

# *Talking...* **TRASH**

The Newsletter of the SWANA Florida Sunshine Chapter

Spring 2021

## **STAY CONNECTED**

Plug-in to Industry Trends and Innovations

**SWANA FL 2021**  
**Virtual Spring Conference**  
**May 10-13**

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Monitor, Measure, Manage

A cost-effective alternative to traditional SCADA systems AND a supplement to routine monitoring.

IETSiteLink remote data acquisition systems provide real-time visibility of landfill systems for decision making, maintenance planning, and compliance monitoring. Remote monitoring of gas systems and leachate systems that include liquid levels, pressure, temperature, flow, and volume totals, to name a few. The IoT battery-operated gateway data collectors can be deployed virtually anywhere and monitored from any device.



Transform Real-Time Data to Real-Time Information and Ultimately Real-Time Decisions

IETSiteLink provides a reliable, cost-effective platform to monitor and manage critical system components in real-time. The dashboard and alarms can be customized to suit site-specific needs. To

make timely, informed, and accurate decisions, solid waste facilities managers, need to have the up-to-date status of critical system components.

With IETSiteLink, Engineers, Managers, and Team Members can all have essential information and alarms at the same time from their Leachate Collection System (LCS) and Landfill Gas Collection Systems (LFG), including: Real-time data for LCS Riser Liquid Levels, Control Panels, Pumps, Flowmeters, and Storage Tanks as well as data from the LFG system at Gas Wells, Condensate Sumps, Flare temperature/flow. Confidently knowing how well your systems are performing will ultimately improve efficiency, productivity, and profitability across the organization.

Alternative and Supplement to Traditional Data Collection Systems

Organizations have historically utilized traditional SCADA systems (Supervisory Control and Data Acquisition) to monitor and control critical processes. However, SCADA often requires a substantial initial investment in infrastructure, hardware, and training. SCADA is also limited in its application for monitoring remote and inaccessible areas where traditional power is not available.

Moreover, in many situations, SCADA's remote system control is unnecessary or even unadvisable due to security risks. Instead, it is the data, the status, and the real-time visibility into the system that is essential for informed decision-making. In those data-driven situations, IETSiteLink is a preferable alternative.

Because IETSiteLink's ultra-low power consumption gateways can run on long-life batteries, they can be installed in virtually any environment or location in a fraction of the time and for a fraction of the cost.



Supplement to Routine Monitoring

Although required, routine compliance monitoring is often not timely enough to make informed operational decisions. *The infrequent nature of monitoring, staff shortages, potential error in manually logged documentation, and reporting delays make informed, proactive decisions almost impossible.* IETSiteLink can fill that gap. Whether it's continuous monitoring of gas or leachate systems, critical event management, or high-level alerts, IET can configure the system to report at a frequency that best suits your facility's needs. The dashboard provides current status and stores historical data on a single platform that can be viewed across any web-connected device.

IETSiteLink is a powerful proactive management tool. All recorded data is stored in a safe and secure cloud-based platform, which can be accessed at any time by the designated individuals on your team. Historical data can be downloaded for subsequent analysis to determine trends, correlating activities, causation events, and predictive analytics.

Scalability and Integration

Landfill owners have invested in the core components required for monitoring. IETSiteLink connects to your existing monitoring components, collects the data, and puts it in the decision maker's hands. Our system is modular in nature and requires minimal change to infrastructure. IETSiteLink can expand as your operations grow and begin monitoring when and where needed. Our gateway box can be seamlessly integrated into your existing systems, providing a singular integrated secure platform for all your facility data management needs.

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Letter from the President

March 2021

The recent safety summit by SWANA indicated that 40% of fatalities in our industry in 2020 were from a vehicle crash or a worker being struck by a vehicle. 52 individuals lost their lives and 70% of those were related to collections, performing an essential service for their communities. The remaining fatalities occurred at landfills, MRFs and transfer stations. Not surprisingly, dense, populous states led the list including New York, California, Texas, Pennsylvania and Florida. As solid waste organizations, we all have safety plans, safety goals and programs to educate and reinforce safety protocols to keep our staff safe. As with any education program, outreach is key to the success. However, with any initiative, fatigue plays a role and it is the responsibility of all manager, crew supervisors and organizational leaders to stay engaged.



It was only a year ago that our country began to feel and react to the impacts of COVID-19. I had an assignment right on the edge of this event and I will always remember the full flight headed there and the 5 people I shared the plane with on the return flight. What a stark contrast and real time impact. What followed was uncertainty and confusion, but at the forefront was the care and safety of solid waste employees. Our folks got creative, developing solutions and protocols for two-man collection routes, office staff working from home, and keeping scalehouse personnel protected. I've always said that the scalehouse is the lynchpin of the organization as most of the financial revenues for programs go through that small building. Organizations managed through quarantining staff and through all of this, kept trash off the streets and communities running, and operated our landfills and MRFs.

So, what's next? I think it all comes back to the people in our industry. The social dynamics of the workplace have been shut out. We have become our kids, spending way too much time in front of a screen on Zoom meetings. We should be reminding folks that they are appreciated for the work they do and their commitment to our communities. Hopefully, we will be back into the norm of appreciation lunches and BBQs soon. Until then, keep yourself and your staff safe.

We are getting ready to review abstracts for what is hopefully our last virtual conference in May. "Stay Connected: Plug-in to Industry Trends and Innovations" will be held from May 10-13th and will showcase ongoing topics that advance the work being done in the solid waste industry. We hope you can be a part of this upcoming event.

Sincerely,

Keith Howard  
SWANA FL President

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# First of Two Parts

## Planning for Uncertainty in Solid Waste Agencies

Marc J. Rogoff and Bill Gaffigan

In February 2002, Donald Rumsfeld, the then U.S. Secretary of State for Defense, stated at a briefing: “There are known knowns. There are things we know that we know. There are known unknowns. That is to say, there are things that we now know we don’t know. But there are also unknown unknowns. There are things we do not know we don’t know.”

As a result, he was almost universally lampooned since many people initially thought the statement was nonsense. However, careful examination of the statement reveals that it does make sense—indeed, the concept of the unknown unknown existed long before Donald Rumsfeld gave it a new audience.

