



Colorado Department  
of Public Health  
and Environment

**DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT**

**Water Quality Control Division**

**5 CCR 1003-6**

**STATE BOARD OF HEALTH**

**GUIDELINES ON INDIVIDUAL SEWAGE DISPOSAL SYSTEMS**

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# DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

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#### TABLE OF CONTENTS

	Page
Reference Materials.....	1
I. Scope and Applicability.....	3
A. Declaration.....	3
B. Purpose .....	3
C. Situations Where "Local Boards of Health" Have Jurisdiction to Adopt Regulations.....	3
II. Regulations Adopted by/for Local Boards of Health.....	5
A. Regulations Coverage .....	5
B. Adoption of Rules and Regulations in Local Board of Health Jurisdictions.....	5
C. Procedures to Adopt Rules and Regulations.....	5
III. Definitions .....	6
IV. Administration and Enforcement.....	12
A. Permit Application Requirements and Procedures .....	12
B. Application Review .....	14
C. Additional Evaluation.....	14
D. Additional Hydrological, Geological, or Engineering Information.....	14
E. Determination .....	14
F. Inspection Stages .....	14
G. Access to Site.....	15
H. Department Authority to Administer and Enforce.....	15
I. Primary Enforcement Responsibility.....	15
J. Experimental Systems.....	15
K. Prohibition of Individual Sewage Disposal Systems in Unsuitable Areas.....	16
L. Fees .....	16
M. Licensing of Systems Contractors and Systems	

	Cleaners .....	16
	1. Contractors.....	16
	2. Cleaners .....	17
	3. License Revocation.....	17
N.	Cease and Desist Orders .....	17
V.	Calculation of Sewage Flow and Characteristics.....	17
	A. Measured values .....	18
	B. New facilities .....	18
	C. Maximum flow for design .....	18
	D. Persons per dwelling.....	18
	E. Design for anticipated flow.....	18
	F. Area Reduction .....	18
	G. Maximum Area Reduction.....	18
	Table I - Quantities and BOD strength of Sewage.....	19
VI.	Minimum Horizontal Distances Between Components of a System and Physical Features.....	22
	A. Ground Features.....	22
	B. New wells, springs, or other facilities.....	22
	Table II - Distances Between System Components & Pertinent Physical Features .....	23
VII.	Soil Test .....	25
	A. Location .....	25
	B. Dimensions .....	25
	C. Procedure .....	25
	D. Calculations .....	25
	E. Performance of Percolation Test.....	25
	F. Alternate Percolation Test.....	25
	G. Soil Profile .....	26
	H. Water Table.....	26
VIII.	Component Design Criteria .....	26
	A. Design Features (General) .....	26
	B. Design Criteria (First Stage Treatment Units) .....	29
	1. Septic tank .....	29
	a. Size .....	29
	b. Septic tank design criteria.....	29
	c. Inlet and outlet pipe .....	30
	2. Aerobic Sewage Treatment System.....	30
	C. Design Criteria (Second or Later Stage Treatment Units).....	31

1.	Soil Absorption System (General) .....	31
2.	Absorption Area Construction .....	34
3.	Serial Distribution System .....	36
4.	Evapotranspiration Disposal of Effluent.....	36
5.	Sand Filter.....	38
6.	Wastewater Pond .....	39
7.	Mound Systems .....	40
8.	Gravelless Soil Absorption Systems.....	40
9.	Constructed Wetland Treatment .....	40
D.	Additional Design Criteria (Other Facilities) .....	40
1.	Grey Water System.....	40
2.	Vault .....	40
3.	Vault Privy.....	40
4.	Pit Privy .....	40
5.	Incineration and Chemical Toilets .....	41
6.	Slit Trench .....	41
7.	Business, Commercial, Industrial, Institutional, or Multi-family Dwelling Waste Systems .....	41
8.	Composting Toilets.....	42
9.	Systems for which data on design, operation and maintenance are limited or undetermined .....	42
a.	Systems which recycle - non-potable .....	42
b.	Systems which recycle treated wastewater for potable purposes.....	43
IX.	Treatment Systems Other Than Those Discharging Through a Soil Absorption or Sand Filter System and Non-discharging Systems .....	43
A.	General.....	43
B.	Review of Application - Performance Criteria .....	43
C.	Performance Criteria.....	43
D.	Method of Analyses - Sampling Points .....	45
X.	Manufactured Units Utilizing Mechanical Apparatus for Treatment of Sewage.....	45
A.	Compliance with guidelines.....	45
B.	Entity management or service policy.....	45
XI.	Approval of Systems Employing New Technology .....	45
XII.	Effluent Discharged to Waters of the State.....	47
XIII.	Installation .....	47
A.	General.....	47
B.	Mechanical Components.....	47

1.	Ventilation and air system .....	47
2.	Component parts installation .....	47
C.	Covers or other protection .....	47
XIV.	Operation and Maintenance .....	47
A.	Responsibility .....	47
B.	Service Label .....	48
C.	Maintenance and Cleaning.....	48
D.	Monitoring and Sampling .....	48
1.	Sampling .....	48
2.	Owner or occupant request for sampling .....	48
3.	Fees .....	48
E.	Disposal of Waste Materials .....	48
F.	No Discharge Permitted Which Does Not Comply With Rules and Regulations.....	49
G.	Termination of Use of System .....	49
XV.	Findings on Appeal.....	49
	General Prohibitions and Penalties .....	49
1.	Permit necessary .....	49
2.	Occupancy permit.....	49
3.	Correction of existing systems if in ground water .....	50
4.	Cesspools prohibited.....	50
5.	Multiple use .....	50
6.	Adequate facilities necessary.....	50
	Penalties .....	50
XVI.	Statement of Basis and Purpose .....	51
XVII.	Financial Impact Statement.....	53
XVIII.	Variance Procedures .....	53
A.	General .....	53
B.	Requirements for Variance Consideration .....	53
C.	Outcome of the Variance Proceeding .....	54
D.	Prohibitions on the Granting of Variance Requests .....	54

## **INDIVIDUAL SEWAGE DISPOSAL SYSTEMS**

The rules promulgated below incorporate by reference (as indicated within) material originally published elsewhere. Such incorporation does not include later amendments to or editions of the referenced material. Pursuant to Section 24-4-103 (12.5), C.R.S., the Department of Public Health and Environment maintains copies of the complete text of the incorporated materials for public inspection during regular business hours. Information regarding how the incorporated materials may be obtained or examined may be obtained from:

Information Center Librarian  
Colorado Department of Public Health and Environment  
4300 Cherry Creek Drive South, Building A  
Denver, CO 80246-1530

Additionally, any material that has been incorporated by reference may be examined in any state publications depository library. Copies of the incorporated materials have been sent to the State Publications Depository and Distribution Center, and are available for interlibrary loans.

## **REFERENCED MATERIALS**

*1994 Annual Book of ASTM Standards, Section 8 Plastics*, Vol. 8.04 Plastic Pipe and Building Products

American Society For Testing Materials  
1916 Race Street  
Philadelphia, PA 19103 (215) 299-5400

*Standard Specifications For Transportation Materials And Methods Of Sampling And Testing*, Sixteenth Edition, 1993

American Association of State Highway and Transportation Officials  
444 North Capitol Street, N.W. Suite 249  
Washington, DC 20001 (202) 624-5800

*Uniform Plumbing Code*, 1994 Edition

International Association of Plumbing And Mechanical Officials  
20001 Walnut Drive South  
Walnut, CA 91789-2825 (909) 595-8449

*National Electrical Code*, 1993 Edition

National Fire Protection Association  
1 Batterymarch Park

P. O. Box 9101  
Quincy, MA 02269-9101 (617) 770-3000

*Standard Methods For The Examination Of Water And Wastewater, 18th Edition, 1992*  
*American Public Health Association, American Water Works Association, and Water Environment*  
*Federation*

American Water Works Association  
6666 West Quincy Avenue  
Denver, CO 80235 (303) 794-7711

*NSF Standard 40 and NSF Standard 41*  
National Sanitation Foundation  
NSF International  
3475 Plymouth Road  
P.O. Box 130140  
Ann Arbor, MI 48113-0140 (313) 769-8010

I. Scope and Applicability

A. Declaration:

In order to preserve the environment and protect the public health; to eliminate and control causes of disease, infection, and aerosol contamination; and to reduce and control the pollution of the air, land and water, it is declared to be in the public interest to establish minimum standards, rules and regulations for individual sewage disposal systems in the state of Colorado and to provide the authority for the administration and enforcement of such minimum standards, rules, and regulations.

B. Purpose:

The purpose of these guidelines as authorized and required by Article 10 Title 25, C.R.S. is to provide guidance and establish minimum standards for the location, construction, performance, installation, alteration and use of individual sewage disposal systems within the state of Colorado, and shall constitute the basis for the adoption of detailed rules and regulations by local boards of health concerning the application for and issuance of permits, the inspection, testing, and supervision of installed systems, the issuance of cease and desist orders, the maintenance and cleaning of systems, and the disposal of waste material.

These guidelines shall apply to individual sewage disposal systems.

C. Situations Where Local Health Departments Have Jurisdiction to Adopt Regulations:

1. In a county which is not part of a district or regional health department and which has, by resolution of its board of county commissioners, established and maintains a county health department or an environmental health department, pursuant to Part 5, Article 1 of Title 25, C.R.S., the board of health in said department shall have jurisdiction over the unincorporated portion of the county and over the territory of all municipalities within the county unless any such municipal corporation therein, having a population in excess of 40,000, maintains its own health department and employs a supervising health officer and has not by agreement of its governing body with the board of county commissioners merged with the latter. (25-1-501 and 504).
2. A county which has, pursuant to said Part 5, Article 1 of Title 25, joined

with other counties in establishing a district health department, and all municipal corporations within the territorial limits of the counties in said district with a population of 40,000 or less, together with any such municipality over 40,000 which has agreed, pursuant to Section 25-1-504(1)(a), to merge and has merged into said district, shall all be subject to the jurisdiction of the board of health of the district health department.

3. Each county health department and each district health department created pursuant to said Part 5 of Article 1 of Title 25, and each county which has not established a county health department or become a part of a district health department pursuant to said Part 5 but which has joined with other counties, by action of their respective boards of county commissions to so organize, and all municipalities within the territorial limits of the counties comprising the region except municipalities of over 40,000 population which have not by merger agreement subjected themselves to the jurisdiction of the local county or local district health department pursuant to said Part 5, may be organized pursuant to Part 7 of Article 1 of Title 25 into a regional health department and become subject to the jurisdiction of the regional board of health, which board has authority to adopt local ordinances, rules and regulations pursuant to C.R.S., Section 25-1-706, but may not exercise executive or administrative functions, which latter functions must be exercised by local boards of health as provided by law or as provided by said regional board of health in its delineation of responsibilities under said ordinances, rules and regulations.
4. If a county has not adopted a resolution creating a county health department and is not part of a district health department, in both cases pursuant to said Part 5, and is not part of a regional health department established pursuant to said Part 7, then the board of county commissioners of the county shall function as the board of health of said county (25-1-608) and shall have jurisdiction over all the unincorporated part of said county and over all parts of each county not represented by town or city organizations.
5. In incorporated towns the board of trustees and in incorporated cities the mayor and council shall act and have jurisdiction as boards of health in counties wherein the boards of county commissioners have not established their respective counties within a county or district health department pursuant to said Part 5 or within a regional health department pursuant to said Part 7.

II. Regulations Adopted by/for Local Boards of Health

A. Regulation Coverage:

Regulations adopted by local boards of health or by the state board pursuant to current guidelines of the state board and adopted in compliance with Section 25-10-104(2), (3), and (4) C.R.S., shall govern all aspects of permits, performance, location, construction, alteration, installation, and use of individual sewage disposal systems of less than 2,000 gallon per day design capacity. (Site approval and a discharge permit from the Department are required for a system with design capacity greater than or equal to 2,000 gallons per day, but local Individual Sewage Disposal System Regulations then govern all other aspects of permits, performance, construction, alteration and installation.)

B. Local boards of health shall have one year from the effective date of these guidelines within which to amend their existing regulations or to adopt rules and regulations which shall be no less stringent than these guidelines, unless their existing rules and regulations are found upon timely submission to and approval by the Department to satisfy the stringency requirements of these guidelines, in which case they shall remain in effect.

