



WASTE MANAGEMENT & ENVIRONMENTAL RESOURCES CONSULTING

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July 10, 2002

Mr. Richard Andre
Minnesota Office of Environmental Assistance
520 Lafayette Road North, Second Floor
St. Paul, MN 55155-4100

RE: Phase 1 Report On Department of Administration's Resource Recovery Operation

Dear Mr. Andre:

Per the OEA's request, I have completed the Phase 1 operation assessment of the Department of Administration's recycling program. This program, including both a collection component and a materials consolidation component, is operated by the Resource Recovery Office (RRO) within the Department of Administration. The primary purpose of conducting this assessment was to identify areas where an improvement in labor efficiencies could be made allowing the RRO to continue providing the current level of service now afforded to State office buildings within the St. Paul area at a reduced cost. This letter report provides my assessment along with recommendations for operational efficiency improvements.

INTRODUCTION

As a result of state budget reductions, all State of Minnesota departments were asked to make adjustments in their operating budgets. As part of the budget adjustments, the RRO's FY03 budget has been significantly reduced. To implement the reductions the RRO recommended the discontinuing of collection of mixed containers from all locations served by RRO and fibers from some locations served by RRO.

The Department has entered into discussions with the OEA to work with the RRO in exploring ways to reinstate full recycling services for all existing locations served by the RRO while meeting existing budget constraints. In so much as I am serving as project manager for a materials recovery facility (MRF) optimization assessment for the OEA, and that the Phase 1 assessment of the RRO's recycling program needed to be completed within a one-week period, the OEA requested my assistance in this endeavor. Additionally, I recently provided a recycling program assessment for a private sector client, independent of the OEA MRF optimization project, which had an almost identical collection system as the RRO's program as well as many similar characteristics in the operation of the RRO's recycling center.

It was agreed that the assessment needed to be completed in two phases. Phase 1, the focus of this report, was to complete an immediate general assessment in order to provide enough short-term efficiency improvements to allow for the continuation of the RRO's collection of both fibers and mixed containers from all locations currently served by the RRO within the modified budget



restrictions. Phase 2, to be completed by August 30, 2002, will provide a more detailed assessment of the RRO's program to identify long-term efficiency improvements and associated changes that could be made to the program.

To assist in organizing the discussion of operations, the information presented below is outlined in three general operational areas – materials collection, materials preparation, and delivery to markets. Each of these areas was examined to determine where short-term efficiencies could be attained. Below is a brief discussion of the current program operations.

MATERIALS COLLECTION

The RRO currently collects materials from approximately 35 locations. Thirty of these buildings are located in St. Paul with two located in Roseville and one each in Oak Park Heights, Bayport, and Stillwater. Though there are a number of other departments and buildings throughout the metro area that participate in the RRO's recycling program, the RRO does not collect these materials or handle them through their recycling center. In these other locations, the program focuses on fiber only (no mixed containers) and the vendor for the fiber (Rock-Tenn) services these locations directly.

The collection routes begin at 6:00 a.m. and may continue until 2:30 p.m. However, depending on what departments and locations need servicing, and what quantities of materials they have ready for pickup, the collections often are completed earlier than this. The collection crew typically consists of two individuals. The truck used for collection, along with a driver, is provided by the Department of Administration's Plant Management Division for a flat rate of \$40/hour for both the truck and driver. The second individual on the collection routes is an RRO employee. On Thursday, June 27th, I spent approximately 1½ hours riding with the collection crew on a couple of their service calls.

Typically, the various departments or buildings are provided with the following three types of bins for recyclables: 12-ft³ plastic hampers on wheels for paper, 33-ft³ metal cages on wheels for cardboard, and 60 gallon carts on wheels for the mix of cans, glass and plastic. Some locations call in advance if they need servicing while others are picked up on a regular schedule regardless of their actual need for pick-up service. The collection crew is provided with a route list for that day and the truck is loaded with empty recycling bins. They proceed to the first location on their list, leave replacement recycling bins and load the ones that contain the recyclables on the truck. They then write on the route list how many hampers, cages and containers they picked up at that location. In a number of cases, several bins at a location may be full, others may only be half full and still others may be empty. Some locations also have vertical balers that are used to bale cardboard originating from that location. It is the crew's responsibility to operate the baler and when a full bale is ready they will load it on the truck. It should be noted that while some buildings have the recycling bins located on the loading dock for quicker service, others require that the collection crew go to other locations within the building to retrieve the full bins and to leave replacements. This can add a considerable amount of time to servicing these buildings.

