



## 2007 Alberta Highway Litter Characterization Study

Prepared for

Recycling Council of Alberta

With support from

Alberta Environment  
Beverage Container Management Board  
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## Table of Contents

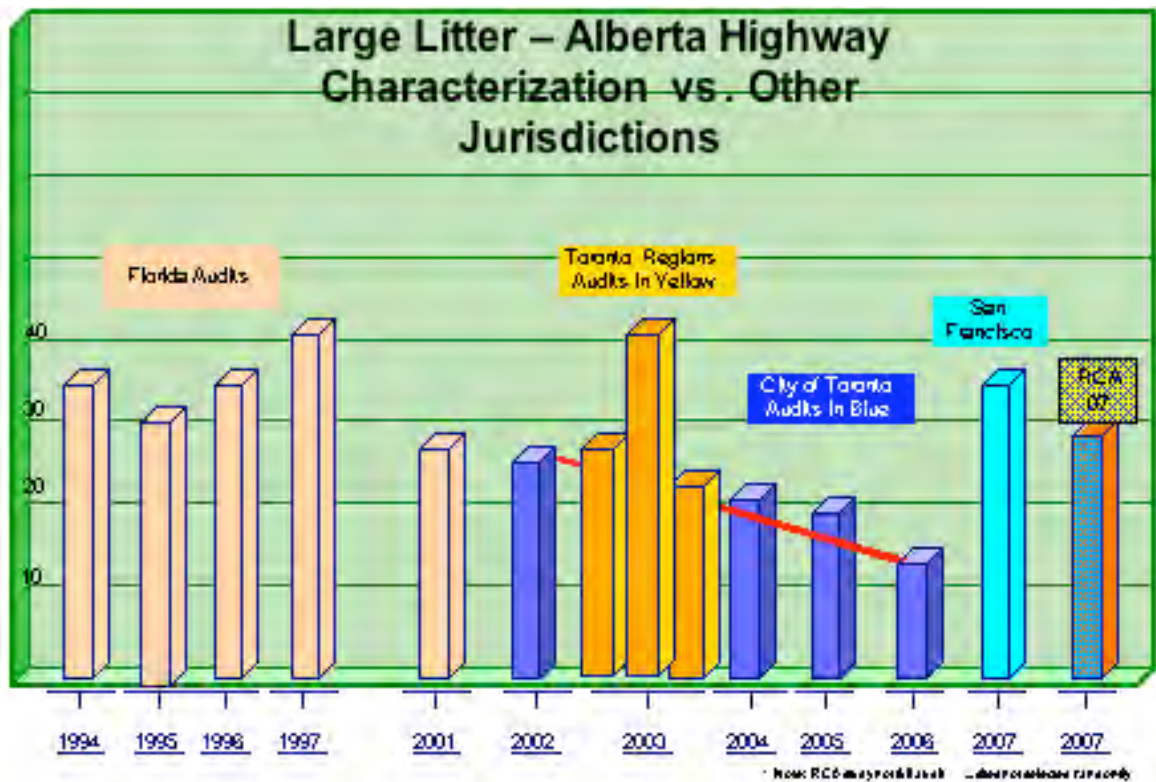
Executive Summary .....	3
Figure 1 – Alberta Sites Compared to Other Jurisdictions.....	3
Alberta Highway Litter Characterization Study.....	6
Background.....	7
2.0 Litter Characterization - Methodology.....	8
2.1 Site Selection Process.....	8
2.1.1 Site Selection.....	8
2.2 Detailed Site Files .....	8
2.3 Conducting a Litter Characterization Observations .....	9
Figure 2 - Schematic of Litter Characterization Site .....	9
2.4 Classification of Large Litter .....	10
Table 1 – Sub-Categories of Large Litter .....	10
Table 2 - Detailed Descriptions of Large Item Sub-Categories .....	12
2.5 Survey Counts of Large Litter.....	16
2.6 Documentation & File Management .....	16
2.7 Photographic Record of the Site .....	16
Figure 3 - Site Photographs (example photographs).....	17
2.8 Branded Litter Observations.....	18
2.9 Survey Schedule and Progress.....	18
3.0 Large Litter Characterization Survey Results .....	19
3.1 Discussion of Large Litter Results .....	19
Table 3 – Litter Observations – by Highest Sub-categories.....	19
Figure 4 - 25 Sub-categories Equal 77% of Litter.....	21
Table 4 – Comparison to Average Observations .....	22
3.2 Milk Container Litter Results.....	23
Table 5 - Milk Containers by Size and Type .....	23
3.2.1 Take-out Litter Discussion .....	24
Table 6 – Take-Out Food Service Litter .....	24
4.0 Branded Litter Results .....	25
4.1 Bags .....	25
4.2 Beer Cans .....	26
4.3 Beer Bottles .....	27
4.4 Soft Drink Brands (Cans).....	27
4.5 Confectionary - Gum .....	28
4.6 Confectionary – Candy Packaging.....	28
4.7 Confectionary – Other Confectionary & Snack Food Packaging .....	29
4.8 Cups – Paper Cups (Cold Drinks).....	29
4.9 Cups – Paper Cups (Hot Drinks).....	30
4.10 Cups – Fast Food Brands (Condiment packaging, napkins & plates).....	30
4.11 Fast Food Brands (Paper and Composite Food Wraps).....	31
4.12 Tobacco Brands .....	31
Appendix 1 - Large Litter Site Characterization Form .....	32
Appendix 2 – Detailed Site Descriptions .....	36
Appendix 3 – Alberta Litter Ranked by Items/ Site .....	37
Appendix 4 - About MGM Management .....	38

# Executive Summary

As illustrated by the chart below, several jurisdictions have been making progress with their litter abatement efforts. The 2007 Alberta Highway Litter Characterization Study data has been shown along with results of other jurisdictions for illustration purposes only. It is important to note, that the 2007 Alberta Highway Litter Characterization Study did not use a random site selection approach to determining where litter was observed. This skews the Alberta data towards higher average items per site than would be observed if random site selection was used.

During the 2007 Alberta Highway Litter Characterization Study, field observers observed 1,390 litter items at 47 sites, yielding an average of 30 large litter items per site.

Figure 1 – Alberta Sites Compared to Other Jurisdictions



As with other litter studies the consultant has conducted, we observe that plastic and paper litter are the largest sub-categories of large litter on Alberta highways. This is consistent with other studies, and is understandable. Miscellaneous plastics and miscellaneous paper represent those littered items that cannot be identified by their “product” type, so they must be characterized by the type of “material” the litter is comprised of.

The 2007 Alberta Highway Litter Characterization figure for miscellaneous plastics, was 10.2% of total litter, compared to an average of 8.7% of total litter for all studies done since 2002 (50,000 data points). Similarly, the Alberta figure for miscellaneous

paper was 9.7% of total litter, compared to an average of 14.7% of total litter for all studies done since 2002.

Tobacco products were observed to be 7.4% of all litter in the current study, compared to a historic average of 4.4% in all studies since 2002.

The Alberta litter observations show higher observances of cups, lids and pieces of hot and cold paper cups than the average levels. This may be due to the use of this type of packaging in the rural areas of Alberta, whereby some consumers discard these items as litter rather than dispose of them properly as garbage. It also may be worth noting that in the photographs of sites, no trash receptacles were noted. It may be that the opportunity to dispose of the litter properly could be improved in rural Alberta.

Another notable observation was that the occurrence of aluminum beer cans (2.9% vs. 0.2%) and that glass beer bottle litter (2.2% vs. 0.2%) in the Alberta data were an order of magnitude (ten times) higher than the averages seen in historic litter data. Non-alcoholic containers (i.e. soft drink containers) were observed in similar levels to historic data. The difference may be that the alcoholic beer containers are discarded from vehicles after consumption, since drinking in vehicles is illegal, and retaining them would be evidence of an offense if the driver is apprehended by law enforcement officials.

