Solid Waste News & Notes

A Newsletter from the Solid Waste Unit of the Hazardous Materials and Waste Management Division

Vol. 3, No. 1 May 2000

"Battling Gas"

(Final installment of a series on Municipal Solid Waste and Landfill Gas)

Imagine doing battle against a huge army of methane molecules marching out from their stronghold, a landfill. Reinforcements arrive constantly. The methane marauders can penetrate everything but the most airtight barriers. Under everyday conditions they are indestructible. When they concentrate forces, they are deadly. What strategies would you consider to win this war? Nuke their stronghold? Blockade? Ambush?

Whether waging a war against methane invasion or simply planing a landfill gas control project, the principles are the same. There are three general approaches: remove the source, block the movement or divert the gases. Relative costs and feasibility vary with each situation. Many times, a combination approach may be the most practical. Let's look at each and consider relative merits and drawbacks.

Eliminating the source of a problem is a simple, permanent solution. Remove a landfill and long-term requirements to monitor and maintain the site under solid waste regulations are avoided. As with survivors of the invading army, the methane in the field would just fade away. However, rarely is this the most economical approach. Only shallow, small landfills offer removal as a practical remedy. Because landfill gas generation may persist for decades, potentially large expenditures for long-term monitoring and maintenance are at stake. We recommend that this option be evaluated in most situations, because high initial costs for removal may be more economical than extended care and monitoring.

Colorado Department of Public Health and Environment

Effective barriers against gases are a challenge. Highly mobile and molecular in size, methane can get through, or around, all but the most efficient barrier systems. And generally that means expensive systems. A methane barrier would have to be literally: "airtight," with seams sealed and anchored into bed rock or the saturated zone, extensive so that gas can't simply go around it and permanent to provide lasting protection. It is usually not advisable to plan to rely on barriers alone, where methane continues to be generated, because sooner or later, the methane will escape.

In general, diverting gases away from points of concern, or points of compliance, may offer the most economical control method. As an ambush is a better use of troops than a frontal assault, providing a preferential pathway for

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Compliance Assistance from the Unit Leader

Confusion exists! Occasionally it comes to our attention that samples for Volatile Organic Compounds (VOCs) are not appropriately collected and/or preserved. Samples that are improperly obtained and/or preserved can cost you money and time in addition to frustration. On June 22, 1998, the Division adopted the "Groundwater VOC Preservation Policy." The policy states, in part, that:

1. Ground water samples collected for VOC analysis shall be collected in bottles that *do not* contain a preservative. The samples shall then be stored at a temperature of 4 degrees Celsius, plus or minus 2 degrees Celsius, and shall be stored inverted.

2. However, ground water samples collected for aromatic hydrocarbon analysis (Benzene, Toluene, Ethyl Benzene, and Xylenes), shall be *acidified* to a pH of less than 2 standard units with concentrated Hydrochloric Acid (1 = 1).

Before you or your contractor conducts a sampling event, please obtain a copy of this policy by contacting your solid waste staff person, the Division's assistance line (303-692-3322) or by accessing the Division's homepage (at www.cdphe.state.co.us/hm/). Unfortunately, not doing so may well result in the need to re-sample.

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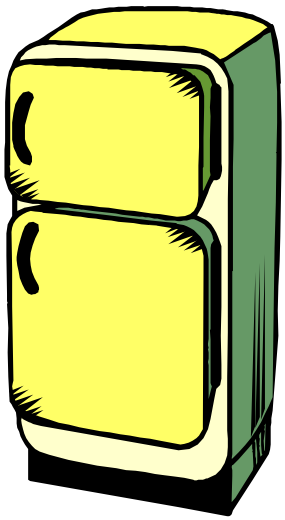
Landfill Disposal of Refrigerated Appliances
A Cool Subject

Rising concerns with ozone depletion, the impact of CFC's (chlorofluorocarbons) on the atmosphere and the enforcement of the 1990 Clean Air Act have all contributed to the implementation of policies designed to ensure the safe and proper disposal of refrigerant-containing appliances. According to the EPA's Federal Appliance Disposal Regulations, under the Clean Air Act of 1990, recycling and disposal facilities are obligated to verify that the proper evacuation of CFCs has occurred from all refrigerant-containing appliances. This includes appliances such as refrigerators, freezers, air conditioners and dehumidifiers. If you are wondering how this may affect your landfill or recycling operation, please read on!



