Montgomery County
Resource Recovery Facility

2010 Waste-To-Energy Excellence Award Application
Executive Summary

Montgomery County Government appreciates this opportunity to present the Montgomery County Resource Recovery Facility (RRF) for SWANA’s 2010 Waste-To-Energy Excellence Award. The special features, commitment to the community, recent improvements, use of the internet, and support of a well managed integrated waste management system make our facility a model for other W-T-E plants in the country.

Throughout this application, there are reference to the supplemental materials and websites which are conveniently linked to this documentation for your viewing ease. In order to use these links you will need an internet connection and web browser. You will also need Adobe Acrobat® Reader™ to open the electronic version of the supplemental materials attached.

This application is submitted by Montgomery County Government, Department of Environmental Protection’s Division of Solid Waste Service. We would like to express our appreciation to the Northeast Maryland Waste Disposal Authority and to Covanta Montgomery, Inc., who were very instrumental in helping to prepare this application and operate this facility.
Beginning commercial operations in August 1995, the Montgomery County Resource Recovery Facility (RRF) was one of the last large Waste-to-Energy facilities built in the United States. The facility was designed by and is operated by Covanta Montgomery, Inc. and features the Martin GMBH stoker technology with process controls consisting of feedback loops that automatically regulate the combustion process.

The RRF uses three parallel combustion trains, each designed to process 600 tons per day of municipal solid waste with a BTU value of 5,500 BTUs per pound. Waste moves by gravity and agitation on top of a downward sloping grate system. The grate system is a patented technology composed of alternate rows of fixed and moving grate bars, known as the Martin Reverse-Reciprocating Stoker. The grate bars push upward against the natural downward movement of the waste bed. This constant movement ensures that the burning waste is continually agitated and pushed back, thus serving as underfire for freshly-fed waste. A forced draft fan supplies the primary combustion air underneath the grate. The RRF is the first publicly owned facility to incorporate Covanta’s LNTM (Low NOx) technology. Staged combustion is accomplished by secondary air injected through the front and rear walls of the furnace just above the grates, while tertiary air is injected much higher in the firebox. Air pre-heaters exist to add additional drying capability using turbine exhaust steam to raise underfire air temperature. By controlling proper bed thickness, the operator optimizes air mixing on the bed for better combustion and minimizes particulate matter entrained in the air stream. Proper bed thickness also protects the grate bars from falling slag from the boiler above.

Above each grate system is a Distral Energy Corp. single drum natural circulation steam generator boiler designed to generate 171,000 pounds of steam per hour at 865 psig and 830°F. The boilers are equipped with natural gas burners capable of heating the boilers during startup and maintaining permitted temperature requirements during combustion upsets. Both lance and stationary rotary soot blowers are used to clean the boiler tubes twice a day to insure proper heat transfer. Water is supplied to the boilers using either two electric or one steam driven boiler feedwater pumps. After nearly 15 years of operation, the boilers have seen minimal amounts of corrosion, and protective inconel applications on the tubes. After about 12 years of operation the evaporator tube configuration was improved as the facility experienced a series of unpredictable tube leaks in this part of the boiler. A three tube pendent design was replaced by a two tube pendent design that included spiral wound inconel coating on the sections exposed to the soot blower and allowed more spacing for the soot blowers to be more effective in cleaning the tubes. Wing-fin tube shields were placed on the evaporator tubes to direct air movement back to the center of the generator section to improve heat transfer along the evaporator section. In 2008, the remaining tubes in the first pass section and the upper portion of the second pass section were covered with inconel as part of the modification of the furnaces to LNTM technology.
Steam from the boilers is used to operate a General Electric turbine generator set complete with main condenser, steam jet air ejectors, and oil lubricating system. The rated capacity of the generator is 74 MW. In 2009 the turbine was retrofitted with new spill tip seals and Brandon sensitized packing (shown to the right) to improve turbine efficiency. At 100% design conditions the facility generates up to 63 MW depending on whether air pre-heaters and steam driven boiler feed pumps are running. Should the turbine generator set be unable to accept the steam from the boilers, a bypass condenser is capable of condensing 100 percent of the steam generated. Steam which enters the turbine at high pressure exits the turbine under vacuum. This vacuum is maintained by the main condenser and steam jet air ejectors.

