

**SOLID NON-HAZARDOUS WASTE AUDIT
(MAY 2004-APRIL 2005)
UNIVERSITY OF TORONTO
ST. GEORGE CAMPUS
TORONTO, ONTARIO**

**ENVIROVISION INC.
FEBRUARY 2006**

TABLE OF CONTENTS

1.0	INTRODUCTION	1
1.1	Purpose.....	1
1.2	Scope.....	1
	Generally stated, the scope of work for this project was as follows:.....	1
2.0	Waste AUDIT RESULTS.....	3
2.1	Methodology.....	3
2.2	Sources of Waste Generation.....	4
3.0	DIVERSION PROGRAMS & WASTE MANAGEMENT SYSTEMS	9
3.1	Waste Diversion Programs	9
3.2	Waste Disposal Systems	11
3.3	Current Annual Diversion Rate	11
4.0	CONCLUSIONS AND RECOMMENDATIONS	12

LIST OF TABLES

Table 1: Waste Diversion Summary (May 2004-April 2005)	10
Table 2: Landfill Waste Summary (May 2004-April 2005)	11
Table 3: Quantities Recycled vs. Quantities Disposed.....	11

LIST OF FIGURES

Figure 1	Waste Audit Summary
Figure 2	Waste Diversion Summary (%)

LIST OF APPENDICES

Appendix 1	Waste Audit Results including: Summary of Buildings and Off-Site Compactors, Waste Audit Summary for all Buildings (Broken Down by Areas), Annual Recovery Rates by Areas
Appendix 2	Waste Audit Summary
Appendix 3	Waste Reduction Workplan Summary

1.0 INTRODUCTION

The following twelve areas of the solid waste generated within the U of T were audited: New College residence, Medical Sciences bld, Ontario Institute for Studies in Education (“OISE”), Robarts library, Bahen Centre, Earth Sciences, Faculty of Education, Sir Sanford Fleming, Whitney Hall, Sigmund Samuel, Simcoe Hall and 100 St. George. Twenty four hour samples were kept aside and tagged by generation area by caretaking for auditing purposes. Full compactor (or open 40 yd containers) were audited at OISE, Medical Sciences bld, 1 Spadina and New College at a transfer station to observe all waste disposed over longer periods of time (approximately one week each) without caretaking staff aware of this study.

1.1 Purpose

The purpose of the solid non-hazardous waste audit is described as follows:

- to comply with the Ministry of the Environment’s (“MOE”) 3R’s Regulation, specifically Regulation 102/94 Part XI which requires educational institutions to conduct waste audits and prepare waste reduction plans on an annual basis,
- to determine the current annual waste diversion rates for the U of T resulting from existing waste reduction, reuse, and recycling programs,
- to identify and quantify the composition and point of generation of waste at the U of T, and
- to identify any additional opportunities for waste reduction and diversion, which may exist at the U of T.

1.2 Scope

Generally stated, the scope of work for this project was as follows:

- to collect data pertaining to the waste collection practices and one day waste audit data of the U of T, and select full waste loads audited at a transfer station,
- to determine the total quantity of waste diverted from landfill through current reduction, reuse, and recycling initiatives by auditing files prided by RPSS, and

- to complete a report of the findings of the waste audit and prepare a Waste Audit Summary and a Waste Reduction Action Plan.

2.0 WASTE AUDIT RESULTS

2.1 Methodology

Waste categories were established prior to the audit based on the MOE's requirements for source separation at Educational Institutions:

- Corrugated Cardboard
- Mixed Paper
- Mixed Containers
- Polystyrene
- Bulk Wood
- Metal
- Yard waste

In coordination with the waste management supervisor and dept of caretaking 24 hr samples of primarily bagged waste was kept aside the day before the audit and each area of the building was designated with a different color tab. The waste was audited with 2 qualified staff people using containers to keep materials separate, a conversion of quantity counts to weight for containers and a portable scale and relevant safety gear. The source separated containers, paper towels and organic waste bins were also spot audited to verify volume to weight conversions. Extra safety supervision was provided on site during the audit at Medical Sciences bld. The audit was performed outdoors during the summer of 2005 primarily in July and this constitutes a summer sample not necessarily indicative of the activities and waste types generated during the regular school year with a much high community population

The full loads of waste were audited at the millennium transfer station with emphasis placed on qualitative observation and large items and special items that were perhaps overlooked at the 24 hrs sample level in the buildings. We looked out for things like furniture, electronics and source separated recyclables. Many pictures and even some weights were taken of interesting observations.

