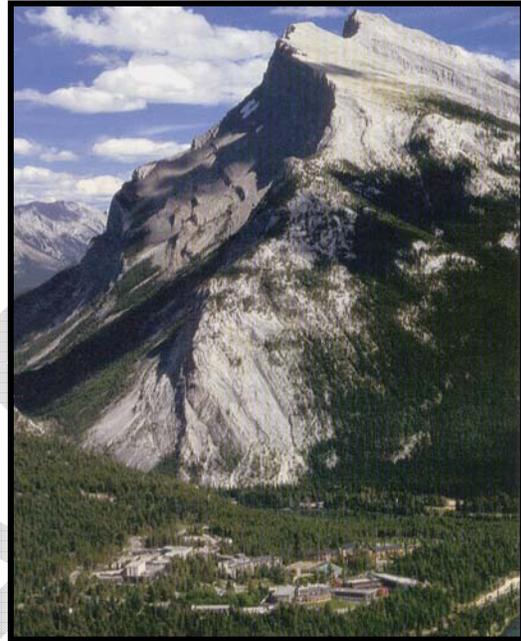


WASTE AUDIT REPORT

The Banff Centre

Banff National Park, AB.



Prepared for:



THE BANFF CENTRE

Prepared by:



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Banff, Alberta

November 2005

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Introduction

In developing their Environmental Management System (EMS), The Banff Centre has been conducting regular waste audits in order to quantify the various components of its waste stream. On November 15th and 16th, Iris Environmental Systems Inc. (IRIS) completed the fall 2005 waste audit on behalf of The Banff Centre. This waste audit contributes to the growing data set comprising information obtained from August 2001 to present. Audits were conducted for four key Banff Centre departments, namely Staff Housing, Housekeeping, Food and Beverage and the Theatre. For the first time the Banff High School was involved in the waste audits, in order for the students to gain an understanding of waste management principles, with the possibility of applying them to the operation of their school.

1.0 Staff Housing Waste Audit

The staff housing waste audit was conducted on November 15th, 2005, and considered the waste produced within a 24-hour period. At this time the occupancy levels of the staff housing were relatively low, reflected by the small amount of waste collected for this audit. The waste collected did not contain evidence of move-out waste. The totals for mass and volume for the waste and recycle streams are presented in Table 1. The recycle stream consisted entirely of refundable beverage containers, while the waste stream consisted of a variety of materials.

Table 1 - Staff Housing audit mass and volume totals

	Waste stream	Recycle stream
Total mass (kg)	5.82	2.40
Total volume (m³)	0.17	0.03
Density (kg/m³)	35.27	96.00

The composition of the waste stream is presented in Figure 1 and Figure 2, respectively. Cardboard constitutes the greatest percentage of both mass and volume for this audit. Food waste made up a large percentage of the mass, but only a small percentage of the volume, indicating the high density of this waste category. The other paper and other plastics categories take up relatively more volume in relation to their weight than the

other major waste categories, suggesting that compaction may considerably reduce the overall waste volume.

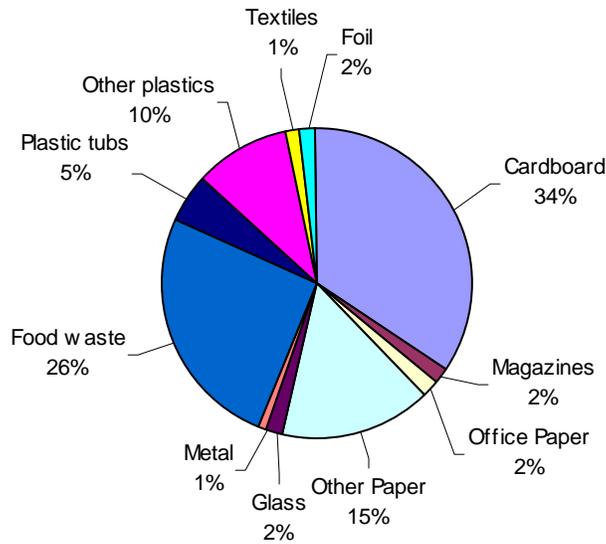


Figure 1 - Staff housing waste stream composition (%mass)