On the front end, the plant utilizes a tipping floor with a trash pit concept. Here, two redundant overhead cranes are used to feed refuse into the hoppers of three combustion units. Only one grapple crane is needed for full operation. Each crane can lift about 5 tons of refuse. Primary combustion air is taken from the tipping floor building to create a negative draft into the tipping floor building. This is to control dust and odors emanating from the refuse. In addition, overhead doors are closed when there is no traffic into the tipping floor building and louvers along the wall opposite the refuse pit can be closed to accommodate times of reduced operating load to keep the negative draft on the building. Refuse is brought to the tipping floor in totally enclosed rail containers on tipping chassis. Up to five trucks shuttle containers from a railyard to the tipping floor and dump the refuse into the refuse pit. Each truck can make 3 to 4 trips an hour. Prior to entering the tipping floor, each container must pass through a Bicron radiation detector. If the detectors set off an alarm, the operator uses a hand-held Bicron Fieldspec multi-channel analyzer to identify the specific isotope and level to determine if the load is safe to dump into the refuse pit in accordance with a radiation monitoring procedure. A radiation detector is also located in the ash system at the grizzly separator. Because the facility operator uses its own drivers, the facility has no traffic problems. Because the refuse containers are totally closed until they get inside the tipping floor, the facility grounds are very clean and free of litter, requiring minimal policing of the grounds.

Flue gases are subjected to several pollution control devices designed to remove metals, acid gasses, nitrous oxides, and particulate material prior to the gases being exhausted to the air. A thermal DeNOx system uses aqueous ammonia to remove nitrous oxides without ammonia slip. A hydrated lime injection system and a spray dryer absorber remove acid gasses such as sulfur dioxide and hydrogen chloride. A carbon injection system removes mercury vapors, dioxins, and furans. At the end of the air pollution controls are a series of baghouse cells which remove particulate matter entrained in the flue gas. The bag cleaning is accomplished by reverse air flow with dedicated reverse air fans. Induced draft fans after the baghouses, but before the stack flues, keep the flue gas stream moving through the boilers and air pollution control equipment. Various continuous monitoring equipment is located throughout the boilers and the air pollution control equipment to ensure compliance with permit conditions. Each combustion train is continuously monitored for furnace temperature, opacity, CO, CO₂, SO₂, HCl, NOₓ, O₂ and exhaust gas volumetric flow. Exhaust gases are emitted to the atmosphere via a 275 foot tall stack.

Fly ash collected from the air pollution control equipment and boilers is transported by enclosed screw conveyors to control fugitive emissions. The fly ash is mixed with the bottom
ash in a water bath ash discharger. Fly ash is also mixed with a controlled amount of dolomitic lime to prevent the leaching of heavy metals from the ash. A ram pushes the combined ash out of the water bath onto a vibrating pan conveyor which transports the ash to an ash storage pit. Overfire combustion air is taken from the ash pit to keep it under negative draft to control fugitive emissions. Holes that incline down to the ash pit at key locations provide access to dig-out areas in the pit that can act as sumps to which a suction line can be lowered to remove water, thus lowering the water content of the ash. The ash is moved by overhead cranes to a grizzly separator which removes oversized items larger than 10 inches. The overs are further sorted by an operator using a front end loader to separate ferrous materials for recycling. Non-ferrous materials are caught in the loader bucket as they vibrate across the separator. This material is loaded into rail containers for shipment to a landfill for disposal or if in sufficient quantity, loaded onto trailers for transport back to the County’s transfer station where large stumps can be ground into mulch or concrete can be accumulated for transport to a recycling facility. Ferrous material which vibrates across the separator falls in a pile and is periodically removed with the loader bucket and loaded into open top trailers for transportation to a scrap market. The undersized material falls through the separator and is conveyed to a combination drum magnet and trommel screen. The drum magnet pulls the majority of the ferrous material still remaining in the ash. Ferrous material is further cleaned. First it receives an air pulse and then passes through the trommel. The trommel screen separates out material less than one inch in diameter. The agitation in the trommel cleans the ferrous which is then directly loaded into open top trailers all within the ash loadout building. The material is suitable for direct delivery to a smelter facility.

A distinguishing feature of the plant is its waste transportation system for both refuse and ash. All refuse is brought to the plant by rail from a transfer station 22 miles away using the railcars and sealed containers shown to the right. This greatly reduces the amount of truck traffic in the county for garbage collection and particularly the amount of traffic impacting the local community around the facility. In the railyard, containers are removed from railcars and loaded onto tipping chassis that will take the refuse to the tipping floor. Empty containers are then loaded back on to the railcars to be delivered back to the transfer station. The facility has various pieces of equipment to load and unload containers onto the railcars as shown to the left – a railcar mover (foreground), two Mi-Jack translift gantry cranes and two sideloaders (background). In addition, the two sideloaders load and unload ash containers onto different railcars for transport to a railyard in Virginia where they are then loaded onto chassis for final transport to a landfill in Virginia.

