Operational and Environmental Performance

The day-to-day operation of MSD's wastewater infrastructure is much like a manufacturing process, consisting of inputs, finished products, and by-products. In our sewage treatment system, the primary inputs include wastewater, energy, and chemicals. From these "raw materials," we generate one finished "product": treated water in compliance with water quality regulations. Our wastewater treatment processes also generate a variety of by-products, including sludge, air emissions, GHG emissions, odors, solid wastes, and recyclable wastes.

Our environmental footprint consists of the materials and energy we consume, the wastes and emissions we produce, and the quality of the treated water we produce. Any improvements we can make in treatment processes, efficiency, conservation, and waste and emissions reductions will, therefore, reduce our environmental footprint. However, our number one contribution to our region's environmental health is returning clean water to local waterways.

In addition, meeting the requirements of the federal Consent Decree to reduce overflows from entering streams, creeks, and rivers is a critical component of improving our region's water quality as well as public health. Performance indicators related to the Consent Decree are published separately, at *www.msdgc.org* and *www.projectgroundwork.org.*

In this section, we present a variety of sustainability indicators relating to our operational and environmental performance. They have been selected to represent products, inputs, and by-products, as shown to the right.

"MSD is incorporating and really practicing and evaluating what we do, by looking at the triple bottom line. It's no longer looking at just regulatory impacts – but also adding the people piece and the financial piece. We have to adopt triple bottom line as a practice if we are going to succeed. It's the way we do business."

— Beverly Head
Superintendent of Industrial Waste Division

Strategic Plan Goals

- Provide reliable infrastructure and high-quality cost-effective utility services for collection and treatment of wastewater and stormwater
- Enhance public health and the environment

Sustainability Goals

- Deploy energy and material resources efficiently
- Minimize waste
- Protect air quality and minimize odors
- Reduce GHG emissions
- Protect and enhance water quality
- Comply with environmental regulations

Key Performance Indicators for Sustainability

- MSD Products
  - Water quality regulatory compliance
- MSD Inputs
  - Wastewater
  - Energy consumption
  - Chemical consumption
- MSD By-products
  - Sludge dewatering
  - Incinerator air emissions
  - GHG emissions
  - Odor control
  - Waste disposal
  - Recycling

Water Quality Regulatory Compliance

Effluent water quality is driven by water quality regulations; as a result, MSD measures performance in this area with respect to regulatory compliance. Figure 8 summarizes 2009 regulatory compliance with respect to water quality regulations.

Industrial Pretreatment Program

Industrial wastewater discharges – typically large in volume and highly concentrated in the pollutants they contain – can affect the chemical and biological balance of MSD's wastewater treatment processes and inadvertently put MSD's regulatory compliance record at risk. To prevent these undesirable outcomes, MSD operates a pretreatment program for industrial customers. The program helps protect the sewer system from accidental industrial releases, avoids interference with MSD wastewater treatment processes, and maintains MSD's compliance with federal regulations.

Under the program, MSD issues permits to 125 Significant Industrial Users (SIUs), establishes local limits for each user, and requires sampling of the wastewater discharges from their facilities. MSD determines regulatory and permit compliance by conducting regular sampling and inspection at each SIU site, at least annually. When an SIU's wastewater discharge exceeds the allowable levels, MSD begins enforcement actions that may result in penalties for the SIU. In certain cases, SIUs can offset portions of the penalties by undertaking Environmental Enhancement Activities. This allows for environmentally beneficial projects or practices that resolve or address compliance violations, such as making changes in manufacturing processes. In 2009, MSD recorded 8 companies in significant non-compliance and invoiced roughly $13,000 in fines.

MSD also issues permits to approximately 75 non-SIUs to help them employ Best Management Practices for their operations. For companies involved in enforcement actions, MSD encourages the company to invest in solving their compliance problem in lieu of paying penalties.

Figure 8: **Excursion Occurrences in 2009**

MSD Wastewater Treatment Plant	Number of Excursions[a] in 2009	Total Compliance Points[b]	Percent Compliance[c]
Mill Creek	2	1,579	99.87
Little Miami	1	1,813	99.94
Muddy Creek	0	1,467	100
Sycamore	3	1,701	99.82
Polk Run	3	1,521	99.80
Taylor Creek	0	1,533	100
Indian Creek	2	1,150	99.80
Mayflower Estates	3	432	99.30
Wesselman Woods	10	432	97.69

[a] An excursion is an event that results in effluent from the wastewater treatment plant exceeding regulated water quality parameters.

