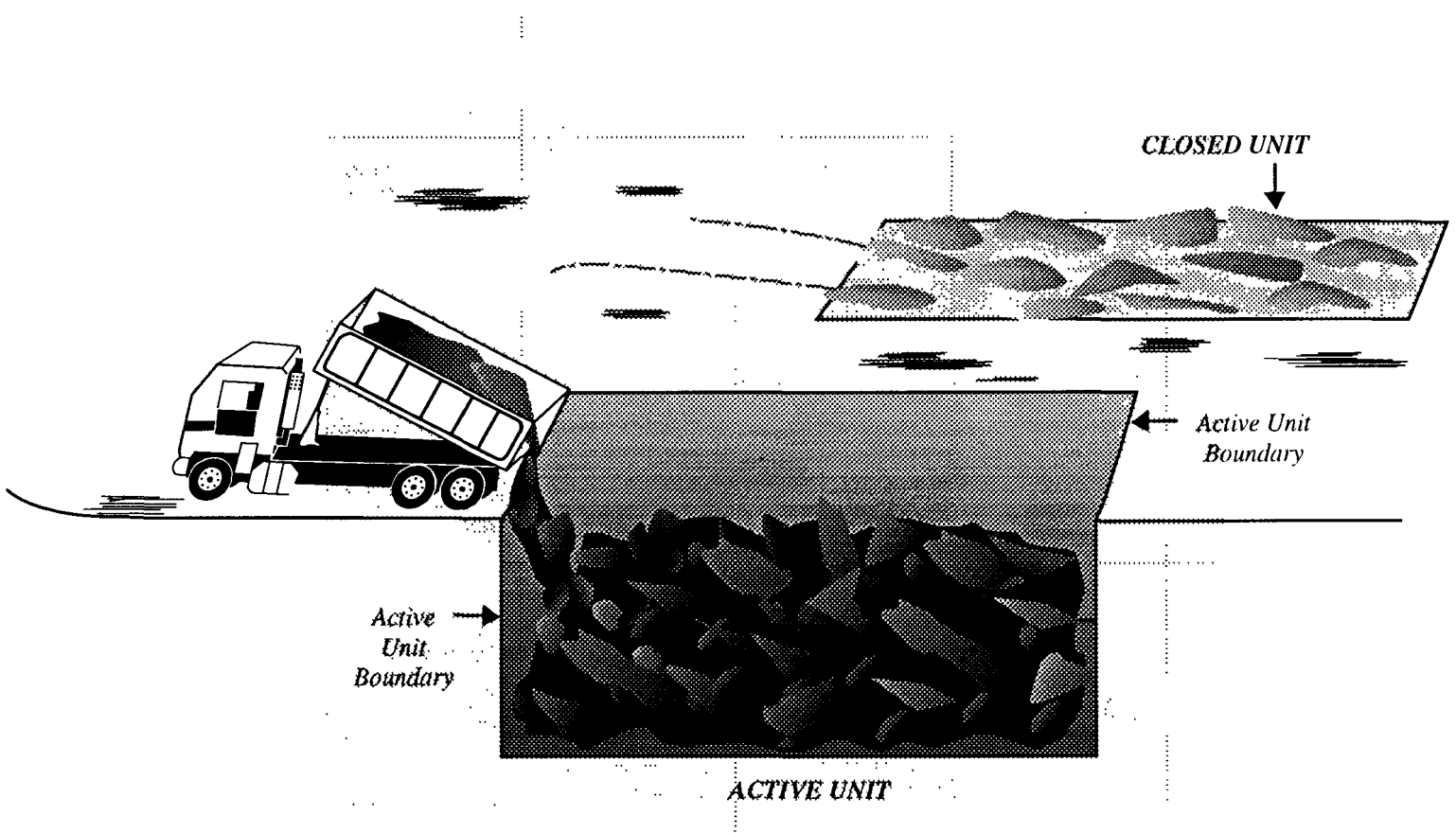




Surface Disposal of Sewage Sludge

A Guide for Owners/Operators
of Surface Disposal Facilities on
the Monitoring, Recordkeeping,
and Reporting Requirements of
the Federal Standards for the
Use or Disposal of Sewage
Sludge, 40 CFR Part 503



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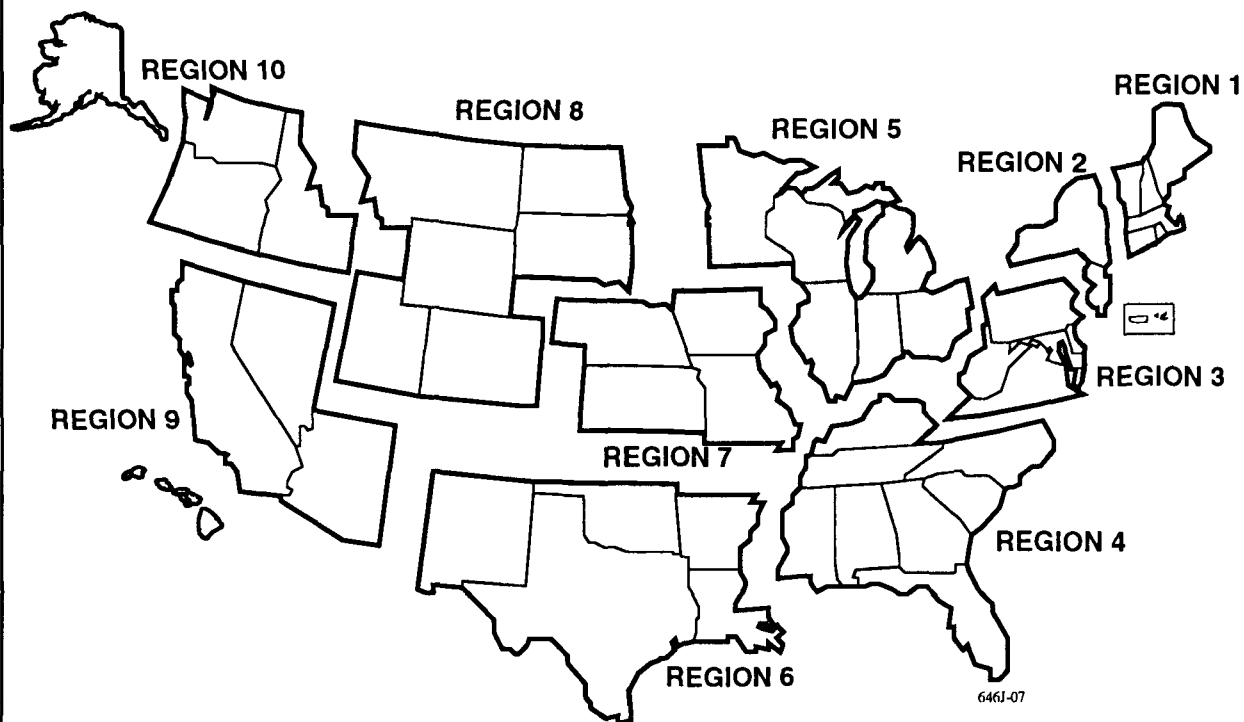
**SURFACE DISPOSAL OF
SEWAGE SLUDGE**

**A Guide for Owners of
Surface Disposal Facilities on the Monitoring,
Recordkeeping, and Notification Requirements in 40 CFR Part 503**

CONTACTS

General questions concerning the Standards for the Use and Disposal of Sewage Sludge should be directed to the EPA Regional Sludge Coordinator. The Sludge Coordinators can be reached on the following numbers:

- **Region 1** Boston, MA (617) 565-3569
- **Region 2** New York, NY (212) 264-8663
- **Region 3** Philadelphia, PA (215) 597-9406
- **Region 4** Atlanta, GA (404) 347-3012 x 2953
- **Region 5** Chicago, IL (312) 886-6112
- **Region 6** Dallas, TX (214) 655-7520
- **Region 7** Kansas City, KS (913) 551-7594
- **Region 8** Denver, CO (303) 293-1627
- **Region 9** San Francisco, CA (415) 744-1909
- **Region 10** Seattle, WA (206) 553-1941



Mail compliance reports required under the Standards for the Use and Disposal of Sewage Sludge to the Water Compliance Branch Chief in your EPA Region at the address listed on the back cover.

PREFACE

Under the authority of Section 405(d) of the Clean Water Act as amended, the U.S. Environmental Protection Agency (EPA) has promulgated, at 40 Code of Federal Regulations (CFR) Part 503, Phase I of the risk-based regulation that governs the final use or disposal of sewage sludge. The intent of this Federal program is to ensure that the use or disposal of sewage sludge occurs in a way that protects both public health and the environment. The Part 503 regulation establishes general requirements, pollutant limits, operational standards, and management practices, as well as frequency of monitoring, recordkeeping, and reporting requirements. These requirements apply to sewage sludge that is land applied, placed on a surface disposal site, or fired in a sewage sludge incinerator. In addition to the sewage sludge surface disposal sites, the regulation also covers sewage sludge that is co-disposed in a municipal solid waste landfill by requiring compliance with 40 CFR Part 258, the regulation that establishes requirements for municipal solid waste landfills. The following types of sewage sludge are not subject to Part 503:

- Sludge generated from treatment of industrial process waste at an industrial facility (40 CFR Part 257), if nonhazardous
- Sewage sludge generated at industrial facilities during the combined treatment of industrial wastewater and domestic sewage
- Hazardous sewage sludge (40 CFR Parts 261, 264, 265, 266, 267, and 268)
- Sewage sludge with a polychlorinated biphenyl concentration of 50 ppm or greater (40 CFR Part 761)
- Drinking water treatment sludge (40 CFR Part 257).

