Nevada Division of Environmental Protection
Bureau of Water Pollution Control

PRETREATMENT & THE SMALL POTW

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This guidance document provides general pretreatment information for the operator of a small POTW (≤ 5 MGD design capacity) that is not required to maintain a formal pretreatment program. Managing an industrial (high-strength) flow is critical to the proper operation of a POTW to avoid upset or violation of a Water Pollution Control permit. In Nevada, industrial pretreatment is administered by the U.S. EPA. Final regulations for the Pretreatment Program are contained in 40 CFR Part 403.

a) Significant Industrial Users: Regardless of design capacity, a POTW is required to maintain a pretreatment program when receiving process wastewater discharged from a Significant Industrial User (SIU). An Industrial User (IU) is deemed significant for any of the following four criteria:

   a) Subject to a pretreatment standard;
   b) Flow ≥ 25,000 GPD (process wastewater);
   c) Flow ≥ 5% of the POTW's average daily dry weather flow;
   d) The Control Authority has determined the IU has the reasonable potential to affect the POTW's operation or violate a pretreatment standard or requirement.

b) Prohibited Discharges: In general, the following eight categories of discharge are prohibited from any Industrial User (IU):

   a) Flammable or explosive;
   b) Corrosive (pH < 5 S.U.);
   c) Obstructing flow in a sewer or POTW;
   d) Interfering with the POTW's operation;
   e) High temperature (> 104°F) upsetting the POTW's biology;
   f) Petroleum, cutting, or mineral oil causing interference or pass through;
   g) Releasing a toxic gas, vapor, or fume and endangering worker or public safety;
   h) Trucked or hauled-in wastes except at POTW-designated receiving points.

3. Illegal Dumping: Illegal dumping in Nevada, including an unauthorized discharge to a POTW, shall be reported to the Division's Spill Reporting Hotline at 888-331-6337 or 775-687-9485.

4. Priority Pollutants: 40 CFR Part 423 lists the 126 chemical pollutants for which an analytical test method has been developed. Included in this list are pollutants such as volatile organic compounds (VOCs), pesticides, heavy metals, and chlorinated compounds. A wastewater analysis of these pollutants by a certified analytical lab can indicate the presence or absence of industrial-strength waste in the collection system. When industry is serviced by the POTW, the Water Pollution Control permit conditions will include a sampling and reporting requirement for the list of priority pollutants or subset (e.g., VOCs, metals).

5. Wastewater Strength: Normal-strength domestic wastewater is about 250 mg/l (BOD_5), 250 mg/l (TSS), 50 mg/l (FOG), 35 mg/l (Total Nitrogen as N), 7 mg/l (Total Phosphorus as P); 6 to 9 Standard Units (pH), and 110 GPCD (Flow). Typically, small POTWs can treat BOD_5 strength of up to 350 mg/l at design flow without much upset. Further overloading may cause plant odor (e.g., insufficient oxygen level in treatment basins) and potential effluent violation. In a small POTW, controlling unconsumed food waste disposal (e.g., kitchen grinders) can reduce organic overloading. If not properly controlled, overloading may eventually require a POTW to implement a design capacity expansion.

6. Flow: High residential flows can be addressed with a public education effort (e.g., water conservation), individual flow metering, and low-flow plumbing fixtures. Alternate, permitted disposal methods for industrial wastewater includes lined evaporation ponds or if the wastewater is clean and non-contact, beneficial reuse, e.g., irrigation or dust control. The Water Pollution Control permit (i.e., Flow Rate Notification section) will include a threshold flow limit condition, which requires written notification to the Division prior to exceeding the design treatment (flow) capacity.

7. Grease (FOG): A leading contributor to sanitary sewer overflow (SSO) is FOG buildup. The Nevada Administrative Code (NAC 446.430) requires grease interceptors in food establishments, which generate grease. Also, new installation of grease traps is prohibited. Sewer ordinances generally limit FOG from any connection to $\leq$ 300 mg/l. Used cooking oil should never be poured down any drain and would be better managed with a collection program where the used cooking oil is recycled into products such as animal feeds, cosmetics or fuel (biodiesel). POTWs equipped with anaerobic digesters can treat grease (FOG) in the digester and make methane gas to reduce the demand on aerobic treatment basins, which could experience poor settling and foaming from excess bacterial filament growth arising from wastewater with excess grease content. The Division also issues individual permits to land application sites (forage crops), which mix interceptor grease waste with septage at a maximum blending ratio of 1:3, i.e., 1 part of interceptor grease to 3 parts of septage (by volume).

8. Commercial Additives: The Division does not recommend or endorse any commercial additive for an interceptor or septic tank used as a substitute for regular inspection and service (pumping). Interceptor additives may emulsify grease in an

interceptor causing downstream deposition and blockage. Similarly, an improperly maintained septic system may cause sewer backup, absorption field failure, and groundwater pollution.