[b] A compliance point is defined as the number of times a permitted water quality parameter is measured in one year. For instance, the daily limit on pH would have 365 compliance points for the year. A monthly average of a parameter would have 12 compliance points for the year.

[c] Percent compliance is calculated as [total compliance points minus the number of excursions in one year]/[total compliance points] * 100 percent.

An Award for Exceptional Regulatory Compliance

In 2008, MSD was one of only four wastewater utilities in the country to receive the prestigious Excellence in Management Award presented by the National Association of Clean Water Agencies (NACWA). Awards are given for exceptional regulatory compliance with the NPDES permitting requirements. This 2008 award honors MSD management and staff for their significant efforts toward improved water quality of their effluent and sets the bar for high performance in the future. For example, the Taylor Creek plant earned the NACWA Platinum award for achieving five years without a single regulatory compliance violation.

EXCELLENCE IN Management Recognition PROGRAM

MSD and Food Company Wornick Collaborate for a Win-Win

MSD and Wornick Foods recently collaborated to achieve a sustainable solution for both organizations. Wornick is a leading supplier of ready-to-serve foods. Since 1995, the company has discharged process water from food sterilization at its Blue Ash facility into MSD sewers.

In 2009, Wornick embarked on a $3 million capital project to recycle its process water and add chilling capacity. To be completed by the end of 2010, this initiative will reduce water usage by 80 percent and proportionately reduce wastewater discharge to MSD. The resulting cost savings amount to more than $1 million annually.

Even though MSD will lose revenue from the resulting sewer flow reduction, MSD will benefit from freed-up sewer line capacity. The reduction in Wornick's wastewater discharge could result in fewer sewer overflows and lower equipment operating costs at SSO 700 (in Reading), the sanitary sewer line that serves Wornick and which overflows during heavy rains. SSO 700 is the highest-volume SSO in the MSD system. It passes wastewater through three 1.2-million-gallon settling tanks to a chemically enhanced, high-rate treatment facility and ultraviolet system, prior to discharging into Mill Creek.

"We are the biggest industrial user in this area," said Michael Hyche, VP of Operations for Wornick Foods. "We're reusing our process water instead of discharging it to MSD, and MSD is gaining additional capacity in its sewer line."

Prior to the start of the project, MSD Superintendent Beverly Head (of the Division of Industrial Waste) and Mike Cappel met with Wornick personnel to review preliminary engineering plans. "We try to work closely with our industrial customers to meet their needs," said Ms. Head. "They'll be our customers for a long time if they can control their own costs and be satisfied with our service."

New Engineering Building Gets LEED Gold Certification

In April 2010, MSD's new LEED® Gold certified engineering building was completed and dedicated in an opening ceremony. The three-story, 58,000+ square-foot structure is owned by the City of Cincinnati and will be known as the Metropolitan Sewer District of Greater Cincinnati Wastewater Engineering and Educational Center. About 150 employees and support staff moved into the building in April 2010. They work for or support our Project Delivery (PD) and Project & Business Development (PBD) divisions, and their primary functions are to develop and execute Project Groundwork.

The facility, a collaboration between MSD and various City and County Departments, was built on a former brownfield site using energy efficient materials with recycled content. Energy-conserving components include a white reflective rubber roof, solar panels, and a special cooling system. The building also uses energy-efficient lighting and makes use of natural light.

The building is accessible to mass transit and offers bicycle racks and outlets for four electric cars. Outside, the new structure boasts a rain garden and two green roofs to control stormwater. To reduce water usage, the building features highly efficient fixtures and occupant sensors. The building will serve as a "green education center" for the Cincinnati community. A special kiosk is being placed in the lobby to help educate visitors about its green features.

What is LEED®?

LEED stands for Leadership in Energy and Environmental Design. It is an internationally recognized green building certification program developed by the U.S. Green Building Council (www.usgbc.org). There are four LEED categories - certified, silver, gold and platinum - which are achieved based on a point system. For more information, visit *www.usgbc.org.*

Getting out of the FOG – MSD's Grease Prevention Program

In 2009, MSD's Industrial Waste Division focused on grease prevention. Fats, oils, and grease (FOG) cause many problems in sanitary sewer lines. FOG builds up on the sides of the pipes, resulting in sewer blockages that can cause backups, flooding, and environmental spills. Blockages cause problems for MSD industrial customers who have to pay for damages and remediation due to FOG buildup, and MSD's operational costs rise due to maintenance and remediation costs.