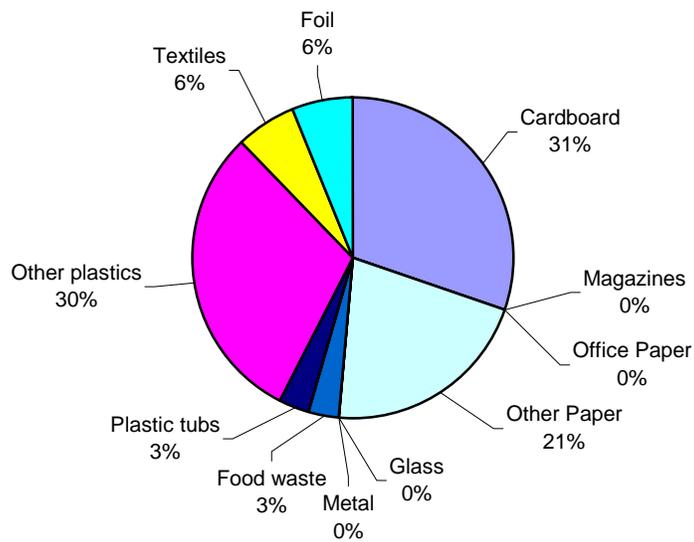


Figure 2 - Staff housing waste stream composition (%volume)

The Banff Centre Waste Audit – November 2005

Note: Percentages displayed on the charts as 0% actually represent percentages of greater than 0% but less than 1%.

Refundable beverage containers were subject to 100 percent source separation for recycling, which is very encouraging. This is consistent with a high recycling rate of this waste category from the last audit. This suggests that if separation of other recyclable materials (i.e. cardboard) was encouraged, a high separation rate could be achieved.

Figure 3 shows a comparison of the waste composition from 2001 to 2005 for selected materials in terms of percentage of total mass. Notable results include a steady drop in the percentage of refundable beverage containers to 0% in Nov 2005, and a large increase in the percentage of cardboard for the November 2005 audit.