Part 503 imposes requirements on the following four groups:

- Persons who generate sewage sludge or derive a material from sewage sludge (i.e., person who prepares sewage sludge)
- Land applicators of sewage sludge

Preface

- Owners/operators of sewage sludge surface disposal sites
- Owners/operators of sewage sludge incinerators.

Part 503 is largely self-implementing—anyone engaged in activities covered by this regulation must comply with the appropriate requirements on or before the compliance deadlines (see the following exhibit), regardless of whether a permit has been issued. A person who violates Part 503 is subject to administrative, civil, and/or criminal enforcement actions.

Compliance Deadlines for 40 CFR Part 503

Requirement	Compliance Deadline
Monitoring, recordkeeping, and reporting requirements	July 20, 1993
All other requirements, including general requirements, pollutant limits, operational standards (i.e., pathogen reduction and vector attraction reduction), and management practices	February 19, 1994*

*If compliance requires construction of new pollution control facilities, the compliance deadline is extended to February 19, 1995. A new pollution facility is any building, structure, facility, or installation from which there is or may be a discharge of pollutants, the construction of which began after the promulgation of Part 503, and includes any building, structure, facility, or installation that replaces or substantially upgrades the process or production equipment necessary to meet a standard under this part. The definition of new pollution control facility does not include replacement of any building, structure, facility, or installation due to normal operational wear and tear or installation of monitoring equipment or devices, including the purchase of computer hardware or software for monitoring purposes.

EPA developed a series of guidance documents to explain the requirements of Part 503. A list of these documents is provided in the reference section at the end of this document. This document was developed for owners/operators of surface disposal sites. It provides detailed guidance on the monitoring, recordkeeping, and reporting requirements for surface disposal. This document is intended to assist owners/operators in complying with Part 503 by explaining requirements and providing examples of appropriate information.

Separate documents explaining the monitoring, recordkeeping, and reporting responsibilities of persons who prepare sewage sludge and persons who land apply sewage sludge are also available. The following documents may be obtained through the EPA Regional offices, listed on the back cover of this document:

- *Land Application of Sewage Sludge—A Guide for Land Appliers on the Requirements of the Federal Standards for the Use or Disposal of Sewage Sludge, 40 CFR Part 503 (EPA, 1993a).*
- *Preparing Sewage Sludge for Land Application and Surface Disposal—A Guide for Preparers on the Monitoring, Recordkeeping, and Reporting Requirements of the Federal Standards for the Use or Disposal of Sewage Sludge, 40 CFR Part 503 (EPA, 1993b).*

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1. SURFACE DISPOSAL

A surface disposal site is an area of land that contains one or more sewage sludge units. A sewage sludge unit is an area within the site where sewage sludge is placed for final disposal. Sewage sludge surface disposal sites include landfills or monofills used only for sewage sludge, piles of sewage sludge, disposal sites dedicated to sewage sludge, sewage sludge surface impoundments, or lagoons designed for the final disposal of sewage sludge.

Unlike land application, surface disposal involves placing sewage sludge on the land for final disposal, not for conditioning the soil or fertilizing crops. Surface disposal sites are not tied to agronomic rates; these rates are applicable to land application sites. Agronomic rate is defined as the whole sewage sludge application rate that provides the amount of nitrogen needed by the crop or vegetation grown on the land, and minimize the amount of nitrogen that passes below the root zone to the ground water.

Surface disposal facilities do not include land used for either treatment or storage of sewage sludge. Neither the land nor the sewage sludge placed on that land for treatment or storage is subject to the requirements of 40 CFR Part 503. Treatment of sewage sludge is the preparation of sewage sludge for final use or disposal. Storage of sewage sludge is the placement of sewage sludge on land for 2 years or less. Whenever sewage sludge remains on the land for longer than 2 years, the person who prepares the sewage sludge, rather than the owner/operator of the site (if the two parties are not the same), is responsible for demonstrating that the land is not an active sewage sludge unit; otherwise, the permitting authority could consider the area a surface disposal site.

Owners/operators of surface disposal sites are subject to a variety of requirements under Part 503. The purpose of this document is to assist owners/operators in complying with and documenting compliance with these requirements.

Owners/operators of all sewage sludge surface disposal sites (those with and those without liners and leachate collection systems) may be required to keep records of:

- Pollutant monitoring
- Management practices
- Vector attraction reduction
- General requirements.

There are no pollutant limits for sewage sludge placed on active sewage sludge units that have a functional liner and leachate collection system. A liner by definition is a soil or synthetic material with a hydraulic conductivity of 1×10^{-7} cm/sec or less. The liner serves as an impermeable barrier preventing the migration of leachate and pollutants from the active sewage sludge unit. Leachate forms as precipitation filters down through the unit and its contents, gathering nutrients and leachable pollutants, which eventually collect at the bottom. A leachate collection system is a device installed immediately above the liner, designed, constructed, and maintained to collect and remove leachate from an active sewage sludge unit. If a functional liner and leachate collection system exists, leachate is drawn off and disposed of, thereby effectively eliminating the risk of ground-water contamination.

In contrast, if no liner and leachate collection system exists, leachate continues to pool at the bottom of the active sewage sludge unit, posing the risk that it may seep into ground water and migrate beyond the property line of the disposal site over time. Active sewage sludge units that do not have an appropriate system to deal with leachate must therefore limit the concentrations of pollutants allowed to enter the unit. For units without liners and leachate collection systems, Part 503 contains limits for three pollutants: arsenic, chromium, and nickel. Because the risk of pollutant migration beyond the property line of the surface disposal site is greater the closer the active sewage sludge unit is to the property site line, Part 503 has established several sets of limits for the three regulated pollutants that are applied according to the distance of the unit boundary from the property line. The owner/operator must keep records of the pollutant concentrations in sewage sludge placed on the site when the active sewage sludge unit is less than 150 meters from the property line. The preparer is responsible for documenting compliance

with pollutant limits when the active sewage sludge unit is more than 150 meters from the property line.

The remainder of this document provides further details of the recordkeeping and reporting requirements for owners and operators of sewage sludge surface disposal sites. Chapter 2 addresses the requirements for active sewage sludge units with liners and leachate collection systems. Chapter 3 addresses the requirements for active sewage sludge units without liners and leachate collection systems. Chapter 3 also discusses requirements for pollutant monitoring since there are pollutant limits for sewage sludge that is placed on active sewage sludge units without liners and leachate collection systems.

2. ACTIVE SEWAGE SLUDGE UNITS WITH LINERS AND LEACHATE COLLECTION SYSTEMS

To be considered an active sewage sludge unit with a liner and leachate collection system, a unit must be equipped with a liner and leachate collection system that meets the following specifications. First, the hydraulic conductivity of the liner must be 1×10^{-7} cm/sec or less. Second, the leachate collection system must be installed immediately above the liner and must be designed, constructed, maintained, and operated to collect and remove leachate from the active sewage sludge unit. If the active sewage sludge unit is not equipped with a liner and leachate collection system that meets these specifications, the unit must meet pollutant limits and the associated requirements for an unlined unit, described in Chapter 3.

Part 503 does not impose pollutant limits on sewage sludge placed in a unit with a liner and leachate collection system. Units with liners and leachate collection systems, however, must still comply with the management practices and general requirements that encompass facility siting, design, and operation. Requirements for vector attraction reduction must also be met through one of several different alternatives. Requirements for pathogen reduction apply unless the active sewage sludge unit is covered at the end of each operating day.

Owners/operators of active sewage sludge units equipped with a liner and leachate collection system are required to keep records of management practices and applicable vector attraction reduction requirements. The records must be maintained for 5 years and be readily available to State and U.S. Environmental Protection Agency (EPA) inspectors. This chapter provides guidance to owners/operators on specific records that may be needed to fulfill the Part 503 recordkeeping and reporting requirements. The owners/operators should be aware that failure to keep adequate records is a violation of the Part 503 regulation and subject to penalty under the Clean Water Act (CWA).

2.1 Records of Management Practices

Owners/operators must ensure that the management practices (requirements for the siting, design and operation of active sewage sludge units to ensure protection of human health and the environment) are met at each active sewage sludge unit. In addition, compliance with these practices must be documented in detailed records and kept for a minimum of 5 years. Compliance with siting and design requirements must be documented only once. Compliance with the operating requirements must be recorded on a continual basis, the frequency of which depends on the specific requirements.

Some of the information gathered to support one management practice may overlap with the information required for others. For example, geotechnical investigations are required to demonstrate compliance with the requirements for three management practices: seismic impact zone, fault zones, and unstable areas. Geotechnical investigations, which are necessary for any construction project, evaluate foundation soils and bedrock and characterize the hydrogeology of a site. Maps or drawings should be obtained or produced as part of compliance with the management practices. A combination of commercially available and customized maps and plans can help demonstrate compliance. Appendix A lists organizations that supply maps.