The FOG program targets restaurants, cafes, lunch counters, cafeterias, bars, clubs, and kitchens at hotels, hospitals, factories, and schools, and it consists of four key components:

- **Prevention Program:** MSD is working with new food industry customers by reviewing permit applications and plans to ensure that the business has the appropriate grease traps installed for their volume load.
- **Reaction program:** If blockages do occur, MSD's first priority is to get sewers flowing again. Then, MSD works with the food service business that caused the problem to diagnose the issue and prevent blockages from happening again.
- **Rehabilitation:** In response to customer requests, MSD developed a rehabilitation program with defined standards and processes to aid food service industrial clients in preventing future problems.
- **Proactive maintenance:** Looking at the collection system, MSD is using its advanced Computer Aided Graphic Information System (CAGIS) program to actively seek out sanitary sewer blockages before they become a problem.

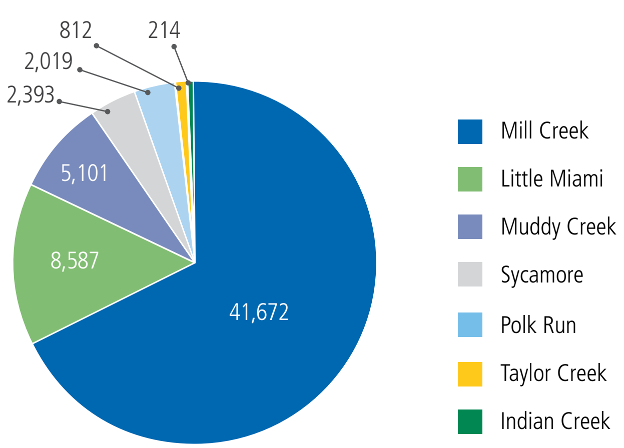
In combination, all four aspects of the program help prevent the unpleasant consequences of sewer blockages from impacting MSD's customers while reducing costs for all.

Wastewater

MSD operates seven major wastewater treatment plants in Hamilton County. The Mill Creek Wastewater Treatment Plant (WWTP) in Lower Price Hill is the largest, treating 114 million gallons of wastewater a day. Three additional plants serve developments at Fort Scott, Mayflower Estates, and Wesselman Woods. The Wesselman Woods package treatment plant was decommissioned in 2010. Figure 9 shows how much incoming flow was treated by these treatment plants in 2009.

Figure 9: **2009 Wastewater Volume Treated by MSD Facilities** (million gallons)

Total = 60,800 million gallons



Notes:

1. Fort Scott was not fully operational and did not have any reportable flows in 2009.
2. Mayflower Estates averaged 0.032 million gallons per day in 2009.
3. Wesselman Woods averaged 0.04 million gallons per day in 2009.
4. Flows from these small plants were transported to Mill Creek for treatment.

Condition Assessments Put Maintenance on Track for the Long Term

With a complex underground system that cannot be observed first hand, pipes must be inspected using closed-circuit television technology to produce a high-quality record of the collections system. MSD televises approximately 300 miles, or nearly 1.6 million feet, of sewer each year. With this information, MSD is able to assess the condition of pipes in the systems and evaluate priorities for rehabilitation or replacement, while increasing staff productivity.

Energy Consumption

Next to water quality protection, energy consumption is the second largest component of MSD's total environmental footprint. Energy is needed to pump sewage from all parts of the sewage collection system to each wastewater treatment plant and through various plant processes, as well as to keep the lights on and computers running.

MSD's primary energy sources include natural gas, purchased electricity, and fuel for fleet vehicles. In alignment with the Cincinnati Green Plan, MSD is working to better manage energy consumption, to reduce both operational costs and GHG emissions. Figures 10 and 11 show MSD's total 2009 energy consumption.

MSD's general facilities (offices and warehouses) also consume energy, which is included in the energy consumption totals listed below. In these buildings, energy consumption is easily reduced by auditing and improving light fixtures and the heating and cooling systems. MSD's Industrial Division began this process by installing energy-efficient light fixtures, as well as motion detectors. Set-back temperature controllers were also installed, along with climate controllers.

In 2010 and 2011, MSD has scheduled major building audits to further reduce energy consumption and the related costs. In addition, we have scheduled two initial sites for energy optimization efforts: the Polk Run and Little Miami treatment plants. At these locations, we will focus on metering, equipment functionality, lighting upgrades, and process improvements. At the Polk Run plant, these initial efforts are estimated to save $80,000 annually.