Given all that has transpired in 2020—a global pandemic, a national recession, and far ranging financial impacts to local solid waste agency budgets through rising operating costs—long-term financial planning for these “known knowns” and “things we do not know we don’t know” are even more important. Our firm’s solid waste advisory practioners, experienced on more than 50 solid waste rate and financial studies and solid waste plans in recent years, offer the following lessons learned for public works and solid waste directors.

### Financial Responsibility

Full-cost accounting (FCA) or financial responsibility for solid waste management has been advocated by the U.S. EPA beginning with the promulgation of the landfill disposal regulations in the 1980s. FCA, unlike cash flow accounting, considers direct, indirect (overhead), upfront (past) and back-end (future financial liability)

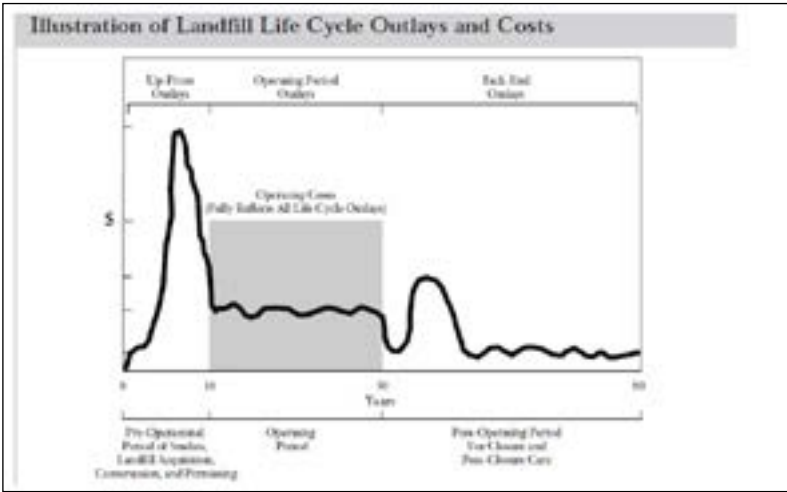


Figure 1 - Landfill lifecycle outlays and costs.  
Figure courtesy of U.S. EPA, 1997.

expenses. Solid waste agencies have substantial long-term obligations, which require long-term planning and have implications today for rate setting. As shown in Figure 1, landfill assets last for many years and exhibit all of these costs, which must be considered in effectively pricing a landfill’s long-term tipping fee.

One of the most significant long-term obligations many agencies have is the funding of closure and post-closure costs. These obligations require cash funding of millions to tens of millions of dollars at an estimable point in the future. The federal

landfill regulations (Subtitle D 40 CFR 258) and implementing state regulations mandate specific standards for all owners/operators to follow when closing a landfill and setting up a program of monitoring and maintenance during a 30-year post-closure period.

For 30 years after closure, the owner/operator is responsible for maintaining the integrity of the final cover, monitoring ground water and methane gas, and continuing leachate management (see Figure 2). All landfills must also comply with the financial assurance criteria. The owner/operator must demonstrate financial responsibility for the costs of closure, post-closure care, and corrective action for

known releases. This requirement can be satisfied by the following mechanisms:

- Trust fund with a pay-in period
- Surety bond
- Letter of credit
- Insurance
- Guarantee
- Financial or Means Test
- State assumption of responsibility
- Multiple mechanisms (a combination of those listed above)

### Post-Closure Care Period

Existing federal and state landfill regulations require that consistent

monitoring procedures be followed each year during the 30-year post-closure care (PCC) period. This essentially means that the operating entity of the landfill must continue to monitor the integrity of closure cap system, groundwater quality and LFG management in a similar fashion as during the pre-closure period.

We are now approaching the 30-year mark on the implementation of Subtitle D regulations (see Figure 2). Landfills which were closed in the mid to late 1990s under the then new regulations will be approaching the end of their prescribed regulatory post-closure period.

The 30-year PCC period prescribed in the regulations can be decreased or extended by the director of the implementing agency of an approved state if it is determined that a change is protective of human health and the environment. Unfortunately, there is little, if any, guidance provided by the U.S. EPA to make this affirmative decision, and if this decision is made, what ground rules can be established on the frequency of monitoring that can be required.

Presently, there is significant uncertainty on the methodology that will be used by State regulators in evaluating whether or not any landfill at the end of its responsibility at the 30-year PCC period will need any additional annual monitoring. Some large agencies and private

operators, as well as professional solid waste organizations, such as the Environmental Research and Education Foundation (EREF) and Solid Waste Association of North America (SWANA), have developed research programs and advocate a performance-based approach to evaluating post-closure requirements.

### Common Practices

The vast majority of municipal landfill owners demonstrate financial responsibility with either the local government financial test (LOGO) or a surety bond:

1. *40 CFR 258.74(f):* Local Government Financial Test (for landfills owned by cities/counties). The LOGO requires that the local government must meet two tests: 1) the ratio of its marketable securities to total expenditures must be greater than or equal to 0.05, and 2) its ratio of annual debt service to total expenditures must be less than or equal to 0.20.

2. *40 CFR 258.74(b):* Surety Bond Guaranteeing Payment or Performance (for landfills owned by private corporations, like Waste Management or Republic Services).

Although these two financial assurance mechanisms are used for well over 90 percent of the landfill owners, any mechanism found in 40 CFR 258.74(a) through (j), including the use of multiple mechanisms (k), is allowed.

Costs must be included for a post-closure care period (generally 30 years) in accordance with state regulations and 40 CFR 258.72. These costs (as well as closure costs) must be adjusted annually for inflation in accordance with 40 CFR 258.72(a) (2). Typically, municipal solid waste agencies operating landfills employ the services of a consulting engineer to provide an annual cost estimate for closure and post-closure care for both county landfills.

### Capital Replacement Needs

When

developing long-term plans for solid waste systems, you also need to evaluate the capital replacement needs for different components of the system. For those with extensive collection programs, it is essential that planning for this uncertainty be conducted as part of a master plan effort.

