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*** PLEASE NOTE THAT ENTRY REQUIREMENTS HAVE CHANGED ***

Application Checklist: (Please make sure the following items are included in your submittal packet)

- Completed release statement (this page), to be scanned and included in digital submission
- Check (made payable to SWANA) or credit card payment for nomination fee (in U.S. dollars) via Excellence Award Nominations
- At least 2 pictures of your operation (may be included in nomination text)
- One copy of your award submittal uploaded using your purchased 2012 SWANA Excellence Awards Application Uploading Instructions
- If you would like to mail your submission, please contact Jesse Maxwell, Program Coordinator, at jmaxwell@swana.org or (240) 494-2237.

Release Statement: I certify that the information provided in this application is accurate and correct to the best of my knowledge. SWANA reserves the right to publish the enclosed information. Nominations become the property of SWANA. My signature gives SWANA the right to publish or make available for purchase any portion of this submitted.

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COVANTA ONONDAGA
Onondaga County Resource Recovery Facility

Onondaga County Resource Recovery Agency

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Covanta Onondaga, SWANA Excellence Awards Program EfW Application 2012
TABLE OF CONTENTS

EXECUTIVE SUMMARY
1) ENGINEERING DESIGN
   - Refuse Processing
   - Combustion and Generation
2) ENVIRONMENTAL IMPACT AND COMPLIANCE
   - Tipping Hall Odor and Fugitives Impact Management
   - Water Impact Management
   - Air Impact Management
   - Solid Waste Management
   - Ancillary Waste Management
   - Additional Compliance Scrutiny
   - Beyond Compliance
   - Permitting History
3) PERFORMANCE
   - Facility Reliability
   - Ash Management
4) SPECIAL WASTE PROGRAM
5) WORKER HEALTH AND SAFETY
   - Initial Training
   - Safety Training
   - On-going Training
   - Specific Training Systems
   - Safety Systems
6) ECONOMICS AND COST EFFECTIVENESS
7) UTILIZATION OF EQUIPMENT, SYSTEMS AND TECHNOLOGIES
8) PUBLIC ACCEPTANCE APPEARANCE AND ASTHETICS
   - Educational Outreach
   - Community Service
9) INNOVATION AND CREATIVITY
APPENDICES LIST OF FIGURES

Figure 1 – Views From the OCRRF Stack
Figure 2 – Facility Interior
Figure 3 – Operation Ownership
Figure 4 – Dedicated Employees Keep a Clean Shop
Figure 5 – OSHA-VPP Citations and Accolades
Figure 6 – History of Achievement
Figure 7 – Employee Training
Figure 8 – Give Back to the Community
Figure 9 – 17 Years of Sponsorship, CNY Envirotan
Figure 10 – Earthday with Jamesville
Figure 11 – Providing Training for the Community
Figure 12 – Information to the Decision Makers and Partner Recognition
Figure 13 – Typical Covanta/Martin GmbH EFW Facility
Figure 14 – Reducing our Carbon Foot Print
Figure 15 – Re-habitation of Run-off Pond
Figure 16 – Saving Fresh Water
Figure 17 – Saving Electricity
Figure 18 – Onondaga County Extraordinary Recycling Rates
Figure 19 – 2011 Emissions Data and Historical Results
Figure 20 – Mercury In Trash and Removal Efficiency
Figure 21 – OSHA Frequency index and Recordables
Figure 22 – Ash to Water Optimization
Figure 23 – Waste Processing History
Figure 24 – Six year Production Statistics
EXECUTIVE SUMMARY

The Onondaga County Resource Recovery Facility (OCRRF) is a state of the art, Martin Gmbh design, Energy from Waste (EfW) facility consisting of three 330-ton processing trains. Covanta Onondaga L.P. operates and leases the OCRRF from Onondaga County Resource Recovery Agency (OCRRA). The lease expires in 2015 at which time Covanta has the option to purchase the facility. The facility is located due south of Syracuse on a 12-acre site in Jamesville, New York. The facility Co-permittees are Covanta Onondaga, L.P. and OCRRA. OCRRA manages the comprehensive, integrated solid waste program for Onondaga County.

The 1994 NYS Certificate to Operate was among the most stringent and the most comprehensive in the United States for EfW facilities. Strict requirements carried over to the 2003 Title V Permit and Solid Waste permit. Even with these constraints Covanta Onondaga has been able to maintain an excellent environmental compliance record with Federal and State permit conditions. The 2007 Title V renewal garnered far more support than detractors; due to our exemplary operation and public education.

The facility was designed to minimize all aspects of impact on the environment. State-of-the-art emissions controls are only one method used to limit the facilities environmental impacts. The entire facility is landscaped to blend in with local topography. The large boiler building is terraced to diminish the impact of its' size. An air-cooled condenser is used instead of a steam-plume emanating water-cooled condenser. The facility operates at zero-discharge with respect to industrial wastewater. Stormwater runoff is routed to the on-site retention pond.

In addition to outstanding compliance, Covanta Onondaga prides itself in its’ proactive approach to facility operations. As the OCRRF operator, Covanta has teamed up with OSHA, EPA, NYSDEC and various industrial, safety and environmental organizations. These partnerships show our dedication to excellence and our willingness to learn from other demanding and meticulous programs.
1) ENGINEERING DESIGN SYSTEMS AND TECHNOLOGIES:

The OCRRF is a state of the art, Martin design, waste-to-energy facility consisting of three processing trains, each consisting of a charging hopper, a feed chute, a stoker, a boiler, a residue discharger, an air pollution control system, and ducts to carry flue gases from the boiler to the stack. Each combustion train has a design capacity of 330 tons per day (reference waste 6000 Btu/lb.). The combustion of refuse by the Martin Stoker System converts the chemical energy in the refuse to thermal energy in the furnace. Each boiler is composed of furnace water walls forming an enclosed area for combustion of refuse and a flow path for the hot flue gases. Water-filled tubes line the furnace walls and are located in the path of the flue gases in the convection zone, super-heater and economizer sections of the boiler. The water-filled tubes provide surface area for heat transfer from the hot flue gases to the water inside the tubes. Figure 13 is a diagram of the facility and boiler internals.

Refuse Processing

Refuse is delivered to the facility in standard (curb-side pick-up) packer trucks, Industrial roll-off trucks and large (18-wheeled) open-top transfer vehicles. The enclosed refuse storage pit is sized to store approximately three days of fuel, or approximately 3000 tons of solid waste.

The OCRRF EFW processing operates 24 hours a day 7 days a week. Waste is received at the Facility Monday through Friday 6:00 AM to 4:00 PM, and Saturday 7:00 AM to 11:00 AM. The facility services all of the municipalities in Onondaga County, excluding the Village and Town of Skaneateles. The facility is authorized to receive municipal solid waste, which includes residential, commercial and governmental and/or institutional waste, the combustible portion of construction and demolition (C&D) debris, light industrial waste and treated and destroyed medical waste and other non-hazardous industrial waste streams as approved by NYSDEC.

Automated truck scales, scalehouse and computer record keeping system are provided to maintain an accurate accounting of all refuse delivered to and residue removed from the Facility. Traffic over the scales and to the tipping hall is controlled by the weigh master. The tipping hall is an enclosed building operating under negative pressure. Once inside the hall, trucks deposit their loads and exit the building. The tipping floor loader operator observes all unloading operations. After an inspection, the waste is pushed into the storage pit. The pit is designed to hold 3,000 tons of municipal solid waste.

Two overhead bridge cranes, equipped with orange peel type hydraulic grapples, carry waste into the feed hoppers of the processing trains from the tipping floor pit. The facility tipping building houses a 3000 ton waste storage pit which provides three days of storage, allowing the facility to store enough waste for continued operation over a three-day holiday weekend. The cranes also mix waste in the pit to produce a uniform mixture for combustion, and to identify any non-processible or unacceptable waste.

The Covanta Onondaga EFW facility was uniquely designed with waste feed controls for the cranes located within the main facility control room instead of sighting them remotely, in the plant. This arrangement increases communication between the fuel feed system and the control room, improves overall control of combustion, and avoids numerous problems.

The feed hoppers deliver the waste via gravity through a feed chute. At the bottom of the feed chutes, the waste is pushed onto the stoker grates by hydraulically operated rams. The stoker grates are proprietary design by Martin GmbH of Munich, Germany. A special feature of this stoker is that the grate bars form a steeply downward plane. Alternate rows of grate bars are fixed and movable. The movable bars push the waste upward against the natural downward motion of the waste. The reverse reciprocating action agitates the bed of waste on the grates continuously so as to cause the
bed to turn over, thereby exposing new surfaces, first drying then volatilization, then ignition and finally complete burn-out.