Siting Requirements

To minimize potential risks to human health and the environment from the surface disposal of sewage sludge, surface disposal units must be placed in areas with the smallest potential for pollutant migration or damage to the environment. For example, if two potential sites are being considered for the location of a surface disposal site, one close to a wetland and superficial ground water and the other in an upland area well removed from sensitive habitat or superficial ground water, the second location would be preferable. These siting requirements address the following factors:

- Endangered species habitat
- Base flood (1 percent chance of occurring in any year)
- Seismic impact zones

- Fault zones
- Unstable areas
- Wetlands.

To comply with these restrictions, the owner/operator of the sewage sludge disposal site must document compliance with all siting requirements and maintain those records for five years.

Endangered or Threatened Species

Part 503 prohibits the placement of sewage sludge on an active sewage sludge unit if it is likely to adversely affect an endangered or threatened species or its designated critical habitat. Any direct or indirect action in a critical habitat that reduces the likelihood of survival and recovery of listed species can be considered adverse modification or destruction of a critical habitat. Critical habitat is any place where an endangered or threatened species lives and grows during any stage in its life cycle. The U.S. Department of Interior, Fish and Wildlife Service (FWS) publishes a list of endangered and threatened species at 50 CFR Part 17.11 and 17.12.

To comply with this management practice the owner/operator of a surface disposal site should consult with the FWS to determine whether any endangered species or critical habitats are present. The telephone number of the appropriate FWS field office can be obtained from the Regional FWS offices, provided in the following list.

- Region 1 (Portland) 503/231-6131 or 6151
CA, HI, ID, NV, OR, WA
- Region 2 (Albuquerque) 505/766-3972
AZ, NM, OK, TX
- Region 3 (Twin Cities) 612/725-3276
IL, IN, IA, MI, MN, MO, OH, WI
- Region 4 (Atlanta) 404/331-3580
AL, AR, FL, GA, KY, LA, MS, NC,
PR, SC, TN, VI
- Region 5 (Boston) 413/253-8627
CT, DE, ME, MD, MA, NH, NJ,
NY, PA, RI, VT, VA, WV

- Region 6 (Denver) 303/236-7398
CO, IA, KS, MT, NE, ND, SD, UT,
WY
- Region 7 (Anchorage) 907/786-3505
AK

The owner/operator should retain all documentation to demonstrate that the site was evaluated for potential effects on endangered or threatened species and/or their habitat and that necessary protective measures were identified and implemented. For example, this documentation should list endangered or threatened species in the area or document that none exists and briefly describe how the endangered or threatened species and its critical habitat are protected.

Usually, documentation will need to be performed only once. If the sewage sludge unit begins to pose a risk to endangered or threatened species, however, the owner/operator should contact the permitting authority or the FWS.

Base Flood Flow Restrictions

Part 503 prohibits an active sewage sludge unit from restricting the flow of a base flood. A base flood is a flood that has a 1 percent chance of occurring in any year (i.e., a 100-year flood). A 100-year floodplain is the area that would be affected by a base flood. Floodplain maps should be reviewed and a field study may be required to determine whether a site is located in a floodplain. If the active sewage sludge unit is or will be sited in a 100-year floodplain, the owner/operator should consult one of several models that predict the impact of development on the base flood flow. The owner/operator should consult with the permitting authority (contact the State or EPA sludge coordinator) for a determination of whether the results of the models indicate a restriction of the base flood flow. For example, the permitting authority may have guidelines that stipulate that an active sewage sludge unit restricts the flow of the base flood if it causes the flood level to rise an additional foot or more. The owner/operator should also consult with the permitting authority on the acceptability of any proposed design and management practices to prevent base flood flow restrictions. The following types of information may be used to describe how this management practice is met:

- A flood plain insurance rate map (available from the Federal Emergency Management Agency) with the site location accurately marked to demonstrate whether or not it is within the 100-year floodplain. Other sources of this information include the U.S. Army Corps of Engineers, the U.S. Geological Survey (USGS), Bureau of Land Management, Tennessee Valley Authority, and local and State agencies.
- If the unit is in the 100-year floodplain, the design details and management practices that will prevent restriction of the flow of the base flood, including a plan view, a cross section of the unit, and calculations used to determine that the site will not restrict the base flood flow.
- If the unit is in the 100-year floodplain, evaluation of the impact of the unit based on predictive models, such as the HEC series generated by the U.S. Army Corps of Engineers.

Seismic Impact Zones

The regulation requires active sewage sludge units located in seismic impact zones to be designed to withstand the maximum recorded ground level acceleration. Information must first be obtained to determine whether the unit is or will be located in a seismic impact zone. If the active sewage sludge unit will be located within a seismic impact zone, the maximum recorded ground level acceleration must be identified and the unit must be designed to withstand that amount of movement without releasing any sewage sludge. If an existing unit does not meet these requirements, it must be closed or retrofitted to withstand the maximum recorded ground level acceleration.

In some areas of the United States, earthquakes occur frequently and information on these areas is readily available. Other sections of the country may also be at risk of earthquakes, although their occurrence is not as frequent. Information on the location of seismic impact zones is available nationally and can be obtained from sources listed in Appendix A. Information on the maximum recorded ground level acceleration should be available from State or local agencies. The following types of information can be used to help demonstrate compliance with the seismic impact zone management practice:

- A seismic map, available from State or local agencies, with the site location marked on the map
-

- Reports from State or local agencies on earthquake activity, including the maximum recorded horizontal ground level acceleration (as a percentage of the acceleration due to gravity (g), $g=9.8 \text{ m/s}^2$) (this information is probably contained in any reports on earthquake activity obtained from State or local agencies)
- A site inspection that focuses on slopes that may have had the toe removed, water seeps from the base of a slope, less resistant strata at the base of a slope, posts and fences that are not aligned, utility poles with sagging or too tight wires, leaning trees, cracks in walls and streets, etc.
- If the active sewage sludge unit is located in a seismic impact zone, documentation on design specifications to accommodate the ground motion from earthquakes, such as shallower unit side slopes, more conservative design of dikes and runoff controls, and contingency plans for leachate collection systems
- Design plans for the unit indicating the maximum ground motion that unit components are designed to withstand, including foundations, embankments, leachate collection systems, liners (if installed), and any ancillary equipment that could be damaged from seismic shocks
- Certification by an engineer with seismic design and geotechnical experience that the unit is designed to withstand the maximum recorded horizontal ground level acceleration.

Fault Zones

Areas that are subject to seismic activity generally have faults. Part 503 prohibits locating an active sewage sludge unit within 60 meters of a fault that has had displacement (i.e., movement) during Holocene time (typically within the last 11,000 years). Site investigations should identify any faults or any lineaments that may indicate the presence of any faults within the site area. If the evaluation indicates that an active sewage sludge unit is located within 60 meters of a fault with displacement during Holocene time, the unit must close, unless otherwise specified by the permitting authority. Fault maps are available from the USGS on a nationwide basis.

Documentation to support this management practice may include the following:

- A Holocene fault map (available from local planning or State geological agencies or the USGS) with the site location marked. In 1978, the USGS published a map series identifying the location of Holocene faults in the United States (*Preliminary Young Fault Maps* [USGS, 1978]). For areas along Holocene faults, an investigation of the

site and surrounding areas should be performed to determine if movement has occurred since 1978.

- A report on the area investigation of the site, emphasizing the location of faults, lineaments, or other features associated with fault movement, such as offset streams, cracked culverts and foundations, shifted curbs, escarpments, or other linear features.
- A geotechnical report on the site indicating the presence or absence of any faults or lineaments.

Unstable Areas

Part 503 also prohibits locating active sewage sludge units in unstable areas. Unstable areas include landslide-prone areas; karst terrain; volcanic regions; areas that overlie underground mining operations; areas that overlie oil, gas, or water extraction operations; and areas with poor foundation conditions. For the purposes of this regulation, unstable areas are areas subject to natural or human-induced forces that may damage the structural integrity of a sewage sludge unit. Some of these features may be obvious; others only can be determined through a geotechnical study. The following information may be used to demonstrate that the surface disposal site and individual sewage sludge unit(s) are not located in unstable areas:

- A one-time detailed geotechnical and geological evaluation of the stability of foundation soils, adjacent manmade and natural embankments, and slopes (may include both in-situ and laboratory test evaluations).
- A one-time evaluation of the ability of the subsurface to support the active sewage sludge unit adequately, without damage to the structural components. If the evaluation indicates that an active sewage sludge unit is located in an unstable area, the unit must close.

Wetlands

Locating an active sewage sludge disposal unit in a wetlands area is prohibited, unless a permit is issued pursuant to either Section 402 or 404 of the CWA, as amended. If an existing active sewage sludge unit located in a wetlands area does not have a Section 402 or 404 permit, it must close. The following types of information may be necessary to demonstrate compliance with wetlands restrictions:

- The location of the site on a wetlands delineation map, such as a National Wetlands Inventory map, Soil Conservation Service soil map, or a wetlands inventory map prepared locally
- A permit and/or permit application for a Section 402 or 404 permit
- A description of a wetlands assessment conducted by a qualified and experienced, multidisciplinary team, including a soil scientist and a botanist or biologist.