Last year, the EPA sued a local municipality for violating the Clean Air Act by crushing discarded household appliances and releasing ozone-depleting substances. According to the lawsuit, the city in question collected discarded appliances from residents and failed to remove the refrigerant from the appliances prior to compacting or crushing them. The suit is seeking penalties of up to $27,500 per day for the violations.

What are the requirements for disposal of refrigerant-containing appliances? Any facility wishing to accept an old refrigerator, freezer, air conditioner or dehumidifier for disposal, or recycling, must follow these basic requirements:

(1) Prior to acceptance, ensure that a signed statement accompanies the appliance indicating that the refrigerant has been removed by a *certified technician*; or,

(2) Ensure that the compressor has been removed from the appliance; or,

(3) Store the appliance in a protected area while waiting for proper evacuation of the refrigerant by a *certified technician*.

The signed statement must indicate the name and address of the person who recovered the refrigerant and the date that the material was recovered. Copies of this document must be maintained at the site.

The landfill may impose an additional charge for storing refrigerated appliances while waiting for the proper evacuation of the refrigerant to occur. These appliances should be stored in an upright position and in an area away from the working face.

What happens to the refrigerant once it is removed from the appliance? It is recycled, of course! The refrigerant is recovered from the old appliance, filtered and made ready to be reused in another appliance or sold on the open market.

For more information regarding the proper disposal of refrigerant containing appliances, please contact the Air Pollution Control Division's CFC Hotline at (303) 692-3200.

—Darrell Dearborn, Solid Waste Unit, (303) 692-3349

Compliance Assistance from the Unit Leader

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More on sampling. We have recently become aware of the potential to have a one-day ground water sampling training. This would be at no or low cost. Before we proceed with the development of such a course, we would like to have some indication of your interest. The target audience is anticipated to be owners and operators of smaller landfills. The overall purpose of the training is to give these owner/operators hands-on sampling experience, to address the reasons for chain-of-custody, sample preservation, sampling protocols, working with sampling contractors and the general "do's" and "don'ts" of ground water sampling.

Please contact your solid waste staff person, or me, if you would be interested in the training, and let us know of any topics of specific interest or concern.

HELP! HELP! No, it is not the Beatles! I'm referring to the use of, application of and interpretation of models such as HELP, MUTIMED and others. The models often indicate that there will be no leachate, and, behold, there is leachate. The Division continues to use these models as a demonstration method to compare designs, however, disagreements have arisen on the application and use of the models.

It would be most HELPful if we could get your experienced opinions on the use and acceptance of these models in order to minimize our review time, decrease the potential for friction and come to mutual understandings for the use of these applications. Please contact your solid waste staff person, or me, with any input or comments.

—Glenn Mallory, Solid Waste Unit Leader, (303) 692-3445
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Thanks for Terrific Tour d'Trash

And hearty handclaps for all who made our foreign visitors welcome and more knowledgeable about solid waste practices in Colorado! Thanks to you, the October tour was a great success. The visitors gained an appreciation, not only of the beauty of this state, but also of the excellent solid waste management facilities to be found here.

Last fall, Leila Talipova, a visiting scholar at the University of Delaware, Department of Civil and Environmental Engineering, asked if she could visit with us to learn more about sanitary landfills and solid waste management in a mountainous environment. She is from the Kyrgyz Republic, a former Soviet state that borders China, Tajikistan, Uzbekistan and Kazakhstan. I was surprised to learn there are no modern, sanitary landfills in Kyrgyzstan, which has a population of almost five million. Colorado was of special interest to her because of the similar terrain and climate. Actually, Colorado's fourteeners would be foothills to their towering mountains – fully 41% of the country is above 9800 feet (3000 meters) elevation, and the highest peak soars to 24,407 feet!

Joining our tour was Jia-Jong (JJ) Chen, Solid Waste Specialist with the Republic of China (Taiwan) EPA, and also a visiting scholar at the University of Delaware, and Dr. Hong Nguyen, a scientist at CDPHE visiting from Vietnam. Leila and JJ stayed in Littleton with a host family that provided great tours to many local attractions.

By now all have returned home, and I am assured they all hold fond memories of Colorado.