If at the expiration of said one year period a local board of health has not obtained approval by the department of the rules and regulations pursuant to these guidelines, these guidelines shall then become the rules and regulations within that jurisdiction and shall be effective until such time as the local board of health adopts its own rules and regulations and they are found by the department to be in compliance with Sections 25-10-105 and 25-10-106, C.R.S. and are no less stringent than these guidelines promulgated by the state board.

C. Procedures to adopt rules and regulations by the local board of health shall be as follows:

1. A preliminary draft of proposed rules and regulations, or amendments thereto, shall be transmitted to the Department for preliminary review at least 30 days prior to a public hearing before a local board of health.
2. Before finally adopting rules and regulations or any amendments thereto, the local board of health shall hold a public hearing on the proposed rules and regulations or amendments thereto.

3. Notice of the time and place of such hearing shall be given at least once, at least 20 days in advance thereof in a newspaper of general circulation within its area of jurisdiction.
4. The local board of health may make changes or revisions in the proposed rules and regulations, or amendments thereto, after the public hearing and prior to final adoption, and no further public hearing shall be required regarding such changes or revisions.
5. All such rules and regulations, and amendments thereto, shall be transmitted to the Department not later than five days after final adoption and shall become effective 45 days after final adoption unless the Department has sooner notified the local board of health that the rules and regulations or amendments thereto or any portions thereof are not in compliance with Sections 25-10-105 and 25-10-106, C.R.S. or with these or later State Board guidelines, or are less stringent than those promulgated by the state board. Any such portions determined by the Department not to be in compliance with said Sections 25-10-105 and 25-10-106 and these guidelines, shall not take effect or be published as rules and regulations of the local board of health and, until made to comply with and be no less stringent than said sections and current guidelines or rules and regulations promulgated by the State Board, said guidelines or rules and regulations of the State Board shall be effective and control such matters and shall be included as part of the rules and regulations of said local board. Such determination by the Department concerning the matters of non-compliance and less stringency shall be provided by written notification received no later than the commencement of business on the 45th day following the date of final adoption, except that if such date falls on a weekend or state holiday, the notice shall have been received not later than the business day next preceding said 45th day.

### III. Definitions

Absorption System - waste water disposal field or a leaching field and adjacent soils or other system for the treatment of sewage in an individual sewage disposal system by means of absorption into the ground and may include evapotranspiration.

Absorption Trench - one or more trenches not over three feet in width in which sewage effluent is percolated into the soil.

Aerobic Sewage Treatment System - an individual sewage disposal system employing

biological action which is maintained by the addition of air or oxygen.

Applicant - any person who submits an application for a permit for an individual sewage disposal system.

Bedrock - the more or less solid undisturbed rock in place either at the surface or beneath surficial deposits of gravel, sand, or soil or a consolidated rock formation of impervious material which may exhibit jointed, fractured, or deteriorated characteristics.

Building Sewer - that part of the piping of a drainage system which extends from the end of the building drain and which receives the discharge of the building drain and conveys it to a public sewer, private sewer, individual sewage disposal system, or other point of disposal.

Competent Technician - a person designated by the local health department who is able to conduct and interpret the results of percolation tests.

Composting Toilet - a unit which consists of a toilet seat and cover over a riser which connects to a compartment or a vault that contains or will receive composting materials sufficient to reduce waste by aerobic decomposition.

Constructed Wetland - A system which utilizes various wetland plants to provide secondary treatment of wastewater through biological, physical, and chemical processes.

Department - the Colorado Department of Health, created by Section 25-1-102, Colorado Revised Statutes as amended.

Design Flow - the design flow is 150% of average daily flow as calculated by methods recognized in this guideline.

Dispersal System - a system for the disposal of effluent after final treatment in an individual sewage disposal system by a method which does not depend upon or utilize the treatment capability of the soil.

Distribution Box - a watertight chamber which receives wastewater from a septic tank or other primary treatment unit and from which effluent is distributed evenly throughout the absorption system.

Division - the division of administration of the department.

Dosing - a high rate periodic discharge into an absorption system.

Dosing Tank - a tank which provides for storage of wastewater from a septic tank intended to be fed to an absorption area at a high rate periodic discharge.

Drywell - a type of soil absorption system dependent upon suitable soil, filled with gravel and containing a system of approved distribution which is designed on the basis of sidewall and bottom absorption area.

Effective Size of granular media is that size such that not more than 10% by weight of the media is finer than the size specified.

Effluent - the liquid waste discharge from an individual sewage disposal system.

Environmental Health Specialist - A person who is trained in physical, biological, and/or sanitary science to carry out educational and inspection duties in the field of environmental health.

Evapotranspiration System - a type of dispersal system that wholly or primarily utilizes liquid evaporation and transpiration by vegetation as a means of effluent disposal.

Experimental System - a particular design or type of system based upon improvements, or development in the technology of sewage disposal and not otherwise provided for in paragraphs (e) to (j) of 25-10-105 (1), C.R.S.

Floodplain - an area adjacent to a stream which is subject to flooding as the result of the occurrence of a one hundred (100) year flood, and is so adverse to past, current or foreseeable construction or land use as to constitute a significant hazard to public or environmental health and safety or to property or is designated by the Federal Emergency Management Agency (FEMA) or National Flood Insurance Program (NFIP). In the absence of FEMA/NFIP maps, a Colorado Registered Professional Engineer shall certify the flood plain elevations.

Floodway - that area of the floodplain in which the channel of the watercourse and those portions of the adjoining floodplain which must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one (1) foot at any point or as designated by the Federal Emergency Management Agency or National Flood Insurance Program. In the absence of FEMA/NFIP maps, a Colorado Registered Professional Engineer shall certify the flood way elevation and location.

Grey Water System - a system designed to collect, treat and dispose only liquid wastes from sinks, lavatories, tubs, showers, and laundry or other approved plumbing fixtures

excluding toilet fixtures.

Groundwater Table - the upper surface of groundwater in the zone of saturation of geologic formation.

Guidelines - minimum requirements as described in this document.

Health Officer - the chief administrative and executive officer of a local public or environmental department, or the appointed health officer of the local board of health.

Individual Sewage Disposal System and the Term "System" [(I.S.D.S.) where the context so indicates] - an absorption system of any size or flow or a system or facility for collecting, storing, treating, neutralizing, stabilizing, or disposing of sewage which is not a part of or connected to a sewage treatment works.

Liner - a watertight membrane liner of at least 0.01-inch (10 mil) thickness which is used to prevent effluent from entering the soil or groundwater table. Material shall be polyvinyl chloride or material of equal or greater integrity.

Local Board of Health - any local, county, district, or regional board of health.

Local Health Department - any city, county, city and county, district, regional public or environmental health department and may include a local board of health.

Long Term Acceptance Rate (LTAR) - The minimum absorption area (A) in square feet computed as a function of the design flow (Q) and the rate of soil acceptance over time according to the formula:  $A = Q/LTAR$

Manufacturer - the person or firm that constructs or assembles individual sewage treatment system components.

Mound System - an absorption system installed where the top of the effluent distribution pipe is installed above the original grade of the area used for absorption.

Percolation Tests - a subsurface soil test at the depth of a proposed absorption system or similar component of an individual sewage disposal system to determine the water absorption capability of the soil, the results of which are normally expressed as the rate at which one inch of water is absorbed.

Permeability - the property of a material which permits movement of water through the material.

Permit - a document, issued by the local health department, authorizing the construction, alteration, installation, repair, and use of an individual sewage disposal system.

Person - individual, partnership, firm, corporation, association, or other legal entity and also the state, any political subdivision thereof, or other governmental entity.

Privy - a structure allowing for the disposal of excreta not transported by a sewer and which provides privacy and shelter and prevents access to the excreta by flies, rodents, or other vectors.

Professional Geologist is a person who is a graduate of an institution of higher education which is accredited by a regional or national accrediting agency, with a minimum of thirty semester (forty-five quarter) hours of undergraduate or graduate work in a field of geology and whose postbaccalaureate training has been in the field of geology with a specific record of an additional five years of geological experience to include no more than two years of graduate work.

Registered Professional Engineer - an engineer licensed in the State of Colorado accordance with Section 12-25-111, C.R.S.

Sand Filter - a subsurface system which utilizes wastewater filtration or absorption or both, and which contains an intermediate layer of sand as filter material.

Sanitarian (Environmental Health Specialist) - a person who is trained in physical, biological, and sanitary science to carry out inspectional and educational duties in the field of environmental health.

Seepage Bed or absorption bed - a subsurface soil absorption area which is wider than three (3) feet, together with a system of approved distribution through which effluent may seep, leach or infiltrate into the soil.

Seepage Pit - a type of soil absorption system dependent upon suitable soil containing a structural internal void and designed on the basis of sidewall area.

Septic Tank - a watertight, accessible covered receptacle designed and constructed to receive sewage from a building sewer, to settle solids from the liquid, to digest organic matter, and store digested solids through a period of retention and allow the clarified liquids to discharge to other treatment units for final disposal.

Serial Distribution - an arrangement of absorption trenches, seepage pits or seepage beds

where effluent is retained to utilize the absorption capacity of a component before flowing into a succeeding component.

Sewage - a combination of liquid wastes which may include chemicals, house wastes, human excreta, animal or vegetable matter in suspension or solution, or other solids in suspension or solution and which is discharged from a dwelling, building, or other structure.

Sewage Treatment Works - a system or facility for treating, neutralizing, stabilizing, or disposing of sewage, which system or facility has a designed capacity to receive more than two thousand gallons of sewage per day, unless designed as an absorption system. The term "sewage treatment works" includes appurtenances such as interceptors, collection lines, outfall and the outlet sewers, pumping stations, and related equipment.

State Board - the State Board of Health created by Section 25-1-103, C.R.S.

State Waters - any and all surface and subsurface waters which are contained in or flow in or through this state, except waters in sewerage systems, waters in treatment works of disposal systems, waters in potable water distribution systems, and all waters withdrawn for use, until all uses and treatment have been completed.

Suitable Soil - a soil which will effectively treat and filter effluent by removal of organisms and suspended solids before the effluent reaches any highly permeable earth such as joints in bedrock, gravels, or very coarse soils and which meets percolation test requirements and has a vertical thickness of at least four feet below the bottom of the absorption area.

Systems Cleaner - a person engaged in and who holds himself out as a specialist in the cleaning and pumping of sewage disposal systems and removal of the residues deposited in the operation thereof.

Systems Contractor - a person engaged in and who holds himself out as a specialist in the installation, renovation, and repair of sewage disposal systems.

Uniformity Coefficient - a value which is the ratio of  $D_{60}$  to  $D_{10}$  where  $D_{60}$  is the soil diameter of which 60% of the soil weight is finer and  $D_{10}$  is the corresponding value at 10% finer. (A soil having a uniformity coefficient smaller than 4 would be considered "uniform" for purposes of this regulation.)

Vault - a watertight, covered receptacle, which is designed to receive and store excreta or wastes either from a sewer or from a privy and is accessible for the periodic removal of

its contents.

Wastewater Pond - a designed pond which receives exclusively wastewater from a first stage treatment unit and which provides an additional degree of treatment.

IV. Administration and Enforcement

A. Permit Application Requirements and Procedures:

1. Prior to commencement of installation, alteration, or repair of a system, a written application shall be submitted to the local health department providing, as a minimum, the information called for on the application form and a permit shall have been issued by the local health department or its designated agent having jurisdiction.
2. A permit fee not to exceed that which is allowed by 25-10-101 et seq. (as amended) C.R.S. shall be required of applicants for an individual sewage disposal system, payable at the time the application is received. This fee shall be based on the average cost to the local health department for processing applications during the preceding calendar year. The fee for permits issued by the Department shall not exceed the maximum allowed by 25-10-101 et seq. (as amended) C.R.S.
3. The local board of health may make provision for the waiver of any permit fee normally required for an individual sewage disposal system.
4. If an individual sewage disposal system permit is issued, it shall expire one year after the date of issuance if construction has not commenced or as specified by local board of health regulations. Any change in plans or specifications after the permit has been issued invalidates the permit unless written approval is secured from the health officer or his/her authorized agent for such changes.
5. The local health department may issue a repair permit and an emergency use permit to the owner or occupant of property on which a system is not functioning properly. Application for a repair permit shall be made by such owner or occupant to the local health department within two business days after receiving notice from the local health department that the system is not functioning in compliance with Article 10 of Title 25, C.R.S. or applicable rules and regulations adopted thereunder or otherwise constitutes a nuisance or a hazard to public health. The permit shall

provide for a reasonable period of time within which repairs shall be made. At the end of that period the system shall be inspected by the local health department to insure it is functioning properly. Concurrently with the issuance of a repair permit, the local health department may issue an emergency use permit authorizing continued use of a malfunctioning system on an emergency basis for a period not to exceed the period stated in the repair permit. Such an emergency use permit may be extended, for good cause shown, in the event repairs may not be completed in the period stated in the repair permit through no fault of the owner or occupant.