*Fleet Management Planning*  
A sound fleet replacement plan is essential to the reliability and cost-effectiveness of a solid waste collection program. Further, equipment that is well-maintained and consistently reliable reduces accidents

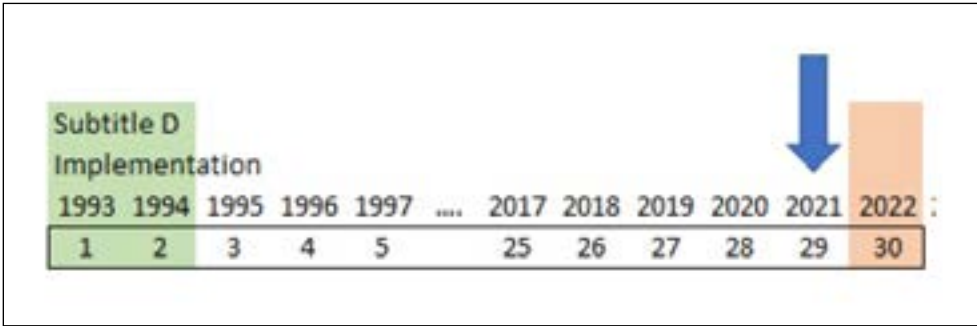


Figure 2 - Subtitle D implementation.  
Figure courtesy of Geosyntec Consultants.

and downtimes, helps provide for higher customer satisfaction, and contributes to enhanced employee morale. Typically, most “best-in-class” sanitation collection systems are on a six to eight-year replacement cycle for automated side-loaders.

Many municipal sanitation departments have developed long-term fleet funding programs in lieu of annually cash expensing these vehicle purchases. These funding plans vary from a long-term, direct surcharge on their customers to transfers from the General Fund or use of local option sales tax programs. We recommend that a department implement a Fleet Replacement Plan into its system.

*Preventative Maintenance*

All solid waste equipment requires routine maintenance during its operation life. Key to the fleet manager’s mission is to increase the availability of this equipment so that their internal customer, the superintendent or operations manager, has the right types and numbers of equipment to complete their routes.

The goal of a proactive preventive maintenance (PM) program is to minimize unscheduled repairs and equipment being down for long periods of time. Certainty is the key. A well-managed PM program maintains a constant awareness of the condition of the solid waste collection fleet before problems become serious problems. Effective PM programs have proven their value by helping agencies extend the life of their equipment, minimizing the high cost of expensive repairs and reduced productivity resulting from fleet downtime.

*Fleet Replacement*

Aging or obsolete equipment requires a greater level of maintenance and repair to prevent out-of-service conditions. Older equipment that has reached the end of its useful life will require expensive repairs beyond standard PM because as a vehicle ages its critical systems become unreliable. In the case of solid waste vehicles, hydraulic systems, chassis drive trains including transmissions, and fundamental body wear require major and costly mid-life rebuilding. It is at this point in a vehicle’s life that a decision be made to either replace the unit or rebuild it.

Capital costs tend to decline over time, while operating and maintenance costs increase. The economic theory of vehicle and equipment replacement predicts that vehicles and equipment should ideally be replaced during the flat portion of the curve; that is, at the time annual operating costs begin to outweigh capital costs. Deferring replacement purchases in order to accommodate short-term budget shortfalls can result in future increased replacement costs and, oftentimes, unmanageable fleet replacement backlogs. There is no single best approach to financing fleet replacement costs. With the financial challenges facing local governments today in providing cost-effective and timely solid waste management services, evaluation of these various approaches should be made focusing on ways to minimize costs and providing value-added services to the public. These considerations will be addressed in future element reports.

Part one of this article presents a wide range of tools and approaches to help solid waste agency decision-makers

to quantify the “known knowns” and the “known unknowns”. All of these guidelines we discuss help in crafting useful solid waste master plans, capital and fleet replacement plans. As practioners in the solid waste industry for well over 35 years, we have developed useful “go-bys” that will provide valuable lessons learned. Given all that we have seen this past year, planning for risk or uncertainty is an important function for solid waste agencies. More agencies need to be asking these hard questions. The next part of the article will talk about modeling efforts for solid waste agencies as part of a total master plan effort.

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ISSUES

- Significant new and ongoing regulatory issues
- Higher labor, energy, fuel, equipment, and insurance costs
- Uncertain and changing market for recyclables
- Political pressure to do more with less
- Perception that private sector can provide better service at reduced cost and with less governmental risk
- Increasingly-engaged public calling for more recycling and implementation of zerowaste goals

CHALLENGES

- Numerous competing priorities
- Effective change requires comprehensive evaluation of current organizational, financial, and operational activities
- Public and elected officials may lack knowledge of costs, risks, or sustainability of implementing new programs
- Well-intentioned new activities can have unintended consequences upon existing systems and finances

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# Gas and Liquid Carrying Pipes in Landfills and Complexity of Conflicts

Ali Khatami, Ph.D., P.E.

A virtual view of modern landfills’ interior reveals a maze of pipes running in various directions at the bottom, near the top, and in between throughout the waste vertical column. Some of these pipes are constructed at locations that will not change over the landfill life, and other pipes get shifted around as the landfill settles over time. Settlement in waste piles is not a new phenomenon and has been observed as long as piles of trash existed around human dwellings from eons ago to the modern days at specific landfill locations. Settlements can occur due to the deterioration of organic matter in the landfill and the addition of more waste over and around the waste mound.

### Pipe Design

Some of the pipes are specifically designed to be located at the bottom of the landfill, such as leachate collection pipes, leachate toe drain pipes, pressure release pipes, etc. These pipes will experience none or very little settlement in the landfill foundation soils over the landfill’s life. If excavation is necessary, it is highly likely to find these pipes at the same location as were initially constructed many years earlier. Other pipes may be near the landfill final cover system, either below or above, closely interacting with the final cover geosynthetics. Many such pipes are for the control of landfill gas or leachate seeps at the landfill surface. These pipes include vertical gas wells, horizontal gas wells,

condensate sumps, condensate force main, compressed air lines to gas well pumps, condensate sumps, seep control sumps, electric conduits to



Many pipes involved in construction of final cover.



Positioning existing large and small pipes above a new final cover geomembrane.

sump pumps, leachate recirculation force main and storm water downchutes. Some of these experience settlements that occur in the waste column and get shifted over time.

