
Farm • A • Syst

*Assessing Your
Household Wastewater
Management Practices*



Household Wastewater Treatment

What is Farm*A*Syst?

Farm*A*Syst (FAS) is a national program which originated at the University of Wisconsin. Forty-six states and U.S. territories have taken the basic FAS material, modified it to fit their locale and are currently distributing it. In Iowa, Farm Bureau has taken the lead in adapting the national model to meet the needs of Iowans.

The goal of FAS in Iowa is to reduce the risk of water pollution, particularly drinking water pollution. The FAS program is a tool that educates farmers and acreage owners how to safeguard their water supply. Farm*A*Syst also alerts rural residents if their current practices are endangering the safety of their water supply or violates Iowa law.

How is this accomplished?

The material is simple and easy to understand. The evaluation can be completed by the acreage owner in private, or with the help of local technical specialists. If the acreage owner has questions or needs additional assistance, the FAS material directs them to professionals. Farm*A*Syst may be a first step for farmers and acreage owners before more costly and comprehensive environmental audits. Farm*A*Syst encourages voluntary environmental protection.

The chapters are designed to give the reader some background on the subject matter so they can complete a short assessment of their current practices. The materials are written so that farmers and acreage owners who value confidentiality can use the materials without having to seek outside advice.

When will this material be ready for public release?

This material is being pilot tested in several watersheds during the summer of 2000. The material will be available for mass distribution in the fall of 2000.

What topics are covered?

This section is just one of the topics to be included. Iowa Farm*A*Syst topics include:

- Pesticide Storage & Management
- Fertilizer Storage & Management
- Site Assessment
- Milking Center Wastewater Practices
- Open Feedlot Manure Management Practices
- Confinement Livestock Manure Storage Practices
- Dead Animal Disposal and Management
- Water Well Condition and Maintenance
- Household Wastewater Management
- Hazardous Materials Storage & Management
- Petroleum Storage & Management

Iowa Farm•A•Syst
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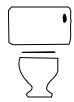
When pioneers headed west across Iowa, group after group camped in the same spots along wagon trails. The old western movies never showed you, but in reality cholera was the number one killer of pioneers. Exposure to contaminated human waste at the communal campsites was the reason why cholera ran rampant. Cholera rarely appears in Iowa today, but bacteria and parasites from untreated or poorly treated sewage can still cause diseases such as Hepatitis A.

Human waste is a major component of wastewater, so rural homeowners need to make sure untreated wastewater is not flowing into road ditches, or discharging

into field tile. Not only is untreated wastewater illegal and a health hazard to your family, but it also may be polluting your favorite place to fish or swim.

NOTE: This chapter does not summarize all the laws related to household wastewater storage and treatment. Due to the complexity of Iowa Code, Iowa Department of Natural Resources rules and county-specific rules, you are advised to contact your county sanitarian if you have additional questions not covered in this chapter. Contact information for the offices is located in the “For More Information” section in this publication.

Wastewater:
A combination of household sewage and dirty water from sinks, washing machines, and bathrooms.



“What is wastewater treatment?”

Wastewater Treatment

When most people think of treating wastewater in a rural home, they think of a septic tank. While a septic tank is essential, it is not the only necessary component to a properly functioning wastewater system. The principal components of a wastewater system are:

- **Primary treatment.** Most rural homes in Iowa use a septic tank for primary treatment. A septic tank’s job is to retain or absorb heavier solids (sludge) and floating material (scum) in wastewater. While a septic tank initiates the treatment of wastewater, it does not remove most organic material, harmful bacteria or other organisms. There is no oxygen available in a septic tank for

significant bacterial activity. A second septic tank only increases total primary treatment capacity and does not provide secondary treatment.

- **Secondary treatment.** The most common secondary treatment in Iowa is a soil absorption system or leach field. Secondary treatment removes the organic matter, harmful bacteria and other organisms from the septic tank effluent. If the soil is too tight for absorption, an alternate system such as a sand filter or mechanical/aerobic unit may be used for secondary treatment. All secondary treatment systems are aerobic, using oxygen to facilitate bacterial breakdown of the waste, whether in the soil or other media.