6. An individual sewage disposal system permit shall be required for expanded use of an existing system.
7. Rules and regulations of the local board of health shall include provisions regarding review by the local board of health, upon request of an applicant, of applications denied by the health officer.
8. The issuance of a permit and specifications of terms and conditions therein shall not constitute assumption or create a presumption that the local health department or its employees may be liable for the failure of any system nor act as a certification that the equipment used in the system or any component thereof used in its operation or that the system for which the permit was issued insures continuous compliance with the provision of Article 10 of Title 25, C.R.S., the rules and regulations adopted thereunder or any terms and conditions of a permit.
9. Except as provided in these guidelines, no individual sewage disposal system permit shall be issued to any person when the subject property is located within a municipality or special district which provides public sewer service, except where such sewer service to the property is not feasible in the determination of the municipality or special district.

B. Application Review:

The application shall include such information, data, plans, specifications, statements, and commitments as required by the local board of health to carry out the purposes of Article 10, Title 25, C.R.S., as amended.

After receiving an application for an individual sewage disposal system permit, the application shall be reviewed by the local health department and an inspection shall be made by the health officer or his/her designated representative consisting of:

1. Inspection of the premises, unless previously inspected.
2. Evaluation of soil where percolation tests are required.
3. A determination as to the suitability of the site and of the proposed design based upon verification of the ground water table, suitable soil, depth to bedrock, ground slope and pertinent physical features.

C. Additional Evaluation:

When the health officer or his/her designated agent has determined that the local health department does not have sufficient information for evaluation of an application or a system, he may require additional tests or documentation.

D. Additional Hydrological, Geological, Engineering or other Information:

When specific evidence suggests undesirable subsurface conditions exist, additional hydrological, geological, engineering or other information provided by a registered professional engineer or geologist may be required to be submitted by the applicant. This requirement shall not prejudice the right of the local health department to develop its own information from its own source.

E. Determination:

A determination shall be made on behalf of the local health department by a sanitarian, environmental health specialist or a registered professional engineer after review of the application, site inspection, test results, and other required information, whether the proposed system is in compliance with the requirements of Article 10 of Title 25, C.R.S. and applicable rules and regulations adopted under said section. A permit may be issued by the health officer or his/her designated representative if the proposed system is determined to be in compliance with the requirements of Article 10 of Title 25, C.R.S. and the rules and regulations adopted pursuant thereto.

F. Inspection Stages:

Local regulations shall specify the stages of construction, installation, alteration, or repair at which time the local health department will require inspections. Before the system is placed in use the owner, the owner's agent or the systems contractor shall provide the local health department with notice that the progress of the work has been sufficiently completed to allow inspection to determine if all work has been performed in accordance with the permit requirements and to

determine compliance of the system with Article 10, Title 25, C.R.S. and the rules and regulations adopted thereunder.

G. Access to Site:

For the purpose of inspection and enforcing applicable rules and regulations and the terms and conditions of any permit issued, the health officer or his/her designated agent is authorized to enter upon private property at reasonable times and upon reasonable notice for the purpose of determining whether or not operating individual sewage disposal facilities and systems are functioning in compliance with Article 10 of Title 25, C.R.S. and applicable rules and regulations adopted pursuant thereto and the terms and conditions of any permit issued and to inspect and conduct tests in evaluating any permit application. The owner or occupant of every property having an individual sewage disposal system shall permit the health officer or his/her designated agent access to the property to conduct required tests, take samples, monitor compliance, and make inspections.

H. Department Authority to Administer and Enforce:

Wherever the term local board of health, local health department, or health officer is used in these guidelines, said terms shall also include the Colorado Department of Health or its designated authority for the purposes of administering and enforcing the provisions of these guidelines as Colorado Department of Health Regulations where necessary to protect the public health and environment.

I. Primary Enforcement Responsibility:

The primary responsibility for enforcement of the provisions of Article 10 of Title 25, C.R.S. and the regulations adopted under said Section shall lie with the local health departments or local boards of health.

In the event that a local health department or local board of health fails to administer and enforce the provisions of said section and the rules and regulations adopted under said Article 10, the department may assume such functions of the local health department or board of health as may be necessary to protect the public health and environment. (25-10-109)

J. Experimental Systems:

Except for designs or types of systems which have been approved by the Division pursuant to C.R.S., 25-10-107 (1), the local board of health may approve an

application for a type system not otherwise provided for in paragraphs (e) to (j) of subsection (1) of C.R.S. 25-10-105 only if the system has been designed by a registered professional engineer, and only if the application provides for the timely installation of a backup system of a type described in said paragraphs in the event of a failure of the experimental system. A local board of health shall not arbitrarily deny any person the right to consideration of an application for such a system and shall apply reasonable performance standards in determining whether to approve such an application. (25-10-107 (2)).

K. Prohibition of Individual Sewage Disposal Systems in Unsuitable Areas:

1. The local board of health may conduct a public hearing, after written notice to all affected property owners as shown in the records of the county assessor and publication of notice in a newspaper of general circulation at least ten days prior to the hearing, to consider the prohibition of permits for individual sewage disposal systems in areas defined in paragraph 2 below, or in defined areas which contain or are subdivided for a density of more than two dwelling units per acre. The local board of health may order such prohibition upon a finding that the construction and use of additional individual sewage disposal systems in the defined area will constitute a hazard to the public health or the environment. In such a hearing, the local board of health may request affected property owners to submit engineering and geological reports concerning the defined area and provide a study of the economic feasibility of constructing a sewage treatment works (§25-10-110, CRS).
2. Within the Cherry Creek watershed in Arapahoe and Douglas counties, no new individual sewage disposal systems shall be constructed within the 100-year flood plain as designated by the Urban Drainage and Flood Control District, or the Federal Emergency Management Agency if no Urban Drainage and Flood Control District designation exists. This restriction shall not apply to the replacement of, or improvements to the operation of, existing individual sewage disposal systems located within the 100-year flood plain.

L. Fees:

Fees authorized in these guidelines shall be set at such amounts as are deemed necessary to cover the operational expense of the several agencies but shall not exceed the maximum amounts specified in these guidelines.

M. Licensing of Systems Contractors and Systems Cleaners:

1. The local board of health may adopt rules and regulations which provide for the licensing of systems contractors. A fee not to exceed twenty-five dollars may be charged by the local health department for the initial license of a systems contractor; a fee not to exceed ten dollars may be charged by the local health department for a renewal of the license. Initial licensing and renewals thereof shall be for a period of not less than one year. Renewals may be scheduled to coincide with the calendar year.

The local board of health may revoke the license of a systems contractor for violation of the applicable provisions of Article 10 of Title 25, C.R.S. of the rules and regulations adopted under said section or for other good cause shown, after a hearing conducted upon reasonable notice to the systems contractor and at which the systems contractor may be present, with counsel, and be heard. (25-10-108)

2. The local board of health may adopt rules and regulations which provide for the licensing of systems cleaners. A fee not to exceed twenty-five dollars may be charged by the local health department for the initial license of a systems cleaner; a fee not to exceed ten dollars may be charged for the renewal of the license. Initial licensing and renewals thereof shall be for a period of not less than one year. Renewals may be scheduled to coincide with the calendar year.
3. The local board of health may revoke the license of a systems cleaner for violation of the applicable provisions of Article 10 of Title 25, C.R.S. of the regulations adopted under said section or for other good cause shown after a hearing conducted upon reasonable notice to the systems cleaner and at which the systems cleaner may be present, with counsel, and be heard. (25-10-108).

N. Cease and Desist Orders:

The health officer or his/her authorized representative may issue an order to cease and desist from the use of any system which is found by the health officer not to be functioning in compliance with Article 10 of Title 25, C.R.S. or with applicable rules and regulations or is found to constitute a hazard to public health, or has not otherwise received timely repairs under the provisions of C.R.S., Section 25-10-106 (1)(j). Such an order may be issued only after a hearing which

shall be conducted by the health officer not less than 48 hours after written notice thereof is given to the owner or occupant of the property on which the system is located and at which the owner or occupant may be present, with counsel, and be heard. The order shall require that the owner or occupant bring the system into compliance or eliminate the health hazard within a reasonable period of time, not to exceed thirty days, or thereafter cease and desist from the use of the system. A cease and desist order issued by the health officer shall be reviewable in the district court for the county wherein the system is located and upon a petition filed not later than ten days after the order is issued.

V. Calculation of Sewage Flow and Characteristics:

- A. Where gallons per day and pounds of biochemical oxygen demand (BOD<sub>5</sub>) per day can be obtained by measurement of existing conditions, such data may be used. This allows local health officials to require installation of a meter located to measure flow into the individual sewage disposal system.
- B. For new facilities the following "Table of Quantities and BOD<sub>5</sub> Strength of Sewage" may be used as a guide to represent average conditions.
- C. Maximum flow shall be considered as 150 percent of average daily flow and shall be the basis for design purposes unless otherwise established by evidence satisfactory to the health officer.
- D. To calculate the sewage flow for dwellings and mobile homes, use a figure of two persons per bedroom.
- E. In no event may the system be designed for a lesser capacity than the anticipated maximum daily sewage flow or treatment requirements of the sewage or wastes in the system.
- F. The local health officer or his/her designated agent may, at his/her discretion, allow reduction in design flow for proven, permanently installed water conservation devices. Reduction rates will be based on flow rate information supplied to the local health department for comparison with standard accepted rates for each fixture that utilizes water conservation devices.
- G. The local Health Officer or designated agent may, at their discretion, require an increase of average daily flow of up to 100 gal/person/day for large or more costly dwellings.



**TABLE I**  
**QUANTITIES AND BOD STRENGTH OF SEWAGE**  
**FOR VARIOUS TYPES OF USES**

<b>TYPE OF ESTABLISHMENT</b>	<b>GALLONS/PERSON/DAY (AVERAGE) (UNLESS OTHERWISE STATED)</b>	<b>LBS. BOD5/PERSON/DAY (UNLESS OTHERWISE STATED)</b>
<b><u>Residential</u></b>		
Single-family dwellings (two people per bedroom)	75	.20
Separate Distribution of Flows - Individual Residential use		
Bath/Shower	14.7	.014
Dishwasher	1.8	.002
Kitchen sink	4.4	.045
Additional for garbage grinder	1.4	.052
Laundry washer	19.5	.037
Lavatory	8.4	.021
Water closet	24.8	.029
Hotels and Motels - per room (without private baths)	50	.15
Hotels and Motels - per room (with private baths)	75	.15
Multiple-family dwellings or apartments	75	.20
Boarding and Rooming houses	50	.15
Mobile Home Parks	75	.20
(per space)	300	.80
<b><u>Commercial</u></b>		
Airports (per passenger)	5	.02
(per employee)	10	.06
Barber and Beauty Shops (per chair)	100	.70*
Bowling Alleys (per lane - toilet wastes only)	5	.03*
Bus Service Areas (not including food)	5	.02

Country clubs		
(per member)	30	.02
(per employee)	20	.06
Dentist offices (per non-wet chair)	50	.14*
Doctors offices (per doctor)	250	.80*
Fairgrounds (per person attending)	5	.02
Factories and plants (exclusive of industrial wastes)		
(per employee per 8-hour shift-no showers)	20	.05
(per employee per 8-hour shift - showers provided)	35	.08
Food service establishments (per seat)		
Restaurant (Open 1 or 2 meals)	50	.06/meal served
24-hour Restaurant	75	.07/meal served
Restaurant with paper service only	25	.01/meal served
Additional for bars and cocktail lounges	30	.02
Drive-in Restaurant (per car space)	50	.02
Kennels (per dog)	30	.20
Laundries, self-service (per commercial washer)	400	.75
Office Buildings (per employee per 8-hour shift)	15	.06
Stores and Shopping Centers (per square foot of Retail space)	.1	.01*
Service Stations (per toilet fixture)	250	.50*
Stadiums, Race Tracks, Ball Parks (per seat)	5	.02
Theaters (Movie, Indoor, or Auditorium)	5	.02
Work or construction camps (semi- permanent - with flush toilets)	50	.17
Work or construction camps (semi- permanent - without flush toilets)	35	.02
<b>Institutional</b> (does not include kitchen wastewater flows)		
Churches (not including food)	5	.01

