

The Utah WaTCH

Wastewater Training Center Happenings

Utah State UNIVERSITY

Utah On-Site Wastewater Treatment Training Center
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Regional On-Site Wastewater Treatment Symposium

The Utah On-Site Wastewater Treatment Training Center will sponsor an *Intermountain States On-Site Wastewater Treatment Symposium* at Utah State University in July 1999. The goal of the symposium is to bring together people from Utah, Nevada, Arizona, New Mexico, Colorado, Wyoming, Montana, and Idaho for a 2-3 day meeting addressing on-site wastewater treatment issues in these states. The focus of the symposium will be on:

- (1) Identification of resources and needs with respect to on-site education, research, regulatory goals, and technology transfer.
- (2) Establishment of a database with regard to the regulation, criteria, use, and performance of on-site treatment technologies in the region.
- (3) Establishment of a communication network among interested parties and development of opportunities for sharing information within these states.

The symposium will be structured using round-table discussion panels with facilitative moderators and note-takers to summarize on-site needs, issues, and proposals. Anticipated results of the symposium include:

- (1) Generation of a network of individuals throughout the targeted states for exchange of information and development of collaborative opportunities.
- (2) Preparation of a document that will summarize issues, needs, and potential roles of the interested parties, and that will also provide an assessment of the status of on-site wastewater treatment in the region.

Planning of this symposium has begun, and representatives from each state have volunteered to help with organizing this event. In Utah, Richard Jex, Utah Department of Environmental Quality and Joel Hoyt, Environmental Director of the Bear River Health Department, have volunteered to assist in this effort. We will post status reports on our website <<http://www.engineering.usu.edu/uwrl/training/symposium>> as planning for this symposium progresses. If you would like to participate in the planning process, please contact Steve Iverson at (435) 797-3159 or by email at <siverson@cc.usu.edu>.

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Manager's Corner— Viewpoint

“Are you telling the on-site story?” This was a question asked of those in attendance at the October 1998 conference of the National Onsite Wastewater Recycling Association (NOWRA). Dr. Ted Loudon, president of NOWRA and soil science professor at Michigan State University, asked if we were as prepared as we could be to explain characteristics, advantages, etc., of on-site systems. As I thought about this question as it applies to those involved in on-site matters in Utah, I think the answer would be that there is definitely a significant amount of positive efforts to upgrade levels of training. Training programs have been developed and conducted by individual Utah public health departments. Support has been given to this new training center, with nearly 100 people from Utah having participated in the training center courses offered to date. Additional training workshops are being requested and developed. Letters of support for additional funding for training center development have been submitted. The Utah on-site regulations are being re-examined and revised for content and user-friendliness. Generally, excitement regarding upgrading levels of training is evident at every turn. All of you deserve a “pat on the back” for all these efforts.

We, as training center staff, are trying to keep up with you by actively seeking avenues and opportunities to extend our training efforts. We will also be hosting an intermountain regional symposium to explore training and outreach partnering possibilities, to establish networking paths with others involved in on-site work in this region, and to share on-site information and ideas with others in these western states (see “Regional On-Site Wastewater Treatment Symposium” on p. 1).

I wish to commend all who have contributed to this training effort. I would also solicit your suggestions on ways that we can work with you in your continuing

efforts to elevate the level of communications, training, outreach, and performance in on-site matters for yourself, your workplace, and your community.

Steve Iverson, Manager
(435) 797-3159

Pictures, Training Aids Needed

We would appreciate any pictures or slides of soil pits, system installation activities, alternate systems, failing systems, etc., that we could duplicate (at our cost, of course) and use to enhance our training center materials. Please send them to: Steve Iverson, Utah State University, Utah On-Site Wastewater Treatment Training Center, 8200 Old Main Hill, Logan, UT 84322-8200. We will return them to you promptly.



Boyd Stringham, Utah County Health Department, and others, practice their soil texture determination skills.



“Ya gotta get a little dirty to do soil texturing.”



Participants at the Heber City Workshops perfect their soil texture identification technique.

On-Site Wastewater Rule Changes Proposed

The Division of Water Quality is currently reviewing proposed changes to the on-site wastewater rule, Utah Administrative Code R317-501 through R317-513, *Individual Wastewater Disposal Systems*. The last revision to the rule (August 30, 1996) was the addition of the chamber systems and the alternate system program for the mound, at-grade, and earth fill systems.

The intent of this rule revision is to fix problems within the rule that are encountered on a regular basis. Many of these problems are editorial or language clarification. A vital part of this revision will be the input from the Wastewater Disposal Technical Review Committee, which represents the 12 local health departments throughout the state.