Pipes near the final cover system, above or below final cover geosynthetics, are designed to consider multiple factors, including location

and orientation. The force of gravity applies to liquids flowing through the pipe, such as condensate lines, which is an important factor for positioning pipes at right locations. The connection to other pipes in significantly different orientations, such as lateral gas pipes connecting to vertical gas wells, is another important factor. Shifting of waste in vertical or horizontal directions can adversely impact vertical and horizontal pipes if the connection design is inadequate.

Another aspect of piping and their interaction with the final cover is the conflict among different pipes—more specifically, conflicts among gas pipes and liquid-carrying pipes, in or near the final cover system. Liquid-carrying pipes may include stormwater downchutes, rainwater toe drain pipes, and leachate toe drain pipes. Storm water downchutes usually are large diameter pipes extending from the top of the landfill to the perimeter storm water system. Rainwater toe drain pipes are pipes that receive water from the final cover geocomposite drainage layer and are located at terraces on slopes and the toe of the slope near the perimeter berm. Leachate toe drain pipes

collect leachate seeps below the final cover geomembrane and are located at terraces on slopes and the toe of the slope near the perimeter berm.

### Things to Consider

While preparing design sets, evaluating the relative positions of pipes and the final cover geosynthetics avoids conflict among pipes.

Engineers specifically pay special attention to the following:

- For gas wells near the landfill’s final surface, the final cover soils and geosynthetics layers are included in the gas design details to show relative depths and locations.
- Design the flow control valves located below the final cover near the landfill’s perimeter with a vertical casing around the valve. It is tall enough to extend through the future final cover and booted at the final cover geomembrane penetration.
- Condensate sumps and associated stub outs (such as condensate force main, compressed air lines, or electric conduits) installed within the landfill footprint before construction of the final cover are designed tall enough to accommodate the final construction cover system around the condensate sump. There will be sufficient space to boot the final cover geomembrane to the condensate sump’s exterior walls.
- Pipes exiting the liner boundary at the perimeter of the landfill are designed to be at least 1 foot above the anchor trench shoulder, so that a geomembrane boot can be installed on the pipe at the point of penetration through the final cover geomembrane.
- Locate the flow control valves near the landfill perimeter and within the lined area outside the alignment of future rainwater toe drain system at the slope’s toe.
- Design gas pipes located above the final cover geomembrane and crossing terraces or access roads to eliminate conflict with the rainwater toe drain at the terrace



Lateral gas header, condensate force main, and compressed air line involved in final cover construction.

- or adjacent to the road.
- Large gas headers located across the slope above the final cover geomembrane design will eliminate conflict with stormwater downchutes.
- Design large gas pipes on top of the final cover geomembrane crossing a tack-on swale to eliminate adverse impacts to the swale flow line.

### Coordinate Efforts

The complexity of landfills varies from site to site. Issues related to conflicts among gas and liquids pipes, pipes and final cover geosynthetics vary depending on the geometry and other landfill features involved at each location. The best way to resolve conflicts before the project goes to construction is to coordinate efforts among parties involved in the design to discuss and find solutions to every conflict at the design stage.

Ali Khatami, Ph.D., P.E. is Vice President of SCS Engineers. He has more than 30 years of experience in design, permitting, and construction of landfills. Dr. Khatami can be reached at [akhatami@scsengineers.com](mailto:akhatami@scsengineers.com) or [www.scsengineers.com](http://www.scsengineers.com).

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# Which Fire Suppression Agent Works Best for Protecting Heavy Equipment?

Leslie Jackson

In general, there are three primary types of fire suppression agents: dry powder, liquid/wet/foam, and clean agents. Which of these agents work best for protecting heavy equipment? Ultimately, the answer is, “It depends.”

### Dry Powders

There are several variations of dry powder but the most common is ABC multi-purpose dry chemical powder, which is effective against Class A (Debris), Class B (Fuel), and Class C (Electrical Fires).

Dry powder provides incredibly fast fire knockdown and floods an entire volume of space, making it ideal for protecting engine and transmission compartments. Pound-for-pound, dollar-for-dollar, dry powder tends to provide the best “bang for your buck” and most versatile all-around performance, which is why it has been the standard for protecting heavy equipment for decades.

### Liquid Agents

The most common liquid agents are effective against Class A (Debris) and



Class B (Fuel) fires. Because they are conductive, they generally are not effective or suitable for Class C (Electrical) fires.

With a liquid agent, you want to directly target specific hazards for optimal performance. The liquid agent provides exceptional cooling, which greatly reduces the chance of fire reignition and makes it ideal for protecting high heat components such as turbochargers, exhaust manifolds and the aftertreatment. Liquid agents also penetrate debris, making it a great option for waste handling or wood processing equipment.

### Clean Agents

Clean agents, such as HFC-227ea, are

generally best suited for sealed, controlled environments and are, therefore, not commonly used on heavy equipment.

### Dual Agents: The Best of Both Worlds

Dual agent systems use *both* dry powder and liquid agents. By using two fire suppression agents, you get the best of both worlds. The dry powder provides fast knockdown and floods the space while the liquid agent targets specific hazard areas and provides an extended, cooling discharge. This ensures both maximum initial and reignition performance.

Best of all, because the dry powder is more efficient than the liquid agent, a dual agent system requires a smaller footprint and is typically more cost effective than a liquid-only system.

### The Importance of a Complete Fire Protection Plan

Fire suppression systems are just one part of an effective fire protection plan. Risk reduction, operator training, and supplemental protection, by a trained and certified fire system technician, are all keys to ensuring the safety of your operators and the productivity of your equipment.

Leslie Jackson is Business Development Manager for AFEX Fire Suppression Systems. AFEX delivers rugged, reliable fire suppression solutions for heavy equipment that maximizes machine safety and productivity. With more than 50 years of industry experience and Factory Mutual, ActivFire, and CE approvals, AFEX is the leader in heavy equipment fire protection. Leslie can be reached at (919) 749-1528 or e-mail [ljackson@afexsystems.com](mailto:ljackson@afexsystems.com). For more information, on AFEX, call (919) 781-6610 to speak with one of their experts or visit <http://afexsystems.com>.