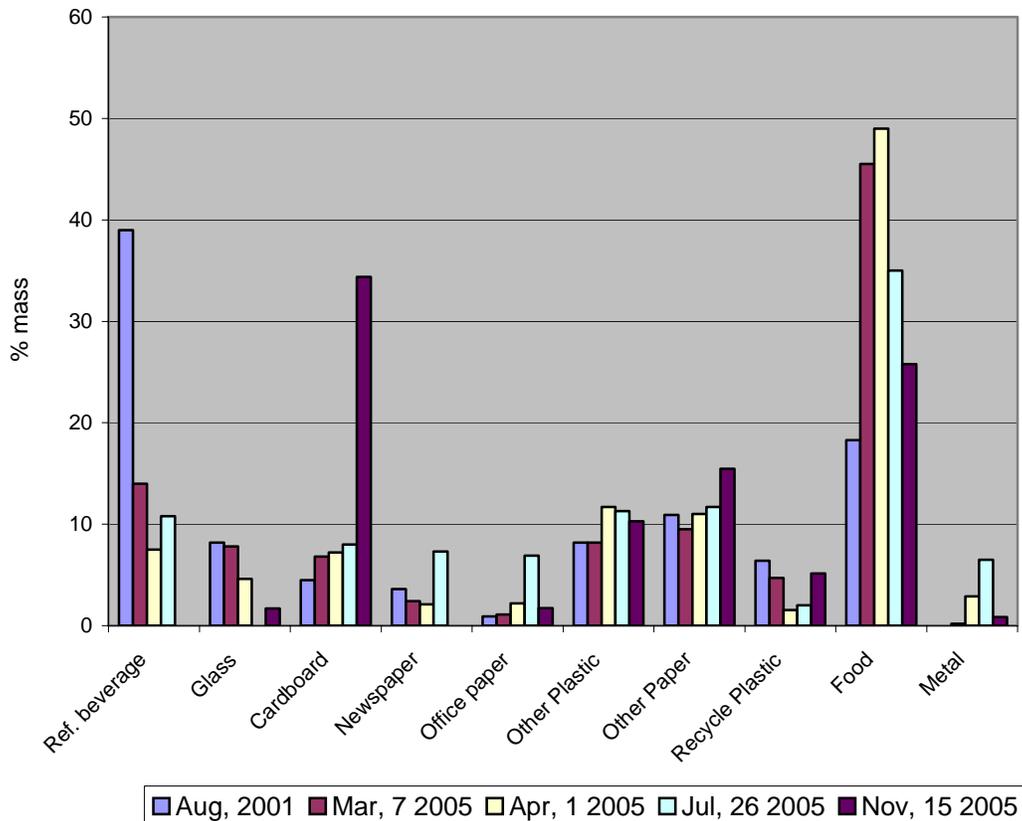


Figure 3 - Staff Housing waste composition patterns: 2001 to 2005

2.0 Housekeeping Waste Audit

The housekeeping waste audit was conducted on November 15th, 2005, and considered waste generated within a 24-hour period. The total mass of waste produced in this period was 72.35kg, with a volume of 1.02m³. This equates to a waste density of 71.28kg/m³. The composition of the waste stream is presented in Figure 4 and Figure 5.

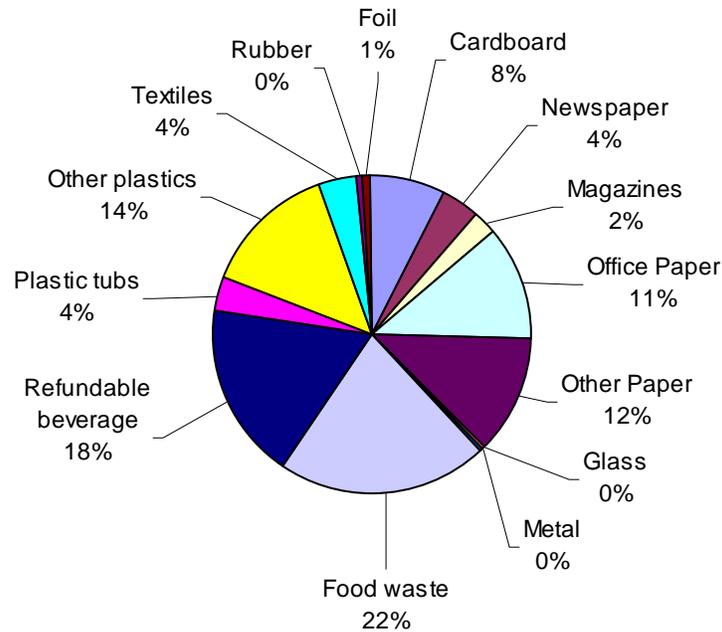


Figure 4 - Housekeeping waste stream composition (%mass)

The waste stream contained a large percentage of recyclable materials, for example 18% of the total mass consisted of recyclable beverage containers. This indicates a low recycling participation rate from both Banff Centre guests as well as housekeeping staff. The housekeeping waste included a recycle stream for office paper, however this was contaminated with plastics, cardboard and other incompatible wastes and was therefore considered as part of the waste stream. Poor recycling participation from this department is a trend that was also observed in the July 2005 audit. Efforts should be made to educate the housekeeping staff about the importance of correct source separation for recyclable waste. Guests should also be encouraged to participate in recycling through source separation, which would require recycling bins to be placed within guest rooms

and throughout Lloyd Hall. It should be noted that the common area on the second floor of Lloyd Hall had the appropriate recycling containers in place.

