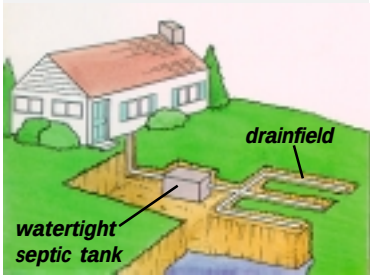
United States Environmental Protection Agency | Region 9 Ground Water Office (WTR-9) | EPA 909-F-04-007 JULY 2004

Tribal Management of Onsite Wastewater Treatment Systems

To protect public health and water quality, states and local governments across North America establish regulations for the safe and appropriate use of OWTS. OWTS can provide effective sewage treatment, if sited in suitable soils, and constructed and operated properly. This guidance document is intended to help tribal nations determine what level of management or tribal regulation will work best to ensure public health and protect the environment.

Onsite Wastewater Management Steps:

- Map
- Design
- Maintain
- Regulate



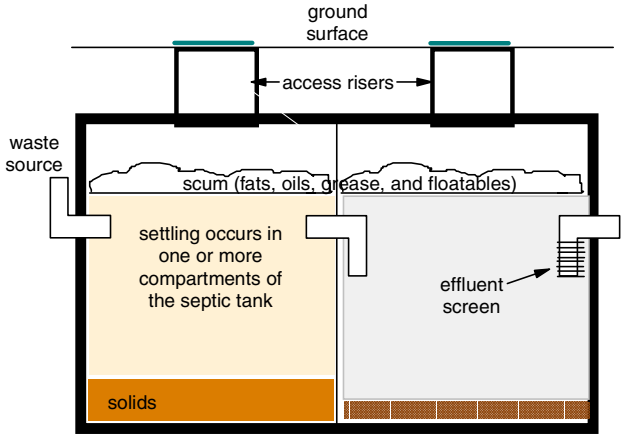
What is onsite wastewater treatment?

Any sewage treatment process that removes contaminants from wastewater at or near the point of generation, with dispersal of fluid nearby, is considered “onsite”, whether it serves a single-family residence, a restaurant, an office building or a major resort. The most common type of onsite wastewater treatment system is the septic system. Onsite wastewater treatment is also called decentralized wastewater treatment, to distinguish it from centralized treatment (at municipal sewage treatment plants.)

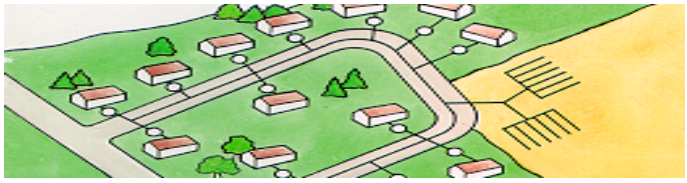
A typical septic system contains the two major components pictured at left: a water-tight septic tank and an absorption field, also known as a drain field or leachfield.

The purpose of the septic tank (see diagram below) is to separate solids from the liquid waste, and to promote breakdown of contaminants by microorganisms (bacteria) naturally present in wastewater. The wastewater breaks down into a layer of solids that sink, a liquid layer (which is mostly water) and a scum layer that floats. The septic tank slows and stabilizes the rate of flow to allow this decomposition. Septic tanks should be able to accomodate at least 2-3 days of average flow for adequate detention time. Solids and scum need to be removed by a professional septic tank pumper on a regular basis (approximately every 1 to 5 years, depending on the size of the tank and number of people using it). The liquid layer flows through the outlet of the septic tank to an absorption area.

As the liquid waste contacts air and microbes in the soil, treatment of pathogens can occur. Some of the liquid can evaporate, and some percolates down to the water table. In some areas where the depth to ground water is very great, seepage pits (which are sometimes mistaken for cesspools) are allowed to be used instead of a leachfield. In other areas where soils cannot provide adequate treatment, or do not drain at a rate that allows for treatment, additional treatment or dispersal technologies may be required. Many of these components, such as sand or peat filters, work by replacing what is missing from the soil environment.



Knowing the output of a conventional septic system in your local soils is the key to understanding how and if OWTS might pose a public health risk. The risk grows with the population. Increasing population density increases the contaminants, such as nitrogen, entering the environment through wastewater. What can a tribe do to manage these systems, while maximizing water use efficiency and ground water recharge, and minimizing risks to public health and the environment? The following pages provide an approach to this question.