The Tour d'Trash was kicked off at CDPHE early Monday, October 18, 1999, with an overview of solid waste management in Colorado. Later that morning we visited Tri-R Recycling where David Powelson explained operations, materials and markets for recyclables. Monday afternoon found us surrounded by massive amounts of trash at Waste Management's D&R Recycling and Transfer Station, in Commerce City, and their material recovery facility for pre-sorted recyclables at 54th and Franklin in Denver -- much machinery, many trucks, and tons and tons of solid waste! Our hosts were Bruce Clabaugh and Phil Price.

The next day we were on the road early to see several landfill facilities. We started at the Denver Arapahoe Disposal Site (DADS), just east of Aurora, where Steve Derus and Tricia Solsrud expounded upon the largest disposal operation in Colorado. Our guests were furnished engineering design drawings, perhaps for future sanitary landfills in Kyrgyzstan. Then on to BFI Tower Landfill, where Tim Wolford showed off his large but birdless landfill. That's an accomplishment! After lunch, beautiful weather bathed the mountains as Les Liman welcomed us to the Summit County Landfill, where we discussed high-altitude operations. Les even provided fresh bear tracks on the perimeter road, making the visit even more memorable.

So, thanks again to our hosts for boosting world understanding, at least on the trash front!

—Pete Laux, Solid Waste Unit, (303) 692-3455

From left to right: Pete Laux, JJ Chen, Les Liman, Leila Talipova and Dr Nguyen at the Summit County Landfill, October 19, 1999.

Not Tired Yet

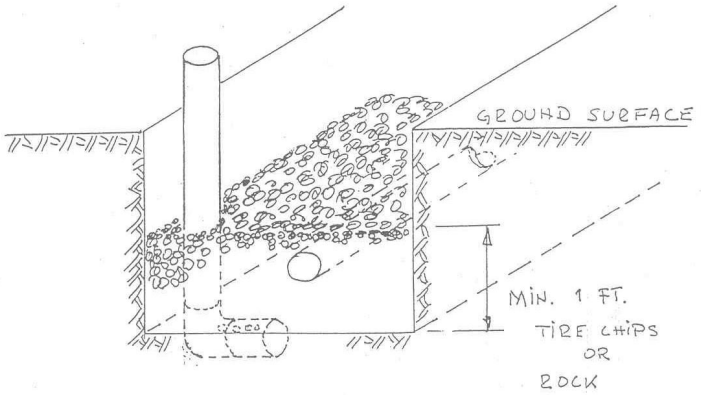
An Update On The Scrap Tire Demonstration Project

Keeping with the tradition of government projects: *more is better*, the tire chip septic system demonstration project has doubled. There are now two systems that have been installed in Weld County, and each serves a single family home. The first system was installed and activated in April 1998. The second system was installed during the fall of 1999 and is scheduled to be in use by early spring 2000.

As you may recall from the first article on this subject, the Colorado Department of Public Health and Environment, and the Weld County Department of Public Health and Environment, have partnered to conduct a study of the reaction between tire chips and individual sewage disposal system effluent (effluent is the liquid waste discharge from an individual sewage disposal system). The primary focus of the study is to evaluate the effect on effluent by the tire chips and appraise the potential impact to shallow ground water. Each system consists of a tank and distribution box, while the absorption field is equally divided into both tire chips and rock aggregate trenches. Sampling ports were installed in both trenches for effluent collection.

I would like to share with you some of the more interesting observations from the first system. Liquid is present in both sampling ports on the tire chip trench. However, in the rock aggregate trench, liquid is only present in the sampling port closest to the distribution box. Liquid has never been observed in the rock aggregate sampling port farthest from the distribution box. I believe there are two possible reasons for this: (1) the rock aggregate has a larger pore space compared to the tire chips, therefore, the rock has a water storage capacity greater than the tire chips; or, (2) the distribution line may have settled, thus preventing fluid migration to the distal end of the trench.