Hospitals (per bed space)	250	.20
Nursing Homes (per bed space)	100	.17
Schools, Boarding	100	.17
Schools, Day	15	.04
(without cafeteria, gym or showers)		
(with cafeterias, no gym or showers)	20	.08
(with cafeterias, gym and showers)	25	.10
(additional for school workers)	15	.06
<b>Recreational and Seasonal</b>		
Camps, day (no meal served)	15	.12
Luxury Resort	125	.17
Resort (night and day)	50	.12
Campground (seasonal occupancy - per unit)**	50	.12
Public Park (during hours when park is open)		
- Flush Toilet (per fixture per hour)	36	.04 lbs./ fixture
- Urinal (per fixture per hour)	10	.01 lbs./fixture
- Shower (per fixture per hour)	100	.10 lbs./ fixture
- Faucet (per fixture per hour)	15	.04 lbs./ fixture
Swimming pools and bathhouses	10	.06
Travel trailer parks (with individual water and sewage hookup - per unit) **	50	.12
(without individual water and sewage hookup - per unit) **	50	.12

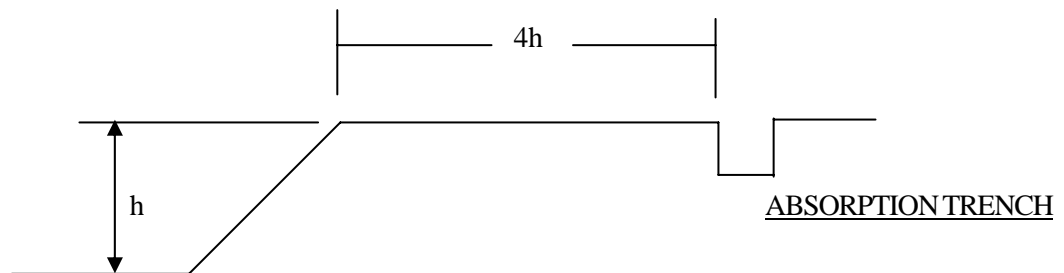
\* = BOD Levels needing further verification

\*\* = Laundry facilities are to be calculated on a per commercial washer basis in accordance with other elements of this table.

VI. Minimum Horizontal Distances Between Components of a System and Physical Features

- A. Minimum, horizontal distances from the various components of a system to pertinent terrain features, including streams, lakes, water courses, springs, wells, subsoil drains, cisterns, water lines, suction lines, gulches, dwellings, other occupied buildings and property lines, shall be in accordance with the following "Table of Minimum Horizontal Distances".
- B. Wells, springs or potable water supply suction lines and all other constructed units listed in the "Table" shall be installed or located in accordance with the minimum distance requirements provided in the table or such increased distances provided by the local board of health regulation.

The minimum horizontal distance required from manmade cut banks and fill areas to individual sewage disposal system components discharging effluent into or onto the surrounding soil shall be four (4) times the height of the bank, measured from the bottom of absorption field, unless it can be demonstrated by a Registered Professional Engineer or a geologist that a mechanical or natural barrier will prevent lateral effluent surfacing. (See diagram below.)



**TABLE II**

**TABLE OF MINIMUM HORIZONTAL DISTANCES IN FEET BETWEEN COMPONENTS OF A SEWAGE DISPOSAL SYSTEM  
INSTALLED AFTER NOVEMBER 15, 1973 AND PERTINENT PHYSICAL FEATURES**

	Spring, Wells, Suction Lines	Potable Water Supply Line	Potable Water Supply Cistern	Dwelling Occupied Building	Property Lines, Piped or Lined Irrigation Ditch	Subsoil Drains, Intermittent Irrigation Lateral	Lake, Water Course, Irrigation Ditch or Stream	Dry Gulches	Septic Tank
Dispersal System Utilizing Aerosol Methods	(3) 100	(4)(2) 10	50	125	10	0	(3) 25	(3) 10	10
Seepage Pit or Slit Trench	(3) 100	(4)(2) 50	25	20	25	10	(3) 50	(3) 25	6
Absorption Trench, Seepage Bed, Sand Filter, Sub-surface Dispersal System, or Drywell	(3) 100	(4)(2) 25	25	20	10	10	(3) 50	(3) 25	6
Unlined Sand Filter in Soil With a Percolation Rate Slower than 60 Minutes per Inch	100	(4)(2) 25	25	15	10	10	25	15	10
Unlined or Partially Lined Evapotranspiration System, Wastewater Pond, or Surface Disposal System Other than Aerosol	100	(4)(2) 25	25	15	10	10	25	15	10
Lined Sand Filter	60	(4)(2) 10	25	15	10	10	25	10	5
Lined Evapotranspiration Field or Lined Wastewater Pond	60	(4)(2) 10	25	15	10	10	25	10	5
Pit Privy or Vault Privy	50	(4)(2) 10	25	15	10	10	25	10	--
Septic Tanks, Treatment Plants, Dosing Tanks, Vaults	(2) 50	(4)(2) 10	25	(1) 5	10	10	50	10	--
Building Sewer or Effluent Lines	(2)(4) 50	(4)(2) 10	(4) 25	0	(2)(4) 10	(4) 10	(2)(4) 50	(2)(4) 10	--

NOTE: The minimum distances shown above shall be maintained between the system components and the physical features described. Where soil, geological or other conditions warrant, greater distances may be required by the local board of health or by the Water Quality Control Commission pursuant to C.R.S. 25-8-206 in accordance with the authority prescribed by law and rules and regulations implemental of said section. Components which are not watertight should not extend into areas of the root system of nearby trees. For repair or upgrading of existing systems where the size of lot precludes adherence to these distances, repaired facility shall not be closer to water supply components than the existing facilities.

- (1) Distance shown shall not apply to treatment plants or effluent lines where recycling is permitted.

- (2) Crossings or encroachments may be permitted at the points as noted above provided that the water conveyance pipe is encased for a minimum distance of ten (10) feet on each side of the crossing. A length of pipe shall be used with a minimum Schedule 40 rating of sufficient diameter to easily slide over and completely encase the water conveyance. Ridged end caps of at least Schedule 40 rating must be glued or secured in a watertight fashion to the ends of the encasement pipe. A hole of sufficient size to accommodate the pipe shall be drilled in the lowermost section of the ridged cap so that the conveyance pipe rests on the bottom of the encasement pipe. The area in which the pipe passes through the endcaps shall be sealed with an approved underground sealant compatible with the piping used.
- (3) Add 8 feet additional distance for each 100 gallons per day of design flow over 1000 gallons per day as specified in the table, unless it can be demonstrated by a registered Professional Engineer or Geologist that a mechanical or natural barrier will prevent contamination.
- (4) Encroachments may be permitted provided the water or wastewater conveyance pipe is encased as in (2) above, specified in the table.



## VII. Soil Test

### A. Location:

Soil percolation tests shall be performed in at least three (3) test holes in the area in which the absorption system is to be located, spaced uniformly over the proposed site, except there shall be no less than one (1) test hole in any twelve hundred (1200) square foot area of the absorption system.

### B. Dimensions:

The percolation test holes shall most preferably be six (6) inches in diameter. The diameter may vary from four (4) to twelve (12) inches in width or diameter where prohibitive soil or geological conditions exist. The holes shall be terminated at the depth of the proposed absorption system and the percolation tests shall be conducted within those soils comprising the 4 feet of acceptable soils beneath bottom of absorption field.

### C. Procedure:

Percolation test holes shall be filled with water to a depth of 14 inches or more at least 8 hours, but not more than 24 hours, prior to conducting the water percolation test, and shall be refilled with water if necessary to a depth of at least 14 inches prior to final measurement. Measure the time for the water to drop one inch within the lower six (6) inches of the percolation test hole. The percolation rate shall be reported in minutes per inch drop.

### D. Calculation:

The field percolation rate shall be the average rate of the percolation tests after rate has stabilized in all the test holes observed in the proposed absorption area. A percolation rate of between five (5) and sixty (60) minutes per inch is required except as provided in VIII-C-b-1(1) of these guidelines.

### E. Performance of Percolation Tests:

1. The percolation test shall be performed by or under the supervision of a registered professional engineer or by a competent technician of the local health department unless the tests were previously performed by a registered professional engineer and the results thereof submitted with the application for a permit.
2. If the applicant demonstrates to the satisfaction of the local board of health that the system is not dependent upon soil absorption, the requirement for percolation tests may be waived.

### F. Alternate Percolation Test:

Alternate percolation test or other soil test procedures may be approved by the local health officer or his/her designated representative providing the test results of alternate procedures meet or exceed those determined using the test procedure detailed in this section.

G. Soil Profile:

One soil profile hole shall be drilled or dug to provide observation of the soil profile of the area of the soil absorption system. The hole shall be prepared at least eight (8) feet deep. The hole may be terminated when groundwater or bedrock is encountered. The hole shall be prepared in such a way as to provide identification of the soil profile four (4) feet below the bottom of the soil absorption system.

H. Water Table:

In the absence of more restrictive regulations of the local board of health, a test hole evaluation showing a dry condition estimated or measured to be at least four feet below the bottom of a proposed soil absorption system during the wettest months may be considered prima facie evidence that the maximum seasonal groundwater table will be sufficiently below the bottom of the proposed absorption system.

VIII. Component Design Criteria

A. Design Features (General)

1. Reliability: Individual sewage disposal systems shall be designed and constructed such that each component shall function, when installed and operated, in a manner not adversely affected by the normal operating conditions including erosion, vibration, shock, climatic conditions, and usual household chemicals used. Each component shall be free of non-functional protrusions or sharp edges, or other hazards, which could cause injury to persons, animals, or properties. Design shall be such as to exclude flies and rodents and to prevent the creation of nuisances and public health hazards and shall provide for efficient operation and maintenance.
2. Pipe Standards: All wastewater lines used in individual sewage disposal systems shall be constructed of compatible pipe, bonding agent, and fittings. Where plastic pipe and fittings are used, the minimum wall thickness of the pipe shall conform to ASTM Standard D 3034, or equivalent. Perforated distribution pipe surrounded by rock within a soil absorption system shall have a minimum wall thickness conforming to ASTM Standard D 2729. Corrugated polyethylene pipe with smooth interior that meets ASTM F405 and AASHTO M252 specifications or equivalent may also be used. Tile, open-joint pipe, and cast iron pipe shall not be used in individual sewage disposal systems.

3. Plumbing Codes: Plumbing fixtures, grease traps, building sewers, vents, sewer lines and other appurtenances shall be designed, operated and maintained so as to comply with the minimum requirements of the Uniform Plumbing Code.
4. Electrical Equipment, if used: All electrical work, equipment, and material shall comply with the requirements of the National Electrical Code.
5. Identification and Data Marking: A permanent type plate or other indelible marking so inscribed as to be easily read and visible for the purpose of inspection shall be provided on major components not constructed on the site where installed. Said inscription shall include the following:
  - Name of manufacturer.
  - Model or serial number designation.
  - Maximum design capacity of the unit and the unit of measurement.
6. Structural Integrity: Tanks shall be so constructed and installed as to withstand earth and hydrostatic pressures when full and when empty. All metal surfaces shall be properly coated to prevent corrosion. The Department shall certify the structural integrity of all tanks, treatment units, and piping materials for use in individual sewage disposal systems. When the Department shall be satisfied and has issued certification, the local Boards of Health shall be entitled to rely thereon.
7. Watertight Requirement: Watertight tanks, vaults, or other units, shall not allow infiltration of groundwater or surface water and shall not permit the release of wastewater or liquids through other than designed openings.
8. Tank Anchoring: In locations where groundwater may cause instability problems to the septic tank, pumping chamber, vault, or other tanks in the individual sewage disposal system due to flotation, the tank shall be anchored in a sufficient manner in order to provide stability when the tank is empty. The method of anchoring must be approved by the local health officer or his/her designated agent prior to installation. The local authority may require the design of the anchoring system to be prepared by a Registered Professional Engineer.
9. Accessibility for Inspection and Maintenance: Each treatment unit shall be equipped with an access manhole located to permit periodic physical inspection, collection and testing of samples and maintenance of all components and compartments including but not limited to submerged bearings, moving parts, tubes, intakes, slots, filters, inlet and outlet baffles, and other devices.