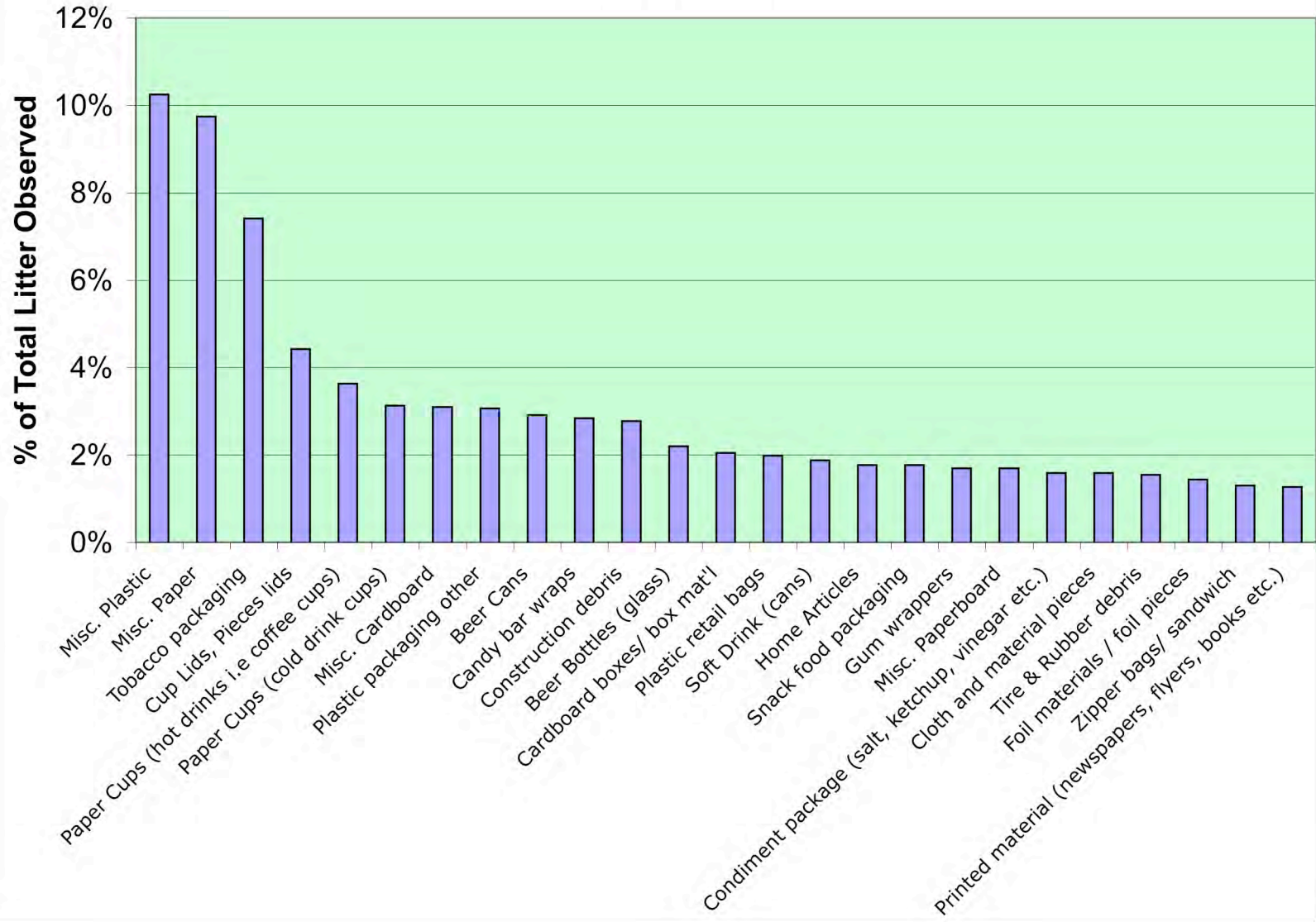
During the study, 19% of all large litter observed can be characterized as originating from a food service source. With nearly one in five items from this business sector is the largest single generator of litter observed in this study.

#### All Take-out Litter

Large Litter	Pass 1	Pass 2	Average *
Cup Lids, Pieces lids	62	61	61.5
Paper Cups (hot drinks i.e coffee cups)	52	49	50.5
Paper Cups (cold drink cups)	41	46	43.5
Plastic wrap	17	17	17
Plastic Jars / Bottles/ Lids	16	16	16
Name Brand (Fast Food etc.) Towels / Napkins / Serviettes	12	14	13
Paper Food Wrap	12	12	12
Plastic drink cups	10	11	10.5
Paper Fast Food Plates	9	9	9
Paper bags - fast food	7	9	8
Paper / foil composite wrap	4	7	5.5
Utensils	3	3	3
Plates - Other Mat's	2	2	2
Poly Fast Food Plates	2	2	2
Polystyrene Trays	2	2	2
Other Plastic Shells/Boxes	1	2	1.5
Cans - steel	1	1	1
Polystyrene clamshells	1	1	1
Paper Trays	0	1	0.5
	254	265	259.5
Total all large litter	1390		
% of total litter	19%		* Average Pass 1 & 2

As noted in Section 3, Results; 25 sub-categories of litter make up 77% of the total litter observed at the sites. See illustration on next page.

## 25 Sub-categories Equal 77% of Litter



## **Alberta Highway Litter Characterization Study**

The 4-H Clubs of Alberta have organized a spring highway clean-up program in Alberta for several years. In 2007, the RCA set out find a methodology to partner with the 4-H clubs, and characterize litter to give them insights into the types of materials littered on Alberta roadways.

RCA retained the services of MGM Management, a British Columbia based consulting firm that has experience in conducting litter research.

Normally MGM Management conducts field work using their own staff, or student labour, to examine sites. These sites are normally randomly selected, to prevent any bias. In the case of the 2007 Alberta Highway Litter Characterization Study; RCA inquired if it would be possible to modify the normal methodology to analyze the litter observed by 4H Club volunteers during their clean up activities.

MGM Management recommended that 4H Club volunteers be designated as auditors for characterizing observed litter, and they record observations for the purposes of this litter characterization work. MGM Management trained 14 “field observers” by remote training methods, using internet webcast technology to instruct the observers on how to take the necessary observations and record litter data for the purposes of this study. These training sessions were done in clusters of volunteers on May 1 & 2, 2007; in preparation for the provincial clean up day on Saturday May 5, 2007.

4H Club litter cleanup teams proceeded to do their clean-up work on Saturday May 5<sup>th</sup>, as per their normal annual procedures. The “leader” in a given group made arrangements to precede the clean-up volunteers and to make their observations on sites that were 200 ft. long x 18 ft. wide; which is the normal size of audited sites.

For the purposes of this litter characterization, only Large Litter items (items > 4 sq. inches) were recorded as observed litter. In analyzing the observations, MGM Management used the same 84 sub-categories for this characterization work as for all other litter audit work, which allows for comparisons with other jurisdictions.

An additional characterization was added to this study, which included a detailed analysis of milk packaging that was observed on Alberta roadways. This analysis examined what packaging types and brands of milk packaging were littered.

During the course of field observations, in addition to categorizing large litter auditors recorded the Brand Names of littered products. This can be of assistance in litter abatement program design at a later date.

This report describes the observations made of litter recorded during the 2007 Alberta Highway Litter Characterization Study.

# Background

MGM Management has conducted, or currently has scheduled, 15 litter audits in various North American jurisdictions. A listing of these litter audits appears in Appendix 4.

This report comments on the litter observed during the 2007 Alberta Highway Litter Characterization Study. This work is not considered a litter audit that compares directly with full litter audits because the sites were chosen by volunteer groups and were not selected in a random manner. This report comments on the characteristics of the litter observed at the Alberta sites in May 2007.

Changing litter behavior is not a quick fix proposition. Success in reducing littering requires a staged approach, involving:

- **Taking a strategic approach towards the problem**
  - Accepting that litter is an issue
    - Understanding the financial implications of clean-ups (all public and private stakeholders)
    - Recognizing that there are negative impacts of litter upon citizens / visitors
    - Having a commitment to make changes and to solve the problem over time
  
- **Having unbiased and credible baseline information**
  - How much litter is on the ground?
  - What is the composition of the litter?
  - What brands/ product sectors create products that are littered?
  - Documenting a baseline litter condition then designing programs to affect improvements.
  - Re-auditing after abatement , education efforts to measure changes
  
- **Designing litter abatement strategies specific to local situations**
  - Who are the litterers?
  - Why do they behave in this manner?
  - What are the “triggers” that can motivate change in these individuals?
  - Do they have an opportunity to dispose of garbage properly?
  
- **Efficiency, Education & Enforcement**
  - Redeployment of existing resources across service departments to achieve optimized efficiency (clean-up, trash receptacles etc.)
  - Develop and deliver targeted educational tools
  - Increasing penalties for littering and illegal dumping, and enforcing littering laws when required.

## **2.0 Litter Characterization - Methodology**

The 2007 Alberta Highway Litter Characterization Study, observed “accumulated litter” on roadways selected by participating 4H Clubs. After the 4H Club field observers recorded their findings the local club volunteers cleaned the site of accumulated litter. It is useful to note that many of the sites observed and recorded have been cleaned by local 4H members for several years, thus the observations likely represent a one year accumulation of litter.

### **2.1 Site Selection Process**

#### **2.1.1 Site Selection**

Full litter audits rely on random selection of audit sites in order to be unbiased. Normally, a geographical information system (GIS) database for the area to be audited is acquired (software used is ArcGIS 9.2 by Environmental Systems Research Institute Inc.) to allow random selection of sites. GIS data files are normally used to obtain spatial coordinates, which are then inputted into a sample generation program to randomly select potential litter audit sites. These data are then plotted onto computer generated maps and detailed locations identified.

For the 2007 Alberta Highway Litter Characterization Study the consultant was asked to modify their normal methodology to characterize litter at a limited number of sites selected by local 4H Clubs. In addition, the Recycling Council of Alberta requested that a further characterization be done relating to milk containers.

The same sub-categories of large litter as normally used for full litter audits, were used to characterize the litter observed during this study.

A total of 47 litter sites were sampled by field surveyors, during the period May 2, 2007 to May 5, 2007.

The location of each site was recorded by 4H Club observers. For each site further details of the audit site were recorded by the audit team while at location, to allow future audit teams to find the same sites should their be an interest in re-examining them again in the future.