Quarterly sampling has occurred since April 1998 for the first system. Elements for which sufficient data and detections exist are barium, lithium, copper, iron, manganese, vanadium and zinc. Interestingly, the concentrations of all of these elements are higher in the rock trench than in the tire chip trench. No inorganic samples, from any component of this demonstration system, have produced results exceeding ground water protection standards. However, organic results from the tire chip trench have shown low levels of tetrachloroethene (PCE) that are slightly above the ground water protection standard. It appears that the origin of PCE is external. That is, the PCE was not introduced into the system from the house. Tetrachloroethene is a solvent that has numerous uses ranging from dry cleaning to a degreaser for auto parts and machinery. If the tires came in contact with PCE, either at a service station, or through the shredding equipment used to produce chips, they may have become contaminated. In an effort to remove potential organic contaminates from the tire chips used in the second system, the tire shreds were washed with a mild soap solution prior to placement in the trench. Future comparisons between data from the first and second systems will demonstrate the effectiveness of this procedure.



Cross-sectional view of a demonstration trench and sampling port.

As you can see from the above information, the data from the tire chip samples have created an unexpected outcome. Are we "tired" yet? — no way! The Department recognizes the need to find new possibilities for scrap tire reuse. Therefore, we will continue to evaluate the use of tire chips in a septic system leachfield. If the information obtained from this study is used to gain Colorado Board of Health approval, for statewide use of scrap tires for this application, we will decrease the number of tires going to solid waste disposal facilities and establish potential markets for tire recyclers.

In the next update, we will (we hope) provide field and laboratory results from the second demonstration system and further observations and data from the first system.

—Roger Doak, Solid Waste Unit, (303) 692-3437

REGULATION UPDATE

The draft composting regulations have been revised, based upon the input received from the February work session. Representatives of the Solid Waste Unit will be appearing before the Colorado Board of Health on May 9, 2000, to request a public hearing date. We expect the hearing date to be July 19, 2000. No times are available at the time of this writing. The revised draft statement of basis and regulatory analysis, for the composting regulations, should be on the Hazardous Materials and Waste Management Division's website (www.cdphe.state.co.us/hm/) by the time you read this.

The draft recycling regulations will be following at a slower pace. We are in the process of gathering additional background information about the current status of recycling in Colorado. We will move ahead with the development of operation standards based on the current input. The Division is considering a phased approach for the implementation of these rules.

Low Interest Loans for Landfills!

The Drinking Water Revolving Fund (DWRF), and the Water Pollution Control Revolving Fund (WPCRF), provide low interest loan programs that fund publicly owned water systems, wastewater treatment works and pollution control projects. Owners and operators of publicly owned landfills might take note of the pollution control projects portion of the WPCRF loan program. Certain activities that may be needed at landfills are designed to protect ground or surface water from pollution. These activities may be eligible for the WPCRF loan program where interest rates are as much as 20% below the market rate!

Landfill-related examples of eligible loans include: funds provided to a county governmental entity for the construction of liners, to an expanded area of their landfill, in order to protect ground water. The interest rate, in today's market, would be approximately 4.8% on a 20-year loan.

If you are interested in finding out more about this program and your eligibility, please contact Debbie Stenson of the Water Quality Control Division at (303) 692-3554, or via e-mail at debbie.stenson@state.co.us.

—Glenn Mallory, Solid Waste Unit Leader,
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THE LIFE AND TIMES . . . STAFF BIOGRAPHIES

Ms. Donna Stoner

At last a Colorado native! This edition of the *"Life and Times"* profiles Ms. Donna Stoner, who not only qualifies as a Colorado native, but a fourth generation one at that. It was Donna's great grandparents that started this tradition when they homesteaded just north of DeBeque in Mesa County. Little did they know that their family would continue to call the West home, with Donna's son and grandson slipping nicely into the fifth and sixth generation slots.

Donna grew up on the Western Slope, and it was at Mesa College that she obtained her B.S. in biology in 1982. Throughout college, Donna was employed in a medical laboratory, where she continued until Unocal hired her to conduct analyses in their environmental and industrial laboratory. After a year of tiring shift rotations, Donna took her affinity for "bugs" and began heading up their wastewater laboratory – a great move, since she was now in a field more to her interest, and the hours were better. Still, the hour and fifteen-minute commute from Fruita each way, each day, was a drain.

Donna considers herself lucky that during the 1982-1984 oil bust she had no trouble finding interesting jobs and training, but she never stopped looking for something closer to home. With this goal in mind, Donna began applying to the Colorado Department of Health. After six months of no word, she applied to Oak Ridge National Laboratory, the inclusion contractor for the Federal UMTRA program. Donna had no problem accepting this new position – it was in Grand Junction! No commute!

