SWANA 2010

Recycling Excellence Award Nomination

A Recycling System Bringing Unrivaled Excellence and Innovation

Tri-County Single-Stream Recycling Facility

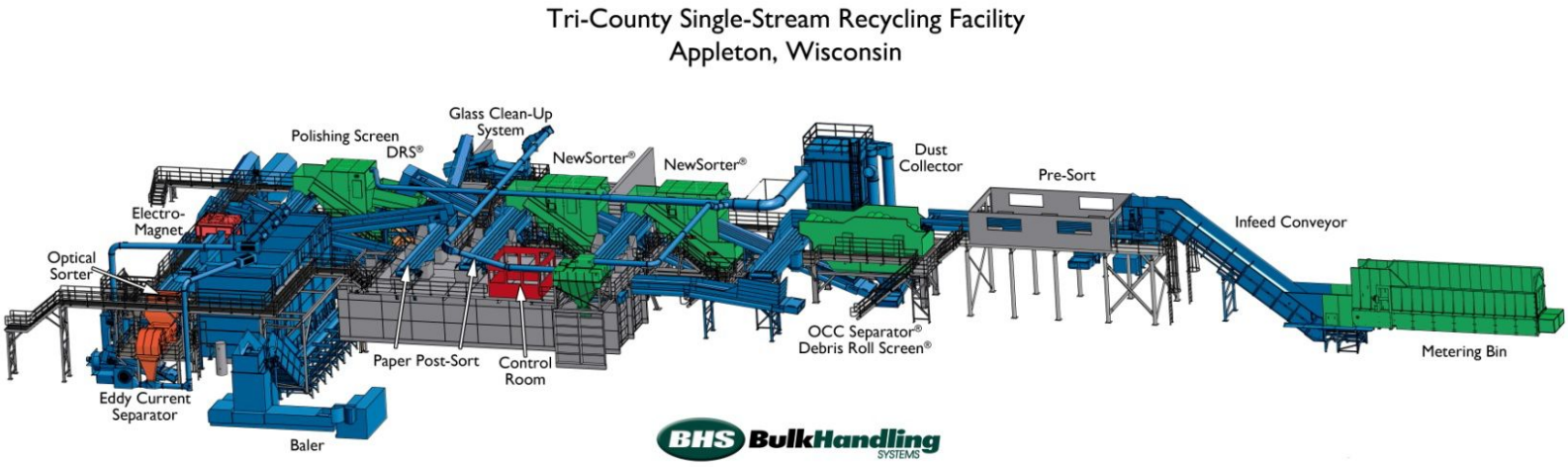
Brown, Outagamie & Winnebago Counties, Wisconsin

EXECUTIVE SUMMARY

This unique Single-Stream Recycling Facility was developed in 2009 by the Tri-County Partnership of Brown, Outagamie and Winnebago Counties, Wisconsin. State-of-the-art features make it one-of-a-kind in the United States. Focus on information and innovation promotes quantity and quality of recycling for 200,000 households in 65 communities and makes this a cutting-edge operation.

Most unique is public-sector ownership and operation of the system, within a predominately private-sector industry. This is among the largest and most innovative such single-stream systems, particularly with the best-practices offered. The model system presents over 20 innovations, half of which provide safety improvements, including: pioneering computerization to optimize operational efficiencies, high-speed Internet connectivity, easy-access floor pits, continuous handrails, and a low residual rate of 5 percent.

Within 9 months of startup, the uniqueness of this system was reported by 4 leading trade journals, including recognition as "MRF of the Month" in *Resource Recycling*. Over 1,200 individuals have already toured the facility, including the general public, elected and administrative officials, educators, regulators, and industry professionals. Visitors came from throughout the United States, and 15 international visitors were hosted from Canada, United Kingdom, Germany, and Finland.



Tri-County Single-Stream Recycling Facility

Brown, Outagamie & Winnebago Counties, Wisconsin

1. Design Of System

1.1 Innovative Program with Public-Sector Ownership & Operation:

Three Counties in northeastern Wisconsin—Brown, Outagamie and Winnebago—teamed up to build one of the largest and most innovative single-stream recycling facilities in the United States that is both publically-owned and publicly-operated. Operation of the 25-tons-per-hour facility began in July 2009, ultimately serving 65 communities and 200,000 households. The high production, state-of-the-art facility processes nearly 50,000 tons per year, equivalent to 3,000 semi-truck loads, and has a capacity for more than 80,000 tons per year by adding other public and private collection programs. The equipment layout is 1 football field long and 3 stories high, within a 50,000 square-foot building.

Recycling industry facilities, including material recovery facilities (MRFs), are largely under private-sector ownership and operation. Publically-owned MRFs are typically operated by private contractors. The fact that this facility is not only publically owned but also publically operated makes it unique, particularly with the innovative and state-of-the-art design and operation features it offers. Brown, Outagamie and Winnebago Counties owned and operated MRFs for 15 years under the former dual-stream program. Because of this historical success, public ownership and public operation of a single-stream system made sense for the next 15 years. Conversion to single stream needed consideration, because this was the preferred technology for the future, the existing dual-stream MRFs were aging, and upgrading with old dual-stream technology would have cost several million dollars. Historical experience also indicated that continued public-sector leadership made sense to help taxpayers by keeping market pricing competitive.

Moving from dual stream to single stream could take place, however, only with a different governmental framework. When the 3 Counties developed dual-stream recycling in the early 1990s, they did so as 3 entirely separate entities, with each County having its own MRF. Fifteen years later, recycling could remain a viable business only with further consolidation. Conversion to single stream would not be cost-effective or sustainable with multiple small County MRFs, but could be considered if one larger facility served all 3 Counties. The large investment, approaching $10 million and including the latest technologies needed for a long-term operation, could then be shared between the Counties.

Development of this Tri-County Single-Stream Recycling Facility was under evaluation by the 3 Counties during 2006 and 2007. By the fourth-quarter 2007, the Tri-County Partnership signed a 15-year agreement to consolidate recyclables processing at just one regional facility, utilizing modern single-stream technology. See Section 3 for more information on the intergovernmental arrangements that made this program possible.

Under the Tri-County Partnership, each of the Counties retains its own administrative structure as well as business relationships with both public-sector and private-sector customers. Through an intergovernmental agreement, Outagamie County would construct, own and operate the facility, and Brown and Winnebago Counties would contract for the processing services. The 3 Counties routinely collaborate and make consensus decisions on major issues. Outagamie County subcontracts with Valley Packaging Industries for labor to perform manual sorting and other duties, with key operation and maintenance tasks performed by County employees, including marketing of commodities.

The highly-automated system uses the latest in separation, optical and air technologies to capture nearly 100 percent of high-value commodities, with a final residual of just 5 percent. The system is designed with flexibility and adaptability to handle variables in the material stream.

The Tri-County Partnership retained Sloan Vazquez as its recycling consultant and contracted with Bulk Handling Systems (BHS) for system production, installation and startup.

Recognition of the excellence and innovation that the Tri-County Partnership developed with this facility is presented in a letter on page 20 from the Wisconsin Department of Natural Resources.

1.2 Basic Equipment:

1.2.1 Metering Bin:

The Metering Bin provides a consistent material flow into the system from the tip floor. With a Metering Bin, the facility is precisely regulated, maximizing both mechanical and manual sorting efficiency. Use of this equipment frees up loader operator time to perform other tasks. An oversized 6-cubic-yard bucket increases the loader efficiency.

1.2.2 Pre-Sort:

The pre-sort process increases the total system throughput, improves the efficiency of machinery separation, and increases the quality of final products. The system includes 8 pre-sort stations, with only 3-4 normally used. Staffing levels and locations are determined according to the feedstock being processed. Sorters remove trash and also large metals and large plastics, both of which are recycled.