Unlike most waste-to-energy facilities, the Montgomery County Resource Recovery is located adjacent to a power plant. Rather than taking river water directly from the Potomac River, the facility draws its process water needs from the
cooling water discharge canal of the power plant who takes water from the river. The facility draws about 890,000 gallons of water per day using one of two vertical turbine water intake pumps, each capable of supplying 100 percent of the plants water needs. About 10 percent of the water intake is discharged backed to the power plant’s discharge canal. Influent water passes through a heat exchanger where it is used to cool the wastewater effluent from the plant. The effluent is then passed through a filter to further reduce suspended solids by about 28 percent. The influent water is passed through one of two clarifiers, each capable of handling 100 percent of the facilities needs. Sludge from the clarifiers is dried on a belt filter press with the sludge cake going to the refuse pit. Clarified water is used as make up to the plant’s cooling water system or passes through gravity filters before going to the demineralizer system to supply boiler-quality make-up water.

There are other support systems for the facility which will be discussed later. They include 22 miles of railroad track maintained and operated by CSX, a transfer station facility located at the population center of the county, and a private landfill located about 250 miles away in Lawrenceville, Virginia.
Environmental Impacts and Regulatory Compliance

Prior to building the Montgomery County Resource Recovery Facility (RRF), Montgomery County Government initiated health risk studies for air and non-air media. These studies look not only at stack emissions and potential human exposures from direct inhalation of the air, but potential health risks from indirect ingestion of soil vegetables, dairy products, beef products, chicken, eggs, or fish. The most recent studies are available online and looked at pond water, sediment, and fish as well as cows’ milk and hay from the area as well as air samples. The reports show that almost every parameter, including dioxins/furans, is at levels consistent with, or lower than, historical data.

In 1997 Montgomery County Government’s Department of Environmental Protection did a study of off-site noise impact from the facility’s operation. It was found that the facility is in compliance with the local noise ordinance and did not impact ambient noise levels. Also in 1997 and later in 2003, Montgomery County Government performed a post operation assessment of lighting impacts from the facility. It was observed that the facility had already made significant efforts to eliminate off-site lighting impacts through good site lighting design and operating procedures and that any additional attempts to darken the facility will produce only limited perceptions of change but may present safety concerns. Montgomery County Government has also sponsored several traffic studies to monitor the traffic impacts from the facility on the surrounding community with the last study being done in 2007. The study concluded that the facility had no measurable impact on local traffic.

The use of a rail haul system reduces truck traffic by about 28,000 trips per year. This helps improve the air quality by reducing vehicle emissions through the use of a centrally located transfer station. In addition, vehicle traffic through the local community is vastly less then other facilities which take customer traffic directly on their tipping floors. Without the garbage trucks driving through the local community, noise levels and roadside litter around the facility are much lower than at other waste-to-energy facilities. Therefore, impacts on the local community as a result of the facility’s operation have been negligible.

In 2009, Montgomery County made upgrades to the air pollution controls on all three of its combustion units by installing LN™ technology and converting its thermal DeNOx system from anhydrous to aqueous ammonia. The latter change removed the storage of a large amount of an extremely hazardous chemical while the former, combined with the voluntary decision by the County to maintain the same level of operation of the thermal DeNOx system, reduce the NOx emission by about 50% from the facility which is located in an Ozone non-attainment area.

Until last year when EPA discontinued the program, EPA recognized the facility as a National Environmental Performance Track (NEPT) member committed to challenging environmental goals and dedicated to continuous improvement. The facility continues to operate under an Environmental Management System (EMS) following these same principles. In the last 10 years of operations, the plant has not received any notice of violations from any regulatory authority. The facility is in full compliance with all permits, which include:

1. Title V air permit
2. NPDES discharge permit
3. Refuse disposal permit
4. Ground water removal permit
5. Surface water removal permit
6. Potable water removal permit

The Facility received the 1998 Excellence in Environmental Engineering award for operations and management from the American Academy of Environmental Engineers. The attached brochure, which was prepared by the facility’s operator, Covanta Energy, highlights other awards the facility has received in the past. Regulatory compliance is extremely important. Covanta performs many inspections/audits in addition to the various routine and surprise inspections performed by regulatory agencies. In the past year, the facility has been inspected by Maryland Department of the Environment’s Air program, Water program, and Solid Waste program. In fact, at the time when EPA finalized its 2009 Mandatory Reporting of Greenhouse Gases rule, the RRF had all the equipment needed to comply.