# What Are the Environmental and Economic Impacts Associated with Flaring Biogas?

Ramon Rivera

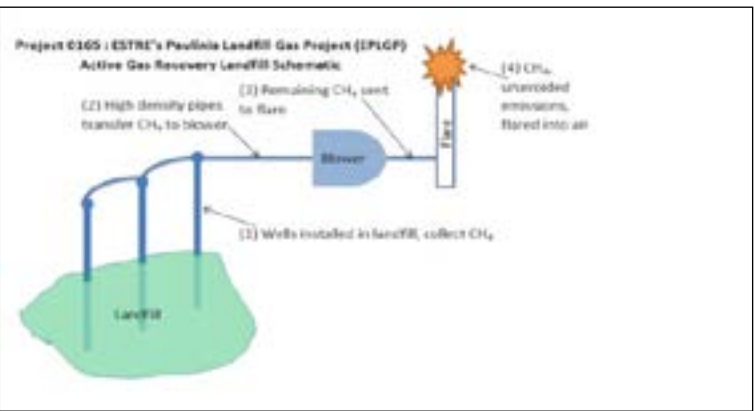
Burning off biogas produced as a byproduct of activities (e.g. on landfills) by flaring it rather than recovering the biogas for use as a source of energy is one way of getting rid of methane and volatile organic carbons (VOCs) produced by these activities—it converts most of them to carbon dioxide. Flaring biogas is a method that is typically used in instances where operators are prohibited from intentionally discharging or venting biogas into the atmosphere. In addition, at landfills and other sites where gases are emitted into the environment, operators are required to monitor surface emissions using a portable, hand-held methane analyzer or similar device.

### Emissions Associated with Flaring Biogas

Emissions of various atmospheric pollutants vary according to gas flow input rate. The emission factor (lb/MMBtu) for the various pollutants can be summarized as follows:

#### Atmospheric Pollutants

- Nitrogen Oxides (NO<sub>x</sub>) – 0.057
- Carbon monoxide (CO) – 0.047
- Particulate Matter (PM) – 0.0123
- Volatile Organic Compounds (VOCs) – 0.0062
- Sulfur Oxide – 0.0403



Simple LFG flare system. Photo courtesy of Vince Reinhart, CC BY-SA 2.0, via Wikimedia Commons.

#### Greenhouse Gas Emissions

- Methane – 0.07 (Global Warming Potential = 34 over 100 years)
- Carbon Dioxide – 191.3 (Global Warming Potential = 1 over 100 years)
- Nitrous Oxide -0.0024 (Global Warming Potential = 298 over 100 years)

#### Cost of Flaring Gas

According to the EPA report, *Evaluating the Air Quality, Climate & Economic Impacts of*

*Biogas Management Technologies*, it is estimated that installation costs range from \$51,700 for projects with lower flow rates (biogas flow rates of 17 SCFM or 0.6 MMBtu/hour) to \$972,000 for projects with high flow rates (biogas flow rates of 830 SCFM or 30 MMBtu/hour), while operating costs range from \$2,070/year for smaller projects to \$38,900/year for larger projects). Disposing of biogas by flaring therefore costs around \$1.25/MMBtu for small scale biogas operations and less than \$0.50/MMBtu at larger operations with high flow rates.

### Economic and Environmental Benefits

Understanding the costs associated with the economic performance of biogas-to-energy technologies will assist landfill and biogas developers in identifying cost-effective biogas management options.

Ramon (Ray) Rivera is CEO of Diamond Scientific (Cocoa, FL). He can be reached at (321) 223-7500 or e-mail [info@diamondsci.com](mailto:info@diamondsci.com).

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# Watered In: Liquid Issues in Landfill Gas Extraction Wells

Dan Cooper and Stephanie Liptak

Over the years, the solid waste industry has observed an increase in liquids in landfills. These liquids are generated from the existing moisture content in the raw waste, degradation of the waste over time and rainfall infiltration. Landfills are designed for these liquids to drain vertically downward to the landfill's bottom leachate collection system where the liquids are piped to leachate storage tanks or ponds. *However, some liquids become trapped in the varying waste layers.* A possible cause of trapped liquids may be improved waste compaction, which limits pore spaces, resulting in minimal liquid flow downward to the leachate collection system. Landfills that receive incinerator ash may also have perched liquids that result when landfilled materials harden in place and cause impermeable layers within the waste mass.

As landfill gas (LFG) extraction wells are installed into a landfill waste mass to remove LFG, due to the path of least resistance, trapped liquids are flooding the wells causing the wells to be “watered in”. In some cases, the gas pressure inside of a watered in well is so high that the liquids in the well will geyser upward as shown in Figure 1. When liquids in the wells inhibit gas collection, waste instability and compliance issues relating to surface emissions and odors can occur. Newer

regulations require the monitoring of penetrations during quarterly surface emissions monitoring events, depending on if the landfill is subject to the newer regulations, trapped liquids in the wells may



Figure 1 - Excess pressure/liquids inside wells can result in geyser conditions.

increase the effort of managing the number of exceedances observed, corrective actions needed to be performed to remediate those exceedances and coordination with regulatory agencies. *Liquids are becoming more difficult to remove from landfills and new extraction methods are having to be implemented to accommodate the increase in liquids.*

**Gas Extraction Well Design**  
One of the common ways the industry is removing liquids is through gas extraction wells that have now become dual liquid and gas extraction devices. Traditional well designs have included 6-inch High Density Polyethylene (HDPE) or Polyvinyl Chloride (PVC) well casings inside a 36-inch diameter boring that is backfilled with large (1 to 3-inch) non-calcareous

stone and sealed near the surface with a bentonite or foam plug. New well designs include larger diameter casings to allow for the easier installation and removal of the pneumatic pumps (typically 4 inches in diameter). Using thin slots (40-mil) instead of holes (5/8-inch) in the well casing to minimize the amount of silt that enters the wells has also been implemented. Another option is to use smaller diameter aggregate in the borehole, which will limit the amount of silt brought into the well while the pneumatic pump is operating. The smaller diameter aggregate will also provide a denser backfill in the borehole that will minimize shifting and well settlement.