1.2.3 OCC Separator® & Debris Roll Screen® Combination:

Cardboard is removed from the material stream with the OCC Separator®. Other materials fall through to a patented Debris Roll Screen® which separates glass from the stream. This unique combination of machines is vital for removing glass, resulting in cleaner commodities and less wear and tear on subsequent processing equipment. The Glass Cleanup System separates fiber from glass for maximum recovery of each commodity.

1.2.4 NewSorters®:

"Overs" from the Debris Roll Screen® are conveyed to two NewSorters® that separate newspaper from the rest of the stream. The newspaper is sent to a post-sort for cleanup prior to being baled.

1.2.5 Polishing Screen:

This screen is used to separate mixed paper from containers. Mixed paper floats on top as containers drop back through the bottom onto another conveyor. A Debris Roll Screen® before the Polishing Screen removes remaining glass.

1.2.6 Paper Post-Sort:

Quality control (QC) post-sort stations are included in the design to ensure optimum marketability of the recovered commodities. The system includes 14 QC stations, with only 8-10 normally used, depending upon material quality and product specifications.

1.2.7 Electro-Magnetic Separator:

Ferrous metals are taken out of the container material stream prior to further processing.

1.2.8 Optical Sorting:

The MultiSort® IR uses the infrared sensing of specific polymers coupled with air blasts to separate PET beverage containers from the container stream. At the manual QC station, any cross contamination or trash is sorted out and redirected to proper streams via conveyors and pneumatic systems.

A computer screen on the MultiSort® IR shows ejection rates *(photo, right)* according to each of the 22 light sensors along with data showing the luminosity on each channel *(middle sections show normalized data; bottom sections show raw data)*. The machine can be adjusted via computer controls on the sorter or through system controls.

1.2.9 Eddy Current Separator:

Aluminum is sorted utilizing an Eddy Current separator and conveyed to a bunker via pneumatic systems.

1.2.10 Control Systems:

Computer controls command the entire sorting system, providing both automatic and maintenance modes. Controls feature color touch screens with a menu-driven system for easy operating interface. Operators can view and control the entire system or individual motors. Controls are flexible to meet changing conditions and are customized to each customer's needs.

1.3 Innovative Features:

The Tri-County Single-Stream Recycling Facility was built from the ground up with many innovations, including easy-access floor pits for safe and convenient equipment maintenance, elevated walkways with special safety railings, and computerized networking systems for operations enhancement. These and other innovations make this a state-of-the-art facility. Model features maximize the production achieved for the dollar invested, make operations and maintenance safe and convenient, and maximize system reliability.

Innovative Safety Features

1.3.1 Continuous Handrails:

The system features continuous handrails throughout the plant for greater safety. Non-segmented handrails eliminate pinch points and provide smooth movements, decreasing the potential for stumbling at transition points including turns and stairs. In case of an emergency, continuous handrails would speed personnel movement. Aesthetically, the handrails create a streamlined and finished look to the system.

1.3.2 Platforms & Walkways:

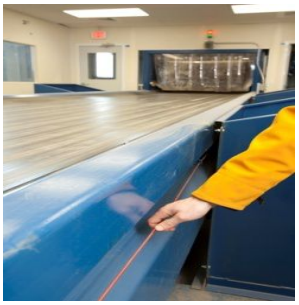
All upper levels are fully interconnected with walkways for safe and convenient access throughout the plant. There is one main point of entry to the upper levels which can then be accessed with the connected walkways and platforms without having to go down to the main floor and up again. Floors are non-slip diamond floor plate on all walkways and platforms. Structures are built to ASCE 7-05 code. Some walkways are 33 percent wider than standard walkways (48” instead of 36”).

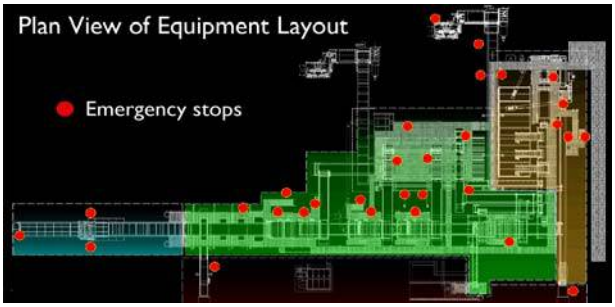
1.3.3 Auto-Close Gates:

Auto-close gates provide safe transitions between platforms and ladders.

1.3.4 Emergency Stops:

Numerous emergency stops, including 28 pull cords and buttons, are located throughout the system.





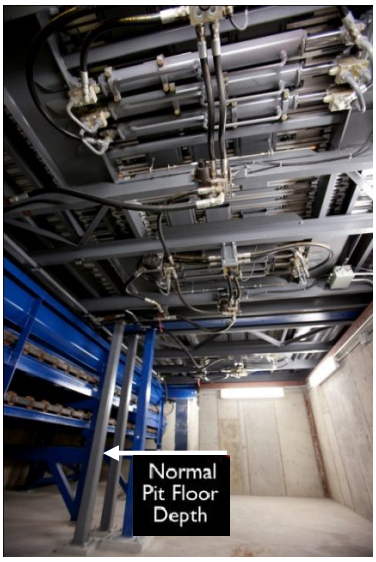
1.3.5 Equipment Access:

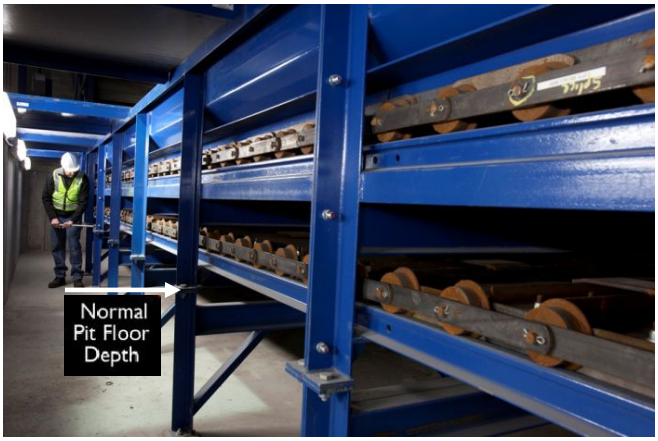
All equipment has safe and convenient access for maintenance.

Easy Opening Access for Metering Bin Clean Out

Screen Cleaning Access

Maintenance is made safer and easier at this facility than other MRFs, because both floor pits for the plant and baler infeeds are 6.5 feet deep rather than the industry-standard depth of 4 feet. Workers are able to "stand-up" rather than needing to "crawl around" for cleaning and maintenance activities. The left photo below shows easy "stand-up" access to walking-floor hydraulic systems. Both photos below show the much less convenient industry-standard normal pit depth of 4 feet.





1.3.6 Pre-Sort:

Sort conveyors are ergonomically designed to prevent repetitive strain injuries. The Pre-Sort Cabin is heated and air conditioned. Sorters have easy access to drop chutes attached to the conveyors.

1.3.7 Electrical Panel Safety:

MCCs allow for full viewing access and diagnostics on site, from outside the panel, while the system is running with no need to stop the system or open panels for exposure to electrical components.