Step 1: Map

The location of all the onsite wastewater treatment systems (OWTS) on the reservation should be mapped and kept in a permanent file. The file could also include global positioning system (GPS) coordinates, narrative descriptions relative to permanent structures, handwritten maps, etc. In order to easily locate septic tanks and drainfields, their physical location should be marked in the field with a note in the file regarding the type of marker (such as risers). In addition, the name and contact information of the residents and owners for all OWTS on the Reservation should be kept in the file.

Pursuant to the Underground Injection Control (UIC) regulations at 40 CFR §144.26, inventory forms are required to be completed by the owners of all community (or large capacity) OWTS that discharge subsurface. Additional information, or in some cases a permit, may also be required. A community, or large capacity, septic system is one that treats the sanitary waste of 20 or more people per day. Therefore, the number of users for each system should be counted to check for UIC applicability. Systems discharging to surface waters are subject to requirements of the Clean Water Act.

Federal Regulatory Terms
(40 CFR part 144.3)

Cesspool means a "drywell" that receives untreated sanitary waste containing human excreta, and which sometimes has an open bottom and/or perforated sides. **BANNED > 20 PERSONS**

Sanitary waste means liquid or solid wastes originating solely from human activities, such as wastes collected from toilets, showers, wash basins, sinks used for cleaning domestic areas, sinks used for food preparation, clothes or dish washing operations. Sources of these wastes may include single or multiple residences, hotels and motels, restaurants, bunkhouses, schools, ranger stations, crew quarters, guard stations, campgrounds, picnic grounds, day-use recreation areas, other commercial facilities, and industrial facilities provided the waste is **not mixed** with industrial waste.

Septic system means a "well" that is used to emplace sanitary waste below the surface and is typically comprised of a septic tank and subsurface fluid distribution system or disposal system.

Well means: A bored, drilled, or driven shaft whose depth is greater than the largest surface dimension; or, a dug hole whose depth is greater than the largest surface dimension; or, an improved sinkhole; or, a subsurface fluid distribution system.

The hydrogeologic conditions under all OWTS must be known in order to protect the reservation's ground water resources. Therefore, the seasonal ground water elevation, ground water flow direction, geologic layers, and the location of all drinking water wells around all OWTS should be inventoried. Knowing this information will help determine the likelihood of contaminants traveling from the soil surface (or drainfield area) to the next downgradient water body (surface or ground water.)

This step provides an excellent opportunity to educate the residents and owners about how OWTS work as well as what maintenance activities are needed on a regular basis.

Step 2: Design

The design of all new OWTS should be approved by an appropriate tribal environmental program prior to any construction. In addition, the design of all new large capacity OWTS should be reviewed by EPA (see contacts list on last page.) At a minimum, the design should account for soil characteristics (based on soil evaluation or percolation test and profile), ground water elevation and flow direction, expected wastewater flow (estimated from the number of users), septic tank volume, and absorption area and type of drainfield. For proper and efficient maintenance, large diameter risers should be installed on the septic tank access ports. These large diameter risers eliminate the need to locate and dig down to the septic tank access ports for each maintenance effort. Observation ports (usually 4 inch diameter PVC risers) should be present on the ends and/or corners of the drainfield lines to properly monitor the drainfield operation. No driving, parking, heavy foot traffic, or watering should be allowed on the drainfield.

OWTS design should be completed by a licensed professional following an approved set of design standards. To reduce the workload required for this effort, the nearest State or County OWTS design standards (which take the local hydrogeologic conditions into account) might be considered for adoption until tribal standards are developed.

Step 3: Maintain

To ensure proper wastewater treatment and ground water protection, an operation and maintenance schedule for each OWTS should be established and followed. All operators should be properly trained in order to properly carry out the maintenance schedule. (See

Training providers box, page 4.) The maintenance schedule should include:

a. Regular monitoring of the sludge and scum layers in all chambers of the septic tank. The septic tank should be pumped when the thickness of the sludge layer and the scum layer exceeds 1/3 of the septic tank's total height. Failure to pump a septic system will result in solids flowing out to the drainfield, which will clog the soil pores and cause drainfield failure. The cost of pumping a septic tank on a regular basis is small relative to the cost of replacing a drainfield.

b. Monitoring the condition of the drainfield for standing water on the soil surface, standing water in the observation ports, erosion, and areas of massive plant growth. Massive plant growth is an indicator of: 1) leaks (if massive plant growth is only in one small area of the drainfield) and/or 2) subsurface mounding of septic tank effluent resulting from an undersized or clogged drainfield (if the massive plant growth is throughout the drainfield or in the area of lowest elevation).

Also, automobiles and other heavy equipment should be prevented from driving and/or parking on the drainfield.

