METRO

A G E N D A

MEETING: **REGIONAL SOLID WASTE ADVISORY COMMITTEE**
DATE: Monday, October 21, 2002
TIME: 3:00 p.m. – 4:50 p.m.
PLACE: Room 370A & B, Metro Regional Center, 600 NE Grand Avenue, Portland

5 mins. **I.** **Call to Order and Announcements** **Susan McLain**

Announcements

Responses to Issues from the September 16th Meeting

Approval of Minutes

10 mins. **II.** **REM Director's Update** **Terry Petersen**

30 mins. **III.** **Report on October 2001 Code Revisions for Local Transfer Stations** **Terry Petersen**

Last October, Metro regulations dealing with local transfer stations were significantly revised to advance several policy objectives such as waste reduction and local access to services. Revisions included establishment of service areas, removal of any limitations on the amount of dry waste received by a station, and increases in the wet waste limitations. A report on the performance of the Code changes was also required (see attachment "A"). This agenda item is an opportunity to summarize the report (staff report and consultant's report) for SWAC, convey Council reaction to the report, and solicit SWAC comments -- particularly on key recommendations and policy issues.

60 mins. **IV.** **Recyclables Contamination and Loss** **Lee Barrett/Steve Apotheker**

A study on commingled commercial recyclables processing was recently issued by Metro (see attachment "B"). The report finds that as commingled collection of commercial recyclables has increased, residual generated by processors and end-users has also increased. This agenda item is intended to: 1) summarize and discuss the report; and 2) launch a SWAC subcommittee to identify and recommend strategies and practices in the Metro region to reduce contamination and loss of material collected for recycling.

5 mins. **V.** **Other Business and Adjourn** **Susan McLain**

All times listed on this agenda are approximate. Items may not be considered in the exact order listed.

Chair: Councilor Susan McLain (797-1553)
Staff: Janet Matthews (797-1826)

Alternate Chair: Councilor Bill Atherton (797-1887)
Committee Clerk: Michele Adams (797-1649)

Executive Summary

Solid Waste Advisory Committee
September 16, 2002

I. Call to Order and Announcements — **Susan McLain**

- Councilor McLain mentioned that she had enjoyed seeing many SWAC members at the Association of Oregon Recyclers (AOR) conference. Mr. Walker congratulated Ms. Storz for receiving a Special Board Award at AOR.
- Approval of Minutes: Mr. Irvine motioned to move the summary; Mr. Kampfer seconded the motion; none opposed; Executive Summary passed as read.

II. REM Director's Update — **Terry Petersen**

- Metro has a new and improved website. In the future we plan to post SWAC agendas and also reports that SWAC members may be interested in viewing. In the longer term future, REM plans to post searchable Metro Recycling Information Center information on the web and also add business functions such as paying transfer station bills online.
- REM's Budget Advisory Committee (BAC) reports to the Executive Officer, unlike SWAC, which reports to the Council. The BAC has reviewed REM's reserve account policies and will review Metro's role in handling the region's old electronic waste.

III. October Report: Preliminary Information — **Terry Petersen**

REM will deliver a report to the Metro Council in October related to transfer station regulation changes made last year. The 3 main changes were: removal of caps on dry waste; creation of service areas; and, wet waste caps based on a facility's service area. The 5 main policies that were intended to be addressed by these changes are: increasing dry waste recovery; improving local hauler access; reducing need for rate regulation; reducing vehicle miles traveled (VMTs); and, increasing competition to benefit ratepayers. This October Report is the first periodic review that was called for every two years, and will address how these changes are working and any recommended changes if needed.

Mr. Petersen then shared his 8 main observations to date in preparing this report. First, the forecasting and waste flow model is sound and the assumptions are reasonable. Second, there is no evidence of significant overall reduction of VMTs. Third, there has been some increase in dry waste recovery as more waste has likely been diverted from Washington County landfills. Fourth, the service area concept is useful in the decision making process and it is important to know how much waste is within each service area. Fifth, Council may want to state multiple criteria when setting the terms of a franchise, one of those criteria being VMTs. There is a need to reaffirm with Council whether they desire to consider franchises under a formula or balanced criteria system. Sixth, the goal is to keep the system simple; Metro strives to use a minimum of regulation to accomplish policy goals. Seven, over the past 5 or 10 years, they system has changed. There no longer seems to be a need for additional transfer capacity and haulers don't seem to be having the problems they were in accessing facilities. Eight, small haulers have reaffirmed that Metro transfer stations play an important role in the overall system and serve as an effective means of controlling prices without direct rate regulation.

SWAC members had few questions, but several did express interest in having a chance to review the report. Mr. Petersen and Councilor McLain agreed that SWAC members would have a chance to review the report and it would be brought back to SWAC again in October. In addition, Mr. Petersen said that if anyone had questions or disagreed with his observations, to please give him a call.

IV. Metro Regulation of Dredge Material — **Terry Petersen**

Mr. Petersen began by explaining that disposal options for dredging material outside of the traditional solid waste system are becoming scarce. In anticipation of increasing amounts of

these materials entering the regional solid waste system, Metro has been reviewing applicable roles and regulations. At this point it is difficult to estimate how much material there will be and what waste classifications it will fall into. However, Metro Code and state law are clear that much of this material would be classified as solid waste. As such it is subject to Metro fees and taxes, but it is likely that the lower clean-up fee would apply. Although the clean-up fee of $3.50 is low *and probably not a prohibitive cost, dredge material* in the past has been disposed of for free. Mr. Petersen questioned whether Metro should exempt dredge materials under Superfund status, or if it is more important to spread the tax base out as much as possible. He noted that if Metro were to assess the clean-up fee on this material, it could possibly offer significant incentive to find useful applications. Mr. Irvine asked if the Metro forecast included dredge material. Mr. Petersen answered that REM forecasts generally look to past trends, and if anything, dredge material could compensate for the decline of petroleum-contaminated soil (PCS). In response to a question by Ms. Chaplen, he added that right now, REM is trying to educate those involved about the solid waste system, and will then see what assistance Metro can offer. Ms. Gilliland added that DEQ is reviewing the classification of dredge material and is also putting together a list of interested parties. Councilor McLain summarized by saying that Metro is trying to get ahead of this issue by determining what rules and regulations apply so any necessary Code changes can be made.

VII. Other Business and Adjourn **Susan McLain**

There was no further business.

Documents to be kept with the record of the meeting:

Agenda Item IV:

1. Staff Report: Discussion of Metro's role regarding the disposal of dredge material (included in agenda packet)

mca
M:\rem\od\projects\SWAC\MINUTES\2002\091602.DOC

REPORT ON THE PERFORMANCE OF THE OCTOBER 2001 METRO CODE REVISIONS FOR LOCAL TRANSFER STATIONS

Date: October 8, 2002 Presented by: Terry Petersen

I. PURPOSE

The purpose of this report is to identify changes to the solid waste system one year after Council established transfer station service areas and revised local transfer station regulations and franchises. In general, staff finds the Code changes of last October have yielded satisfactory results in achieving Council policy objectives. No Code changes to the service areas in general or local transfer stations in particular appear warranted at this time. There are a few secondary issues identified in this report that Council may wish to clarify, either through discussion in a public forum or formal legislative action.

II. BACKGROUND

On October 25, 2001, the Metro Council adopted Ordinance No. 01-916C, which amended the Metro Code to establish a new transfer station regulatory framework based on Service Areas, including new provisions for Local Transfer Stations.

The key changes were to:

1. Establish Service Areas for all solid waste transfer stations.
2. Define a Service Area in terms of geographic locale around a facility based on distance to the next closest facility.
3. Define a Local Transfer Station as a transfer station that serves the demand for wet waste disposal generated in a single Service Area.
4. Calculate the demand[1] for disposal of putrescible waste generated within each Service Area.
5. Limit the "cap" on wet waste for a Local Transfer Station to the amount of demand estimated for the Service Area.
6. Require a Local Transfer Station to serve the local haulers within their Service Area.
7. Remove the "cap" on dry waste, and raise the required recovery rate from 25% to 30%.

[1] For this analysis, "demand" is defined as the total tons of discards generated within a service area. Actual hauling and delivery patterns are not factored into the demand calculation.

8. Revise the three existing Local Transfer Station Franchises to be consistent with the new provisions and increase their wet waste tonnage authorizations from 50,000 outgoing tons/year to 65,000 incoming tons/year for each facility.