Although this application is for the RRF, it is important to understand that the success of this facility does not stand by itself but as an important part of an integrated waste management system in Montgomery County, Maryland. Other components of the system include a waste transfer station where waste is centrally collected. Here the waste is inspected for radioactive materials and separated into waste which can and can not be processed at the RRF. ISO intermodal containers are loaded with processible waste and put onto railcars for transportation to the facility. Also included in the system is a drop-off site for home owners to deposit their recyclables. This material is transported along with county-wide curbside recyclables to a Materials Recovery Facility so as to reduce the amount of inert material, such as glass and cans that would otherwise be a heat sink when disposed of at the RRF. Household hazardous waste collection events in combination with a household hazardous waste drop-off area, removes harmful and highly combustible solvents and pesticides which could harm the facility workers. This program also targets removal of mercury material from the waste stream which would pass through the combustion process and have to be captured by the carbon injection air pollution controls. The County also runs a yard trim collection and composting program which helps reduce nitrous oxide generation at the facility, thus lowering the demand on the NOx control systems. In addition to the County’s collection and composting program, the County encourages back yard composting. Finally, Brunswick Waste Management Facility, Inc. maintains a dedicated landfill disposal cell at its landfill facility in Brunswick County, Virginia. At this facility, Montgomery County's non-processible waste is disposed with the ash from the facility being used as daily cover. In this picture, you see one of the facility’s ash containers being tipped onto the working face of the disposal cell.
Montgomery County Government operates on a July to June fiscal year so some annual figures presented will be on a fiscal year basis. Since the start of commercial operation in 1995, the facility has processed more than 7.8 million tons of solid waste. The nominal annual throughput of the facility is 558,450 tons based on waste with an average energy value of 5,500 BTUs per pound and 85 percent availability to allow for maintenance. Our history has demonstrated that the facility can operate at 115 percent of this rated throughput. Excluding the time the boilers were being modified, last year’s availability was at 92.5 percent. Turbine availability (excluding major scheduled outage) was just shy of 100 percent. The chart to the right shows that a second degree polynomial is the best fit curve to the annual net power generated by the RRF per annual tons of MSW processed.

Fly ash from the air pollution control equipment and boilers is transported in an enclosed system of screw conveyors and building structures to control fugitive dust emissions. Fly ash is mixed with a controlled amount of dolomitic lime to prevent the leaching of heavy metals from the ash waste. The fly ash is then mixed with the bottom ash in a water bath ash discharge. A ram pushes the combined ash out of the water bath onto an incline where vibrators assist in dewatering the ash via gravity separation. Ash continues to be pushed onto a vibrating pan conveyor which transports the ash to an ash storage pit. Four downward sloping penetrations in the pit wall provide access for suction lines to remove any standing water exposed by the cranes digging a sump area in the ash pit. The pit is about 200 feet long by 13 feet wide to allow for continuous ash generation without the need for continuous ash processing. The ash is moved by overhead cranes to a grizzly separator which removes oversized items larger than 10 inches. The overs are further sorted by an operator using a front end loader. Non-ferrous materials are caught in the loader bucket as they vibrate across the grizzly separator. If materials such as stumps or concrete start to appear in large enough quantities, the system can remove the material to be shipped back to the Montgomery County transfer station. There stumps can be ground and recycled or concrete can be stored and shipped to a recycling facility. Otherwise, this material is loaded into 20 foot long rail containers for shipment to a landfill for disposal. Ferrous material which vibrates across the grizzly separator falls in a pile and is periodically removed with the loader bucket and loaded into open top trailers for transportation to a scrap market. In the event of poor burnout, say from an emergency shutdown of a unit where trash needs to be run off the grates, the system allows for direct loading of material as it accumulates in the pit into top loaded containers which can then be transported back to the tipping floor and dumped into the refuse pit rather than allowing the material to be sent to our out-of-county landfill. The undersized material falls through the grizzly and is conveyed to a combination drum magnet and trommel screen. Routine ferrous recovery testing has demonstrated that about 89.8 percent of all ferrous material is captured. Ferrous material is air
pulsed (which replaced a previous water spray) and then passed through the trommel. The trommel screen separates out material less than one inch in diameter. The agitation in the trommel cleans the ferrous which is then directly loaded into open top trailers. This process removes a little more than 1% of all residue disposed. The material is suitable for direct delivery to a smelter facility.

For Fiscal year 2009, ash generation, which includes a small amount of reagent addition for pollution controls, was 29.8% by weight of the refuse processed. Ferrous recovery was 2.4% by weight of the refuse processed. Due to the increased price of steel and higher throughput, ferrous recovery generated a record high, $1.4 million in revenue to offset operating expenses. Ferrous from the grizzly separation goes to a different and lower priced market than the cleaner ferrous material discharged from the trommel.

Gross electric generation for fiscal year 2009 was 352,000 MWh or 655 KWh per ton processed. Electric sales for the year totaled an amazing $22.4 million which helped offset operating expenses.