9. Infiltration & Inflow: When industry is absent, high flow (and low influent BOD_5) may be due to infiltration and/or inflow (I/I). Infiltration is groundwater entering the collection system through indirect connections such as cracks, leaks or other sewer pipe or joint defects. Inflow is stormwater or groundwater entering the collection system through direct connections including manholes, roof drains (downspouts), dewatering (sump pumps), or runoff. I/I reduction involves collection system modification, repair, or replacement. The Division does issue separate discharge permits to facilities for the alternative discharge of clean, non-contact dewatering (e.g., clean dewatering effluent discharged into a storm sewer).

10. Grit: Grit can either be organic (e.g., egg shells, coffee grounds) or inorganic (i.e., silt, sediment) in origin. Grit accumulation in a sewer may reduce its flow carrying capacity and abrade mechanical equipment at the POTW. Storm flow diversion channels and the sealing of manhole covers in the collection system low spots reduce sediment inflow. Grit is removed at the POTW with gravity and vortex (centrifugal) flow separators.

11. Petroleum Hydrocarbons: TPH is the range of gas, diesel, and oil range carbon compounds (e.g., $C_6 - C_{40}$) produced from crude oil. For an oil-removal treatment works, the Division's most stringent discharge standard is 1.0 mg/l. Petroleum discharged into a POTW can be flammable, interfere with treatment, and pass through causing aesthetic standard violation (surface sheen). Pretreatment of petroleum and other waste oil is best handled at its origin (pollution prevention). Pretreatment techniques include oil-water separation, dissolved air floatation, air stripping, absorbent materials, adsorption (e.g., activated carbon), and enzyme-assisted activated sludge processes. If the POTW ordinance allows TPH in the influent, the treatment process must be designed to treat this pollutant without interference or pass through and be able to demonstrate removal of TPH to comply with the 1.0 mg/l discharge limit.

12. Ethylene Glycol: Like petroleum, ethylene glycol (antifreeze) is best handled by source segregation at its origin (pollution prevention). Besides antifreeze, automotive fluid recycling centers handle related maintenance fluids including used oil, transmission and brake fluids, and lubricant grease. Presently, neither the Division nor the EPA has enacted a Maximum Contaminant Level for ethylene glycol. Antifreeze is deemed moderately toxic upon ingestion. Discharge to a POTW of ethylene glycol is prohibited if upset or pass through occurs. Ethylene glycol is water soluble so the operator's detection of this pollutant without lab or test kit analysis would be by its slight sweet odor or visual detection of a fluorescent dye (e.g., antifreeze used in an automotive radiator). Ethylene glycol test kits are commercially available for a quick (i.e., "ballpark") analysis. A certified lab can provide a more accurate (but longer turnaround time) analysis of ethylene glycol.

13. Corrosives: Aerobic biological wastewater treatment processes generally operate in the near-neutral pH range (6 to 9 S.U.). Pretreatment of corrosive wastewater is by chemical neutralization with an acid or base. A useful and inexpensive analytical tool for the small POTW is a pH meter to check for trends and minimize upset.

14. Metals: Heavy metals (e.g., cadmium, lead, silver) can interfere with POTW and aquatic biology and accumulate in biosolids (sludge). Pretreatment includes chemical precipitation, adsorption, and ion exchange. An indication of illicit metal discharge may include receipt of septic, black (toxic) influent and a sudden pH swing. Reference limits (i.e., Nevada's drinking water standards) for metals and other inorganic parameters are found in the NDEP Profile I List (see References).

15. Septage: The liquid and solid waste pumped from septic tanks is referred to as septage (licensed septage haulers in Nevada placard their trucks "sewage sludge"). The waste hauler's load may also include portable toilet fluids, waste activated sludge, and interceptor grease. Septage is much stronger than domestic wastewater, e.g., 4,500 mg/l (BOD_5); 15,000 mg/l (TSS); and 700 mg/l (TKN). If septage is treated, preliminary treatment (screening and grit removal) and sufficient aeration demand must be considered. In facultative ponds, available capacity must be considered if septage is treated due to its high strength, e.g., typical ratio of septage to domestic wastewater strength of 20:1. When treating portable toilet fluids, be aware of the presence of chemical additives (e.g., deodorants), which may inhibit biology at higher treatment levels. The Division allows alternative disposal of septage, chemical toilet fluids, and interceptor waste at individually permitted land application sites (forage crops) or lined drying beds (landfills).

16. Brine: Salt brine is generated from ion exchange (IX), reverse osmosis (RO), process blow-down (e.g., cooling towers), and water softeners. Salt buildup accelerates metallic corrosion, inhibits biology at high level, and can cause effluent TDS violation. Irrigation use (reclaimed water) is reduced when salt-sensitive landscape is planted. Pretreatment includes individually permitted lined evaporation ponds or dust control.