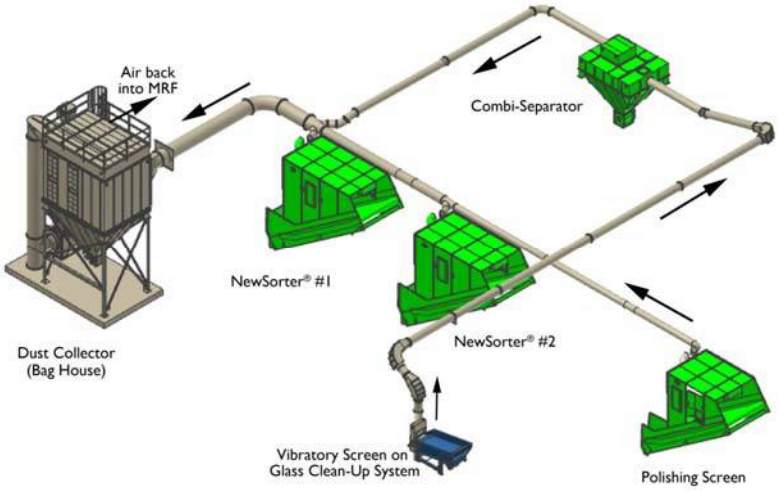
Other Innovative Features

In addition to safety innovations, other innovations provide fundamental enhancements in facility design and operation.

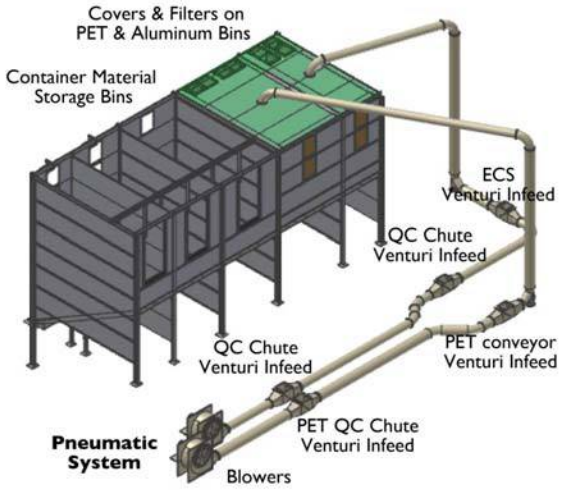
1.3.8 Dust Collection System:

Agitation of materials usually causes ambient dust throughout a MRF. A unique feature of the Tri-County facility is the dust collection system that dramatically reduces dust and simplifies dust removal. The two NewSorters® and the Polishing Screen have enclosed hoods with an air duct system (left schematic below) that transports the dust to the dust collector (right photo), located outside the building. The filtered warm air is returned into the plant for maximum heat recovery. Dust is collected and treated as residue.

In addition, dust covers and filters have been added to the PET and aluminum bins to control ambient dust carried by the pneumatic systems (right schematic below), optimizing the overall cleanliness of the plant.



Dust Collection System



Dust Covers and Filters

1.3.9 Optimized Recovery:

The highly-automated system uses the latest in separation, optical and air technologies for an extraordinary capture of high-value commodities and a final residual of just 5 percent. In addition to the already achieved high efficiency, aspirators are being installed to further increase fiber recovery and reduce residual. Two aspirators are being added to the Polishing Screen. Fiber from those aspirators feeds into a Rotary Air Separator on the mixed fiber stream.

There is already an aspirator on the Glass Cleanup System that pulls fiber from the glass and adds it to the mixed fiber stream for maximum fiber recovery.

On the residual quality control (QC) line, recovery was increased with the addition of PET and aluminum drop chutes to the pneumatic transfer system. The material is now conveyed directly to those bins. This is the first time multiple drop points were used within a pneumatic system. This addition has proven to be so successful that it is now a standard design feature on similar BHS systems.

1.3.10 Flexible & Robust System Design:

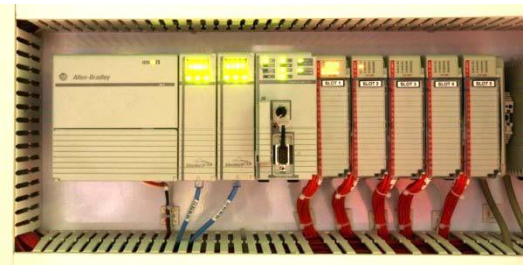
The facility was designed with flexibility to adapt to changes in the material stream while maximizing recovery and minimizing residual. The system allows for numerous ways to track, evaluate and recalibrate the system, optimizing recovery, increasing the operational efficiency of the equipment and allowing for alterations to the existing equipment based on changing material compositions. Operationally, the baling process produces high bale densities, such that plastics buyers pay a premium price for the high densities. The plant was designed with space to easily add a second baler and increase tonnage throughput. Equipment and conveyors are robust and heavy-duty, engineered and manufactured for long service life.

1.3.11 Control Systems:

MCC Panels

Controls are another important key to the effectiveness and performance of the Tri-County system. MCC panels allow for full access and diagnostics on site, from outside the panel, while the system is running. The PLCs (Programmable Logic Controllers) represent the "brains" of the entire system and are housed in the two MCC panels with the other components of the Control Systems.

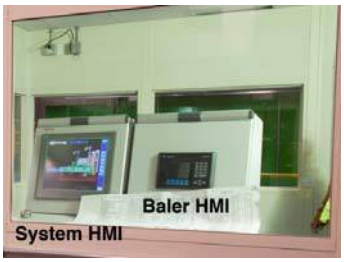
MCC Controls



Close-up of the PLC

These components include the VFDs (Variable Frequency Drives) for various pieces of equipment which enable operators to adjust the speed of the equipment from the HMI (Human Machine Interface) screens in the Control Room. Some of the VFDs can be adjusted through an HIM (Human Interface Module) on the drives themselves within the MCC.

The two main HMI screens are located in the upper-level Control Room, one for the System and another for the Baler. From these screens, the whole system can be monitored and adjusted when necessary.



In addition, local HMI screens are located at the Baler and at the Baler Infeed Conveyor to allow for control at the equipment in addition to the HMI in the Control Room. The HMI at the Baler Infeed Conveyor controls the bin hoists for easy selection of material to be baled.

Baler Infeed Conveyor HMI

The MultiSort® IR optical sorter has an informational screen on the machine with local computer and keyboard controls. The sorter data can be viewed remotely and the machine settings can be adjusted either at the machine or remotely for maximum efficiency.

With the high-speed Internet connection linked to the controls, technicians can log into the Control Systems and view the HMI screens from anywhere in the world to monitor, diagnose and troubleshoot the system. This maximizes the fine-tuning and refinement of the system, increasing productivity and minimizing downtime.

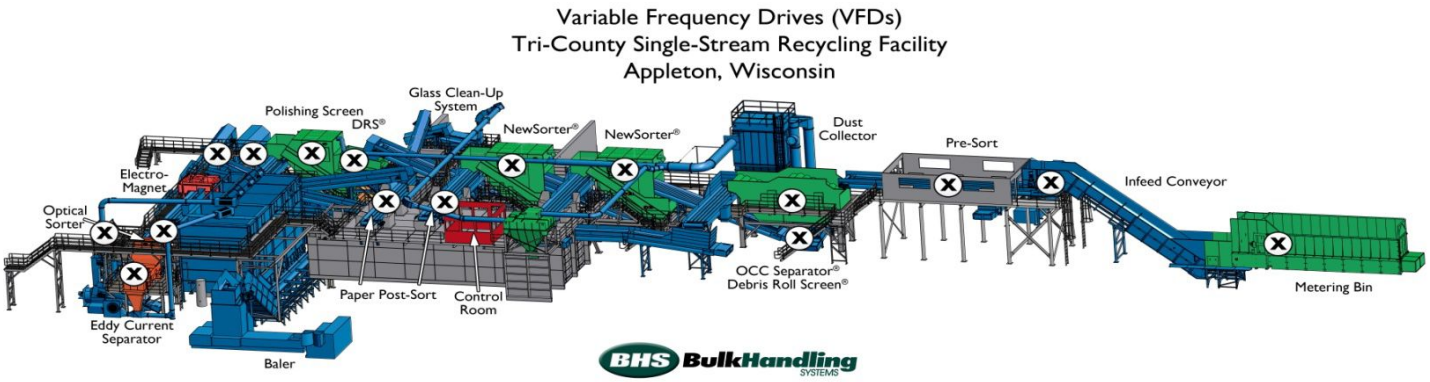
The controls have the following components and features:

- Start/stop touch screen control of each motor in maintenance mode
- One button system start/stop touch screen control in automatic mode
- Reset touch screen control of each of the ACVF drives
- Master control relay for isolation of control power for emergency stop

1.3.12 SCADA (Supervisory Control And Data Acquisition):
The Tri-County facility is designed to utilize a unique SCADA system to track system performance and maximize production. The SCADA system will gather data and report on system hours, infeed hours, variable frequency drive (VFD) information (*see schematic below for VFD locations)* (output, drive temperature, overload count & various codes), ejection rates on the optical sorter, and other system information in real time. This will enable operators to make quick adjustments to the system, increasing efficiency and reducing overall costs.

This SCADA system is highly customizable, with additional features available as needed for flexibility and expansion. Those options include adding or expanding the following:

- Overall Equipment Efficiency
- Downtime Tracking
- Event Logging
- Power Management
- Preventive Maintenance
- Dashboard Display
- Remote Access
- Remote Monitoring & Control



2. REGULATORY COMPLIANCE & BEYOND

The Tri-County recycling programs fully comply with State of Wisconsin regulatory requirements and actually go far beyond with voluntary programs. In addition, Tri-County representatives are frequently invited to participate in state-wide recycling-issue groups sponsored by the Wisconsin Governor and Department of Natural Resources. Tri-County representatives are currently active in two such groups, both involving the Tri-County Single-Stream Recycling Facility. One group is the Council on Recycling, appointed by the Governor to advise the Governor, Legislature and State Agencies on recycling matters. The Council on Recycling will tour and meet at the Tri-County facility during May 2010. The second is a Work Group currently studying future options for more cost-effective handling of recovered glass. Processing information from the Tri-County facility is being shared with the State to assist in completing these evaluations.

The State of Wisconsin operates a self-certification program for installations such as this material recovery facility (MRF). Outagamie County successfully performed this self certification for 2009. The facility is in full compliance with State requirements for recyclables processing. It has not been cited for any violations, and there are no non-compliance issues in existence.

Wisconsin Statutes prohibit a wide range of materials from being landfilled, including all of the materials recovered by this MRF. By developing this facility, recyclables processing is provided for 65 communities throughout the Tri-County service area. These 65 communities are thereby in compliance with the State's landfill ban for these materials.

Many of the landfill bans were legislated in 1990 and took effect in 1995, some were added over subsequent years, and yet others will take effect in 2010 (electronics) and 2011 (oil absorbents and filters). The Tri-County programs provide recycling services for all bans currently in effect and will also address the new bans taking effect this year and next year.

The broader solid waste programs of the 3 Counties also offer recycling services for the following materials banned from landfills: appliances (freon and non-freon), used oil, lead-acid batteries, yard materials, tires, and electronics (computers, monitors, televisions, fax machines, DVD and VCR players, printers, cell phones).

In addition to mandated recycling, the Tri-County programs offer numerous other recycling opportunities for residents, including: postage paid envelopes to recycle ink jet cartridges, compost bins for household products, clean wood, concrete, household batteries, antifreeze, scrap steel, propane tanks, fluorescent light bulbs, household hazardous waste, and prescription and over-the-counter medications and inhalers. A 24/7 drug drop box has been established at a local police station, with a second drop site being planned. Also, recycling bins are loaned to community groups for special events such as festivals, sporting events, fairs, picnics, and reunions.

The Tri-County Single-Stream Recycling Facility is rapidly growing in stature within the industry. In October 2009, this facility served as the host site for an annual meeting of key regional and central office recycling personnel of the Wisconsin Department of Natural Resources. This group also toured the Tri-County recycling facility and viewed the latest technology now offered by the public sector. The recycling program not only complies with all regulations but far exceeds regulations. It is looked to by State leaders for assistance in establishing new industry-wide directions for the future.

3. PLANNING

Intergovernmental business planning that ultimately allowed this Tri-County Single-Stream Recycling Facility to be developed goes back 10 years to the year 2000. As history, in the mid 1970s, Brown, Outagamie and Winnebago Counties each developed its own sanitary landfill. During the early 1990s, each developed its own MRF. By the late 1990s, in part because of private-sector market consolidations, the 3 Counties realized they also needed to make business changes.

After extensive studies by Executives, Board Members, and Directors from all 3 Counties and following nearly unanimous approval from 75 elected and administrative officials, a Tri-County intergovernmental agreement was signed in 2001. This agreement represented a pioneering 25-year business model for the 3 Counties. By 2003, the Counties enacted major consolidations, with the number of landfills reduced to 1 regional facility and the number of MRFs reduced from 3 to 2.

Over the next 4 years, the nationwide progression toward single-stream recycling took hold in the Midwest, including Wisconsin. In 2007, the Tri-County Partnership serving a total population of 500,000 signed an additional 15-year regional agreement to consolidate from 2 MRFs to 1. Under the agreement, this Tri-County Single-Stream Recycling Facility was developed at Outagamie County's 450-acre solid waste and recycling complex, centrally located within the 3-County service area. Active facility planning occurred during 2008, and construction began later that same year.

The nearly 10 years of business plan transition that ultimately resulted in development of this Tri-County Single-Stream Recycling Facility is quite remarkable, considering the number of counties and communities involved. Also important is the fact that this is one of the largest publically-owned and publically-operated such facilities in the United States, within a predominately private-sector industry.

Without consolidations created by the Tri-County regionalization agreement of 2001 and the new governmental business model it represented, the Brown-Outagamie-Winnebago County Partnership would not have implemented single-stream recycling. Market forces favoring single-stream recycling would have progressively weakened the former dual-stream program, ultimately to the point of having its future in doubt.

The new governmental business plan under which the 3 Counties operate provides the benefits of economy-of-scale facilities with associated cost efficiencies. The solid waste and recycling business model of the 3 Counties is similar to that of the private sector, which utilizes a smaller number of larger facilities to serve large regional areas. This public-sector commitment to the industry will ensure that both public-sector and private-sector customers relying upon these services will receive them long into the future, with the cost efficiencies and stability afforded by the program.

Besides bringing a new generation of recycling to northeastern Wisconsin, this project also allowed expansion of a recycling program in northern Michigan. Outagamie County conducted procurement in 2008 to find a buyer for its existing dual-stream equipment. Emmet County, Michigan, purchased the entire plant of equipment. The equipment was dismantled and shipped in 25 semi-truck loads, then refurbished and re-assembled in a new 23,000 square-foot facility. Quadrupling the capacity of the existing system, this expansion will provide dual-stream recycling for 4 Michigan counties and acceptance of many new types of materials, including film bags, milk and juice cartons, and #1-7 plastics. Startup will occur in April 2010.

4. Performance, Economics & Cost-Effectiveness

4.1 Implementation Schedule:

The project was constructed and placed into operation ahead of schedule. The target date for going on-line was July 1, 2009. Initial startup actually occurred in May, and by mid-June the plant was fully operational.