The performance of the air pollution control devices are of high importance to the operation of the plant. Flue gases are subjected to several pollution control devices designed to remove metals, acid gasses, nitrous oxides, and particulate material prior to the gases being exhausted to the air. A thermal DeNOx system uses aqueous ammonia to remove nitrous oxides without ammonia slip. In 2009 the RRF became the first publicly owned facility to install the LN™ technology, developed by Covanta. While the use of LN™ can lower NOx generation below the plant’s permit limit on NOx emissions of 1,100 tons per year, Montgomery County opted for a cleaner environment by also running the thermal DeNOx system. In 2009 the plant reported emitting only 554 tons for the calendar year or 1.05 tons per 1,000 tons processed. A hydrated lime injection system and a spray dryer absorber removes acid gasses such as sulfur dioxide and hydrogen chloride; 192 tons or 0.36 tons per 1,000 tons processed were reported as emissions in 2009. A carbon injection system removes mercury vapors, dioxins, and furans. The plant reported emissions of <0.01 pounds of Dioxins/Furans and 37.4 pounds of mercury for all of 2009. At the end of the air pollution controls is a baghouse which removes particulate matter entrained in the flue gas. Various continuous monitoring equipment is located throughout the boilers and the air pollution control equipment to ensure compliance with permit conditions. Each combustion train is monitored for furnace temperature, opacity, steam flow, CO, CO₂, SO₂, HCl, and O₂. In the past ten years of operation, not one notice of violation was received, due in no small part to automated predictive alarm systems that monitor continuous emission monitoring data to determine if permit limits are likely to be exceeded. Such a system alerts the operator to take action before a problem occurs.
Program Planning

Montgomery County Government maintains a 10 year plan for the management of solid waste. The plan is updated every 3 years and a table of contents of the plan is attached. The Plan describes the County’s programs for providing comprehensive management of solid waste generated by the County’s residential, commercial, institutional, industrial, and agricultural sectors from 2009 through 2019. The Plan establishes the framework on which current solid waste management activities are conducted and future programs are implemented. This Plan reflects the established integrated solid waste management system adopted by the County Council and implemented by the County Executive. The Plan sets the manner in which solid waste generated throughout the County will be managed for the next ten years and beyond.

The general solid waste goals include the following specific elements:

- The County must undertake all waste reduction measures to the extent practical and feasible.
- All waste recycling measures should be implemented that are practical with available technologies and markets and which are not significantly more expensive than the waste disposal measures that would otherwise be needed. Technology, markets, and cost effectiveness should be reviewed regularly so that recycling may be expanded as new opportunities arise or, conceivably, contracted if markets for particular materials disappear for a long time.
- The County will operate, or cause to be operated, a waste-to-energy Resource Recovery Facility (RRF) to burn the combustible solid waste remaining after reduction and recycling.
- Out-of-County landfilling is the preferred disposal method for RRF ash, bypass waste, and non-processible waste that cannot be recycled or reused. “Bypass” means sending processible waste to out-of-County facilities for disposal when the amount of waste received exceeds the capacity of the County disposal system or projections predict that future waste receipts will cumulatively exceed the physical or permitted capacity of County facilities. In-county landfilling should occur only if cost effective out-of-County landfilling options become unavailable or legislatively prohibited.
- The County solid waste acceptance, drop-off, recycling and disposal facilities are designed based upon projections of solid waste generated in the County. To conserve capacity at the RRF and at other solid waste and disposal facilities for the residents and businesses of the County, the use of these facilities is restricted to solid waste generated in the County. This restriction does not apply to the Materials Recovery Facility (MRF), where under the terms of a contract with Office Paper Systems (OPS), the County may allow other jurisdictions to use any excess capacity at the OPS facility.
- The County builds and maintains solid waste acceptance and disposal facilities primarily to accommodate municipal solid waste generated in the County. The County facilities may not necessarily accommodate other types of waste.

The County has adopted an integrated solid waste management system to achieve its goal of reducing and recycling solid waste to the maximum feasible extent. The most preferred management option is the reduction of solid waste at its source. The second most preferred solid
waste management technique is recycling and reuse of solid waste. The County’s goal is to achieve, maintain, or exceed 50 percent recycling of municipal solid waste by the end of Calendar Year 2010. The third tier option is combustion of solid waste remaining after reduction and recycling for the recovery of electrical energy. The least preferred method of managing solid waste is landfilling. Solid waste remaining after reduction, recycling and combustion is landfilled. This hierarchy recognizes the interdependence of all elements of an integrated solid waste management system.

To realize its recycling goals, the County has implemented a policy of County-wide (non-municipal) curbside collection of recyclable materials and established a policy favoring purchase of recycled materials. The County has adopted regulations requiring recycling at non-municipal multi-family residential (apartment) and commercial properties and has numerous programs to promote and further achieve its recycling goals. The County has also adopted a ban on all recyclables at the County’s solid waste disposal facilities.

To address community concerns, the County established two citizen advisory committees; one is composed of residents from around the facility. The committees allow residents to comment on facility related issues from ranking aspects in the EMS to health risk studies, and to receive regular reports on the status of the facility’s operation. The County, in connection with the operation of the facility, has sponsored studies of air and non-air media to determine the environmental impact from the operations of the facility. The County has also performed cumulative health risk studies to account for the operation of nearby industries and any combined effect that may take place to harm the health of the people in the community or the environment. The County has also sponsored noise studies, lighting studies, and traffic studies, to assess the impact of the facility on the local community and all these studies are presented to the local citizen advisory committee for review or comment.