Iowa Code requires that every wastewater system include primary and secondary treatment. Discharge of untreated sewage, or effluent, into a road ditch or tile outlet is illegal!



“Do I have a complete wastewater system?”

Wastewater System Assessment

Homeowners can begin to assess how well their wastewater system is working, by asking themselves three questions:

- Where does my wastewater system discharge?
- Do I have a system that provides both primary and secondary treatment?
- Are there any signs of the wastewater coming to the surface of the soil (surfacing)?

If your wastewater system consists of a septic tank that drains into a tile line, ditch or pasture, your system lacks secondary treatment. State code requires secondary treatment. Without it, you are releasing harmful bacteria and organisms that will quickly find their way to surface water.

Most wastewater systems dispose of untreated wastewater below ground, which allows bacteria the soil to clean the wastewater. Some unique systems, such as wetlands or sandfilters, are used to properly treat wastewater prior to surface discharge.

To safeguard your drinking water, Iowa Code requires your wastewater treatment

system to be a safe separation distance from the source of your drinking water. Septic tanks must be located 50 feet away from a water well and lateral fields. Other forms of secondary treatment must be 100 feet from a water well.

Primary Treatment

Septic tank. A septic tank allows the heavy solids to settle out of the wastewater and the scum to float to the top. A septic tank must be divided into two chambers by a center wall. A baffle allows the sewage to be drawn out below the scum and above the solids and flow to secondary treatment. Baffles and tank dividers help ensure that scum and settleable solids are retained in the tank.

Some solids do break down in the septic tank, though it happens too slowly to keep up with the daily accumulation of solids and some solids will never break down. This is why all septic tanks need to be pumped out on a regular basis, every three to five years.



“How large should my septic tank be?”

Minimum septic tank capacity

House size	Tank size
Up to, and including 3 bedroom homes	1,000 gallons
4-bedroom homes	1,250
5-bedroom homes	1,500
6-bedroom homes	1,750
7+ bedroom homes	As directed by county sanitarian
IN ADDITION...	
Kitchen garbage disposal	+ 250 gallons
Water softener	+ 250
High volume water fixture, such as a whirlpool bath	+ 250

Septic Tank Capacity

The optimum size of your septic tank is based on the number of bedrooms in your home. This table helps you figure the minimum storage size of your septic tank, based upon the size of your home and water usage habits.

Secondary Treatment Methods

Lateral fields. In Iowa, soil absorption fields are the most common form of secondary treatment. Absorption fields use permeable soil to naturally clean the wastewater. An absorption field consists of level, parallel trenches, one-to-three feet deep. The trench is filled with six-to-twelve inches of gravel and a perforated pipe is placed in the gravel. The area is then filled with soil.

The effluent leaves the septic tank and

enters the perforated pipe. The effluent leaks out of the pipe, through the gravel and into the soil. The soil filters out tiny solids and pathogens (disease-producing microorganisms) before it reaches the groundwater. By the time wastewater reaches groundwater, it is sanitary, or clean. A properly functioning lateral field will not freeze.

Absorption fields may not work in some areas because of high groundwater, shallow bedrock, poor soils or other conditions.



“The county sanitarian told me that a typical septic system won’t work because of my soils. What are my options?”

Alternative Secondary Treatment Methods

- **Sand Filter.** Sand filters are large in-ground pits filled with two feet of sand between upper and lower rock layers. The sand layer filters and treats the wastewater before it is collected in the bottom rock layer for discharge. Sand filter effluent must be sampled annually to ensure waste is properly treated.
- **Mechanical aerobic system.** You may be required to install a mechanical aerobic system if your soils are unsuited for a leach bed, or the site is too small for a properly sized system. In a mechanical aerobic system, air is pumped into the tank which speeds up the decay of solids. The effluent from the mechanical aerobic system must be directed to another small secondary treatment system. These systems are more expensive to operate and require regular maintenance. Iowa Code states these systems should only be installed when your county sanitarian determines the site is unacceptable for a full-sized soil absorption system. Sand filters are usually preferred over

mechanical aerobic systems because of the lower maintenance and greater stability. Homeowners with mechanical aerobic systems are required by law to:

