

CHAPTER 1

INTRODUCTION

1.1 Background

Approximately 18 million housing units, or 25% of all housing units in the United States, dispose of their wastewater using onsite wastewater treatment and disposal systems. These systems include a variety of components and configurations, the most common being the septic tank/soil absorption system. The number of onsite systems is increasing, with about one-half million new systems being installed each year.

The first onsite treatment and disposal systems were constructed by homeowners themselves or by local entrepreneurs in accordance with design criteria furnished by federal or state health departments. Usually, a septic tank followed by a soil absorption field was installed. Trenches in the soil absorption system were dug wide enough to accommodate open-jointed drain tile laid directly on the exposed trench bottom. Some health departments suggested that deeper and wider trenches be used in "dense" soils and that the bottom of those trenches be covered with coarse aggregate before the drain tile was laid. The purposes of the aggregate were to provide a porous media through which the septic tank effluent could flow and to provide storage of the liquid until it could infiltrate into the surrounding soil.

It has been estimated that only 32% of the total land area in the United States has soils suitable for onsite systems which utilize the soil for final treatment and disposal of wastewater. In areas where there is pressure for development, onsite systems have often been installed on land that is not suitable for conventional soil absorption systems. Cases of contaminated wells attributed to inadequately treated septic tank effluent, and nutrient enrichment of lakes from near-shore development are examples of what may occur when a soil absorption system is installed in an area with unsuitable soil or geological conditions. Alarmed by the potential health hazards of improperly functioning systems, public health officials have continually sought methods to improve the design and performance of onsite systems.

Unfortunately, the great increases in population have exacerbated the problems associated with onsite systems. The luxury of vast amounts of land for homesites is gone; instead, denser housing in rural areas is more common.

In many areas, onsite systems have been plagued by poor public acceptance; feelings that those systems were second rate, temporary, or failure prone. This perspective contributed to poorly designed, poorly constructed, and inadequately maintained onsite systems.

Recently, the situation has begun to change. Federal, state, and local governments have refocused their attention on rural wastewater disposal and, more particularly, on wastewater systems affordable by the rural population. Onsite systems are now gaining desired recognition as a viable wastewater management alternative that can provide excellent, reliable service at a reasonable cost, while still preserving environmental quality. Federal and many state and local governments have initiated public education programs dealing with the technical and administrative aspects of onsite systems and other less costly wastewater handling alternatives for rural areas.

In this time of population movements to rural and semirural areas, high costs of centralized sewage collection and treatment, and new funding incentives for cost and energy saving technologies, those involved with rural wastewater management need more information on the planning, design, construction, and management of onsite systems. This process design manual provides primarily technical guidance on the design, construction, and maintenance of such systems.

1.2 Purpose

This document provides information on generic types of onsite wastewater treatment and disposal systems. It contains neither standards for those systems nor rules and regulations pertaining to onsite systems. The design information presented herein is intended as technical guidance reflective of sound, professional practice. The intended audience for the manual includes those involved in the design, construction, operation, maintenance, and regulation of onsite systems.

Technologies discussed in this manual were selected because of past operating experience and/or because of the availability of information and performance data on those processes. Because a particular wastewater handling option is not discussed in this manual does not mean that it is not acceptable. All available technologies should be considered when planning wastewater management systems for rural and suburban communities.

Groundwater and surface water pollution are major environmental considerations when onsite systems are used. All wastewater treatment and disposal systems must be designed, constructed, operated, and maintained

to prevent degradation of both groundwater and surface water quality. For onsite systems designed and constructed using Environmental Protection Agency funds, all applicable regulations must be complied with, including requirements for disposal to groundwaters (40 FR 6190, February 11, 1976).

This manual is only a guide. Before an onsite system is designed and constructed, appropriate local or state authorities should be contacted to determine the local design requirements for a particular system.

1.3 Scope

This manual includes:

1. A strategy for selecting an onsite system
2. A procedure for conducting a site evaluation
3. A summary of wastewater characteristics
4. A discussion of waste load modification
5. A presentation of generic onsite wastewater treatment methods
6. A presentation of generic onsite wastewater disposal methods
7. A discussion of appurtenances for onsite systems
8. An overview of residuals characteristics and treatment/disposal alternatives
9. A discussion of management of onsite systems

The emphasis of this manual is on systems for single dwellings and small clusters of up to 10 to 12 housing units. Additional factors must be considered for clusters of systems serving more than 10 to 12 housing units. A brief discussion of onsite systems for multi-home units and commercial/institutional establishments is also presented, when the system designs differ significantly from those for single dwellings.