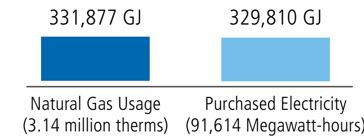
Chemical Consumption

Chemicals are an integral component of wastewater treatment, allowing MSD to treat millions of gallons a day, efficiently, while meeting regulatory requirements for effluent water quality. Figure 12 shows MSD's chemical consumption in 2009. Chemicals also constitute a significant operating cost. For these reasons, MSD seeks to reduce chemical consumption on an ongoing basis. For example:

- In prior years, MSD completed installing ultraviolet (UV) disinfection systems at all small-volume plants. While UV disinfection consumes more energy than pure chemical disinfection, it produces a higher-quality effluent and uses less chlorine. For MSD, the cost benefit is acceptable at small facilities.
- While the Mill Creek and Little Miami treatment plants use hypochlorite for disinfection, both plants closely monitor usage on a daily basis to ensure the minimal amount needed is used for varying flow conditions and changing composition of incoming wastewater. MSD is currently reviewing alternatives for various chemicals to further reduce chemical consumption and reduce costs.
- In 2009, the Sycamore treatment plant started chemical reduction efforts related to treating phosphorus for odor control. Here, we are testing biological treatment of phosphorus, which would allow for a potential 8,000 gallon annual reduction of poly-aluminum chloride, based on 2009 usage. Testing and the transition to biological treatment will be completed by the end of the third quarter in 2010. In addition, odor issues have subsided at the treatment plant for several years; for this reason, it may be possible to discontinue the use of hypochlorite for odor control. If hypochlorite can be eliminated, the annual consumption of this chemical would be reduced by about 7,000 gallons. Currently, we are monitoring odor issues with the discontinuation of hypochlorite.

Figure 10: **2009 Natural Gas and Electricity Consumption**

Total = 661,687 Gigajoules (GJ)
= 10.9 GJ per million gallons treated

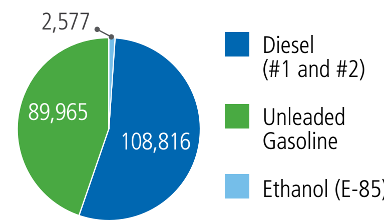


Notes:

1. Natural gas is consumed by stationary combustion sources, which include the incinerators at the Mill Creek and Miami treatment plants, all Mill Creek facilities including the Gest Street Garage and auxiliary facilities, the Galbraith Road Collections office and auxiliary facilities, the MSD Administration Building, the MSD septic receiving station, and Muddy Creek, Sycamore Creek, Taylor Creek, and Polk Run treatment plants.
2. Purchased electricity is represented for all MSD treatment plants, auxiliary facilities, Gest Street Garage, and the MSD Administration building.

Figure 11: **2009 Fuel Consumption in Gallons**

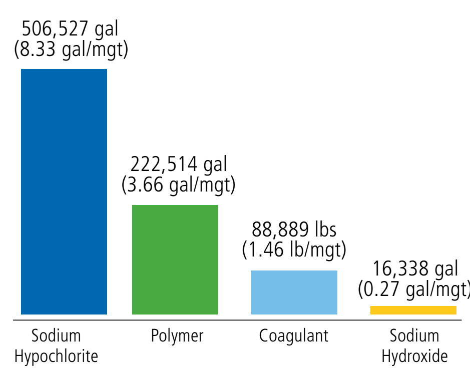
Total = 201,358 gallons
= 3.31 gallons per million gallons treated



Notes:

1. Fuel for fleet vehicles is of three types: diesel, unleaded gasoline and E-85 (gasoline consisting of 85 percent ethanol, a grain-derived fuel). The fleet includes over 300 passenger vehicles, vans, trucks, construction equipment, and pumps.
2. In keeping with the Cincinnati Green Plan, MSD supports fuel reduction by implementing and abiding by the City's no-idling policy and including alternative and flex fuel vehicles in the fleet. Currently, there are 8 hybrid vehicles and 45 flex fuel vehicles in the fleet, of which 28 were purchased in 2009.

Figure 12: **Chemical Consumption for Wastewater Treatment Operations in Gallons or Pounds per Million Gallons treated (mgt)**



Sludge Dewatering

Aside from effluent, MSD's second biggest output is sludge. Sludge is a semi-solid by-product of the wastewater treatment process. The options for disposing of sludge include incineration, landfilling, composting, or application to agricultural lands as fertilizer. MSD uses incineration, because the benefits outweigh the costs and concerns. For example, incineration does not have the same public safety issues, costs, or fuel, air emissions, and landfill space concerns associated with the landfilling option. Figure 13 shows how much sludge was produced by each plant in 2009.