#### **2.2 Detailed Site Files**

The consultant received site observation forms for each site examined. These forms contain the following:

- discrete site location ID number
- travel directions / or a description of where the site is located
- copies of photos taken on-site (where available)
- Large Litter Site Surveyor Form - (recording large litter observed)
- Milk Container Observations (where such containers were observed)

### 2.3 Conducting a Litter Characterization Observations

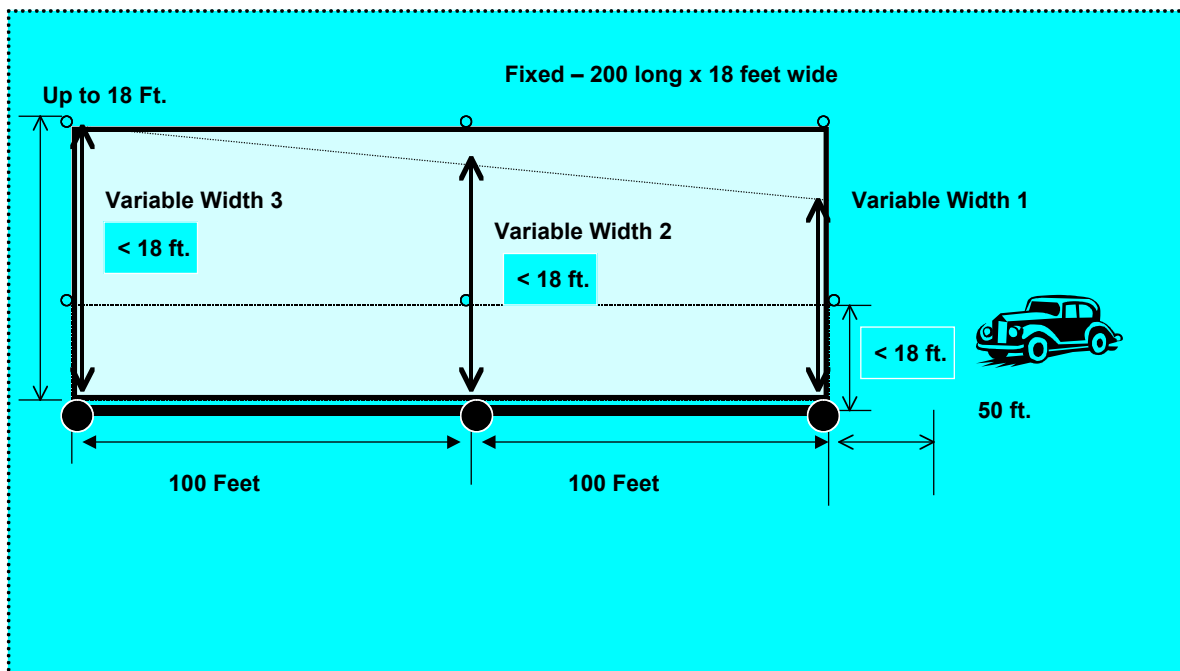
Teams were organized by local 4H Clubs and volunteers participated in both the characterization study and in cleaning up litter after the observations were completed.

Prior to the field work, the consultant carried on four webcast training sessions with 4H litter observers. These sessions lasted approximately 60 minutes, and provided participants with an understanding of how to make the field observations, how to record observations, taking photographs and how to submit data to the Recycling Council of Alberta, for transfer to the consultant for analysis.

Each site was measured to be 200 feet long, by 18 feet wide. This is the same size as all full litter audit sites as per previous litter audits.

The width of the site was measured from 1.5 feet inside the curb or highway pavement, (from the center of the roadway) towards the outer edge of the site, up to a maximum width of 18 feet. The rule was set to include 1.5 feet into the roadway since the municipality or road authority is responsible for litter clean up on the roadway as well as in ditches. Sites with a width of 18 feet and 200 feet long were designated are “fixed” sites. For the 2007 Alberta Litter Characterization Study, all 47 sites observed were fixed sites.

**Figure 2 - Schematic of Litter Characterization Site**



## 2.4 Classification of Large Litter

For purposes of classifying litter, and in accordance with the methods used in previous litter surveys conducted by us, large litter was defined as being greater than 4 square inches in size.

**Table 1 – Sub-Categories of Large Litter**

Eighty-four sub-categories of large litter were counted, including:

Major Category	Sub-Category Number	Large Litter	Sub-Category Name	Material
1	1	Beer Cans	Beverage	metal
	2	Beer Bottles (glass)	Beverage	glass
	3	Soft Drink (glass)	Beverage	glass
	4	Soft Drink (cans)	Beverage	metal
	5	Soft Drink (plastic)	Beverage	plastic
	6	Sport Drink (glass)	Beverage	glass
	7	Sport Drink (plastic)	Beverage	plastic
	8	Water (glass)	Beverage	glass
	9	Water (plastic)	Beverage	plastic
	10	Wine/ Liquor (glass)	Beverage	glass
	11	Wine/ Liquor (plastic/other)	Beverage	plastic
	12	Milk/Juice (Plastic)	Beverage	plastic
	13	Milk/Juice (glass)	Beverage	glass
	14	Milk/Juice (Gable Top)	Beverage	paper
2	15	Foil Pouches	Other Packaging	composite
	16	Aseptic (Box)	Other Packaging	composite
	17	Broken Glass Container	Other Packaging	glass
	18	Six pack plastic rings	Other Packaging	plastic
	75	Foil containers	Other Packaging	metal
3	19	Plastic drink cups	Cups	plastic
	20	Paper Cups (cold)	Cups	paper
	21	Paper Cups (Hot)	Cups	paper
	22	Polystyrene cups (foam)	Cups	plastic
	23	Other paper cups	Cups	paper
	24	Cup Lids, Pieces lids	Cups	plastic
4	25	Plastic retail bags	Bags	plastic
	26	Paper retail bags	Bags	paper
	27	Paper bags - fast food	Bags	paper
	28	Plastic bags - not retail	Bags	plastic
	29	Paper bags - not retail	Bags	paper
	30	Zipper bags/ sandwich	Bags	plastic
5	31	Cardboard boxes/ box mat'l	Other Packaging	paper
	32	Paperboard (cereal type)	Other Packaging	paper
	33	Paper Beverage Cases	Other Packaging	paper
	34	Polystyrene clamshells	Other Packaging	plastic
	35	Paper clamshells	Other Packaging	paper
	36	Other Plastic Shells/Boxes	Other Packaging	plastic
6	37	Plastic Jars / Bottles/ Lids	OTHER CNTRS.	plastic
	38	Glass jars/ bottles misc.	OTHER CNTRS.	glass
	39	Cans - steel	OTHER CNTRS.	metal
	40	Cans - aluminum	OTHER CNTRS.	metal

	41	Container lids	OTHER CNTRS.	
	42	Aerosol cans (paint, oils, etc.)	OTHER CNTRS.	metal
7	43	Paper Food Wrap	Food Wraps/ Cntrs	paper
	44	Paper / foil composite wrap	Food Wraps/ Cntrs	composite
	45	Plastic wrap	Food Wraps/ Cntrs	plastic
	54	Condiment package (salt, ketchup, vinegar etc.)	Take-Out Extras	
	55	Utensils	Take-Out Extras	plastic
	56	Name Brand (Fast Food etc.) Towels / Napkins / Serviettes	Take-Out Extras	paper
	57	Paper Fast Food Plates	Take-Out Extras	paper
	58	Poly Fast Food Plates	Take-Out Extras	plastic
	59	Other Plastic FF Plates	Take-Out Extras	plastic
	60	Plates - Other Mat's	Take-Out Extras	
8	46	Polystyrene Trays	Trays	plastic
	47	Paper Trays	Trays	paper
	48	Other Mat'l Trays (what?)	Trays	
9	49	Gum wrappers	Confectionary/Snack	
	50	Candy bar wraps	Confectionary/Snack	
	51	Candy pouches	Confectionary/Snack	
	52	Sweet packaging (describe)	Confectionary/Snack	
	53	Other confectionery (describe)	Confectionary/Snack	
	63	Snack food packaging	Confectionary/Snack	
10	61	Clothing or clothing pieces	Cloth	
	62	Other cloth	Cloth	
11	64	Plastic packaging other	Other Miscellaneous	plastic
	65	Paper packaging other	Paper/ Fibre Mat'l	paper
	66	Plastic / composite other	Other Miscellaneous	
	67	Foil materials / foil pieces	Other Miscellaneous	metal
12	68	No Brand Name Towels / Napkins / Serviettes	Paper/ Fibre Mat'l	paper
	69	Lottery ticket debris	Paper/ Fibre Mat'l	paper
	70	Printed material (newspapers, flyers, books etc.)	Paper/ Fibre Mat'l	paper
	71	Stationary (school, business etc.)	Paper/ Fibre Mat'l	paper
	72	Receipts (business forms, bus transfers, etc.)	Paper/ Fibre Mat'l	paper
13	73	Cigarette / cigar debris (>4")	Tobacco	
	74	Tobacco other (packs, matches, cellophane)	Tobacco	
14	76	Misc. Paper	Other Miscellaneous	paper
	77	Misc. Plastic	Other Miscellaneous	plastic
	78	Misc. Paperboard	Other Miscellaneous	paper
	79	Misc. Cardboard	Other Miscellaneous	paper
	80	Misc. Glass	Other Miscellaneous	glass
	81	Vehicle & Metal Road Debris	Other Miscellaneous	
	82	Construction debris	Other Miscellaneous	
	83	Tire & Rubber debris	Other Miscellaneous	rubber
	84	Home Articles	Other Miscellaneous	

**Table 2 - Detailed Descriptions of Large Item Sub-Categories**

1	Beer Cans	All brands of consumer beer can containers
2	Beer Bottles (glass)	Refillable and non-refillable beer bottles, all sizes
3	Soft Drink (glass)	Soft drinks, carbonated, non-carbonated, flavoured drinks in glass containers
4	Soft Drink (cans)	Soft drinks, carbonated, non-carbonated, flavoured drinks in metal can containers
5	Soft Drink (plastic)	Soft drinks, carbonated, non-carbonated, flavoured drinks in plastic containers, all sizes
6	Sport Drink (glass)	Sport drinks, carbonated or non-carbonated, flavoured drinks in glass containers, all sizes
7	Sport Drink (plastic)	Sport drinks, carbonated or non-carbonated, flavoured drinks in plastic containers, all sizes
8	Water (glass)	Packaged water, carbonated or non-carbonated, flavoured drinks in glass containers, all sizes
9	Water (plastic)	Packaged water, carbonated or non-carbonated, flavoured drinks in plastic containers, all sizes
10	Wine/ Liquor (glass)	Wine & liquor in glass, all sizes
11	Wine/ Liquor (plastic/other)	Wine & liquor in plastic or any other formats, all sizes
12	Milk/Juice (Plastic)	Milk or juice containers, packages in plastic
13	Milk/Juice (glass)	Milk or juice containers, packages in glass
14	Milk/Juice (Gable Top)	Milk or juice containers, packages in gable top paper cartons, all sizes
15	Foil Pouches	All packaged goods in foil packaging, pieces of foil materials
16	Aseptic (Box)	Drink-in-box, juice, fluids, other
17	Broken Glass Container	Glass fragments
18	Six pack plastic rings	Retainer plastic for carrying cans
19	Plastic drink cups	Cups, all sizes, all resin types
20	Paper Cups (cold)	Cups, all sizes, all paper types - cold drinks
21	Paper Cups (Hot)	Cups, all sizes, all paper types - hot drinks
22	Polystyrene cups (foam)	Cups, all sizes, all polystyrene types - hot drinks
23	Other paper cups	Cups, other materials
24	Cup Lids, Pieces lids	Fragments and pieces of cups
25	Plastic retail bags	Whole and pieces of retail plastic bags