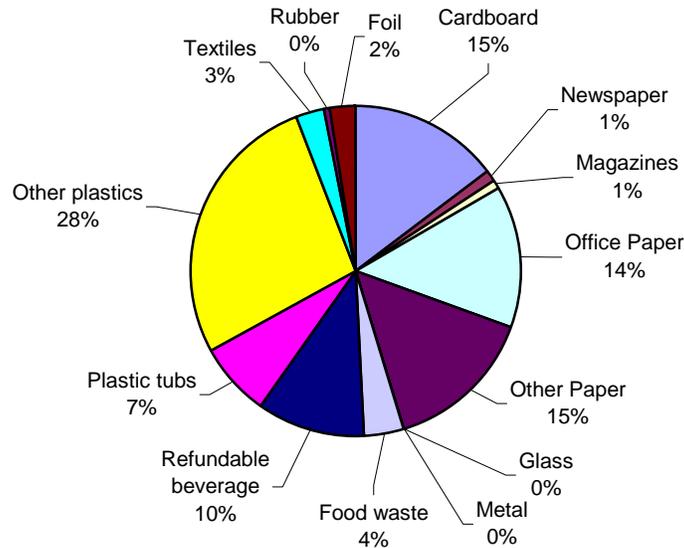


Figure 5 - Housekeeping waste stream composition (%volume)

The main component of the textiles waste category (2.9kg) consisted of Swiffer® disposable mop pads. These pads are non-biodegradable (www.pgbrands.com) and non-recyclable, are packaged in plastic boxes, and create a waste source that would not be present with the use of conventional mops or sponges.

The housekeeping garbage contained a significant number of Banff Centre disposable coffee cups. These cups are constructed of paper with a polyethylene coating (www.dixiefoodservice.com), and are non-recyclable. The Banff Centre may wish to consider the use of recyclable coffee cups that do not have a polyethylene coating.

Further waste audits of the housekeeping department will allow changes in waste generation and source separation rates to be observed, and will hopefully reveal improvements in recycling rates and reductions in overall waste volumes.

3.0 Food and Beverage Waste Audit

The waste audit for the Food and Beverage department was conducted on November 16th, 2005. This audit was greatly facilitated by the participation of the Banff High School students, who assisted with the sorting and measuring of the waste. The food and beverage audit considered the waste produced during a normal operating day (November 15th, 2005).

The totals for mass and volume of both the waste and recycle streams for the Food and Beverage audit are presented in Table 2. The waste stream constitutes a significantly greater proportion of the generated waste than the recycle stream, in terms of both mass and volume.

Table 2 - Food and Beverage mass and volume totals

	Waste stream	Recycle stream
Total mass (kg)	519.05	73.80
Total volume (m³)	2.48	1.16
Density (kg/m³)	209.42	63.90

A breakdown of the waste stream reveals the significance of its various components, and is displayed in Figure 6 and Figure 7. It can be seen that food waste is by far the most important waste category, particularly in terms of the mass percentage. The categories of “other paper” and “other plastic” are less significant in terms of mass, but contribute greatly to the total waste volume. This result may suggest an application for waste compaction.