4.2 Capital Budget:

A capital budget of $9,900,000 was established with approval from the 3 County Boards; however, the project was actually constructed for under $9,800,000. This cost included the entire system of equipment, a 16,000 square-foot building expansion, and modifications to the existing building. Also included was a $200,000 addition not originally planned that provided live walking floors below the OCC and newspaper bunkers.

4.3 System Performance:

System performance meets and exceeds expectations. Several important performance metrics, including those most fundamental to cost efficiency, exceed industry norms and specifications established for this facility.

4.3.1 Production Tonnage:

The system was planned for a production rate of 25 tons per hour. This production rate has been met and exceeded, with some days running at 26, 27, or 28 tons per hour. As operational experience is gained, computer networking systems are fully utilized and mechanical and managerial optimization occurs, consistent production rates exceeding 25 tons per hour are fully expected.

4.3.2 Production Run Time:

Maximizing daily production run time is important to achieve monthly and annual production goals. An average run time of 90 percent is established as the goal for this facility. It often runs more than 90 percent of the time and sometimes 95 percent and higher.

4.3.3 Manual Sorting & Personnel Required:

Although much of the sorting is performed mechanically, manual sorting is also required for the purpose of quality control. Based on industry experience, the equipment request for proposals (RFP) stated that at least 1 ton per hour should be processed for each plant operations worker employed. The facility can actually process 26-27 tons per hour with 24 or fewer operations workers, so the project specifications are exceeded.

Outagamie County subcontracts with Valley Packaging Industries (VPI) for sorting and other labor. When beginning single-stream operations in mid-2009, VPI experienced significant staff turnover due to the fast-paced work environment. Although staff turnover still occurs, the operation is stable, and VPI's service is successful.

4.3.4 Commodity Processing:

The facility processes the commodities received beyond expectations, even though the material composition is somewhat different than expected. The exact material composition was not known before facility design, because a significant portion of the recycling stream was delivered directly to a paper mill in Brown County and not fully characterized.

4.3.4.1 OCC Processed:

OCC was originally projected as 7 percent of the total stream, whereas, it thus far has been running at 14 percent, or 100 percent higher than planned.

The OCC disc screen handles the exceptionally heavy load and effectively performs separation. In fact, the OCC produced is so clean that a quality control person is not needed at the QC station.

100 Percent More OCC Than Expected

4.3.4.2 Glass Processed:

Although glass was originally projected as 14 percent of the total stream, it has thus far averaged 20 percent, or 42 percent higher than planned. This heavier glass load is effectively removed from the system, with locations for removal being at the bottom of the OCC and polishing screens.

42 Percent More Glass Than Expected

Not a single truck load of paper fiber has been rejected due to concern about glass content.

4.3.5 Residual Produced:

Throughout the single-stream recycling industry, residual rates are typically in the range of 10 to 20 percent, with some being 25 percent and higher. In contrast, the residual rate at the Tri-County facility is a very low 5 percent.

5 Percent Residual

This low residual rate of 5 percent results from three factors:

- Effective education throughout the 65 communities
- Effective sorting and processing by the MRF
- Placement of a quality control person on the final residual conveyor

Industry professionals from throughout the United States have stated that our raw material stream is "the cleanest they have seen." This speaks very highly of the education programs within the 3 Counties and dedication of the local recycling community.

4.3.6 System Innovations and Enhancements:

The various system innovations and enhancements described in Section 1 have proven to be of great value in yielding high quality plant performance. The plant functions efficiently and sorts materials effectively. Both the mechanical and manual sorting functions meet and exceed performance specifications. System networking and optimizing as described below will ensure over the long term that the plant produces a high-tonnage throughput, operates consistently and reliably, and produces the quality end products required by markets.

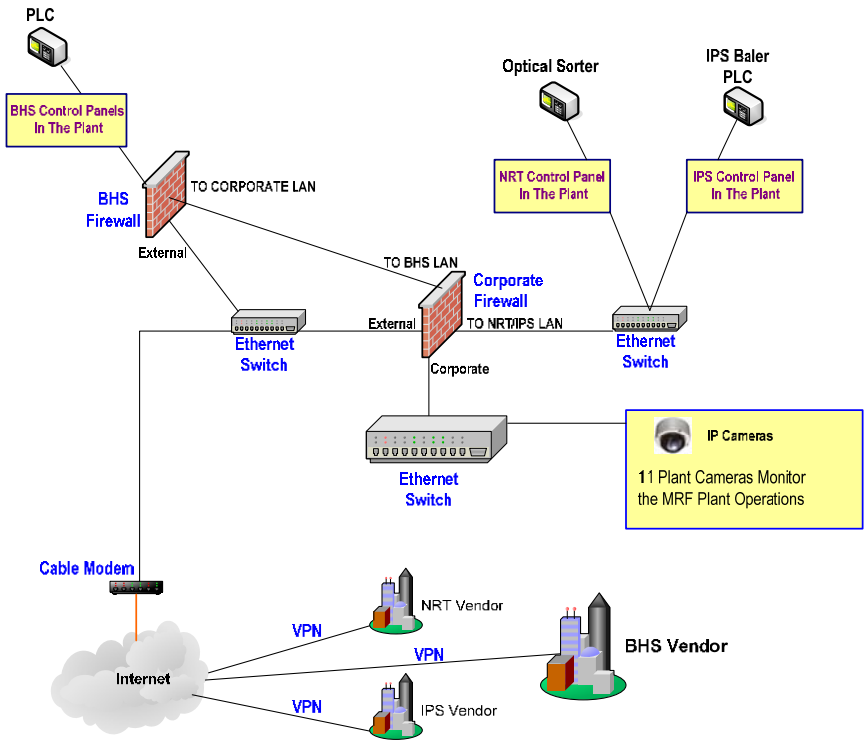
Local paper mills that purchased our fiber since inception of the original dual-stream MRF continue now to purchase the quality paper bales produced by this single-stream MRF.

4.4 System Networking & Optimizing:

One of the most fundamental innovations is the computerized networking system traveling throughout the plant and linked via high-speed Internet systems to the headquarters of each major equipment supplier. This network will be key to long-term system performance and optimizing. With these networking capabilities, facility performance will most certainly meet and exceed industry norms.

Equipment suppliers from Oregon (BHS), Tennessee (NRT) and Georgia (IPS) obtain high-speed access to their respective Internet Protocol (IP) addresses on our local area network (LAN) through encrypted communication over an Internet virtual private network (VPN). Firewalls provide security protection when vendors access their IP addresses on the facility LAN. Two Programmable Logic Controllers (PLCs), one for the entire BHS system and the other for the IPS baler, perform the primary system controls. The PLCs handle analog or digital (discrete) data from equipment located throughout the plant. Software by GE Fanuc, called iFix, is used to operate the Supervisory Control and Data Acquisition (SCADA) system.

The central SCADA system communicates with the remote PLCs and thereby collects select real-time data on a continuous basis. Communications between the SCADA system and PLCs are via high-speed Ethernet protocol using CAT 5 cables. The collected data is sent to another software program called iHistorian, which holds the data similar to a database.



4.5 Recycling Collection Benefits:

The performance, economics and cost-effectiveness of recycling relate in large part to the curbside collection system that is upstream of the MRF. Large costs are expended on collection, and significant savings can be achieved if efficiencies are gained. Although conversion of curbside collection systems throughout the Tri-County service area is still underway, one major city has already made their conversion and is reporting its financial gains. Page 24 is a news article about the City of Oshkosh, located in Winnebago County. Oshkosh reports large financial savings as well as dramatically increased recycling with single-stream.