26	Paper retail bags	Whole and pieces of retail paper bags
27	Paper bags – fast food	Whole and pieces of fast food outlet paper bags
28	Plastic bags – not retail	Whole and pieces of plastic bags, not retail i.e. dry cleaning
29	Paper bags - not retail	Paper bags & sacs, example leaf bag debris
30	Zipper bags/ sandwich	plastic lunch bags and sacs
31	Cardboard boxes/ box mat'l	All cardboard and box materials
32	Paperboard (cereal type)	Cereal, shoe boxes and pieces etc.
33	Paper Beverage Cases	Paper material outer packaging for beverage products
34	Polystyrene clamshells	Whole and pieces of take-away or other Styrofoam containers
35	Paper clamshells	Whole and pieces of take-away or other paper containers
36	Other Plastic Shells/Boxes	PET, PVC, HDPE , other material shells
37	Plastic Jars / Bottles/ Lids	All jars, bottles etc, plastic, non beverage, example dish detergent bottle
38	Glass jars/ bottles misc.	All jars, bottles not described above, in glass
39	Cans – steel	Food, non-food and other product steel can containers
40	Cans - aluminum	Food, non-food and other product aluminum can containers
41	Container lids	All lids, closures, and pieces > 4 sq. in.
42	Aerosol cans (paint, oils, etc.)	Aerosol cans, tops, lids - all products
43	Paper Food Wrap	Wrap for food, commercial & non-commercial; example meat wrap,
44	Paper / foil composite wrap	Wrap for food or non-food items, commercial & non-commercial; example hamburger paper/ foil composite wrap,
45	Plastic wrap	All plastic wrap types, food, non-food
46	Polystyrene Trays	Trays for take-out, non-take out, microwavable, display etc
47	Paper Trays	Trays for take-out, non-take out, microwavable, display etc
48	Other Mat'l Trays (what?)	Trays for take-out, non-take out, microwavable, display etc
49	Gum wrappers	Packaging used to seal, sell gum products
50	Candy bar wraps	Packaging used to seal, sell candy products
51	Candy pouches	Packaging used to seal, sell candy products - pouch format

52	Sweet packaging (describe)	Packaging used to seal, sell confections (cakes, pies, sweet snack products)
53	Other confectionery (describe)	All other packaging for confectionaries
54	Condiment package (salt, ketchup, vinegar etc.)	Pouches, containers, creamers etc
55	Utensils	Forks, knives, chop sticks etc
56	Name Brand (Fast Food etc.) Towels / Napkins / Serviettes	Towels & napkins etc with brand identification identifiable
57	Paper Fast Food Plates	Paper Plates, used to serve fast food
58	Poly Fast Food Plates	Polystyrene Plates, used to serve fast food
59	Other Plastic FF Plates	Other Material Plates, used to serve fast food
60	Plates - Other Materials	Plates for other than fast food applications, i.e. picnic plates used by families
61	Clothing or clothing pieces	All cloth, clothing pieces, and clothing discarded on the site
62	Other cloth	Tarps, industrial fabrics etc
63	Snack food packaging	All snack food (i.e.. Salty snacks, chips)
64	Plastic packaging other	Plastic packaging otherwise not described
65	Paper packaging other	Paper packaging otherwise not described
66	Plastic / composite other	All paper and composite debris not previously described
67	Foil materials / foil pieces	Foils and pieces, aluminum food foils, industrial foils
68	No Brand Name Towels / Napkins / Serviettes	Napkins and towels - no brand identification
69	Lottery ticket debris	Tickets, and gaming items
70	Printed material (newspapers, flyers, books etc.)	All printed material, commercially printed
71	Stationary (school, bus. etc.)	Includes school papers, written items, other printed materials such as business forms

72	Receipts (business forms, bus transfers etc. )	Receipts, business items, invoices, packing slips, bus transfers, commercial tickets (concerts, cinema)
73	Cigarette / cigar debris (>4")	Tobacco items
74	Tobacco other (packs, matches, cellophane)	Packages, wrappers, tobacco foil products, lighters, matchboxes
75	Foil containers	Foil containers (ice cream wraps)
76	Misc. Paper	All other non-described paper material, whole or shredded, unidentifiable as another category
77	Misc. Plastic	All other non-described plastic material, whole or shredded, unidentifiable as another category
78	Misc. Paperboard	All other non-described paperboard material, whole or shredded, unidentifiable as another category
79	Misc. Cardboard	All other non-described cardboard material, whole or shredded, unidentifiable as another category
80	Misc. Glass	All other non-described glass material, whole or broken, unidentifiable as another category
81	Vehicle & Metal Road Debris	Debris associated with transportation, private or commercial
82	Construction debris	Debris associated with construction, private or commercial
83	Tire & Rubber debris	Rubber materials, tire pieces, shock absorbers, sheet rubber or pieces
84	Home Articles	All non-described household items, (i.e.. Lamps, electrical, lawn chairs, etc)

## **2.5 Survey Counts of Large Litter**

After setting up each site, the litter observer commenced the large litter survey. Before starting the litter characterization survey, the field observer checked his/her tape recorder to ensure it was working properly (if a tape recorder was available).

The field observer then dictated the description sections of the Surveyor Site Form (Appendix 1) into the recorder. This information described the site number, date, digital photos taken, camera used, start time, type of site (rural, residential, industrial, commercial, village or town core), type of roadway, whether road is divided, grass height, evidence of a clean-up, stop sign/ traffic light visible, fast food near-by, convenience store nearby, described the litter catch points (grass mow line, hedge, fence, other), and provided a visual litter rating on a subjective basis. All photographs form part of the archival record for this survey and have been supplied to the Recycling Council of Alberta.

The visual litter rating is an “opinion” expressed by the litter observer as to whether the site is dirty (highest rating = 4) or clean (lowest rating = 1).

Once this information is recorded the field observer proceeded to walk the first pass through the site slowly, taping his/ her observations into the tape-recorder as they observe the site. Proceeding back and forth across the width of the site until the surveyor has walked the site up to the mid-point. The surveyor noted that they had reached the mid-point, then continued observing litter up to the end of the site boundary, making verbal notations of the litter observed and categorizing them into the 84 sub-categories of litter. This completed “Pass One”. The field observer then repeated the observations (“Pass Two”) over the site, using the same procedure, but in the opposite direction. Results of the two passes are used in data analysis.

## **2.6 Documentation & File Management**

At each site the teams were required to keep detailed records of their observations of large litter. Verbal observations were then transcribed onto a Large Litter Site Form (Appendix 1). In this way the verbal record was transferred to a written record for the site. This written record was then provided to the consultant for data entry and litter characterization analysis.

Each form was returned to the Recycling Council of Alberta for archival purposes.

## **2.7 Photographic Record of the Site**

At each site location, the litter observers took digital photographs, where possible. One shot was taken at the start of the site, looking towards the end of the site – away from the vehicle. The second shot was taken in the mid-point of the site – looking across the width of the site toward the width boundary. And the final photograph was taken at the end of the site – looking back towards the start of the site (towards the vehicle). The purpose of the photographs is to set the scene of the site – not to detail litter on the ground.

**Figure 3 - Site Photographs** (example photographs)



## **2.8 Branded Litter Observations**

Using the Large Litter Site Form (with 84 sub-categories of large litter) as a guide, data was also gathered for observing Branded Litter. Branded litter is large litter (i.e. over 4 square inches) that has a recognizable brand name affixed. Field observers verbally identified litter by brand name, which was later transcribed onto the Large Litter Site Form, for data entry and analysis. Where any doubt occurred in the identification of a brand of litter, no entry was made.

## **2.9 Survey Schedule and Progress**

The field observers were trained May 1 -2, 2007. Following an orientation and safety training session field observations began immediately. Fieldwork was conducted between May 2, 2007 – May 5, 2007. Hard copy forms were received by the consultant by June 5, 2007. Data analysis began on June 11, 2007.

# 3.0 Large Litter Characterization Survey Results

## 3.1 Discussion of Large Litter Results

A total of 47 sites were observed by field observers. Details of the locations and team leaders appear in Appendix 2.