If the collection crew has room on the truck and enough replacement bins, they may go to the next location and change those out. Most of the time the truck is full and they go back to the recycling center to unload the serviced bins and put replacement bins on the truck for the next location.

MATERIALS PREPARATION

Once the serviced bins are delivered to the recycling center they are taken to a scale where every bin is weighed and the date, location, type of material and weight are recorded. After recording this information a variety of activities can take place depending on the type of material and the condition of the material.

Cardboard brought to the recycling center is baled in one of two vertical balers. The bales are either moved directly into a tractor-trailer for delivery to Rock-Tenn or stored along a wall until a tractor-trailer is available.

Some locations, such as Revenue, generate fibers that are confidential in nature. These hampers are taken over to an automatic lift-dump where they are dumped in a Gaylord. When the Gaylord is full a piece of cardboard is placed on top and the Gaylord is sealed. Once Rock-Tenn picks up this material they provide a guarantee of confidential treatment of this material. Upon arriving at Rock-Tenn's facility, the Gaylords are opened and the contents are immediately dumped into a mixing vat.

Fibers that are not confidential in nature are taken to an area near the sorting conveyor. Using an automatic lift-dump, the hampers are dumped at one end of the sorting conveyor. A sorter stationed at the conveyor near this point will sort the material into several categories. Materials designated for a second sort (explained below) are tossed onto a conveyor aligned perpendicular to the main conveyor and directly in front of the first sort station. This material runs off the end of this smaller conveyor into a metal cage on wheels. The sorter will also pull out any contaminants (i.e., film plastic, plastic report covers, broken three-ring binders, etc.) and toss these off to the side in a trash container. Additionally, the sorter will pull out any cardboard and toss that to their other side in a separate container to be processed when full. The material not sorted will run off the end of the conveyor onto a second perpendicular conveyor, which will carry the material to another metal cage on wheels. If the paper being sorted is to be marketed as a mixed grade, very little or no additional sorting will be done. There may be a sorter stationed further down the line (either on the main conveyor or the final conveyor) to pull out any contaminants not caught earlier in the process. If the paper is going to be marketed as a higher grade paper, there will be a second, and in some cases a third, sorter stationed down the line to pick out the majority of lower grade paper that would preclude the sorted material from being marketed as a higher grade. This material will be sorted into a bin to be processed at a later time. Once a metal cage is full it is loaded onto the staged tractor-trailer or put off to the side until a trailer is available.

In some cases, the paper brought to the recycling center is shredded or in small pieces. As this material is fluffy and it is difficult to obtain high densities, it is taken over to the second vertical baler and baled. This second baler can also be used for baling cardboard and, if the markets warrant it, aluminum.

Some fibers come in to the facility in the form of books, manuals and other types of documents that have bindings. The majority of this material comes from various state legal departments and includes such items as outdated rule books. In many cases the paper itself is recyclable but the bindings are not, due to glues, metal strips or plastic strips used in the bindings. These materials are designated for a second sort.

The second sort is done manually and the RRO has use of individuals in the Sentencing-to-Service (STS) program. The individuals in this program have gone through the criminal justice system for

minor violations and as part of their sentence are assigned to do community service. Depending on the time of year, how many individuals are in the program and the number of work projects needing their services, the recycling facility may be provided with this labor one day per week or several days per week. Currently, the facility is getting this labor approximately once a week.

The second sort involves manually removing the bindings and other contaminants from this material in order to retrieve the paper. This may involve hand ripping the pages out of books and manuals or using a paper cutter to remove the bindings.

The STS labor also provides another service to the facility. Boxed materials are sometimes sent to the facility. These may be in the form of documents where a printing error has occurred, old unused forms that are no longer used, or old, non-confidential records of various kinds that are no longer needed. Very often these materials will contain papers, which cannot be recycled or recycled only in small quantities blended in with other types of paper. The STS labor will hand sort through these boxes, separating this material out and in the process upgrading the quality of the boxed paper for recycling.

The last category of materials handled by the recycling facility is the mixed container stream. This includes steel cans, aluminum cans, glass containers, PET plastic containers and HDPE plastic containers. The carts containing these materials are wheeled over to the container room. A sorting table and can crusher located in the sorting room can be used to hand separate the materials into metal, glass and plastic streams. This practice has generally been stopped as the materials are delivered to the Waste Management, Inc. (WM) single-stream MRF for processing. The current procedure for handling this material involves dumping the mixed containers into 1-yd³ plastic hampers for delivery to the MRF.