The purpose of this report is to address the requirements established in Metro Code Section 5.01.131(b) which requires the Director of the Regional Environmental Management Department (REM) to provide a written report to the Metro Council that includes:

1. A quantitative review of the demand for disposal of Putrescible Waste within all Service Areas.

2. A review of the performance of the obligations and limits of the new Code provisions for Local Transfer Stations in achieving the policies stated by Council in adopting them.

3. A recommendation on any revisions of Service Area boundaries, changes in the need for disposal capacity within any Service Area, or changes of obligations or limits imposed on any Local Transfer Stations.

The REM Department retained a consultant[2] to assist in an analysis of the first two reporting requirements, the consultant report is included as Attachment A.

III. WHAT HAS CHANGED SINCE OCTOBER 2001?

It is helpful to put the findings and recommendations in this report in the context of what has changed in the local solid waste industry during the past year. Several important changes are:

1. Continued Consolidation. Acquisitions within the industry have continued. Vertically integrated companies – companies with their own hauling operations and transfer stations, such as Allied, Pride, Waste Connections, and Waste Management – continued to purchase smaller independent hauling companies. As a result, considerably more of the waste within each service area is now controlled by the owners of the local transfer stations. The three national companies now account for 46 percent of the wet waste collection in the Metro region, compared to about 9 percent in 1994.

2. Out-of-Region Disposal. Authority for Waste Connections to transport 5,000 tons of additional waste to Vancouver was granted on November 20, 2001[3]. At least until December 31, 2003, when most of the current non-system licenses for putrescible waste expire, this reduces the amount of waste that would otherwise go to one of the region's transfer stations.

3. Pending New Transfer Station Application. Independent haulers in east Multnomah County have continued to make progress toward gaining the land use authorization needed for their

[2] Cascadia Consulting Group with Sound Resource Management Group.
[3] For a total of 10,000 tons.

proposed transfer station at 14041 NE Sandy Boulevard in Portland. They are currently resolving a number of issues including easement rights for alternative access to the site following the mandated closure of their current entrance that crosses the Burlington Northern tracks.

4. Administrative Cap Increase. On May 8, 2002, the Executive Officer granted Pride Recycling's request for a 5% increase in the tonnage limitation thereby increasing Prides's cap to 68,250 tons. No other requests were received for increases in the tonnage cap.

5. Additional Recovery Capacity. The region's capacity for processing mixed dry waste for recoverables continues to expand. The Council recently approved a license to KB Recycling for a new material recovery facility in Clackamas County. In addition, there is a pending application for a new Waste Management recovery operation at the Hillsboro Landfill.

6. Organics Recovery. Two out-of-region facilities have recently expressed interest in processing organics, making it likely that distant facilities will be part of a regional organics recovery program. It appears likely that transfer and transport of source separated organics to distant processing facilities will be part of a regional organics recovery program.

7. Public Services. Service to the general public is not required as a condition of the Metro franchises for local transfer stations. None of the three local transfer stations have chosen to offer this service. Instead, they have focused on cost-efficient transfer and recovery of commercially collected waste. Metro transfer stations continue to be the dominant provider of public services for self-haul customers.

8. Renewal of the Forest Grove Franchise Agreement. The Forest Grove Franchise Agreement, which has no tonnage limitations, is scheduled to expire December 3, 2002. As specified in the Metro franchise, it will be automatically renewed for an additional five years, provided that the Franchisee is not in default. The transfer station received about 103,000 tons in FY 2001-2002, compared to the 48,000 estimated to be generated in the service area defined by distance. It is likely that the amount of wet waste delivered to Forest Grove will increase due to recent acquisitions of hauler collection franchises in Washington County by Waste Management.

IV. SUMMARY: ACHIEVEMENT OF KEY POLICY OBJECTIVES

1. Increase Recovery from Mixed Dry Waste. Recovery of waste materials from mixed dry waste increased about 8% in the entire region (comparing first quarters of 2001 and 2002). Lifting the caps on dry waste at local transfer stations appeared to account for about one-quarter of this region-wide total increase. Other system changes during the past year, such as the capital improvements at Metro South Transfer Station, account for the rest of the gains in recovery.

2. Reduce Vehicle Miles Traveled (VMT). There appears to have been a slight increase region-wide in vehicle miles traveled (comparing first quarters of 2001 and 2002). Some independent waste haulers have been able to drive shorter distances between the points of collection and disposal. However, this has been more than compensated by increases in VMT by haulers that own their own transfer stations – Pride, Allied, and Waste Management. Raising the caps on local transfer stations has allowed these companies to bring more of their own wet waste to their facilities, including loads from more distant service areas. Without the wet waste cap, however, the increase in VMT could have been even higher.

3. Ensure Access to Transfer Stations. In general, gaining access to the existing transfer stations does not seem to be a significant problem for most waste haulers in the Metro region. The REM Department has not received any complaints during the past year from independent haulers regarding a lack of access.

V. SUMMARY: KEY RECOMMENDATIONS AND POLICY ISSUES

1. Maintain Current Tonnage Caps. The current franchise limitation on tonnage at Willamette Resources (Wilsonville) appears to be adequate at this time. Tonnage caps at Recycle America (Troutdale) and Pride Recycling (Sherwood) are less than the amount of waste generated in their service areas. However, much of the waste generated in these two service areas is either controlled by integrated companies that are committed to delivering it to their own facilities, or it is waste controlled by independent haulers that have not expressed an interest in delivering it to one of the existing local transfer stations. Therefore, it appears that tonnage cap increases at these transfer stations would be justified only if the owners can demonstrate a strong likelihood of additional waste within their service areas being delivered to their stations.

2. Identify Additional Decision Criteria. In 2001 the Council considered a number of criteria when deciding on the appropriate tonnage limitation for local transfer stations. The amount of waste generated in each service area was important, but it was not the only criteria considered. The Council might want to amend Metro Code to state these policy criteria.

3. Increase Organics Recovery: Exempting source-separated organics from counting towards the wet waste tonnage caps, coupled with conservative tonnage caps on wet waste, might provide additional incentive for the industry to develop organics recovery in the Metro region. This is an issue the Council might want the Solid Waste Advisory Committee to examine.

4. Maintain Consistent Approach on Out-of-Region Waste. Consistent with the staff reports and analyses conducted during 2001, the REM Department is not considering out-of-region waste when administering the tonnage caps.

VI. SUMMARY: KEY BUSINESS AND TECHNICAL FINDINGS

1. Hauling Patterns. During the past year, a complex interaction of factors influenced haulers' decisions on where to deliver waste. These include the October 2001 changes in Metro's regulations, variation in tip fees at different transfer stations, quality of services (e.g. queuing time), continued industry consolidation, Metro's granting of non-system licenses, and competition in the commercial collection market within the City of Portland.

2. Consolidation. Acquisitions within the industry have continued during the past year. More waste within each service area is now controlled by vertically integrated companies that also own transfer stations. The three national companies (Allied, Waste Connections, and Waste Management) now account for 46 percent of the wet waste collected in the Metro region. This compares to about 9 percent in 1994.

3. Financial Impact. Less tonnage appears to have been diverted from Metro transfer stations to local transfer stations than assumed at the time the Council considered the October 2001 regulatory revisions. As a consequence, the fiscal impact on Metro (of about $1.7 million in reduced costs and about $1 per ton increase in unit costs) is less than was projected in the October 2001 analysis, based on data through July 2002. However, additional diversion is possible under the caps, which would increase the fiscal impact.

4. Wet/Dry Waste Estimates. There are some discrepancies between estimates of wet waste from the Department's database and those reported by facilities. There might be technical explanations for this (e.g. transport mode splits for wet/dry waste). However, the classification and reporting of waste at private transfer stations might underestimate wet and overestimate dry waste. The Department will continue to examine this issue.

VII. TONNAGE DATA

Table 1 shows the estimated wet waste generated in each of the three Local Transfer Station Service Areas (refer to the Service Area map, Attachment B) for FY 01-02 and compares affiliated with non-affiliated tonnage estimates from Metro's waste generation database[4].