**Table 3 – Litter Observations – by Highest Sub-categories**

All Litter Observations					
* Pass 1 and Pass 2 observations are averaged. Averages may not be whole numbers.					
	Large Litter	Pass 1	Pass 2	Average *	% of Total Large litter
1	Misc. Plastic	130	155	142.5	10.2%
2	Misc. Paper	129	142	135.5	9.7%
3	Tobacco packaging	97	109	103	7.4%
4	Cup Lids, Pieces lids	62	61	61.5	4.4%
5	Paper Cups (hot drinks i.e coffee cups)	52	49	50.5	3.6%
6	Paper Cups (cold drink cups)	41	46	43.5	3.1%
7	Misc. Cardboard	42	44	43	3.1%
8	Plastic packaging other	44	41	42.5	3.1%
9	Beer Cans	42	39	40.5	2.9%
10	Candy bar wraps	41	38	39.5	2.8%
11	Construction debris	38	39	38.5	2.8%
12	Beer Bottles (glass)	29	32	30.5	2.2%
13	Cardboard boxes/ box mat'l	28	29	28.5	2.0%
14	Plastic retail bags	26	29	27.5	2.0%
15	Soft Drink (cans)	26	26	26	1.9%
16	Home Articles	25	24	24.5	1.8%
17	Snack food packaging	25	24	24.5	1.8%
18	Gum wrappers	21	26	23.5	1.7%
19	Misc. Paperboard	22	25	23.5	1.7%
20	Condiment package (salt, ketchup, vinegar etc.)	21	23	22	1.6%
21	Cloth and material pieces	22	22	22	1.6%
22	Tire & Rubber debris	24	19	21.5	1.5%
23	Foil materials / foil pieces	21	19	20	1.4%
24	Zipper bags/ sandwich	18	18	18	1.3%
25	Printed material (newspapers, flyers, books etc.)	16	19	17.5	1.3%
26	Vehicle & Metal Road Debris	19	16	17.5	1.3%
27	Plastic wrap	17	17	17	1.2%
28	Plastic Jars / Bottles/ Lids	16	16	16	1.2%
29	Name Brand (Fast Food etc.) Towels / Napkins / Serviettes	12	14	13	0.9%
30	No Brand Name Towels / Napkins / Serviettes	11	13	12	0.9%
31	Paper Food Wrap	12	12	12	0.9%
32	Soft Drink (plastic)	12	12	12	0.9%
33	Paper packaging other	11	12	11.5	0.8%
34	Receipts (business forms, bus transfers, etc.)	11	12	11.5	0.8%
35	Milk/Juice (Plastic)	11	11	11	0.8%
36	Polystyrene cups (foam)	12	10	11	0.8%
37	Container lids	12	9	10.5	0.8%
38	Plastic drink cups	10	11	10.5	0.8%
39	Water (plastic)	10	11	10.5	0.8%
40	Candy pouches	9	11	10	0.7%
41	Clothing or clothing pieces	10	10	10	0.7%
42	Paper Fast Food Plates	9	9	9	0.6%
43	Paper bags - fast food	7	9	8	0.6%
44	Broken Glass Container	7	8	7.5	0.5%
45	Paperboard (cereal type)	8	6	7	0.5%
46	Stationary (school, business etc.)	7	7	7	0.5%
47	Other confectionery (describe)	6	7	6.5	0.5%
48	Milk/Juice (Gable Top)	6	6	6	0.4%
49	Paper / foil composite wrap	4	7	5.5	0.4%
50	Sweet packaging (describe)	5	6	5.5	0.4%

69.8%  
Top 20 sites

77.0%  
Top 25 sites

## All Litter Observations

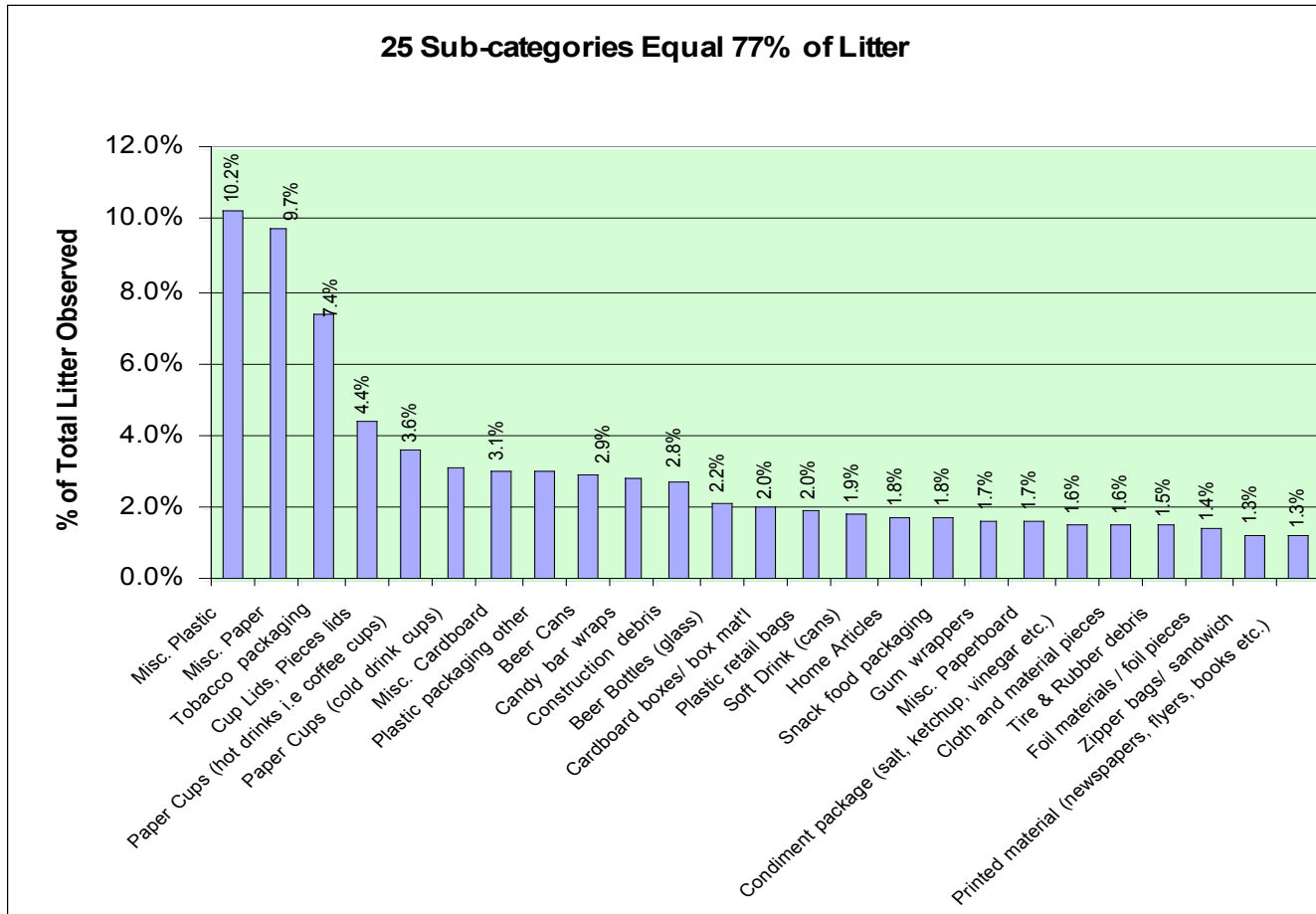
\* Pass 1 and Pass 2 observations are averaged. Averages may not be whole numbers.

Large Litter	Pass 1	Pass 2	Average *	% of Total Large litter
51 Paper retail bags	5	5	5	0.4%
52 Plastic bags - not retail	5	5	5	0.4%
53 Lottery ticket debris	4	5	4.5	0.3%
54 Plastic / composite other	5	4	4.5	0.3%
55 Foil Pouches	4	4	4	0.3%
56 Paper Beverage Cases	3	3	3	0.2%
57 Utensils	3	3	3	0.2%
58 Paper bags - not retail	3	2	2.5	0.2%
59 Six pack plastic rings	2	3	2.5	0.2%
60 Sport Drink (plastic)	2	3	2.5	0.2%
61 Aerosol cans (paint, oils, etc.)	2	2	2	0.1%
62 Aseptic (Box)	2	2	2	0.1%
63 Cans - aluminium	2	2	2	0.1%
64 Plates - Other Mat's	2	2	2	0.1%
65 Poly Fast Food Plates	2	2	2	0.1%
66 Polystyrene Trays	2	2	2	0.1%
67 Soft Drink (glass)	2	2	2	0.1%
68 Sport Drink (glass)	2	2	2	0.1%
69 Wine/ Liquor (glass)	2	2	2	0.1%
70 Other Plastic Shells/Boxes	1	2	1.5	0.1%
71 Cans - steel	1	1	1	0.1%
72 Foil containers	1	1	1	0.1%
73 Glass jars/ bottles misc.	1	1	1	0.1%
74 Milk/Juice (glass)	1	1	1	0.1%
75 Other Mat'l Trays (what?)	1	1	1	0.1%
76 Polystyrene clamshells	1	1	1	0.1%
77 Paper Trays	0	1	0.5	0.0%
	1357	1424	1390.5	100.0%

Number of sites observed for large litter 47

Average Items / Site 30

**Figure 4 - 25 Sub-categories Equal 77% of Litter**



As with other litter studies the consultant has conducted, we observe that miscellaneous plastic and paper litter are the largest sub-categories of large litter on Alberta highways. This is consistent with other studies, and is understandable. Miscellaneous plastics and miscellaneous paper represent those littered items that cannot be identified by their “product” type, so they must be characterized by the type of “material” the litter is comprised of.

The 2007 Alberta Highway Litter Characterization figure for miscellaneous plastics, was 10.2% of total litter , compared to an average of 8.7% of total litter for all studies done since 2002 (50,000 data points). Similarly, the Alberta figure for miscellaneous paper was 9.7% of total litter, compared to an average of 14.7% of total litter for all studies done since 2002. This lower observation for paper may reflect the flat nature of the lands in much of Alberta, and the effect of wind on large litter blowing off site.

Tobacco products were observed to be 7.4% of all litter in the current study, compared to a historic average of 4.4% in all studies since 2002.

Table 4 on the next page compares the 2007 Alberta Highway Litter Characterization data to historic averages in other litter studies undertaken by the consultant.