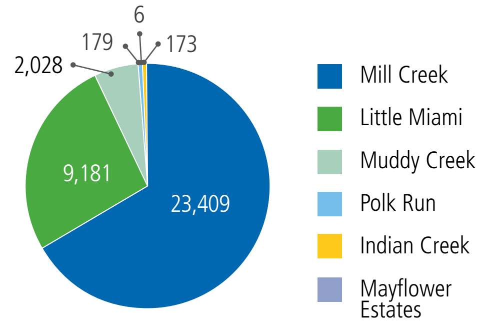
For MSD, the primary environmental issue associated with sludge is finding the best balance between energy and chemical consumption. Dewatering processes apply polymer chemicals to thicken the sludge, and energy is required to run belt presses and centrifuges that remove the water. The resulting product (called "sludge cake") requires less energy for efficient incineration. In addition, because sludge cake is more compact, MSD uses less fuel to transport it from the treatment plants to the incinerators. The challenge is to adjust the system so that both energy and chemical consumption are minimized in both the dewatering and incineration processes. Optimization efforts at the Polk Run treatment plant have dewatered sludge further, thereby reducing sludge hauling by about 40 percent and saving approximately $34,000 per year.

In 2009, MSD had a target range of solids in sludge between 22.5 percent and 25 percent. At the Mill Creek and Little Miami facilities respectively, the average solids contents in 2009 were 26.8 percent and 22.0 percent. With the installation of the new fluidized bed incinerators at Mill Creek, MSD is working with industry experts to determine the optimal operating range to achieve quality outputs at the least costs for energy and chemicals.

Figure 13: **2009 Sludge Production, in Dry Tons, by Treatment Plant**

Total = 34,976 tons

= 0.58 ton per million gallons treated



Notes:

1. Sludge from the Sycamore and Taylor Creek plants is transported to Little Miami and Mill Creek treatment plants, respectively, for incineration.
2. Fort Scott development plant was not fully operational in 2009 and did not generate a measurable quantity of sludge.
3. Nearly 97 percent of MSD sludge was incinerated, with the remainder (1,144 tons) transported to a landfill.

Incinerator Air Emissions

MSD operates sludge incinerators at two locations: Mill Creek and Little Miami plants. In 2000, MSD installed a fluidized bed incinerator at the Little Miami treatment plant, designed to handle all sludge produced at this facility. The equipment proved so efficient and clean that MSD made plans to replace the six multi-hearth incinerators that were built at Mill Creek in the late 1950s and 1980s. MSD is now completing the installation of three new fluidized bed incinerators at the Mill Creek wastewater treatment facility.

The original Mill Creek units were fueled with natural gas and fuel oil. Typically, two of the six were in operation at an average feed rate of 1.6 dry tons per hour. These older incinerators burned digested sludge, which had to be heated to remove volatile organic compounds. This system cost MSD $2 million a year in natural gas.

The new Mill Creek incinerators started operation in the mid to late 2010. They cost $75 million to permit and construct, and are anticipated to save about $1 million in fuel costs a year. The new incinerators burn undigested sludge, which means the incinerators can be self-fired by the thermal energy contained in the waste being burned. The old incinerator building will be demolished, and the Mill Creek digesters will be decommissioned.

Benefits of Fluidized Bed Incineration

This type of incinerator uses a bed of hot sand or granular material to burn sludge. A high-velocity airstream passes through the bottom of the bed, causing the granular material to behave like a fluid. The benefits of fluidized bed incineration are:

- No landfilling
- No hauling
- Less pollution: Air emissions will be reduced by 75 percent or better, compared to current incinerator emissions
- Fewer visible emissions — no yellow or gray haze
- Fewer odors
- No venting to the atmosphere during emergency situations
- Ability to meet more rigorous emission standards in the future

The rated capacity of the three new incinerators is 4 dry tons per hour each, for a total of 12 dry tons per hour. When operating continuously, they can be autogenous, or self-fueling. This feature will dramatically reduce fuel consumption and air emissions, including GHG emissions.