As fate would have it, however, eight months later Bud Franz of the Hazardous Materials Division called Donna to sit for the State employment screening test. Shortly thereafter, in August of 1985, Donna was offered one of three positions. For approximately six and a half years, Donna was part of the UMTRA program, until January of 1992, when she made the jump to the Solid Waste/ Underground Storage Tank Program. During this time Donna was completing her master's degree in public administration at the University of Colorado at Denver.

As part of the Solid Waste Unit, Donna is (and always has been) responsible for 12 counties on the Western Slope. A perfect fit, since this allows her to live and work in Grand Junction. The facilities Donna oversees are primarily landfills, with a couple of fly ash sites and most of the State's brine disposal sites, adding additional variety. Donna agrees with Ron, Roger and Pete when she says it's the diversity that keeps her job interesting – that, and being able to relieve "office fever" each spring inspection season when it's time to get out and interact with facility operators.

"Finding solutions for waste disposal problems unique to the West," is the thing Donna finds the most enjoyable about her position. Western Slope facilities "do not have the same disposal options as in the city, so we have to rely more on treatment options."

Obviously living nearer to the mountains, which we city folk can only gaze at during our daily commute, allows Donna to indulge her love for the outdoors. Growing up in the area developed her passion for skiing and mountain biking, and each year finds her planning a new and exciting multi-day excursion for herself and fellow biking enthusiasts. This year's trip to White Rim sounds beautiful!

Donna appreciating the desert ecosystem during a trip to Death Valley.

So how does this mother, grandmother, regulator and biker like to unwind? By traveling of course! Whether the trip is to Europe for skiing in Austria, to Hawaii and Florida to practice SCUBA, or to visit her son on the East Coast, where he has continued the tradition of environmental work at a Superfund site in New Jersey, Donna lives up to her self-description as "open" and willing to "try most anything at least once."

In the next Issue we will profile Ms. Pat Martinek.

—Brenda Lujan, Contributing Columnist, Former Solid Waste Unit Staff Member and Environmental Attorney with the firm of Burns, Figa & Will, P.C.

"Battling Gas"

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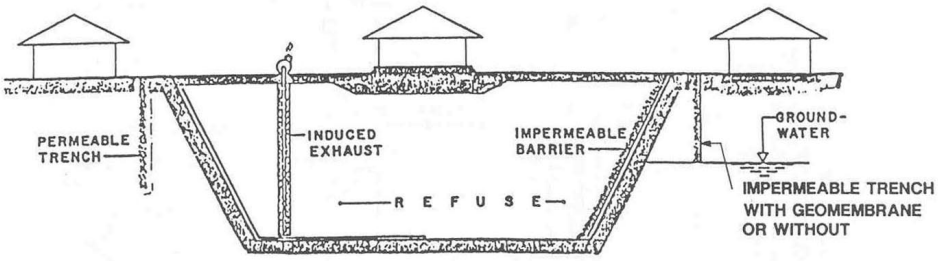
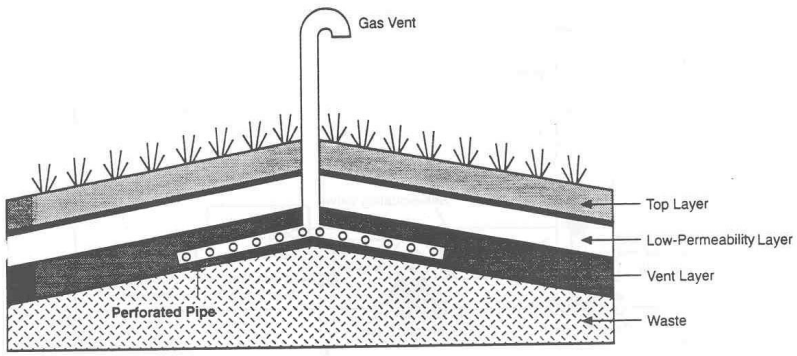
the gas to follow usually requires less construction and maintenance costs than barriers. Diversion structures don't have to be special, they need only to offer an easier way for the gases to flow: easier than horizontally through the ground away from the landfill, or vertically through the landfill cover.