5. UTILIZATION OF EQUIPMENT/SYSTEMS & TECHNOLOGY

This facility is a carefully-planned integration of state-of-the-art equipment/systems and technology with unrivaled creative and innovative qualities. Over 20 innovations are packaged along with conventional design features to create a total system design from the ground up that maximizes personnel safety, processing efficiency and product quality. Nine months of full-scale operation show that all performance goals have been met and many have been exceeded. Product quality is consistently high, and product sales are strong.

In addition to maximizing plant safety and cleanliness, special effort was made throughout planning and design to achieve the following:

- A system design ensuring maximum high-value commodities and minimum residual
- Equipment that produces optimum sorting results reliability over the long term
- Processing equipment and conveyors that are heavy-duty and robust in design for long service life
- A system of equipment that can be maintained easily with minimal down time to maximize operating hours and productivity
- Maximum production quantity and quality for the capital and operating dollars and resources invested

Full-scale operation demonstrates that the facility meets these objectives. The plant efficiently separates the materials for which it was designed, including both the mechanical and manual sorting functions. The plant incorporates many design features that will provide long-term operational flexibility. One such feature is the numerous extra manual sorting and quality control stations that will allow adaptations to any long-term changes in raw-material composition, product-quality specifications, or materials to be recovered and recycled. The plant is also designed so baling can be performed from either of two locations, at the baler infeed conveyor or the upper level control room. This feature provides valuable flexibility in managing personnel assignments, training personnel and ensuring maximum production reliability. Furthermore, the plant is planned for later addition of a second baler, which would maximize hourly tonnage production and minimize shift hours required.

Going forward, the challenge and opportunity will be to fully utilize the facility's capabilities and maximize its day-to-day production and reliability. The cutting-edge design uses computer technology to continually collect and report information about the operation, allowing management personnel to analyze the information and take corrective measures or set new directions, all to maximize performance and reliability. The following computer systems will provide the tools needed to optimally use the facility's capabilities:

- A Mainsaver software package will provide information on a daily basis regarding specific preventive maintenance tasks required for all equipment throughout the facility.
- The Supervisory Control and Data Acquisition (SCADA) computerized management system will monitor numerous pieces of equipment throughout the plant, including its current, temperature, overload and fault conditions, and provide "real-time" and "historical/trend" information to supervisory and management personnel. With early warnings of potential equipment breakdown, preventive maintenance can be conducted during "off-hours" so daily and weekly production is not compromised. Through this tracking, equipment longevity will also be maximized. Examples of information retrieved from the SCADA system will be posted on our website at:

  www.single-stream.us/DataSCADA

  SCADA systems are commonplace in some industrial sectors, but not yet recycling facilities.

- The SCADA system will provide operational efficiency information for the present and previous days, so production standards are met daily and, if not, so corrective measures can be taken. This tracking will ensure ongoing production meeting the maximum quantity and quality standards and allow continual fine-tuning and improvement as new information is learned about the system and product. Operational course adjustments, both short-term and long-term, will ensure maximum results for the dollars and resources invested.
- High-speed Internet connectivity will allow authorized companies rapid access into our local area network (LAN) for updating of their software and systems to the latest industry standards and meeting the unique needs of this facility.

Central Hub of SCADA & Telecommunication Systems
Including Firewalls, Ethernet Switches & VPN Appliance

6. WORKER HEALTH & SAFETY

Provisions for the health and safety of workers and visitors in the plant were paramount in the planning and design of this facility. Daily operations also give foremost attention to continuing safety and health. Monthly safety meetings are held with workers and supervisory personnel to review potential concerns and ensure that continuing improvements are implemented. No major injuries have occurred at the facility.

Various safety and health features were designed into the facility as described in Section 1. The following is a summary of the 10 most important and innovative features.

6.1 Continuous Handrails: *(see Section 1.3.1)*

- Non-segmented handrails provide smooth daily movements throughout plant
- Emergency egress movements can proceed without interruption
- This is a rare or non-existent feature at other facilities , but universal throughout this plant

Auto-Close Gate *Continuous Handrails*

6.2 Auto-Close Gates: *(see Section 1.3.3)*

- Provided at all applicable locations
- Ensures safe use of ladders from platforms

6.3 Safe Platforms & Walkways: *(see Section 1.3.2)*

- Project specifications required all upper levels to be interconnected for easy & safe access
- Some walkways are 33 percent wider than standard
- Operations, maintenance & tours are all made safer

6.4 Emergency Stops: *(see Section 1.3.4)*

- Both cords & buttons are provided
- 28 locations throughout plant

6.5 Equipment Guarding: *(see Section 1.3.5)*

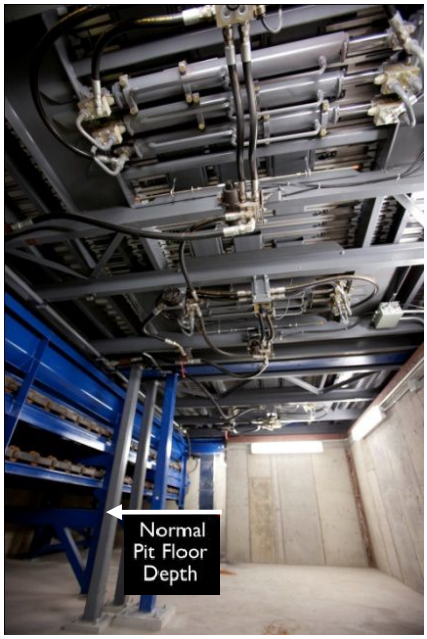
- Easy-to-remove guarding is provided at metering bin
- Provides protection from moving machinery
- Allows easy access for maintenance

6.6 Equipment Access: (*see Section 1.3.5)*

- Ladders provided to all access points on disc screens & other machines
- Easy access provides for safe & reliable maintenance

6.7 Safe-Access Floor Pits: *(see Section 1.3.5)*

- The industry-standard depth for pits is 4 feet, requiring workers to "crawl" in tight spaces
- However, this facility provides two major pits 6.5 feet deep, allowing workers to "stand upright"
- Cleaning and preventive & corrective maintenance are performed more safely & efficiently
- This is rare or non-existent at other facilities, but fundamental at this plant

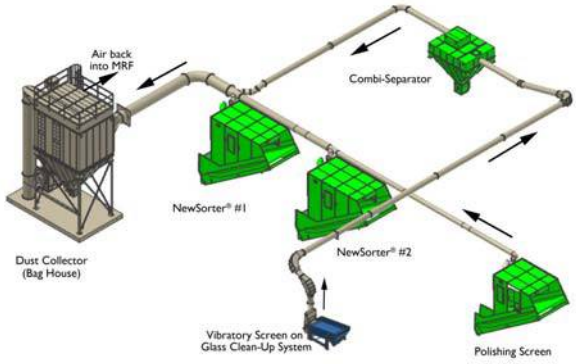


6.8 Safe Electrical Panels: *(see Sections 1.3.7 and 1.3.11)*

- Diagnostics access is available without opening panel doors for exposure to electrical systems
- Unnecessary electrical hazards are avoided

6.9 Dust Collection System: *(see Section 1.3.8)*

- Dust collection hoods are provided on both newspaper disc screens & polishing screen
- Collected air is transported via ducts to outside dust collector (bag house)
- Filtered air is returned to plant for energy recovery
- This is rare or non-existent at other facilities, but fundamental at this plant from the beginning



6.10 Dust Mitigation System: *(see Section 1.3.8)*

- Hoods & filters on PET & aluminum storage bins mitigate dust from pneumatic systems
- This is rare or non-existent at other facilities, but was added to this plant

7. PUBLIC ACCEPTANCE & INFORMATION EXCHANGE

The final important measure of this Tri-County facility success is whether it receives public acceptance and whether information is effectively disseminated to communities and trade professionals, so they recognize the new generation it represents. As demonstrated below, this project has achieved those measures of success, and beyond expectations.