Table 1 – Estimate of Wet Waste Generated by Local Transfer Station Service Areas for FY 01- 02 (inside Metro region)

	Local Transfer Station Service Areas		
	Pride	**Recycle America**	**WRI**
Hauler Groups	tons / (percent of total)	tons / (percent of total)	tons / (percent of total)
Affiliated with facility	34,000 (22%)	49,000 (39%)	18,000 (100%)
Not affiliated with facility	124,000 (78%)	76,000 (61%)	0
Total	158,000	125,000	18,000

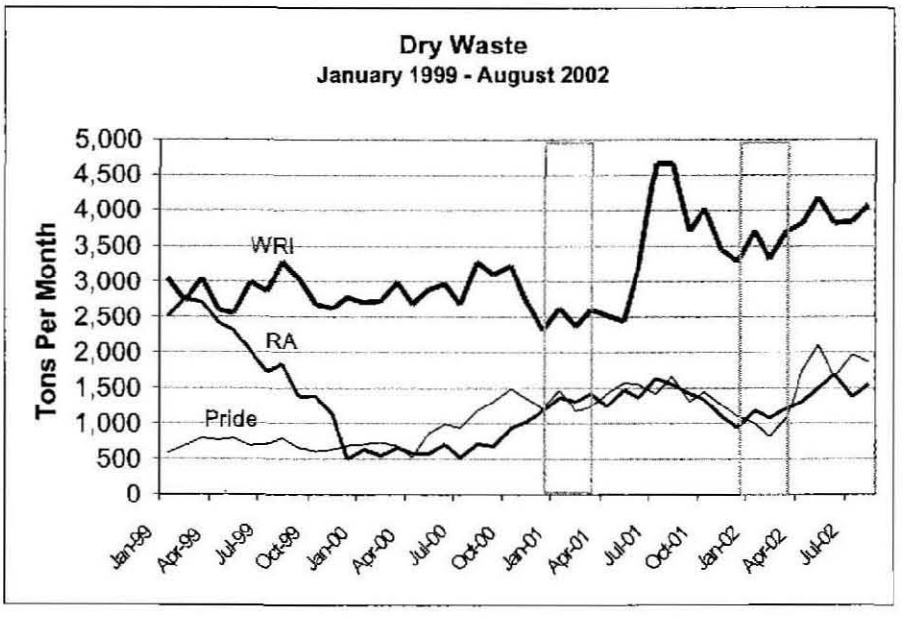
[4] These are planning level estimates based on Metro's waste generation database. Note that geographic service areas for Portland's commercial waste do not exist, and Metro's database cannot track the origins of these waste loads.

Table 2 shows actual deliveries of wet waste to each of the three Local Transfer Stations for FY 01-02 and compares affiliated with non-affiliated delivery tonnages.

Table 2 – Actual Deliveries of Wet Waste Received by Local Transfer Stations in FY 01- 02 (inside Metro region)

	Local Transfer Stations		
	Pride (Cap: 68,250)	**Recycle America** (Cap: 65,000)	**WRI** (Cap: 65,000)
Hauler Groups	tons / (percent of total)	tons / (percent of total)	tons / (percent of total)
Affiliated with facility	27,335 (39%)	49,917 (87%)	47,617 (98%)
Not affiliated with facility	43,138 (61%)	7,164 (13%)	923 (2%)
Total	70,473	57,081	48,540
	Metro has cited Pride for exceeding its cap.	7,919 tons under cap may reflect mid-year implementation of cap.	16,460 tons under cap: see note for Recycle America. In addition, WRI's non-system licenses for wet waste total 50,500 tons.

The following charts show the historical delivery of wet and dry waste to the three local transfer stations. The first quarters of 2001 and 2002, which are shaded on the charts, were used for a "before and after" comparison of the October 2001 regulatory changes. The charts illustrate local transfer stations were increasing their tonnage prior to October 2001.



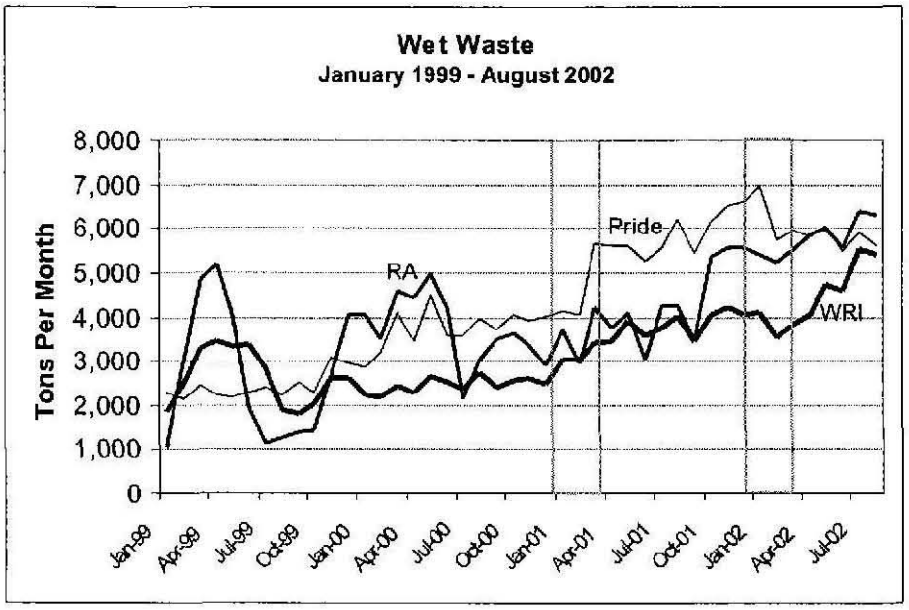


Figure A

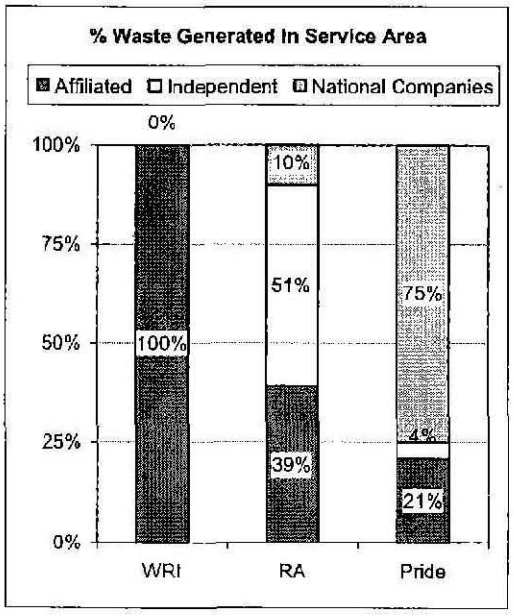


Figure B

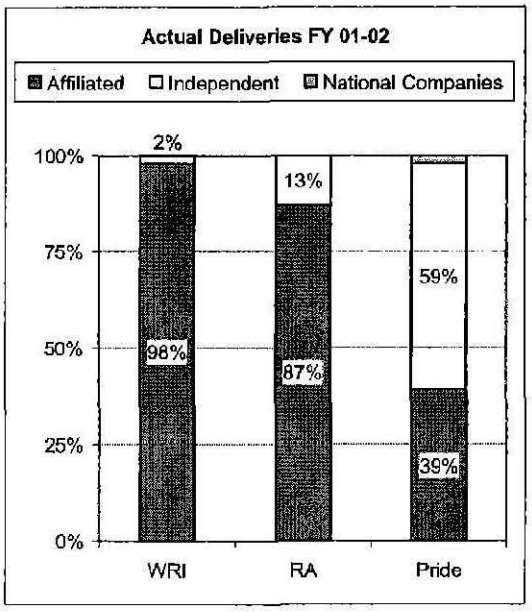


Figure A shows the share of wet waste estimated in each service area by hauler groups (affiliated with the facility, independent, or national company).

Figure B shows the share of wet waste actually delivered to a local transfer station by hauler groups (affiliated with the facility, independent, or national company).

VIII. RECOMMENDATIONS AND POLICY ISSUES

Recommendation 1. Maintain current tonnage caps.

Pride Recycling tonnage cap.

The facility tonnage authorization of 68,250 tons per year, as amended by the Executive Officer[5], appears adequate at this time. Before the cap is increased, the facility owner should be asked to demonstrate that there is a likelihood of additional waste from within its service area being delivered to the facility.

As illustrated in Table 2, Pride received 70,473 tons of wet waste in FY 01-02, of which 39% was delivered by Pride, and 61% was delivered by other independent haulers. However, as illustrated in the Table 1, Pride's own collection franchise accounts for only 22% of the total tons estimated within the service area.