Where applicable, research into the industry standards and other state rules has been used to benchmark how our rule compares to other rules and standards. The states surrounding Utah have been contacted along with other states that have developed on-site wastewater system programs.

At this time most of the research has been completed. We are presently working on finalizing the research and preparing a draft of the proposed rule changes. We anticipate that the draft of the rule changes will be ready for review by the Wastewater Disposal Technical Review Committee and the local health departments in February 1999. Following input on the draft from the committee and the local health departments, the final draft will then be prepared by May 1999. After considering public comments from interested parties, the revised rule will be prepared for adoption.

At the beginning of this revision, a list of topics was generated for review. The list was then presented to the Wastewater Disposal Technical Review Committee for comment. The topics being considered for review include septic tank watertight testing, gravel specifications, the use of effluent filters in septic tanks, groundwater table monitoring, clarification on rule language with chamber systems, acceptable materials for system components, system operation and maintenance programs, editorial errors, and organization.

Richard Jex
Utah Department of Environmental Quality

The Utah WaTCH

Student Team Develops Training Models

Five undergraduate students majoring in environmental engineering at Utah State University assisted the training center during the 1997-1998 academic year by developing practical training aids that included both physical and computer models of on-site treatment systems. The students prepared the models as their Senior Design Project. The Senior Design Project within the College of Engineering is a year-long academic course that allows students to work in teams to obtain hands-on experience with regard to three key elements of engineering practice: (1) designing, (2) building, and (3) testing an applied engineering system. Students work with faculty, staff, and industry personnel to consider project scoping, manpower and materials budgeting, project scheduling, design calculations, construction quality control, and testing procedures.

The Senior Design Project included three components:

Pilot-scale soil absorption field trenches to demonstrate the greater uniformity of flow in pressurized distribution systems than in conventional gravity-flow systems.

Two trenches were constructed in 2 ft (w) x 2 ft (d) x 20 ft (l) wooden boxes. The trenches were backfilled with gravel to a depth of two feet. For the gravity flow system, conventional 4-inch PVC pipe with perforations was laid on the surface of the gravel. The conventional gravity-flow trench is supplied water via a wooden reservoir. Water from the reservoir, simulating intermittent effluent flow from a septic tank, flows by gravity into the absorption trench.

The low-pressure pipe dosing system was constructed of 2-inch

PVC pipe with 3/8 inch perforations. This pipe laid on the surface of the gravel, and fill materials were placed around the pipe to prevent splashing of the water. Water is distributed to this system from a garden hose under low pressure to simulate septic tank effluent dosed from a pumping chamber.

In both systems, plexi-glass windows built into the sides of the trenches allow visual observation of the absorption bed.

Bench-scale, portable soil absorption field trenches to demonstrate the greater uniformity of flow in pressurized distribution systems than in conventional gravity-flow systems.

A bench-scale demonstration model of gravity flow and pressurized flow was also constructed. The size of this model, including both flow systems, is 2 ft x 4 ft x 6 in and weighs approximately 25 pounds. It is also used to demonstrate the difference in flow distribution under gravity feed and under low-pressure distribution conditions. Movement of water can be seen by direct observation through clear plastic tubes as well as in wetting fronts as the soil moves through the "soil" (florist's floral foam). This smaller-sized bench-scale model can be easily transported to other sites for training.

Both the pilot-scale and bench-scale models demonstrate the greater level of uniformity in flow distribution along the pipe in the low-pressure system than through gravity flow.



Pilot-scale soil absorption field trench

Computer computational model of a low-pressure system to theoretically test pipe design.

The number, size, and spacing of orifices affect the head pressure that must be maintained in the pipe to achieve uniform distribution of effluent throughout the piping system. This software can be used to vary these parameters and obtain the desired outflow. It is a working program but is presently being modified to make it more user-friendly.

Another Senior Design student team of environmental engineers is working this academic year on a mound system model that will demonstrate appropriate mound design characteristics.

The members of the 1997-98 Environmental Engineering Senior Design Project included:

Byron Colton (Group Leader), Morgan Atkinson, Ross Gleason, Micah Nielsen, and Brent Seeley. Their advisor was Dr. Ronald C. Sims. A copy of their project report can be obtained from Steve Iverson at the Utah Water Research Laboratory (telephone (435) 797-3159; email: siverson@cc.usu.edu).