## Table 4 – Comparison to Average Observations

### Alberta Litter Characterization vs. Average Observations

		AB	All Studies <sup>1</sup>
		2007	2002-07
		(%of total litter)	
Rank			
1	Misc. Plastic	10.2%	8.7%
2	Misc. Paper	9.7%	14.7%
3	Tobacco packaging	7.4%	5.5%
4	Cup Lids, Pieces lids	4.4%	2.8%
5	Paper Cups (hot drinks i.e coffee cups)	3.6%	2.0%
6	Paper Cups (cold drink cups)	3.1%	0.9%
7	Misc. Cardboard	3.1%	1.0%
8	Plastic packaging other	3.1%	0.6%
9	Beer Cans	2.9%	0.2%
10	Candy bar wraps	2.8%	1.9%
11	Construction debris	2.8%	2.2%
12	Beer Bottles (glass)	2.2%	0.2%
13	Cardboard boxes/ box mat'l	2.0%	0.3%
14	Plastic retail bags	2.0%	0.3%
15	Soft Drink (cans)	1.9%	2.9%
16	Home Articles	1.8%	2.3%
17	Snack food packaging	1.8%	8.0%
18	Gum wrappers	1.7%	2.3%
19	Misc. Paperboard	1.7%	0.5%
20	Condiment package (salt, ketchup, vinegar etc.)	1.6%	1.0%
21	Cloth and material pieces	1.6%	0.6%
22	Tire & Rubber debris	1.5%	1.2%
23	Foil materials / foil pieces	1.4%	2.8%
24	Zipper bags/ sandwich	1.3%	0.4%
25	Printed material (newspapers, flyers, books etc )	1.3%	6.3%

1. Comparison to all litter data from 2002 - 2007, representing 50,000 litter observation datapoints . MGM Management studies only.

The Alberta litter observations show higher occurrence of cups, lids and pieces as well as hot and cold paper cup litter than the average levels. This may be due to the use of this type of packaging in the rural areas of Alberta, whereby some consumers discard these items as litter rather than dispose of them properly as garbage. It also may be worth noting that in the photographs of sites, no trash receptacles were noted. It may be that the opportunity to dispose of the litter properly could be improved in rural Alberta.

Another notable observation was that the occurrence of aluminum beer cans (2.9% vs. 0.2%) and that glass beer bottle litter (2.2% vs. 0.2%) in the Alberta data were an order of magnitude (ten times) higher than the averages seen in historic litter data. Non-alcoholic containers (i.e. soft drink containers) were observed in similar levels to historic data. The difference may be that the alcoholic beer containers are discarded from vehicles after consumption, since drinking in vehicles is illegal, and retaining them would be evidence of an offense if the driver is apprehended by law enforcement officials.

A ranking of all 2007 Alberta Highway Litter Characterization Study sites, by items per site appears in Appendix 3.

### 3.2 Milk Container Litter Results

One of the objectives of the 2007 Alberta Highway Litter Characterization Study was to examine the occurrence of milk containers as part of a sub-set of all large litter observed. This request to examine this packaging group was made by the Alberta Milk Container Recycling Program, a sponsor of the overall study.

Field observers were asked to note all milk containers they observed as litter, and to record the material and container type, the size and the brand of the product if visible. Table 5, below outlines the observations for milk container made during the study.

Milk packaging was observed to be a relatively small contributor to total large litter at the sites observed. Total milk packaging litter represented 1.3% of total litter as compared to higher contributions from other beverage categories (paper cups (hot & cold) 6.7%; beer cans 2.9%, beer bottles 2.2%, soft drink cans 1.9% and soft drink plastic bottles 0.9%).

**Table 5 - Milk Containers by Size and Type**

<u>Milk Container Observations</u>				May-07
				Brand
Polycoat milk cartons	Paper construction	Over 1 L		
		1 Litre	4	Beatrice (1)
		500 ml	1	
		250 ml		
Plastic Milk Containers	High Density Polyethylene (white opaque plastic)	4 litre jugs	1	Dairyland
		2 Litre jugs	2	
		1 Litre jugs	4	Dairyland (2), Nestle (1)
		500 ml. containers	4	Dairyland (1)
		325 ml. containers	2	Beatrice
		200 ml. containers		
		Plastic milk bags		
				% of total litter
Total			18	1.3%

### 3.2.1 Take-out Litter Discussion

In examining the results of the 2007 Alberta Highway Litter Characterization Study, the Recycling Council of Alberta requested that the consultant segregate litter items that are likely to be from items associated with take-out food services. In doing this, it is recognized that whereas the vast majority of items listed below would originate from a food service location, some items may be from other sources.

Table 6 below, describes those large litter sub-categories that are associated with take-out food services.

**Table 6 – Take-Out Food Service Litter**

All Take-out Litter

Large Litter	Pass 1	Pass 2	Average *
Cup Lids, Pieces lids	62	61	61.5
Paper Cups (hot drinks i.e coffee cups)	52	49	50.5
Paper Cups (cold drink cups)	41	46	43.5
Plastic wrap	17	17	17
Plastic Jars / Bottles/ Lids	16	16	16
Name Brand (Fast Food etc.) Towels / Napkins / Serviettes	12	14	13
Paper Food Wrap	12	12	12
Plastic drink cups	10	11	10.5
Paper Fast Food Plates	9	9	9
Paper bags - fast food	7	9	8
Paper / foil composite wrap	4	7	5.5
Utensils	3	3	3
Plates - Other Mat's	2	2	2
Poly Fast Food Plates	2	2	2
Polystyrene Trays	2	2	2
Other Plastic Shells/Boxes	1	2	1.5
Cans - steel	1	1	1
Polystyrene clamshells	1	1	1
Paper Trays	0	1	0.5
	254	265	259.5
Total all large litter	1390		
% of total litter	19%		

During the study, 19% of all large litter observed may originate from a food service source. With nearly one in five items from this sector this source is the largest single generator of litter observed in this study.

## 4.0 Branded Litter Results

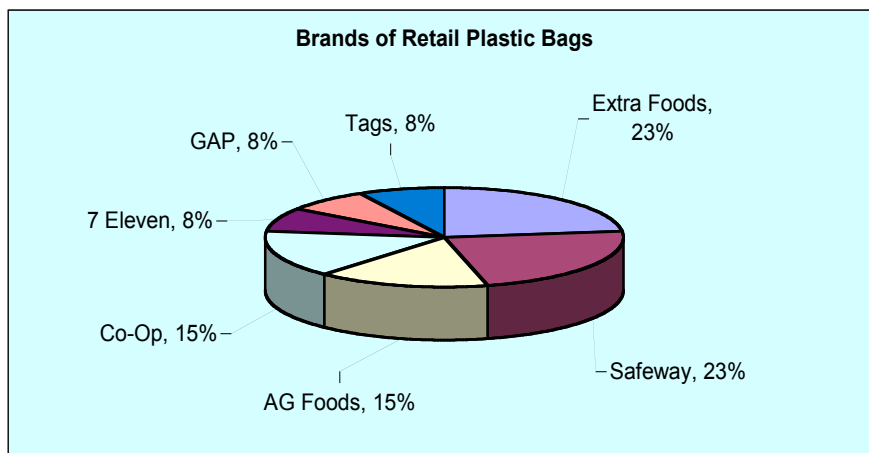
The Recycling Council of Alberta requested field observers record the brands of littered items on Alberta highways. The discussion of that follows recognizes that this study observed a relatively small quantity of litter (1,390 items) on sites that were selected because they had litter on them. Because of this selection procedure these sites are not considered randomly chosen. However, the sub-categories of litter presented below do show a similar pattern of contributions by branded products as has been noted in other litter audits performed by the consultant.

### 4.1 Bags

Two types of retail bags were observed, constructed of paper or plastic, that had identifiable brands that were recorded.

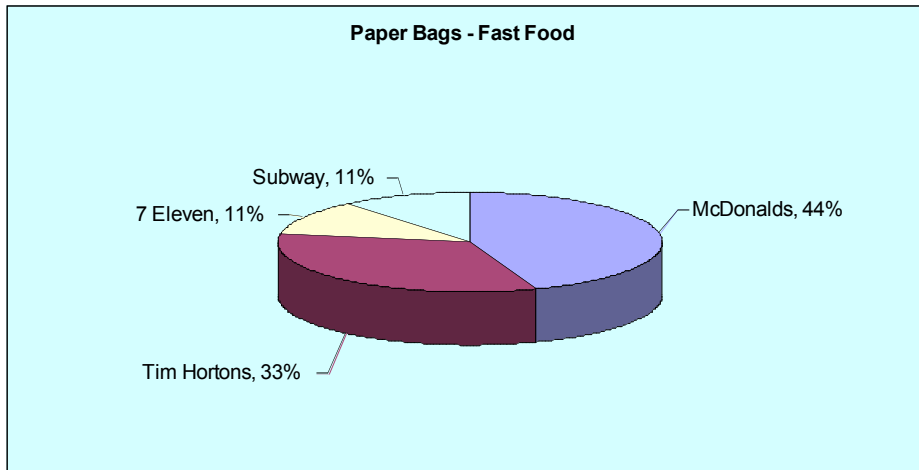
#### Plastic Bags - Retail

Brand Name	# Items	% of Brands
Extra Foods	3	23%
Safeway	3	23%
AG Foods	2	15%
Co-Op	2	15%
7 Eleven	1	8%
GAP	1	8%
Tags	1	8%
	13	100%