The County website even provides real time and archived emission data for various permit parameters so anyone can see what the plants compliance status is at any time. The same website provides a virtual tour of the facility. Quarterly, emissions data is downloaded onto a CD for viewing in the local branch of the County’s public library. And annually, the County sponsors its award winning “Behind the Scenes” workshops teaching residents how their solid waste is handled. As part of the workshops, participants get a first hand look at the operations of the plant and its inner workings.
Worker Health & Safety

Everyone at the Montgomery County Resource Recovery Facility places the highest value on worker safety. Maryland Occupational Safety and Health (MOSH) has recognized the RRF as a Voluntary Protection Participant (VPP) Star site. All employees are encouraged to participate in the safety process in an active role. A recent visit by MOSH noted the “Best Practices”:

- The addition of cage extensions on permanent ladders near platform edges.
- Bolting down and load rating on all storage shelving units.
- Replacement of chains with swing gates at platform entry points.
- Chained wheel chocks at all unloading locations to assure availability.
- Housekeeping.
- Visible plant signage.

While not exhaustive, this list indicates the commitment of the plant staff to go beyond regulations to meet their Safety team Mission Statement’s challenge:

“The purpose of the Covanta Safety Committee is: to continuously improve the safety of all persons working or visiting Covanta Montgomery.”

As a measure of the success the table below shows the Total Case Injury Rate (TCIR) and the Days Away, Restricted, and/or Transfer (DART) rate for the facility for the past three years.

<table>
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<tr>
<th>Year</th>
<th>Hours</th>
<th>Total Cases (injury &amp; Illness)</th>
<th>TCIR</th>
<th>Cases Days Away and Restricted</th>
<th>DART (injury &amp; Illness)</th>
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<tr>
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<td>1.32</td>
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<td>2</td>
<td>2.87</td>
<td>1</td>
<td>1.44</td>
</tr>
</tbody>
</table>

Site Three Year Rate (2009) | 2.30 | 1.38
NAICS Average for 2008 | 3.4 | 1.9

It is the objective of all employees to have an accident free workplace. To meet this goal all plant staff (laborer to plant manager) take-on the physical aspects during the monthly safety works order day to remove hazards. Truly, safety is a value that will not be compromised at this facility.
Economics and Cost Effectiveness

The RRF property is owned by Montgomery County and leased to the Northeast Maryland Waste Disposal Authority (NMWDA). On behalf of the County, NMWDA financed the cost of designing and constructing the RRF and related transportation improvements necessary for the project. For the duration of the outstanding bonds on the RRF, NMWDA owns the facility. Upon repayment of the bonds, scheduled to be complete in 2016, the County may purchase the facility for one dollar. NMWDA contracted for the design, construction, and operation of the RRF with Covanta Montgomery, Inc., a subsidiary of Covanta Energy Corporation. The County, in turn, entered into an agreement with NMWDA for the disposal of non-recycled waste and payment of service fees. An Electricity Sales Agreement provides that NMWDA deliver and sell, and Constellation Energy Services accepts and purchases all electricity net of in-plant usage according to a pre-negotiated rate schedule. The County controls the incoming processible waste through a competitive tip fee and progress towards a 50% recycling goal. The annual target for processible waste to the facility is in the range of 85 percent to 92 percent of permit capacity or 558,450 to 604,440 tons per fiscal year. The County Council sets solid waste tip fees. The County’s tipping fee, in comparison to fees that must be paid by private collectors at alternative disposal sites, influences the extent of solid waste export from the County.

The County continually strives to increase revenues from the sale of electricity and ferrous materials to offset the cost to the waste generators. The attached chart shows the monthly revenues received in fiscal year 2009 for both electricity and ferrous.

For fiscal year 2009, the County budgeted $31.9 million for the operation of the resource recovery facility program. Actual expenditure for the year was $30.8 million which is close, yet still under the budget. The budget process is strongly influenced by tonnage projections, estimates for special projects, rail charges, and inflation factors such as CPI, wage index, and equipment cost index. There is a 50:50 sharing of ferrous revenue. In addition to the existing 92:8 revenue split for electric energy and capacity until the operator receives $960,000, the County instituted an electric optimization pilot for the second half of fiscal year 2009. The pilot gave Covanta an incentive to maximize on peak electric generation, there in bringing more revenue to both the County and Covanta. All renewable energy credits are sold by the NMWDA and go to the County to offset operating expenses.