**Combustion and Generation**

There are a number of critical features unique to the Martin design that optimize typical Covanta facility combustion efficiency and provide for the achievement of controlled levels of emissions. These design features ensure optimal combustion conditions.

The heat energy produced through the combustion of municipal solid waste is used to generate steam. Steam produced in the boilers is used to generate electricity in the generator rated for 39.6 megawatts maximum. Approximately 36 megawatts of electricity is produced with an estimated 3.5 megawatts reserved for in-house use and the balance delivered to the National Grid. The Turbine Steam Rate efficiency has increased, as the facility waste processing throughput has increased over the years, see FIGURE 22. Reducing water disposal with ash is an efficiency for reduced transportation costs; FIGURE 21 demonstrates the trend perfectly.

Since energy recovery is a significant source of revenues, it is particularly important to strive for the highest practical thermodynamic efficiency of the combustion system. Design parameters meet this objective in several regards:
- Consistently thorough burnout of combustible solid waste for maximum energy recovery;
- Minimal use of carefully controlled combustion air;
- Optimized overall heat cycle;
- Minimum in-plant energy requirements;
- Generation of in-plant power;
- Integrated automatic controls for optimal facility performance.

To utilize the heat energy for maximum efficiency, the heat from flue gas is extracted at various zones of the process. Feedwater is heated in the economizer. The water is heated to saturated steam in the convection section and the furnace water-wall tubes. Saturated steam is superheated in the boiler to make dry "superheated" steam.

Numerous individually controlled under-grate compartments control the flow of primary combustion air to the under-side of the burning refuse bed. The design of the furnace and combustion control system is such that the flue gas is at or above 1800°F for greater than one second. This time-temperature relationship insures complete combustion. See FIGURE 13 for the relationship of the integrated furnace and boiler.

Furnace volume, combustion temperatures, flue gas temperatures and retention times are designed to destroy organic compounds, while minimizing formation of nitrogen oxides and carbon monoxide. The boiler design incorporates state-of-the-art features including combustion air distribution and control, location and sizing of heating surfaces and applied cleaning methods during operation.

Furnace walls above the grate surface are protected from high temperature corrosion by silicone carbide tile and monolithic refractory coating to a height of approximately 25 feet. The type of refractory on the furnace walls is designed to obtain controlled heat transfer into the furnace water walls. The net effect of such a design is reduced furnace wall temperatures and less fouling of the walls. Each boiler incorporates an Ammonia Injection system for Nitrogen Oxides reductions. Anhydrous ammonia is injected into the furnace to convert nitrogen oxide gas to nitrogen and water vapor. Two injection levels are available to maximize reduction efficiency according to boiler conditions.

Beyond the furnace is an open radiant down-pass followed by a convection section. These passes serve to generate steam and reduce the temperature of the gas stream entering the super-heater below 1300°F and permits sufficient residence time for the temperature of entrained fly ash particles to
come into equilibrium with the flue gas temperature. The three-stage super-heater section is followed by the economizer section.

The high pressure, super-heated steam generated in the boilers at 865 psi and 830°F is supplied to the turbine-generator where electricity is produced and steam is extracted for in-plant use. The turbine is a nineteen stage full-condensing turbine with four extraction points. Extracted steam from the turbine is used to pre-heat water prior to introduction into the boiler at the economizer. Steam is also used to remove gases from the feed water (deaerate). Exhaust steam from the turbine generator is condensed in an air-cooled condenser. The electricity produced flows through the step-up transformer and then over an interconnection line into the National Grid distribution system.

The low energy steam leaving the turbine is condensed in a 10-cell, Air Cooled Condenser (ACC). The condenser maintains a vacuum due to the condensing of the incoming steam. This vacuum of the condenser works with the pressure generated in the boilers (865 psi) these forces combine to draw the steam through the turbine to drive the generator. The condensate created by the ACC is returned to the condensate receiver tank and boiler feed water system.
2) ENVIRONMENTAL IMPACTS AND REGULATORY COMPLIANCE:

The Covanta OCRRF is governed by one of the most comprehensive and most restrictive regulatory umbrellas of any Municipal Waste Combustor (MWC) in the United States. From both air emissions and solid waste permit standpoint the facility’s permits contain emissions standards and operating requirements that are more restrictive than the applicable State and Federal Standards. These additional requirements were the result of concerted efforts of local individuals and national environmental groups active during the planning and original permitting process.

The OCRRRA operations are consistent with the New York State Solid Waste Management Policy which ranks waste prevention, reuse, recycling, energy production and then landfilling for disposal of municipal waste. The OCRRRA operation was sighted several times in the NYS Policy for leadership diligence and innovation. Thanks to the people of Onondaga County, the community has a 95% participation rate and reduces the amount of trash it creates by more than 60% FIGURE 18. The program has won awards from the EPA, the Governor of New York, the National Recycling Coalition, the New York State Department of Environmental Conservation, the American Forest and Paper Association, and the Solid Waste Association of North America. The Covanta Onondaga EfW facility is only one component of OCRRRA’s comprehensive, integrated solid waste management system. The system services all the municipalities of Onondaga County, except the Village and Town of Skaneateles. OCRRRA implemented its mandatory, comprehensive recycling program, Operation Separation, in 1990. Operation Separation includes residential and commercial recycling programs, operation of two drop-off sites for recyclables. Operation Separation is one of the most successful recycling programs in the United States. In addition to the usual recycling of paper, metal, plastic and glass, OCRRRA offers compost facilities for yard waste and business food waste; OCRRRA has collection events for household hazardous waste to keep it out of the MWC and assure proper disposal; a continuous household battery collection program and a mercury collection program that includes household fluorescent bulbs. OCRRRA offers comprehensive public education and enforcement programs.

Covanta permit conditions explicitly mandate the recovery of energy in a highly efficient, environmentally acceptable manner, from solid waste that cannot be technically reused or recycled. The facility’s permit also incorporates many permit conditions that are designed to ensure that the facility receives waste only from service areas that have NYSDEC approved waste plans that incorporate source separation. From the residue of the combustion process at the Covanta EFW facility, nothing goes to waste. Scrap steel and non-ferrous metals are separated from the ash and recycled. The ash is also used in place of clean earth for certain fills.

The OCRRRA-Covanta partnership proves that when appropriately sized and permitted, MWCs can co-exist with very strong recycling programs, as evidenced in Onondaga County. In the permits for the Onondaga EfW, the sizing of the facility was limited to what was calculated to be residue after the Onondaga County Resource Recovery Agency reached aggressive recycling diversion goals. That provision, in combination with a management structure that includes flow control and a publicly owned facility that invests tip fee revenues into an integrated waste prevention, recycling and composting program, has yielded one of the nation’s strongest recycling programs. FIGURE 18 illustrates the strong recycling efforts that go hand-in-hand in Onondaga County outpacing the national average for recycling.

Tipping Hall Odor and Fugitive Impact Management

Odor, which normally emanates from trash, is kept to an absolute minimum. MSW delivered to the facility is processed within 3 to 4 days. Air from the tipping floor is drawn out of the building by the Forced Draft (FD) fans providing the primary air to the combustion process. The tipping hall is under negative pressure. This assures that all malodorous smells and volatile emissions are contained and are destroyed at high temperatures of the boilers combustion chamber. With three combustion trains running the tipping floor building has complete air exchange greater than four times each hour.
A newly proposed EfW facility has used Covanta Onondaga to model odors. Odor sampling was done at the edge of the tipping floor pit and at other point of the building. This information was helpful to the proposed facility to head off concerns from critics. It provided concrete evidence that the of waste in the facility does not and will not pose a nuisance concern.

Recently the EPA and appliance recyclers have taken advantage of this element of the process. Refrigerator recycling releases CFCs from the dense foam insulation used in their construction. During de-construction insulation is bagged tightly and delivered to the Covanta EfW facility. The insulation and CFCs can be very effectively destroyed in the EfW process; any fumes that escape from the bagged insulation to the tipping floor building are drawn into and destroyed by the high furnace temperatures. With the encouragement of the EPA this process is not regarded as the best disposal method for this CFC material.

Water Impact Management

The Covanta EfW is a zero discharge facility with respect to industrial wastewater. The facility was engineered and currently re-uses on-site generated waste water in various processes. Due to the zero discharge design and operation of the facility, the OCRRF is not subject to State or Federal discharge permitting to the waters of New York State or to the Publicly Owned Treatment Works (POTW).

No storm water is discharged to off-site surface water body or sewer systems. Storm water runoff from paved areas of the facility is routed through one of two oil/water separators before entering the on-site retention pond. Drainage from grass covered areas is routed directly to the pond. The on-site retention pond is designed to retain the water collection of a 10-year, 24-hour storm. Collected water will infiltrate to ground water and collect any solids.