Randy Wilde—Winner of the Newsletter Title Contest

Randy Wilde of the Bear River Health Department submitted the winning entry for the title of this newsletter. His entry, "The Utah WaTCH," is an acronym for Wastewater Treatment Center Happenings. We felt that this entry, with an emphasis on the role of the newsletter to "watch" for happenings in the on-site wastewater treatment industry and to pass that information onto readers, captured the spirit of the goals and mission of the newsletter. Mr. Wilde received a soil evaluator's toolkit for his winning entry.

Randy began working with the Bear River Health Department in the spring of 1993 as a technician. After graduating from Utah State

University in 1994 with a B.S. in Applied Biology with an environmental emphasis, he continued working with the Department (primarily in Box Elder County) as a state-licensed Environmental Health Scientist (EHS). Like many other EHS, Randy is responsible for several areas of health protection, including on-site wastewater treatment, the institutional/community health program, and inspections of food establishments. He is also the Box Elder County Hazmat Responder.

Randy and his wife Holly have three children, Sara (4 years old), Callie (2 years old), and Addy (1-month old).

We would like to thank Randy for his entry as well as his enthusiastic support of our training center.

If you would like to be added to our mailing list please contact:

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Regulatory Spotlight - Watertightness of Septic Tanks

R317-505. Septic Tanks

R317-505-1. General Requirements

Septic tanks shall be constructed of sound, durable, watertight materials that are not subject to excessive corrosion, frost damage, or decay. They shall be designed to be *watertight below the liquid level*, to withstand all expected physical forces, to provide settling of solids, accumulation of sludge and scum, and access for inspection and cleaning...

Wastewater that leaks out of a septic tank that is not watertight may not be adequately treated and can contaminate ground and surface waters. In addition, infiltration of ground water into a leaky tank can hydraulically overload the soil-based treatment and disposal system. All septic tanks are designed to be watertight, but faulty manufacturing techniques or poor installation practices may result in a leaky tank.

During manufacturing, production of tanks with watertight concrete faces depends primarily on the water-to-cement ratio of the concrete mix and the duration of the moist-curing period (D'Amato and Devkota, 1998). Concrete with a low water-to-cement ratio (typically 0.5 by weight) and a long moist-curing period (typically seven days or more) usually exhibits no leakage. Other factors that improve watertightness include having adequate air entrainment in the concrete and controlling cracks and honeycombs.

During installation, the tank must be placed on a firm, compact, or bedded subgrade and be level in both directions to prevent uneven settling of the tank, shearing off of inlet and/or outlet pipes, or cracking of the tank. The installer should not place the tank on large rocks or other objects that could damage the tank. In general, at least four to six inches of bedding material, such as sand, should be placed underneath the tank, especially if protruding obstructions are encountered. The soil and bedding should be compacted around the tank to prevent excess settling. The backfill

or bedding around the tank should be free of large or sharp rocks or large soil clumps.

All pipe connections and seams between tank parts must be adequately sealed with sealants designed for the corrosive atmosphere of the septic tank (Bishop, 1996). Roofing tar does not adequately seal a joint because of its material properties; it also does not have adequate soil and acid resistance. Butyl rubber mastic has been shown to do a better job of sealing joints or seams, but does not act as a structural component to inhibit water loss through seams. Another method is to use hydraulic cement to seal the mid-seam of two-piece tanks, with epoxy brushed on, inside and out, when the cement is dry. Additional methods of ensuring an adequate seam seal include the use of a properly designed tongue and groove and mechanical fasteners to hold the two sections of the tank together so soil shifting will not separate the sections.

Though septic tank watertightness is required in most states, including Utah, not all states require testing. A testing program of 500 septic tanks in Mohave County, Arizona, found that 26 percent of concrete mid-seam (2-piece) tanks and 12 percent of concrete with a lid cover (1-piece) tanks failed a watertightness test (Bishop, 1996). No fiberglass septic tanks failed the testing program. In Utah, a testing program conducted by Wasatch City / County Health Department showed about 20 percent failure in the tanks tested. In Tooele County, tanks at all new installations are tested for watertightness. About thirteen percent of the newly installed tanks have shown unacceptable leakage rates. In all three testing programs, the failure rate decreased as the testing progressed as a result of manufacturers and installers learning proper methods to ensure watertightness.