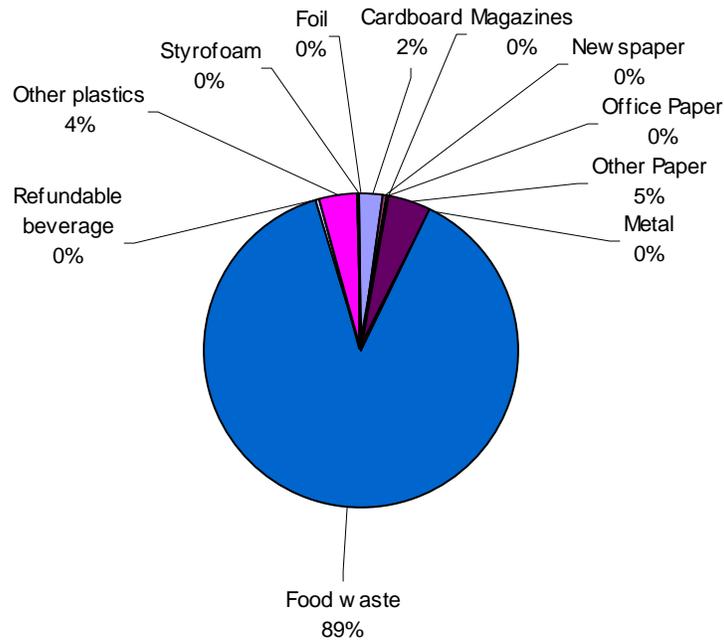


Figure 6 - Food & Beverage waste stream composition (%mass)

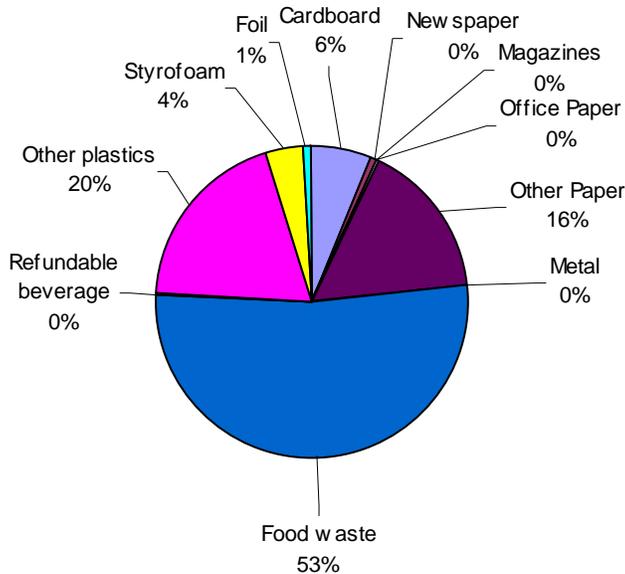


Figure 7 - Food & Beverage waste stream composition (%volume)

The composition of the recycle stream is presented in Figure 8 and Figure 9. The main component of the recycle stream was steel chafing fuel containers, with a total mass of 38kg. These containers were not observed in the July audit, and may be an intermittent

component of the recycle stream. These containers contain flammable solvents and are therefore considered hazardous waste, and should be sent to Safety and Security as part of their Hazardous Waste Program. There may also be the option of reusing these containers by refilling them with chafing fuel. Cardboard recycling is well conducted, although care should be taken to properly flatten all boxes in order to reduce the overall volume.

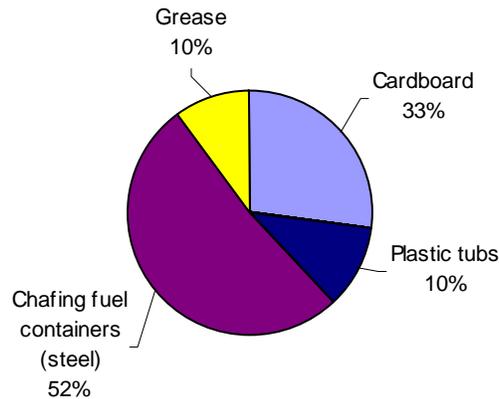


Figure 8 - Food & Beverage recycle stream composition (%mass)

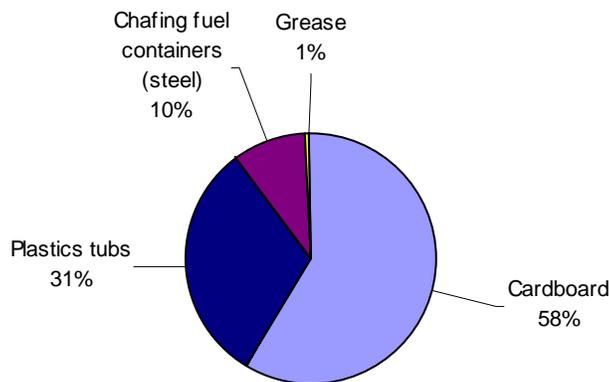


Figure 9 - Food & Beverage recycle stream composition (%volume)