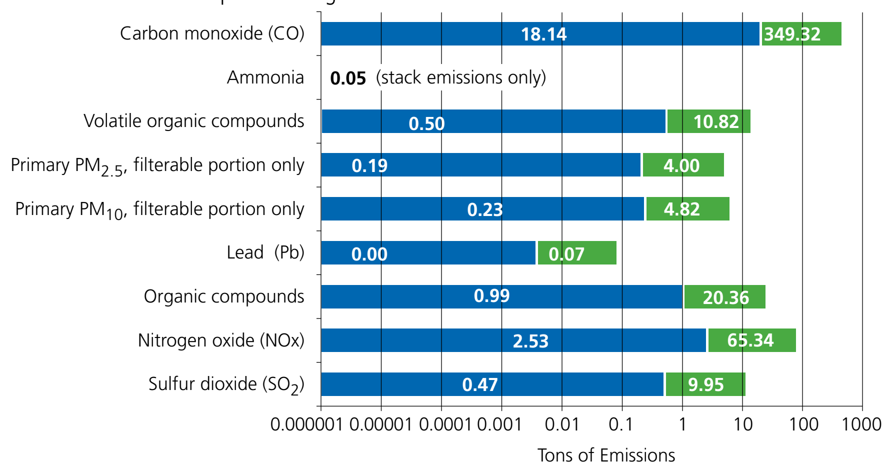
Figure 14 shows the average incinerator air emissions in 2009, before the new incinerators came on line. We anticipate the future air emissions will be significantly improved, once data from the new units is available. All regulated pollutants were below regulated limits in 2009. We experienced instances in operating conditions when opacity fell below permit limits, percent oxygen in stack gas went above permit limits, and scrubber pressure drop went below the permit limit.

Figure 14: **Total Air Emissions from MSD Incinerators in 2009**

Mill Creek Incinerator Emissions (Old Multi-Hearth Incinerators)

2009 Total = 487.78 tons

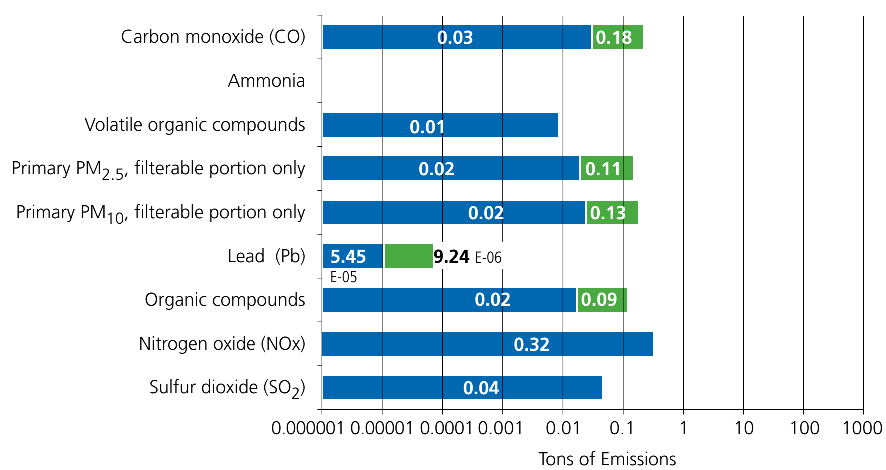
= 0.01 ton per million gallons treated



Little Miami Incinerator Emissions (Fluidized Bed Incinerators)

2009 Total = 0.97 ton

= 0.000016 ton per million gallons treated[a]

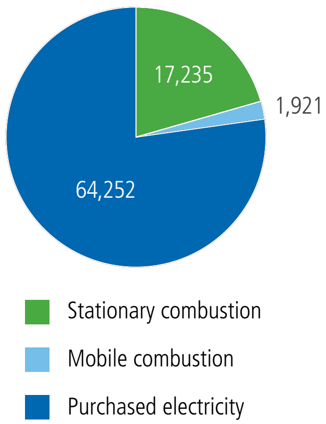


Fugitive emissions   Stack emissions

[a] Includes both stack and fugitive emissions. Stack emissions are process emissions that can reasonably pass through a stack, chimney, vent, or other functionally equivalent opening. Fugitive emissions comprise all other missions not characterized as stack emissions.