All maintenance activities performed on OWTS should be kept on record. This record is suggested to be a notebook that includes: OWTS construction drawings ("as-builts") and design capacities, standard worksheets which are filled in and signed and dated by the owner/operator(s) as maintenance occurs, analytical test results, pumping company statements, and summaries of any problems and how they were resolved. The date the drainfields are switched (if alternating drainfields are utilized for an OWTS) should also be included in the maintenance schedule and documented in the record.

Whether the tribe, the system owner, or a third party is responsible for maintenance, the system will not function if the system owner does not know that the OWTS is there. Workshops, radio announcements, or messages in water bills are some of the ways the tribe might inform system owners of OWTS operation. At a meeting several years ago, someone suggested linking OWTS management fees to cable television service fees as one means of insuring system owner compliance.

Step 4: Regulate

Developing and incorporating the OWTS Management Guidelines into ordinances is the final, and perhaps the most important step in protecting the tribe's drinking water aquifers from sewage contamination. This step will establish a uniform standard for OWTS management throughout the reservation. Without establishing ordinances, efforts invested in developing an OWTS management program can be lost over time as leadership changes. Sustainable growth and a healthy population depends on clean water supplies.

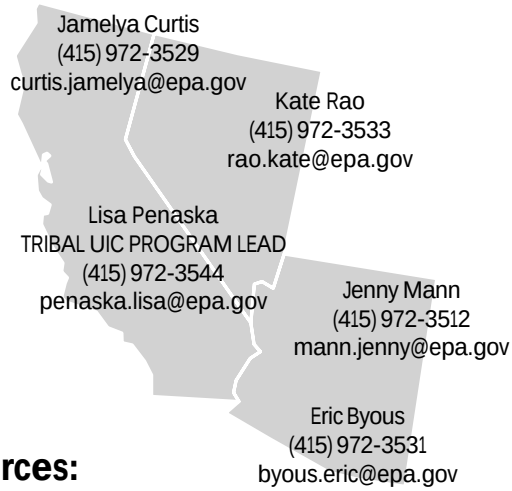
If you decide to establish an OWTS management program, funding to support your effort may be available through EPA or through the USDA Rural Utilities Service in the form of loans or grants.

More detailed information can be found in the *Voluntary National Guidelines for Management of Onsite and Clustered (Decentralized) Wastewater Treatment Systems,* with examples in a separate management handbook. These documents and others, including homeowner educational materials can be downloaded from www.epa.gov/owm/mtb/decent/index.htm.

CENTRALIZED OR DECENTRALIZED TREATMENT?

CENTRALIZED	**DECENTRALIZED**
benefits:	**benefits:**
Stabilized waste stream and high volume treated effluent available for reuse	Onsite recharge/reuse
Centralized maintenance and operation	Lower capital costs o long-distance pipelines
Treatment upgrades to address "new" contaminants are also centralized	***Considerations:***
Considerations:	*Need to maintain access for O&M*
Higher capital costs	*Soil and aquifer characteristics, housing density may change over time, decreasing peformance*
Bigger risk from spill or leaks	*Advanced treatment and monitoring can be costly*
Users still need to connect	

EPA Region 9, Ground Water Office Contacts for Tribes



More EPA resources:

EPA onsite wastewater page:
http://cfpub.epa.gov/owm/septic/home.cfm
Homeowner maintenance checklist:
www.epa.gov/owm/septic/pubs/septic_sticker.pdf
Large capacity septic (UIC) inventory form:
www.epa.gov/safewater/uic/pdfs/7520-16.pdf

TRIBAL WASTEWATER EVALUATION: available for tribes within EPA Region 9 (see map) , or through our partnership with the Rural Community Assistance Corporation, (760) 492-2543.

Other Training Options

Technical information about onsite wastewater treatment options is available free or at low cost from the **National Small Flows Clearinghouse,** (800) 624-8301 Eastern Standard Time, www.nsfc.wvu.edu. Training is available from several sources, such as any of the training centers listed:

SELF STUDY: California State University, Office of Water Programs correspondence training, CSU-Sacramento, (916) 278-6142, www.owp.csus.edu/wastewater.htm

FIELD EDUCATION: California Wastewater Training and Research Center, CSU-Chico, (530) 898-6027, www.csuchico.edu/cwtrc

Northern Arizona University Onsite Wastewater Demonstration Facility, NAU-Flagstaff, (520) 523-4330, www.cet.nau.edu/wdp/

University of Arizona Extension, Yuma Ag. Center (520) 782-3836, http://ag.arizona.edu/waterquality/OWTFPage.htm

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$ A healthy, well-maintained and appropriately sized septic tank will generally require less pumping over its service life, saving time and money.