Since field testing of septic tanks for watertightness is essential for ensuring that a tank will adequately contain wastewater, the Utah Wastewater Disposal Technical Review Committee, an advisory group to the Utah Department of Environmental Quality, which is composed of local health department officials, has approved a draft test method for watertightness of septic tanks. The test method was developed by investigating available standards for tightness testing, contacting other states that test for watertightness and obtaining copies of their testing methods, and considering specific limitations and concerns that were presented at the local level. The test is aimed at identifying

tanks that have large leaks. It is assumed that minor leaks are of less significance. The proposed method is as follows:

Septic tanks shall be tested for watertightness before backfilling. The tank should be filled 24 hours before the inspection for water level equalization. At the time of inspection there shall be no change in the water level for 30 minutes, nor shall moving water, into or out of the tank, be visible. The regulatory authority may allow two piece tanks, with the joint below the water level, to be backfilled to within 3 inches below the joint to provide adequate support to the seam of the tank. Testing shall be supervised by the regulatory authority.

This method may be modified during the rule revision process that will take place in 1999 (See "On-Site Wastewater Rule Changes Proposed").

Additional information on watertightness of septic tanks can be obtained from the video, *Producing Watertight Concrete Septic Tanks*, and the accompanying *Septic Tank Manufacturing Best Practices Manual*, developed by the National Precast Concrete Association. Also, the American Society of Testing Materials (ASTM) has published *Standard Specification for Precast Concrete Septic Tanks*. These materials are available for loan from the Utah Wastewater Treatment Training Center by contacting Steve Iverson at (435) 797-31259 or by email at <siverson@cc.usu.edu>.

References:

Bishop, C. 1996. Results and discussion of watertightness testing of septic tanks in Mohave County, Arizona. Mohave County Environmental Health Division, Kingman, AZ.

D'Amato, V.A. and I.C. Devkota. 1998. Development of prefabricated septic tank and pump tank construction and installation standards for North Carolina. On-Site Wastewater Treatment, Proceedings of the Eighth National Symposium on Individual and Small Community Systems. American Society of Agricultural Engineers, St. Joseph, MI.

Internet Offers On-Site Information

If you have Internet access, there are many sources of information on on-site wastewater management. Sites may be found by using a search engine such as Yahoo! or Excite or by browsing through different sites and their associated links.

We do not endorse any sites and want to remind readers that information available at these sites is not guaranteed to be accurate. In addition, site addresses often change, so the accuracy of the information listed below may also change. We've featured three sites here, and will feature additional sites in our next issue.

<http://www.nsfcc.wvu.edu>

This is the home page of the National Small Flows Clearinghouse (NSFC). The NSFC is a nonprofit technical assistance center funded by the U.S. Environmental Protection Agency that provides free and low cost informational services and products to help small communities address their wastewater treatment needs. Included on this site is information on technical aspects of system design and site characterization as well as methods to develop public support for on-site or community wastewater treatment projects. A guide to NSFC products and services can be requested. Information on subscribing to three publications produced by NSFC can also be obtained at this site, including: (1) *Pipeline*, a newsletter designed to explain small community wastewater issues to the public, (2) *The Small Flows Journal*, a publication that includes professional papers on the study of on-site and small community wastewater issues, and (3) *Small Flows*, a technical newsletter that deals with information dissemination about small wastewater treatment systems.

<http://www.nowra.org>

The National Onsite Wastewater Recycling Association, Inc. (NOWRA) was founded in 1991 as a national professional organization to advance and promote the on-site wastewater industry. This site includes the

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Training Courses Scheduled for January 1999

The Utah On-Site Wastewater Treatment Training Center will conduct two courses at the Utah Water Research Laboratory in Logan, Utah on January 28 - 29, 1999.

Basic Site Evaluation Techniques for On-Site Wastewater Treatment will be held on Thursday, January 28, 1999. This one-day classroom and laboratory workshop will emphasize assessment of soil characteristics and application of those characteristics to the ability of a soil to treat and dispose of wastewater. Hands-on exercises will be used to provide participants with experience in determining critical soil properties.

The second workshop, a classroom course on the *Fundamentals of On-Site Wastewater Treatment Systems*, will be held on January 29, 1998. This course will consist of classroom discussions and demonstrations on composition of wastewater (including grey and black water); septic tank construction, testing and maintenance; effluent filters; wastewater distribution



Peg Cashell, training center instructor, teaching the Heber City workshop attendees methods of soil characterization.



"Ant Farms" used to show water movement characteristics through sand and clay layers at the Cedar City workshop.

and treatment in conventional soil absorption systems; design of trenches and beds; use of alternative systems in Utah; and water conservation techniques.

Field sessions to provide participants with hands-on experience in soil and site evaluation will be held during the spring, summer, and fall of 1999 at two sites in Utah. Local health departments may request that this training be held in their district. Locations will be selected on a first-request, first-serve basis. Departments hosting the field session will be responsible for the selection and preparation of soil pits for evaluation exercises. All participants in the field sessions are required to have attended the *Basic Site Evaluation Techniques Course* that was held in Cedar City in March 1998, Charleston in September 1998, or the course that will be held in Logan in January 1999.