Common locations for gas control systems.

The concept is simple: give the gas an EASY WAY OUT! An easy way might be through a perforated pipe or tube, a trench filled with gravel, or a vent. Realize that "easy" is a relative term and refers to the physical situation at the landfill. Information on local geology and landfill design and operation should be used as the basis for planning an effective gas control system. If there is not much information available, which is the situation with many old landfills, an assessment is recommended. Even with some geological data and landfill information on hand, the gas control system should be built to allow an expansion or upgrade, if the initial design proves to be inadequate.

Control systems are classified as "passive" or "active." Passive systems are designed to operate without adding external energy. They rely on internal pressure, concentration gradients and diffusion to move the gases to release points from which they dissipate into the air. Active systems, on the other hand, have external energy applied to move the gases. Most active systems utilize a blower to make the gases move through the system. Typically, the blower "sucks" the gases from wells, and collection pipes, and "blows" them into a flare, where they are destroyed. Obviously, an active system involves more operational and maintenance costs. On the other hand, they are more powerful and can be "fine tuned" to perform more efficiently. All control systems should include monitoring points to measure their performance.



Passive gas control system.

Vertical vent pipes comprise the simplest mitigation system. Typically, pipes of 6 to 12 inches in diameter extend 10 feet above the ground, have a turbine cap, and are spaced 100 to 200 feet apart, along the critical edge(s) of the landfill. Should the initial system be inadequate, vents could be added in between until the radius of influence of each vent overlaps the adjacent. Horizontal vent pipes within the landfill material, or along an edge, also may be considered.

Trenches offer migration control by means of an impermeable membrane on the outer side, permeable fill material within the trench, or a combination of both. Trenches can form an effective barrier, but additional components are necessary to make a complete control system. Gases in a buried permeable trench could be removed through passive vents, or through a connection to a blower.

A good reference that provides an overview of landfill gas regulations, applicability and technical considerations is in Section 3.5 in EPA's *Solid Waste Disposal Facility Criteria Technical Manual*, publication EPA 530-R-93-017, available from the Solid Waste Unit for $20. Another useful resource can be found on the Tennessee Division of Solid Waste Management website under "Landfill Gas Monitoring and Mitigation." In addition to informative text, these manuals contain design drawings of typical systems and components.

Currently, in Colorado, there are 10 operational active landfill gas collection and control systems, four at open landfills: Denver Regional, Foothills, Fountain and Tower; and six in closed landfills: Boulder Marshall, County Line, Forest Springs, 48th & Holly, Laidlaw North and Lowry. At this time, all collected gases are destroyed in flares. However, Tower Landfill soon will expand their extraction system and use the gas to fuel four, one megawatt, modular power generation plants at the facility. With New Source Performance Standards and Emissions

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"Battling Gas" ***(Continued from page 7)***

Guidelines (NSPS/EG) in air regulations coming into effect, I'm sure there soon will be more collection and control systems in Colorado.

Besides landfill areas, individual structures, such as buildings and utility installations, can be protected by passive or active control systems. Gas mitigation and protection measures are easily incorporated into the design of buildings and structures to be built where gas may be present. Some local jurisdictions have enacted ordinances or zoning requirements to ensure that adequate measures are incorporated with new construction. Prior to construction, a wide range of inexpensive protective designs, such as subgrade venting pipes or trenches, vapor barriers or combinations, may be considered. If no basement or buried structure is necessary, simply having air space between the ground and the building would suffice.

Adding gas protection to existing structures usually is more expensive, and design options are limited. Interior subslab depressurization systems, known as radon-style systems, are effective in removing radon gas and also may be used to remove landfill gases. These systems remove gases from beneath the floor or foundation before they can enter the building. Typically, they are comprised of vent pipes from beneath the building to above the roof line with a fan blower to move the gases. Active ventilation and exhaust systems or positive pressurization also may be considered as ways to keep gases out of enclosed spaces.

Again, any system that furnishes an easier way for the gases to follow will afford some measure of protection for an area, structure or enclosure. Let your engineering mind run rampant with ideas for gas control systems. As always, the Solid Waste Unit is a ready ally in your battle against the dangers of landfill gases. Give us a call.

—Pete Laux, Solid Waste Unit, (303) 692-3455

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