Therefore, the facility not only processes recyclables effectively but also garners recognition throughout the State and Nation needed to make it a long-term success. One important note of recognition came from the Wisconsin Department of Natural Resources in a letter included as page 20.

7.1 Grand Opening, Open House & Ongoing Tours:

Wisconsin Department of Natural Resources Officials Explain Facility to Television Media

Over 750 Individuals Attended Grand Opening & Open House

More than 1,200 Individuals Have Toured The Facility

The Grand Opening was held on July 13, 2009 for invited dignitaries and guests. Over 200 people attended from throughout Wisconsin, and many traveled from around the United States. Representatives attended from municipalities, businesses, regulatory agencies, community organizations and academia.

A Vendor Exhibition was part of the Grand Opening. Three exhibition halls were provided, in the tipping floor room, bale storage room and main equipment/processing room. Exhibitors included project consultants, equipment companies and contractors, as well as companies selling collection equipment. The vendor event was a huge success in illustrating not only the processing aspect of recycling but also collection.

A public Open House was held July 15, with a large turnout of over 550 people. Attendees were enthusiastic about the "new era of recycling brought with single-stream". An additional 490 individuals have toured the facility since July.

Many visitors are from the Tri-County service area; however, others have come from elsewhere around Wisconsin, across the United States, and Canada, Germany, United Kingdom and Finland. The Tri-County Single-Stream Recycling Facility has become a showcase for interested guests from throughout the State and Nation, as well as foreign countries. Over 1,200 visitors have already toured the facility.

7.2 Trade Journal Recognition:

Within just 9 months, the creative and innovative qualities of this program were reported by 4 leading national trade journals, including recognition as "MRF of the Month" in *Resource Recycling* and feature articles in *Waste & Recycling News, MSW Management* and *Waste Age* (see pages 21-23).

7.3 Story Featured on Local Television:

All 4 local television stations have reported multiple stories on the Tri-County Single-Stream Recycling Facility. The latest report was on April 7 by WFRV Channel 5 from Green Bay, Wisconsin. Please see our website to view this 3-minute news report (the ".wmv" file is 8 MB):

www.single-stream.us/TelevisionWFRV

7.4 Story Featured on Local Radio:

A local radio station, WHBY 1150, recently ran a 5-part story over a one-week period (February 15-19) on our comprehensive programs. The story highlighted various innovated aspects of the programs, with much attention given to the Tri-County Single-Stream Recycling Facility. Please see our website to listen to the 10-minute radio program recording (the ".mp3" file is 12 MB):

www.single-stream.us/RadioWHBY

7.5 Education & Information Exchange:

After developing the special design features and innovations to make this a state-of-the-art MRF, the next goal was to educate communities and the public about single-stream recycling. The education process was launched during the Grand Opening and Open House and continues daily.

A new website, **www.single-stream.us**, was created for this facility that will promote local education and broader information exchange with other professionals. A "virtual tour" can be taken by viewing our website 3-dimensional views, photographs and videos. This sharing of information and collaborating on experiences will further advance the state-of-practice for single-stream recycling. Such exchanges are already occurring between this plant and recycling professionals around the United States and Europe. Please see our website to view the following productions (3D views and photos are 1 minute each [the ".wmv" files are 25 MB each] and video is 6 minutes [the ".wmv" file is 120 MB]) illustrating the plant and its operations:

www.single-stream.us/3DBHS
www.single-stream.us/PhotosBHS
www.single-stream.us/VideoBHS

7.6 Excellence of the Local Recycling Community:

The 500,000 people managing recyclables in their 200,000 households throughout the Tri-County service area deserve huge credit for sending a very clean stream of materials to this MRF. Education programs carried out in the 65 municipalities are very effective with the recycling community, resulting in a 5 percent residual rate that is remarkably low compared to typical industry-wide conditions.

7.7 Summary:

The excellence and innovation of this Tri-County system have already been recognized by 40 national and international recycling professionals touring the facility; 65 local communities receiving state-of-the-art service; 20 regulatory agency officials visiting the facility; 7 local television, radio and newspaper news outlets; and 4 national trade journals.

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Jim Doyle, Governor
Matthew J. Frank, Secretary

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Box 7921
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FAX 608-267-3579
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April 15, 2010

Mr. Philip P. Stecker, P.E., BCEE
Director of Solid Waste
Outagamie County
1419 Holland Road
Appleton, WI 54911

SUBJECT: Recognition of the Tri-County Single Stream Material Recycling Facility

Dear Mr. Stecker:

I would like to thank you and the other Brown, Outagamie and Winnebago County leaders for your vision, planning, construction and operation of the Tri-County Single Stream Material Recycling Facility (Tri-County MRF), located in Outagamie County. I am also offering support for recognition of this facility by the Solid Waste Association of North America (SWANA) for their recycling excellence award. This facility certainly exemplifies excellence in the recycling business, not only in Wisconsin, but nationally.

The Tri-County MRF represents much that we are proud of in Wisconsin. It is a state-of-the-art, single-stream MRF that has utilized best practices in the business to efficiently increase the amount of recycling within the three county area. The Tri-County MRF is the largest publicly owned MRF in the country and the second largest MRF in our state. It represents a terrific example for communities across the state and beyond, of collaboration among county and local governments to achieve greater efficiencies in combined recycling operations, and provides enhanced service to residents. Because of it's design and operation, and the collaboration that has occurred between the three counties in it's planning, the Tri-County MRF has attracted over 1,200 visitors not only from your service area but from elsewhere around Wisconsin, the United States and other countries.

We offer our congratulations and thanks to the counties for their progressive and collaborative work to increase recycling in northeastern Wisconsin. Again, I support national recognition of this MRF and wish you well in your submittal.

Sincerely,

Allen K. Shea
Administrator
Division of Air & Waste Management
Wisconsin Department of Natural Resources

cc: Ann Coakley, WA/5
Len Polczinski - NER

WASTE & RECYCLING NEWS

Crain Crain's News Source for Environmental Management July 20, 2009

RECYCLING

Excerpt from full article
Photos added by Outagamie County

Suzanne Bangert
Deputy Administrator
Air & Waste Division
WI Dept. of Natural Resources

Single-stream MRF launches in Wis.

A Wisconsin regional single-stream materials recovery facility has officially commenced operations, drawing praise from one of state's congressional representatives.

Rep. Dr. Steve Kagen
U.S. House of Representatives

Outagamie County, Wis., will operate the Tri-County Single-Stream Recycling plant in Appleton, Wis., which held its grand opening, July 13. The $9.9 million facility, which will employ 25, will serve 60 Wisconsin communities and 200,000 households in Outagamie, Brown and Winnebago counties. The counties are combining their recycling programs.

"The Tri-County Single-Stream Recycling facility reflects our traditional Wisconsin value of being responsible and saving for the future," said Rep. Dr. Steve Kagen, D-Wis. "It creates jobs. It stimulates our local economy and demonstrates how, by working together as a community, we will build a better future for all of us in northeast Wisconsin."

Initially, it will process 50,000 tons of recyclables per year, but has an 80,000 ton-per-year capacity.