Further information on these courses can be obtained from Steve Iverson at (435) 797-3159 (email: siverson@cc.usu.edu). You can also visit our web site at <http://www.engineering.usu.edu/uwrl/training>. Course description brochures were sent to all local health departments and other interested participants in December 1998.

Calendar of Events

January 28, 1999

Workshop: *Basic Site Evaluation Techniques for On-Site Wastewater Treatment*. Utah On-Site Wastewater Treatment Training Center, Utah Water Research Laboratory, Logan, UT. Steve Iverson (435) 797-3159. [<http://www.engineering.usu.edu/uwrl/training/workshop.html>].

January 29, 1999

Workshop: *Fundamentals of On-Site Wastewater Treatment and Disposal Systems*. Utah On-Site Wastewater Treatment Training Center, Utah Water Research Laboratory, Logan, UT. Steve Iverson (435) 797-3159. [<http://www.engineering.usu.edu/uwrl/training/workshop.html>].

January 31, 1999 - February 4, 1999

53rd National Association of Conservation Districts Annual Meeting. San Diego, CA, Robert Raschke (303) 988-1810.

February 9, 1999

Utah Wastewater Disposal Technical Review Committee Meeting. Wasatch City/County Health Department, 805 West 100 South, Heber City, UT. Dwight Hill (801) 370-8771.

February 25-27, 1999

Pumper and Cleaner Environmental Expo. Nashville, TN. Cole Publishing (800) 257-7222.

March 9, 1999

Utah Wastewater Disposal Technical Review Committee Meeting. Weber/Morgan District Health Department, 2570 Grant Avenue, Ogden, UT. Dwight Hill (801) 370-8771.

March 10-12, 1999

Nevada Water Environmental Association Annual Meeting. Las Vegas, NV. Rick Warner (702) 954-4621 or <rwarnersmtp@washoe.nv.us>.

April 13, 1999

Utah Wastewater Disposal Technical Review Committee Meeting. Utah County Health Department, 589 South State Street, Provo, UT. Dwight Hill (801) 370-8771.

May 5-6, 1999

Annual UEHA Spring Conference. Vernal, UT. Bruce Costa (435) 896-5451 ext. 16. [<http://www.ueha.org>].

May 25-27, 1999

Great Plains/Rocky Mountain Hazardous Substances Research Center Conference. St. Louis, MO. Carla Wolfe (785) 532-7464 or [<http://www.engg.ksu.edu>].

June 8, 1999

Utah Wastewater Disposal Technical Review Committee Meeting. Uintah Basin Public Health Department, 734 North Center, Duchesne, UT. Dwight Hill (801) 370-8771.

July 6-9, 1999

National Environmental Health Association Annual Conference. Nashville, TN (303) 756-9090 or [<http://www.neha.org>].

August 10, 1999

Utah Wastewater Disposal Technical Review Committee Meeting. Bear River Health Department, 655 East 1300 North, Logan, UT. Dwight Hill (801) 370-8771.

October 4-7, 1999

National On-Site Wastewater Recycling Association Annual Conference. Macon, GA. (800) 966-2942.

October 12, 1999

Utah Wastewater Disposal Technical Review Committee Meeting. Southeastern Utah District Health Department, 28 South 1st East, Price, UT. Dwight Hill (801) 370-8771.

October 1999

16th Annual On-Site Wastewater Treatment Conference, Raleigh, NC. Joni Tanner at (919) 513-1678.

October 31, 1999

Annual Meetings, American Society of Agronomy, Soil Science Society of America, and Crop Science Society of America. Salt Lake City, UT (608) 273-8080 or [<http://www.agronomy.org>].

December 14, 1999

Utah Wastewater Disposal Technical Review Committee Meeting. Davis County Health Department, Courthouse Annex, 50 East State Street, Farmington, UT. Dwight Hill (801) 370-8771.

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Internet ... (continued from page 7)

quarterly newsletter, Onsite Insight, a calendar on events relating to on-site wastewater treatment, and links to web sites of manufacturers, academic and government groups, and other septic tank information sites.

<http://plymouth.ces.state.nc.us/septic/index.html>

This is a site maintained by North Carolina State University (NCSU) in Raleigh, NC. It includes information on on-site wastewater training/demonstration facilities in North Carolina. Several publications, including proceedings of the annual NCSU on-site wastewater systems conference as well as technical guidance documents, are also available on-line. Links to state government and academic web sites concerning on-site wastewater treatment are provided.

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