Industrial process water is 100% recycled in a managed process. Floor drains and equipment drains are collected in the settling basin. Even with 100% recycling of the waste water, fresh water is required to make up the short fall to supply all of the facilities needs. Most of the water used is related to the Spray Dry Absorber (SDA) or other “back-end” facility processes. “Back-end” processes include SDA lime slurry production, SDA flue gas temperature control, SDA carbon make-up/transport and ash handling. Settling basin water is pumped to the facility’s ash dischargers and becomes the quench water for the ash residue. In 2011 the Covanta began importing used industrial waste water to offset the purchase of fresh water. Waste water is used as a beneficial reuse to reduce up to 25% of the 30 million gallons of fresh water that the facility currently uses annually.

As part of the zero discharge facility capability Covanta utilizes an Air Cooled Condenser (ACC); this technology has many advantages over the traditional condenser cooling tower technology systems. The ACC avoids thermal pollution of local waterways associated with water cooled condensers or “once-through” heat exchange. It eliminates water discharge needed to maintain the cooling tower chemistry; eliminates evaporative losses of fresh water; eliminates the large quantities of fresh make-up water and the use chemicals to keep the tower water clean.

In 2011 the runoff pond was cleared and cleaned of dead-fall weeds and brush. After 15 years of runoff operation the pond became over grown and supported weeds only. It was opened up to support wild life; fish and birds. As a zero discharge facility, correct operation of the pond is a significant aspect in the EMS analysis. A fountain was installed after the clearing for aeration and in 2012 the pond will be stocked with Chinese Grass Carp. These fish have a voracious appetite for almost anything; they will keep the vegetation under control and help to maintain a healthy pond environment. We also hope to be able to other hardy species of fish. In the six months of operation we have had two families of ducks and a family of Canadian Geese take refuge in the pond.
**Air Impact Management**

Due to the nature and makeup of the wastes processed, the air emissions from MWC facilities can contain organics, metals, and acid gases. These emissions can contribute to air pollution that may endanger public health and the environment. Therefore, to better control such emissions, the EPA has promulgated regulations under the Clean Air Act to establish operating practices and emission limitations. While other facilities required retrofitting, the Covanta Onondaga facility was designed and equipped in 1993 with air pollution control (APC) technology that anticipated the 1998 EPA's maximum achievable control technology (MACT) standards that were later promulgated. The facility has consistently exceeded the most stringent standards issued by the EPA and NYSDEC subsequent to commencing commercial operation and has not needed to update or retrofit any additional APC technology. The APC equipment originally installed at the Covanta facility continues to exceed the requirements of the MACT standards and consistently outperform the majority of EfW facilities in the U.S.

Air pollution control (APC) equipment at the OCRRF includes dry scrubbers for acid gas control, fabric filter bag houses for particulate removal, selective non-catalytic reduction (SNCR) systems for control of nitrogen oxides and carbon injection for mercury and dioxin/furan control. Several years ago the original fiberglass bag technology used in the fabric filters was replaced with Ryton; a high temperature plastic filter fabric, which both improved collection efficiency and reduced pressure drop and associated power consumption.

The OCRRF employs a continuous emissions monitoring system (CEMS) that provides continuous feedback on the effectiveness of the APC equipment. The CEMS and the Data Acquisition System (DAS) continuously measure and record concentrations of oxygen, carbon dioxide, carbon monoxide, sulfur dioxide, nitrogen oxides, opacity, baghouse inlet temperature, boiler roof temperature (correlated to combustion zone temperature), steam pressure, steam temperature and steam flow for each boiler. Sample probes are located in two locations; first in the duct work before the flue gas enters the scrubber and second at the outlet of the baghouse going to the induced draft (ID) fan inlet. The ID fan provides a negative pressure greater than the positive pressure supplied by the FD fan; this keeps the entire combustion train under negative pressure prior to discharge up the stack. In addition to CEMS-monitored constituents, a number of operating parameters are continuously measured including scrubber lime flow rate, carbon injection rate and ammonia injection rate to each combustion train APC.

NOx emissions are controlled with selective non-catalytic reduction (SNCR) technology. NOx is precursor or contributor to ozone layer reduction in the upper earth's atmosphere. The SNCR reduction process minimizes the facilities impact on earth's upper atmosphere. The process involves the injection of anhydrous ammonia (NH3) into the upper furnace. The Introduction of ammonia at this particular location in the furnace allows for a temperature dependent reaction that reduces the amount of NOx emissions. \( \text{NH}_3 + \text{NO}_x \rightarrow \text{N}_2 + \text{H}_2\text{O} \) (simplified for demonstration). The reaction produces nitrogen and water instead of the formation of NOx, although it does not completely alleviate it does reduce the amount of NOx emissions.

Organics emissions are typically composed of Carbon and Hydrogen in numerous permutations. The most significant with regard to toxicity from combustion are termed dioxin/furans. This is a family of chemicals that are produced when plastic and organic materials are burned. They can be controlled by combustion temperature. The secondary air injection control system in the furnace allows the final combustion temperature to exceed 1800°F. At these elevated temperatures the gaseous organics are oxidized or burned within the flue gas.

Acid gases such as sulfur dioxide, hydrochloric acid and sulfuric acid are controlled with the injection of high calcium lime. After the usable heat has been extracted from the flue gas to produce and superheat the steam, the gases pass through a large reactor vessel. The Spray Dry Absorber (SDA) reactor vessel is designed to provide the proper gas residence time for the drying process to be completed. This assures that the calcium based salts that are formed by neutralizing the acid gases...
with the lime are dry enough to leave as particulate matter. The flue gas has a residence time of greater than one second while it swirls through the vessel. Typically, this achieves reductions of 85% to 99%.

Mercury and dioxin/furans are captured with the injection of activated carbon in the reactor vessel. Carbon injection removes greater than 97% of the vaporized mercury. In the carbon injection system, a powdered, activated, lignite-based carbon is mixed with water to form carbon slurry. The carbon slurry is introduced into the flue gas path via the SDA rotary atomizers with the lime slurry. In the Scrubber, additional water is introduced to reduce flue gas temperatures. At temperatures below 300°F, metals that were vaporized in the furnace are changed from a vapor to a particulate state.

Particulate matter will drop out of the flue gas stream into the SDA hopper or be carried into the baghouse. Flyash, metals (condensed from vapor form) and the reagents are captured by the baghouse. The baghouse has an efficiency greater than 99% for removal of particulate matter from the flue gases. The flyash is discharged from the SDA hopper and baghouse hoppers into a screw conveyor and is conveyed to the fly ash discharge system. The conveyors can deliver the flyash to the bottom ash dischargers to be mixed with the bottom ash. Alternatively, the flyash can be conveyed to a silo and batch fed into a Dustmaster. The dustmaster combines the ash with enough water to dampen the material without creating mud.

The OCRRF has successfully completed and received results for 17 annual stack tests, during which 36 different constituents are measured. The facility has consistently demonstrated compliance with its emissions limits, and, in the case of most pollutant constituents, measured emission levels that are well below the permitted limits. See FIGURE 19 and FIGURE 20 illustrating the facility’s exceptional stack test emission results. Annual compliance testing shows emissions are typically less than 15% of the permit limits.

Solid Waste Management

Control of solid waste starts as soon as the hauler vehicles enter the facility. Vehicles pass-over scales, while on the scales they pass-by radiation detectors. The radiation detectors were installed in 1994, 10-years prior to any New York State regulations made mention of their use. Procedures are in place to detect, assess, contain, handle and resolve radioactive waste incidents. A typical detection will require the load to be held at the OCRRA Rock Cut Road facility. Medical products and procedures count for greater than 99% of radiation detects. These materials will typically decay to background levels within a week at that point they can be safely disposal can be permitted.

Construction and demolition (C&D) materials are not delivered directly to the Covanta OCRRF. OCRRA receives and separates C&D prior to delivery to the OCRRF. Gypsum wallboard, steel, carpeting and yard waste materials are not transferred to the facility. As detailed above, OCRRA has instituted a Source Separation program for keeping many plastics and paper from the delivered Municipal Solid Waste (MSW). OCRRA also has appointed members of their work force as Trash Cops. They visit the tipping floor at least once each day to review private hauler loads being delivered to verify that recyclables and non-processable MSW are not delivered to the OCRRF. Non-processable materials will include tires, appliances, drums, large quantities of drywall.