Occasionally, trapped liquids may lead to higher temperatures within the wells, which then requires the use of Chlorinated Polyvinyl Chloride (CPVC) or steel casings to avoid deformation of the well casings due to heat. These designs along with modifications to the liquid conveyance infrastructure for the wells can assist the LFG and landfill operators in capturing liquids that enter the gas wells.

**Managing the Collected Liquids**  
The liquids collected from the gas extraction wells are often referred to as “top liquids” since they are extracted from the top layers of the landfill and not through the landfill’s bottom leachate collection system. Top liquids, similar to the leachate collection system, must be conveyed across the landfill to leachate storage tanks or ponds through a piping network. The

piping network, referred to as the dewatering forcemain system, must be designed to handle the required flow and corrosive and silty nature of the top liquids (see Figure 2). The dewatering forcemain system must also be designed with minimal low spots, air release valves, cleanouts every 500 feet, and an appropriate diameter to allow for scouring velocity flow. The installation of pressure gauges on the dewatering forcemain piping is also beneficial for operations troubleshooting as blockages may develop in the system over time causing elevated pressures. The chemical composition of the top liquids must also be considered when determining whether to mix these liquids with other landfill liquids or to manage them separately. The top liquids often tend to be more potent than liquids that are collected in the bottom



Figure 2 - Pressure gauges and cleanouts are beneficial for troubleshooting dewatering forcemain systems.

leachate collection system since the top liquids are not filtered through the waste mass.

**A Healthy and Compliant System**  
Overall, landfill owners and operators should understand

the removal of landfill liquids is pertinent to a healthy and compliant gas collection and control system and for the longevity of the landfill. All gas wells should be designed to remove liquids or at least have the contingency to do so. Troubleshooting appurtenances described should also be integrated in the dewatering forcemain system for operation and maintenance purposes.

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# Commentary

## Informal Sectors in Waste Management: What Can Developed Countries Learn from India?

Ashpreet Kaur

Rag pickers, or “Kabadiwalas”, are a boon for developing nations. India has had informal waste collection for a long time. In almost every society, community and residential area where waste is being generated or dumped, kabadiwalas are always found scavenging for things they can sell in the market as recyclables or reusables. If people are disposing of their waste via a government collection system, they keep the recyclables so that they can sell them off to kabadiwalas.



Image courtesy of <https://journals.openedition.org/factsreports/5143>

### Collection System

So, how does it work?

Kabadiwalas collect recyclables like glass, paper, books, plastic, etc., once per day or week and shout to the area, “Raddi dedo, kabad dedo.” This means, “Please give me your recyclables.” People sell their segregated recyclables to kabadiwalas in exchange for food or money. People even sell their hair in India. On Sundays (when most people wash and cut their hair), a person collects all the discarded hair and exchanges it for food, bathroom supplies, snacks etc. E-waste is also exchanged for “Jeera” (cumin seeds) in Delhi. There is a place in Delhi called Tagore garden that is known for exchanging recyclables for food. If there is open dumping, people scavenge for e-waste,

glass, plastic etc. This waste usually comes from localities and institutes where segregation is not done, and the recyclables are not sold off to kabadiwalas.

### Advantages

The advantages to having such an informal waste collection system are:

- Recyclables are being segregated at the source.
- Less waste is going to landfills.
- No startup cost for the government (government is saving money as it is not paying anything to these pickers).
- People are getting incentivized.
- These people usually know what can be sold in the market, so information about the type of sellable plastic or glass can be used in policy making or banning plastic.

### Challenges

The challenge is labor injustice. Usually kabadiwalas sell recyclable material to the nearest transfer station or the nearest recycling facility. These recycling facilities then sell the recyclables at higher cost, giving only a small fraction of money to kabadiwalas. So, an unjust scenario has been created where kabadiwalas are not getting their fair share for “cleaning” the trash.

Another challenge is health problems. Kabadiwals are usually poor and small children are also part of this sector. At times, they go around with bare feet and naked hands in scorching heat to collect waste. Not only is there the issue of heat exhaustion, they are also not aware of the health issues that a hazardous dumpsite can cause.

### Solutions

- The government should incentivize informal sectors and make sure that kabadiwals are getting right amount of money for their hard work
- Kabadiwals should be provided knowledge about health issues and ensured safe working conditions since they are helping to segregate the waste.

### Takeaways for Developed Nations

While developed nations usually have problems with recycling, in India or other third world countries, the problem is littering. With regards to this informal sector set up, I suggest that developed nations can use some labor (volunteers, NGOs, homeless people, people without jobs, etc.) to go out into communities and collect recyclables. These people can be given training and knowledge needed to carry out the tasks. They will be paid, and the society will eventually become aware of which items are recyclable and the money they can make. However:

- It must be ensured that the incentives given are enough in the initial stages for the community to make this transition.
- The volunteers and workers are given some sort of incentive that is sustainable enough to attract them.
- Some recyclables cannot be sold into the market, so there needs to be a circular economy process put into place in order for everyone to benefit from the material.

The benefits here are more than then challenges and, hence, this sector needs to be strengthened. A network is very beneficial and crucial for waste management and segregation.

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### Reference

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# Orlando’s Mandatory Recycling Ordinance: A Success Story

Evan Novell

The City of Orlando has joined a continuously growing list of municipalities that have begun to take sustainability seriously and, therefore, implemented policies that target environmental stewardship inefficiencies as well as begun to lay the groundwork for a more sustainable approach to doing business within the city. One of these policies, an amendment to the article addressing the Solid Waste portion of the city’s municipal code, outlines a phased-in approach to a city-wide, mandatory recycling ordinance for all commercial and multi-family properties.

The overarching goal of the ordinance is to reduce the amount of waste



Reusable totes being distributed to one of the many multifamily properties that make up half of Orlando’s resident base.

destined for landfills, which are a leading source of greenhouse gases and a significant contributor to climate change—a direct threat to Orlando’s

moniker of “The City Beautiful”. Considering that municipal solid waste and recycling are inextricably linked with the vast majority of commercial and multi-family properties (everyone produces waste), municipal or otherwise, the ordinance itself is far reaching in its ability to mitigate the environmental and quality of life impacts of the properties and businesses across this spectrum.