Additional categories were added based on actual waste composition observed during the visual inspection and on other information provided.

2.2 Sources of Waste Generation

A review of the U of T activities identified the following sources of waste generation:

- Residence living quarters (New College Residence)
- Laboratories (Faculty Department-Medical Sciences)
- Office/Administration
- Washrooms
- Kitchen/Cafeteria
- Classrooms, hallways and public areas

2.3 Waste Quantities, Composition and Distribution

The waste type, composition and distribution at the U of T were determined by performing an audit of all solid non-hazardous waste generated at the facility over a twenty four hour period and with select off site auditing of full waste loads. The total waste quantities diverted from landfill through current reduction and recycling initiatives and the total waste shipped to landfill from May 2004 to April 2005 were provided by the U of T.

The solid waste generated at the U of T's St. George Campus was divided in the following generation areas:

- New College Residence: Office/Administration, Kitchen, Washrooms, Residence Area
- Medical Sciences blds: Office/Administration, Cafeteria, Washrooms, Laboratory, Lobby/Classrooms
- (OISE): Office/Administration, Cafeteria, Washrooms, Lobby/Classrooms

These three, aforementioned building types are a good example of the major type of building and the activities conducted within the buildings typical of the U of T. A large residence with cafeteria, a mixed use building with many faculties and labs and finally a building with both administrative and student activities of a non science nature.

- Other Buildings including: Bahen, Earth Sciences, Faculty of Education, Sir Sanford Fleming, Whitney Hall, Sigmund Samuel, Simcoe Hall, Robarts library and 100 St. George.

The waste in these buildings was segregated by area in some cases and not in other primarily due to

the small size of the building and the smaller focus on these areas compared to New College, Medical Science and OISE buildings.

One of the key aspects of O. Reg. 102/94 is for waste generators to get a good understanding of the areas of their operation that generate the most waste, how it is generated and what the composition is. In so doing one can be aware of where to focus their recycling and waste reduction efforts.

During the one-day waste audit conducted in the summer of 2005, the areas generating most of the waste by weight are as follow: Robarts Library - 419.2 kg, Medical Sciences - 216.3 kg, OISE - 139.2 kg and New College Residence - 121.7 kg. During the waste audit, a total of approximately 1,361.4 kg of waste was audited. Spread sheets showing the individual waste categories and the weight of each category generated from all areas of the U of T are included in Appendix 1.

Based on the total amount of waste sorted, the buildings generating the greatest quantities of waste at the U of T were:

- Robarts Library 30.8 %
- Faculty Department (Medical Sciences) 15.9 %
- Administration Office (OISE) 10.2 %
- Residence (New College Residence) 8.9 %

The remaining eight buildings generated a total of 465.03 kg of waste, representing approximately of 34.2 % of the total waste audited.

Based on the total amount of waste sorted, the areas of the buildings audited within the U of T generating the greatest quantities of waste were:

- Robarts Library
 - Cafeteria 90.3 %
 - Hallways 8.5 %
- Faculty Department (Medical Sciences)
 - Laboratory 55.7 %
 - Lobby/Public Area/Hallways 19.4 %
- Administration Office (OISE)
 - Lobby/Public Area/Hallways 58.8 %

- Washrooms 20.3 %
- Residence (New College Residence)
 - Residence Area 45.6 %
 - Kitchen 29.1 %

Based on the total amount of waste sorted, the largest primary categories of waste generated during the audit were:

- Robarts Library
 - Mixed Paper 96.0 %
 - Beverage Cans 2.2 %
- Faculty Department (Medical Sciences)
 - General Waste 88.1 %
 - Mixed Paper 7.2 %
- Administration Office (OISE)
 - General Waste 74.5 %
 - Mixed Paper 13.4 %
- New College Residence
 - General Waste 71.9 %
 - Mixed Fibre (Paper Products) 12.5 %

Robarts Library

Robarts Library generated the largest quantity of the total waste audited among the 12 buildings (approximately 30.8 %). The area generating the most waste at this location was cafeteria (90.3 %). The largest quantity of waste generated at the cafeteria was mixed fibre , which accounted for approximately of 96 % of the total waste audited within Robarts Library. Furthermore, the other major categories of waste generated in the remaining areas of Robarts Library were: paper towels and general waste (offices and washrooms). Paper towels generated in the hallways at Robarts Library accounted for 33.4 % of the total waste generated in this area. Furthermore, significant quantities of mixed containers disposed of with regular garbage were also observed in the hallways and washrooms. These observations identify an excellent opportunity for additional improvements to the waste reduction program already in place.

