Washington State Department of HEALTH | LOSS Large On-site Sewage Systems

# Fact Sheet

# Understanding Flow Data for Large On-site Sewage Systems (LOSS)

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The Department of Health LOSS Program devotes a lot of effort to educating owners, operators, and managers on the requirements of operating their LOSS and helping them address problems. One straight forward metric for tracking system health and performance is Flow Data. Accurately measured and recorded Average Daily Flow data can provide valuable insights for your system, such as:

1. Determining if your drainfield or other sewage system components are being overloaded.
2. Indicating if your system has Inflow and Infiltration issues (I&I).
3. Indicating if your system has stuck or leaking fixtures.
4. Providing historical data that can be used to inform repairs and modifications.

However, Average Daily Flow data alone usually cannot establish whether you are exceeding your Design Flow, or if your system is violating your permit.

## Peak Design Capacity and Average (Operating) Flow

The Peak Daily Flow, often referred to as the Design Flow, is the maximum amount of sewage your LOSS can treat during a 24-hour period. It includes what you might expect on holidays, weekends, or other days where the LOSS sees its highest possible usage. The Peak Daily Flow is used by engineers to size LOSS components, including sewage tanks and drainfields, and it is also used as the basis of LOSS permit limits

The Average Daily Flow, also called the Operating Flow, is the amount of sewage your LOSS does treat during a 24-hour period. While the Peak Daily Flow is the maximum sewage your LOSS can treat, the Average Daily Flow is the amount of sewage that is actually treated by your LOSS on a daily basis.

The Average Daily Flow is determined by monitoring your LOSS's discharge to the drainfield over the course of a month. You are required to report your Average Daily Flow for each

month of the year when renewing your LOSS permit. This Average Daily Flow is used to determine a LOSS's compliance of the limits in your Operating Permit.

When determining if a system is in compliance with their permit limits, it is important to keep in mind the difference between Peak Daily Flow and Average Daily Flow.

The Peak Daily Flow represents a 24-hour maximum, while the Average Daily Flow represents a monthly average and does not account for peak times like weekends and holidays.

To determine if a LOSS may have exceeded their peak flow, a "peaking factor" is applied to the Average Daily Flow. Peaking factors range from 1.3 to 2.3, depending on facility usage and how the LOSS was designed. Peaking factors are proposed by your LOSS engineer and may be based on data from other similar LOSS systems, or from established engineering practices. The peaking factor can also be applied to the Peak Design Capacity to determine the Operating Capacity.

If no specific peaking factor is known, the department accepts a peaking factor of 1.43 to estimate Peak Daily Flow using Average Daily Flow. A peaking factor of 1.43 means a system's Average Daily Flow should stay below 70% of the system's Peak Daily Flow.

When LOSS engineers review the reported flows, they will apply the peaking factor to the flows before comparing to the Peak Design Capacity.

If a LOSS engineer determines that a LOSS might have exceeded their permit limits, the engineer, depending on the severity of the exceedance, may require compliance related actions to further investigate potential issues or to remediate known issues.

## Annual Reports

State law requires LOSS systems to obtain and renew an annual operating permit. The operating permit has standard permit requirements, which are applied to all permits. The operating permit might also have system specific permit conditions or effluent monitoring requirements.

To renew your operating permit, you are required to turn in an Annual Report. These reports detail yearly maintenance activities and monthly Average Daily Flows.

Accurate measurements and record keeping practices allow LOSS engineers to evaluate system performance based on the Annual Report. The Average Daily Flows are compared to the system's Design Flow and Operating Capacity. While a Peak Daily Flow should not exceed the system's Design Flow, the Average Daily Flow should not exceed 70% of the Design.

## Overloading

When the Peak Daily Flow going to the drainfield exceeds the Design Flow, you are violating your permit. When Average Daily Flow exceeds the Operating Capacity of your system, your system is being overloaded and may also be considered a violation of your permit.

Overloading can occur due to hydraulic overloading (too much flow) or organic overloading (not enough treatment) and can result in system failure. The most common type of failure is surfacing sewage in the drainfield. This occurs when the drainfield receives too much organic matter and a thick biomat forms along the bottom of the trench. A biomat is a black,

jelly-like layer of bacteria, organic matter, and residual solids that plugs up the soil and prevents effluent from trickling through. Other types of overloading failure include tanks overflowing and treatment units underperforming.

Failure to fully treat sewage can leave dangerous viruses and bacteria in the effluent. The fate of all sewage from onsite treatment systems is to eventually enter groundwater sources.

To protect our aquifers and drinking water sources, we must ensure sewage receives appropriate treatment.

## Inflow & Infiltration

When reported flows are seasonally high, specifically during heavy rain events, it may indicate inflow & infiltration (I&I). **Inflow** occurs when water on the surface is able to flow into Onsite Sewage System (OSS) components. The most common location for this to occur is in septic tank risers and lids. When risers and lids are not watertight, rainwater can flow across the ground and into the tank. **Infiltration** occurs when groundwater enters OSS components through leaks in the infrastructure. The most common location for infiltration to occur is at pipe joints and tank inlets and outlets.