Excluding finance charges which are scheduled to disappear in 2016, the facility has operated around $15 per ton processed for the past fiscal year. To this extent, the facility operation has been successful in operating within budget and better than expected.
Utilization of Equipment/Systems and Technologies

The Montgomery County Resource Recovery Facility (RRF) uses three parallel combustion trains, utilizing the Martin Reverse-Reciprocating Stoker technology. The success of the system can be seen by the quality of the resulting ash. The plant has consistently produced ash averaging slightly better than 70 percent reduction by weight of the process tonnage.

Above each grate system is a Distral Energy Corporation boiler equipped with natural gas burners and lance and stationary rotary soot blowers. These boilers have consistently operated around 67-69 percent efficiency. Annual boiler availability over the life of the facility ranges from 90 to 97 percent with total boiler availability (average availability of all 3 boilers combined) averaging 93 percent.

Steam from the boilers is used to drive a General Electric turbine generator set complete with main condenser, steam jet air ejectors, and oil lubricating system. The rated capacity of the generator is 74 MW. At 100 percent design conditions the facility generates up to 63 MW depending on whether air pre-heaters and steam driven boiler feed pumps are running. Should the turbine generator set be unable to accept the steam from the boilers, the bypass condenser is capable of condensing 100 percent of the steam generated. Turbine generator availability typically averages around 99 percent. On rare occasions, the facility experiences an unplanned event that takes the turbine off-line, but Covanta’s operators have always been able to resolve the problems and recover the turbine usually within a couple of hours.

Flue gases in the boilers are subjected to several pollution control devices designed to remove metals, acid gasses, nitrous oxides, and particulate material prior to the gasses being exhausted to the air. A thermal DeNOx system uses aqueous ammonia to remove nitrous oxides without ammonia slip. About 1.9 pounds of ammonia was used per ton of waste processed last year. A hydrated lime injection system and a spray dryer absorber remove acid gasses such as sulfur dioxide and hydrogen chloride. According to stack testing data, SO₂ removal efficiencies are typically in the mid-90 percent removal. A carbon injection system removes mercury vapors, dioxins, and furans. According to stack testing data; mercury removal efficiencies range from 84 to 98 percent depending on the amount of mercury in the waste to be removed. Through recycling and household hazardous waste programs in the County, alternate disposal opportunities are available for mercury containing waste such as batteries, CFLs and thermometers. At the end of the air pollution controls, baghouse cells remove particulate matter in the flue gas. The fabric filter baghouses remove over 99.9 percent of the particulates, and the opacity readings have been less than 1 percent, compared to the permit limit of 10 percent.

Ferrous removal from the ash is achieved in two ways. A grizzly separator removes oversized items larger than 10 inches. The overs are further sorted by an operator using a front end loader. Non-ferrous materials are caught in the loader bucket as they vibrate across the Grizzly separator. The system also has the flexibility to pull concrete and tree stumps for recycling if desired. Ferrous material which vibrates across the grizzly separator falls in a pile and is periodically removed with the loader bucket. The undersized material falls through the grizzly and is conveyed to a combination drum magnet and trommel screen. Routine ferrous recovery testing has demonstrated that about 90 percent of the ferrous material is captured. Ferrous recovery from the waste was 2.4 percent by weight.
Public Acceptance, Appearance and Aesthetics

Estimates of the County’s population in 2009 are around 960,000. Since 1989, Montgomery County has been Maryland's most populous jurisdiction. The Maryland State Office of Planning projects that the County will remain the most populous jurisdiction for the next 25 years. To handle this growth the County has a policy to minimize solid waste traffic on County roads. In the 1980’s, the County constructed the Solid Waste Transfer Station to reduce the number of vehicle trips to the then active County landfill. In 1995, the County established a rail haul system to transport solid waste from the Transfer Station to the RRF in order to reduce solid waste truck traffic through communities. The insistence on the use of totally enclosed containers along with this arrangement has allowed the facility an exceptionally clean overall appearance. In 1997, the County entered into a long-term contract with Brunswick Waste Management Facility, Inc. for disposal of RRF ash, bypass waste, and non-processible wastes that primarily uses rail transport of these materials. This arrangement has allowed the County to operate without the presence of an active landfill in the local community. The County does maintain property near the facility that is designated for a future landfill should the need arise. At the present time, this land is leased, mainly for agricultural activity.

To address community concerns, the County established two citizen advisory committees; one is composed solely of residents in the community surrounding the facility. The Committees allow residents to comment on a variety of issues related to the facility from ranking aspects in the facility’s EMS to health risk studies and to receive regular reports on the status of the facility’s operation. The County studied air and non-air media to determine the environmental impact from the operations of the facility. The County also performed cumulative health risk studies to account for the operation of nearby industries and any combined effect that may harm the health of the people in the community or the environment. The County also sponsored noise, lighting, and traffic studies, to assess the impact of the facility on the local community. All these studies are presented to the local citizen advisor committee for review or comment. The committee’s concern over the presence of an extremely hazardous chemical stored at the facility motivated the County to convert its thermal DeNOx system to an aqueous ammonia based system from an anhydrous ammonia based system.