Figure 15: **MSD's 2009 Carbon Footprint**

Total = 83,408 metric tonnes CO_2-e
= 1.37 metric tonnes per million gallons treated



Notes:

1. Stationary combustion sources include the incinerators at the Mill Creek and Little Miami treatment plants, all Mill Creek facilities including the Gest Street Garage and auxiliary facilities, the Galbraith Road Collections office and auxiliary facilities, the MSD Administration Building, the MSD septic receiving station, and Muddy Creek, Sycamore Creek, Taylor Creek, and Polk Run treatment plants.
2. Total emissions for mobile combustion were calculated using the fuel consumption data presented above and national averages for fuel economy by vehicle type.
3. Carbon dioxide equivalents represent the universal unit for comparing emissions of the various GHGs to one unit of CO_2 based upon their GWP value. Global warming potentials (GWPs) from the Intergovernmental Panel on Climate Change Second Assessment Report were used to convert non-CO_2 gases to carbon dioxide equivalents (CO_2-e). Global warming potentials indicate the degree of warming to the atmosphere that would result from the emission of one unit of a given GHG compared to one unit of CO_2. All non-CO_2 gases are expressed as CO_2-e within the emissions inventory.

Greenhouse Gas Emissions

MSD's 2009 GHG emissions inventory establishes a baseline of GHG emissions associated with MSD operations and facilities. Our primary emission sources arise from stationary combustion of natural gas, use of purchased electricity, and mobile combustion (fleet vehicle fuel consumption). The total emissions for 2009 amounted to 83,408 metric tons of carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), expressed as carbon dioxide equivalents (CO_2-e).

For the future, our goals are to develop a carbon-reduction policy and to reduce our carbon footprint over time by improving energy efficiency and cutting consumption of carbon-based fuels. In addition, we want to bring our GHG-reduction efforts into alignment with regional government initiatives and set appropriate targets for GHG reductions. We will also expand the scope of future GHG inventories to include secondary sources of emissions, such as emergency and backup generators, treatment plant processes, employee commuting, treatment chemical use, and sludge disposal.

Mill Creek Plant Cuts Blower Usage

In October 2009, the Mill Creek treatment plant set a new low record of 1,590 kilowatt-hours (kWh) for blower usage in secondary treatment, 30 percent less than the average monthly usage of 2,300 kWh in 2006.

Blowers keep aeration tanks properly mixed, so that the microorganisms, or bugs, can thrive. The bugs consume the solids in the wastewater. Until recently, the conventional wisdom was that 4 milligrams per liter of dissolved oxygen was optimal; however, that amount of air consumes a tremendous amount of energy and is, therefore, expensive to generate.

Mill Creek personnel are now challenging the rule of thumb, as part of an optimization process begun in 2007. "We didn't change our equipment as much as we changed our philosophy," said Tim Hauck, plant supervisor. "We found that we could use less air, more effectively, and without compromising quality. Our electric costs for 2009 are about $200,000 less than what we spent in 2006."

Continuous Process Improvement Teams

MSD's Continuous Process Improvement teams were formed several years ago in the wastewater treatment division. These teams look at influent screening, liquid stream, and solid stream processes optimize resources and reduce wastes. Improvements are measured using defined indicators, some of which apply to material and energy use:

- Electrical usage for aeration
- Electrical usage for secondary by-pass
- Electrical usage for blowers
- Natural gas usage for incineration
- Hypochlorite usage
- Polymer usage

Effective measuring and management of these areas allow MSD to streamline treatment processes and reduce operational costs.

Odor Control

Currently, MSD considers odor control in all new projects. For instance, a new Septage Receiving Station at the Mill Creek Treatment Plant was put into operation in June of 2009. Located at the southeast corner of Gest and Evans streets, the station accepts sanitary waste and grease from public and private sources. Community concerns about odors prompted the construction of this building, which includes two high bays equipped with a carbon filter odor control unit. This automated station replaced the open manhole at the north end of the Mill Creek plant. This project, costing $4.2 million, was begun in November 2007 and completed in May 2009 with a formal dedication.

> *"There has been a big improvement in the smells that come from the Mill Creek treatment plant over the last few years. Living up the hill from MSD has become less noticeable as the incidents of odors have become dramatically less."*
>
> -- Jeanne Nightingale, Resident on Glenway Avenue

MSD and Lower Price Hill CAP: Relationships Foster Solutions

In an effort to address odor issues affecting the Lower Price Hill community, the Community Advisory Panel (CAP) was established in February 2002 by a Memorandum of Agreement (MOA) between MSD and the Cincinnati Office of Environmental Management. The agreement required MSD to increase public announcements when odor issues were anticipated, to develop a 5-year plan for odor control improvements, and invest a minimum of $25,000 by 2005 for specific odor control projects.

In the first year, MSD and the CAP tackled odor issues through research, discussion, and operational improvements. In December 2002, when a Cincinnati City Council decision to repeal the Title X air quality ordinance made the MOA null and void, MSD chose to continue working with the CAP to identify additional odor sources. As a result, MSD significantly updated infrastructure and commissioned a septage receiving station that reduces and better contains odors. These improvements were voluntary and went beyond the requirements of the original MOA.