Operating Requirements

In addition to the one-time siting requirements, Part 503 contains management practices that are, in a sense, ongoing operating requirements. These requirements must be undertaken on a continuous basis after siting a surface disposal facility to ensure that human health and the environment are continually protected. The following list highlights the operating requirements:

- Storm water runoff control
- Leachate collection and control
- Methane gas monitoring and control
- Food/feed/fiber crop prohibition
- Grazing prohibition
- Public access restrictions
- Prohibition of ground-water contamination.

Storm Water Runoff

One of the Part 503 surface disposal management practice requires runoff from an active sewage sludge unit to be collected and disposed of in accordance with National Pollutant Discharge Elimination System (NPDES) requirements and any other applicable requirements. In addition, the runoff collection system must be designed to handle the runoff from a 24-hour, 25-year storm event. Although not required, it is recommended that the runoff collection system be designed by an engineer with experience in designing storm water control systems. The following types of information may be used to support compliance with this management practice:

- Copies of the NPDES permit and any other permits
- A description of the design of the system used to collect and control runoff, including plan view, drawing details, cross sections, and calculations showing that the system has the capacity to collect the runoff volume anticipated from a 24-hour, 25-year storm event
- A calculation of peak runoff flow, including data sources and methods used to calculate the peak runoff flow from a 24-hour, 25-year storm event
- A description of inspection and maintenance required for the system
- A description of the procedures for managing liquid discharges and complying with NPDES and other requirements.

Leachate Collection and Control

If an active sewage sludge unit has an appropriate liner and leachate collection system, the owner/operator must document that the leachate collection system is properly operated and maintained while the unit is active and for 3 years after closure of the sewage sludge unit. Documentation must also indicate that the leachate is disposed of properly.

The following types of information may be used to demonstrate compliance with this management practice:

- Detailed material specifications for the liner, including drainage layer, filter layer, piping, and sumps
 - A description of the leachate collection system design, leak detection capability, and capacity for removal of leachate and liquid from the system
 - Design details, including layout of system and components shown in plan view and cross section and spacing and configuration of pipes, sumps, pumps, drainage plans
 - Test results demonstrating system compatibility with sewage sludge and leachates for all system components and materials
 - A description of inspection and maintenance schedules and procedures
 - An operational plan describing the method of treatment and/or disposal of leachate and schedules for disposal
-

- Records of collection, treatment and disposal activities that demonstrate compliance with applicable requirements. For example, volume collected, monitoring data on treated leachate, volume disposed of (where and when).

Methane Gas Monitoring

Methane gas must be continuously monitored for an active sewage sludge unit that is covered daily. When a final cover is placed on a sewage sludge unit, methane gas must be continuously monitored for 3 years after closure of the sewage sludge unit. The system should be designed by an engineer with experience in methane gas monitoring and extraction systems at landfills, surface impoundments, or active sewage sludge units. The methane gas monitoring system is required to detect the presence of methane in the air in structures within the surface disposal site and at the property line of the surface disposal site. Alarms, lights, or other warning devices should be deployed to notify site personnel of any methane gas levels exceeding 25 percent of the lower explosive limit for methane in facility structures and levels exceeding the lower explosive limit at the property line. Emergency contingency plans should be developed as part of the methane monitoring plan that indicate who is to take what actions and at what times when methane gas concentrations exceed specified levels. The following types of information may be used to demonstrate compliance with this management practice:

- A description of the system design, including plan drawing and calculations showing that the system can monitor air for methane gas concentrations
- Design details of the site, including gas monitoring locations, spacing, and layout
- Descriptions of methane monitoring schedules, alarm systems, emergency procedures, emergency contingency plans, system maintenance schedules, and any known methane mitigation
- Results of methane gas monitoring, including the maximum and average levels recorded.

Food/Feed/Fiber Crops Prohibition

Growing food, feed, or fiber crops on any active sewage sludge unit is prohibited, unless explicitly authorized by the permitting authority. The following types of information can be used to demonstrate compliance with this management practice:

- A listing of any vegetation on the unit
- A description of procedures to ensure adherence to the crop use restrictions.

Grazing Prohibition

The Part 503 regulation prohibits grazing of animals on active sewage sludge units, unless specifically authorized by the permitting authority. The types of information that can be used to demonstrate compliance with the grazing restriction include the following:

- If the location of the surface disposal site and the land use of surrounding properties exclude or limit grazing, then the only necessary documentation or records may be the certification statement required by the regulation.
- If the owner/operator has to install animal restriction devices (such as grates at gate entrances or electric fencing), records should be kept on the design, installation, and maintenance of the devices and a site map showing the locations of the devices.

Public Access Restrictions

The Part 503 regulation requires the owner/operator to restrict public access to active sewage sludge units and to closed units for 3 years after closure. Physical barriers, such as fences and locked gates, may be used to prevent public access to active units. In addition, signs may be posted. The following types of information can be used to demonstrate compliance with the public access restriction standards:

- A site map, showing the access control locations (e.g., placement of signs, fences and gates, and natural barriers)
- A description of access restriction measures, such as placement of vehicle barriers, signs, and construction plans for the placement and configuration of fences and gates

- Language on warning signs
- An inspection schedule for the access controls and repair procedures
- Schedules for security guard postings or security inspections.

Prohibition of Ground-Water Contamination

The regulation states that sewage sludge placed in an active sewage sludge unit cannot contaminate an aquifer. Contamination is defined as an exceedance of the maximum contaminant level (MCL) for nitrate-nitrogen, published in 40 CFR Part 141. If the background level is above the MCL for nitrate-nitrogen, contamination is defined as allowing the existing level to increase. Compliance with this management practice must be demonstrated in either of the following two ways:

- Certification by a qualified ground-water scientist that sewage sludge placed on the active sewage sludge unit does not contaminate the aquifer. This should include a report demonstrating that the design, construction, and operation of the liner/leachate collection system and/or the geology of the site is sufficient to retard liquid flow during the active life and post-closure period.
- Providing ground-water monitoring data. This data should include both baseline monitoring data on the aquifer obtained prior to placing sewage sludge in the unit, and ground-water monitoring data collected periodically throughout the life of the active unit.

Note that the regulation requires this management practice to be met by either certification of a qualified ground-water scientist or the results of a ground-water monitoring program. The scientist must have a bachelor or post-graduate degree in the natural sciences or engineering and have sufficient training and experience (as demonstrated by State registration or professional certification) in ground-water monitoring, pollutant fate and transport, and corrective actions.

2.2 Records of Vector Attraction Reduction

Eleven options are available for compliance with the vector attraction reduction requirements of Part 503. Options 1 through 8 include sewage sludge processing methods (e.g., volatile solids

reduction, pH adjustment) and are performed by the person who prepares the sewage sludge. Options 9 through 11 are "barrier approaches," such as subsurface injection, incorporation into the soil, and covering with soil or a suitable material. These options are performed by the owners/operators of surface disposal sites during or after placement of the sewage sludge on active sewage sludge units.

Whenever one of options 9 through 11 is used, the owner/operator must certify whether the vector attraction reduction requirement is met. In addition, the owner/operator must keep records containing a description of how vector attraction reduction is met. The description should be supported by documentation of any process controls or management practices used to achieve the vector attraction reduction. Records of the certification and description must be kept for at least 5 years.

Option 9—Sewage Sludge Injected Below Surface of the Land

Option 9 requires that the sewage sludge be injected below the surface of the land and that no significant amount of sewage sludge be visible within 1 hour of injection. If the sewage sludge meets the Class A pathogen reduction requirements, injection must take place within 8 hours after being discharged from the pathogen reduction process. Documentation on compliance could include a field notebook with entries describing how sewage sludge is injected below the land surface, the class of pathogen reduction achieved, how much time elapses between the pathogen reduction process and injection (if Class A), and observations on the amount of sewage sludge present on the land surface 1 hour after sewage sludge was injected.

Option 10—Sewage Sludge Incorporated into the Soil

If sewage sludge is going to be incorporated into the soil for vector attraction reduction, the sewage sludge must be incorporated within 6 hours of placement on the active sewage sludge unit. If the sewage sludge is Class A, it has to be placed on the unit within 8 hours after being discharged from the pathogen reduction process. There is no time period requirement for Class B sewage sludge. Documentation on compliance could include a field notebook with entries describing how the sewage sludge was incorporated and the class of pathogen reduction

achieved. If the sewage sludge is Class A, notes should include the date and time (hour of day) the sewage sludge was discharged from the pathogen reduction process and the date and time (hour of day) the sewage sludge was incorporated into the soil.

Option 11—Sewage Sludge Covered With Soil or Suitable Material

Under option 11, the sewage sludge is simply covered with soil or other material at the end of each operating day. Option 11 meets vector attraction reduction requirements and pathogen reduction requirements. In contrast, when options 9 or 10 are used, Class A or Class B pathogen reduction requirements must have been met prior to surface disposal. Documentation on compliance with option 11 could include a field notebook describing when and how the soil or another material is placed over the sewage sludge at the end of each operating day, the thickness of the cover, and the type of cover material used.