10. Indicators of Failure for Systems Utilizing Mechanical Apparatus: A signal device shall be installed which will provide a recognizable indication or warning to the user that the system or component is not operating or is operating but malfunctioning. This indication or warning shall be in the form of a visual or audible signal, or both.
11. Serviceability: Components shall be so designed and constructed that when installed in accordance with manufacturer's recommendations, they shall be capable of being easily maintained, sampled, drained, pumped, inspected and cleaned.
12. Sampling Access: Where a required final effluent sample cannot be easily obtained, a sampling well shall be constructed. The sampling well shall be accessible and provided with a properly secured cover.
13. Instructions: The manufacturer shall provide clear, concise instructions covering the unit which, when followed, will assure proper installation and safe and satisfactory operation.
14. Surface Activity: The surface of the ground over the individual sewage disposal system or any part thereof, must be restricted to activity or use which will allow the system to function as designed and which will not contribute to compaction of the soil nor to structural loading detrimental to the capability of the component to function as designed.
15. Distribution Box: A distribution box, if used, shall be of sufficient size to equally distribute effluent to the lateral lines and shall be constructed with the inlet invert at least one (1) inch above the level of the outlet invert.
16. Sewage Pumping System Where Applicable:
  - a. Non-clog pump opening shall have at least 2-inch diameter solids handling capacity where raw sewage is pumped or not more than 1/2-inch diameter solids handling capacity if previously settled effluent is pumped.
  - b. Automatic liquid level controls shall be provided to start and shut off pumps at a frequency required by the design.
  - c. Pressure pipe shall be of sufficient strength to accommodate pump discharge pressure and the pipe shall be sized to maintain a velocity of 2 or more feet per second.
  - d. Automatic air release valves shall be installed at high points in the pressure line where necessary to prevent air locking.
  - e. A storage basin preceding the pump shall be provided to allow pump cycling commensurate with the pump design capacity. The

second compartment of the septic tank shall not be used as a pumping chamber unless it can be shown that the minimum 30-hour detention time will not be decreased and the pump is screened or provided with an approved filtering device to assure that only liquid effluent will be discharged.

f. The discharge line from the pumping chamber shall be protected from freezing by burying the pipe below frost level or sloping the pipe to allow it to be self-draining.

17. Floodplains: No new or expanded system shall be installed in a floodway. When a system is installed in a 100-year floodplain then the new or repaired system shall meet or exceed the requirements of the National Flood Insurance Program. The system as approved by the local Health Officer or his/her designated agent shall be designed to minimize or eliminate infiltration of floodwaters into the system, and discharge of the system into the floodwaters.

B. Design Criteria (First Stage Treatment Units)

1. Septic Tank:

a. A septic tank shall be constructed to permit detention of incoming sewage for a minimum of thirty (30) hours, or the capacity shall be based upon the number of bedrooms according to the following table:

SEPTIC TANK SIZE BASED UPON NUMBER OF BEDROOMS

<u>Number of Bedrooms</u>	<u>Minimum Effective Liquid Tank Capacity (gallons)</u>
2	750
3	1000
4	1250
Each Additional	250

b. Septic tank design criteria:

- (1) Except for grey water systems the effective liquid capacity shall be no less than 750 gallons.
- (2) Inlet invert shall be at least 3 inches higher than the outlet invert.
- (3) Outlet tee or baffle shall extend above the surface of the liquid to within one inch of the underside of the tank top

and shall extend at least 14 inches below the outlet invert.

- (4) The distance from the outlet invert to the underside of the tank top shall be at least 10 inches.
  - (5) Liquid depth shall be a minimum of 30 inches and the maximum depth shall not exceed the tank length or 60 inches, whichever is less.
  - (6) A septic tank shall have two or more compartments or more than one tank may be used in series to provide the following capacity arrangement. The first compartment of a septic tank shall hold no less than 1/2 of the required effective capacity.
  - (7) The transfer of liquid from the first compartment to the second or successive compartment shall be made at a liquid depth of at least 14 inches below the outlet invert, but not in the sludge zone.
  - (8) At least one access no less than 20 inches across shall be provided in each compartment of a tank.
  - (9) The opening cover of a septic tank manhole, inspection port, or sampling access port shall be no deeper than 8 inches below the finished grade, and made of materials resistant to degradation from moisture or sewer gases.
- c. Pipe meeting or exceeding ASTM Standard D 3034 properly supported to prevent failure by settling shall extend from the septic tank for a distance of at least five (5) feet from the inlet and outlet ends.

2. Aerobic Sewage Treatment System:

- a. General Design: The shape and design of an aeration compartment, its inlet and outlet arrangements, baffling and air application shall:
  - (1) Allow for intimate mixing of applied sewage, return solids, and applied air.
  - (2) Prevent excessive short-circuiting of flow.
  - (3) Prevent the deposition and buildup of solids in the aeration compartment.
- b. Method of Aeration: The method of aeration shall be

accomplished by mechanical aeration, diffused air, or a combination of these. The method of aeration shall at all times maintain aerobic conditions at the maximum organic loading in both the aeration and settling compartments.

C. Design Criteria (Second or Later Stage Treatment Units):

1. Soil Absorption System (General):

- a. For a system treating and disposing of effluent through a soil absorption system, the method for calculating minimum absorption area shall be based upon the amount of suitable soil and the capacity of the soil to absorb liquids as established by the percolation test and upon design criteria and construction standards for such type of absorption system as set forth in these guidelines.
- b. Unless designed by a registered professional engineer and approved by the local board of health (approval may be given by the local health department if authorized by regulations of the local board of health for such systems treating exclusively domestic wastes), no such system may be permitted in areas exhibiting any of the following conditions:
  - (1) Where the soil percolation rate is slower than one inch in sixty minutes or faster than one inch in five minutes except that a percolation rate faster than one inch in five minutes in soils of sandy texture may be permitted, or the percolation may be slowed by soil treatment.
  - (2) Where the maximum seasonal level of the groundwater table is less than four feet below the bottom of the proposed absorption system.
  - (3) Where bedrock exists less than four feet below the bottom of the proposed absorption system.
  - (4) Where the ground slope is in excess of thirty percent.
- c. Soil building or replacement will be permitted to bring the soil within the requirements of suitable soil.
- d. Absorption Area Formulas: In the course of developing local ISDS Regulations, the Local Board of Health is to determine that to be used within its jurisdiction.
  - (1) The minimum absorption area in square feet (A) for an individual sewage disposal system shall be determined as a function of the design flow of sewage in gallons per day,

(Q), and the percolation rate in minutes per inch, (t), according to the formula:

$$A = \frac{Q}{5} \sqrt{t}$$

Note: Where the percolation rate is found to be faster than five minutes per inch in soils of sandy texture, the minimum value of the "t" for use in this formula shall not be less than "5".

- (2) Long Term Acceptance Rates (LTAR): The minimum absorption area A in square feet may also be computed as a function of the design flow (Q) and the Long Term Acceptance Rate (LTAR) according to the formula:

$$A = \frac{Q}{\text{LTAR}}$$

LTAR's for Wastewater for Soil Absorption Systems

<u>Percolation Rate</u> (Minutes/Inch)	<u>Typical soil</u> <u>Textures</u>	<u>Maximum Loading</u> <u>Rate</u> (gal/sq. ft./day)
<5**	Gravel**	Not Suitable
1-5	Coarse to Medium Sand	1.30
6-10	Fine Sand to Loamy Sand	1.20
11-20	Sandy Loam to Loam	.72
21-30	Loam	.50
31-40	Loam to Silty Loam*	.40
41-60	Clay Loam to Clay*	.30
Over 60**	Silty Clay Loam/Silty Clay	.20

\*Soils without highly expansive clays

\*\*Design by Registered Professional Engineer required

Note: Percolation rates faster than 5 minutes per inch require a Professional Engineer design as per C.1.b.(1) above.

e. Allowable Absorption Area Reductions and Increases:

- (1) Adjustment for Deep Gravel: The length of an absorption trench or seepage bed may be calculated by allowance for the sidewall area of additional depth of gravel in excess of six (6) inches below the bottom of the distribution pipe

according to the following formula:

$$L = \text{length required prior to adjustment} \times \frac{(W + 2)}{(W + 1 + 2d)}$$

Where: W = width of trench in feet

d = depth of gravel below distribution pipe in feet.

- (2) Flow reduction for the use of permanently installed devices may be allowed at the discretion of the local health officer or his/her designated agent, but in no case shall the maximum daily flow used for design purposes allow greater than 20% reduction.
  - (3) Reduction in soil absorption area may be allowed for gravelless soil absorption systems upon approval of the Department and at the discretion of the local health officer or his/her designated agent.
  - (4) The absorption area calculated as in subparagraph "d.(1.)" above may be increased by an additional twenty (20%) percent if wastes from a garbage grinder are discharged into the system and by not more than an additional forty (40) percent if wastes from an automatic clothes washing machine are discharged into the system.
  - (5) If dosing is used in conjunction with an absorption trench or seepage bed system, a reduction of twenty-five percent (25%) may be allowed if approved by the local health officer or his/her designated agent.
  - (6) The maximum reduction from all combined alternatives shall be no greater than 50% of the standard required soil absorption area and shall be subject to the limitation contained in item (4) above.
- f. The ground surface shall be graded to deflect precipitation or other outside water from the disposal area. The absorption area shall be protected against erosion.
- g. Alternating Systems: A diversion valve or other approved diversion mechanism may be installed on the septic tank effluent line allowing alternating soil absorption systems. Each soil absorption system shall be a minimum of fifty (50%) percent of the total area required excluding the reductions given for dosing and gravelless systems. The diversion mechanism shall be readily accessible from the finished grade and shall be switched on an

annual basis. Reductions in absorption field area are not applicable to alternating systems; flow reductions may be taken where applicable.

- h. Dosing: Dosing may be used in conjunction with soil absorption systems. The dosing frequency may be calculated according to the following table:

Suggested dosing Frequencies for Various Soil Textures

<u>Soil Texture</u>	<u>Dosing Frequency</u>
Sand	4 doses / day
Sandy Loam	1 dose / day
Loam	Frequency not critical*
Silty Loam	1 dose / day*
Silty Clay Loam	1 dose / day*
Clay	Frequency not critical*

\*Long term resting provided by alternating fields is desirable and recommended in these soils

2. Absorption Area Construction

- a. Absorption Trench and Seepage Bed: an absorption trench or seepage bed shall be of sufficient width and length or dimension to provide the required absorption area. The bottom of the trench or bed and distribution lines shall be level. Perforated distribution pipe which shall be required for an absorption trench or seepage bed shall be placed the entire length of the trench or bed and shall be surrounded by clean graded gravel, rock or material of equal efficiency which may range in size from 1/2 inch to 2 1/2 inches and shall be placed from at least 2 inches above the top of the distribution pipe to at least 6 inches below the bottom of the distribution pipe. The separating distance between soil absorption systems shall be a minimum of six (6) feet sidewall-to-sidewall. The separating distance between parallel distribution lines in a seepage bed shall not exceed 6 feet and a distribution line shall be located within 3 feet of each sidewall of the seepage bed. Pipe for gravity distribution shall be no less than 3 inches in diameter and preferably less than 100 feet in length. The terminal ends of lines shall be capped unless looped or air vented. The top of the placed gravel or such material used shall be covered with a layer of hay, straw or similar pervious material. An impervious covering shall not be used. Tile or open joint pipe shall not be used.

A final cover of soil suitable for vegetation at least 10 inches deep shall be placed from the top of the hay, straw or similar pervious material to the finished surface grade of an absorption trench or

seepage bed. The final cover shall be graded to deflect runoff water away from the disposal area.

Machine tamping, rolling or hydraulic compaction of final cover shall not be permitted, however, hand tamping may be allowed where necessary to stabilize the soil to prevent erosion or the intrusion of extraneous water.

If dosing is used in conjunction with an absorption trench or seepage bed system, the dosing chamber shall be sized to account for the volume of the distribution system and the dosing frequency.