- Retain a maintenance contract with a manufacturer-certified technician at all times.
- Submit maintenance agreements and responsibility waivers to the county recorder and be placed in the abstract of title for the premises.
- Inspect the unit for proper functioning every six months. Effluent must be sampled at each inspection.
- **Mound systems** are an alternative above ground sand filter system. They can be used to treat effluent from septic tanks where lateral fields are impractical. Because the above ground filter bed is covered with soil, they look like a small hill.
- **Constructed wetlands** mimic the treatment that occurs in a natural wetland. They work to remove pollutants from wastewater by relying on plants, such as cattails, and a combination of naturally occurring biological, chemical and physical processes taking place in a constructed vegetation and rock bed.

- **Lagoon** systems include one or more pond-like bodies of water designed to receive, hold and treat wastewater for a predetermined period of time. There are specific design criteria such as seepage rate, water depth, volume, isolation, and discharge treatment that must be met to use a lagoon.

- **Holding tanks** are just temporary storage tanks for untreated wastewater. Holding tanks must be pumped and hauled to a municipal sewage treatment plant when they are full. They are rare in Iowa and used for a few short-term situations.



“I don’t have a treatment system that has been listed. What kind of a treatment system do I have?”

Illegal Sewage Disposal

Many homes in Iowa are still utilizing sewage disposal methods that were once common, but are now illegal because of their ineffective treatment and tendency to plug up and discharge to the surface.

- **Cesspools** consist of a hole, or above-ground swamp, receiving sewage directly from a building’s sanitary drainage system. Cesspools are illegal

in Iowa because they do not provide proper wastewater treatment.

- **Seepage pits** are underground structures constructed to dispose of septic tank effluent, or “greywater,” by soil absorption through its bottom and walls. Seepage pits are also illegal in Iowa because they do not effectively treat wastewater and tend to plug up and run over.



“Replacing a wastewater system is expensive. What can I do to prolong the life of my current system?”

Wastewater System Maintenance

Regular maintenance on your wastewater system is a sound financial investment. If a system fails, it’s probably too late for maintenance, meaning replacement is inevitable. A little maintenance now is less than one-tenth the cost of replacing a wastewater system.

System Maintenance Tips:

Have your septic tank pumped every three-to-five years.

This removes the built up solids and helps prevent clogs. If you have a garbage disposal, pump out the septic

tank more frequently; solids tend to build up faster in the tank.

Don’t assume your system will function properly without maintenance.

A frequently heard misconception: “Our septic system works great. We’ve never pumped the tank or done anything to it and we’ve never had any problems.” This usually means there is no secondary treatment and untreated sewage is illegally discharging into a field tile or road ditch.

Don’t use additives.

Additives may reduce the need for tank pumping, but that means solids are not settling in the tank. If solids are

flowing out of your septic tank, they may clog and possibly destroy your lateral field or other secondary treatment structure.

Avoid adding yeast or bacteria to your septic tank.

This is unnecessary because the amount added is insignificant compared to the bacteria in the tank. Human sewage typically contains one trillion organisms per gallon. Additives are a waste of money and merely add more organic matter for your system to process and safely eliminate.

Look for signs of system failure.

The most obvious sign of failure is wastewater backing up into a home. Other warning signs are occasional wet spots or soft spots over a lateral field. A system has failed if there is standing water, black water or a crust over the soil covering the absorption field.

Do not dispose of toxic material in a wastewater system.

Materials such as motor oil, paint thinner and pesticides can harm the bacteria in a sewage treatment system as well as pollute groundwater. Grease, coffee grounds, disposable diapers and

cat litter decompose slowly, so they fill the septic tank quickly or plug the absorption field. Normal use of bleach, detergents, disinfectants and water softener salt will not significantly harm the bacteria in a wastewater system.

Make sure only household wastewater enters your sewer system.

Downspouts and house-footing drains should not drain into your wastewater system. If you have a water-softening system, keep regeneration frequency to a minimum or make sure regeneration water does not enter your wastewater system. Iowa Code prohibits you from discarding large quantities of grease by disposing of it in your wastewater system.

If your system is overloaded, conserving water or the installation of a larger soil absorption field may be necessary.