Residue from the combustion process is produced; approximately 90,000 tons of mixed residue products from 330,000 tons of incoming waste each year. Approximately 10% of the residue or 9,000 tons is ferrous metal and approximately 450 tons is non-ferrous metals (aluminum, copper and brass) that are recycled annually. The ash is also a usable product; it has received a Beneficial Use Determination (BUD) from the NYS Department of Environmental Conservation (NYSDEC) it is used as daily cover for a landfill; at the landfill after the days trash has been received it must be covered to prevent wind blowing, odor and vermin intrusion.
Ancillary Waste Management

In 2006 Covanta eliminated the last manifested waste stream. The facility’s parts washer solvent was switched to a non-hazardous solvent. The fully-synthetic solvent has very low volatility and can be disposed of with used oil. Used oil generated at the facility has been consistently characterized as non-hazardous. Disposal of the used oil is handled through a tolling agreement. The vendor that supplies the various equipment lubricants also picks up the used oil for cleaning and recycling as fuel oil.

Universal Wastes are handled appropriately. Used batteries from the facility are accumulated and disposed of with the July collection or delivered directly to OCRRA throughout the year. OCRRA has instituted a battery collection system. As part of the process, Covanta collects batteries from the curb-side pickup drivers during the month of July. Rechargeable lithium and NiCd batteries that require disposal as part of facility operations are collected for off-site recycling. Lead acid batteries that are used as part of the Covanta operations; are delivered to a scrap dealer for recycling on a regular basis. Fluorescent bulbs are shipped off site for mercury recycling. Electronics; Computers and accessories are collected internally to be shipped to a Covanta E-Waste facility. This service is also available to all of the Covanta employees.

Additional Compliance Scrutiny

From conception of the OCRRF project there have been concerted efforts of local individuals and national environmental groups. The local citizens did not want the facility to become a dumping ground for all of the Central New York trash. Thus the size was limited to the expected growth of Onondaga County. From both air emissions and solid waste permit standpoint the facility’s permitting contained standards that are more restrictive than the applicable State and Federal requirements. These additional requirements were the result of active during the planning and original permitting process.

The Onondaga County Health Department (OCHD) was enlisted as an additional layer of regulatory oversight. Prior to the first day of operation, OCHD instituted the “Incinerator Monitoring Program”. The program originally included (1) soil sampling, (2) ambient air sampling and (3) ash analysis monitoring. The soil program began with baseline samples taken in 1994 prior to start-up of the OCRRF. Soil sampling is conducted along the route the vehicles transporting ash residue follow from the OCRRF to Landfill located an hour away. The soil sampling is conducted on a quarterly basis and includes metal analysis and periodic analysis of organics. Soil sampling is also conducted downwind of the facility to verify emissions are not accumulating in local soils. Ash residue analysis is conducted by the OCHD on a semi-annual basis and includes total metals analysis and periodic analysis for organics.

The OCHD program originally included ambient air samples from both permanent and periodic roving sites around the County reported on a quarterly basis. The testing results showed no indication of any ambient increases due to the operation of the OCRRF three operations. This air sampling portion of the program was stopped after nine years in 2003.

Beyond Compliance

In addition to compliance to all of the overlying regulations and the OCHD Monitoring program, Covanta prides itself in its’ proactive mind-set. Covanta operations include regularly scheduled environmental compliance audits. Since joining the EPA performance Track in 2007 and then the NYS Environmental Leaders in 2008 Covanta is on a 3-year cycle for auditing the Environmental Management System (EMS). At least annually there are regularly scheduled and unscheduled NYSDEC inspections from both the air and solid waste divisions. For the life of the facility, these NYSDEC inspections have not revealed any significant matter.
In February 2007, Covanta Onondaga gained membership into the National Environmental Performance Track (NEPT). In 2009 NEPT was disbanded, the same year Covanta was designated by the NYSDEC as a founding member of New York Environmental Leaders (NYEL) program. In 2011 Onondaga became a Tier III member of the newly formed nationwide Stewardship Action Council (SAC). To participate in these programs, Onondaga had to develop a system to consolidate all of the numerous environmental requirements into a concise and clear Environmental Management System (EMS). The EMS Manual acts as the go-to directory for all of the environmental policies, practices and procedures for the facility. The EMS is audited every 3 years to be sure emphasis is given to all environmental aspects and concerns. To gain acceptance into the programs Onondaga had to develop projects that the governing body would consider significant and in keeping with their expectations and demonstrate Onondaga’s commitment to the process of going beyond compliance.

NYEL and SAC are partnership programs to recognize and reward private and public facilities that demonstrate strong environmental performance beyond regulatory requirements. This means not only working to get numbers down for compliance but striving to get them as low as possible. Covanta Onondaga strives not only to accomplish the minimum goals but to have no negative impact on the environment. State wide only 12 companies have been admitted into the NYEL program and nationally only 62 companies have been accepted into SAC. Members have set three-year goals for continuous improvements in environmental performance beyond their legal requirements, have internal systems in place to manage their environmental impacts and demonstrate ties to their community.

Covanta Onondaga has committed to and completed the following projects and operational practice changes as a result of entry into the NEPT, NYEL and SAC programs:

- Replace high-mercury fluorescent bulbs with low mercury “green” bulbs. Replace all mercury switches in the facility with non-mercury alternatives.
- Install a non-ferrous recovery system. The system allows for the recycling of approximately 90% of the non-ferrous metals from the ash. Prior to installation Aluminum, Copper and Brass were being land filled with the ash.
- Shut down boiler combustion fans during outages when internal air circulation is not needed for personnel entrance and safety.
- Reduce lighting in rarely used areas **FIGURE 17**.
- Install occupancy detectors in noncritical areas; locker rooms, lunch rooms, pump rooms, office, laboratories and seldom used areas.
- Install local switches in the tipping floor high bay; light can be off 14 hours of the day.
- Install low-flow shower heads in employee locker room.
- Install waterless urinals.
- Import industrial waste water **FIGURE 16** to off-set and reduce fresh water use; saving near 3 million gallons per year.
- Replace three 15 year old loaders with two new loaders **FIGURE 14**. Increased fuel efficiency and emission reductions.
- Replace 10 to 30% of annual diesel usage with a mixed bio-diesel **FIGURE 14**. For 2011, our first year, we obtained 25% biodiesel usage.
- Rehabilitate the storm water runoff pond **FIGURE 15** into a lively green space.

**Permitting History**

The Onondaga County Resource Recovery Facility (OCRRF) has a long history from when it was first proposed more than twenty-five years ago to the present. After preliminary studies were concluded, the County formed a Solid Waste Management Team in 1980. The project was kept alive with some incremental progress between 1981 and 1987; when the City of Syracuse and the County were able to resolve some of the outstanding issues that were holding up the project. In November 1985, EPA issued a PSD permit for the project. The NYSDEC Permit to Construct was effective July 15, 1992, in
December 1992 construction of the OCRRF commenced. Covanta has been operating the facility since November 1994 and received the original shared, Covanta/OCRRA, Permit to Operate on October 13, 1995.

The Covanta OCRRF is currently regulated pursuant to NYSDEC Title V air permit #7-3142-00028/00009 and Solid Waste permit #7-3142-00028/00011. The facility is also subject to all applicable state and federal regulations. In addition, the facility's air permit contains some emissions standards that are even more restrictive than the applicable NSPS and MACT Standards. The facility’s Solid Waste Permit was developed to be consistent with the New York State Solid Waste Management Plan goals for recycling and directly incorporates permit conditions that promote those goals within the facility’s service area. As one of the latest permitted MWC facilities the OCRRF is governed by one of the most comprehensive and restrictive regulatory umbrellas in the Country from both an air emissions and solid waste permit standpoint.

The facility's Solid Waste Permit was developed to be consistent with the New York State Solid Waste Management Plan goals for recycling and directly incorporates permit conditions that promote and incorporate those goals within the facility’s service area. The original New York State solid waste permit allowed for 295,000 tons of waste per year to be processed. The Permit was updated in 1998 to allow 336,000 tons of waste per year and again in 2001 to the current allowance of 361,350 tons per year. This final level is the original engineering design specification for maximum throughput. Actual processed tons can be seen in FIGURE 23. 361,350 was the tonnage used as the basis for the Health Risk Assessment (HRA). The HRA was used to develop the original permit limits for both solid waste and air emissions. A comparison of the permit limits and actual stack test results can be found on FIGURE 19.

The emissions levels established in the original Certificate to Operate were among the most stringent and the most comprehensive in the United States for waste-to-energy facilities. Prior to codifying the MACT standards for Municipal Waste Combustor Guidelines (40 CFR 60 Subpart Cb) OCRRF was required, in the state permit, to meet them. Included were provisions to ratchet down limits based on actual stack testing emissions level. Even with the limits ratcheting down we continue to reduce actual emissions. See FIGURE 19 to compare the latest, 2011 to historical emissions. As a result of the Covanta Onondaga results, Onondaga was used as a benchmark for emissions reductions.