A large portion of the non-affiliated waste delivered to Pride has been recently acquired by Waste Management (West Beaverton Sanitary), and could potentially be routed to a different facility. Moreover, other large franchised collection routes in Pride's Service Area are serviced by WRI (Allied) and Waste Management. The total estimate of demand for this Service Area far exceeds what may be actually delivered.

Recycle America tonnage cap.

As with Pride, before the cap is increased at Recycle America, Waste Management should be asked to demonstrate that there is a likelihood of additional waste from within the Recycle America service area being delivered to the facility.

As illustrated in Table 2, Recycle America received 57,081 tons of wet waste during FY 01-02, of which 87% was delivered by Waste Management, and 13% was delivered by independent haulers. In comparison, Table 1 reflects that Waste Management's collection franchises account for about 49,000 tons of the total wet waste discards generated in this service area. This is noteworthy because, Table 2 shows that actual deliveries to Recycle America from its affiliated haulers totaled 49,917 tons – which exceeds the Table 1 estimate of wet waste generated from its affiliated haulers in this service area. Notwithstanding the City of Portland's commercial accounts[6], this could be another indicator of the finding regarding an increase in VMT resulting from raising the facility tonnage caps.

---

[5] On April 22, 2002, Pride made a request to amend its tonnage authorization of 65,000 tons per year. Consistent with Metro Code section 5.01.131(c) on May 8, 2002 the Executive Officer granted the request amending Pride's franchise to increase Pride's cap to 68,250 tons (Amendment#1 F-002-98).

[6] Commercial accounts in Portland are competitive, not franchised geographic areas. Therefore Metro's waste generation database cannot track the origins of these waste loads.

At this time, there is one known potential applicant for a new transfer station in east Multnomah County. The proposed facility is Columbia Environmental[7] located at 14041 NE Sandy Boulevard, in Portland. The facility is currently in the process of obtaining land use approval from the City of Portland and resolving easement issues. The Department expects Columbia Environmental to submit an application for a local transfer station franchise in the near future, at the same time a solid waste permit application is submitted to the Oregon Department of Environmental Quality.

Even in the absence of a new transfer station, all of the estimated tonnage in the Recycle America service area exceeds what is likely to actually be delivered to Recycle America. Many of the haulers in the Recycle America service area have elected not to use that facility for a variety of reasons.

WRI tonnage cap.

The facility tonnage authorization of 65,000 tons per year, as authorized by Council in October 2001, appears adequate at this time. As illustrated in Table 2, the facility received 48,540 tons of wet waste during FY 01-02, and 98% of that waste was delivered by WRI affiliated haulers while 2% was delivered by independent haulers.

Recommendation 2. Consider modifying Metro Code to clearly communicate the criteria that will be used to establish tonnage limitations for local transfer stations.

In 2001 the Council considered a number of factors when deciding on the appropriate tonnage limitation for local transfer stations. The amount of waste generated in each service area was important, but it was not the only factor that was considered.

The Council might want to identify the policy criteria that will be the basis for future decisions regarding franchise terms such as tonnage limitations. The criteria could include the amount of waste generated with a service area, the amount of waste within a service area likely to actually be delivered to the local transfer station, the regulatory compliance history of the operator, the impact on waste recovery goals, and the ability to maintain the value of public assets, such as the Metro transfer stations.

Recommendation 3. Increase Organics Recovery

During the past 15 years, the emergence of private facilities that recover recyclable material from mixed dry waste has helped reduce the need for traditional waste transfer facilities. The region has invested a considerable amount of public and private money on recovery facilities that would have otherwise been spent on the waste transfer infrastructure.

The region has aggressive plans for further reducing waste, including the recovery of organic waste such as food. It is reasonable to ask whether the principle of investing in recovery, rather

[7] Columbia Environmental is currently known as Oregon Recycling Systems and operates as a processor of source-separated recyclables.

than waste transfer, should be applied to mixed wet waste. If the region is successful in diverting food and other recoverable material from mixed wet waste, there is not likely to be a need for much additional capacity strictly for the transfer of waste at existing transfer stations.

Because of the potential financial consequences for local businesses and ratepayers, Metro needs to be realistic when basing regulatory decisions on waste reduction plans and goals. At the same time, however, the Department recommends that the Council examine such opportunities to create incentives for additional recovery.

Exempting source-separated organics from counting towards the tonnage cap, coupled with a conservative wet waste cap, might provide additional incentive for the industry to develop organics recovery in the Metro region. This is an issue that the Council might want the Solid Waste Advisory Committee to examine.

Recommendation 4. Maintain Consistent Approach to Out of Region Waste.

Consistent with the staff reports and analysis conducted last year, the REM Department is not considering out-of-region waste when administering the tonnage limitations included in the transfer station franchises.

IX. FISCAL IMPACTS

The following analysis examines the effect on Metro of the October 2001 regulatory changes. The analysis compares Metro costs with and without the changes by estimating Metro and non-Metro tonnage and calculating associated Metro revenue and costs. Fiscal impact is measured in terms of change in gross annual cost to Metro and unit (per-ton) costs using observed solid waste flow data through July 2002, and the tonnage forecast for FY 2002-03, which was prepared in April 2002.

	Estimate (without policy change)	April Forecast (includes policy change)	Change
	FY 2002-03 Revenue Tonnage		
Metro	685,808	625,032	(60,776)
Non-Metro	557,751	612,384	54,633
Total	1,243,559	1,237,417	(6,143)
	FY 2002-03 Gross Cost		
	$54,964,390	$53,270,266	($1,694,125)
	FY 2002-03 Unit Cost		
	$63.37	$64.34	$0.98

As a result of the regulatory changes, the revenue-generating tonnage delivered to Metro transfer stations is about 61,000 tons fewer than it would have been without the changes, and tonnage delivered to non-Metro facilities is about 55,000 tons higher. The difference—about 6,000 revenue-generating tons—represents the approximate number of additional tons recovered as a

result of Metro's new policy (tonnage generally shifted from facilities with lower recovery to higher-recovery facilities).

Metro's gross cost of operations is proportional to the number of tons delivered to Metro transfer stations. So, as Metro tonnage declines, Metro's gross cost declines. Hence, the 61,000-ton decline at Metro's transfer stations resulted in approximately $1.7 million lower gross costs to Metro.

Because of the structure of Metro's transfer and disposal contracts and the inclusion of certain fixed costs in the Metro tip fee, Metro's costs of disposal operations decline more slowly than revenue when tons leave the Metro transfer stations. For this reason, Metro's unit costs increase as tonnage delivered to Metro transfer stations declines. The 61,000-ton decline at Metro transfer stations added approximately $0.98 per ton to Metro's unit cost for FY 2002-03.

By way of comparison, the analysis that accompanied Ordinance 01-916C in October 2001, projected that about 100,000 tons would be diverted away from Metro transfer stations to non-Metro facilities as a result of the policy change. Staff calculated that this diversion would reduce REM's total cost by $2.8 million and raise unit cost by $1.27 per ton.

In fact, based on data through July 2002, less tonnage appears to have been diverted from Metro transfer stations than originally assumed; but there has been greater diversion from private transfer stations and limited-purpose landfills. As a consequence, the FY 2002-03 fiscal impact on Metro (of about $1.7 million in costs and about $1 per ton in unit costs) is less than projected in the analysis that accompanied Ordinance 01-916C.

However, based on the tonnage remaining under the caps (about 8,000 for Recycle America and 16,000 for WRI, per Table 2), it is possible that additional tons may be diverted in the future. If the additional diversion is realized, the fiscal impact on Metro may approach the $1.27 per ton estimated last Fall.

S:\REM\metzlerb\October TS Report 2002\LTSReportFINAL.doc

EXECUTIVE SUMMARY:

Processing of Mixed Commercial Recyclables

A. Purpose of Study

This study was designed to answer the following questions:

1. Does the Metro region have the processing capacity and capability to handle more tons of mixed paper fibers and fibers/TAP (all fibers mixed with tin, aluminum and plastic containers)?

2. Does the region have the processing capacity and capability to handle single-stream mixtures (all fibers mixed with all containers, including glass)?

3. To what extent, and due to what practices, are collected recyclables lost through processing by inclusion in the wrong commodities (e.g., plastic or metal in paper fibers)?