2.3 Records of Pathogen Reduction

Part 503 does not impose recordkeeping requirements for pathogen reduction on the site owner/operator. Since the preparer is responsible for pathogen reduction, the preparer must document compliance.

2.4 Reporting

In general, the owner/operator of a surface disposal site will not be required to report unless specifically notified that the facility has been designated as a "Class I sludge management facility" by the EPA Regional Administrator or the State Director of an approved sewage sludge management program. If a surface disposal site is designated as Class I, the types of information that will need to be reported will be the same information as kept for the recordkeeping requirements. Annual reports cover information generated during the calendar year (January 1 through December 31). Owners/operators would be expected to submit data collected during the course of the year. They are not expected to resubmit the one-time documentation on siting and design conditions. Annual reports should be submitted to the EPA Regional Water Compliance Branch Chief. The address for each Branch Chief is provided on

the inside of the back cover of this document. The map on the inside of the front cover shows the EPA Region in which each State is located.

In addition, owners/operators who are also preparers of sewage sludge are required to submit an annual report if their facilities meet the definition of Class I sludge management facility or if their facilities are publicly owned treatment works (POTWs) with a design flow rate equal to or greater than 1 million gallons per day or POTWs that serve 10,000 people or more. Class I sludge management facilities are defined as POTWs required to have a pretreatment program under 40 CFR 403.8(a), including any POTW located in a State that has elected to assume local pretreatment program responsibilities under 40 CFR 403.10(e). The EPA Regional Administrator has the authority to designate additional facilities, including surface disposal facilities as Class I. Preparers include persons who generate sewage sludge and persons who derive a material from sewage sludge. Any owner/operator of a surface disposal site who is also a preparer should refer to the manual entitled, *Preparing Sewage Sludge for Land Application or Surface Disposal: A Guide for Preparers of Sewage Sludge on the Monitoring, Record Keeping, and Reporting Requirements of the Federal Standards for the Use or Disposal of Sewage Sludge Use or Disposal, 40 CFR Part 503* (EPA, 1993b), for a full discussion of the preparers' responsibilities.

2.5 General Requirements

The first general requirement simply states that no person shall place sewage sludge on an active sewage sludge unit unless the requirements in Part 503 are met.

The second general requirement identifies areas where active sewage sludge units are prohibited. Active sewage sludge units in the following areas must be closed by March 22, 1994:

- Within 60 meters of a fault that had displacement during Holocene time
- Unstable areas
- Wetlands, unless authorized in a permit issued pursuant to Section 402 or 404 of the CWA.

The third general requirement addresses closure of active sewage sludge units. Owner/operators of surface disposal sites that have active sewage sludge units that will close are required to submit a written closure and post-closure plan to the permitting authority 180 days prior to the closure date. Appendix B presents a sample outline of the contents of a closure plan. The plan must include the following elements:

- Discussion of how the leachate collection system will be operated and maintained for 3 years after the sewage sludge unit closes (for units with liners and leachate collection systems, only)
- Description of the system used to continuously monitor, for 3 years after the unit closes, methane gas in the air in any structures within the surface disposal site and in the air at the property line (for units with covers only)
- Discussion of how public access to the surface disposal site will be restricted for 3 years after closure of the last sewage sludge unit in the surface disposal site.

In addition, the owner of the surface disposal site must provide written notification to the subsequent owner of the site that sewage sludge was placed on the land. The notification should include:

- Map of the surface disposal site clearly showing the locations of sewage sludge units and their dimensions
- Amount and quality of sewage sludge disposed of on each unit
- Results of methane gas monitoring, if conducted
- Type of liner and leachate collection system installed, if appropriate, and the volume and characteristics of leachate collected
- Copy of the written closure and post-closure plan
- Warnings, as appropriate, against excavation; development; public access; grazing; and cultivation of food, feed or fiber crops on the site.

3. ACTIVE SEWAGE SLUDGE UNITS WITHOUT LINERS AND LEACHATE COLLECTION SYSTEMS

If an active sewage sludge unit does not have both a liner, with a hydraulic conductivity of 1×10^{-7} cm/sec or less, and a leachate collection system, owners/operators of such units may not dispose of sewage sludge in an active sewage sludge unit unless the sewage sludge meets specific pollutant limits. Part 503 established pollutant limits to protect public health and the environment from reasonably anticipated adverse effects of arsenic, chromium, and nickel in the sewage sludge. These pollutant limits are based on the results of an exposure assessment for ground-water and vapor pathways.

To ensure the protection of public health and environment, sewage sludge must be analyzed to demonstrate compliance with the applicable pollutant limits. The pollutant limits vary according to the distance from the boundary of the active sewage sludge unit to the property line of the surface disposal site. Owners/operators may request site-specific limits from the permitting authority when the values for certain site parameters differ from the values used to develop the pollutant limits.

Owners/operators are responsible for complying with vector attraction reduction, unless these requirements have been met by the person who prepared the sewage sludge for surface disposal. Owners/operators that dispose of sewage sludge in units that do not have liners and leachate collection systems are also subject to the management practices and general requirements that encompass facility siting, design, and operation. Owners/operators are required to keep compliance records on their activities. These records must be readily accessible to State and U.S. Environmental Protection Agency (EPA) inspectors and maintained for at least 5 years. This chapter provides guidance to owners/operators on monitoring, recordkeeping, and reporting requirements. The owners/operators should be aware that failure to keep adequate records is a violation of the Part 503 regulation and subject to substantial penalty under the Clean Water Act (CWA).

3.1 Monitoring of Pollutant Concentrations

If sewage sludge is placed in an active sewage sludge unit without a liner and leachate collection system that is less than 150 meters from the property line, the owner/operator must monitor for arsenic, chromium, and nickel. Pollutant concentration limits vary based on the following cases:

- If the active sewage sludge unit boundary is less than 150 meters from the surface disposal site property line, the owner/operator must demonstrate compliance with the applicable concentration limits given in Exhibit 1.
- If the active sewage sludge unit boundary is 150 meters or more from the surface disposal site property line, the preparer must demonstrate compliance with the applicable concentration limits given in Exhibit 1. (The owner/operator has no monitoring requirements in this case.)
- If site-specific limits are set by the permitting authority, the owner/operator is responsible for demonstrating compliance with those limits.

Exhibit 1. Pollutant Limits for Surface Disposal of Sewage Sludge

Unit Boundary to Property Line (meters)	Pollutant Limits (dry weight basis; mg/kg)			Sampling and Analysis Responsibility
	Arsenic	Chromium	Nickel	
0 to less than 25	30	200	210	Owner/Operator
25 to less than 50	34	220	240	Owner/Operator
50 to less than 75	39	260	270	Owner/Operator
75 to less than 100	46	300	320	Owner/Operator
100 to less than 125	53	360	390	Owner/Operator
125 to less than 150	62	450	420	Owner/Operator
150 or more	73	600	420	Preparer

Monitoring Frequency

The Part 503 regulation establishes a monitoring frequency for sewage sludge placed in an active sewage sludge unit. As shown in Exhibit 2, the monitoring frequency increases as the amount of sewage sludge disposed of increases. The monitoring frequency established by the regulation does not restrict persons from analyzing sewage sludge quality more often—more frequent sampling and analysis may be advantageous. The results of each sampling event represent the sewage sludge quality from the date the sample was taken until the date of the next sample. If an owner/operator samples quarterly, for example, and the results from one quarter show that the sewage sludge quality exceeded a limit, all the sewage sludge used or disposed of after that sample was collected will be in violation until another sample demonstrates compliance. If samples are collected more frequently, the owner/operator may be able to document that, in general, the sewage sludge quality consistently meets applicable requirements.

Exhibit 2. Monitoring Frequency

Amount of Sewage Sludge Disposed (metric tons per 365-day period; dry weight)	Monitoring Frequency
Greater than zero but less than 290	Annually (1 time per year)
Equal to or greater than 290 but less than 1,500	Quarterly (4 times per year)
Equal to or greater than 1,500 but less than 15,000	Bimonthly (6 times per year)
Equal to or greater than 15,000	Monthly (12 times per year)

Technically, sewage sludge does not violate Part 503 requirements until disposal. A violation can be prevented by waiting for the analytical results of sewage sludge analyses before disposal and using alternative disposal methods, if necessary. Obviously, the ability to use this strategy will depend on the availability of space to store the sewage sludge.

The Part 503 regulation specifies the number of sampling events that must occur during a year. The approximate interval between sampling events is also defined. For example, the monitoring frequency "once per quarter (four times per year)" means a total of four sampling events must

occur at 3- month intervals (i.e., one sampling event every 3 months). The four sampling events cannot occur in 4 consecutive days (or weeks or months), if the sewage sludge is continuously disposed of over the course of a year. The owner/operator should schedule sampling events at evenly spaced intervals during the time when sewage sludge is disposed of.

Procedures For Sampling And Analysis

This section describes three factors that are critical for the development and implementation of a self-monitoring program that will produce precise and reliable analytical results:

- Collection of representative samples of the sewage sludge
- Use of appropriate analytical techniques
- Adherence to quality assurance/quality control (QA/QC) procedures for sampling and analysis.