The Title V air emissions permit came up for renewal in 2007. Covanta and OCRRA proposed no major changes and yet the State took 3 years to issue the permit. Two years into the process the NYSDEC decided that a hearing was required to address the issues the detractors were bringing up; this was accomplished in 2009. At the Public Hearing there were 22 speakers only 5 were in opposition. Most of the objections issues were with regard to solid waste handling and what they believe were broken promises by the County Legislature and not air emissions issues. The cynics demanded the use of clear bags for all trash, increased monitoring; demand the County reinstate OCHD ambient air monitoring and investigate claims of Mercury poisoning in Glacier Lake. The NYSDEC closed the proceedings with no mitigating actions required. And on August 8, 2011 the Permit was issued.

The solid waste permit came up for renewal in 2011. This was a renewal of a NY state permit, with no changes there was no discussion of hearings. The solid waste permit was issued along with the Air permit on August 8, 2011.
3) PERFORMANCE

Since OCRRA has entrusted Covanta to operate the OCRRF there has never been a time that waste could not be delivered to the facility on the normal schedule. Covanta has maintained a better than 90% boiler availability for 13 of the 17 operating years. The remaining 4 years were greater than 88% available. Covanta has consistently generated electrical revenues greater than budget. The Kilowatt per ton rate has increased as the tonnage processed has increased. Overall average boiler availability for 2011 was 94%, a bit higher than the Facility’s 17-year (1995-2011) average of 91%. FIGURE 24 illustrates the efficiencies and availability factors for the past 5 years. The amount of purchased power, indicating turbine downtime is consistently low; with the exception of required turbine maintenance. Turbine outages have been limited to less than 3 days when needed. Emissions performance can be seen in FIGURES 19 and 20.

Facility Reliability Program

The Facility follows a rigorous predictive and preventative maintenance program. A key element of this program is a computer based maintenance management system, which organizes and tracks maintenance requirements and records work orders for repair work and preventative maintenance at the Facility. A complete history of all equipment in the plant is stored in the computer and is updated as work orders are completed. This state-of-the-art maintenance management system is a vital component in the overall maintenance and operations program.

As part of the normal scheduled maintenance program, all major Facility components undergo periodic maintenance and inspection. Each combustion unit is shutdown for maintenance, cleaning and inspection at approximately half-year intervals. Unit shutdowns are scheduled to coincide to the extent possible with periods of off-peak and reduced energy demand. The turbine-generator inspection program is scheduled at approximately three-year intervals, at which time waste disposal operations can continue and steam generated from the OCRRF can bypass the turbine and be sent to the directly to the condenser.

The Facility is designed to accommodate routine preventive maintenance, scheduled equipment maintenance and emergency maintenance without disrupting refuse disposal or generation of energy. Proper maintenance of all systems is given the highest priority at the Facility. Installed duplicates back up most essential equipment. Spare duplicates stored at the Facility back up other equipment. A computer tracking system provides for rapid access to spare equipment and parts.

The Facility has implemented on-going quality assurance programs. The goal of these programs is to monitor key aspects of the Facility’s operation and provide timely notification of improper conditions or adverse trends. Utilizing the information and data collected, the Covanta staff, as well as the corporate staff, each examines specific aspects of Facility operations. Monitoring program include predictive and preventative programs; vibration monitoring, oil analysis, thermal imaging and equipment use rotation.

Covanta has numerous resources to draw upon for assistance of almost any nature. In addition to the many other Covanta facilities, many partnerships have been forged. From these partnerships, Covanta can benefit directly from knowledge gained by others and Covanta assists others by adding experiences to the pool:
- New York Environmental Leaders (NYEL)
- Stewardship Action Council (SAC)
- Occupational Safety and Health Administration (OSHA)
- Energy Recovery Council (ERC)
- Solid Waste Association of North America (SWANA)
- Integrated Waste Services Association(IWSA)
- Manufacturers Association of New York (MACNY)
- New York Bio-mass Alliance
Ash Management

The OCRRF does not generate hazardous waste. Covanta has successfully completed seventeen years of bi-annual ash residue characterizations utilizing the NYSDEC-approved Ash Sampling Protocol. The results of all thirty-four ash characterizations have demonstrated that the combined ash residue is not characteristic of toxicity, and is therefore, a non-hazardous solid waste.

All ash transportation is done while wet. The bottom ash removal system is designed to handle any size material that can be delivered through the feed chute and across the grates. Bottom ash from the grate siftings are discharged into a water-bath discharger. The wet ash is hydraulically pushed from the discharger, up an incline so water may run back. The, now damp, ash continues up and onto a conveying system.

Fly ash from the air pollution control (APC) system and from the boiler hoppers is collected through a screw conveyor system. The flyash is stored in a silo and batch fed into the Dust Master, similar to a pug mill. Water conditioned fly ash follows a parallel path to the residue storage building, where the fly joins the bottom ash.

Combined ash-residue is loaded into trucks by front-end loader and weighed out on the Facility's scales prior to transport to landfill. Transportation of the ash is accomplished by OCRRA using covered 10-wheel dump trucks. Covered open-top tractor-trailers are used to transport the scrap materials for recycling. Ash is maintained damp; this is optimized at 25% to 35% enough to eliminate dusting but low enough that ash cannot drip and reduced the amount of trucks required.

As mention earlier; the scrap and the ash residue are usable products. The ash has received a Beneficial Use Determination (BUD) from the NYS Department of Environmental Conservation (NYSDEC) it is used as daily cover for a landfill; at the landfill after the days trash has been received it must be covered to prevent wind blowing, odor and vermin intrusion.
4) PROGRAM PLANNING:

SPECIAL WASTE PROGRAM

Covanta in partnership with OCRRA does accept industrial waste. Industrial waste must conform to guidelines that have been established for safety and environmental compliance. The NYSDEC and Covanta early on, in the life of the facility developed a process to evaluate newly proposed waste streams for destruction at the OCRRF. The meticulous analysis allows for materials that do not greatly differ from MSW to be brought in and those that do differ must go through a through environmental, safety and operational compatibility analysis.

Another aspect is the secure destruction of materials that required viewed or certified destruction. This can include confiscated drugs, law enforcement uniforms, proprietary materials or contaminated food stuffs to name just a few categories. Covanta provides this service to branches of local law enforcement free of charge.
5)  WORKER HEALTH AND SAFETY:

As of March 2012, Covanta Onondaga has gone over two years without a lost time accident. Covanta Onondaga joined the Occupational Safety and Health Administration (OSHA) Voluntary Protection Program (VPP) in 2006. Before enlisting in the program, we were well on our way to safety excellence. The OSHA injury Frequency index for the facility employees is and has been well below industry standards see FIGURE 21. For the years 2007, 2009 and 2011 there were zero OSHA incidents and only one for each of the years 2008 and 2010.

Another example of Covanta Onondaga’s responsible and safe operation of its facility was its proactive approach towards and desire to become part of OSHA-VPP FIGURE 5. Although an excellent safety record already existed for years, Covanta Onondaga employees decided to pursue the OSHA-VPP STAR program in an effort to continuously improve. In May 2005, employees met with OSHA on site to understand the process and benefits of the program. An application was submitted in December 2005. On June 22, 2006, the Region II VPP Manager recommended that the facility be accepted as an OSHA-VPP STAR facility. The VPP status was renewed in 2009.

The VPP program acceptance process includes a rigorous onsite evaluation by a team of OSHA safety and health experts. The onsite evaluation included: review of records, logs, inspection history, facility walkthrough, formal and informal employee interviews. At the conclusion of the onsite evaluation a recommendation was made to the Secretary of Labor for acceptance into the STAR program. Sites that make the grade must submit annual self-evaluations and undergo periodic onsite reevaluations to remain in the program. Many benefits are derived from being in VPP. Fewer injuries and illnesses mean improved employee motivation and reduced costs. Entire industries benefit as VPP sites evolve into models of excellence and influence practices industry wide. Employees become ambassadors of safety, enthusiastically spreading the message with vendors, contractors, and visitors.

The continuous improvement aspect of VPP is ongoing. Using VPP as a tool, employees have initiated job safety analysis (JSA) programs and hazard assessment programs. It gives employees a stake in their own safety and ability to mitigate problems they encounter FIGURE 4. Operation Ownership allows an employee to feel even more ownership and recognition for working above and beyond FIGURE 3. VPP also reaches into other aspects of employees’ lives; including safety at home, which consists of home relevant safety training practices. In 2007 and 2010 Covanta reached out to the families of our employees by providing safe driving classes taught at the facility for employees and their families.

All contractors scheduled to work at the any Covanta site must be vetted by an outside company; IS Net World (ISN). ISN collects self-reported conformance information from contractors/suppliers, verifies its accuracy, and then reports the results in its clients. This allows Covanta to select those resources that best meet all of our requirements. Upon arrival, all contract employees go through a training session. Training includes general facility procedures as well as specific training pertaining to the tasks to be fulfilled. All work done at the OCRRF is done under the safety procedures and practices dictated by Covanta.