4. To what extent are recyclable materials lost through inclusion in processor garbage?

5. How are processors and fiber end-use markets responding to the increasing extent of mixed-recyclables collection in the Metro region?

6. What messages should local governments and Metro convey to generators, collectors, and processors about the mixing of recyclable materials at each stage of recovery?

B. Background of Study

Local government solid waste managers and the Commercial Recycling Work Group, a committee of Metro-area recycling specialists, asked Metro to conduct this study to inform efforts at increasing commercial recycling. Increased recovery of commercial-source materials is a key strategy for meeting the region's goals, as outlined in Metro's *Regional Solid Waste Management Plan* and the *Waste Reduction Initiatives*.

Local governments in the Metro region encourage or require businesses to separate their recyclable materials for collection. To improve customer convenience and to allow more cost-efficient use of trucks and crews, most collection companies are moving from a system that keeps different materials separated toward a system in which all fibers (paper) and containers (metal and plastic—and increasingly, glass) are mixed together. Processors sort these mixtures into commodities for sale to end-use markets.

Some paper mills have complained about increasing quantities of unwanted items in the commodities they buy from processors. Some processors have expressed concerns about the higher costs to produce the lower-value commodities they can extract from mixed recyclables. Some recycling advocates have objected to a watered-down ethic of source separation and to the possibility that recyclables set out for collection are being disposed. Governments want to ensure that the recycling system can help achieve recovery goals while complying with regulations against disposing source-separated recyclables.

C. Study Methodology

Metro contracted with Environmental Practices, a Portland-area consulting firm, to sort out and weigh the components of fiber commodities produced for market from all-fiber and fiber/container mixtures. Because fiber comprises about 90% of commingled commercial materials recovered in this region, the study focused on principal fiber grades produced by each of eight facilities. Metro staff estimate that these eight facilities handle at least 80 percent of commingled commercial materials collected in the Metro region. The study team also measured the percentage of recyclables in hand-sorted garbage at processors and estimated the amount of recyclables in screened discards. The consultants and Metro staff observed processing operations and interviewed processor and end-use market (paper mill) employees. Oregon Department of Environmental Quality staff assisted in study design and statistical analysis of results.

Metro wishes to convey its appreciation to the processors that allowed and assisted this analysis of their operations and made staff available to answer questions. This report aggregates some individual processor data for the entire study group, including capacity and throughput. Processors are not identified by name.

D. Answers to the Questions

This section summarizes study findings, based on measurement, observation and interviews.

1. **Does the Metro region have the processing capacity and capability to handle more tons of mixed paper fibers and fiber/TAP (all fibers mixed with tin, aluminum and plastic containers)?**
   - Yes. Metro-region processing facilities have the aggregate capacity and capability to handle twice as many tons of mixed fibers and fibers/containers as are now delivered to them. Only two facilities in this study regularly run more than one shift per day. No facility claims to be operating at full capacity on any shift.
   - Unused capacity of 350,000 tons. The facilities participating in this study could handle at least 350,000 additional tons of material per year, whether residential or commercial. This is twice the amount of potentially recyclable paper disposed in the Metro region in 2000. Current total production of these facilities is 290,000 tons per year (not including one processor that would not disclose this information). Their aggregate capacity is 640,000 tons per year.
   - Capacity for mixtures. Because facilities process pure loads faster than mixed loads, and mixed fibers faster than fibers/containers, the actual excess capacity for mixtures may be no more than 250,000 tons per year for studied facilities.

2. **Does the region have the processing capacity and capability to handle single-stream mixtures (all fibers mixed with all containers, including glass)?**
   - One processor does it now. One processor accepts single-stream loads from out-of-region sources as well as material from in-region that contains significant glass. Other processors are seeing (and hearing) increased glass in fiber/TAP materials, especially from apartment building sources and mixed residential/commercial loads. (Single-stream collection is not endorsed by Metro-area local governments.)
   - Glass not recycled. Virtually all the glass in single-stream loads ends up disposed, either in processor-screened fines, hand-sorted garbage or shipped out in commodities to mills that then discard it. Glass mixed with fibers is treated as a contaminant by every facility.
   - Glass-contaminated commodities. The glass content of paper commodities produced by the single-stream processor (0.14%) is three times the average for all other facilities (0.05%) and five times the average (0.03%) when only fibers are sorted. (See Table ES-2.) Note that Facilities B

and G, which reload material for further sorting elsewhere, both, have relatively high glass contamination levels (0.07% and 0.11%).

- Paper mill problems. Mills see glass as a major concern if single-stream collection increases. Only a few mills have had serious problems with glass to date, which included greater costs for equipment repair and replacement, production shutdowns and disposal. These costs affect recycling economics, including the price paid for commodities.
- Plastic and metal. Most paper mills consider plastic and metal a lesser problem than glass, even though plastic and metal out-throws averaged 10 times the level of glass in all fiber samples from single-stream sorting (1.5% vs. 0.14%). The same ratio occurred for all fiber samples at all facilities in the study (0.58% vs. 0.06%). Facility B, with 1.4% plastic/metal out-throws, not only sorts a fiber/TAP mixture that has considerable multi-family material, but also produces a fast-sorted reload. (See Table ES-2.)
- Capacity. The capacity of studied facilities to handle single-stream loads probably exceeds 100,000 tons per year.
- Automation. Automatic sorting equipment improves the economics of sorting single-stream loads, but it does not recover glass; it breaks it and screens it out of other materials, producing an unmarketable mix of glass, paper and dirt.
- Regulation. Local governments in the Metro region forbid mixing glass with residentially collected fibers but do not exclude this option for commercial routes. Because many collection vehicles serve residential and commercial customers on the same route, glass collected at commercial accounts can (and does) contaminate residential recyclables.

3. **To what extent, and due to what practices, are recyclable materials lost by inclusion in the wrong commodities (e.g., plastic or metal in paper fibers)?**
   - Out-throw average. The average out-throw rate (bottles, cans and film misplaced in fiber commodities) was 0.65% for all fiber samples in this study. Weighting the study out-throw rates according to the quantity of each fiber commodity collected commingled in the Metro region brings the region's out-throw average to 1%. (See Appendix J, Table J. The region produces far more tons of the commodities with the highest out-throw rates—mixed scrap paper, ONP and OCC—than of the cleaner high-grade ledger and office pack grades.)
   - Loss of containers. The 1% regional, weighted out-throw loss refers only to bottles, cans and recyclable plastic film, of which 17,000 tons are delivered to processors. This out-throw rate translates into 1,350 tons that leave processing facilities buried inside fiber commodities—a loss of 8% of the containers that processors handle. Another 6% of containers delivered to processors ends up in disposed residues, for a total processing loss of about 14%. (These numbers do not include bottle bill containers or containers that do not go to processors.)
   - Misstated recovery rate. If these 1,350 tons of out-throws plus 4,000 tons of prohibitives included in fiber commodities were subtracted from the weights that end-use markets report to DEQ, the region's recovery rate would drop by 0.25%. Only 33% of the Metro region's fibers are collected in commingled form (135,000 tons out of 400,000 total), often as fiber-only mixtures. If all fibers were collected commingled with all containers in a single stream, the region's recovery rate could drop by one percentage point.
   - Correlation with mixture. Commodities prepared from single-stream loads averaged out-throw rates of 1.6%, compared with out-throw losses ranging from 0.3% to 0.5% at *most* facilities that process fiber/container loads with only incidental glass. Samples taken from fiber-only loads averaged 0.1% out-throws. These differences are statistically significant at greater than the 95% confidence level (see Table H). One facility that processes a fiber/TAP mixture including multi-family loads with high container content had a 1.5% out-throw level that cannot be distinguished statistically from single-stream results.

- Automation. The highest out-throw rates were found in negatively sorted paper grades at highly automated facilities that process the most extensive mixtures. (Negatively sorted material goes off the end of the sort line after garbage and other commodities are removed.) Negatively sorted ONP #6, a mix of newspaper, magazines, mixed scrap paper and other fiber, averaged 4% out throws at one automated facility. Less automated operations averaged 0.5% out-throws for this grade. Mixed scrap paper averaged 4.5% out-throws at another automated facility, compared with an average below 1% for this grade at facilities that handle simpler mixtures with less automation.