Medical Sciences

Waste generated within Faculty Department (Medical Sciences) accounted for approximately 15.9 % of the total waste audited. Approximately 55.7 % of the total waste generated at the aforementioned location originates from laboratory and approximately 19.4% from public areas (hallways). General waste accounted for approximately 88.1 % of the total waste generated within the Faculty Department.

OISE

Waste generated within the OISE accounted for approximately 10.2 % of the total waste audited. Approximately 58.8 % of the total waste generated at the aforementioned location originates from public areas (hallways) and approximately 20.3 % from washrooms. General waste accounted for approximately 74.5 % of the total waste generated within the OISE. Furthermore, mixed paper accounted for approximately 13.4 % of the total waste generated within the OISE. Moreover, a significant quantity of beverage glass waste disposed of with regular garbage was also observed in the OISE's hallways.

Residence (New College)

Waste generated within New College accounted for approximately 8.9 % of the total waste audited. Approximately 45.6 % of the total waste generated at the aforementioned location originates from residence area and approximately 29.1 % from kitchen. General waste accounted for approximately 71.9 % of the total waste generated within New College. Mixed paper accounted for approximately 12.5 % of the total waste generated within the aforementioned area. Furthermore, a significant quantity of beverage glass waste disposed of with regular garbage was also observed in the New College's hallways.

As mentioned before, the remaining eight buildings (Bahen centre, Earth Sciences, Faculty of Education, Sir Sanford Fleming, Whitney Hall, Sigmund Samuel, Simcoe Hall and 100 St. George) generated a total of 465.03 kg of waste, representing approximately of 34.2 % of the total waste audited. In general, the largest quantities of waste generated within the aforementioned areas were: general waste, mixed fibre and paper towels. However, significant quantities of concrete and wood wastes were observed in the hallways of Earth Science and Sanford Fleming, respectively. This is more than likely an irregularity as was found in 215 Huron where we observed a large amount of floor sweepings on the audit day. Significant quantities of aluminum cans and/or glass bottles disposed of with regular garbage were also observed in Bahen Centre hallways.

NOTES FOR OFF SITE AUDITS AT TRANSFER STATION

Please refer to photographs.

New college bin:

- approximately 1 yard of cardboard.
- Five boxes of fluorescent tubes weighing approx 10kg.
- Lots of cable and wire and some scrap metal
- Eight full clear bags of containers

1 Spadina bin:

- One large overhead projector and lots and lots of e-waste computers, boards, laptops etc
- Three full bags of mixed paper and boxes of old reports, a few bags of yard waste
- Several wall partitions with metal frame, and lots of chairs
- Lots of interlocking bricks and some polystyrene packaging
- Lots of unbroken down cardboard

Medical Sciences

- Five large pieces of Styrofoam, four items of e-waste
- Over 140 bags of animal bedding

OISE

- The most cardboard of all 4 off site loads
- Full bags of mixed paper and containers source separated
- A few pieces of wood

3.0 DIVERSION PROGRAMS & WASTE MANAGEMENT SYSTEMS

3.1 Waste Diversion Programs

Recycling and re-use programs have been initiated at the U of T for the following materials:

Recycled

- Mixed Fibre (Mixed Paper) and paper towels
- Grass, branches and yard waste
- Clear plastic wrap and scrap plastic
- Cardboard
- Toner Cartridges
- Batteries
- Fluorescent Lamps
- Foam Packaging (Polystyrene)
- Organics (Food Waste)
- Bottles and Cans and cartons
- eWaste (Electronic Equipment)
- Acetates (Transparencies)
- Tires
- Recyclable furniture with metal attachments and general wood and pallets

Re-used

- Furniture, books, gadgets, office dividers and miscellaneous

The amount of waste diverted from landfill due to the above initiatives is presented in Table 1 entitled “*Waste Diversion Summary (May 2004-April 2005)*” and found on the following page.

Table 1: Waste Diversion Summary (May 2004-April 2005)

Material	Total Diversion (metric tonnes)^A
Recycled	
Mixed Paper	759.31
Yard Waste	48.94
Metal	95.6
Wood Pallets	70.95
Cardboard	231.93
Toner Cartridges	0.493
Batteries	7.733
Fluorescent Lamps	9.62
Foam Packaging (Polystyrene)	1.0
Organics	910.07
Bottles and Cans	293.58
Electronic Equipment	20.31
Transparencies	0.4
Furniture	23.150
Tires	0.130
Sub-Total	2,473.21
Re-used	
Furniture	50.00
Sub-Total	50.00
Total	2,523.21

A - Based on the information provided by the U of T.