- b. Absorption or Seepage Pits: Absorption or seepage pits having adequate soil absorption may be permitted by the local health departments as an alternative, where absorption fields are impracticable, and where the subsurface conditions are otherwise suitable for pit installations. The capacity of the pit shall be computed on the basis of percolation tests made in each stratum penetrated. The weighted average of the results shall be used to obtain a design figure. Soil strata in which the percolation is slower than 30 minutes per inch shall not be used for absorption or seepage. The effective area of the pit is the vertical wall area (based on dug perimeter) of the pervious strata below the inlet. No allowance shall be made for impervious strata or bottom area. Pits shall be separated by a distance equal to 3 times the greatest lateral dimension of the largest pit. For pits over 20 feet in depth, the minimum space between pits shall be 20 feet. Pits shall be provided with both vertical sidewall and top supporting structural concrete or other material of equal structural integrity. Adequate safety protection shall be provided to protect against personal injury during construction or use.
- c. Dry Wells: Dry wells may be permitted by the local health department. They shall be filled with clean, graded rock which may range in size from 1/2 to 2 1/2 inches in diameter. The rock shall extend from the bottom of the pit to at least two (2) inches above the inlet pipe. At least one four (4) inch perforated vertical standpipe will be attached to the end of the distribution line with a tee fitting. It shall extend to the bottom of the drywell and up to the finished grade and fitted with a removable cap to be used as an inspection pipe. The absorption area of the dry well shall be computed on the basis of percolation rates, or the long-term acceptance rates of each stratum penetrated. The weighted average of the results shall be used to obtain a design value. The effective area of the pit will be calculated by adding the area of the sidewalls below the horizontal inlet line and the area of the bottom of the pit, excluding any impermeable stratum penetrated. Dry wells so sized may only be permitted in soils with a percolation rate faster than

sixty (60) minutes per inch. Drywells shall be separated by a distance equal to the depth of the excavation or ten (10) feet, whichever is greater.

3. Serial Distribution System: A serial distribution system may be used in all situations where a soil absorption system is permitted and shall be used where the ground slope does not allow for suitable installation of a single level absorption field, unless a distribution box or dosing chamber is used. The horizontal distance from the side of the absorption system to the surface of the ground shall be adequate to prevent lateral flow and surfacing of effluent above ground. When a serial distribution system is used, the following design and construction procedures shall be followed.
  - a. The bottom of each absorption field and its distribution line shall be level.
  - b. There shall be a minimum of 10 inches of ground cover over the gravel fill.
  - c. An absorption field shall follow approximately the ground surface contours so variation in absorption field depth will be minimized.
  - d. There shall be a minimum of 6 feet (horizontal measurement) of undisturbed earth between adjacent absorption field trenches and between the septic tank or other treatment unit and the nearest absorption field.
  - e. Adjacent absorption fields shall be connected with a relief line or a drop box arrangement such that each trench fills with effluent to the top of the gravel before flowing to succeeding trenches.
4. Evapotranspiration Disposal of Effluent: An evapotranspiration system may be used exclusively or in combination with a soil absorption system.
  - a. An evapotranspiration system shall be designed by a registered professional engineer who shall furnish design data for a complete review of the design.
  - b. Data to be furnished shall include, but shall not be limited to: liner material and bedding, properties of the soil in the evapotranspiration bed, and provision for vegetation cover.
  - c. When high groundwater table, bedrock, fractured rock, or highly pervious material (percolation faster than 5 minutes per 1 inch) endanger the underground water, a durable and impermeable liner shall be installed to prevent the sewage effluent from entering the underlying formation or groundwater table.

- d. An evapotranspiration system shall be located in an area where there is exposure to sunshine.
- e. The system bed shall be crowned and covered with a minimum of four (4) inches of selected backfill material and with a vegetation cover.
- f. Bed area shall be protected to prevent damage from vehicular or pedestrian travel. The ground surface shall be graded to deflect precipitation and other outside water away from the disposal area.
- g. The following formula may be used as a guide for determining the area necessary for total evapotranspiration of septic tank effluent:

$$\text{Area (in square feet)} = \frac{\text{Design Flow (in gallons per day)} \times 586}{\text{Lake Evaporation Rate at the Site (in inches per year)}}$$

- h. As an alternative, a system may be designed on the basis of a monthly water balance for the system. Such a design would provide for total storage of average daily flows for all periods in which evapotranspiration is not shown to occur. The design shall also provide wicks (sand structures which penetrate through the rock media to the bottom of the bed) equal to 10 to 15 percent of the bed surface area. The wicks shall be uniformly spaced throughout the bed. Adequate surface area shall be provided to evaporate/transpire total annual average daily flows at a rate equivalent to local net lake evaporation over the remaining period of the year. (If the system is designed as a percolation/evapotranspiration system, the amount of storage and ET capacities may be reduced by the volume of effluent percolating into the soil.)
- i. Sand utilized in Evapotranspiration or Evapotranspiration/Absorption beds for cover shall meet the following gradation requirements and be approved by the design engineer:

<u>Sieve Size</u>	<u>Percent (%) Passing</u>
4	100
40	50-55%
200	<15

Note: Except for dwellings, if the system is designed for summer use only, as determined by the local health department, multiply the above area by 0.6 to obtain the required area.

5. Sand Filter:

- a. The filtering material shall be clean, coarse sand, all passing a screen having four meshes to the inch. The sand shall have an effective size between 0.25 and 0.6 mm. The uniformity coefficient shall be 4.0 or less.
- b. The sand shall be at least 2 feet deep below the distribution lines. The distributors and underdrain, if required by the local board of health, shall be surrounded by coarse screened gravel or crushed stone.

Underdrain effluent must then be discharged via a soil absorption system or be further treated as necessary to meet receiving water standards or those of Article IX as applicable.

All of the gravel or stone shall pass a 2 1/2 inch screen and shall be retained on a 3/4-inch screen. Fine gravel 1/4 inch size or less may be used above and around the coarse material, both at the distributor and underdrains. The separating distance between parallel distribution lines shall not exceed 6 feet, and a distribution line shall be located within 3 feet of each filter sidewall. Pipe for gravity distribution shall be no less than 4 inches in diameter. The slope of the distributors shall be 0.4 percent where dosing tanks are not used, and the slope of the underdrains 0.5 to 1.0 percent. The sand must be thoroughly settled by flooding or other means before the distributors are placed at the final grade. The distributor and underdrains may be of agricultural tile, or bell and spigot pipe, or perforated pipe.

The top of the sand bed shall be no less than 4 feet above the high ground water table for installations in which effluent percolates downward through the soil.

- c. The minimum area for a sand filter shall be computed as a function of the maximum daily sewage flow according to the following table.

LOADING RATES FOR A SAND FILTER

<u>Type of Service</u>	<u>Application Rate Gallons per Square Foot per Day</u>
Without Garbage Grinder	1.15
With Garbage Grinder	.95

- d. A dosing tank shall be provided where the total filter area exceeds 1,800 square feet. The size of the dose, or the net capacity of the dosing tank, shall be at least 75 percent of the volume of the distributors.

6. Wastewater Pond:

- a. A wastewater pond, where permitted by the local board of health, may be used to provide an additional degree of treatment following first stage treatment. The pond shall be designed for a loading not to exceed 0.46 pounds of BOD<sub>5</sub> per 1,000 square feet of water surface area. Special design shall be required in each case in which non-domestic kinds of individual sewage disposal system wastes will be received.

Maximum water depth in the pond shall not exceed 5 feet. The inside slope of the pond, dike or embankment shall not be steeper than 2:1, (2 feet measured horizontally for each foot measured vertically). A center inlet shall be provided.

- c. Unless four feet of unsaturated soil exists beneath the bottom of the pond, said pond shall be constructed in impervious soil or be sealed to prevent excess seepage of wastewater. Only ponds exhibiting an exfiltration rate of  $1 \times 10^{-6}$  cm/sec. or less shall be deemed adequate to prevent excess seepage.
- d. Adequate safety protection shall be provided, such as fencing and signs, to protect against personal injury.
- e. Surface runoff shall be diverted away from the pond except where controlled by design.

7. Mound Systems: A mound soil absorption system shall be designed by a registered professional engineer, and the design shall be site-specific and include specifications for fill material, basal area size calculations, absorption area calculations, distribution networks, cap, topsoil, final grading, and other pertinent information to the construction of the system as may be requested by the health officer or his/her designated representative.

- a. The distribution system shall be designed for uniform effluent application throughout the mound.
- b. The effluent distribution system shall be graded to drain back to the dosing chamber or buried below frost line.
- c. The final slope of the mound backfill shall be no greater than 3 to 1

(three [3] feet horizontally to one [1] foot vertically).

- d. The mound shall be planted with suitable vegetative cover.
8. Gravelless Soil Absorption System: All gravelless soil absorption systems shall be approved by the Colorado Department of Health. Where permitted by the local board of health these systems shall be limited to only those absorption area reductions given through the Department's certification. The absorption area of a chamber type absorption system shall be equivalent to the footprint of the interior of the chamber (Interior base area).
9. Constructed Wetland Treatment: A constructed wetland treatment system shall be designed by a registered professional engineer and the design shall be site specific and include specifications for: loading, capacity, liner material, filter media, density and species of plant material, effluent level, final discharge type, and other pertinent information as requested by the health officer or his/her designated representative. The design shall include estimates of effluent quality at the inlet and outlet. Sampling ports, or some other means of effluent sampling, to demonstrate compliance with Section IX of these Guidelines, shall be required by the local health department. Sampling is to be paid for by the owner.

D. Additional Design Criteria (Other Facilities):

1. Grey water system: A grey water system shall meet at least all minimum design and construction standards for a septic tank system based on the amount and character of wastes for the fixtures and the number of persons to be served.
2. Vault: A vault, if permitted by the local board of health, shall have a minimum 1000 gallon effective capacity and may be permitted under limited use occupancy for water carriage sewage systems on property which cannot accommodate a sewage treatment system. A signal device shall be installed to indicate when pumping is necessary.
3. Vault Privy: A vault privy, if permitted by the local board of health, shall be built to include: fly-tight construction, a superstructure affording complete privacy, an earth mound around the top of the vault and below floor level, which slopes downward away from the super-structure base, a floor and riser of concrete or other impervious material, and with seats and covers of easily cleanable, impervious material, and hinged. All venting shall be fly-proofed with No. 16 or tighter mesh screening. Effective capacity of the vault shall be no less than 400 gallons.
4. Pit Privy: A pit privy constructed in soil, if permitted by the local board of health, shall be built to include: fly-tight construction; a superstructure affording complete privacy and a self-closing door; an earth mound

around the top of the compartment and below the floor level, which slopes downward away from the superstructure base; a floor and riser of concrete or other impervious material; and with seats and covers of easily cleanable, impervious material, hinged. All venting shall be fly-proofed with No. 16 or tighter mesh screening. Effective capacity of the pit shall be no less than 400 gallons. Pit shall be located in soil where the maximum seasonal level of the groundwater table will be no closer than four (4) feet below the bottom of the pit.

5. Incineration and Chemical Toilets: An incineration toilet, which may be used in connection with a grey water system by permit from the local board of health, shall be designed and installed in accordance with all applicable federal, state, and local air-pollution requirements. A portable chemical toilet, which may be used by permit from the local board of health, shall have a superstructure which meets the requirements of the paragraph titled Vault Privy. Use of a portable chemical toilet in permanently occupied buildings shall be prohibited except during construction or under emergency circumstances as determined by the local health department.
6. Slit Trench: A slit trench, if permitted by the local board of health, shall be located in suitable soil and shall be excavated approximately one foot wide and two feet deep for the required length. Excrement shall be covered with at least two inches of soil at least once a day or more frequently if requested by the local board of health or its designated agent. A superstructure of a temporary nature shall be provided to afford privacy. A slit trench shall be considered a temporary convenience to be used no longer than 7 days, and shall be backfilled with at least one foot of soil with additional allowance for settling to grade when use has been discontinued.
7. Business, Commercial, Industrial, Institutional or Multi-family Dwelling Waste Systems:
  - a. Performance criteria and construction standards for a system which will service commercial, business, institutional or industrial property, or multifamily dwellings shall conform to these guidelines.
  - b. Such systems shall be designed by a registered professional engineer. An application for such a system shall be reviewed by the local board of health unless disposal is through an absorption system and the wastes are exclusively domestic type wastes, in which case review shall be by the local health department if authorized by regulations of the local board of health for such systems.
  - c. Systems shall receive only such biodegradable wastes for treatment

and disposal as are compatible with those biological treatment processes as occur within the septic tank and the soil matrix.