4. **To what extent are recyclables lost through inclusion in processor garbage?**
   - Disposal rates. It is estimated that processors dispose at least 0.5% of all commingled recyclables they sort. Based on individual processor interviews, the average garbage disposal rate for all facilities in this study is about 1%. The study found that at least half of this garbage consists of recyclable material, both fiber and non-fiber. It was not possible within the scope and time frame of this study to measure the percent of all received materials that each facility disposes.
   - Hand-sorted garbage. Based on samples by the consultant, the garbage that workers remove from sort lines averaged 45% recyclables. Metal, plastic and glass made up 26% of this quantity, and fiber comprised 19%.
   - Screened garbage. Four facilities use screens to remove small fragments from the sort line, including dirt, broken glass, shredded paper, bits of cans and low-volume plastic bottles. In one facility, this material passes off the end of the belt. Screened mixtures are not recovered at this time, and appear to consist of at least 85% recyclable material, based on visual inspection. Processors estimate that screens add 0.25% to facility disposal rates.
   - Disposal and mixture. Facilities handling fibers-only loads had much lower garbage rates than facilities handling more extensive mixtures. Most facility operators reported their own testing results, ranging from about 0.1% for fibers-only to 1.5% for single-stream, with fibers/TAP at about 1%.
   - High and low. The highest rate of recyclables in hand-sorted garbage (70%) was found at the facility that sorts the most single-stream material. At the time of the study, sorters at this new facility were putting scrap metal in garbage, a practice that has since been corrected. This facility also disposes notable quantities of glass/paper/plastic/metal fragments that run off the end of the sorting line. In general, fibers-only processors had the lowest percentages of recyclables in hand-sorted garbage (28% to 50%).
   - A seeming exception. One facility, which sorts mixed fibers/TAP, had the lowest percentage of recyclables in hand-sorted garbage (25%), partly due to well-trained permanent staff, but also due to high-speed automation that screens out fragments, and because this facility reloads much of its negatively sorted material for reprocessing elsewhere. This facility averaged the second-highest rates of out-throws (1.5%) and prohibitives (3.4%) in its fiber commodities.

5. **How are processors and fiber end-use markets responding to the increasing extent of mixed-recyclables collection in the Metro region?**
   - Adjusting to mixtures. Half the processors in this study have invested in equipment that will enable them to handle increased supplies of mixed-recyclables collection.
   - Recent changes. Two facilities installed new automated equipment in the three months before the study, and another did it nine months before. A fourth processor will move into a new, automated facility early next year. Processors are still experimenting with their new technologies.
   - A place for everything. Processor investments have created a complex ecology that can handle virtually any type of load, from pure fiber to a total mixture of every curbside item. Automation reduces the number of shifts, and therefore the labor costs, needed to handle mixtures.

- Reloads. Several local and out-of-region processors and collectors sell unsorted or partly sorted commercial and residential mixtures to processors that can sort it economically. These reloads have high out-throw and prohibitive levels.
- The pressure to mingle. The need for cash flow to pay off large capital investments in automated processing equipment drives processors to compete for low-value mixtures they would have refused a few years ago—a competition that brings an air of inevitability to increased commingling. Collection companies—and some governments—favor increased commingling as a way to constrain the rise in collection costs. Automated collection (one big roll cart) has contributed to even higher out-throw, prohibitive and disposal rates in other communities, and may become a trend in the Metro region that needs to be monitored.
- Commodity quality. More complex mixtures sorted with high-speed automation tended to produce commodities that do not meet published standards for the grade. Negatively sorted MSP and ONP grades consistently exceeded official out-throw and prohibitive limits at almost all facilities, possibly reflecting end-use market willingness and preparation to take more contaminated lower grades at a lower price.
- Paper mill concerns. Glass remains a concern for all paper mills. The jury is still out on whether increased screening at processors and mills can remove glass from paper. Out-throws and prohibitives as a whole increase mill disposal costs. As one processor said, "When the mills reach their limit, they push back." One regional mill has cut its consumption of mixed paper by 75% in the last six months due to contamination levels.
- End-use demand is sound. Although demand by Northwest paper mills for recycled grades is not expected to increase, regional mills prefer the low transportation costs of local supplies. These mills have adjusted their processes, standards and prices to accommodate the lower grades of material being produced from commingled collection. One mill has stated publicly it could absorb all mixed paper generated in Oregon.
- Economics. Lower market prices could counteract collection savings from commingling.
- Technology. Processors that use more automated equipment are looking into vacuums and air classifiers to remove shredded paper from broken glass, so less paper is lost. There is little evidence, however, that air classifiers allow screened or negatively sorted glass to be recovered. These mixed fragments include too much material that does not yield to air separation, e.g., metal, plastic and substances unacceptable to glass markets.
- Vertical integration. Processors that have strong alliances with collectors had the lowest out-throw and prohibitive rates. These alliances—often co-ownership, but sometimes only long-standing relationships—allow processors to control what they receive and to adjust to market and regulatory changes. Typically, such alliances concentrate on securing fiber-only loads or on keeping containers separated from fibers.
- Container resistance. Some processor/collector alliances that specialize in fibers-only loads may be discouraging customers from recycling their containers, and thus subverting the right to recycle.

6. What messages should local governments and Metro convey to generators, collectors and processors about the mixing of recyclable materials at each stage of recovery?

(Conclusions are presented in "E Recommendations," below.)

E. Recommendations

The Metro Regional Environmental Management Department recommends consideration of the following measures to ensure the integrity and success of a recycling system that is responding to increased commingling.

1. **Form a subcommittee of Metro's Solid Waste Advisory Committee to address the loss of recyclables and the increase in residue at processors and markets.**

   This subcommittee could address the above issues in a broad systematic way, including performance standards related to loss of recyclables and residue, roles and responsibilities of involved stakeholders, use of incentives and disincentives, and the economic impacts of changes to the system. Some specific recommendations derived from immediate problems observed in the study are offered with respect to collection, processing and markets and may help shape the discussion of the subcommittee. Stakeholders on the subcommittee should involve haulers, private recycling collectors, processors, markets, local governments, Metro and the Oregon Department of Environmental Quality.

   A. Collection

   i. **Prohibit the collection of glass mixed with fiber from commercial generators.**
   Metro and local governments should work to discourage and prohibit generators and collectors of commercial recyclables from mixing glass with fiber, as the local governments currently do with residential recyclables collection. This discrepancy between commercial and residential regulation leads to contamination of all materials when collectors mix loads from both sources on the same vehicle, or when processors mix loads at their facilities. Education and enforcement challenges may be found with multi-family generators and with recyclables collected from front-loaded containers and automated roll-carts. [Since the publication of this draft report, local governments have met and indicated their intention of adopting rules to prohibit the collection of glass mixed with fiber from commercial generators. Some local governments intend to instruct haulers to collect glass containers separately from other containers, as well.]

   ii. **Monitor and enforce proscriptions against collecting glass mixed with recyclables.**
   Local governments have adopted administrative rules for residential recycling collections that require that glass be collected separately from fiber. Compliance with these rules may be slipping. A complaint-driven approach does not appear to be sufficient. One alternative is for a third party, such as Metro or local government representatives, to check deliveries to processors to ensure compliance. Where possible, collectors should leave notes and, if necessary, withhold collection for generators that do not comply.

   iii. **Develop consistent education, monitoring and feedback.**
   Generators need clear and repeated information, aimed both at employees and managers. Collection companies local governments and Metro should provide consistent messages to generators. Collectors should conduct regular inspections of loads and give feedback to generators.

iv. **Promote increased recycling by businesses, including fiber-only and fiber/TAP (tin-aluminum-plastic) mixtures.**
Messages may vary locally but should encourage only mixtures that processors can handle with minimal loss and contamination. All processors in this study have shown they can keep out-throw levels below 1% with a two-sort of fibers separated from mixed containers; most processors can produce commodities with less than 1% out-throws from fiber/TAP mixtures that do not include glass. Mixing metal and plastic containers with fibers, however, may open the door for more "incidental" glass. If stakeholders can agree on an acceptable level of recyclable losses, commingling offers convenience to generators, may increase participation and recovery (even accounting for out-throw losses), and improves collection economics. It is important to ensure that processors are capable of effectively handling fiber/TAP mixtures before promotion of this mixture to businesses.