Figure 10 shows changes in the composition of the food and beverage waste stream from 2003 to 2005. No significant results can be obtained from this analysis, however there appears to be a reduction in the percentage of the total mass of the other paper and other plastic categories, and an increase in the percentage of food. Once more data becomes available a statistical analysis will reveal the significance of these results.

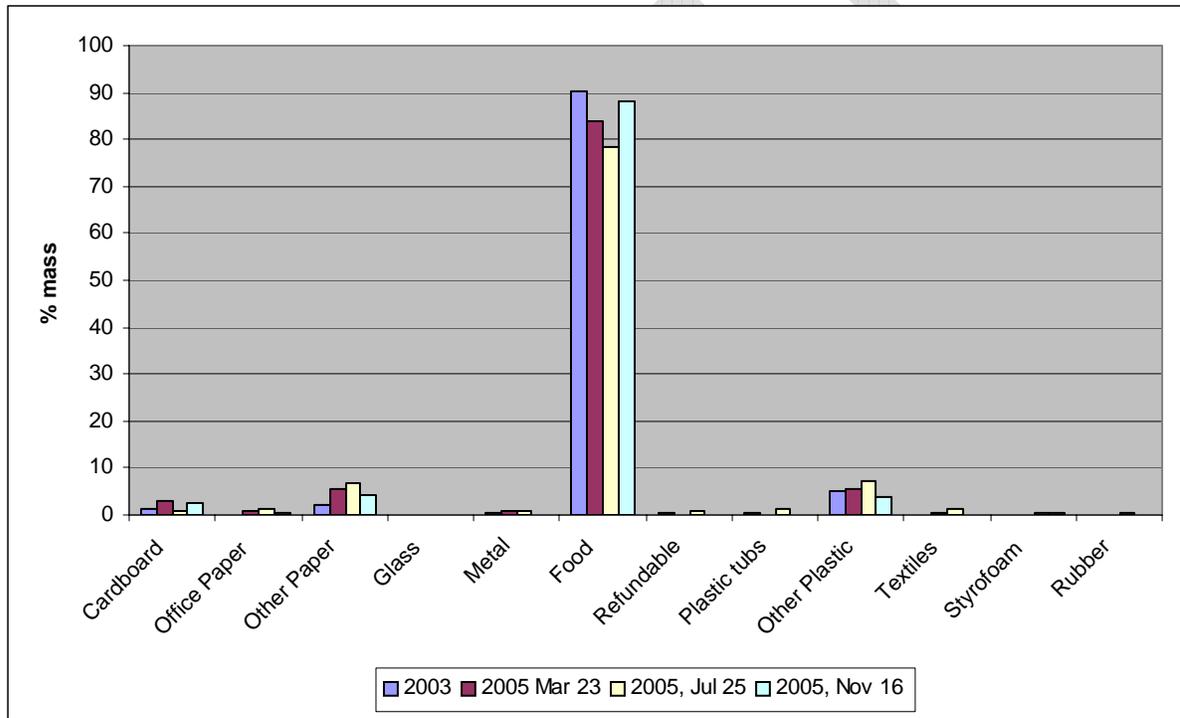


Figure 10 - Food & Beverage waste composition patterns: 2003 to 2005

4.0 Theatre Waste Audit

The theatre waste audit was conducted on November 16th, 2005, with the assistance of the Banff High School students. The audited waste consisted of a full dump load of waste generated during October and November, and is derived from one-off set

construction events occurring during this period, and the disposal of end of life tools and equipment.