3.2 Waste Disposal Systems

Approximately 1,851.8 metric tonnes of general waste was generated by the U of T from May 2004 to April 2005. The table below titled “*Landfill Waste Summary (May 2004-April 2005)*” presents landfill waste summary.

Table 2: Landfill Waste Summary (May 2004-April 2005)

Material	Total Waste (metric tonnes) ^A
General Waste	1,851.8
Total	1,851.8

A - Based on the information provided by the U of T.

3.3 Current Annual Diversion Rate

Table 3: Quantities Recycled vs. Quantities Disposed

Material	Total Waste (metric tonnes)	Percent (%)
Waste Disposed	1,851.8	42.3
Materials Reused	50.0	1.14
Materials Recycled	2,473.21	56.5
Total Waste Generated	4,375.01	100.0

Based on the total amounts of waste generated and materials recycled and reused, the current annual diversion rate through existing programs at the U of T is 57.6 %. This percentage could be increased if the U of T chose to include other re-use programs such as milk, egg and bread trays etc. To be consistent with past record keeping these considerations are not part of the scope of this study. Also there are countless vendors and departments in such a large community as the U of T one that it is difficult to track individual re-use programs although we acknowledge that they do exist.

4.0 CONCLUSIONS AND RECOMMENDATIONS

The U of T is a leader and a winning institution in its field when it comes to waste reduction and recycling. Not only is the diversion and waste reduction high relative to others in its class but the wide range of materials accepted for recycling and the depth and breadth of the programs is impressive. The data used to calculate diversion rates is as accurate as can be and it has been checked re-checked and makes use of conservative estimates. As mentioned before other programs for re-use have been excluded which would only further add to the impressive numbers. In the spirit of continuous improvement this report provides the following recommendations.

Based on the findings of our solid non-hazardous waste audit conducted at the U of T, the following conclusions and recommendations are intended to maximize the U of T's waste diversion potential:

1. In 2005, the U of T sent approximately 1,851.8 metric tonnes of waste to landfill and diverted approximately 2,523.2 metric tonnes of waste from landfill through recycling and reuse. This represents a diversion rate of approximately 57.6 %. This diversion rate is above the provincial target of 50% by the year 2000 and U of T is well on its way to meeting the 60% target of 2006.
2. According to O. Reg. 102/94, the Waste Audit Summary (Appendix 2) or the Waste Reduction Workplan (Appendix 3) must be posted at the U of T in a place where employees/students can review it. Furthermore, according to O. Reg. 102/94, when the summary is posted, the workplan should also be available for review for any of the U of T's employee/student who may requests it.
3. A report of a waste audit and reduction workplan must be retained on file for at least five years. Other reports and studies done in the past should also be available for review and incorporated in future audits for the sake of comparison and to track progress. O. Reg 102/94 audits should be conducted annually.
4. Specific problem areas can be identified by reviewing the tables building by building and area by area. For example animal bedding was identified in the audit as a major component of the waste stream in buildings with labs. This material was found to be compostable and a source separation program is now in place.

5. The U of T as much as possible makes use of multi-compartment containers for waste collection and recycling. This practice is excellent. Given the large size and numerous buildings and department there is still a presence of “solitary” waste bins on campus. If a person is carrying a recyclable material on their person they are more than likely to throw it in a close convenient waste can than to carry it with them for long stretches looking for a recycling centre. We recommend eliminated lonely waste bins and only having waste bins that are attached or close to recycling containers.
6. As observed in the full compactor audits at the transfer station caretaking and other U of T’s staff must make a special effort to not throw out source separated recyclable items and large and special items that are recyclable or re-useable. This process we realize is ongoing and is part of a continuing and ongoing policy of education and promotion.
7. In general public areas (i.e. classrooms, hallways, lobbies) generate more waste and have lower capture rates of materials.
8. Given the huge size of the U of T’s both from a geographical foot print point of view and the large numbers of faculties, schools, colleges, administrative and business units it is important for all of these different communities within the greater community to be aware of what the programs are, who to contact for help or questions and to have as much consistency as possible across the campus.
9. The full waste load audits at the transfer station as shown in the attached tables revealed a very important observation about sample size and procedure. The twenty four hour samples primarily of bagged waste kept aside by caretaking were not indicative of large recyclable items and full bags of source separated recyclables that were observed in the compactor scale audits. Had this extra step not been taken the percentage the capture rate of a given material would have been greatly screwed.
10. The U of T should consider an audit during the regular academic winter period, given the different type of community and much larger population frequenting the U of T grounds to compare with the summer results.