8. Composting Toilets:

- (1) Deposits of feces, urine, and readily decomposable household garbage that are not diluted with water or other fluids may be retained in a compartment, in which aerobic composting will occur. The compartment may be located, subject to local board of health or other applicable regulations or codes, within a dwelling or building provided the unit complies with the applicable requirements of these guidelines, and provided the installation will not result in conditions considered to be a health hazard as determined by the local health department. The effective volume of the receptacle must be sufficient to accommodate the number of persons served.
- (2) Adequate additional volume shall be provided for the use of composting materials which shall not be toxic to the process or hazardous to persons and which shall be used in sufficient quantity to assure proper decomposition.
- (3) Compartment and appurtenances related to the unit shall include fly-tight construction and exterior ventilation as required by the Uniform Plumbing Code.
- (4) When the available effective volume is filled to seventy-five percent (75%) of capacity, residue from the unit shall be properly disposed of by acceptable solid waste practices.
- (5) If a system will be installed where low temperature may be a factor, design shall compensate for the effects of the low temperature.
- (6) Composting toilets shall bear the seal of approval of the National Sanitation Foundation or an equivalent testing program. Composting toilets shall be operated according to manufacturer's specifications.

9. Systems for which data on design, operation and maintenance, based upon use in Colorado, are limited or undetermined:

- a. Systems which recycle treated wastewater for non-potable purposes such as flushing water closets or urinals:
  - (1) That portion of the wastewater recycled for non-potable purposes such as flushing water closets or urinals must meet the treatment requirements of Article IX of these

guidelines for effluent in which the possibility exists for occasional direct human contact.

(2) No cross-connection to a pipe, fixture, or supply containing potable water shall be permitted.

b. Systems which recycle treated wastewater for potable purposes:

(1) No system shall be permitted which will recycle wastewater for potable purposes except a system which shall consistently meet all of the sanitation and maximum contaminant level requirements of rules, regulations and standards of the Colorado Department of Health and of the local board of health.

IX. Treatment Systems Other Than Those Discharging Through a Soil Absorption or Sand Filter System and Non-discharging Systems

A. General:

Those systems which will discharge effluent directly to the atmosphere, the ground surface or below ground, or which employ aerobic principles of sewage treatment or a dispersal system, may be permitted only if designed by a registered professional engineer. This Article IX shall not apply to systems discharging below ground through a soil absorption system or sand filter system or to a non-discharging system.

B. Review of Application:

The local board of health shall review all applications for such systems which may result in discharge or drainage of effluent from the property of origin. No permit shall be issued for such a system if the local board of health determines a potential health hazard or private or public nuisance or undue risk of contamination exists. The local board of health may, by regulation, authorize the local health department to review applications and issue permits for systems which do not permit the drainage of effluent off the property of origin. For systems discharging to State waters, see XII.

C. The following minimum performance criteria shall be required for all systems pursuant to this Article IX:

1. If effluent discharge is made into the atmosphere or upon the ground surface in areas in which the possibility exists for occasional direct human contact with the effluent discharge, the effluent at the point of sampling shall meet each of the following standards:

a. The geometric mean of the fecal coliform density shall not exceed twenty five (25) per one hundred (100) milliliters when averaged

over any five (5) consecutive samples, and no single sample result for fecal coliform shall exceed two hundred (200) per one hundred (100) milliliters.

- b. The arithmetic mean of the standard 5-day biochemical oxygen demand (BOD<sub>5</sub>) shall not exceed twenty (20) milligrams per liter when averaged over any three (3) consecutive samples.
  - c. The arithmetic mean of the total suspended solids shall not exceed forty (40) milligrams per liter when averaged over any three (3) consecutive samples.
2. If the effluent discharge is made into the atmosphere or upon the ground surface in an area so restricted as to protect against the likelihood of direct human contact with the discharged effluent, the effluent at the point of sampling shall meet each of the following standards:
  - a. The geometric mean of the fecal coliform density shall not exceed five hundred (500) per one hundred (100) milliliters when averaged over any five (5) consecutive samples, and no single sample shall exceed five thousand (5000) fecal coliform per one hundred (100) milliliters.
  - b. The arithmetic mean of the standard 5-day biochemical oxygen demand (BOD<sub>5</sub>) shall not exceed twenty (20) milligrams per liter when averaged over any three (3) consecutive samples.
  - c. The arithmetic mean of the total suspended solids shall not exceed forty (40) milligrams per liter when averaged over any three (3) consecutive samples.
3. If effluent discharge is made beneath the surface of the ground and discharge will not be made through suitable soil, either existing or constructed, or through a sand filter, the following standard shall be met:
  - a. There shall be at least (4) feet of soil between the maximum seasonal high water table and the level of effluent discharge.
  - b. The arithmetic mean of the standard 5-day biochemical oxygen demand (BOD<sub>5</sub>) shall not exceed sixty (60) milligrams per liter when averaged over any three (3) consecutive samples.
  - c. The arithmetic mean of the total suspended solids shall not exceed one hundred (100) milligrams per liter when averaged over any three (3) consecutive samples.
4. To determine compliance with the standards contained in this section IX samples shall be taken at least once per week but no more frequently than

once per day.

D. Methods of Analysis - Sampling Points:

All effluent samples shall be analyzed according to the methods prescribed in the 18th Edition of "Standard Methods for the Examination of Water and Wastewater" (American Public Health Association). The point of sampling shall be a location that is representative of final discharge from the system.

X. Manufactured Units Utilizing Mechanical Apparatus for Treatment of Sewage

A. Individual Sewage disposal systems utilizing mechanical apparatus and furnished for installation in Colorado shall comply with the minimum requirements of criteria and construction standards set forth in these guidelines.

B. No such unit utilizing mechanical apparatus and which is designed for discharge either upon the ground or beneath the ground surface or which may adversely affect state waters shall be permitted unless:

1. the system is installed within a geographic area wherein a public, quasi-public, or private entity, or political subdivision is continually responsible for the efficient operation and maintenance of said unit,
2. Or the operator of the system insures an efficient operation of all mechanical and electrical component parts provided prior to and during continuing use.

XI. Approval of Systems Employing New Technology

A. For purposes of this Section XI, a system employing new technology is a system based on improvements and developments in technology of sewage disposal and not otherwise provided for in Section 25-10-105(1)(e) through (j).

B. Certification

1. Except as provided for in paragraph C. of this Section XI, upon application by a systems contractor, registered professional engineer or manufacturer of an individual sewage disposal system employing new technology, the Division may hold a public hearing to determine whether the system for which application has been made has established a record of performance reliability which would justify approval of permits by the health officer in the same manner as which the health officer acts on applications for permits for systems which treat and dispose of effluent through an absorption system.

- a. In any case where the Division has received information that a system for which application for certification has been made is not reliable, the Division shall hold a hearing pursuant to subparagraph

B.1.

- b. In no case shall the Division deny certification without holding a hearing pursuant to subparagraph B.1.
  - c. Notice of the time and place of such hearing shall be given at least once, at least 20 days in advance thereof by publication in the Colorado Register and by mailing thereof to all local boards of health and to all persons who have expressed an interest therein or who have requested to be placed on a list for notification which shall be kept by the Division expressly for this purpose.
  - d. Any person may participate in the public hearing by presenting written or oral testimony at the discretion of the Division. No person shall be denied an opportunity to participate at the hearing without good cause shown.
- 2. If the Division determines, based upon reasonable performance standards and criteria that the system's reliability has been established, then the Division shall certify the system and shall notify each local board of health of said certification.
  - 3. Upon notice of certification, a local health officer or his/her designee shall be entitled to consider a permit application for the certified system in the same manner as applications for systems which treat and dispose of effluent through an absorption system.
  - 4. The Division's determination on whether to grant certification shall be final agency action for the purposes of the State Administrative Procedure Act, Sections 24-4-101 to 108, C.R.S. (1982).
  - 5. A denial of certification shall be in writing with the reasons for denial contained therein.
- C. The Division shall certify any system employing new technology for subsurface discharge without holding a public hearing pursuant to subparagraph B.1. when the system bears the National Sanitation Foundation Standard 40 Certification or meets an equivalent testing program's standards.
  - D. Certification pursuant to this section shall not relieve the holder thereof or the user of a certified system from the responsibility of complying with these guidelines and any applicable rules and regulations adopted pursuant to law.
  - E. If, at any time after an individual sewage disposal system employing new technology has been certified pursuant to this Section XI, the Division receives information that the system so certified does not meet the standards in these Guidelines or in any way constitutes a public health hazard, the Division may, in its discretion, hold a public hearing to revoke certification. In holding this

hearing, the Division shall follow the same procedure as is laid out in paragraphs B.1.c. and B.1.d. of this Section XI. The Division's decision to revoke certification after the hearing shall be final agency action for the purposes of the State Administrative Procedures Act.

- F. Pending a final decision by the Division on certification of an individual sewage disposal system employing new technology or revocation of certification previously issued pursuant to this Section XI, local boards of health may determine whether to issue a permit for the system pursuant to regulations adopted under 25-10-106(1)(g) of the Act.
- G. Certification of systems under this Section XI shall be specific to those model(s) certified pursuant to paragraphs B. or C. only.

## XII. Effluent Discharged to State Waters

Any system which will dispose of effluent by discharging into State waters shall be designed by a registered professional engineer, and the application shall be submitted for preliminary approval to the local board of health. Once approved, the application shall be forwarded to the Division for issuance of a permit in compliance with all applicable regulations of the Water Quality Control Commission. Compliance with such a permit shall be deemed full compliance with all individual sewage disposal system regulations.

## XIII. Installation

- A. General: Treatment units shall be set on a firm and level base except as otherwise provided in these guidelines and shall be capable of accommodating flow with hydraulic efficiency.
- B. Mechanical Components:
  - 1. Ventilation and Air system: Mechanical components shall be installed in a properly vented location and all vents, air intakes, and air hoses shall be protected from snow, ice, or water vapor accumulations.
  - 2. Components Installation: Mechanical components installed in or at the unit must be protected against damage or impairment of their efficiency by flooding, foaming, or surcharging.
- C. Covers, Barriers, or Other Protection: All systems must be installed to include protection of openings against entrance of insects and rodents.

## XIV. Operation and Maintenance

- A. Responsibility: The owner and the party in possession of real property upon which an individual sewage disposal system is used, shall be jointly and severally responsible for operation and maintenance of the system unless jurisdiction for responsibility has been transferred to a public, quasi-public, or political

subdivision. The person denying such responsibility shall bear the burden of proof for such denial upon establishment of ownership or possessory rights in the property served by the system.

- B. Service Label: For treatment plants utilizing mechanical apparatus or under a service policy, a clearly visible, permanently attached label or plate giving instructions for obtaining service shall be placed at a conspicuous location.
- C. Maintenance and Cleaning: When directed by the local health department, for the purpose of obtaining compliance with rules and regulations, the owner or user of a system shall provide for maintenance and cleaning of an individual sewage disposal system and shall notify the local health department upon completion of any maintenance work and report to said department and submit such evidence of compliance with any maintenance and cleaning schedule in the form and as the department requires.
  - 1. The local board of health may adopt rules and regulations for the scheduling of maintenance and cleaning of systems and practices adequate to insure proper functioning of acceptable systems, and may require proof of proper maintenance and cleaning, pursuant to any such schedules and practices, to be submitted periodically to the local department of health by the owner of the system.
- D. Monitoring and Sampling:
  - 1. Reasonable periodic collection and testing by the local health department of effluent samples from individual sewage disposal systems for which monitoring of effluent is necessary in order to insure compliance with the provisions of rules and regulations may be performed not more than two times a year, except when required by the health officer in conjunction with an enforcement action.
  - 2. Any owner or occupant of property on which an individual sewage disposal system is located may request the local health department to collect and test an effluent sample from the system. The local health department may perform such collection and testing services.
  - 3. If the local health department collects and tests effluent samples, a fee not to exceed that which is allowed by 25-10-101 et. seq. (as amended) C.R.S. 1973, may be charged for each sample collected and tested. Payment of such charge may be stated in the permit as a condition for its continued use.
- E. Disposal of Waste Materials:

Disposal of waste materials removed from a system in the process of maintenance or cleaning shall be accomplished at a site approved by local county officials in a manner which does not create a hazard to the public health, a nuisance or an

undue risk of pollution and which complies with state and local rules and regulations. (See Sludge Regulations and Solid Waste Regulations.)