DELIVERY TO MARKETS

The fiber market utilized by the RRO is Rock-Tenn. The grades of material sold to Rock-Tenn include cardboard, ledger paper and a mixed stock, which has a lower value than the ledger.

Rock-Tenn stages a tractor-trailer at one of the two loading docks at the recycling center. Prepared fibers in Gaylords, bales and metal cages are loaded onto the tractor-trailer by RRO staff and once a full load is obtained a call is placed to Rock-Tenn to pick it up. Rock-Tenn will pick up the material, usually the same day or within a 24-hour period, and leave an empty tractor-trailer at the facility. On average, one tractor-trailer per day is loaded and picked up.

The mixed containers, as note previously, are delivered to the WM MRF which is located 14 miles round trip from the RRO's facility. The same truck and driver supplied by Plant Management Division is used to make this delivery run. On average, three trips per week are made to the WM MRF.

It should also be noted that none of the revenues received from the sale of materials goes back to the RRO. State statute (MN Statute 115A.15, Subd. 6) requires that all revenues resulting from the sale of recyclable commodities must be deposited in the general fund.

TIME AND MOTION DATA

With the quick turn around required on the Phase 1 assessment, there was insufficient time to perform time and motion observations on the various activities involved in the collection of materials and the operation of the recycling facility. However, the facility manager has conducted such studies in the

past on most, though not all, of the activities involved in the operation of the system. I sat down with the facility manager and reviewed the data he had put together previously. It appeared reasonable and is summarized in Table 1 on the next page. Data was converted into a per week basis for consistency and ease of comparison.

The time it takes to actually complete a route can vary considerably depending on number of call-ins that day, number of bins at each location, weather conditions and traffic conditions. As a result, there is no information available regarding the average length of time it takes to complete one route. The actual number of trips made per day is not kept track of, although the number of buildings serviced per day is recorded. Some buildings generate small amounts, so two or three locations may be serviced on one trip. Others require one trip for their materials alone and during certain times of the year some buildings may require two or three service trips per day. Based on the logs that I reviewed and making assumptions about how many trips were required for that day, the average number of trips per day is roughly ten. Based on the hours during the week the truck is in use and accounting for its use to deliver mixed containers to the WM MRF, it appears to take approximately 37 minutes per route, not including the time it takes to unload the full containers at the facility. With a gross estimation of 50 trips per week, it appears to take approximately 31 hours per week for running the routes.

Unloading of the trucks once they arrive back at the facility takes, on average, 6 hours per week (1.2 hours per day). The heart of RRO's facility operation is fiber management once the material arrives at the facility. As noted previously, several operations can take place depending on the type of paper handled. For example, the handling of confidential paper takes approximately 10 to 12.5 hours per week (2 to 2.5 hours per day). This includes dumping the confidential paper into Gaylords and sealing the Gaylords.

Table 1
Average Time Required For Performing Various Functions At RRO's Recycling Facility

Functions		Hours Per Week
Collection		
Running the Collection Routes ¹		31.0 hours/week.
Unloading Route Truck		6.0 hours/week
Fiber Handling		
Confidential Paper Mgmt.		10.0 to 12.5 hours/week
Cardboard Mgmt.		7.5 hours/week
Sorting of Fiber		
	Sorting into grades ²	21.0 hours/week
	Sorting into mixed only ³	7.0 hours/week
Shipping ⁴		9.0 hours/week
Mixed Container Handling		
Sorting and Crushing		15.0 hours/week
Sorting Only		7.5 hours/week
Shipping		3.5 hours/week

¹ No data actually available on this. Estimates are based on the number of trips/day and other data.

² Based on an average of 84 hampers/day @ 3 minutes/hamper.

³ Based on an average of 84 hampers/day @ 1 minute/hamper.

⁴ Based on 20 minutes to unload empties and 1.5 hours to load full cages, gaylords and bales.

The cardboard operation, involving taking the material to the vertical baler and baling the cardboard, takes approximately 7.5 hours per week (1.5 hours per day).

The hampers containing the other fibers are taken to the sorting conveyor where a quality sort is carried out. Contaminants are pulled out as well as second sort materials. The remaining paper can be sorted into two grades (ledger and mixed) or run off the end of the conveyor as a mixed grade only. The average time for sorting the fibers is 21.0 hours per week (4.2 hours per day) if the material is grade sorted or 7.0 hours per week (1.4 hours per day) if it all goes out as mixed.