The less water used, the less stress on a wastewater system. Consider installing water-saving fixtures such as water conserving showerheads and 1.6 gallon flush toilets. Plumbing leaks need to be immediately fixed. A leaky faucet can waste up to 300 gallons of water per month, and a leaky toilet can waste up to 100 gallons of water per day.

Iowa Code requires the homeowner to obtain a permit before a wastewater system is repaired or installed. Before the permit is issued, the county sanitarian must perform a site evaluation.

"I need to install a new wastewater system. Where do I start?"

Contact Your County Sanitarian

The best resource for helping with problems or questions about a rural home's wastewater system is your county sanitarian. Please refer to the list of county sanitarians at the end of this chapter.

Installing a New System

A new wastewater system can be

expensive and if not installed properly, will be even more costly. First, you need to have your county sanitarian perform a site evaluation. With the site evaluation, the county sanitarian will help you decide what type and size of wastewater treatment system to install and where to install it. Once a site evaluation is finished an application for construction permit must be made to the local board of health.

For More Information

County Sanitarian

Also known as county environmental health specialist. If you cannot find a listing in the phone book, (in the county government section) contact the courthouse or your county board of supervisors.

- Evaluate failed or non-functional sewer systems.
- Help design a proper sewage treatment system.
- Issue construction permits for updated systems.
- Inspection of construction to assure conformance with standards.
- Grant money for water testing and well plugging.

Iowa Department of Public Health

(515) 281-7462

Lucas State Office Building
Des Moines, IA 50319-0075

Ken Sharp,

Environmental Health Consultant
www.idph.state.ia.us

- Offers training and technical assistance to local environmental health specialists.
- Provide consultation in the field for local boards of health to address significant public health issues.
- Assist public in evaluating conditions of high risk.

Iowa State University Extension

Contact your county extension office. The county director, or area ag engineer may be able to answer your questions or direct you to other Extension specialists.

- Publications on a variety of topics are available at Iowa State University Extension county offices, or from the Publication Distribution Center, Ames, (515) 294-5247. Many of the publications are available online at www.extension.iastate.edu/Pages/pubs

Evaluate your potential risk for having unsafe drinking water. The evaluation areas are in the shaded 'Risk' column. Choose the answer that best fits your situation, as listed in the boxes to the right. Note how likely you are to have drinking water problems, as indicated by "low risk," "moderate risk" and "high risk."





- Take special note of the critical evaluation points. If you fail to meet these standards, your drinking water supply is in immediate danger.



- Those situations that violate Iowa Code are indicated by '!'

Risk	Low Risk	Moderate Risk	High Risk
Wastewater system assessment			
Type of wastewater system 	<ul style="list-style-type: none"> • A septic tank with leach field or another soil absorption system. 	<ul style="list-style-type: none"> • A septic tank and secondary treatment system such as a sand filter, constructed wetland or aerobic system. 	<ul style="list-style-type: none"> • Cesspool, seepage pit, dry well, wet well or untreated open discharge.
Location of wastewater system 	<ul style="list-style-type: none"> • Primary treatment located more than 50 feet from a water well AND • Secondary treatment located more than 100 feet from a pond or lake. 		<ul style="list-style-type: none"> • Primary treatment located less than 50 feet from a water well OR • Secondary treatment located less than 100 feet from a pond or lake.
Septic tank size and design 	<ul style="list-style-type: none"> • Meets minimum capacity requirements AND • Tank has inlet and outlet baffles AND • Tank has a center divider. 	<ul style="list-style-type: none"> • Meets minimum capacity requirements but has no center tank divider. 	<ul style="list-style-type: none"> • Undersized tank OR • No tank baffles.
Fixtures and maintenance	<ul style="list-style-type: none"> • Water-conserving fixtures throughout the house that are inspected regularly for leaks AND • Leaks fixed immediately. 	<ul style="list-style-type: none"> • Some water conserving fixtures AND • Fixtures are inspected occasionally for leaks AND • Some leaks fixed immediately. 	<ul style="list-style-type: none"> • No water-conserving fixtures OR • Fixtures are leaking.
Collection of wastewater	<ul style="list-style-type: none"> • Only household sewage discharged to system. 	<ul style="list-style-type: none"> • Some clear water (rain downspouts, footing drains, sump pumps or other groundwater) enters sewer system. 	<ul style="list-style-type: none"> • Significant amounts of clear water (rain downspouts, footing drains, sump pumps, or other groundwater) enters sewer system.
Wastewater system maintenance			
Septic tank maintenance	<ul style="list-style-type: none"> • Tank emptied at least every three years. 	<ul style="list-style-type: none"> • Tank emptied every five years. 	<ul style="list-style-type: none"> • Tank not pumped in the last five years.
Signs of wastewater on soil surface (surfacing)	<ul style="list-style-type: none"> • No signs of surfacing, such as wet spots or abnormally green grass. 	<ul style="list-style-type: none"> • Occasional wet spots, abnormally green grass or soft spots present over lateral field. 	<ul style="list-style-type: none"> • Standing water, black water or a crusted layer on soil surface is present over lateral field.