## Paper Bags - Retail

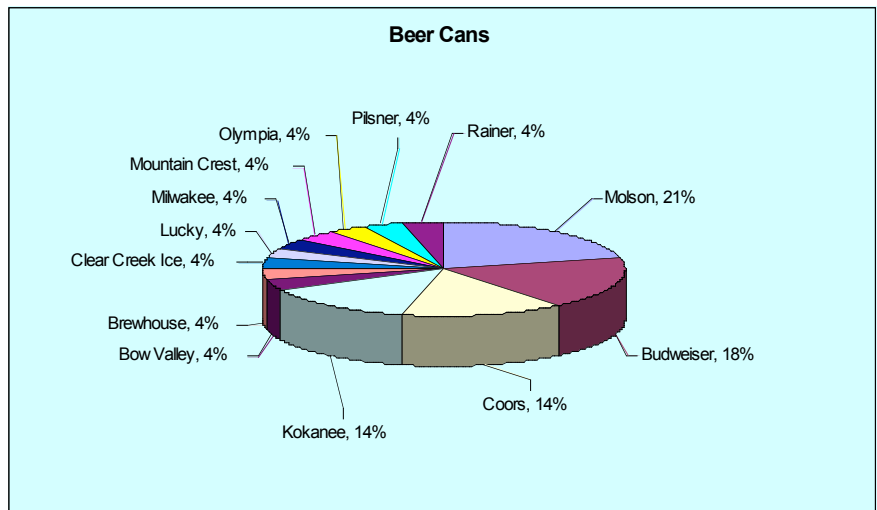
Brand Name	# Items	% of Brands
McDonalds	4	44%
Tim Hortons	3	33%
7 Eleven	1	11%
Subway	1	11%
	9	100%



## 4.2 Beer Cans

### Beer Cans

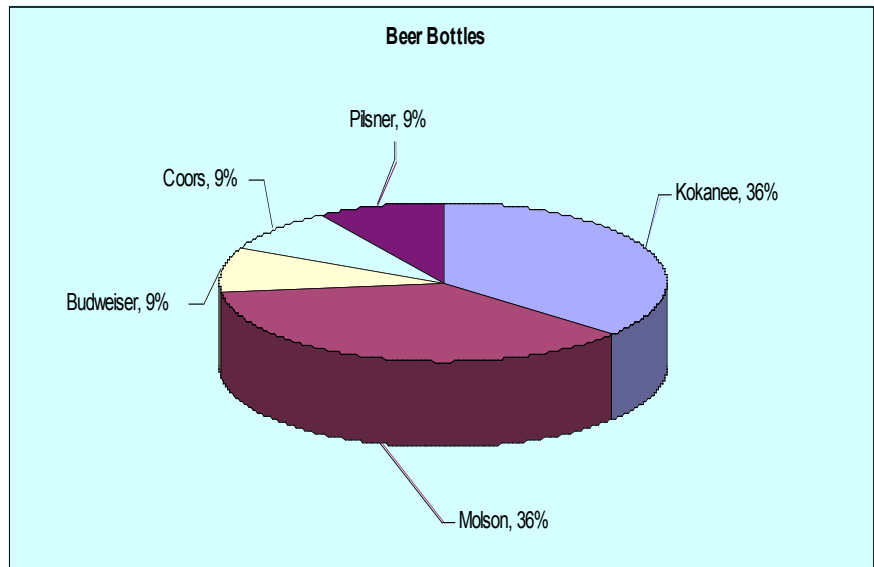
Brand Name	# Items	% of Brands
Molson	6	21%
Budweiser	5	18%
Coors	4	14%
Kokanee	4	14%
Bow Valley	1	4%
Brewhouse	1	4%
Clear Creek Ice	1	4%
Lucky	1	4%
Milwakee	1	4%
Mountain Crest	1	4%
Olympia	1	4%
Pilsner	1	4%
Rainer	1	4%
	28	100%



### 4.3 Beer Bottles

#### Beer Bottles

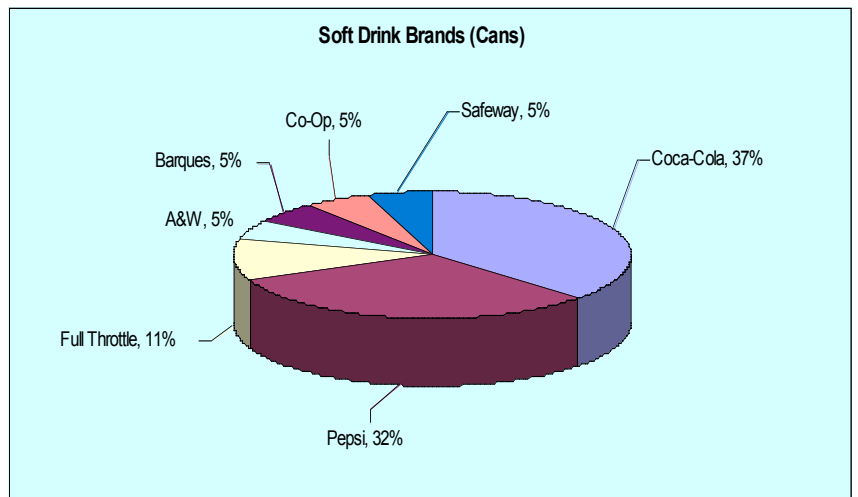
Brand Name	# Items	% of Brands
Kokanee	8	36%
Molson	8	36%
Budweiser	2	9%
Coors	2	9%
Pilsner	2	9%
	22	100%



### 4.4 Soft Drink Brands (Cans)

#### Soft Drink Containers (Cans)

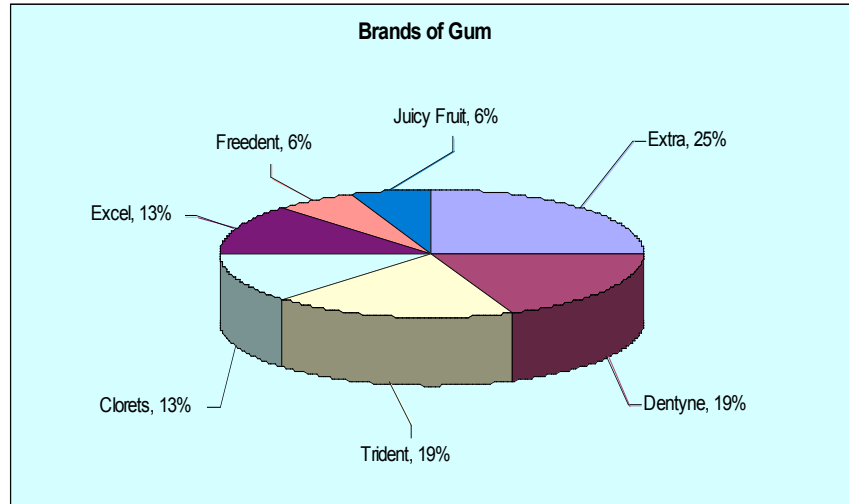
Brand Name	# Items	% of Brands
Coca-Cola	7	37%
Pepsi	6	32%
Full Throttle	2	11%
A&W	1	5%
Barques	1	5%
Co-Op	1	5%
Safeway	1	5%
	19	100%



## 4.5 Confectionary - Gum

### Confectionary - Gum Brands

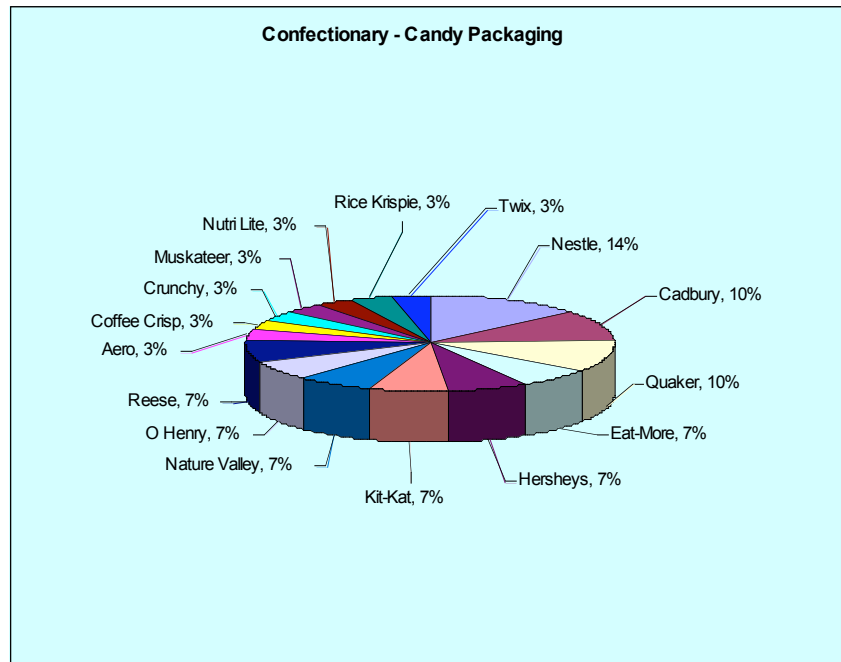
Brand Name	# Items	% of Brands
Extra	4	25%
Dentyne	3	19%
Trident	3	19%
Clorets	2	13%
Excel	2	13%
Freedent	1	6%
Juicy Fruit	1	6%
	16	100%



## 4.6 Confectionary – Candy Packaging

### Confectionary - Candy Brands

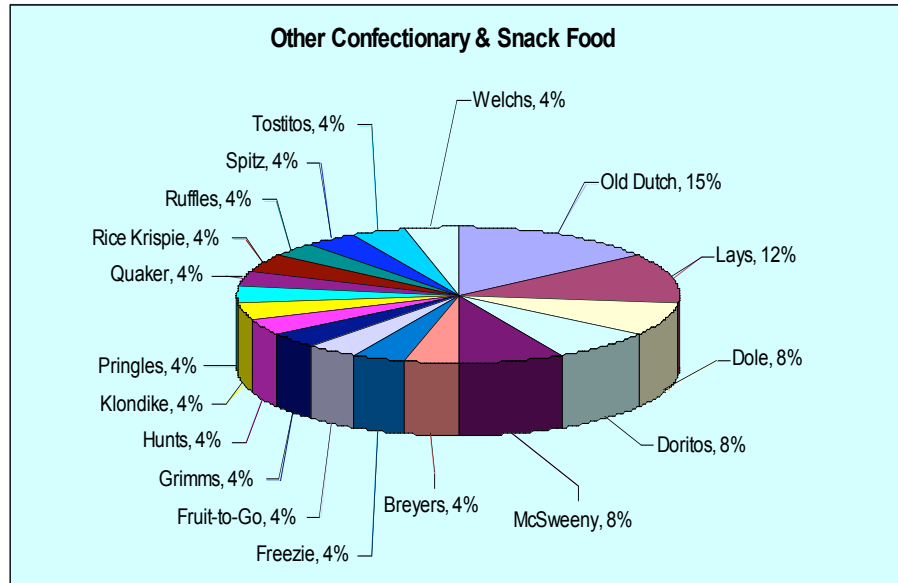
Brand Name	# Items	% of Brands
Nestle	4	14%
Cadbury	3	10%
Quaker	3	10%
Eat-More	2	7%
Hersheys	2	7%
Kit-Kat	2	7%
Nature Valley	2	7%
O Henry	2	7%
Reese	2	7%
Aero	1	3%
Coffee Crisp	1	3%
Crunchy	1	3%
Muskateer	1	3%
Nutri Lite	1	3%
Rice Krispie	1	3%
Twix	1	3%
	29	100%



