FACT SHEET

Primary Treatment in Decentralized Wastewater Systems: Program Points

WERF
Water Environment Research Foundation
Collaboration. Innovation. Results.

Why Are Primary Treatment Units Important and What Must Be Considered?

The overall function of onsite wastewater systems, and ultimately the protection of environmental and public health, depends on specific processes occurring consistently and with operational efficiency. The septic tank and/or grease trap components effectively:

- Separate digestible solids materials from floatable materials in the wastewater influent stream and temporarily store solids for a sufficient amount of time to allow biological processes to occur.
- Digest or biologically transform accumulated materials resulting in some pollutant removal but most importantly a higher quality effluent in advance of secondary treatment.
- Grease traps cool influent wastewater enabling separation of fats, oils, and grease which are removed from the system.

Better design and use decisions can be facilitated by information exchange about what ***is known*** including:

- Hydraulics (residence time, low dispersion), surface area, and compartmentation are three design elements known to impact performance
- Sizing of septic tanks influences performance, with larger units generally being more effective digesters needing less frequent pumping
- Climate and associated temperatures influence biological digestion processes and solids removal practices

PROGRAM POINT

Properly designed and operated onsite wastewater systems, dependent on properly functioning primary treatment units (septic tanks and grease traps), are critical to the protection of ecosystems and public health.

Did You Know?

- Onsite wastewater treatment systems (septic systems) serve approximately ***23%*** of an estimated ***115 million*** occupied homes in the United States. The majority of these systems utilize a ***septic tank*** which is sometimes preceded by a ***grease trap*** for primary treatment of the wastewater flow.
- The ***septic tank*** and ***grease trap*** are referred to as primary treatment units. They are extremely important to the overall performance of onsite wastewater systems serving to separate solids, temporarily store separated materials, and facilitate management of wastes via biological processes.
- Despite this functional importance, ***design and operational standards*** are typically ***highly prescriptive*** and based on limited and often dated scientific information. The design of septic tanks has evolved mostly as a function of ***construction convenience***, ***low cost***, and ***repetitive practice***.

Improvements in system and component performance requires better research and exchange of experiential knowledge concerning ***unknowns*** and ***new design considerations*** such as:

- Implications of changing water use and wastewater characteristics including graywater separation and the use of more household chemicals, pharmaceuticals and personal care products, and water softeners
- Most of the performance information available is specific to single residential (household) systems...how applicable are these designs and performance characteristics to residential clusters or commercial or industrial settings?
- Management of food service wastewater is a particular concern; very little has been done to optimize processes for the removal of oil and grease
- Effluent screening devices are believed to be a benefit to the systems' performance capability, yet little research has been compiled regarding their effectiveness

This fact sheet is intended for a broad class of policymakers with varying levels of technical expertise including public health, environmental protection, economics, growth and development, and others with broad interests related to decentralized wastewater systems.

WERF
Water Environment Research Foundation
Collaboration. Innovation. Results.

PROGRAM POINT

Advancing the science of decentralized wastewater treatment and the associated performance of primary treatment units is important to communities in the context of economic development and environmental and human health. This issue may factor into the economic viability of land development and growth in many locations. Appropriate investments in research, information exchange, and communication among stakeholders are important to decision-making and action at the federal, state, and local levels.

Thinking About Economics

Efforts to minimize investment costs in decentralized wastewater evaluations have resulted in research expenditures with marginal value towards improving overall design and performance. ***Dollars spent on good scientifically based and applied research in this area can result in economic benefits in terms of minimizing negative health implications, reducing system failures, promoting sustainable community growth and development, and creating markets for technological advancements in primary treatment.***

Commercially viable, paradigm-shifting designs have been difficult to develop due to higher initial costs for construction and associated deviations in design that often do not align with current standards or regulatory codes. This scenario precludes the evolution of new opportunities in business and product development that could be economically beneficial.

What About Information Exchange?

Information that is available in the decentralized wastewater arena could be better managed and distributed to diverse stakeholder groups. Some of the most potentially useful and applicable data—particularly field survey and monitoring data—exists in quantity but is not accessible in a practical way. An investment of resources into data management and information exchange is needed, particularly if the funds also provide states and extension services some level of assistance with collection, organization, and dissemination of monitoring data. In an effort to address quality assurance concerns, checks and balances for quality of information should be developed as part of this information exchange system.

Research Tools

The following resources are available at www.werf.org and www.ndwrcdp.org:

- Research Digest: Factors Affecting the Performance of Primary Treatment in Decentralized Wastewater Systems
- Bibliographic Database of Research and Data on Performance of Primary Treatment Units in Decentralized Wastewater Systems

PROGRAM POINTS

In addition to the information exchange and research requirements necessary for improved decision making, system performance can be enhanced by addressing issues concerning:

- *The lack of Quality Assurance and Quality Control (QA/QC) procedures for tank manufacturing and installation practices, particularly in relationship to watertightness and mitigation of leaks (an environmental health concern)*
- *Accounting for regional-specific and associated climatic influences in installation and design*
- *The relationship of system performance assessment practices to appropriate levels of health and safety risks with the goal of establishing standards and codes based on risk considerations and associated mitigation costs*

WERF Project 04-DEC-7
Principal Investigator
Victor D'Amato, PE, ARCADIS U.S., Inc.
Communications Consultant
Anita Bahe, Ph.D., Lynx Group International