A small amount of I&I is to be expected. It is common to see flows increase a small amount during winter months. I&I becomes an issue when those increases start to hydraulically overload your onsite sewage system. Even though the extra water is “clean”, the additional volume reduces your system’s ability to treat and remove contaminants from the sewage.

The problems from I&I are most evident in the septic tank. Where higher flows reduce the amount of solids removed from wastewater. I&I can also damage your drainfield, resulting in wastewater surfacing because the wastewater cannot move through the soil fast enough. Or causing diluted wastewater to move through your drainfield too quickly, reducing the in-ground treatment received.

To address I&I, you must first identify where it is occurring. This is generally done visually. During high rainfall events physically check all your tanks and components for “clean” water flowing into the system beyond what you would normally expect.

Using a camera to inspect conveyance lines and pipes is also a great way to visually identify places where I&I might be occurring. Smoke testing and other methods may also be used to help identify trouble areas like leaking manholes or cleanouts.

## Stuck or Leaking Fixtures

Sometimes you may notice a sudden peak, or gradual increase in flow during times where you wouldn’t expect I&I. These flow increases can often be attributed to stuck or leaking fixtures inside a home or buildings connected to your LOSS. If you notice an odd spike or increase in flows, checking toilets and faucets is a good place to start.

## Quality Data

It is important to track flows as accurately as possible. Different methods can be used, and they each provide a different level of reliability. Where feasible, DOH recommends a wastewater flow meter to directly measure flow sent to your drainfield.

A pump run-time meter can be used to calculate flows in a fairly accurate way. Siphon counters and pump event counters can be used to calculate flow but are less accurate.

If no method is available to measure wastewater flow, you can use water bills reading to estimate flow. However, because not all water used is then discharged to the LOSS, water bills generally overestimate total flow sent to the drainfield. Additionally, there is no indication if I&I is an issue when using a water bill to estimate wastewater flows.

The frequency of measurement also plays a factor in quality data. DOH requires monthly recording of flows to be reported on your Annual Report. This is frequent enough to establish the average flow of your LOSS, but not peak daily flow. When you are troubleshooting your LOSS, more frequent monitoring may be a great way to investigate various issues.

## My LOSS flows are below 3,500 GPD. Can I transfer out of the LOSS Program?

The LOSS program regulates OSS with Design Flow of 3,500 gallons per day (gpd), up to 100,000 gpd. Local health jurisdictions (LHJ), regulate OSS with Design Flow less than 3,500 gpd. In some cases, a LOSS owner may request transition to an OSS because the system flows are very low. This may be allowed, however there are a few important things to consider.

As mentioned above, the flows required for your Annual Report are **Average Daily Flow**, monthly flow reading are all that is necessary for reporting. However, your LOSS Permitted Flow is the Peak Daily Flow which is not captured in monthly readings.

To convert Average to Peak Daily Flow, a peaking factor of 1.43 is applied to Average Daily Flow readings. If your average daily flow is above 2,447 gpd, your Peak Daily (Permitted) flow will be above 3,500 gpd.

You may propose taking more frequent flow measurements. To better capture actual peak flows, please consult with the LOSS program to establish an appropriate flow monitoring regiment to capture your system's actual Peak Daily Flow before starting to collect the data.

There are a few requirements before transferring from the LOSS program to an LHJ OSS:

- Two years of flow data showing Peak Daily Flows below 3,500 gpd (or Average Flow below 2,447 gpd)
- Occupancy rates to determine if the LOSS is being used at capacity or not.
- No outstanding LOSS Permit Conditions.
- LHJ you will be transferring to must be willing to accept you as a permittee.

**IT IS IMPORTANT TO NOTE:** if you do transfer out of the LOSS program, and then later decide to expand your system to Design Flow above 3,500 gpd, you must re-apply for a LOSS permit, and you will be required to bring all components up to current LOSS standards.

If you are interested in transferring out of the LOSS program, please contact us to begin the process.

**EXAMPLE**: LOSS A, a residential development with 12 homes, would like to transfer to the Clallam County OSS program because they believe their flows are low enough and they have no plans to expand.

Flow measurements have been taken monthly for the past 3 years with summertime flows reaching about 3,100 gpd.

Occupancy data shows that 7 of the 12 homes are occupied year-round, and 5 homes are occupied on weekends. 1 home has been unoccupied and on the market for the past 6 months.

LOSS A has provided records going back 3 years, which is sufficient. Because the flows are recorded monthly, we must apply a safety factor to estimate peak daily flows. Using a 1.43 Safety Factor, we can estimate the Peak Daily Flow to reach 4,428 gpd.

Because occupancy of the development is less than 100%, we could reasonably assume there is good potential for flows to increase even more should the vacant house be sold or weekend residents convert to full-time residents.

**LOSS A would not be allowed to transfer out of the LOSS program.** Based on the data available, it can be expected that the LOSS does exceed 3,500 gpd on a regular basis. We can also expect that flows would increase in the near future should residents' use patterns also change.

Information and Guidance can be found on our website: www.doh.wa.gov/LOSS

Contact us at (360) 236-3330 or by email at wastewatermgmt@doh.wa.gov.