Annually Covanta Onondaga takes part in the Integrated Waste Services Association (IWSA) OSHA sponsored Hauler Safety initiative. This is a national safety campaign sponsored by the IWSA–Occupational Health and Safety Administration Alliance Program (IWSA-OSHA Alliance). The event focuses on educating public and private waste haulers, and facility employees and contractors about best health and safety work practices in waste collection and the EFW workplace. Several haulers are rewarded for their participation in thought provoking quizzes FIGURE 12.
Initial Training

Before a new Covanta employee takes-up a position in the OCRRF they under go extensive training. The familiarization training commences with an introduction to the company that includes its history, organizational structure, policies and procedures. This is immediately followed by an introduction to safety, stressing its importance at all times. An explanation of the Company Safety Program covers such topics as prompt supervisor notification, accident investigation and continuous diligence reporting while a review of company safety rules includes eye and ear protection, clearance and locking procedures and confined space entries.

Safety Training

Weekly and monthly safety training classes follow themes defined by the corporate safety programs. Topics are covered in monthly safety meetings, which are then reinforced by supplemental training each week. In addition, instruction is provided immediately, as required, for specific key operation or maintenance personnel covering changes or modifications to laws, regulations, or permits affecting facility operations.

First Aid and Cardiac Pulmonary Resuscitation (CPR) Certification Training: All personnel are required to attend a First Aid and Cardiac Pulmonary Resuscitation (CPR) training course. This course is conducted annually by the American Red Cross or an equivalent certified instructor.

The purpose of the company-training program is to ensure that Covanta personnel, at all position levels, operate and maintain the facilities in a safe, efficient and environmentally sound manner. The training program is designed to prepare company personnel to exceed the requirements and qualifications needed to operate a resource recovery facility as mandated by applicable Federal, State, and local laws, regulations and ordinances.

Prior to taking a position in the facility, permits are reviewed and instruction is given on the Waste Control Plan, which includes the definitions of the various waste classifications, screening procedures and the handling of hazardous, non-processible, unacceptable and untreated waste. A review follows of the Contingency Plan that includes the Environmental Compliance Plan, the Spill Prevention and Control Countermeasure (SPCC) Plan, the Fire and General Emergency Plan and the Crisis Management Plan.

System descriptions are used as the standard text in conjunction with Logic Diagrams, Piping, Instrument Drawings and Electrical One Line Drawings. These provide a detailed overall technical training presentation of the plant on a system-by-system basis.

On-going Training

Safety Training: Some of the specific safety training procedures include:
- First Aid, CPR and AED
- Hazwoper- working with hazardous material and first responder training in the event emergency
- Fire prevention, extinguisher use
- Emergency Evacuation
- PPE, lifting, ergonomics
- OSHA right to know
- Mobile equipment safety
- Hazard recognition
- Incoming waste hazards
- Crane safety for working around and on cranes
- Hoisting and rigging safety
Environmental Training: Some of the specific environmental training procedures include:

- Combustion Theory
- Permit conditions
- Incoming waste handling
- Hazardous waste handling
- Spill Prevention and Control (SPCC)
- Crisis management
- Ash Handling
- Reporting and record keeping
- Storm water pollution prevention
- Interfacing with the public
- CEM theory and operation

Specific Training Systems

Environmental Compliance Awareness Training: The purpose of the Environmental Compliance Training Program is to raise the level of environmental awareness among all the employees, enhance job skills and provide the necessary knowledge to operate and maintain the plant in an environmentally sound manner. Included in this program is a general overview of environmental compliance and its importance to Covanta and the community, an overview of environmental legislation, permits and regulations, pollution control systems, regulatory agencies, critical housekeeping areas and employees environmental responsibilities. Site specific information is then reviewed including NYSDEC regulations and OCRRF permits. Environmental Compliance Awareness Annual Refresher Training is conducted for all employees at each facility.

Power Plant Fundamentals: The Power Plant Fundamentals course is an interactive computer assisted training program, which takes, on average, ninety hours to complete. It is administered by the Facility Manager and is assisted by the Facility Training Coordinator. The objective of this course is to present a thorough explanation of the technical and safety related aspects found in modern power generation facilities. The Martin Stoker Training Program is a self-study system with hands on on-the-job training (OJT) back by hours of individual instruction (one-on-one training) in the plant.

Systems Training Enhancement Program (STEP): The Systems Training Enhancement Program (STEP) is the job site specific on-going training program for all systems and equipment with the exception of the Martin Stoker. It consists of study assignments that identified trainees must complete to gain the knowledge required to perform specific job tasks. The STEP materials focus on the job tasks that must be performed for the proper operation of equipment rather than the engineering or construction associated with it.

Simulator Training Exercises: The training simulator has a plant control system of the type that can be found in many waste to energy plants. The simulated boiler is rated at 90 klb/hr steam flow, 865 psig main stream pressure, 830°F main steam temperature, 2% continuous blowdown and 180°F under fire air temperature. However, the stoker control system is specific and designed to simulate the Martin Stoker Control System.

Other identified needs: Vendors, community colleges and vocational schools as well as in-house specialists are performed. Maintenance training is an on-going requirement and is prepared and implemented according to the identified need using vendor training sources, selected technical seminars, and in-house maintenance specialists such as Martin Stoker maintenance specialists, continuous emissions monitoring specialists and other support staff. Covanta also encourages employees to take advantage of a tuition reimbursement program for relevant college course credit.
Safety Systems

**Independent water supply fire system with redundant diesel driven pumps:** Sufficient water capacity to handle a potential fire at the facility is provided by an on-site 250,000-gallon water storage tank. The tank is supplied through a municipal water source that is also available if the tank should go dry. The automatic fire and smoke detection systems and the water flow alarm systems are tested quarterly.

**Redundant communication systems:** A dual channel radio system carried by all of the operators and half of the maintenance crew, a single channel 25 station dedicated intercom system with a loudspeaker pager and seven stations from the office phone system terminate in the operating plant.

**Ammonia detection systems:** Anhydrous ammonia used for Selective Non-Catalytic Reduction (SNCR) of NOx emissions. As a hazardous chemical, extreme care is taken in its handling and application. Two separate leak detection systems are employed to ensure safe use of the chemical. One system monitors the area around the tank and a separate system monitors the area in the vicinity of the boiler injection points.

**Centralized emergency Light battery system:** This was installed to replace the numerous independent emergency light systems. This system is monitored from a central panel and can detect when a light bulb is burned out. This also eliminates batteries and control circuitry from areas that are less than favorable to electrical devices. The sophisticated charging system and high quality batteries eliminates the disposal of numerous lead-acid batteries.
6) ECONOMICS AND COST EFFECTIVENESS:

Covanta Onondaga in conjunction with the OCRRA operate the Onondaga County Resource Recovery Facility. The energy revenues from the facility are used to pay the $178 million in bonds used to design, build and engineer the facility, which began operations February, 1995. In addition, energy revenues are used to compensate Covanta for operating and maintaining the facility on behalf of Onondaga County.

Initial tip fees when the facility was built in 1995 were $99/ton. Overtime through the refinancing of project debt and additional waste processing; the per ton fee has come down. Tip fees are currently $74/ton for contracted haulers less a $4/ton credit for prompt payment to OCRRA. OCRRA collects enough revenue to pay Covanta for operations and fund OCRRA’s many program. Annual tip fees collected by OCRRA of just over $20 million, ferrous and non ferrous metal recovered from the EfW facility, contribute another $2 million. Electric sales account for $7 million. These revenues generated from the EfW operations are used by OCRRA for its award winning recycling program, household hazardous waste days, public relations outreach, transfer stations as well as paying Covanta for operation & maintenance of the facility.
7) UTILIZATION OF EQUIPMENT, SYSTEMS AND TECHNOLOGIES:

Through the combustion process, solid waste is reduced approximately 90% by volume and approximately 75% by weight. The resulting ash residue is transferred from the ash dischargers of the combustor to the ash residue storage building via an enclosed residue handling system, which includes a ferrous metal separation system and a non-ferrous metal separation system. The process is optimized to reduce the amount of ash requiring transport FIGURE 22.

The heat energy produced through the combustion of municipal solid waste is used to generate steam. Steam produced in the boilers is used to generate electricity in the generator rated for 39.6 megawatts maximum. Approximately 36 megawatts of electricity is produced with an estimated 3.5 megawatts reserved for in-house use and the balance delivered to the National Grid. Megawatt per ton efficiency has increased, as the facility waste processing throughput has increased over the years, see FIGURE 7.