Representative Samples

To obtain a valid sample of sewage sludge, the sample must be taken from the appropriate locations, represent the entire amount of sewage sludge, and be handled properly from the time of collection through analysis. It is important that samples be collected from locations that are representative of the sewage sludge that is disposed of. This location should be safe and accessible.

The technique for sampling the sewage sludge will vary depending on whether the sewage sludge is flowing through pipes, moving along a conveyor, or contained in a truck, pile, or bin. Sewage sludge that is flowing or moving should be sampled at equal intervals during the amount of time the unit operates each day. This time-composited technique is most desirable because sewage sludge that moves is more likely to be mixed better than sewage sludge in a pile or bin. If sewage sludge samples have to be collected from a pile or bin, the appropriate number of samples to collect from various points in the pile should be determined using the statistical procedure described in the document entitled, *Environmental Regulations and Technology: Control of Pathogens and Vectors in Sewage Sludge* (EPA, 1992). At a minimum, core samples

should be taken from at least four points in the pile or bin. Sewage sludge sampling techniques are also described in the following references, which are available through the Regional Sewage Sludge Coordinator:

- *POTW Sewage Sludge Sampling and Analysis Guidance Document* (EPA, 1989)
- *Sewage Sludge Sampling Techniques* (demonstration video) (EPA, 1993c).

Appropriate preservation techniques ensure that samples remain unchanged during the holding time prior to analysis. At a minimum, all sewage sludge samples in the field and in the laboratory should be preserved by cooling to 4°C with dry ice or an ice water bath. Holding times also influence the validity of analytical results. It is important to know and respect sample holding times for each parameter being analyzed. The metals do not degrade easily and can be held up to 6 months. Appropriate sample containers must be used; either plastic or glass containers can be used to collect samples for analysis of metals. The containers must be clean and contaminant-free. In addition, sufficient sample volumes must be collected to perform the analyses. The sample volumes needed for each analysis vary depending on the percent total solids of the sewage sludge and the detection level of the analytical method used. The laboratory used for analyses should be consulted to determine the amount to collect. A conservative rule of thumb is to collect 1 liter or a volume containing 1 gram dry weight for metals analysis. For specific information on sampling techniques for pathogen analysis, refer to the EPA document entitled, *Environmental Regulations and Technology: Control of Pathogens and Vector Attraction in Sewage Sludge* (EPA, 1992).

Appropriate Analytical Techniques

All analyses performed to determine compliance with Part 503 must be conducted using methods specified in Part 503. Pollutant analysis must be performed using the methods provided in the

EPA document entitled, *Test Methods for Evaluating Solid Waste* (EPA, 1986)¹. The following list highlight the approved methods for the analysis of regulated pollutants:

- Arsenic: EPA Methods 3050/3051 and 7060/7061
- Chromium: EPA Methods 3050/3051 and 6010/7191/7190
- Nickel: EPA Methods 3050/3051 and 6010/7520.

Although both methods 7060 and 7061 can be used to analyze arsenic, high concentrations of chromium, cobalt, copper, mercury, molybdenum, nickel, or silver can cause analytical interference with method 7061. Therefore, method 7060 is often preferable to method 7061. Aluminum is a severe positive interference in method 7060, especially when using D2 ARC background. It is advisable, therefore, to use Zeeman background correction instead.

Laboratory results of sample analysis often take up to several weeks to receive. If the owner/operator disposes of sewage sludge prior to receiving the laboratory results and the results show that pollutant limits were exceeded, the owner/operator is in violation.

Quality Assurance/Quality Control

A QA program is used to achieve a desired quality for activities, such as sample collection, laboratory analysis, data validation and reporting, documentation and recordkeeping. QA programs should address the following areas:

- Proper sample collection procedures, equipment, preservation methods, and chain-of-custody procedures to ensure representative samples
- Proper sample preparation procedures, instruments, equipment, and methodologies used for the analyses of samples

¹*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, EPA Publication SW-846, Second Edition (1982) with Updates I (April 1984) and II (April 1985) and Third Edition (November 1986) with Revision I (December 1987) and Update I (July 1992). Second Edition and Updates I and II (PB-87-120-291), are available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA, 22161. Third Edition and Revision I and Update I (Document number 955-001-00000-1), are available from the Superintendent of Documents, Government Printing Office, 941 North Capitol Street, NE, Washington, DC, 20002. Future updates will be noticed in the *Federal Register*.

- Proper data validation through analysis of field and laboratory blanks, splits, and duplicates
- Proper procedures and schedules for calibration and maintenance of equipment and instruments associated with the collection and analyses of samples
- Proper recordkeeping to produce accurate and complete records and reports, when required.

Quality control, which is a part of the QA program, relates to the routine use of established procedures and policies during sample collection and analysis. The objective of QC procedures is to ultimately control both the accuracy and the precision of all analytical measurements made. QC for sample collection includes the use of duplicate and spiked samples and sample blanks. QC for sample analysis includes the use of spiked and split samples, proper calibration protocols, and appropriate analytical methods and procedures. Chapter 1 of *Test Methods for Evaluating Solid Waste* (EPA, 1986) provides guidance on QA/QC for sample collection and analysis. Each analytical method describes additional QC procedures.

3.2 Records of Pollutant Concentrations

The Part 503 regulation requires owners/operators of active sewage sludge units without liners and leachate collection systems to maintain records documenting the concentration of pollutants in the sewage sludge if the units are located less than 150 meters from the property line of the surface disposal site or if site-specific pollutants have been approved by the permitting authority. Documentation of sampling and analysis for pollutant concentrations should include the following information:

- Date and time of sample collection, sampling location, sample type, sample volume, name of sampler, type of sample container, and methods of preservation (including cooling)
 - Date and time of sample analysis, name of analyst, and analytical methods used
 - Laboratory bench sheets indicating all raw data used in analyses and calculation of results
-

- Sampling and analytical QA/QC procedures
- Analytical results expressed in dry weight.

3.3 Records of Management Practices

Owners/operators must ensure that the management practices are met and must document how they are met in detailed records. Records must be kept for at least 5 years. Refer to Section 2.1 for further details.

3.4 Records of Vector Attraction Reduction

As mentioned in Chapter 2, there are 11 options to comply with the vector attraction reduction requirements. Options 1 through 8 are performed by the person who prepares the sewage sludge. Options 9 through 11 are performed by the owner/operator of the surface disposal site during or after placement of the sewage sludge on the active sewage sludge unit. The options available to the owner/operator are subsurface injection, incorporation into the soil, and cover with soil or a suitable material. For more detailed information on documenting vector attraction reduction activities, see Section 2.2.

3.5 Records of Pathogen Reduction

There are no reporting requirements for pathogen reduction applicable to owner/operators of surface disposal units.

3.6 Reporting

Several reporting provisions in Part 503 may apply to owners/operators of active sewage sludge units (see Section 2.4).

3.7 General Requirements

Several general requirements contained in Part 503.22 apply to owners/operators of active sewage sludge units (see Section 2.5).

REFERENCES

- U.S. Environmental Protection Agency. 1994a. *Guide to the Federal Part 503 Rule for the Use or Disposal of Biosolids (Plain English Guide to 503)*. Washington, DC: EPA/832-R-93-003.
- U.S. Environmental Protection Agency. 1994b. *Guide to Risk Assessment for the Part 503 Rule for Use or Disposal of Biosolids*. Washington, DC.
- U.S. Environmental Protection Agency. 1994c. *Odor Control Handbook*. Washington, DC.
- U.S. Environmental Protection Agency. 1993a. *Land Application of Sewage Sludge—A Guide for Land Appliers on the Requirements of the Federal Standards for the Use and Disposal of Sewage Sludge, 40 CFR Part 503*. Washington, DC: EPA/831-B-93-002b.
- U.S. Environmental Protection Agency. 1993b. *Preparing Sewage Sludge for Land Application or Surface Disposal—A Guide for Preparers of Sewage Sludge on the Monitoring, Record Keeping, and Reporting Requirements of the Federal Standards for the Use or Disposal of Sewage Sludge, 40 CFR Part 503*. Washington, DC: EPA/831B-93-002a.
- U.S. Environmental Protection Agency. 1993c. *Sewage Sludge Sampling Techniques*. Video.
- U.S. Environmental Protection Agency. 1993d. *Domestic Septage Regulatory Guidance: A Guide to the EPA 503 Rule*.
- U.S. Environmental Protection Agency. Draft 1993e. *Guidance for Writing Permits for the Use or Disposal of Sewage Sludge*. Office of Wastewater Enforcement and Compliance. Washington, DC.
- U.S. Environmental Protection Agency. 1993f. *Technical Manual for Solid Waste Disposal Facility Criteria - 40 CFR Part 258*. Office of Solid Waste. Washington, DC.
- U.S. Environmental Protection Agency. 1992. *Environmental Regulations and Technology: Control of Pathogens and Vectors in Sewage Sludge*. Office of Research and Development. Cincinnati, OH: EPA/625/R-92/013
- U.S. Environmental Protection Agency. 1989. *POTW Sewage Sludge Sampling and Analysis Guidance Document*. Office of Water. Washington, DC.
- U.S. Environmental Protection Agency. 1986. *Test Methods for Evaluating Solid Waste*. Office of Solid Waste. Washington, DC. EPA/SW-86.