As the fiber products are picked up by Rock-Tenn there is no actual time expended for delivery to markets. However, once an empty tractor-trailer is staged at the facility it takes time to unload the empty metal cages from the trailer and load full cages, Gaylords and bales onto the truck. The average time to perform this operation is approximately 9.0 hours per week (1.8 hours per day).

A small amount of the material handled at the facility (approximately 2%) is mixed containers (steel and aluminum cans, glass, plastic containers). Once the 60-gallon carts containing this material are unloaded from the collection truck, they are taken to the container room where a sorting procedure can be performed to separate the mixed materials into separate streams and crush the cans if so desired. Recently, however, the operations staff has done away with the sorting procedure and now the 60-gallon carts are emptied into 1-yd³ plastic hampers. The unloading and sorting procedure averages approximately 15.0 hours per week (3.0 hours per day). The unloading of mixed containers directly into the 1-yd³ plastic hampers takes approximately 7.5 hours per week (1.5 hours per day).

Once 12 of the 1-yd³ plastic hampers are full, they are loaded onto the collection truck and delivered to the WM MRF where they are manually dumped into a bunker. It takes approximately 3.5 hours per week to load the hampers on the truck, deliver the materials to the WM MRF, dump the materials, drive back to the recycling facility, and unload the empty hampers.

The second sort on materials such as books and other bound documents is performed by individuals from the STS program. On occasion facility staff will do this second sort to clean up backlogs but this is not routine. The labor the facility receives from the STS program is free and requires little supervision time from operations staff.

IDENTIFICATION OF EFFICIENCY IMPROVEMENTS

Historically, the recycling facility has been operated with the goal of maximizing revenue. To achieve this goal the facility has put much emphasis on sorting fiber into separate grades so they can get a higher price for quality ledger paper. In talking with staff at the facility, they could not give me an average price per ton they receive on different grades of paper. Based on the data they did have available, they receive \$37.22 per ton for all their fibers on average. The mixed containers do not generate revenue, but the facility is not charged by WM for dumping the material at the MRF.

The decision to stop the collection of mixed containers in all buildings, and fibers in some buildings, was based more on a time constraint rather than a cost constraint. By cutting out the mixed containers, which are approximately 2% of the materials handled, and stopping service to some low generating facilities that are geographically further away from the RRO facility, the program could concentrate on upgrading the quality of the fiber they market and maximize revenue.

If, however, maximizing the recycling service were the goal, maximizing operational efficiencies might allow the Department to provide the same or increased levels of service to recycling program participants. With this shift in focus, several operational changes have been identified and discussed which will result in increased operational efficiencies and allow for the continuation of the program at current levels. These identified changes include the following:

Alteration of Protocol for Servicing Customers

The current collection system is a combination of on-call servicing of customers and regularly scheduled pickups. In many cases the collection crew finds that at any given location the hampers are less than two-thirds full or several of the containers are empty at the time of pick up. An effort should be made to work with customers to ensure that when hampers are picked up they are all utilized and all at least 80% full. In addition, all locations should be put on an on-call basis so that when the crews arrive at a facility they are maximizing the materials they are collecting. Though the quality of the materials in the hampers is generally quite high (i.e., low levels of contamination) continuing efforts should be made to work with customers to reduce contaminants even further. This will result in quicker and more efficient sorting of this material. One suggestion is to target those facilities and departments where the higher levels of contamination are occurring for more educational outreach.

Discontinue Weighing of Every Hamper, Cart and Cage Picked-up On the Collection Routes

Historically, operational staff has weighed every bin (e.g., hampers, carts and cages) delivered to the facility. The RRO has over 9 years of data on the weights of materials delivered to the facility. Rock-Tenn provides the facility with weigh tickets on every load. It was estimated by RRO staff that by eliminating the weighing function approximately 24 hours of time per month could be saved (approximately 5.5 hours/week). Based on an average hourly rate of \$19.90/hour¹, including benefits, this is equivalent to an estimated cost savings of \$109.45/week. With the amount of weight data available to the RRO, an average weight per bin can be calculated and counting bins coming from each agency would be all that's required. Counting bins from each agency is being done now on the daily route sheets. An estimate on an agency-by-agency basis should suffice for determining if an agency has achieved the 60% by weight recycling goal established under MN Statute 115A.15, Subd. 9.

If the RRO wants to verify the tonnage information and see how accurate the estimations are, they could always do spot checks on bins from each agency once a month or once a quarter. If they want to take into account potential seasonal fluctuations in some materials recycled they can calculate this as well using the data that's been gathered previously. For example, if the number of beverage containers recycled is greater in summer months and less in winter months, specific seasonal averages can be calculated using the already existing weight data.