Risk	Low Risk	Moderate Risk	High Risk
Aerobic system maintenance	<ul style="list-style-type: none"> • County sanitarian approved the system installation AND • Regular maintenance performed by manufacturer-certified technician AND • Inspected every six months including an effluent sample. 	<ul style="list-style-type: none"> • Unit has not been inspected OR • Sampling has not been performed in the last six months. 	<ul style="list-style-type: none"> • Regular maintenance schedule not followed OR • System requires more than normal maintenance OR • Results of effluent sample indicate a malfunction.
Addition of toxic agents (solvents, degreasers, acids, engine oil, paints, and pesticides)	<ul style="list-style-type: none"> • No disposal of toxic substances into plumbing system. 		<ul style="list-style-type: none"> • Disposal of toxic substances into plumbing system.
Floatable solids (Grease and oils)	<ul style="list-style-type: none"> • No disposal of grease or oils into plumbing system. 	<ul style="list-style-type: none"> • Some floatable solids flushed into system. 	<ul style="list-style-type: none"> • Excessive disposal of grease or oils.
Household cleaners (soap, detergent, bleach, scouring agents, and drain cleaners)	<ul style="list-style-type: none"> • Minimal use—less than recommended amounts. 	<ul style="list-style-type: none"> • Careful use—no more than the recommended amounts. 	<ul style="list-style-type: none"> • Extensive use—detergents and cleaners without regard to measuring.
Garbage disposal use	<ul style="list-style-type: none"> • No garbage disposal. 	<ul style="list-style-type: none"> • Minimal use. 	<ul style="list-style-type: none"> • Daily use.
Water softener discharge	<ul style="list-style-type: none"> • Does not discharge into septic tank. 	<ul style="list-style-type: none"> • Discharges into septic tank with low frequency regeneration. 	<ul style="list-style-type: none"> • Discharges into septic tank with high frequency regeneration.

 Critical
 Violates Iowa Code

County Environmental Health Officials

County	1stName	LastName	Telephone	County	1stName	LastName	Telephone
Adair	See Guthrie County			Jefferson	Dennis	Rotenburger	(515)472-5929
Adams	Eldon	Rike	(515)322-3910	Johnson	Kathryn	Flora	(319)356-6040
Allamakee	Laurie	Moody	(319)568-3014	Jones	Dan	Olson	(319)462-4715
Appanoose	Bill	Milani	(515)437-1909	Keokuk	Valerie	Hammes	(515)622-2610
Audubon	See Guthrie County			Kossuth	Jack	Bradley	(515)295-3813
Benton	Marc	Greenlee	(319)472-3119	Lee	Joel	Matt	(319)372-5227
Black Hawk	Mark	Linda	(319)291-2413	Linn	Tom	Hart	(319)398-3551
Boone	Luke	Nelson	(515)432-9910	Louisa	Ron	Johnston	(319)523-5271
Bremer	Doug	Bird	(319)352-0332	Lucas	See Appanoose County		
Buchanan	Ed	Fitzgerald	(319)334-2873	Lyon	Jeff	Williams, P.E.	(712)472-3154
Buena Vista	Kim	Johnson	(712)749-2555	Madison	Scott	Vander Hart	(515)462-5051
Butler	Steve	Busse	(319)267-2630	Mahaska	Don	Russell	(515) 673-3257
Calhoun	Keith	Roos	(712)297-8323	Marion	John	McCoy	(515)828-2243
Carroll	Carl	Wilburn	(712)792-9532	Marshall	John	Kunc	(515)754-6370
Cass	See Guthrie County			Mills	Sheri	Bowen	(712)527-9699
Cedar	Phil	La Rue	(319)886-2248	Mitchell	Elgy	Wegner	(515)732-5861
Cerro Gordo	Tom	Reichard	(515)421-3064	Monona	Jennifer	Judd	(712)423-3400
Cherokee	Aimee	Barritt	(712)225-6721	Montgomery	Kathy	Powers	(712)623-4893
Chickasaw	Ken	Rasing	(515)394-2406	Monroe	See Davis County		
Clarke	Allan	Mathias	(515)342-6654	Muscatine	Verne	Fuegen	(319)263-0482
Clay	Tammy	McKeever	(712)262-8165	O'Brien	Don	Dawson	(712)757-0105
Clayton	Frank	Phippen	(319)245-2451	Osceola	Derrick	Peterson	(712)754-2201
Clinton	Robert	Summers	(319)659-8148	Page	Donnie	McCoy	(712)542-3864
Crawford	See Carroll County			Palo Alto	Bert	Naig	(712)852-3058
Dallas	Terry	Brooks	(515)993-5803	Plymouth	Gordon	Greene	(712)546-7516
Davis	Donnie	Herteen	(515)437-1909	Pocahontas	Michele	Webbink	(712)335-4142
Decatur	Keith	Hinds	(515)446-7131	Polk	Bobby	Baker	(515)286-3376
Delaware	Norman	Wellman	(319)927-5925	Pottawattamie	Kay	Mocha	(712)328-5792
Des Moines	Jim	Holley	(319)753-8265	Poweshiek	Carroll	Smith	(515)623-3762
Dickinson	David	Kohlhaase	(712)336-2770	Ringgold	See Clarke County		
Dubuque	Paul	Buss	(319)557-7396	Sac	Chuck	Bettin	(712)662-7929
Emmet	Terry	Reekers	(712)362-5702	Scott	Larry	Linnenbrink	(319)326-8618
Fayette	Lyle	Jackson	(319)422-3767	Shelby	Joseph	Stroehner	(712)755-2609
Floyd	Mike	Milligan	(515)257-6145	Sioux	Doug	Julius, P.E.	(712)737-2248
Franklin	Kermit	Voy	(515)456-4269	Story	Don	Nolting	(515)382-7240
Fremont	Bob	Mather	(712)374-2685	Tama	Lee	Wiges	(515)484-4788
Greene	Tim	Healy	(515)386-8343	Taylor	Tim	West	(712)523-2556
Grundy	Sandra	Harms	(515)869-5210	Union	Louis	Boeckman	(515)782-7803
Guthrie	Steve	Patterson	(515)747-8320	Van Buren	Jim	Laughlin	(319)293-2531
Hamilton	Amy	Ratcliff	(515)832-9565	Wapello	Bill	Cox	(515)684-5425
Hancock	See Kossuth County			Warren	Rick	Wilson	(515)961-1062
Hardin	John	Stonebraker	(515)858-5058	Washington	Jeff	Thomann	(319)653-7782
Harrison	Matt	Pitt	(712)644-2302	Wayne	Don	Petty	(515)872-1301
Henry	Jodi	Sutter	(319)385-6785	Webster	Gary	Boerner	(515)573-4107
Howard	LaCinda	Altman	(319)547-4505	Winnebago	See Kossuth County		
Humboldt	Daryl	Enfield	(515)332-2492	Winneshiek	Doug	Groux	(319)387-4120
Ida	Richard	Madsen	(712)364-2533	Woodbury	Don	Martensen	(712)279-6119
Iowa	Richard	Heller	(319)628-4401	Worth	Al	Venz	(515)324-1741
Jackson	Troy	Jacobsen	(319)652-5658	Wright	Sid	Swenson	(515)532-3461
Jasper	Sue	Irving	(515)792-7603				



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