17. Drinking Water Plants: Wastewater from these plants includes backwash, sludge, and purge. Chlorine removal is required for any surface discharge to avoid fish kill. Pretreatment of backwash and sludge includes settling and solids dewatering. Alternate discharge of drinking water treatment plant wastewater includes individually permitted lined evaporation ponds or drying beds.

18. Solid Waste: Except for toilet paper, much of the trash discharged into the collection system (e.g., butts, rags, tissue paper, food wrappers, personal sanitary items, etc.) is only minimally biodegradable or non-biodegradable and may interfere with flow. The POTW addresses trash with preliminary treatment (e.g., screens). The lagoon (pond) operator should consider a bar screen (at a minimum) to reduce floating trash in the ponds, which interferes with algae growth and fouls mechanical equipment. If the POTW experiences high trash loading, a public education effort can be helpful.

19. Detergents: Excess detergent use can cause caking or precipitation in the sewer (powdered detergent), foaming, or inhibit biology (antibacterial compounds). Algae blooms can arise from detergent phosphate builders (softener). Discharge limits may require biological or chemical phosphorus removal. Effluent foam from Dissolved Organic Nitrogen (DON) may require water spray control at the outfall for aesthetic limits.

20. Household Waste: Expired (leftover) household products may be hazardous and any discharge into the POTW is to be prohibited in a sewer ordinance policy (e.g., solvents, paints, high-strength cleaners, or pesticides). This waste is best handled in a community curbside pick-up program or segregated waste bins located at the waste hauling transfer station or landfill.

21. Pharmaceuticals: Expired (leftover) pharmaceutical waste can interfere with POTW biology (e.g., antibiotics) or pass through the treatment works and accumulate in the receiving environment. This consumer waste is better handled as a secure household trash (childproof) or sent to a pharmaceutical waste recycling program. To prevent accidental ingestion by children, several resource sites have suggested crushing any leftover prescription pills and mixing in used cat litter prior to trash disposal.

22. Drug Labs: Illegal drug labs (e.g., methamphetamine) shall be promptly reported to the local law enforcement agency. When abandoned, operators of illegal drug labs have haphazardly discarded toxic, hazardous wastes including flammable solvents, corrosives (acids and caustics), reactive compounds, metallic salts, and contaminated plumbing fixtures in the process. Site remediation is to be handled by qualified professionals equipped with proper personal protective equipment (PPE). The Division has not yet published cleanup standards for drug lab effluent discharged from contaminated plumbing fixtures. The Division does recommend that any discharge of effluent into the municipal collection system or individual septic system be minimized to the maximum extent possible to avoid any interference, pass through, or further environmental harm. The U.S. EPA has recently published its own guidance document on voluntary drug lab cleanup standards and procedures (see References).

REFERENCES:

i. Introduction to the National Pretreatment Program, EPA-833-B-98-002 (1999).

ii. Voluntary Guidelines for Methamphetamine Laboratory Cleanup, EPA (2009), website: https://www.epa.gov/emergency-response/voluntary-guidelines-methamphetamine-and-fentanyl-laboratory-cleanup

iii. NDEP Profile I (2009), website: https://ndep.nv.gov/uploads/land-mining-regs-guidance-docs/20210824_NDEP_Profile1_List.pdf

iv. NDEP Spill Reporting, website: https://nevadaenvironmentalactivities.ndep.nv.gov/Spill/ReportForm.aspx

v. EPA Pretreatment Program, website: https://www.epa.gov/npdes/national-pretreatment-program

vi. EPA Priority Pollutants, website: https://www.epa.gov/eg/toxic-and-priority-pollutants-under-clean-water-act

vii. Wastewater Bacteria, Gerardi (2006).

viii. Wastewater Engineering Treatment & Reuse (4th ed.), Metcalf & Eddy (2003).

ix. Water and Wastewater Technology (5th ed.), Hammer & Hammer (2004).

List of Acronyms:

BOD_5	5-Day Biochemical Oxygen Demand
Division	Nevada Division of Environmental Protection
EPA	U.S. Environmental Protection Agency
FOG	Fats, Oil & Grease (vegetable & animal fats)
GPCD	Gallons per Capita per Day
I/I	Infiltration & Inflow
IU	Industrial User
IX	Ion Exchange
mg/l	Milligrams per Liter
MGD	Millions Gallons per Day
N	Nitrogen
NAC	Nevada Administrative Code
ppm	Parts per Million
pH	Potential of Hydrogen
P	Phosphorus
POTW	Publicly Owned Treatment Works
RO	Reverse Osmosis
SSO	Sanitary Sewer Overflow
SIU	Significant Industrial User
SU	Standard Unit
TDS	Total Dissolved Solids
TN	Total Nitrogen
TKN	Total Kjeldahl Nitrogen
TPH	Total Petroleum Hydrocarbons