The totals for mass and volume for both the waste and recycle streams are presented in Table 3. The densities of both the waste and recycle streams are particularly high, so further waste compaction would not be necessary.

Table 3 - Theatre audit mass and volume totals

	Waste stream	Recycle stream
Total mass (kg)	553.75	157.50
Total volume (m³)	2.44	0.61
Density (kg/m³)	227.13	256.93

Engineered wood, such as plywood and fibreboard, made up the bulk of the waste stream, accounting for 88% of the mass and 78% of the volume. There is the possibility of recycling much of this wood for woodworking and craft purposes, and the Banff High School displayed interest in utilising this source for school activities. If recipients for this material could be found then the mass and volume of the theatre waste stream could be drastically reduced. The composition of the remainder of the theatre waste stream (excluding engineered wood) is presented in Figure 11 and Figure 12.

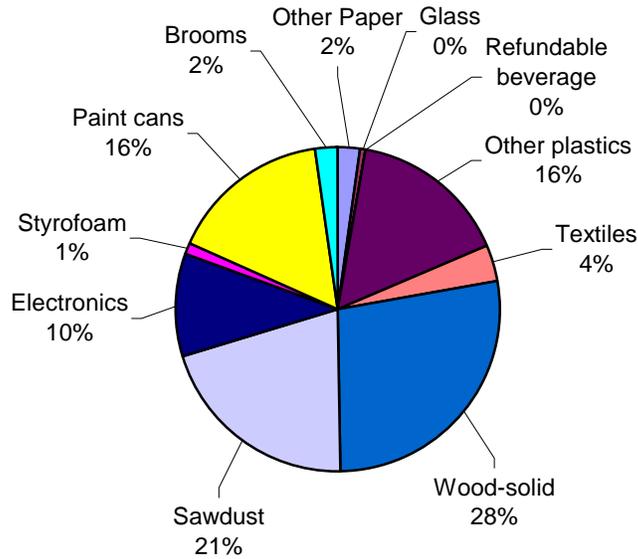


Figure 11 - Theatre waste stream composition (excluding engineered wood) (%mass)

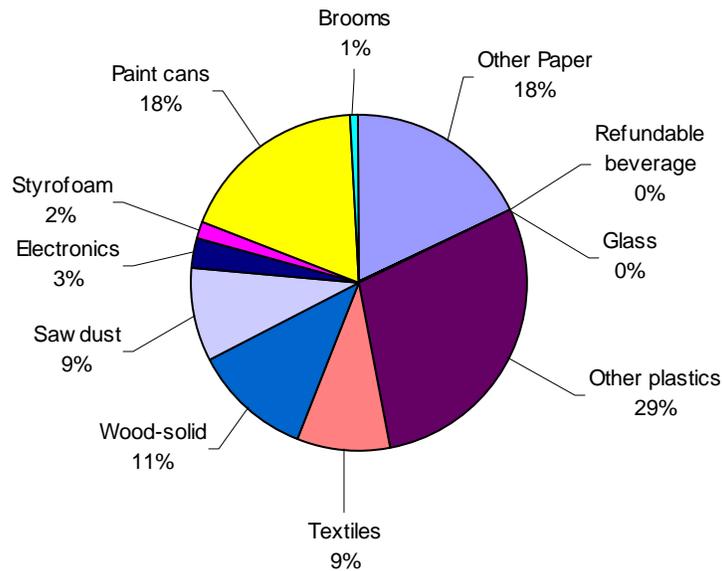


Figure 12 - Theatre waste stream composition (excluding engineered wood) (%volume)

The waste stream did not contain any significant amounts of recyclable products, so source separation for this department can be deemed a success. Paint cans were once again found in the waste stream, indicating the need to reiterate the disposal protocols suggested after the July audit. The paint cans are classed as hazardous waste, and should be sent to Safety and Security as part of their Hazardous Waste Program.

The composition of the recycle stream is presented in Figure 13 and Figure 14. The recycling facilities within the theatre department are well utilised, with good separation of recyclable products.