B. Processing

i. **Discourage or prohibit processors from handling source-separated materials in ways that make them less likely to be recycled.**
A combination of government and market pressure is needed to prevent contamination and loss of recyclables caused by processors mixing a variety of materials, either on the floor of their facility before sorting or when reloading them for shipment to other processors. The City of Portland has such a prohibition. If processors mix loads from out-of-region single-stream sources and automated roll cart routes with cleaner regional loads, this will contaminate regional materials. Sorting loss levels should be monitored periodically. Based on container out-throws and disposal across all samples in this study, processors fail to recover more than 14% of all recyclable containers, scrap metal and plastic film delivered to them (see Appendix I).

ii. **Processors should provide clear and complete operating plans that indicate how all types of recyclables would be sorted, stored and marketed.**
These plans should describe how different mixtures would be handled to ensure maximum recovery of delivered loads. Plans should cover containers and scrap metal as well as fibers.

iii. **Processors need to do a better job of removing solid waste from fiber commodities that are produced.**
On average, processors removed 37% of the solid waste mixed with commingled recyclables. The balance of 63% of solid waste, or 4,065 tons, was shipped in fiber commodities to their respective markets. The amount of solid waste in fiber commodity shipments is expected to increase to more than 13,000 tons annually as commingling becomes a more accepted regional collection practice.

C. Markets

Fiber markets are faced with the consequences of increasing quantities of solid waste mixed with fiber and greater percentages of unusable fiber in commodities from processors. Although no specific recommendations are made in this report, it is crucial that markets are involved in the discussion because more recyclables are lost and more residues are disposed by markets than by processors.

2. **Increase the focus on the recovery of plastic, metal and glass containers and scrap metal.**

   Some collectors may be discouraging their commercial customers from recycling containers and some processors do not accept containers at their facilities. For most commercial generators, container recycling collection is an optional service, unlike residential generators where it is always included in the service. As a result, commercial container recycling rates are 21%, compared to residential container recycling rates of 53%. Some options to increase inclusion of containers and scrap metal in commercial recycling collection are:

   A. **Include plastic bottles, metal containers, glass containers and scrap metal in a mandatory disposal ban that has been proposed by the Commercial Recovery Work Group for additional stakeholder discussion.**

   B. **Increase promotion of container recovery by local governments and by the Commercial Recovery Work Group as part of their general outreach and targeted assistance program to businesses.**

3. **Undertake additional research.**

   Market and government stakeholders may want more and better data to make decisions about the region's approach to recycling. For instance:

   A. **Obtain more objective and detailed data on processor disposal of residues to derive a more accurate estimate of recyclables lost through commingling.**

   B. **Examine research done in other communities on best management practices and how these can affect out-throw, prohibitive and disposal rates as a result of system changes, such as moving to more automated collection (with wheeled carts) and more automated processing.** National data indicate that, unless best management practices are adopted, residue levels and commodity contamination are likely to increase from our current regional levels as these system changes are implemented.

   C. **Research how other communities regulate, enforce and communicate about contamination with all stakeholders, including local governments, haulers, private recycling collectors, processors and markets.**

   D. **Evaluate the importance of convenience (mixing of recyclables) for increasing recovery from commercial generators.** Are certain types and sizes of businesses more responsive to convenience? Can routing, equipment or education resolve problems?

4. **Work with the Oregon Department of Environmental Quality to revise existing administrative rules (340-090-0090) that prohibit the disposal of source-separated recyclable materials.**

   With commingling, loss of recyclables is occurring both at the processor and the market. In effect, disposal of recyclables is taking place when containers are left in fiber commodities. While commingling does result in net gains in recovery, there are widely divergent levels of recovery by processors. In addition, increasing amounts of solid waste are being collected commingled with recyclables, with less than half of the solid waste removed and disposed by the processor. The majority of the solid waste is commingled with fiber commodities and sent to markets. Thus, the amount of recovered fiber reported to DEQ is inflated by the amount of solid waste in the fiber.

A. **DEQ should develop performance standards that are appropriate to commingling that address the loss of recyclables at both processors and markets.**

B. **DEQ should ask markets for the amount of solid waste contamination in their commodity deliveries. DEQ should reduce market shipments by this solid waste contamination to obtain more accurate figures for recovered materials.**

C. **DEQ should enforce those standards with processors through reporting and inspection.**

For more information, please contact either of the following Metro staff:

Steve Engel
engels@metro.dst.or.us
503.797.1535

Steve Apotheker
apothekers@metro.dst.or.us
503.797.1698

M:\rem\wr\projects\ComProcStudyReport\Final Report 101402.doc

COMMINGLED COMMERCIAL

RECYCLABLES PROCESSING STUDY

PRESENTATION TO

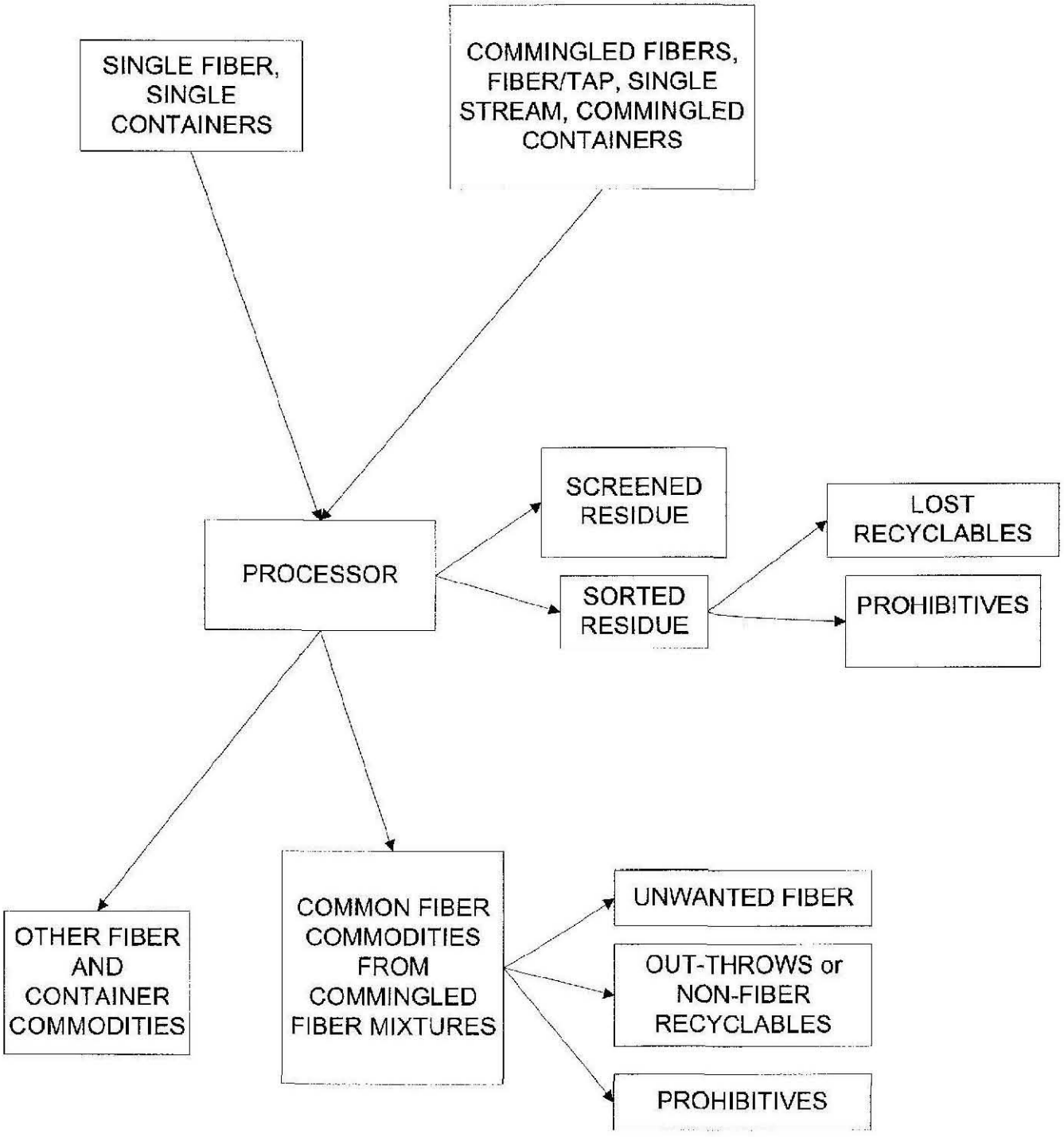
SOLID WASTE ADVISORY COMMITTEE

OCTOBER 21, 2002

PURPOSE OF STUDY

1. Adequate processing capacity and capability
2. Ability to handle single-stream mixtures
3. Recyclables and prohibitives disposed by processor
4. Recyclables and prohibitives "lost" in market commodities
5. Local and national market concerns
6. Response of collectors, processors and markets to commingling