Over the past two years, Orlando’s dedicated recycling staff have worked side-by-side with property managers, residents, and business tenants alike through more than 550 individual site visits accounting for more than 1,000 hours of work involving property assessment, container right-sizing, compliance verification, and educational outreach. In most cases, newly compliant properties were provided with bilingual, educational half-pagers and/or property-specific guidance sheets outlining how, where and when to recycle at their property. Due to various socioeconomic factors and other extenuating circumstances, recycling has not been received equally from one property to the next. In instances where a property struggled to implement a successful recycling program, Orlando, with the expertise and financial aid of The Recycling Partnership, was able to provide the property with reusable totes, eliminating the need for plastic bags and reducing overall contamination.

In addition to the commercial and multi-family components of the ordinance, the city has preemptively implemented recycling programs at each of its 101 municipal facilities in an exemplary effort to lead the charge towards Orlando’s goal of zero waste to the landfill by 2040. This pairs well



Educational and Instructional information provided in bilinagual format by The City of Orlando with the aid of The Recycling Partnership.

with Orlando’s mantra of “providing the opportunity to recycle” and largely serves to reinforce a positive, rather than negative, outlook on municipal recycling endeavors. Looking forward, there is an incredible opportunity to employ similar as well as new strategies as the ordinance unfolds into its latter phases.

Since its implementation in 2019, the ordinance has successfully completed two of its four phases and aims to conclude its third phase on April 1 of this year. To date, the city and other, local private haulers have increased Orlando’s recycling availability by approximately 18,512 cubic yards with the potential to divert up to an additional 852 tons annually. These figures are projected to grow as the ordinance matures and new recycling programs are implemented well into and beyond the completion of the ordinance in 2023.

Evan Novell is Sustainability Project Manager for the Solid Waste Division, City of Orlando. He can be reached at [Evan.novell@orlando.gov](mailto:Evan.novell@orlando.gov).



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- City of St. Cloud
- City of Clearwater
- City of Tampa

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Member News

A Tribute to Paul J. Stoller: April 10, 1942 – July 29, 2020

The solid waste industry lost a “giant” in our profession. In mid-September 2020, we were shocked to learn that Paul J. Stoller passed away in his hometown of Lexington, MA. Quoting from Paul’s obituary from the Tributearchive.com by Goldman Funeral Chapel in Malden, MA, “... Paul was born in Brooklyn, New York on April 10, 1942 to Helen and Louis Stoller. Paul’s interest in the environment led him to study Environmental Engineering at CCNY and SUNY at Stony Brook. He spent over 40 years consulting for governments to structure public/private partnerships. Paul was a Vice President and 30-year employee at CDM Smith.”

Paul was a pioneer in the waste-to-energy (WTE) industry. In the 1970s, prior to working for CDM, he worked for the MITRE Corporation and was an author of the infamous “MITRE Model”, which included a WTE implementation process flow sheet that could encircle a large-size conference room. EPA provided that model to communities that received Urban Policy grant to investigate resource recovery feasibility. Paul then put into practice the concepts in the MITRE Model in the early 1980s with

CDM to develop the Hillsborough County, FL Faulkenburg Road WTE facility, as well as the development of Hillsborough’s Southeast Landfill, including the siting, permitting and procurement for both facilities. He



went on from there to successfully help many other municipal governments develop WTE projects, including Kent County, MI, Pasco County, FL, Lee County, FL, Bristol, CT and Lancaster County, PA.

Paul worked nearly his entire career at CDM Smith, and most recently performed outside consulting services to private clients, including CDM Smith. He was a long-time and active member of SWANA, and a frequent

presenter at both WASTECON and NAWTEC. Paul was preceded in death by his loving wife and companion, Sandra, who passed away February 18, 2020. Paul and Sandy traveled the world extensively. Interestingly, Paul recounted only recently to Warren Smith that his interest in travel started following a WTE facilities tour in the early 1980s for Hillsborough County, visiting WTE’s in six European countries.

It was Wei Liu at CDM Smith’s Tampa office, along with others there, who learned of Paul’s passing. Then, Wei organized and hosted a virtual memorial for Paul, attended by many of his clients, colleagues and friends.

Paul Stoller will be greatly missed, but his professional accomplishments and contributions to implementing successful WTE and other Municipal infrastructure projects will live on for many years.

—By Wei Liu, Warren Smith and Dan Strobridge. Wei Liu, P.E. is an Environmental Engineer at CDM Smith, Tampa, FL; Dan Strobridge was a V.P. and Project Manager for CDM Smith and is now an in-house consultant, Tampa, FL; and Warren Smith (retired) was Solid Waste Director for Hillsborough County

One Year Later: The Miami-Dade County Department of Solid Waste Management Working Through the Pandemic

A year has gone by since America and the world were hit hard with the COVID-19 pandemic. Although there is now a vaccine against the virus, little has changed in the way of daily life for most people since March 2020.

This is also true for the Miami-Dade County Department of Solid Waste Management (DSWM). In fact, little has changed for DSWM even from the time before “Coronavirus” became a household word everywhere.

“Nearly all of our services have continued, uninterrupted, since the pandemic began about a year ago,” said Michael Fernandez, DSWM Director. “We’ve had to make a few minor adjustments, such as having staff wear additional personal protective equipment (PPE), but that’s about it. We’re still collecting residential garbage and recycling as well as bulky waste, and all of our

disposal sites have remained fully operational—we never stopped doing any of these things.”

In fact, the only thing that caused a minor hiccup at DSWM all this time was a perennial threat: a tropical storm. “COVID never really affected our operations, but when then-tropical storm Eta threatened us in November, we had to suspend garbage and recycling collection for one day,” Fernandez said. “But, we would have had to do that anyway for a tropical storm or hurricane, COVID or no COVID.”

After Eta veered away from Miami-Dade County, things returned back to normal for DSWM. “After just one day, we went back to what we do every day: providing the best waste collection and disposal services to our customers,” said Fernandez.

Eta’s experience could have compounded an already challenging situation, with COVID raging across Florida and the rest of the U.S. However, with DSWM’s resiliency

and recent experiences with several major crises, DSWM staff and management took it in stride.