WASTE AUDIT SUMMARY-Industrial, Commercial and Institutional Establishments

(As Required by Ontario Regulation 102/94)

Company / Institution: University of Toronto, St. George Campus	
Contact Person: Reno Strano	
Site Address: 215 Huron Street, 5 th Floor, Toronto ON M5A 1A1	
Telephone:	Current Year: May 2004-April 2005

Type of Establishment		<input checked="" type="checkbox"/> Educational	Enrollment:
<input type="checkbox"/> Restaurant	<input type="checkbox"/> Over \$ 3 million	<input type="checkbox"/> Manufacturing	Hours/Month:
<input type="checkbox"/> Hospital	O.Reg. 964 Class A,B,F	<input type="checkbox"/> Office Building	sq.m.:
<input type="checkbox"/> Hotel/Motel	No. of Units	<input type="checkbox"/> Retail Shopping	sq.m.:

Waste Management Summary (Quantities in Tonnes)												
Waste Category	Generated			Reused			Recycled			Disposed		
	Base Year	Current Year	Increase/Decrease	Base Year	Current Year	Increase / Decrease	Base Year	Current Year	Increase/Decrease	Base Year	Current Year	Increase/Decrease
Yard Waste		48.940						48.94				
Organics(Food Waste)		910.070						910.070				
Batteries		7.733						7.733				
Fluorescent Lamps		9.615						9.615				
Toner Cartridges		8.8						0.493			8.307	
Transparencies		0.4						0.4				
Mixed Containers (Bottles, Cans)		402.176						293.580			108.596	
Metal		100.415						95.6			4.815	
Wood		84.138						70.95			13.188	
Furniture		96.381			50.00			23.150			23.231	
Mixed Fiber (Paper)		1,163.464						759.310			404.154	
Cardboard		253.276						231.93			21.346	
eWaste (Electronic Equipment)		101.622						20.310			81.312	
Foam Packaging (Polystyrene)		17.79						1.0			16.79	
Tires		0.130						0.130				
Waste to Landfill (incl. concrete and paper towels)		1,170.065									1,170.065	
Total		4,375.015			50.0			2,473.211			1,851.804	
Percent Change												

Recycled Content of Materials (Bought or Sold)	
Material	Percentage of Recycled Content ^A
Ledger- purchase material containing recycled content	10-100
Newspaper- purchase material containing recycled content	0-100
Cardboard- packaging material with post-consumer recycled content	10-100
Plastic bottles, Glass Containers and Aluminum Cans-purchase material containing post -consumer recycled content	10-100
Wood-packaging material with post-consumer recycled content	10-100
Metal-material with post-consumer recycled content	25-100

A-Based on the average percentage of recycled content obtained from available website publications.

Note: Recycled-content material is an item that contains recovered materials. Recovered materials include both pre-consumer and post-consumer wastes. Post-consumer material comes from previously used business or consumer products. Pre-consumer material is basically manufacturing waste.

I hereby certify that the information provided is complete and correct, and the establishment complies with all the requirements of Ontario Regulation 102/94.		
Signature of Authorized Official:	Title:	Date:

WASTE REDUCTION WORKPLAN SUMMARY- SUMMARY-Industrial, Commercial and Institutional Establishments
 (As Required by Ontario Regulation 102/94)

Company / Institution: University of Toronto, St. George Campus		
Contact Person: Reno Strano		
Site Address: 215 Huron Street, 5 th Floor, Toronto ON M5A 1A1		
Telephone:	Period: (May 2004- April 2005)	Waste disposed: 1,851.8 metric tonnes

Type of Establishment		<input type="checkbox"/> Educational	Enrollment:
<input type="checkbox"/> Restaurant	<input type="checkbox"/> Over \$ 3 million	<input checked="" type="checkbox"/> Manufacturing	Hours/Month: 120,000
<input type="checkbox"/> Hospital	O. Reg. 964 Class A,B,F	<input type="checkbox"/> Office Building	sq.m.:
<input type="checkbox"/> Hotel/Motel	No. of Units	<input type="checkbox"/> Retail Shopping	sq.m.:

Waste Reduction Workplan								
Waste Category	Quantity (Tonnes)	Proposed Action to Reduce, Reuse or Recycle Material	Projections			Start Date	End Date	Status
			Reduction (Tonnes)	Reuse (Tonnes)	Recycling (Tonnes)			

I hereby certify that the information provided is complete and correct, and the establishment complies with all the requirements of Ontario Regulation 102/94.		
Signature of Authorized Official:	Title:	Date: