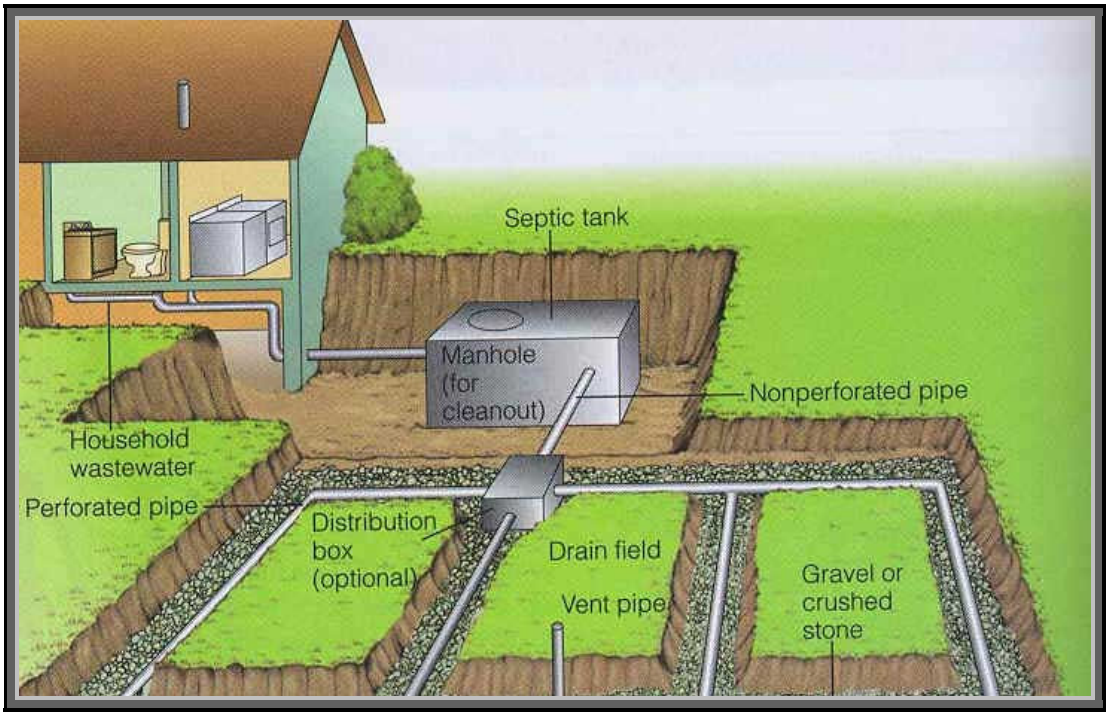
STARK COUNTY COMBINED GENERAL HEALTH DISTRICT



Sewage Treatment System Property Transfer Inspection Guidelines

STARK COUNTY HEALTH DEPARTMENT

*"Striving Toward a **Healthier** Community."*

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Sewage Treatment System Property Transfer Inspection Guidelines

Onsite sewage treatment systems (S.T.S.) are to be routinely inspected in Stark County at the time of a property transfer. The inspection leads to a report that provides the client with information about the type and condition of the sewage treatment system as observed at a specific date and time. Suggestions for additional testing or corrective actions regarding system components may also be in the report. It should be every inspector's intent to provide as much unbiased information about the condition of the onsite system, at the time of inspection, so that the client can draw informed conclusions about the system. The inspector should report any observed condition that may represent an indication of a malfunctioning system to the health department within three (3) days of the observance. The references included below are sections of the regulations that pertain to proper system function versus malfunction:

29-03 (C) All STS installed or altered, or permitted to be installed or altered, prior to the effective date of these rules shall comply with the rules in effect at the time of installation, alteration, or permit issuance, unless otherwise required by this chapter. An HSTS that has been installed or altered prior to the effective date of these rules and that is operating or has the capacity to be operable on the effective date of these rules is deemed approved for the purposes of this chapter unless declared to be a public health nuisance by the board of health

29-07 (C) A STS shall comply with the following performance requirements and prohibitions:

(1) An STS shall be maintained in proper working condition.

(2) An STS shall comply with the conditions specified in an installation and/or operation permit issued by the board of health.

(3) No STS or part thereof shall create a public health nuisance or safety hazard nor pollute surface water or ground water.

(4) No STS shall discharge to any ditch, stream, pond, lake, natural or artificial waterway, drain tile, other surface water conveyance or to the surface of the ground unless authorized by an NPDES discharge permit pursuant to Chapter 6111. of the Revised Code or otherwise specified in this chapter.

(5) No STS shall discharge to an abandoned well, drainage well, a dry well or cesspool, a sink hole or other connection to ground water. If classified as a class V injection well, an HSTS serving a two or three family dwelling or an SFOSTS shall comply with 40 C.F.R. 144 (as published in the July 1, 2005 Code of Federal Regulations) and the registration requirements pursuant to rule 3745-34-13 of the Administrative Code.

(6) No STS shall receive water from roof drains, foundation drains, clear water sumps, swimming pools, or other sources that do not convey or generate sewage from the structures served by the STS.

(7) No STS shall be permitted for the holding, treatment, or dispersal of industrial waste or storm water for industrial activities. For the purpose of this rule, the normal use of housekeeping products does not constitute industrial waste.

29-07 (G) The board of health shall consult with appropriate sewer entity personnel as necessary to determine sanitary sewer accessibility:

(1) An STS shall not be sited, permitted, or installed where a sanitary sewage system is accessible and has capacity to accept additional flows.

(2) An STS shall not be altered, replaced, maintained, operated, or used where a dwelling or structure is accessible to a sanitary sewerage system.

(3) Whenever a sanitary sewerage system becomes accessible to a dwelling or structure served by an STS, the dwelling and/or structures shall be connected to the sanitary sewage system and the STS abandoned in accordance with rule 29-17 of the S.C.S.T.S. Regulations.

29-07 (I) No person shall discharge, or permit to be discharged, treated or untreated sewage, the overflow drainage or contents of a sewage tank, or other putrescible, impure or offensive waste, into an abandoned well, spring or cistern or into a natural or artificial well, sink hole, crevice extending into bedrock, stream, ditch, or surface of the ground.

The inspection is not a warranty or guarantee that the system will properly function for any period of time in the future. The inspection is not an assurance that the soil is adequately treating or will adequately treat effluent.

The following is an outline of the inspection procedures.

Gather Records and Data

1. Obtain permit and system drawing from the Stark County Health Department or owner.
2. Contact the sanitary engineers for information on the availability of sewer.
3. When able, interview user / owner for maintenance and location information

Evaluate the Home's Plumbing

1. Check all plumbing
2. Check for softener back flush and footer drainage into system
3. Check for plumbing leaks and water usage

Locate the Treatment System Components

1. Locate and gain access to the septic tanks and diversion and / or distribution boxes
2. Locate soil absorption / treatment system
3. Identify any potential retrofits / repairs
4. Evaluate by flow and dye testing system
5. Observe overall site conditions
6. Determine system's performance and condition

Reporting

1. Report observed conditions to homeowner, buyer and the Stark County Health Department; include maintenance or minor repair recommendations

Recommended Materials and Equipment for Inspections
Many of the inspection procedures, described in this document, require special equipment, information, and reference materials:

Sewage treatment system drawing
Flashlight
Watch or stop watch
5-gallon bucket
Shovel or spade
Hoe or rake
Crow bar
Metal detector (optional)
Tile probe
Latex gloves
Towels or rags
Scum measuring devise (optional)
Bleach and water solution
Hundred foot measuring tape
Eye protection
Mirror
Level
Garden hose or other water source
Tracing dye solution
Appropriate report form
Clear cylinder container (optional)
Traffic cones (optional)
Educational materials

Safety During Sewage Treatment System Inspections

Never enter a septic tank or lift station chamber. The tank contains very little oxygen and high levels of hydrogen sulfide, methane, carbon dioxide, all life threatening gases. Never smoke near septic tank openings. Gases such as methane are potentially combustible. Always remember that the liquid and solid contents of the sewage treatment system are capable of causing infectious diseases. After working on any part of the septic system, always wash hands thoroughly before eating, drinking or smoking. Keep heavy vehicles and other heavy equipment away from the septic components. The tank and other components may collapse due to weakness from corrosion. Keep children and other spectators away from the septic system when it is being opened or cleaned.

Major Components of Onsite Systems
In general, onsite systems include three components:

Treatment Tanks
A treatment tank is a buried, watertight receptacle designed and constructed to receive wastewater from a building. Treatment tanks are designed to be either anaerobic (septic) or aerobic. A septic tank's tranquil environment allows solids to separate from the liquids, provide limited digestion of organic matter, store

solids and allows relatively clear effluent to discharge into the absorption area. The environment in an aerobic tank is not tranquil. Air may be forced into the effluent, or mechanical agitation devices, pumps or impellers constantly mix the effluent. A properly working aerobic tank yields a more thoroughly treated effluent that is both clearer and has fewer odors.
Research has shown that multiple tanks or two compartment tanks are more effective in solids separation than a single tank with one compartment. If multiple tanks or a multi-compartment tank are encountered, all tanks and compartments must be evaluated.

Distribution System
The distribution system is the method by which effluent is conveyed from the treatment tank into the soil treatment / absorption area. The distribution may consist of a gravity delivery line from the treatment tank to a distribution box or to a tank with a lift or dosing pump, which conveys wastewater to the soil absorption system.

Soil Treatment/Absorption area
This component is very important because it is the most difficult component of an onsite system to correct. Treatment and absorption of the effluent into the soil is achieved through one of the following:

- Leaching trenches and beds
- Leach wells and cesspools
- Above ground mounds and above ground leach systems
- Drip systems

Inspectors should carefully determine the location, type, size and if present the liquid level within the treatment / absorption area. A completely saturated treatment / adsorption area will accelerate organic clogging and could eventually result in the absorption area malfunction.

Gathering Records and Data for Inspections
Determining the adequacy of a sewage treatment requires knowledge about its age, design, use and maintenance. Such information is to be obtained from reviewing the application, permit and as-built plans from the Stark County Health Department. The records will also provide valuable time saving information when attempting to locate buried system components. Homes built prior to the mid 60's may not have any records on file. Such information along with use and maintenance records should be obtained by interviewing the property owner. Check the Stark County engineer's GIS aerial photos for hydraulic features; note any streams or drainages close or in contact with the property. The Stark County Soil Survey or NRCS web soil survey can be consulted to determine soil conditions. Lastly, determine if sanitary sewer is available by contacting the Stark County Sanitary Engineers or if in a city / village the city sewer department or city engineer. If sewer is available note it on the report form.

Interviews are best done in person; maintain a courteous and professional demeanor. Begin the interview by reviewing all pertinent written information gathered from the health department. Some written records may contain inaccuracies. An interview may help to verify and correct data on written records and provide an excellent opportunity to educate the user about how to care for their sewage treatment system. Inspectors are encouraged to provide educational materials for the system's new users. Educational materials are available from the EPA's website, Ohio State Extension Service website, and small flows onsite sewage treatment website.

Procedures for Conducting the Field Inspection

Inspections conducted when the S.T.S. has been impacted by precipitation events, including but not limited to: rainfall, snow melting, and snow cover must specifically identify the encountered condition.

General

The field portion of a Stark County onsite system inspection should be conducted in the following sequence. At all time the inspector's personal safety, as well as protection of the client and the environment, shall receive the highest priority.

1. Note the weather at the time of inspection.
2. During the site visit, walk the entire house looking for unexpected fixtures, plumbing or discharges and exterior property looking for lush vegetation or discharges on or through any of the following: the surface of the ground, streams, road ditches, storm drains or unexpected pipes.
3. Note if trees, shrubs, their roots or any other landscaping features have been located above any system component or with ten (10) feet of the absorption system that could possibly create a negative impact on the system.
4. Create a site map drawing. Be sure to indicate distances of the treatment tank lid from two fixed points so that is will be easy to relocate the lid in the future. Do this for a distribution box as well, if one has been located and accessed.
5. Be alert for above-grade evidence of a well. Note the location and distance of the well on the site drawing.
6. Compare the information gathered onsite to the information gathered previously and note any discrepancies on the report form.
7. Locate and gain access to the treatment tank(s), either initially or as indicated below and determine their composition. Check for infiltration of surface water into all tanks, and then locate the other system components.
8. Perform a dye and hydraulic load test. The test should thoroughly evaluate how liquid levels in the tanks and disposal area react to an appropriate volume of introduced clean water and dye.

Inspection of the Internal Plumbing

By providing an inspection of the internal plumbing, the inspector can obtain information regarding where the building sewer discharges to the treatment tanks and can identify the presence of multiple systems or improperly discharging sewage. It is especially important to confirm if the laundry facilities discharge to the sewage treatment system. In the case of dwellings with finished basements, crawls spaces or built with a slab foundation, an additional colored dye test may be used to determine if plumbing is directed correctly to the system.

Minimum Plumbing Inspection Criteria

1. Review the existing sewage treatment system location documents. Confirm the number, size and general exit point(s) of the waste line(s) consistency with the system's location documents and note any deviations.
2. Observe the general location of the plumbing fixtures within the dwelling to be reasonably sure you have determined that all waste line exit points and interior plumbing fixtures are accommodated. Check for plumbing leaks and improperly operating toilets as these can add additional water to the sewage treatment system. Note leaks on inspection form and recommend repairs.

3. Observe the general condition and materials of the waste piping. Differences in piping materials may be indicative of plumbing alterations necessitated by sewage treatment failures. For example, a capped line that previously accepted the washing machine discharges.
4. Determine if any particular fixture cannot reasonably be piped to the observed exit point. If any exist, dye should be used to confirm the discharge point for that fixture. Observation of the effluent within the first septic tank or trash trap should confirm the colored discharge. If the colored discharge is not observed, further investigation of the discharge point is required and should be noted.
5. Determine if a footer sump or water softener services the residence. If one exists, confirm the discharge point of the footer sump or back flush for the softener is separate from the domestic waste lines and the domestic waste is not directed to this equipment. A softener back flush line is usually a small, clear or black rubber hose that is approximately 10ft long, though sometimes more, which directs back flush out of the appliance. Follow the back flush line to its outlet. If the back flush line terminates in the building sewer or in another line that feeds to the sewage treatment system, it should be noted that it needs to be rerouted out of the sewage treatment system. Additionally, the inside of the footer sumps should be visually inspected for dye; even if no waste lines are routed to it. The presence of dye in a footer sump can indicate a cracked or broken sewer line which leaks down the exterior of the basement wall.

Treatment Tanks
General
Sewage treatment tanks should not be entered, as they are hazardous environments.

During the initial investigation to locate the treatment tank, be careful to avoid damage to the tank and any aerobic tank buried electrical wires. The inlet and outlet baffles and tees should be thoroughly inspected. The inlet and outlet baffles and tees are susceptible to deterioration and must be treated with caution. The baffles and tees help protect the absorption area from solids carryover. If deteriorated or missing, they should be repaired or replaced and the client should be notified of the potential problems associated with increased solids entering the absorption area.

Treatment tanks are generally comprised of one of three different materials and the inspector should note the material of the tank(s). Concrete tanks are generally the most common compared to tanks of other materials. Metal treatment tanks are not used currently, but were used in years past. They have an average life expectancy of 20 to 25 years. Plastic or fiberglass tanks resist deterioration; however, they are susceptible to puncture by a probe rod. Extreme care should be used during the initial probing when locating tanks of this nature.

Minimum Tank Inspection Criteria
1. A satisfactory liquid level occurs when the liquid level is below the inlet invert and equal to the height of the outlet invert. If a treatment tank is overfull, the inspector should determine whether the problem is in the distribution system or in the absorption area.
2. (Optional) Scum thickness and sludge depth may be evaluated through the inlet access port by using a Sludge Judge, Sludge Stick or similar device. **Tanks should not be pumped until the inspection of the absorption system has been completed**. If the tank(s) were pumped before the inspection, the owner or the owner's agent should be advised that the inspection cannot proceed until the tanks are operating at normal water levels. If the tanks are pumped after the inspection it should be noted and reported if sewage flows back into the tank from the absorption field.

3. Check for continuous flow through the building sewer and into the treatment tank. This may indicate a plumbing leak which needs repaired
4. Flush every toilet in the structure at least once; expose the observation port over the inlet to note changes in treatment tank's liquid level (or observe backup conditions).
5. When necessary insert a mirror on a 45-degree angle through the inspection ports and inspect the underneath side of the tank top while shining a flashlight on the mirror. Determine the treatment tank's construction, composition, size / dimension and condition of the tank, the baffles, and the cover. Determine the tank's capacity. Do this for every tank in the system. Determine whether or not the tank is deteriorating and in need or replacement. If risers are needed for servicing the tanks, recommend in report to add risers to non-riser openings.
6. Check the baffles in every compartment by inspecting them directly through the inspection ports, or by using a mirror and a flashlight through the inspection ports of the treatment tank. In the case of an aerobic treatment tank, the electrical and mechanical operations of the pumps and compressors should be checked by observing them in operation. Proper function information may be obtained from the systems distributor or manufacturer.

Dosing and Lift pumps and Tanks and Siphon Tanks

General

Dosing and lift pump tanks and siphon tanks should be inspected for physical integrity, just as treatment tanks are inspected. Dosing and lift tanks house an effluent grade pump that either simply transports (lifts) the effluent to another elevation or delivers a specific volume of effluent to a pressure distribution system at a specific pressure. Newer sewage treatment systems maybe time dosed. Siphon tanks contain a proprietary device that operates on atmospheric pressure, and at a factory set "trigger depth" the accumulated effluent is moved downhill under pressure.

Minimum Lift Pump and Tank Inspection Criteria

1. Always check the absorption area before turning on either a lift or dosing pump; however, if the pump has recently been activated, finish all aspects of the inspection before checking the water level in the absorption area.
2. Check the condition and soundness of all pump and siphon tanks, using the tank inspection procedure described previously, including the alarm system. Note the size and volume of the pump chamber.
3. If the system has a pump or pumps, verify the operation of every pump and its control system. Use a rake, hoe or similar device to elevate the appropriate float and activate the various components.
4. Visually inspect exposed electrical cables, junction boxes, etc. Do NOT touch any electrical wires or components unless you have personally de-energized the circuit, verify that the alarm and pump are on separate circuits. If not, note this on the inspection form.
5. Verify that all pumps are resting on a concrete block and elevated above the tank bottom. Pumps should not be suspended.
6. Gather information about the pump and dose volume if possible. Often a homeowner may set a pump that is not rated for effluent, or floats may be set so that the pump short-cycles, instead of delivering an appropriate volume of effluent to the distribution system.
7. For siphon pressurized systems, open the observation port and check for continuous trickling. Run sufficient water into the siphon tank to cause the siphon to cycle, and watch for proper operation.
8. Check tank for inflow from cracks or holes or around inlet and outlet seals. Note any deficiencies.

Distribution Systems

General

Effluent is conveyed to the absorption area through solid rigid pipe in a manner that will provide for distribution of the effluent through the absorption area. Effluent may be moved by gravity or by pump. When effluent delivery line passes under areas subject to heavy loads (driveways), it is common to either use a heavier grade of pipe (schedule 40 or 80) or encase the effluent delivery line in a larger diameter heavier grade pipe. Systems installed since the 70's have used a diversion box with the soil treatment system split evenly and set to divert. As part of the interview process the inspector should ask the frequency of diversion by the system's owner or user.

Gravity, Demand dose, and Flood dose systems

In gravity systems, the effluent should be distributed either to a number of trenches or through several interconnected lines in an absorption bed. A distribution box (D-box) is a small, usually concrete, container that most often receives effluent from a connecting pipe from the diversion box. The D-box has one inlet and several outlet ports. The outlets are at least one inch below the inlet's elevation. A variety of devices can be used to fine-tune the effective outlet elevations so that all lines receive an equal volume of effluent. A D-box should be used to divide the flows in all gravity trench systems. When found, the location and condition of the diversion box and distribution boxes should be noted. Systems that were installed on slopes may have drop boxes with flow controls that cause the leach line to flood before rolling over to the next leach line in series. A lift pump can also discharge effluent to a D-box; or if the system is set to divert into the diversion box. When a lift pump is utilized and effluent is distributed by gravity, typically one of two methods is employed: *demand dose or flood dose.* Demand dosing simply delivers effluent to a box in a no specified volume or rate of flow. Effluent enters the box at a faster rate than gravity. It does not distribute far beyond the distribution box until a biomat develops, much like a typical gravity system. However, flood dosing utilizes a known rate of flow and the home's daily design flow for the dose volume. Piping or conduit, trench width, flow elevations and dose volume configurations are optimized during the design and installation of the flood dose system to allow equal flow of effluent across the length of the infiltrative surface.

Low Pressure systems

Pressure distribution systems use a pump to assure equal distribution of the effluent across an entire absorption area or system. In a pressurized distribution system, a pump delivers effluent to a manifold, which in turn supplies a series of somewhat smaller diameter laterals. Pressure distribution may be encountered in all system types.

Distribution Minimum Inspection Criteria

1. Distribution systems where boxes are not exposed, are checked by examining the treatment tank's outlet and the water levels within the soil absorption component. If the liquid level is above the lowest point of the outlet tank of the treatment tank, further investigation is needed to locate and evaluate the cause of this condition. See "Minimum Inspection Criteria for Leach bed or Leach Trench System" for more information.
2. If a D-box is found and exposed, it should be evaluated; if a D-box is not found, the absorption area investigation should proceed. However, if known to exist, the location of the D-box should eventually be established on the site sketch or a notation that further investigation would be needed in order to locate the D-box.

3. When a diversion or D-box is located and exposed, check for the presence of solids. If solids are present, their presence should be noted and a recommendation given to have them removed. The structural integrity of the boxes should be evaluated for any significant defects or deterioration. Boxes must be watertight and not leak effluent or have exterior surface water entering the boxes. Make sure the boxes are level and/or that effluent is equally distributed by the D-box to the laterals.

Absorption Area Types, Sizes and Conditions-Subsurface Systems Overview

The absorption area is the most critical component of an onsite sewage treatment system. Soil is utilized at the treatment and disposal medium. The absorption system is designed and sized to accommodate proper treatment and prevent hydraulic failure (backup or surfacing). Appendix A of this document will give more helpful hints for inspecting the following items.

Leachwells

General

Leachwell systems that receive effluent from septic tanks no longer meet current regulatory code for new construction or replacement. However, these systems may continue to exist if they are operating as designed.

Leachwell Minimum Inspection Criteria

1. Determine the structure's water level by either looking in the riser or exposing the inspection port on the leachwell. If liquid is at or above the inlet invert or in the riser, the high water level should be reported and the system is unsatisfactory. If there is no inspection port, a tile probe should be used along the sides to determine if the gravels and soils on the sides of the leachwell are dry, moist or saturated. Saturated or surfacing conditions should be reported.
2. The storage capacity of the leachwell below the inlet pipe should be determined and confirm there is a least one-day's flow capacity. The volume and / or dimensions of the leachwell should be noted on the report.

Leach beds or Leach Trench Systems

General

Leach beds are usually rectangular level bottom excavations that are partially filled with aggregate in which a network of perforated pipes distributes the effluent throughout the bed. Beds may have distribution boxes.

Leach trenches (leach lines) are long, narrow trenches from 1.5 to 3 feet wide that are excavated along the contour of the ground. Trenches are usually of equal length, partially filled with aggregate, in which a perforated (4" or 8") pipe is centered to distribute the effluent throughout the length of the trench. Effluent is delivered to the trenches either under pressure (pump or siphon delivery) or by gravity.

Serial distribution directs all the effluent to a series of trenches that are "stepped down" usually by using drop box with flow controllers / elbows on a sloped site. After the first trench fills, the effluent "overflows" into the second; when the second trench fills, the effluent again overflows into the next lower trench, and on. Parallel distribution trenches receive effluent from a common distribution box (D-box) and or diversion box. All trenches should receive an equal volume of effluent and their individual conditions should be similar when probed.

Minimum Inspection Criteria for all Leach bed or Leach trench systems

1. Determine the type, location and approximate size of the absorption system.
2. Determine if there is standing liquid in the leach trench or leach bed by probing or by looking in the distribution box (or observation port). Measure the depth of the effluent throughout the absorption area. If the effluent level is excessive, note the level of ponding in the trench(s).
3. A sufficient number of probes should be made in each absorption area by the inspector to make a complete absorption area evaluation. If there are six or more inches of dry aggregate in a "parallel distribution system", the absorption area is satisfactory. If there is less than six inches of dry aggregate, the high water condition should be noted. "Serial distribution systems" are designed to flood the upper-most trenches first, and then flood subsequent trenches. Note a high water condition if all trenches in the series have less than six inches of dry aggregate present.
4. When liquid is present in an absorption area of a leach bed or leach trenches, it should be of an equal depth and evenly distributed throughout the entire bed or trenches. If it is not, further investigation is necessary. Possibilities include, but are not limited to:
    a. The bed or trench may not have been excavated with a level bottom.
    b. Sludge may be clogging the aggregate or soil interface.
    c. A pipe may be crushed, clogged, broken.
5. In serial distribution systems, if a lower trench is full but higher trenches are not, further investigation is necessary. Check drop boxes flow distribution. Another possibility is that a field tile may have short-circuited the leach trenches.
6. In parallel distribution trenches, check to make sure the trenches receive effluent equally from the distribution box and the subsurface conditions encountered during probing should be similar. If not, further investigation is necessary.

Above-grade Systems: Mounded Systems

General

A mounded system is usually a bed type distribution system built on top of suitable fill material (sand). In mounded systems, the fill provides both a level surface upon which the aggregate is placed and a porous filtering sand for effluent renovation. In these systems, fill and aggregate are contained within a berm of suitable soil and the aggregate is above the site's preconstruction grade. The cover over the aggregate is graded to direct precipitation away from the mound.

In this type of absorption system, a piping network distributes the effluent throughout the aggregate. These systems distribute effluent or treated effluent, under pressure using either a pump or siphon delivery.

Minimum Inspection Criteria for Mounded Systems

1. Examine the mounded system for:
    - ✓ Leakage on top, side slopes and toe of slopes
    - ✓ Sufficient depth of soil cover at the top edges
    - ✓ Animal burrows, deeply rooted vegetation and erosion
2. Check observation ports and note if any standing water is present. When liquid is present in a mounded absorption area, it should be of an equal depth and evenly distributed throughout the entire mound. The presence of effluent in the suitable fill is not an unsatisfactory indication.

3. Refer to the dosing and lift station section of this document. Also check by measuring the "squirt height" (head height) and pump run time when the pump is operating. The head height should be equal across the length of the mound. Note any differences in the measured head; further investigation into a broken or crushed pipe or port may be required. The Health Department records contain base-lines for these measurements for comparison.

Interceptor and Curtain Drains

On sites where a perched seasonal zone of saturation has been identified, an interceptor or curtain drain may have been utilized to capture and move subsurface water (perched groundwater) around the system. The interceptor drains typically resemble a "squared U" where the closed bottom is upslope and parallel to the longest dimension of the treatment system area. The curtain drain typically is box shaped and surrounds the treatment system area. The ends of the drains will extend downslope some distance below the lower sides of the absorption area and will be brought to the ground's surface. Drains should be open and flowing clear water only. *Drains should not be a source of surfacing effluent, if this is found to be the case; this condition should be noted on the report and the homeowner should be informed to find and correct the problem.*

Subsurface Sand Filters

General

Subsurface sand filter systems that receive effluent from septic tanks no longer meet current regulatory code for new construction or replacement. However, these systems may continue to exist if they are operating properly. In a sand filter system (single pass), the septic tank or aerobic unit effluent is intermittently spread across the surface of a bed of sand through a network of distribution lines. The effluent is either gravity or dosed onto the surface of the sand and is allowed to percolate through the sand and be treated by the bioslimes that form on the sand. Collector pipes beneath the filter collect treated effluent after it has passed through the sand and discharge to a soil treatment system or direct discharge off-lot. Some filter beds will directly infiltrate the filtered effluent into the soil below.

Minimum Inspection Criteria for Subsurface Sand Filters

1. To achieve acceptable treatment, the wastewater retention time in the filter must be sufficiently long and reaeration of the media must occur to meet the oxygen demand of the applied wastewater. When applying dye and hydraulically loading a subsurface sand filter, typically effluent with dye should not be visible within the first 24 hours of the loading test with a single septic tank or 48 hours with two septic tanks. If dye is visible, the sand in the bed may have channeled or the bed was improperly sized or installed with inadequate amount or size of filter sand. Effluent at the outfall should be clear, colorless and odorless. Note those conditions of the report, if present.
2. Area around the filter bed should be checked for saturation by probing. Note condition of soils surrounding the filter bed. The ground surrounding the filter bed should not be saturated for proper treatment of effluent.
3. The top of the filter bed should be covered with short grass. The filter bed should not have a lush grass or mushy, hummocky, or wet oozing top. These are signs that the filter bed sand is plugged with organic matter, causing failure. Note these conditions if present, and report to the health department.

Aerobic Treatment Units

General

Aerobic Treatment units (ATU's) or aerators receive septic tank effluent, which is oxygenated and mixed by compressors or aerators. ATU's should be operating in accordance with the Ohio Department of Health and manufacturer's specifications. **Systems using these technologies are required to maintain a service contract for the life of the system.** A review of the homeowner's service records from the service provider should be reviewed prior to the inspection. ATU's are typically used to either treat effluent before a soil absorption system or before off-lot discharge.. These systems are designed with visible and audible alarms to alert the owners and / or service providers to warn of compressor / aerator failure and high water. These alarms may indicate that an inspection or maintenance is required immediately.

Minimum Inspection Criteria for Aerobic Treatment Units

1. Aerobic Treatment unit tanks should be inspected for physical integrity, just as septic tanks are inspected. Note the type and treatment capacity of the systems. Installation should be in accordance with the manufacture's specifications. Note any problems with the tank chambers, weirs or moving parts on the inspection report and inform the owner to contact a licensed service provider.
2. Aerobic components should be operating at normal water level during the inspection. The aerobic chamber should be turning over in a rolling boil and be a chocolate brown in color. The aerobic chamber may have a musty or earthy odor when opened. A black color and a septic odor indicate a problem with the ATU, and further investigation is required. Note any problems with the aerator chamber on the inspection report and inform the owner to contact a licensed service provider.
3. Aerobic treatment units should not be on timers unless specified by the manufacturer and approved by the Ohio Department of Health.
4. Visually check the hoses, wires, leads and contacts for signs of damage or corrosion. Test the alarms of the system. Note any problems.
5. Check the filters to see if the filters need serviced or replaced. Check for detritus in the system.
6. Check final effluent color and clarity at distribution box or outfall. Effluent should be clear and colorless.
7. If system has a chlorinator or dechlorinator, check for the presence of chorine and / or thiosulfate tablets. If an ultraviolet light is present check to see that it is operating and clean. Note any problems on the inspection report.

Accessory Components

Any accessory component of the system, which can range from items such as an effluent filter to an aerobic treatment unit, should be noted on the inspection form. These accessory components should be operating in accordance with the manufacturer's specifications.

Setback Distances

Measure set back distances from drinking water wells to the septic tanks, soil absorption systems, and leachwells. Distances are to be recorded on the Stark County Sewage system and water supply evaluation form. Septic tanks and soils absorption systems are required to be fifty feet to water wells. Leachwells are required to be one hundred feet to water wells. Encroachment on these setbacks will require further evaluation of the system by the Stark County Health Department. The health department will determine an appropriate course of action in regard to these requirements.

Hydraulic Load and Dye Trial for Identifying Gross Loss of Hydraulic Capacity

Hydraulic capacity-the potential for a soil treatment/absorption system to accept wastewater—varies as a result of changes in effective treatment area, wastewater flow, waste strength, and biological activity in the soil. When overly stressed by excessive flows or waste strengths, a system may lose hydraulic capacity. In the most severe cases, this may result in a complete failure (i.e., a wastewater backup into the house or onto the ground surface). The functioning of a soil treatment system may also be impaired as a result of cave-ins, crushed pipes of objects stuck in lines. The flow trial is a means for identifying blockages or significant reduction of hydraulic capacity.

The hydraulic loading and dye test in conjunction is a technique that is used to assess a sewage treatment system during a property transfer inspection. It is not a be-all-and end-all test, nor is it accurate under all conditions. The results of a hydraulic loading and dye test should always be interpreted within the context of the entire inspection. If a system is showing signs of failure, certain flow trial procedures may actually aggravate the problem. An example of this is when the sanitary tee has rotted of the outlet of the septic tank. Under such circumstances, the hydraulic loading test should be done at the outlet of the septic tank to prevent putting scum and solids into the soil treatment system. If there is an obvious cave-in over the soil treatment/absorption system, the system clearly needs a major repair and no hydraulic loading trial is necessary.

Situations when a hydraulic loading test and dye test may give unreliable results

1. During the last month, the home was unoccupied for a continuous period of seven days more.
2. Evidence that the septic tank has been recently pumped.
3. The system has had a recent soil fracturing (indicated by Styrofoam beads in the treatment area drainage or boxes) or hydrogen peroxide treatment (usually evidenced by chemical scouring or a bleached-out appearance on concrete components). Inspectors should be mindful that use of either treatment indicates an attempt to fix a major system failure, which may recur.

Situations when a hydraulic loading test performed at the septic tank outlet is recommended as other methods may contribute to a failure.

1. Over accumulation of solids in the tank: (a) depth of combined solids is greater than 34 inches; (b) depth of scum is grater than 11 inches; or (c) depth of sludge is greater than 26 inches.
2. Evidence of structural damage to the system: (a) broken tee or baffle; (b) cracked tank; (c) evidence of a heavy object placed over the soil treatment/ absorption system; or (d) one component or more has been exposed as a result of soil erosion.
3. Inspector has not measured the depth of solids and the system has not been pumped in 3 years. An adequately sized, conventional system, which has been pumped in the last 3 years, is unlikely to have an over accumulation of solids; however, inspectors may wish to measure solids for added certainty.

Determining the hydraulic loading volume

Normal wastewater flows vary over the course of a day, peaking during the morning and evening hours when people are most likely to use the kitchen, bathroom and laundry facilities. The greatest flow that may enter a system during an hour time is called the peak one-hour flow. As it is typically the most stressful condition that the flow trial is designed to approximate (i.e. peak one hour flow = hydraulic loading volume).

An examination of the literature indicates that peak one-hour flow can be estimated as 12 times the average hourly flow or half the daily design flow. Systems in Stark County are designed based on the daily flow (i.e., design flow = daily flow), which can be calculated as 120 gallons per bedroom per day. Therefore hydraulic loading can be calculated as half the design flow or as the number of bedrooms times 60 gallons. The table below indicates the hydraulic loading volumes for homes relative to number of bedrooms and design flow volumes.

Number of Bedrooms	Design Flow (Gallons/Day)	Hydraulic Loading Volume (Gallons)
2	240	120
3	360	180
4	480	240
5	600	300
6	720	360

Hydraulic Loading and Dye Test Procedures

1. Determine the septic tank condition and diversion box/ distribution box conditions. If there is evidence of solids carryover from the septic tank to the soil treatment system or if the tee is missing on the outlet, perform the dye test and hydraulic loading test with a water hose out the outlet cleanout. If the system has been pumped in the last 3 years, then it can be assumed that there will be no solid carryover during a hydraulic loading using the in-home fixtures. Note water levels at the inlet and outlet.
2. The flow trial volume (refer to previous table) may be added at a rate of between 5 and 10 gallons per minute. This may be done by placing a garden hose at the inlet or outlet inspection port of the tank or by opening water taps in the house. An inline flow meter may be used on a garden hose to measure flow rate. If no metering device is available, flow rate from a garden hose may be estimated by opening the tap fully and timing the fill up of a 5 gallon bucket. Dye should be added to the outlet of the septic tank or flushed down the toilet, which is the preferred method of entry.
3. Measure and record the time it takes to add the hydraulic loading volume as determined in step 1. If water begins to back up (i.e. rises more that two inches above the outlet bottom), record the time it took for this to occur. Inspectors should note that when first adding flow to the soil treatment systems, a small rise in water level (1or 2 inches) will occur in the septic tank; this is not back up.
4. Calculate the volume of flow accepted by the soil absorption system. Record the results on the inspection report form. If the system did not accept the full hydraulic loading volume, refer the owner to the health department and a sewage treatment installer or service provider.

Dye Tracing for Confirming Treatment Bypasses

Soil treatment/absorption systems use the soil to treat wastewater and remove pathogens, (i.e., disease-causing organisms and viruses) from wastewater. When wastewater bypasses soil treatment, wastes and pathogens are not adequately removed and remain in unhealthful concentrations. For example, treatment may be bypassed by an overflow pipe that routes flow out of a septic system component, preventing it from reaching the soil treatment system. Bypasses are illegal under Ohio law and should be eliminated when they are confirmed.

Bypasses may take complex and broken paths, making them difficult to trace visually or even by use of a sewer snake. Dye tracing overcomes this problem, as dye will resurface and flow wherever wastewater

does (i.e., up to the ground surface, into a body of water or stormwater system. Yellow-green fluorescein dye is the preferred color to perform a dye test, as it shows up best.

Identifying Suspected Treatment Bypasses

Most bypasses are installed to drain undersized systems or failed systems or drain gray-water appliances (e.g., washing machines). Another color dye such as red may be used to identify bypass lines for laundry or plumbing. Bypasses in conventional sewage treatment systems are not uncommon. Therefore, check all systems thoroughly.

The following procedures may be used to investigate find potential bypasses, but require a large volume of water to be effective. Therefore, the dye tracing and hydraulic loading trial are to be performed together.

1. Ask the residents if they know of any wastewater bypasses or overflow pipes.
2. Look through the outlet inspection port to make certain that dye is moving into the outlet pipe. If the dye is not migrating to the tank outlet or if the flow trial is being done at the tank outlet, place dye at the outlet and use a garden hose to wash it through.
3. Walk the property boundary and note any catch basins within view, pipes emerging from the ground or retaining walls as well as waterbodies that border the property. It may be necessary to move beyond the property boundary, especially in an area of older homes. Pipes could run a great distance before discharging. Be mindful of neighborhood drainage patterns. Always check low spots, creeks and storm drains even if they are not immediately adjacent to the property. Also, walk throughout the whole property and note any waterbodies and groundwater upwellings. Inspectors should note both visible and wet areas where outlets are likely to discharge. Check the interior of leach wells and septic tanks using a mirror and flashlight if necessary. A bypass is most likely installed at or just above the flow line.
4. If any potential bypasses are observed, note their locations and any signs of flowage, (i.e., actual flow or evidence of flow, such as laundry lint, algal growth, or erosion patterns on the ground). If any catch basins are found they should be checked for bypass lines.
5. Once the hydraulic loading and dye test is in process and water is being added to the sewage treatment system, begin observation of the suspected bypasses by checking them every 10 minutes for dyed water. If dye is present, it indicates a bypass. If no dye is present by the end of the hydraulic loading test the suspected bypasses should be checked the next day; within 24 hours of performing the hydraulic loading. Record the occurrence in the inspectors report, noting the location and general description of the by pass and time it took for the dye to be observed. Dated photos of surfacing dye is recommended. Report bypass to health department within 3 days of discovery and have the owner contact the health department and a licensed sewage treatment system installer.

Checking Catch Basins for Bypasses

Determining the need to open catch basins

If the cover of the catch basin is a grate, dye may be observable without opening the grate. Attempt to look inside the access hole using a flashlight. If a suspected bypass, bottom of the basin or water in the basin can be viewed clearly, then the tracing dye will also be visible and opening the basin is not necessary. Check the inside of the catch basin for bypass lines. A bypass line is typically a 2 or 4-inch diameter pipe. However, the minimum standard pipe size for a stormwater drain is 12 inches; therefore, an inspector should be suspicious of any pipes less than 12 inches in diameter. If no suspected bypass is found close the catch basin and proceed with the inspection as appropriate.

Safety precautions for observing and opening catch basins

1. A municipality, either township, county or state, usually owns catch basins. Determine ownership and notify and obtain permission from local officials prior to accessing a catch basin. Ask for assistance in following safety procedures as these may change from one municipality to another.
2. Oncoming traffic can be dangerous. Do not attempt to open or look inside the catch basins where posted speeds exceed 25 miles per hour.
3. Never enter a catch basin without following appropriate Occupational Safety and Health Administration precaution (refer to OSHA 1910.146 Permit Required Confined Space Rule).
4. Never leave an open catch basin unattended (i.e., out of view).
5. Do not attempt to open or look inside man hole covers, located more than five feet laterally from the curb edge to the furthest point on the cover without a flagger or road crewman to direct traffic.
6. Catch basins should not be opened or observed during inclement weather or when driving conditions are poor.
7. To limit traffic hazards, consider parking a vehicle, with the hazard lights flashing, approximately 10 feet up-traffic from the catch basin being observed or accessed. Place traffic cones up-traffic and at intervals around the cover in a triangular formation.

Preparing the Inspection Form and Report

Reaching conclusions about the System

The following section presents decision points that will enable the inspector to draw conclusions regarding the system under inspection. There are three potential conclusions:

- Satisfactory- System is functioning properly and no nuisance was observed.
- Unsatisfactory- System is creating a nuisance at the time of inspection and needs repaired, replaced or updated.
- Satisfactory with comments or concerns.

Any concern or unsatisfactory conclusion reached regarding an onsite system that requires further action must be resolved or negotiated between the buyer and seller. It is not the responsibility of the Stark County Board of Health or the service provider to resolve the financial or legal responsibility of resolving the items of concern.

In addition to the above conclusions, certain unsatisfactory observations should be reported to the health department within 3 days of the inspection. These observations include:

- Ponding or breakout of sewage or effluent onto the surface of the ground or bodies of water.
- Backup of sewage of effluent into portions of buildings below ground.
- Backup of sewage into the building served which is not caused by a physical blockage of the internal plumbing.
- Any manner of leakage observed from or into the septic tanks, connecting pipes, distribution boxes and other components that are not designed to emit sewage or effluent.

These factors and thorough site notes enable a conclusion about every component in the system.

If a component is found to be unsatisfactory, the system is unsatisfactory until the component is repaired or replaced.

Concern Comments/ Observations

- High water condition observed in soil treatment system. This observation of water within six-inches below the inlet elevation of the laterals in an indication of impeded drainage within the soil treatment/disposal area. While the observation is not a failure, it is an indication that the system may be nearing the end of its serviceable life and may require corrective measures in the near future.
- Solids level above 1/3 of septic tank liquid capacity.
- No/low levels of solids with no record of recent pumping.
- System age.
- System with poor or no maintenance history.
- Access ports greater than 12 inches below the finished grade.
- Sludge level in pump tank within three inches of the pump inlet.
- Soil fracturing or chemical injection has been used to remediate the septic system regardless of the results of a hydraulic load test. These remedies are temporary in nature and may indicate potential problems with continued operation of the system.

- ❑ Leachwell system passed hydraulic load test but has less than one day's storage available.
- ❑ Number of bedrooms in the health department approval that was the basis for the system design and approval is less than the number of bedrooms present or being represented as readily available to the inspector.
- ❑ Constant flow through building sewer from structure served regardless of satisfactory condition of the balance of system.
- ❑ Indirect sump pump, footer drains, roof and downspout discharges to the surface areas where the sewage treatment system is located.
- ❑ Absorption area could not be located with the tools on hand. Additional exploration will be required to locate it.
- ❑ Pump discharge is inadequate.
- ❑ Structure vacant more than 7 days.
- ❑ Unequal distribution with treatment/absorption area.
- ❑ Separate gray water disposal system that was not inspected.
- ❑ Overfull treatment tank (liquid above the outlet) when the treatment/absorption area is satisfactory.
- ❑ Deterioration of concrete components.
- ❑ New gray water sources directed to the system within last 30 days.
- ❑ Lush vegetation at or near the treatment/absorption area.
- ❑ Unexplained pipe or tile to stream, road ditch, storm sewer, catch basin.
- ❑ Septage odors emitted from discharges of drains or basement sump pumps.
- ❑ D-box could not be located.
- ❑ Trees and/or shrubs located over soil absorption area.
- ❑ Signs of previous unsatisfactory performance, including:
  - stains in soils adjacent to treatment tanks, of surface of ground
  - stains or water level marks on treatment tank walls; debris on tank ceiling or up in riser
  - stains at top of aggregate
  - sludge in aggregate

The client should draw their own conclusions regarding the effect these factors may or may not have on the system under investigation.

Unsatisfactory

Reasons for concluding a system is unsatisfactory include, but are not limited to:

- Ponding or breakout of sewage or effluent onto the surface of the ground.
- Seepage of sewage or effluent into portions of buildings or sumps below ground.
- Backup of sewage into the building served which is not caused by a physical blockage of the buildings internal plumbing.
- Leakage into tanks, access or observation ports, leakage from any component which was not designed to leak into the environment.
- Septic tank or treatment tank baffles or tees are damaged or missing.
- Physically deteriorated components (concrete or metal tanks, D-box).
- Clogged or broken effluent delivery lines or other pipes.
- Non-functioning electrical component (aerobic device, pump, controls, alarms, etc.).
- Effluent or gray water on the surface of the ground or observed to be discharging to the waters of Ohio.

- Any sewage or effluent entering the structure (through pipes or seepage through the wall).
- A well is present in the treatment area, or any direct discharge of effluent or sewage to a well, bore hole, natural or man-made cavern or cavity, or sink hole is observed.
- Direct sump pump, footer drains, roof and downspout discharges to the sewage treatment system.
- Plumbing fixtures were dye tested and ultimate disposal location could not be determined.

Corrective Measures

Potential corrective measures that may be negotiated between the buyer and seller if agreed upon include, but not limited to:

- ❑ Replace or repair tanks, baffles, tees, pipe, etc.
- ❑ Replace or repair electrical components (lift or dosing pump, alarms, controls, etc.
- ❑ Repair or replace aerobic treatment units, filters, motors, etc.
- ❑ Install a new treatment/absorption area.
- ❑ Eliminate points of infiltration.
- ❑ Install water conservation devices or repair leaking plumbing.
- ❑ Evaluate existing water use data, if available, and compare to existing design flow and project future use.
- ❑ Reduce loading to the treatment/disposal area by:
  - Relocating water softener back flush, downspouts, footer drains to an acceptable location
  - Install water saving devices

The client should be cautioned and instructed to contact the Stark County Health department for guidance regarding the permit application process for parts or tank replacements. Following completion of repairs, Stark County inspectors should verify that the concerns or unsatisfactory conditions were corrected and summarily documented.

Notes on Completing the Inspection Form

The inspection is to be reported on the Stark County Health Department Inspection form. Clarify any issues surrounding any concerns or unsatisfactory conditions. All inspection report forms should be prepared, signed and dated by the inspector that conducted the field investigation. Based on your notes create a neat and accurate site map. Be sure to indicate distances to the septic tank lid and D-box (if located and accessed) from two fixed and permanent points so that it will be easy to relocate the system's components in the future. The report should indicate the conditions of each component.

A copy of the inspection form should be provided to the Stark County Health Department within 3 days. Like wise, if a condition is observed that requires immediate attention of the health department, notification of the observation should be provided with 3 days of the inspection.

Appendix A – Soil Absorption Components "A Closer Look"

The probing and effluent level exploration process is similar for all systems, including EZ-Flow®, Infiltrator®, and similar gravel alternative systems. However, care should be taken not to damage the system, for example Infiltrator® leach trenches. In these cases, probe to the side of the trench to determine saturation levels. Serial distribution systems should not experience liquid in the lower trenches while there are unsaturated upper trenches. Regardless of system type, careful observation and note-taking is necessary. Once components are located, inspectors should do the following:

1. Look for any trees, large shrubs or other plants with extensive root systems growing over or within 10 feet of any system components. Inspectors should inform owners that large roots might crack, offset, or otherwise intrude and damage components.
2. Look for any indication (e.g., tire tracks and other imprints) that heavy machinery or heavy objects (e.g., cars, above-grade pools, sheds, etc.) are or have been over any system components. If any heavy objects are present, the owner should remove objects and discontinue the placement of such objects over the system components. Heavy objects may crush or offset system components.
3. Look for any indication that storm water (e.g., roof runoff or outflow from foundation drains such as sump pumps) is flowing into or over any sewage system components. If this condition is present, the owner should take steps to redirect the flows. Runoff that is diverted to area of the soil treatment system may flood it and interfere with proper wastewater treatment or cause backup. Runoff diverted over other system components adds to wear and tear. Runoff may also infiltrate components eventually flooding the soil treatment system.
4. Look for physical evidence of system malfunction, such as cave-in or exposed components by erosion. If present, the owner should be instructed to have the malfunction fixed by a licensed service provider.
5. Look for any observable signs of system malfunctioning, such as septic odors, ponding, or other signs of waste water outbreak, patches of lush green grass (in conjunction with other signs of failure and giving consideration to seasonal growth patterns), burnt out grass or ground staining. Symptoms, such as the above, indicate a system failure and should receive the immediate attention of the health department and a sewage treatment installer or service provider.

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