The quenched ash removal system moves the cooled ashes to a residue storage building. A multi-step process removes 1) all oversized items (overs); 2) smaller ferrous material (unders) and 3) non-ferrous metals. Overs are those items that will not fit through a “grizzly” screen; eight-inch spaced steel bars. The unders are removed from the ash using a rotating drum magnet. Non-ferrous metals are pulled out of the ash with an eddy-current separator. The non-ferrous metals consist of aluminum, copper and brass. The overs, unders and non-ferrous are sent to a scrap dealer to be shredded and cleaned of unwanted debris.
8) PUBLIC ACCEPTANCE, APPEARANCE AND ASTHETICS:

The long history of meticulously documented operations and environmental emissions monitoring has helped Covanta to gain acceptance in what had originally been a fairly hostile community. Other sites have also been able to use the exemplary operating results to gain acceptance in what has proven to be an uphill struggle to alleviate concerns and fears that clouded the EfW industry for years. New York State has in recent years updated its Solid Waste Management Plan. As proof of the success of the EfW industry, it has been targeted by the NYSDEC as a disposal method that must be promoted. Backing by the State and other organizations such as SWANA, IWAS and ERC has helped to remove unwarranted stigma.

Keeping the facility attractive FIGURE 3 and at the same time being able to quash negative press with operating data goes a long way to build acceptance in the community. Covanta has earned enumerable awards and citations, building a history of positive press FIGURE 6. Being a neighbor and not an industrial presents puts a face forward for the community to be comfortable asking questions. Educating people as to what goes on behind the fence and trees, the processing of their trash, gives people a feeling that they are invested in the Covanta OCRRF.

The site is in the Town of Onondaga, Village of Jamesville, New York; within an east-west trending valley called Rock Cut and Rams Gulch, bounded by high terrain to the north and south. The facility site is bordered by I-481 to the north and Rock Cut Road to the south. The site is approximately one mile east of the intersection between I-81 and I-481. I-481 has an exit directly onto Rock Cut Road that is only yards from the facility entrance. The proximity of the site to major transportation arteries minimizes the use of local roads by refuse vehicles. The terrain serves to limit the visibility of the site from surrounding communities. The Onondaga County Resource Recovery Agency's (OCCRA) Rock Cut Road Transfer Station, a drop-off facility for recyclables and household waste, is directly across the street from the OCRRF. Parts of the property were a scrap yard and later a water retention area for I-481 drainage before fill was placed on-site. Due to the prior usages the construction of the OCRRF was deemed to be a beneficial land usage.

The entire facility is landscaped with Lilac bushes, White Pine, Maple and Japanese Maple trees. Visitors are greeted by a minimalist low sitting administration building set behind a manicured garden. Trucks in queue for the tipping floor are blocked from public view behind the property fence and a windrow of pine trees. The stormwater retention pond and the surrounding area are landscaped with plants, which incorporate a visually pleasing natural area to the site terrain. In the warmer months, the retention pond is often inhabited by various birds, geese and ducks. Landscaping of the site combines clustered and linear planting with seeded and planted berms to form visual screening and provides highlighting and softening of building edges.

The large boiler building is terraced to diminish the impact of its’ size. The view of the facility from Rock Cut Road is obscured by an architectural concrete wall. The siding on the facility is a four-tone blue on the bottom to a light grey on top. This color scheme allows the building to blend and fade into the sky above.

The OCRRF has been able to minimize impact on the local environs through its’ original engineering. Zero water discharge eliminates impacts on the local waterways. An air-cooled condenser (ACC) eliminates the plume; the most visible telltale of a typical power plant. This single item has the greatest visual impact for the facility. A water-cooled condenser would have would have a much larger signature plume of steam rising from it. The ACC uses a closed water system that does not emit a view interrupting plume.

Educational Outreach

Covanta Onondaga participates in many community educational endeavors. Covanta has teamed-up with Jamesville Elementary Students for Earth Day clean-up. Covanta employees join the students on an
area clean-up of the school yard, adjacent baseball fields and the local high-rise apartment building neighboring our facility. Covanta provides Earth Day t-shirts, gloves, trash bags and disposal service for the collected trash FIGURE 10.

Employees of Covanta annually present educational materials to students in the class room setting. Several elementary school classes take tours of the facility each year. Civic and private organizations also request tours and educational instruction. These include scouting organizations, senior citizens groups, private schools and home schooled students.

Numerous institutions of higher education tour our facility annually. Undergraduate and graduate program students from Cortland Community College, Onondaga Community College, SUNY Cortland and SUNY College of Environmental Science and Forestry are received every year for tours. If tours are not conducive to their curriculum in-class presentations are available. Prior to school financial cutbacks we were receiving 1000 tourist each year; of late the number is down to below 500 students.

Both Covanta and the OCRRA have several partnerships in area schools. The OCRRA recycling program has been highly successful and has been recognized by state and national awards. Covanta’s community relations program began when the facility began commercial operations on February 25, 1995. The Covanta OCRRF held a dedication ceremony and open house attended by over 1,000 area residents during May of 1995. In 2011 the OCRRF celebrated the processing of 5.5M tons of trash processed since 1995. Elected officials were invited for an open house FIGURE 12.

OCRRA has an impressive web site http://ocrra.org/ that provides information on all of their services and assistance on locating other allied services. The OCRRA.org web site provides a virtual tour of the OCRRF EfW facility. The virtual tour goes into detail of the benefits of EfW and day-to-day operations of the facility. The site provides up-to-date emissions test results; 1998 through 2011. There are a links from their website to the Covanta Corporate web site.

The Covanta website http://www.covantaenergy.com/ provides information on the benefits of EfW over land filling; information on how EfW reduces oil importation: information on how EfW reduces the amount of green house gas is formed compared to land filled trash.

Community Service

Covanta provides Secure disposal services to local law enforcement departments free of charge. The Syracuse Police, Liverpool Police, Dewitt Police, Onondaga County Sheriff and many other agencies have utilized this service on an annual basis. Confidential records, old official uniforms and confiscated drugs are securely destroyed on site.

Covanta Onondaga is the largest benefactor of the Central New York Envirothon FIGURE 9. The Envirothon is sponsored by the area Soil and Water Conservation Districts. It is a 2-day multi-county competition between high school Environmental Education classes and clubs. The regional winner advances to the state and the state winner advances to the nationals. Covanta also provides personnel for the event as registrars, time keepers and group escorts. Participants are challenged for their knowledge of flora, fauna, geological structure, current events and presentation skills.

Covanta also provides funding to the Onondaga County Soil and Water Conservation District for their other projects such as working directly with local farmers to educate and facilitate resource conservation. Attention is focused on soil and water protection projects such as stabilizing eroding river banks.

Covanta regularly donates to local nonprofit organizations FIGURE 8 including volunteer fire departments and fine arts endeavors; as an annual contributor of the Syracuse Opera Company. Covanta has regular sponsorships and accept challenges for new groups as their needs arise.
Covanta regularly provides use of the building structures and stairways for high rope rescue training by the Onondaga County Rescue Crew **FIGURE 11**. The local fire crews are invited in each year to do a response scenario and a walk around to familiarize themselves with the facility and what equipment we have to offer.
9) INNOVATION AND CREATIVITY:

Covanta OCRRF has become a showpiece of Covanta Energy facilities. The motto embraced by the operations group is “A clean shop is a happy shop.” Every month all available plant personnel take part in a “Power Hour”. During this extended hour, specific often over looked areas and practices are targeted. These are the projects that give the facility that extra touch and show that the employees “own” the facility and take pride in where they work.

Covanta’s OSHA-VPP Star Status, EPA National Environmental Performance Track (NEPT), NYEL and other employee driven or beyond compliance programs help to inspire our people. All of these endeavors further to empowered our employees to take ownership of the facility and all aspects of areas they occupy 8 hours each day FIGURES 2 & 3. For management as the easy projects are completed the more intensive projects require much more funding and employee time, management has stepped up and backed these programs. The requirements of these programs; projects that go beyond compliance, force the imaginations of our employees to come up with more endeavor. After the “low hanging fruit” projects have been picked, more must be identified.