F. No Discharge is Permitted Which Does not Comply With Rules and Regulations:

No sewage or effluent shall be permitted to be discharged into or upon the surface of the ground or into state waters unless the sewage system and effluent meets the minimum requirements of applicable rules and regulations.

G. Termination of Use of System:

The contents of a septic tank, vault, or seepage pit, the use of which has been terminated, shall be properly disposed of whereupon the emptied tank, vault, or pit shall be filled with soil or rock, or the health officer may require the tank or vault to be removed and disposed of properly.

XV. Findings on Appeal

- A. Any applicant whose permit application has been denied by the health officer may request review of the application by the local board of health.
- B. A request for review shall be made within 60 days after denial of an application by the local health officer.
- C. The applicant shall bear the burden of supplying the local board with sufficient evidence to document that the denied system will be constructed and used in such a manner as to comply with the declaration and intent of these guidelines and all applicable state and local rules and regulations and required terms and conditions in any permit issued pursuant thereto.
- D. Such review shall be conducted pursuant to the requirements of C. R. S., 24-4-105.

For purposes of administration and enforcement of the "Individual Sewage Disposal Systems Act" (Article 10 of Title 25, C.R.S., the following provisions of said Act specifying general prohibitions and penalties, and are set forth for ease of reference but not as guidelines herein:

Section 25-10-111, C.R.S. General Prohibitions

- 1) No city, county, or city and county shall issue to any person a permit to construct or remodel a building or structure which is not serviced by a sewage treatment works, until a permit for an individual sewage disposal system has been issued by the local health department.
- 2) No city, county, or city and county occupancy permit shall be issued to any person for the use of a building which is not serviced by a sewage treatment works until a final inspection of the individual sewage disposal system has been conducted and final permit issued by the local health department, as provided for

in Section 25-10-106 (1)(h) C.R.S. and the installation has received the approval of the local health department.

- 3) No individual sewage disposal system presently in use which does not comply with the provisions of Section 25-10-105 (1)(e) regarding minimum separation between the maximum seasonal level of the groundwater table and the bottom of an absorption system shall be permitted to remain in use without compliance with this section and the rules and regulations adopted under this section, later than October 1, 1975.
- 4) Construction of cesspools defined as covered underground receptacles which receive untreated sewage from a building and permit the untreated sewage to seep into surrounding soil are prohibited.
- 5) Not more than one dwelling, commercial, business, institutional or industrial unit shall be connected to the same individual sewage disposal system unless such multiple connection was specified in the application submitted and in the permit issued for the system.
- 6) No person shall construct or maintain any dwelling or other occupied structure which is not equipped with adequate facilities for the sanitary disposal of sewage without endangering the public health.

Section 25-10-112, C.R.S. Penalties

- 1) Any person who commits any of the following acts or violates any of the provisions of this section commits a Class 1 petty offense as defined in Section 18-1-107, C.R.S.:
  - (a) Constructs, alters, installs, or permits the use of any individual sewage disposal system without first having applied for and received a permit as provided for in Section 25-10-105 (1)(f) or Section 25-10-106, C.R.S.;
  - (b) Constructs, alters, or installs an individual sewage disposal system in a manner which involves a knowing and material variation from the terms or specifications contained in the application or permit;
  - (c) Violates the terms of a cease and desist order which has become final under the terms of Section 25-10-106 (1) (k), C.R.S.;
  - (d) Conducts a business as a systems contractor without having obtained the license provided for in Section 25-10-108 (1) C.R.S., in areas which the local board of health has adopted licensing regulations pursuant to said Section;
  - (e) Conducts a business as a systems cleaner without having obtained the license provided for in Section 25-10-108 (2) C.R.S., in areas which the local board of health has adopted licensing regulations pursuant to said

Section;

- (f) Willfully fails to submit proof of proper maintenance and cleaning of a system as required by rules and regulations adopted pursuant to Section 25-10-106, C.R.S.

XVI Statement of Basis and Purpose – September 20, 2000

The Individual Sewage Disposal System Guidelines mandated by Article 10 of Title 25, Section 25-10-104 (1) C.R.S., were first adopted in October of 1973 as temporary emergency guidelines. The State Board of Health then adopted those Guidelines, with minor revisions, in 1974.

As more experience was gained in the field, many questions were directed to the Water Quality Control Division for resolution. Based on the subsequent discussions held with local health agencies, the General Services Section of this Division conducted a limited investigation into the various causes of the ISDS failures throughout the State during the summer of 1977.

The Office of the Attorney General advised the Division of the need to review the 1974 Guidelines. The Division's experience had shown that some local jurisdictions had not adopted their own ISDS regulations as required by Section 25-10-104 (2). This made monitoring and enforcement difficult for this Division. Therefore, the Guidelines, which were adopted in May of 1979, contained a provision that the Guidelines became the local ISDS regulations for any jurisdiction, which failed to adopt its own regulations within one year.

The advent of alternatives in on-site treatment and disposal technology and the 1983 passage of HB 1400, which redefined an individual sewage disposal system, necessitated the revision of the 1979 Guidelines. The Department notified all local boards of health of the opportunity to participate in this revision and accepted all that attended the first two meetings as committee members.

The Colorado Court of Appeals ruled on June 9, 1988 that Language in Section IX of the 1984 Guidelines, providing that systems must "consistently meet" certain standards, is unconstitutionally vague. The 1988 Guidelines identified effluent sampling frequencies and defined the allowable amount and frequency of exceedances of those standards in response to the Court of Appeals ruling.

Further advances in on-site treatment and disposal technologies, as well as a need for general housekeeping review of the regulations, necessitated a revision of the 1988 Guidelines in 1994. This process was initiated by members of the Western Colorado Association of Environmental Health Officers who authored the initial draft of the revised Guidelines. Input was then solicited from all local health agencies. The resulting revisions were then referred back to all local health agencies and to those individuals who had expressed interest in the process.

The main objectives in the 1994 Guidelines were to incorporate new treatment and disposal alternatives, to generally improve the readability of the document, and to correct

a long-standing error in the formula for sizing of evapo-transpiration systems.

In 1997 the Colorado General Assembly made significant revisions to the Individual Sewage Disposal Systems Act. Among the revisions to the ISDS Act was a provision allowing the local board of health “to grant variances to ISDS rules in accordance with the guidelines for rules adopted and revised by the state board” (Section 25-10-105 (2) (a)). On January 19, 2000 the State Board of Health adopted Section XVIII Variance Procedure. This addition to the Guidelines established the framework for that local variance process. All other elements of the Guidelines remained as adopted in 1994.

A review of the newly adopted Section XVIII by the staff of the Office of Legislative Legal Services commenced a discussion of the respective roles of local boards of health and staff regarding the hearing and issuance of variances. The concern centered on the compatibility of the delegation of authority by the board of health to the health officer, environmental health specialist, or similarly qualified individual with the legislative provision granting the authority to grant variances to the local board of health. Ultimately, it was the opinion of the staff of the Office of Legislative Legal Services that the provisions of paragraph B.2.b., providing that “the board may delegate the authority to approve or deny variance requests to the health officer, environmental health specialist, or similarly qualified individual, as designated” to impose requirements and conditions on an approved variance, conflict with the ISDS Act. The ISDS Act, in Paragraph (2) (a) of 25-10-105 provides that “a local board of health shall have authority to grant variances to ISDS rules”.

The purpose for adoption of these Guidelines is to bring the variance procedure into compliance with the provisions for such a process as defined in the enabling statute.

In these revised 2000 Guidelines, changes are made to delete provisions related to the delegation of authority from the local board of health to the health officer, environmental health specialist, or other similarly qualified individual with respect to the variance process. The remaining changes proposed are for the purpose of readopting changes made at the previous rulemaking hearing so that the rule as published in CRS is consistent with that adopted by the Board. Language related to liability on the part of local boards of health, which grant variances, is also deleted. The description of the ISDS permit fee is expanded to cover permits with variances. Examples are provided describing conditions, which might exist, or actions, which might be taken to justify the granting of a variance. The prohibition on the granting of variances to mitigate construction errors is expanded to cover issues other than the ISDS itself.

All other element of the Guidelines remain as adopted in 1994 and all other provisions of Section XVIII establishing minimum procedural requirements regarding the application for, review of, and decision making regarding variances from elements of the ISDS Guidelines remain as adopted in January of 2000.

This statement of basis and purpose applies only to the current Guidelines and not to any previous version.

The above statements are intended to comply with 24-10-103 C.R.S.

## XVII Financial Impact Statement

Since these Guidelines conform to current industry practices, since these Guidelines allow the cost of administering the ISDS program to be passed on to users of that program in the form of permit fees, and since these Guidelines expand the ability of individual property owners to construct and operate individual sewage disposal systems on properties on which such systems could not presently be permitted, they have no adverse fiscal impact. The removal of the ability of the local board of health to delegate the authority to grant variances is expected to have no financial impact.

## XVIII. Variance Procedure

### A. General

The purpose of this Section is to provide a procedure for local health departments to consider variances from the design and/or siting requirements of the Colorado Guidelines On Individual Sewage Disposal Systems. The local boards of health may adopt this or a more stringent procedure, but are not required to adopt any variance procedure. Variances may only be considered by those local health departments which formally adopt and implement a state approved variance procedure.

The local board of health may set fees for processing an ISDS permit with a variance in accordance with the provisions of Section 25-10-107 of the Individual Sewage Disposal Systems Act. This permit fee may be the standard ISDS permit fee or may be a separate fee based upon the cost of processing a permit with a variance.

### B. Requirements for Variance Consideration

1. To consider a variance request, the State Board of Health and then the local board of health must adopt a procedure for issuing variances.
2. Where the local board of health adopts a variance procedure, the board must hear variance cases and approval of a variance requires a majority vote of the local board of health.
3. Prior to the rendering a decision on a variance request, a Public Hearing must be held. The hearing shall be the subject of a Public Notice or notice shall be sent via certified mail, with a minimum 20-day reply time from the date of mailing, to all adjacent property owners.
4. Requests must be accompanied by:
  - a. Site specific request identifying the specific criteria from which a variance is being requested;

- b. Technical justification by a Colorado Registered Professional Engineer or Professional Geologist, which indicates the specific conditions which exist and/or the measures which will be taken to result in no greater risk than that associated with compliance with the requirements of the regulation. Examples of conditions which exist, or measures which might be taken, include but are not limited to the following: evidence of a natural or physical barrier to the movement of effluent to or toward the feature from which the variance is requested; placement of a manmade physical barrier to the movement of effluent to or toward the feature from which the variance is requested; soil amendment or replacement to reduce the infiltration rate of the effluent such that the travel time of the effluent from the absorption field to the physical feature is no less than the travel time through the native soils at the prescribed setback; and treatment equivalent to that required to meet National Sanitation Foundation (NSF) Standard 40 be provided.
  - c. A discussion of alternatives considered in lieu of the requested variance;
  - d. Technical support for selected alternative, which may include a testing program, which confirms that the variance does not increase the risk to public health and to the environment; and
  - e. A statement of the hardship, which creates the necessity for the variance. No variance will be allowed solely for economic gain.
- 5. The applicant has the burden of proof that the variance is justified and will pose no greater risk to public health and the environment than would a system meeting the standard being varied as in 4.b. above.
  - 6. The local board of health has the ability to impose requirements and conditions on any variance granted.

C. Outcome of the Variance Proceeding

The applicant shall be notified, in writing, of the decision regarding the request for a variance. The notice of a denial of a variance shall include those reasons which form the basis for the denial. The notice of an approval of a variance shall include any conditions of the approval. The variance, and any conditions thereof shall be recorded on the deed to the property and any expenses associated with that recording shall be the responsibility of the party obtaining the variance.

D. Prohibitions on the Granting of Variance Requests

- 1. No variance will be issued to mitigate an error in construction involving any element of property improvements.

2. No variance will be issued where the property can accommodate a conforming ISDS.
3. No variance will be issued, which will result in setbacks to an offsite physical feature which do not conform to the minimum setbacks defined in Table II of these Guidelines.
4. No variance will be issued, which reduces the 4-foot separation to ground water or bedrock.
5. No variance from the horizontal setback from a well shall be given which does not also meet the variance requirements of the Board of Examiners of Water Well Construction and Pump Installation Contractors.