REFERENCES (Continued)

U.S. Environmental Protection Agency. 1978. *Process Design Manual for Municipal Sewage Sludge Landfills*. Cincinnati, OH: EPA-625/1-78-010.

U.S. Geological Survey. 1978. *Preliminary Young Fault Maps*. MF 916.

APPENDIX A

SOURCES OF MAPS AND INFORMATION

SOURCES OF MAPS AND INFORMATION

The addresses listed below are not a complete listing of all sources; however, most information and maps can be obtained through one of these organizations. The table lists sources of USGS information within most States.

American Institute of Civil Engineers 345 East 47th St. New York, NY 10017-2398	U.S. Department of the Army U.S. Army Corps of Engineers Washington, DC 20314-1000
Building Seismic Safety Council 201 L St., NW Suite 400 Washington, DC 20005 (202) 289-7800	U.S. Department of the Interior Fish and Wildlife Service 1849 C St., NW Washington, DC 20240 (202) 208-5634
Bureau of Land Management 1849 C St. NW Washington, DC 20240 (202) 343-7220 (Locator) (202) 343-5717 (Information)	U.S. Department of Transportation Federal Aviation Administration 800 Independence Ave., SW Washington, DC 20591 (202) 267-3085
Federal Emergency Management Agency Flood Map Distribution Center 6930 (A-F) San Thomas Rd. Baltimore, MD 21227-6227	U.S. Geological Survey 12201 Sunrise Valley Drive Reston, Virginia 22092 (800) USA-MAPS
National Information Service for Earthquake Engineering (NISSE) University of California, Berkeley 404A Davis Hall Berkeley, CA 94720 (415) 642-5113	U.S. Geological Survey Branch of Geological Risk Assessment Stop 966 Box 25046 Denver, Colorado 80225 (303) 236-1629
Tennessee Valley Authority 412 First St., SE Third Floor Washington, DC 20444 (202) 479-4412	U.S. Geological Survey EROS Data Center Sioux Falls, South Dakota 57198
U.S. Department of Agriculture Soil Conservation Service P.O. Box 2890 Washington, DC 20013-2890 (202) 447-5157	U.S. Geological Survey National Earthquake Information Center Stop 967 Box 25046 Denver Federal Center Denver, Colorado 80225 (303) 236-1500

U.S. Geological Survey Earth Science Information Center (ESIC) State Offices		
<p>Geological Survey of Alabama 420 Hackberry Lane, Room 200 P.O. Box O, University Station Tuscaloosa, AL 35486-9780 (205) 349-2852</p>	<p>Geophysical Institute University of Alaska — Fairbanks Fairbanks, AK 99775-0800 (907) 474-7487</p>	<p>Arizona State Land Department Resource Analysis Division 1616 W. Adams Phoenix, AZ 85007 (602) 542-4061</p>
<p>Arkansas Geological Commission Vardelle Parham Geology Center 3815 W. Roosevelt Road Little Rock, AR 72204 (501) 324-9165</p>	<p>California Dept. of Conservation Div. of Mines and Geology Information Office 660 Bercut Drive Sacramento, CA 95814-0131 (916) 324-7380</p>	<p>Library, Map Collection San Diego State University San Diego, CA 92182-0511 (619) 594-5650</p>
<p>Map and Imagery Laboratory Library, University of California Santa Barbara, CA 93106-9010 (805) 893-2779</p>	<p>Natural Resources Center Dept. of Environmental Protection 165 Capitol Avenue State Office Building, Room 553 Hartford, CT 06106 (203) 566-3540</p>	<p>University of Connecticut Map Library, Level 4 Storrs, CT 06268 (203) 486-4589</p>
<p>Delaware Geological Survey Cartographic Information Center University of Delaware 101 Penny Hall Newark, DE 19716 (302) 831-8262</p>	<p>Florida Resources and Environmental Analysis Center 361 Bellamy Building Florida State University Tallahassee, FL 32306-4015 (904) 644-2883</p>	<p>Geographic Information Center Department of Community Affairs 1200 Equitable Building 100 Peachtree Street Atlanta, GA 30303 (404) 656-5527</p>
<p>Office of State Planning Governor's Office State Capitol, Room 406 Honolulu, HI 96813 (808) 587-2894</p>	<p>University of Hawaii at Manoa Thomas Hale Hamilton Library 2550 The Mall Honolulu, HI 96822 (808) 956-6199</p>	<p>Idaho State Historical Library 450 N. 4th Street Boise, ID 83702 (208) 334-3356</p>
<p>University of Idaho Library Map Collection Moscow, ID 83843-4144 (208) 885-6344</p>	<p>Illinois State Geological Survey Natural Resources Building 615 E. Peabody Drive Champaign, IL 61820 (217) 244-0933</p>	<p>University of Illinois at Urbana- Champaign Map and Geography Library 1408 W. Gregory Drive Urbana, IL 61801 (217) 333-0827</p>
<p>Purdue University Laboratory for Applications of Remote Sensing Entomology Building, Room 220 W. Lafayette, IN 47907-1158 (317) 494-6305</p>	<p>Iowa Geological Survey 123 N. Capitol Street Iowa City, IA 52242 (319) 335-1575</p>	<p>Kansas Geological Survey University of Kansas 1930 Constant Avenue Campus West Lawrence, KS 66046-2598 (913) 864-3965</p>
<p>Kansas Applied Remote Sensing Program Space Technology Center University of Kansas 2291 Irving Hill Road Lawrence, KS 66045-2969 (913) 864-7720</p>	<p>Kentucky Geological Survey 228 Mining and Mineral Resources Building University of Kentucky Lexington, KY 40506-0107 (606) 257-5500</p>	<p>Division of Flood Control and Water Management Department of Transportation and Development 1202 Capitol Access Rd., Rm. 401 Baton Rouge, LA 70821 (504) 379-1473</p>

**U.S. Geological Survey
Earth Science Information Center (ESIC)
State Offices (Cont.)**

<p>Maine Geological Survey State House Station, #22 Augusta, ME 04333 (207) 289-2801</p>	<p>University of Maine College of Forest Resources The Map Store South Annex A Orono, ME 04469 (207) 581-6277</p>	<p>Maryland Geological Survey Department of Natural Resources 2300 St. Paul Street Baltimore, MD 21218 (410) 554-5524</p>
<p>University of Massachusetts Cartographic Information Research Services 102D Hasbrouck Laboratory Amherst, MA 01003 (413) 545-0359</p>	<p>Land and Water Management Michigan Department of Natural Resources Steven T. Mason Bldg., Box 30028 Lansing, MI 48909 (517) 373-9123</p>	<p>University of Minnesota S76 Wilson Library John R. Borchert Map Library Minneapolis, MN 55455-0414 (612) 624-4549</p>
<p>Department of Administration Land Management Information Center 300 Centennial Office Building 658 Cedar Street Saint Paul, MN 55155 (612) 297-2490</p>	<p>Mississippi Institutions of Higher Learning MARIS 3825 Ridgewood Road Jackson, MS 39211 (601) 982-6354</p>	<p>Missouri Department of Natural Resources Division of Geology and Land Survey 111 Fairgrounds Road Rolla, MO 65401 (314) 368-2125</p>
<p>Montana Bureau of Mines and Geology Montana Tech Main Hall, Room 200 Butte, MT 59701-8997 (406) 496-4174</p>	<p>Conservation and Survey Division University of Nebraska - Lincoln 113 Nebraska Hall Lincoln, NE 68588-0517 (402) 472-3471</p>	<p>Government Documents Department University of Nevada - Las Vegas Library 4505 Maryland Parkway Las Vegas, NV 89154 (702) 739-3409</p>
<p>Nevada Bureau of Mines and Geology University of Nevada - Reno, MS 178 Scrughem Engineering - Mines Bldg. Room 301 Reno, NV 89557-0088 (702) 784-6691</p>	<p>Documents Department Dimond Library University of New Hampshire Durham, NH 03824-3592 (603) 862-1777</p>	<p>Department of Environmental Protection and Energy New Jersey Geological Survey 29 Arctic Parkway Trenton, NJ 08638 (609) 292-2576</p>
<p>Technology Applications Center University of New Mexico 2808 Central Avenue, SE Albuquerque, NM 87131 (505) 277-3622</p>	<p>Map Information Unit New York Dept. of Transportation Building 4, Room 105 Albany, NY 12232 (518) 457-3555</p>	<p>North Carolina Geological Survey Department of Environment, Health, and Natural Resources 59 Woodfin Place Asheville, NC 28801 (704) 251-6208</p>
<p>North Carolina Geological Survey Department of Environmental, Health, and Natural Resources 512 N. Salisbury Street, Room 519C Raleigh, NC 27611-7687 (919) 733-2423</p>	<p>North Dakota Geological Survey 1022 E. Divide Avenue Bismarck, ND 58505-0840 (701) 224-4109</p>	<p>Ohio Department of Natural Resources Division of Soil and Water Conservation Remote Sensing Section-ESIC Fountain Square, Building E2 Columbus, OH 43224 (614) 265-6770</p>
<p>Geology Library University of Oklahoma 100 E. Boyd, Room R-220 Norman, OK 73019-0628 (405) 325-6451</p>	<p>University of Oregon Map and Aerial Photography Library 165 Condon Hall Eugene, OR 97403-1229 (503) 346-3051</p>	<p>Department of Geology and Mineral Industries (DOGAMI) #28, Room 965 800 Northeast Oregon Street Portland, OR 97232 (503) 229-5580</p>