In working with the CAP, we experienced first hand the benefits of stakeholder engagement. As a result, MSD chose to continue hosting CAP meetings once a quarter, to foster the relationship with the Lower Price Hill community on the foundation of common interests and two-way communications that had been built. Over time, the focus of the meetings has expanded beyond odor control issues to include other operational topics and partnerships such as support of the Oyler School-Based Health Center and the Lower Price Hill Day community event. In 2009, MSD brought the new septage receiving station on line and dedicated the facility to the Lower Price Hill Community. Additionally, we completed an odor control study to evaluate odor control systems. Looking forward, we are currently reviewing the design for decommissioning the anaerobic digesters, a current source of odor issues.

To report odor complaints, please call the Hamilton County Air Quality 24-hour hotline (513-946-7777 or 800-889-0474) or follow instructions at the complaints website at *http://www.hcdoes.org/airquality/webpages/complaints.htm*.

Waste Disposal

MSD's largest solid waste stream consists of sludge cake, all of which is incinerated when the incinerators are properly functioning. Hauling sludge cake to a landfill is only used as a backup measure. Other solid waste streams generated by the wastewater treatment process are handled as follows:

- **Screenings, grit, and scum.** As wastewater enters each treatment plant, a screening process removes particles such as paper towels and other non-biodegradable materials, as well as grit (such as sand or gravel). Further in the treatment process, scum accumulates at the top of the clarifiers (large settling tanks), which MSD skims off. MSD collects screenings, grit, and scum from each facility and transports it to the Mill Creek treatment plant. MSD contracts with a waste hauler to collect the accumulated screenings and grit and remove them to a disposal facility. Scum is reprocessed at the Mill Creek plant before it is also hauled away for disposal.
- **Ash.** This material is the result of incineration; it is put into lagoons for storage and then hauled by a waste management company to a disposal facility, where it is used as landfill cover. Lagoons are located at the Mill Creek and Little Miami plants, in proximity to the incinerators that produce the ash. Mill Creek's lagoon is emptied several times a year; however, the Little Miami lagoon can go as long as 10 years without having to be emptied.

Figure 16 summarizes the quantities of MSD's wastewater treatment-related solid waste disposed of in 2009.

Figure 16: **2009 Waste Disposed in Solid Waste Landfills**

Solid Waste Type	Quantity Disposed in Landfills in 2009
Sludge cake	1,144 dry tons
Screenings, grit, and scum	7,354 tons
Ash	13,672 tons

Recycling

In 2009, MSD reviewed its recycling practices for paper, cardboard, wood pallets, computers, ink and toner cartridges, aluminum cans, plastic, glass, oil, metal, yard waste, and batteries. We found that paper is the only material that we recycle consistently, at an estimated rate of 20 percent of total paper waste. All other materials such as ink and toner cartridges were either thrown in the trash or were sporadically recycled. Our current practices leave plenty of room for improvement, and we plan to establish formal targets and change practices throughout the organization to improve our performance.

Simple Changes Make a Big Difference

Since the mid nineties, MSD's Industrial Division has investigated and implemented analytical methods and procedures to minimize sample and reagent use, thereby reducing the amounts of chemicals and disposables used for testing. In 2009, we purchased automatic samplers for several instruments and a flow injection analyzer for the analysis of nutrients.

As a result, the overall generation of laboratory wastes and the related disposal costs have decreased significantly. For example, in 2009, no chemical waste removal was needed. Price quotes received in 2010 for removal of wastes accumulated over the 2-year period were halved, although the number of analyses remained the same or increased.

Chemical Composition of Ash

Ash is the residual material from sludge incineration, during which all volatile compounds are burned off. Because MSD stores ash in lagoons prior to land filling, testing the concentration of hazardous or carcinogenic constituents is important for both the safety of the crews and the community. The ash is composed of sand, with some metal residuals. Keeping the ash wet allows for the metals to settle at the bottom of the pond. In 2009, the average concentration of heavy metals in the ash lagoons is shown below.

2009 Concentration of Regulated Contaminants in Ash

Regulated Contaminant	2009 Average Concentration in Ash (mg/L)	Regulated Limit (mg/L)
Arsenic	<0.05	5
Barium	<0.05	100
Cadmium	<0.05	1
Chromium	<0.05	5
Lead	<0.05	5
Mercury	<0.0020	0.2