- Eliminated styrofoam cup usage by all employee.
- Installed double sided printers for high volume print jobs.
- Installed water less urinals and low flow shower heads to save water.
- Purchased Wobblelights for furnace internal lighting during maintenance and inspection procedures. These provide better vision for safety and reduced power consumption.
- Elimination of the last manifested waste stream by switching to a non-hazardous parts washer solvent.
- Mercury turn-in sponsorship; home improvement store gift cards and digital thermometers for delivery of mercury containing thermostats and thermometers.
- Mercury switches in the facility are replaced on high pressure service fire pumps and soot blow system applications with non-mercury switches.
- Using bulk vegetable bags to catch ash while running screw conveyors backward instead of forcing the screws back and forth to remove a pluggage FIGURE 4.
- The use of bio-diesel and new more efficient loaders to reduce our carbon foot print FIGURE 14.
- Re-habitation of what had become a swamp for a run-off pond FIGURE 15.
- Importing waste water from other industrial facilities to defray our use of fresh water FIGURE 16 by approximately 3 million gallons per year.
Covanta Onondaga
The Facility and
The Illustrated Efforts of Our Employees
Minimize our impact on the local area

From the OCRRF Stack
   Looking East
   Looking West
Keeping the facility shipshape inside and out is a requirement.

Facility Interior  Firing Deck
Control Room      Turbine Deck
Employees show their pride with Operation Ownership.

Recognize individuals that put in that extra effort.
Our employees are dedicated to keeping their work areas clean. They come up with innovative methods that help with their duties and the entire facility.
Citations and accolades boost morale and performance

Employee driven VPP, puts our employees in charge of safety and problem mitigation
History of Achievements

- 2012 Green Core Business Certification - membership application
- 2012 Environmental Business Journal (EBJ) Project Merit Award
- 2011 Stewardship Action Council (SAC) Certificate of Membership
  - For going above and beyond regulatory requirements
- 2010 NYSDEC - NYEL Renewal, NY Environmental Leader Membership (1 of 13 NYS facilities)
- 2010 OSHA - VPP Renewal, US Department of Labor, Star Membership (1 of 107 NYS facilities)
- 2009 NY Environmental Leaders (NYEL) program recognition
  - Recognition of environmental excellence; going above and beyond legal requirements
- 2008 Empire State Soil & Water Conservation Society - Conservation Education Award
- 2008 Power Magazine EfW Power Plant of the Year
- 2008 ASME Large Waste to Energy Facility of the Year
- 2008 MACNY/OSHA Alliance Safety Award - Best Practices Award - Ergonomics Program
- 2007 EPA National Performance Track recognition
- 2007 SWANA - Gold Excellence for Waste-to-Energy
- 2007 National Safety Council - Occupational Safety Excellence Award
- 2007 MACNY - Safety Excellence Award
- 2006 OSHA VPP Star Site recognition
  - VPP is designed to promote excellence in safety and health management systems by recognizing facilities that have implemented employee driven outstanding health and safety programs
- 2006 State of New York Legislative Resolution for Safety Excellence
- 2006 State of New York Assembly Citation for Safety Excellence
- Covanta Onondaga is an outstanding member of
  - American Society of Mechanical Engineers (ASME)
  - Solid Waste Association of North America (SWANA)
  - Manufacturer’s Association of Central New York (MACNY)
  - National Safety Council
  - NY Bio-Mass Energy Alliance
Employee continuous training includes Proven class room training and stress Inducing situations to properly prepare For all contingencies.
Our Employees and Covanta Give Back to the Community
Covanta Onondaga has been the major Sponsor of the Central New York Envirothon for 17 years
Covanta spearheads the Jamesville Elementary and Community Earthday Cleanup
Covanta regularly provides structures for high rope rescue training by the Onondaga County Rescue Crew
2011 Elected officials tour, getting information to the decision makers.

Recognition of our hauler partners
During the OSHA/IWSA Hauler Week
A TYPICAL COVANTA ENERGY FACILITY

1. Tipping Floor
2. Refuse Holding Pit
3. Feed Crane
4. Feed Chute
5. Martin Stoker Grate
6. Combustion Air Fan
7. Martin Residue Discharger and Handling System
8. Combustion Chamber
9. Radiant Zone (furnace)
10. Convection Zone
11. Superheater
12. Economizer
13. Dry Gas Scrubber
14. Baghouse or Electrostatic Precipitator
15. Fly Ash Handling System
16. Induced Draft Fan
17. Stack
Covanta Onondaga has been able to
Reduce its’ carbon footprint with
Bio-Diesel and new
More efficient mobile equipment
Storm water Run-off Pond After 15 Years of use

2011 After Clearing and Cleaning
2011 Covanta began to import waste water from other companies. To replace 2.5M – 3.0M gallons of fresh water use each year.

The additional water requires a robust distribution management system with tighter control.
Initiatives that add directly to the bottom line.
Reduced lighting where possible, without effecting safety or productivity
Recycling Rates, Onondaga County, 2005-11

Key emissions factors are under tight control

Comparison of Long-Term Facility Average to 2011 Test Results
(Average of 3 Boiler Units)

- 2011 Result Average
- 17-Year Average

* Nitrogen Oxides (NOx) emissions are controlled via injection of ammonia into the boiler. Ammonia injection is continuously optimized to ensure emissions stay below the NOx and ammonia permit limits.
Facility Mercury Emissions & Air Pollution Control System Effectiveness

Mercury levels upstream of air pollution control system, indicative of Mercury levels in incoming waste stream

Based on Facility Average Annual Stack Test Data 1995 through 2011

Mercury Emission Levels at Stack (downstream of air pollution control system)

Trend Line

Mercury Removal (indicative of air pollution control system effectiveness)
Key indices of safe operation are trending down
OSHA Frequency Index (OFI) & OSHA Recordable (REC) Incidents
Efficient Operations are optimized to reduce ash tons
Ash Produced as a Percent of Processed Waste
Optimized facility Usage

Covanta Onondaga EfW
Processed tons

![Bar Chart showing processed tons from 1995 to 2011.](chart.png)
### Production Statistics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Throughput</td>
<td>actual tons</td>
<td>350,498</td>
<td>348,263</td>
<td>319,136</td>
<td>315,385</td>
<td>326,782</td>
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<tr>
<td></td>
<td>ref tons</td>
<td>316,582</td>
<td>315,764</td>
<td>288,808</td>
<td>283,795</td>
<td>290,234</td>
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<tr>
<td>HHV</td>
<td>btu/lb</td>
<td>5,419</td>
<td>5,440</td>
<td>5,430</td>
<td>5,399</td>
<td>5,329</td>
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<tr>
<td>Steam Production</td>
<td>klbs</td>
<td>2,389,295</td>
<td>2,367,788</td>
<td>2,171,508</td>
<td>2,143,755</td>
<td>2,196,619</td>
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<tr>
<td>Gross Power</td>
<td>Mwhrs</td>
<td>254,099</td>
<td>251,223</td>
<td>227,258</td>
<td>218,118</td>
<td>235,455</td>
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<tr>
<td></td>
<td>kwh/ref ton</td>
<td>802.6</td>
<td>795.6</td>
<td>786.9</td>
<td>768.6</td>
<td>811.3</td>
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<tr>
<td>Net Power</td>
<td>Mwhrs</td>
<td>222,320</td>
<td>219,491</td>
<td>197,378</td>
<td>190,067</td>
<td>206,189</td>
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<tr>
<td></td>
<td>kwh/ref ton</td>
<td>702.3</td>
<td>695.1</td>
<td>683.4</td>
<td>669.7</td>
<td>710.4</td>
</tr>
<tr>
<td>InPlant Power</td>
<td>Mwhrs</td>
<td>31,779</td>
<td>31,785</td>
<td>30,629</td>
<td>29,301</td>
<td>29,327</td>
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<tr>
<td></td>
<td>kwh/ref ton</td>
<td>100.4</td>
<td>100.7</td>
<td>106.1</td>
<td>103.2</td>
<td>101.0</td>
</tr>
<tr>
<td>Purchased Power</td>
<td>Mwhrs</td>
<td>0</td>
<td>53</td>
<td>749</td>
<td>1,250</td>
<td>61</td>
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<tr>
<td>Turbine Steam Rate</td>
<td>lbstm/kwh</td>
<td>9.40</td>
<td>9.43</td>
<td>9.56</td>
<td>9.83</td>
<td>9.33</td>
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<tr>
<td>Turbine Availability</td>
<td>% avail</td>
<td>100.0%</td>
<td>99.8%</td>
<td>97.2%</td>
<td>94.7%</td>
<td>99.7%</td>
</tr>
<tr>
<td></td>
<td>% online</td>
<td>100.0%</td>
<td>99.8%</td>
<td>97.1%</td>
<td>94.4%</td>
<td>99.7%</td>
</tr>
<tr>
<td>Boiler Availability</td>
<td>% avail</td>
<td>93.3%</td>
<td>93.8%</td>
<td>93.3%</td>
<td>93.6%</td>
<td>93.9%</td>
</tr>
<tr>
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<td>% online</td>
<td>89.2%</td>
<td>90.3%</td>
<td>85.8%</td>
<td>82.0%</td>
<td>86.0%</td>
</tr>
</tbody>
</table>

- 2009 and 2010 had turbine outages completed