**U.S. Geological Survey
Earth Science Information Center (ESIC)
State Offices (Cont.)**

<p>Oregon State Library State Library Building Salem, OR 97310-0640 (503) 378-4368</p>	<p>Department of Environmental Resources Bureau of Topographic and Geological Survey 916 Executive House 101 S. Second Street Harrisburg, PA 17105-2357 (717) 783-8077</p>	<p>South Carolina Land Resources Cartographic Information Center Commission 2221 Devine Street, Suite 222 Columbia, SC 29205-2474 (803) 734-9100</p>
<p>South Dakota Geological Survey Science Center University of South Dakota Vermillion, SD 57079-2390 (605) 677-5227</p>	<p>Tennessee Valley Authority Federal ESIC Maps and Surveys Branch Haney Building, Room 100 Chattanooga, TN 37402-2801 (615) 751-MAPS</p>	<p>Map Library Room 15 Hoskins The University of Tennessee Knoxville, TN 37996-4006 (615) 974-4315</p>
<p>Texas Natural Resources Information System State Office Building, Room 428 1700 N. Congress Avenue Austin, TX 78711-3231 (512) 463-8337</p>	<p>Utah Geological and Mineral Survey 2363 S. Foothill Drive Salt Lake City, UT 84109-1491 (801) 467-7970</p>	<p>University of Vermont Map Room Bailey/Howe Library Burlington, VT 05405-0036 (802) 656-2503</p>
<p>Department of Mines, Minerals and Energy Division of Mineral Resources Natural Resources Building Alderman and McCormick Roads Charlottesville, VA 22903 (804) 293-5121</p>	<p>Washington State Library Information Services Division Capital Campus 16th and Water Streets Olympia, WA 98504 (206) 753-4027</p>	<p>Map Collection and Cartographic Information Center University of Washington - Libraries FM-25 Seattle, WA 98195 (206) 543-9392</p>
<p>West Virginia Geological and Economic Survey Cartographic Information Center Mont Chateau Research Center Cheat Lake Morgantown, WV 26507-0879 (304) 594-2331</p>	<p>State Cartographer's Office 160 Science Hall 550 N. Park Street Madison, WI 53706-1404 (608) 262-3065</p>	<p>Geological Survey of Wyoming University Station P.O. Box 3008 Laramie, WY 82071 (307) 766-2286</p>

APPENDIX B

OUTLINE OF SAMPLE CLOSURE AND POST-CLOSURE PLAN

OUTLINE OF SAMPLE CLOSURE AND POST-CLOSURE PLAN

Owner/Operator Name:
Mailing Address:
Telephone Number:
Address of Active Sewage Sludge Unit Location:

I. ACTIVE SEWAGE SLUDGE UNIT CONDITIONS

A. General information

1. Size of active sewage sludge unit (hectares or acres)
2. Description of liner, if applicable
3. Description of leachate collection system, if applicable
4. Copy of NPDES permit if there are discharges to U.S. waters

B. Schedule of final closure (milestone chart)

1. Final date of sewage sludge accepted
2. Date all onsite disposal completed
3. Date final cover completed
4. Final date vegetation planted or other material placed
5. Final date closure completed
6. Total time required to close the site

II. DISPOSING OF SEWAGE SLUDGE

A. Total volume of sewage sludge to be disposed of on the active sewage sludge unit (m³ or yd³)

B. Description of procedures for disposing of sewage sludge

1. Size of surface disposal site, number of active sewage sludge units, and size of units necessary for disposing of sewage sludge (include site map of disposal area)
2. Design and construction of active sewage sludge units

III. COVER AND VEGETATION

A. Final cover, if applicable

1. Total area to be covered (m² or yd²)
2. Characteristics of final cover
 - a. Type(s) of material(s)
 - b. Depth of material(s)
 - c. Total amount of material(s) required
3. Final cover design
 - a. Slope of cover
 - b. Length of run of slope
 - c. Type of drainage and diversion structures

B. Vegetation (if vegetation is to be planted)

1. Total area requiring vegetation (hectares or acres)
2. Name or type of vegetation (e.g., rye grass)

C. Erosion Control (if vegetation is not to be planted)

1. Procedures and materials for controlling cover erosion
2. Justification for procedures and materials used

IV. GROUND-WATER MONITORING (if applicable)

A. Analyses required

1. Number of ground-water samples to be collected
2. Ground-water monitoring schedule (e.g., quarterly, semi-annually)
3. Details of ground-water monitoring program

B. Maintenance of ground-water monitoring equipment

V. COLLECTION, REMOVAL, AND TREATMENT OF LEACHATE

A. Description of leachate collection system (i.e., pumping and collecting procedures)

1. Description of the leachate sampling and analysis plan
2. Estimated volume of leachate collected per month

- B. Description of leachate treatment process, if on-site
 - a. Design objectives
 - b. Materials and equipment required
- C. Disposal of leachate
 - 1. If discharged to surface waters, include copy of NPDES permit
 - 2. If hauled offsite, provide final destination
- D. Maintenance of equipment
 - 1. Repairs and replacements required
 - 2. Regular maintenance required over the duration of closure and post-closure periods

VI. METHANE MONITORING (if applicable)

- A. Monitoring requirements
 - 1. Monitoring locations
 - 2. Types of samples
 - 3. Number of samples
 - 4. Analytical methods used
 - 5. Frequency of analyses
- B. Maintenance of monitoring equipment
- C. Planned responses to exceedances of limits

VII. MAINTENANCE ACTIVITIES

- A. Surface disposal site inspections
 - 1. List all structures, areas, and monitoring systems to be inspected
 - 2. Frequency of inspections for each
- B. Planned responses to probable occurrences (including those listed below)
 - 1. Loss of containment integrity
 - 2. Severe storm erosion
 - 3. Drainage failure

C. Maintenance of cover and/or vegetation

1. Cover maintenance activities and schedule
2. Mowing schedule
3. Reseeding and mulching schedule
4. Soil replacement
 - a. Labor requirements
 - b. Soil requirements
5. Fertilizing schedule
6. Sprinkling schedule
7. Rodent and insect control program

D. Control of erosion

1. Maintenance program for drainage and diversion system
2. Activities required to repair expected erosive damage
3. Replacement cover soil
 - a. Amount to be stored onsite during the post-closure period
 - b. Specification of alternative sources of cover soil, if applicable (i.e., offsite purchase agreement or onsite excavation)

VIII. INSTALLATION OR MAINTENANCE OF THE FENCE

- A. If a fence already exists, describe required maintenance at closure to ensure it is in good condition
- B. If fence is to be installed, specify:
 1. Area to be enclosed
 2. Type of materials used
 3. Dimensions of fence
- C. Security and public access practices planned for the post-closure period
 1. Description of security system
 2. Maintenance schedule

IX. CLOSURE SCHEDULE

- A. Schedule for closure procedures
- B. Schedule of periodic inspections

Mail compliance reports required under the Standards for the Use and Disposal of Sewage Sludge to the Water Compliance Branch Chief in your EPA Region at the following address:

REGION 1

Water Compliance Branch Chief
(WCC)
Water Management Division
U.S. EPA Region 1
JFK Federal Building
Boston, MA 02203-2211

REGION 6

Water Compliance Branch Chief
(GW-EA)
Water Management Division
U.S. EPA Region 6
1445 Ross Avenue
Dallas, TX 75202-2733

REGION 2

Water Compliance Branch Chief
Water Management Division
Room 845
U.S. EPA Region 2
26 Federal Plaza
New York, NY 10278

REGION 7

Water Compliance Branch Chief
(WACM)
Water Management Division
U.S. EPA Region 7
726 Minnesota Street
Kansas City, KS 66101

REGION 3

Water Compliance Branch Chief
(3-WM50)
Water Management Division
U.S. EPA Region 3
841 Chestnut Street
Philadelphia, PA 19107

REGION 8

Water Compliance Branch Chief
(8WM-C)
Water Management Division
U.S. EPA Region 8
999 18th Street, Suite 500
Denver, CO 80202-2466

REGION 4

Water Compliance Branch Chief
(WPEB-1)
Water Management Division
U.S. EPA Region 4
345 Courtland Street, N.E.
Atlanta, GA 30365

REGION 9

NPDES Compliance Section (W-5-3)
Water Management Division
U.S. EPA Region 9
75 Hawthorne Street
San Francisco, CA 94105-3901

REGION 5

Water Compliance Branch Chief
(WCC-15J)
Water Management Division
U.S. EPA Region 5
77 West Jackson Boulevard
Chicago, IL 60604-3590

REGION 10

Water Compliance Branch Chief
(WD-135)
Water Management Division
U.S. EPA Region 10
1200 6th Avenue
Seattle, WA 98101-3188