Do Negative Sort on Second Sort Materials

There are times when hampers will come in that are predominantly materials targeted for the second sort (i.e., books, bound documents, etc.). In these cases, rather than sorting these materials out on the conveyor sort line, sort out the contaminants and marketable fibers and let the second sort materials fall off the end of the conveyor into a cage. This negative sort concept is based on the principle that rather than sorting out the majority of materials, sort out the materials that are in a lesser amount. This can save time in the sorting process although arguably the timesavings realized may be insignificant.

¹This is based on the combined annual salaries and benefits for 1 supervisor, 1 lead worker and 3 laborers. The salaries were reported at \$151,522.62 with another \$55,396.80 for benefits for a total of \$206,919.42. Though the supervisor's salary is greater than the others he is a working supervisor who spends most of his time working side by side with the other operations staff.

Market All Paper as a Mixed Grade

Rather than sorting paper into ledger grade and mixed grade categories, sort out only the contaminants, cardboard, and second sort items with the remaining fiber stream all going into the mixed grade. Based on the estimates provided by the facility manager, this could save up to 14 hours per week in sorting which could then be used for other activities at the facility. This 14 hours/week is equivalent to an estimated \$278.60/week. The down side to this is the price received for the fibers would be less since everything is marketed at a lower grade. However, in consideration of the overall economics, it is more prudent to economize the cost of operations.

Put Cans, Glass and Plastic Bottles in 3-yd³ Containers and Arrange for a Service Provider to Pick Them Up

Currently, the mixed containers are loaded on the truck and delivered to the WM MRF. This accounts for approximately 3.5 hours of time per week. If arrangements can be made to have this material picked up at no cost by the current service provider or at very little cost by the current or another service provider, this will free up the truck and driver to either maintain the current level of service or expand it. Another option would be to reduce the truck and driver usage by 3.5 hours per week. At a \$40 per hour charge for the truck and driver, this would reduce the weekly operational cost by \$140 per week. This cost reduction is not guaranteed, however, due to a variety of operational variables.

It should be noted that any estimated cost savings identified in the above efficiency improvements are for comparative purposes only. It is premature to discuss any reductions in operations personnel. At this time the current complement of facility staff appears necessary for operation of the facility.

CONCLUSIONS AND RECOMMENDATIONS

Many of the solutions discussed above appear to be promising. By implementing several of these ideas, sufficient savings in time should be realized to allow the RRO to continue collection of both fibers and mixed containers from all locations and, possibly, expand these services. Actual cost savings resulting from implementation of most of these ideas is harder to quantify as the hours saved by most of these suggestions will not necessarily result in the ability to reduce the operations total labor force. Some workdays or workweeks may be slower than others but, on average, there appears to be enough work activity to keep the existing complement of operational personnel busy.

The efficiency improvements recommended to be implemented immediately are:

- Discontinue having recycling center staff deliver mixed containers to the WM MRF. Instead, arrange for a service provider to pick these up at the RRO recycling facility for MRF delivery;
- Implement a call-in pickup service for all customers currently serviced by the RRO;
- Work with these customers in stressing that hampers will not be picked up until they are all at least 80% filled to capacity;

- Where feasible, provide a bigger container or more containers to a customer for the aggregation of their recyclables so that service trips are less frequent;
- Discontinue the practice of weighing every hamper, cage and cart delivered to the facility and use average weights per hamper, cage and cart to determine quantities. Periodic spot checks of containers (monthly or quarterly) would be a good idea to verify weights have not changed; and
- Explore with Rock-Tenn the possibility of marketing all the fiber as a mixed paper grade. This will save significant time in the sorting function and allow the continuation of the existing program. Differentiation can always be implemented again if the situation changes.

These operational changes should save sufficient time and human resources to allow for the continuation of the current program. In my discussions with the facility manager, he has no doubt that these changes could result in continuation of the current program.

In closing, I want to mention the tremendous amount of cooperation and participation of the staff at the RRO. They have been extremely forthcoming and helpful in resolving this situation. Most of the recommendations listed above were initially scoped out by them and my job was made much easier in the process.

In Phase 2 of this project, a more in-depth look at the operation will be performed, as well as exploring alternative strategies for a self-sustaining, cost-effective recycling service to state agencies. In the meantime, if you have any questions regarding this report, please feel free to contact me at (952) 544-6005.

Sincerely,



Tim L. Goodman
President & Principal Consultant
Tim Goodman & Associates