Grand Opening July 13, 2009
Attended by over 200 Dignitaries & Guests

MRF of the Month

Tri-County Single-Stream Recycling Facility

echnical Specifications*

Tri-County Single-Stream Recycling Facility

Location:
Appleton, Wisconsin

Start-up date:
July 2009

Number of processing lines:
One (single-stream)

Throughput:
Single-stream:
25 tons per hour

Estimated tons of material to be processed:
Designed with an 80,000-ton capacity, MRF will initally process 50,000 tons annually

Residue rate:
Projected to be less than three percent

The brand spanking new Tri-County Single-Stream Recycling (TCSSR) facility, located in Appleton, Wisconsin, is a byproduct of the newly-combined recycling programs of Brown, Outagamie and Winnebago counties. The largest public-sector single-stream MRF in the Badger State and one of the larger publicly owned and operated single-stream plants in the U.S., the TCSSR presently serves some 60 communities (over 200,000 households) within the three counties, handling both residential and commercial recyclables.

"We have brought a new era of recycling to Wisconsin," says Philip Stecker, Outagamie County's director of solid waste. "This facility allows us to serve some 500,000 residents in Northeastern Wisconsin; that's 10 percent of the state's total population."

Operated by Outagamie County, the $9.9 million regional facility includes a state-of-the-art single-stream processing system designed, engineered, manufactured and installed by Bulk Handling Systems. Outfitted with the latest in screening, optical and air-separation technologies, the system was created by BHS to process an average of 25 tons per hour, all while generating minimal residual material.

According to company representatives, the single-stream system employs the use of integrated processes that emphasize mechanization, and the extraction of recoverable materials, all on the first pass. As a result, this technology allows the TCSSR to experience a high-value material capture rate of nearly 100 percent, and produce an end-product with extremely low residue values (projected to be less than three percent). In addition to including a large old corrugated cardboard separator and steel disc debris roll screen, in order to remove virtually all glass at the front end (currently, glass content is approximately 25 percent of the overall material flow), the processing system also includes a unique filtration system that provides a cleaner, dust-free working environment for the plant's 20 total employees.

MSW Management
The Journal for Municipal Solid Waste Professionals

By Don Talend **March-April 2010** *Excerpt from full article*

Public Facility Segregates High-Value Stock

Even a publicly owned MRF can attempt to realize the revenue potential of higher-priced commodities that entered the facility as recyclables. Such is the case in Appleton, WI, where Outagamie County operates the $9.9 million, 50,000-square-foot Tri-County Single-Stream Recycling (SSR) facility, one of the largest publicly owned MRFs in the country.

Phil Stecker, P.E., BCEE, director of solid waste for Outagamie County, points out that the Bulk Handling Systems (BHS)–designed SSR processes about 95% of the incoming material into saleable commodities. Side-loading refuse haulers from Outagamie County and transfer trucks from Brown and Winnebago counties back into the tipping area via large roll-up doors and dispense their loads. A wheel loader performs three functions on the tipping-area piles, Stecker explains. One is simply creating more floor space by consolidating the small piles into larger ones. “Another function is to do some blending of the loads,” Stecker says. “One load might be a certain kind of material like paper; another load might be a lot of container material. The plant functions much better if we have a well-blended material.”

The main conveyor first transports the material to a presort station staffed by up to five employees who pull out fugitive material. The enclosed heated and air-conditioned station is located 16 feet above the main facility floor and equipped with six drop chutes that feed rolloff containers below.

The remaining “clean” stream of recyclables is then conveyed to the automated portion of the SSR, which cost $7.3 million to construct and start up. A BHS/NRT MultiSort optical sorter separates polyethylene terephthalate (PET) plastics from the stream and a Dings Co. Electro Magnet and BHS Eddy Current Separator remove metals. “The heart of the plant is the disc screens—we have a series of four,” says Stecker. A BHS OCC Separator is for old corrugated cardboard (OCC). BHS NewSorter No. 1 and No. 2 disc screens take out newsprint. A BHS Polishing Screen does the final separation of small paper fiber from containers.

Waste Age

By Michael Fickes October 2009

Single-Minded

Excerpt from full article

A Tri-County Single-Stream MRF

Three counties in Wisconsin recently joined forces to build a high throughput, state-of-the-art single-stream MRF to process recycling materials. The new facility opened in July. All three counties manage solid waste collection, disposal and recycling operations as enterprise funds responsible for supporting themselves. Officials hope eventually to accept materials brought in by other public and private collection operations.

“We all ran our own MRFs from 1993 to 2001,” says Philip P. Stecker, Outagamie's director of solid waste. “Then we signed tri-county agreements to work together on recycling. We started with dual-stream recycling. By 2007, we realized we would have to switch to single-stream collections, which residents prefer, to prevent private competitors offering single stream from cutting into our market.”

Other communities and private haulers that have asked about bringing their recyclables to the new MRF further encourage Stecker. “We haven't moved on this yet,” he says. “But we're interested. We're presently running a nine-hour shift. If we attract more tonnage, we'll have to run a longer shift or perhaps add a shift, which would create more jobs.”

the NORTHWESTERN oshkosh, wi .com

BY DOUG ZELLMER • OF THE NORTHWESTERN • MARCH 24, 2010

Blue carts jump-start recycling

Kevin Marx makes sure no recycling material spilling out of the semi trailer before delivering them from Sunnyview Recycling Facility to Outagamie County Recycling Facility in Appleton

Oshkosh officials said not only has single-stream recycling saved the city more than $459,000, residents have dramatically increased the amount of waste they are recycling since the blue carts arrived six months ago.

The city began distributing 64 and 96 gallon blue carts on wheels late last summer for the city's single stream recycling effort that co-mingles recyclables replacing weekly pick-ups of alternating materials. The program formally began Oct. 1.

Jennifer Semrau, recycling specialist for Winnebago County, said single stream recycling has collected 22 percent more recyclables or 316 tons more from city of Oshkosh residents through February of this year compared to the same period a year ago. "We have been very happy with the increase in the amount of recyclables collected, which is one of our primary goals in going to single stream," Semrau said. "Studies have shown that people will recycle more products if you give them more capacity to recycle, which the blue bins provide. People tend to recycle more if the bins are big enough."

Oshkosh resident Norm Luft said initially he was a little skeptical about the blue recyclable carts city residents started to use when the single stream recycling program began the first week of October. "I was more concerned about the winter and how the elderly would get their carts out there," said Luft, who lives on North Lark Street. "Otherwise, I think it has been working out quite well." Luft said he hasn't had problems with the blue carts, which are picked up every two weeks by one-person automated side loading recycling trucks. The city owns three of the trucks at about $215,000 each. "I don't find any problems wheeling the cart around even when it's full," Luft said.

Fewer workers are also needed to pick up single stream recyclables for a savings and the city is also saving on equipment rental and tipping fees at the Winnebago County landfill.

Oshkosh Finance Director Peggy Steeno said city taxpayers were levied $937,951 in 2009 to support the recycling effort, but it has dropped to $478,200 in the 2010 taxes for a savings of more than $459,000. She said of the $459,000, the city is projected to have a savings of more than $163,000 in wages and fringe benefits this year with fewer sanitation workers needed with single stream recycling. Since the city owns its recycling trucks there's a savings by not having to rent equipment as was the case in the past. Steeno said the city also saves $18.40 a ton in tipping fees by recycling instead of having the items buried in the landfill.

Co-mingled recyclables are dropped off at the Winnebago County transfer station on County Trunk Y across the county landfill. The recyclables are then transported to a new single stream-recycling center in Appleton where the materials are separated, baled and then sold to businesses that include paper mills and metal buyers.

Semrau said the amount of residual trash that isn't deemed suitable for recycling from city of Oshkosh residents is less than 5 percent of the total single stream tonnage collected, mainly incorrect plastics in the recyclables, including plastic toys and unapproved bottles. She said educating the public on recycling has brought more awareness to reduce the amount of residual trash. "Looking at single stream processing facilities around the nation the 5 percent or less residual rate is very low," she said.