COMMINGLED COMMERCIAL RECYCLABLES PROCESSING STUDY



FINDINGS

1. Things keep changing.

2. Capacity is not an issue for processors.

3. Glass mixed with fiber is not recovered.

4. Processor residue contains recyclables and total residue increases with commingling.

5. Contamination of fiber commodities increases with commingling.

6. Recyclable container recovery suffers from lack of collection and loss from the recovery system.

7. Improved management practices and additional equipment can reduce loss of recyclables and improve commodity quality.

TABLE H: Confidence Intervals for Contamination Levels, By Facility

Commingled Commercial Recyclables Processing (May/June 2002)

Percentages of Out-Throws and Prohibitives in Fiber Commodities, with Total Contamination Segregated by Source and Mixture of Material Processed
(Averages; Facilities Indicated That Handle Each Type of Source/Mixture)

Source, Mixture (Facility)	Glass Bottles	Plastic Bottles	Plastic Film	Metal	Out-Throw Subtotal	Confidence Interval 90%	Prohibi-tives	Confidence Interval 90%	Total Contamination	Confidence Interval 90%	
All Fiber Samples (All Facilities)	0.06%	0.29%	0.09%	0.20%	**0.65%**	(0.50-0.80%)	**2.33%**	(2.02-2.63%)	**2.98%**	(2.60-3.35%)	
Commercial Fiber Only (A,E,H)	0.03%	0.01%	0.06%	0.02%	**0.12%**	(0.07-0.16%)	**1.28%**	(0.92-1.64%)	**1.40%**	(1.03-1.77%)	
Commercial Fibers (G)	0.11%	0.10%	0.09%	0.20%	**0.50%**	(0.35-0.65%)	**3.79%**	(2.63-4.94%)	**4.28%**	(3.01-5.56%)	R
Com/Res Fiber and Fiber/TAP (D)	0.01%	0.22%	0.14%	0.16%	**0.52%**	(0.39-0.65%)	**1.97%**	(1.20-2.74%)	**2.49%**	(1.64-3.34%)	
Com. Fiber & Com/Res Fiber/TAP (C)	0.05%	0.06%	0.04%	0.13%	**0.27%**	(0.19-0.36%)	**2.06%**	(1.29-2.83%)	**2.34%**	(1.54-3.13%)	R
Commercial Fiber/TAP (B)	0.07%	0.87%	0.15%	0.36%	**1.45%**	(0.71-2.20%)	**3.42%**	(2.43-4.42%)	**4.88%**	(3.53-6.22%)	R
Com/Res Single Stream (F)	0.14%	0.82%	0.11%	0.55%	**1.62%**	(0.97-2.28%)	**2.35%**	(1.93-2.76%)	**3.97%**	(3.11-4.83%)	

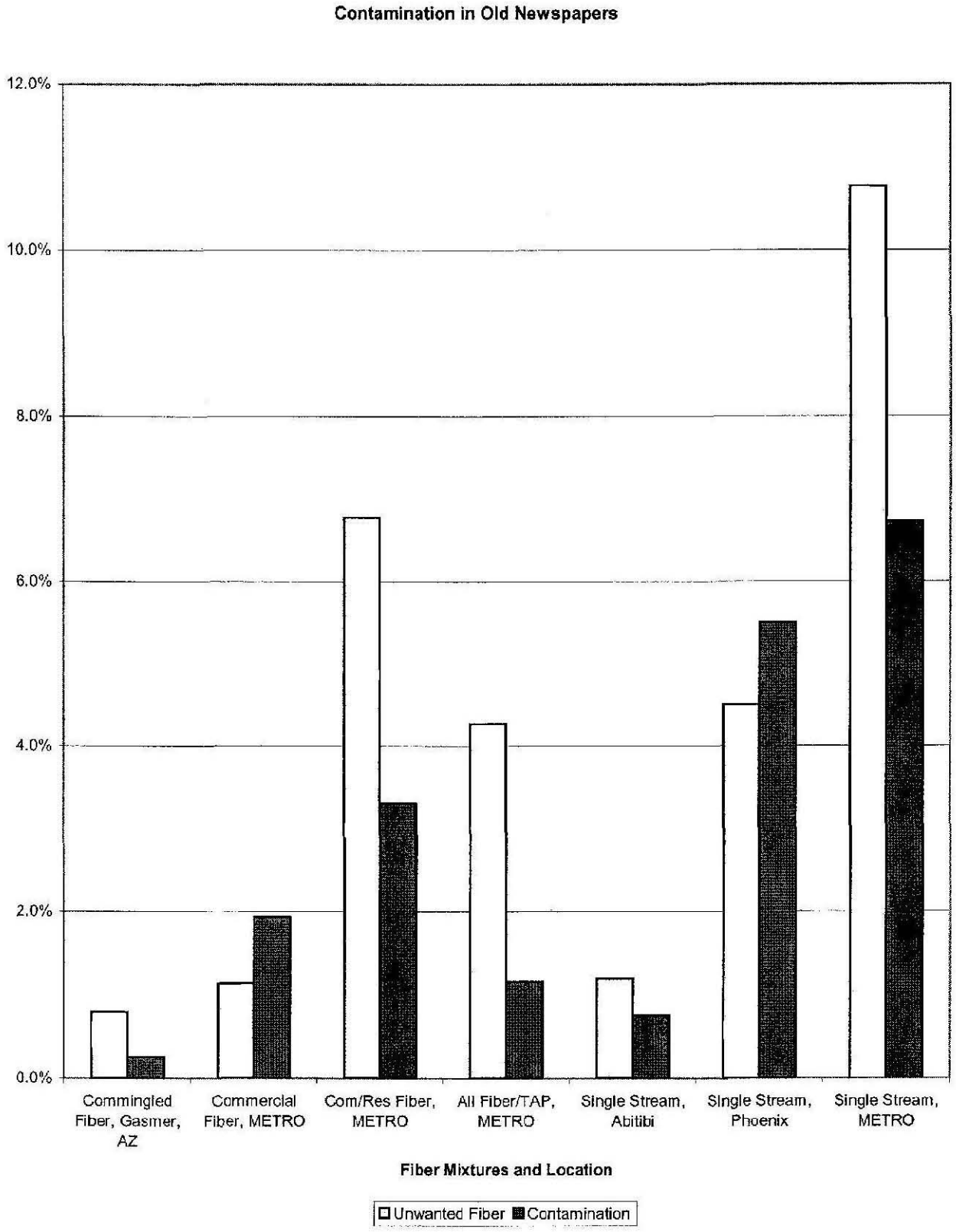
Potential effect of commingling on Metro region recovery

Scenario A. Current commingling level	Out-throws Tons	Prohibitives tons	Total tons
Processor	1,924	2,352	4,276
Market	1,349	4,065	5,414
Total	3,274	6,416	9,690

Scenario B. Greater commingling level	Out-throws Tons	Prohibitives tons	Total tons
Processor	1,924	2,352	4,276
Market	4,135	13,279	16,730
Total	6,059	15,631	21,006

Commingled Containers and Plastic Film in 2000, in tons

Program	Source Separated	Com-mingled		Total
Residential curbside	12,883	6,318		19,201
Commercial	1,933	8,603		10,535
Subtotal	14,816	14,921		29,736
Bottle Bill containers	35,205	0		35,205
Total marketed	50,021	14,921		64,941
Container Flow at Processors				
Containers and film marketed		14,921		86%
Container loss				
Processor residue		1,112	6%	
Out-throws to mills		1,349	8%	
Total Loss		2,461		14%
Net delivery to processor		17,382		100%


Contamination in Old Newspapers
12.0%
10.0%
8.0%
6.0%
4.0%
2.0%
0.0%
Commingled Fiber, Gasmer, AZ
Commercial Fiber, METRO
Com/Res Fiber, METRO
All Fiber/TAP, METRO
Single Stream, Abitibi
Single Stream, Phoenix
Single Stream, METRO
Fiber Mixtures and Location
Unwanted Fiber
Contamination