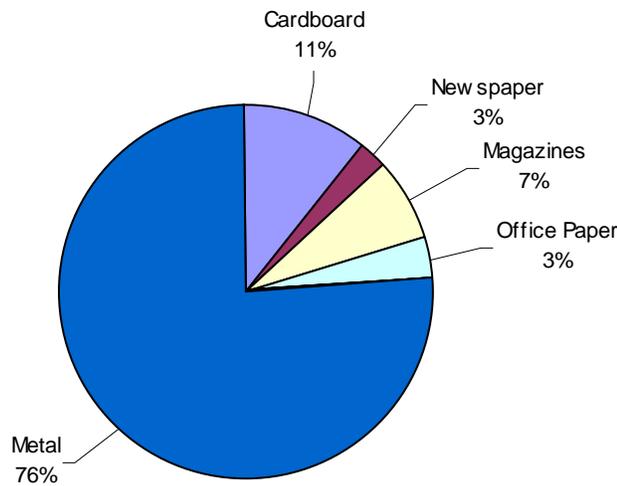


Figure 13 - Theatre recycle stream composition (%mass)

The theatre waste audits have now been conducted on two separate occasions, July 2005 and November 2005. Once more data becomes available it may become possible to see trends in the waste stream composition, even though the nature of waste generation from the theatre department may seem to be irregular.

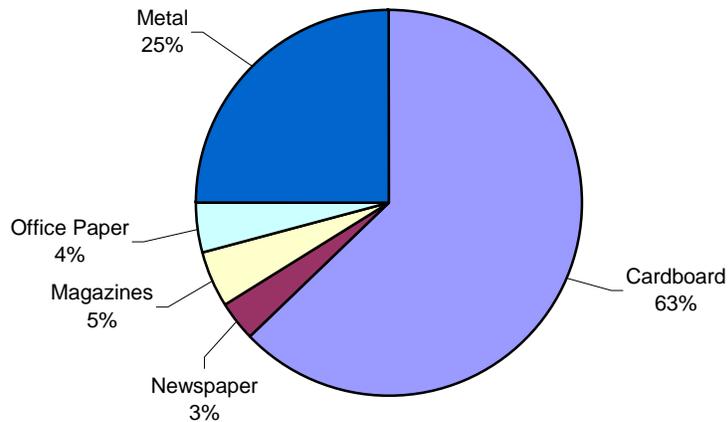


Figure 14 - Theatre recycle stream composition (%volume)

5.0 Campus-wide Waste Assessment

Campus-wide waste assessment, performed in conjunction with the Town of Banff, was not conducted as part of the November 2005 audit. This audit is to take place on an annual basis as part of the March waste audit.

6.0 Conclusions and Recommendations

The November 2005 waste audit revealed both strengths and weaknesses of The Banff Centre's waste management program, including issues identified from previous audits. The staff housing, food and beverage and theatre departments should be commended for their effective source separation of recyclable materials and all of the departments assisted in the preparation of the materials. This success indicates the potential for improvement and expansion of recycling programs at The Banff Centre. A number of possibilities exist for optimisation of the waste management program.

- Consider composting food and other organic waste when composting facilities become available.

- Waste compaction could be used to reduce overall waste volumes, particularly with staff housing and housekeeping waste, which is relatively low density.
- The successful staff housing recycling program could be expanded to include other waste categories, such as cardboard and plastics.
- Wood waste from the theatre department could be reused for woodworking by the Banff High School or other groups.
- Recyclable coffee cups could replace non-recyclable disposable coffee cups.
- Consider discontinuing the use of Swiffer® disposal cleaning pads by the housekeeping department.
- Banff Centre guests and housekeeping staff should be encouraged to participate in source separation for recycling.
- Paint cans (theatre department) and chafing fuel containers (food & beverage) should be disposed of in accordance with hazardous waste protocols.

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