The County website provides real time and archived emission data for various permit parameters. Anyone can see the plant’s compliance status at any time. The same website provides a virtual tour of the facility. Emissions data is also on CD for viewing in the local County public library. And annually, the County sponsors its award winning “Behind the Scenes” workshops teaching residents how their solid waste is handled. As part of the workshops, participants get a first hand look at the operations of the plant and its inner workings.

The facility operator, Covanta Montgomery, Inc., is an active member of the Poolesville Chamber of Commerce and a proud participant the Montgomery County Chamber of Commerce and Montgomery County Public Schools Partners in Business & Education. Each year the plant sponsors local activities and gives tours to students ranging from elementary schools to colleges. The facility also provides additional business to the local community by purchasing goods and services from the businesses in this rural part of the county.

Being so close to our nations Capital, the RRF has been a showcase facility to dignitaries from around the globe, opening its doors to visitors from Europe, Asia, and Australia. Indeed, the facility has placed a major emphasis on being a good neighbor.
Innovation and Creativity

While the facility is unique as the only domestic waste-to-energy facility that receives all its waste by rail and ships its ash out by rail, the real uniqueness of this facility lies in the combination of qualities it possesses. Few facilities possess the state of the art combustion control technology of this facility such as LN™ technology. Few facilities utilize the reverse air bag cleaning technology on their baghouses. Few facilities utilize wastewater from another power plant as their process water supply. As with most WTE facilities, there are a number of concerned neighbors but few facilities have our very proactive approach to addressing their health concerns. Six efforts stand out in this area:

1. **Radioactive Material Detection:** In order to assure the community that harmful radioactive materials are not processed at or shipped from the facility, five different detection points are in the waste processing stream. First all incoming vehicles at the Transfer Station scales are scanned for any indications of radioactive material. A second scan is performed at the entrance to the transfer station tipping floor. Once the MSW has been compacted and loaded into a container it is scanned a third time prior to placing the material on railcars for transport to the RRF. A fourth scan is made at the entrance to the RRF tipping floor prior to dumping the MSW into the refuse pit. If at any time a detection alarm is received, (set at 2 times background levels) that load is pulled aside and scanned with a hand held isotope identification unit. If the radioactive isotope is identified as harmful material, experts are called to remove and dispose of the material. The final scan is made after the MSW has been processed. The ash is scanned to assure that no radioactive material is placed in the landfill. This multi-point system assures the community and the operators that radioactive material is not processed that could harm them.

2. **Health Risk Studies:** Montgomery County Government studies health risk for air and non-air media. These studies look not only at stack emissions and potential human exposures from direct inhalation of the air, but potential health risks from indirect ingestion of soil vegetables, dairy products, beef products, chicken, eggs, or fish. An article on the findings was published in EM Magazine entitled, “Multiple Pathway Health Risk Assessment of a Municipal Waste Resource Recovery Facility in Maryland.” The most recent studies are available online. Also associated with the facility was a 1997 noise monitoring program by Montgomery County Government’s Department of Environmental Protection to study off site noise impact from the facilities operation. In 1997, Montgomery County Government performed a post operation assessment of lighting impacts from the facility. This was followed up by another study entitled, “Off-site Lighting Impact Analysis” in 2003. Montgomery County Government has also sponsored several traffic studies to monitor the traffic impacts from the facility on the surrounding facility with the last study being done in 2007.

3. **Citizen Advisory Committees:** The County established two citizen advisory committees, one of which is composed solely of residents in the community surrounding the facility. The Committees allow residents to comment on a variety of issues related to the facility
from ranking aspects in the EMS to health risk studies and to receive regular reports on the status of the facility’s operation.

4. **Internet Access:** The County website provides real time and archived emission data for various permit parameters so anyone can see what the plants compliance status is at any time.

5. **Air Pollution Control Upgrades:** The County made substantial capital investments in process improvements. By installing LN™ technology on all combustion units while maintaining ammonia reagent use levels, NOx emissions are about 50% less at the facility, which is located in an Ozone non-attainment area. Also, the County converted the thermal DeNOx system to remove the storage and use of the extremely hazardous chemical, anhydrous ammonia.

6. **System Innovations:** Over the years the Covanta made improvements throughout the facility. Pendent design changes included going from a three nested tube pendent to a two nested tub made of higher quality steel with spiral wound inconnel sections for better cleaning and fighting corrosion. Wing-fin tube shields were placed on the evaporator tubes to direct air movement back to the center of the generator section to improve heat transfer along the evaporator tubes. The turbine was retrofitted with new spill tip seals and Brandon sensitized packing to improve turbine efficiency. Finally, a filter canister was added to the wastewater effluent to further reduce suspended solids by about 28% prior to its discharge back into the environment.