“Mosquito control in our county falls under our purview, so when Zika hit Miami-Dade in 2016, our solid waste operations went to work supporting them as much as possible,” Fernandez said. “Then we were hit with Hurricane Irma in 2017 and we were able to mobilize quickly to remove over 4 million cubic yards of debris from our roads and rights-of-way. So, our employees are seasoned and ready to go, no matter what the emergency.”

While everyone is hoping for an end to the pandemic real soon, it is good to know DSWM staff is up for the task of providing excellent services every day—come what may.

Michael Fernandez is Director of the Miami-Dade County Department of Solid Waste Management. He can be reached at (305) 514-6626 or e-mail [mfern@miamidade.gov](mailto:mfern@miamidade.gov).

SWANA FL Scholarship Program

Every year SWANA FL awards up to two scholarships, each valued at \$2,000 per student, per school year. The application deadline is May 1, 2021. Information about the student scholarship and application guidelines can be found on the [SWANA FL Website](#).

Three Additional Scholarships Are Available

In addition to the Florida SWANA student scholarships, three additional scholarships are available through [SWANA International](#).



A member of the DSWM waste collection team.



DSWM Director Mike Fernandez (left) visits with staff and management at one of the DSWM’s landfills.



A DSWM employee cleans and sanitizes a waste collection truck at the end of the day.



Member News

COVID-19 Affects 2021 Legislative Session

According to the Florida Constitution, the 2021 Legislative Session began on Tuesday, March 2 and will run for 60 consecutive days. It is a time when legislators and the public meet and discuss proposed legislation. Normally, there would be social gatherings such as Palm Beach County Days or the Florida Nurses Association Day when hundreds of people would travel to Tallahassee to meet with their legislators, the Governor and other Cabinet members.

But not this year ...

The Session will take place, but it will look different than past years. For example, no one, other than Senators and staff, is allowed in the Senate Office Building. If you want to testify before a



committee about a bill, you must go to the Donald L. Tucker Civic Center and speak from that location via a televised presentation.

On the House of Representatives side, a limited number of the general public is allowed in committee rooms but only if they plan to testify on a bill before the

committee. Meetings are broadcasted by The Florida Channel. Like any other telecommunications, there are problems ... not hearing a person due to microphone issues or other technical issues.

This new way is making it harder for the general public to have their voice heard. Tracking down your State Representative and State Senator is not always easy. Their staff members become even more important as they are your lifeline to the elected office.

A Representative has approximately 175,000 people in their district and a Senator can have up to 400,000. They want to hear from their constituents so if you do not live in their district, you may be wasting your time. Therefore, if you need to get your message across to the elected official, here are a few pointers:

- Have a one-page document outlining why the legislators need to take action, i.e. vote in favor or against a bill. In most years, approximately 3,000 bills are filed in the House and Senate so a legislator needs to have a short summary, not a large report.
- Get the document to the staff member as soon as possible
- Need to find your legislator?
  - State Representative – [www.myfloridahouse.gov](http://www.myfloridahouse.gov)
  - State Senator – [www.flsenate.gov](http://www.flsenate.gov)
- You can find information about bills on the websites listed above too.



Make sure to be involved with your state legislature. They have the ability to affect your life in many ways such as regulatory, taxes, transportation and yes, even solid waste. Make your voice heard!

*Keyna Cory is the President of Public Affairs Consultants and has represented the solid waste and recycling industry before the Florida Legislature and regulatory agencies for more than 30 years. She can be reached at (850) 681-1065 or e-mail [Keynacory@paconsultants.com](mailto:Keynacory@paconsultants.com).*

SWANA FL Legislative Update Webpage

Did you know that SWANA FL has a webpage dedicated to legislative and FDEP rulemaking updates? Take a look at the page below to learn what bills and rules may directly effect the solid waste industry and our members.

<https://swanafl.org/news/legislative-updates/>

Hillsborough County Solid Waste Launches Bike Drop-Off and Donation Program

Hillsborough County Solid Waste owns and operates five Community Collection Centers (CCCs) to provide residents a convenient and responsible means of disposing of items not collected curbside. Hillsborough County residential customers may drop off electronics, paint, bulky waste, batteries, tires, furniture and more. In addition, residents with excess recycling or who live in multi-family units without access to a recycling program can also drop off accepted program recyclables at one of the county’s conveniently located CCCs.

Last year, a few astute county staff noticed that residents were disposing of bicycles that were in good shape or only needed minor repairs. What started as a well-intentioned idea to keep these bikes out of the landfill and to donate them to children in the community, has now become a new county program with 26 bikes recently provided to Hillsborough County Children’s Services. The Children’s Services department focuses on keeping children, young adults, and families protected and empowered to live safe and healthy lives.

When asked about the new bike donation initiative, Eduardo

Busquets, a facility manager with Hillsborough County Solid Waste Services, said, “We just want to be able to put a smile on some kids faces that normally don’t have anything to smile about. Whatever the circumstances are that they’re going through, whether it’s family



issues or whatever the case may be, at least when they’re at Children’s Services they’ve got a bike to ride or maybe even get to take it home with them.”

Hillsborough County continues to be creative in updating ongoing and developing new initiatives to become a leader in sustainability. In recognition for these efforts, Hillsborough County was recently

awarded Platinum certification from the U.S. Green Building Council in its Leadership in Energy and Environmental Design program (LEED) for cities and communities—the first in the state of Florida to achieve the Platinum designation. To that end, Hillsborough County is currently developing a Sustainability Action Plan, outlining actions to increase waste reduction, improve its residents’ standard of living, and more.

The bike donation initiative not only diverts non-burnable waste from the landfill, but also conserves natural resources and increases quality of life aspects for residents. In the coming months, the Solid Waste Division hopes to expand reuse and waste reduction efforts to target other reusable items routinely dropped off at Community Collection Centers, continuing the road to sustainability.

*Daniel Gallagher, E.I. is the Recycling & Waste Reduction Specialist for the Hillsborough County Public Utilities Department. He can be reached at (813) 221-6549 or e-mail [GallagherD@hillsboroughcounty.org](mailto:GallagherD@hillsboroughcounty.org).*



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