of our wastewater treatment services by the government.

Check your September Water/Sewer bill for this handy refrigerator reminder magnet.

In the Beginning

First, let's review some fundamental decisions that CMA developers made during the early 1960s, while contemplating a new, moderate-sized development in a wooded area outside the town of Bath. The developers realized the community's location had no access to a potable, public water supply; but also, its location was substantially distant from a municipal sewage plant and/or primary sewage trunk line. In both the water and sewer cases, CMA'S developers determined they would need to build their own facilities to support the community. For the water supply, they bored a well (eventually two wells), and they built a water distribution infrastructure (see article on Water in Spring 2020 newsletter).

For its sewer system, CMA's developers' only choice was to use one (or more) septic tanks, either installed on each individual property, or one large tank for the whole development. The community's staggered development plan precluded the latter. The practical choice was to require septic tanks on each individual property. Only one problem: A septic tank requires a septic drain field (a "leach field") on the property. However, that works ONLY when soil conditions permit. Unfortunately, most of the home sites did not "Perc" – the hard, rocky, shale-type soil does not rapidly absorb water deeply into the ground. Therefore, the developer installed a network of underground pipe connecting most CMA properties to a sewer processing system. This consists of a lagoon, wetland, and UV treatment.

Setting the Stage

In CMA's system, individual home's septic tanks serve as **Stage One** of a natural four-stage system to process raw sewage; thereby enabling CMA to satisfy federal and state pollution control requirements at a relatively low cost.

The lagoon operates as **Stage Two**, processing the septic tank effluent from each property by exposing the lagoon surface to the sun's ultraviolet radiation. It also oxygenates the water-borne bacteria and other biological contents. Oxygenation is a natural chemical process that can kill many types of bacteria.

In response to the EPA's and WV Department of Environmental Protection's (WV DEP) increasingly stringent requirements to limit nitrogen-bearing compounds in wastewater, CMA's developers later added a third natural wastewater treatment process. They constructed **Stage Three**, a purpose-built wetland adjacent to the sewage lagoon. The wetland is composed of a shallow network of permeable PVC pipes that slowly carry outflow of lagoon fluid through plants that are specially selected based on their ability to selectively remove nitrogen-bearing compounds through their root structure.

CMA's wastewater treatment process is completed in **Stage Four** with direct irradiation of the liquid outflow from the wetland with ultraviolet energy. CMA constructed a station that shines extremely bright UV lights onto clear glass tubes carrying the

liquid flowing from the wetland. As the outflow slowly passes by the ultraviolet lamps, the light kills any bacteria that may remain after passing through the previous stages.

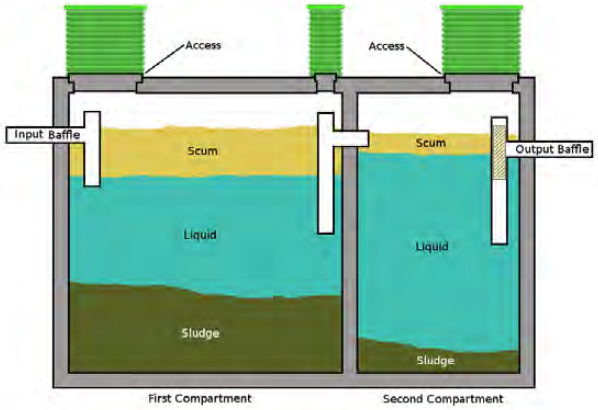
After CMA's four-stage wastewater treatment process is complete, the clean outflow is released into a tributary of Sir John's Run that flows through a corner of CMA's common property - near the intersection of Cold Run Valley Road and Herbert Quick Drive. Sir John's Run flows into the Potomac River near Hancock, Maryland.

Maintaining the System

Periodically, each element of the four-stage process requires maintenance to assure it is fully performing as it was designed. Because the four-stage process was designed to depend primarily on natural and biological processes (and not chemical processes), material costs are minimal. However, there are labor costs involved in maintaining this fragile system. For example, the lagoon requires periodic attention to prevent weeds from growing near or into its shallow waters; aging wetland distribution pipes need repair or replacement; and the ultraviolet station occasionally requires replacement bulbs or electrical components. It's important to note that CMA maintains multiple redundant subsystems to avoid issues if outages impact the sewage treatment system.

Our contractor, Warm Springs Public Service District, periodically inspects and maintains the infrastructure that performs Stages Two through Four, as described above with guidance and oversight by CMA's volunteer Sewer Chairperson. They ensure that the treatment system performs in accordance with the designer's specifications and meets or exceeds federal, state, and local requirements.

Perhaps more importantly, the WV DEP, working closely with EPA, requires periodic inspections of CMA's treatment system. It also requires that a laboratory test be regularly conducted to assure that water released by our sewer system is in full compliance with current standards, in order to maintain our license to operate. WV DEP regulators have the power to shut down CMA's system in the event that CMA is found to not be in compliance with current standards and guidelines.



An approximation of a dual tank septic system. Yours may be different.

Doing Your Part

In a healthy, well maintained septic tank, the effluent (liquid) material that flows into CMA's system is primarily composed of water. Heavy solids, fecal matter, food particles, and grease drop to the bottom and become part of the aggregated material (sludge) that accumulates at the bottom of the tank. Water-borne biologic materials are somewhat lighter and float to the top of the tank. A pipe, or baffle, in the first tank allows the effluent to flow to the second septic tank. There, additional solids settle out before the effluent enters CMA's treatment system.

When the septic tank is not regularly pumped out by a licensed professional septic cleaning firm, the tank may begin to release accumulated solids into CMA's system, through the interconnected network of underground pipes and into the CMA sewage lagoon - creating a potential economic disaster for all of us. **Owners must take this responsibility very seriously; to ensure that their own septic tanks are professionally cleaned on a regular basis.** That's why CMA asks, "When did you last have your septic tanks serviced?"

So, the seafood that you order at your favorite restaurant this weekend likely grew up as a teenager in the Chesapeake Bay in waters that perhaps came from your property here in Berkeley Springs, West Virginia. It's a small world.

Coming Up Next

The next article of the CMA's Water and Sewer series will discuss when to have your septic tank pumped, and what you can do to keep your septic tank healthy – including what NOT to put down your drains.