## 4.7 Confectionary – Other Confectionary & Snack Food Packaging

### Other Confectionary & Snack Food Brands

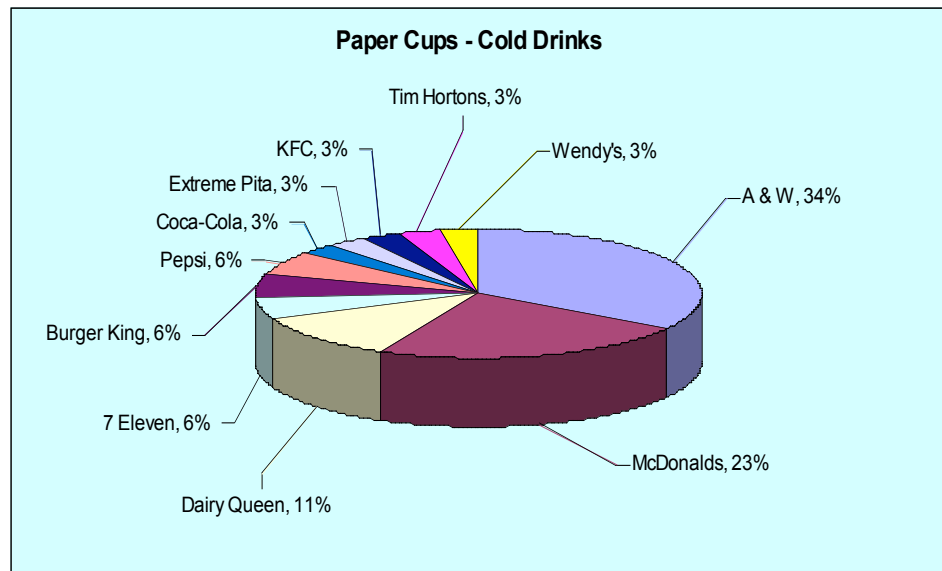
Brand Name	# Items	% of Brands
Old Dutch	4	15%
Lays	3	12%
Dole	2	8%
Doritos	2	8%
McSweeny	2	8%
Breyers	1	4%
Freezie	1	4%
Fruit-to-Go	1	4%
Grimms	1	4%
Hunts	1	4%
Klondike	1	4%
Pringles	1	4%
Quaker	1	4%
Rice Krispie	1	4%
Ruffles	1	4%
Spitz	1	4%
Tostitos	1	4%
Welchs	1	4%
<b>Total</b>	<b>26</b>	<b>100%</b>



## 4.8 Cups – Paper Cups (Cold Drinks)

### Paper Cups (Cold Drinks)

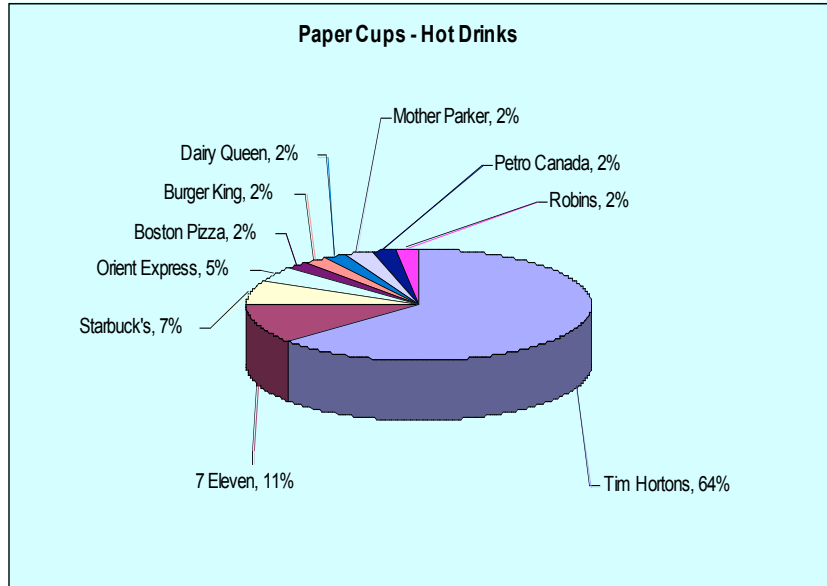
Brand Name	# Items	% of Brands
A & W	12	34%
McDonalds	8	23%
Dairy Queen	4	11%
7 Eleven	2	6%
Burger King	2	6%
Pepsi	2	6%
Coca-Cola	1	3%
Extreme Pita	1	3%
KFC	1	3%
Tim Hortons	1	3%
Wendy's	1	3%
<b>Total</b>	<b>35</b>	<b>100%</b>



## 4.9 Cups – Paper Cups (Hot Drinks)

### Paper Cups (Hot Drinks)

Brand Name	# Items	% of Brands
Tim Hortons	28	64%
7 Eleven	5	11%
Starbuck's	3	7%
Orient Express	2	5%
Boston Pizza	1	2%
Burger King	1	2%
Dairy Queen	1	2%
Mother Parker	1	2%
Petro Canada	1	2%
Robins	1	2%
	44	100%

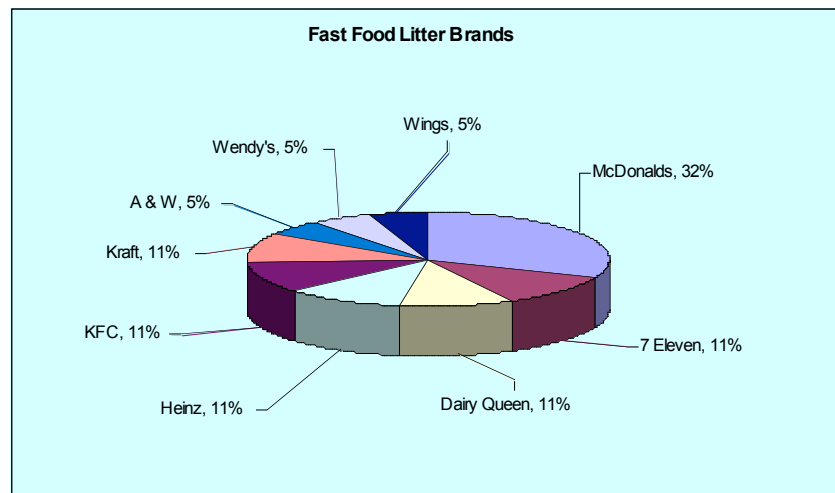


## 4.10 Cups – Fast Food Brands (Condiment packaging, napkins & plates)

### Fast Food Branded Litter

Brand Name	# Items	% of Brands
McDonalds	6	32%
7 Eleven	2	11%
Dairy Queen	2	11%
Heinz	2	11%
KFC	2	11%
Kraft	2	11%
A & W	1	5%
Wendy's	1	5%
Wings	1	5%
	19	100%

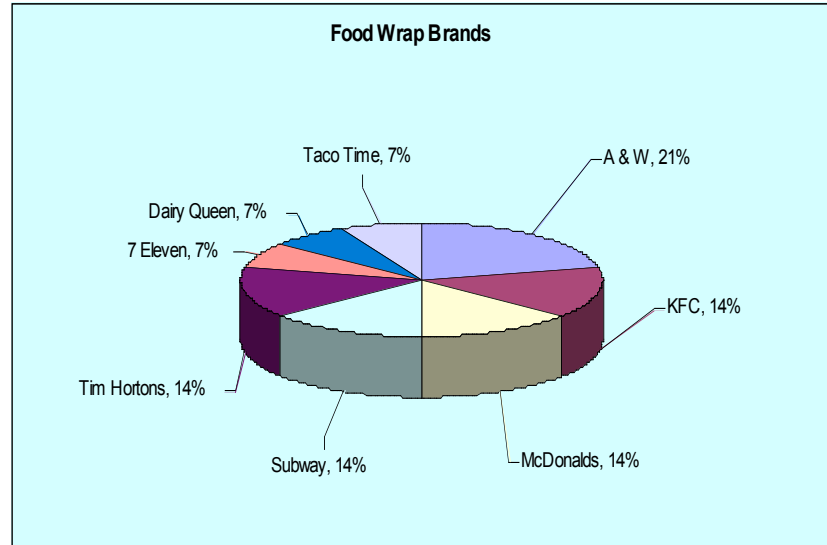
1. Note: Combines condiment packaging, branded napkins, and FF plates



## 4.11 Fast Food Brands (Paper and Composite Food Wraps)

### Fast Food Branded Food Wraps

Brand Name	# Items	% of Brands
A & W	3	21%
KFC	2	14%
McDonalds	2	14%
Subway	2	14%
Tim Hortons	2	14%
7 Eleven	1	7%
Dairy Queen	1	7%
Taco Time	1	7%
	14	100%

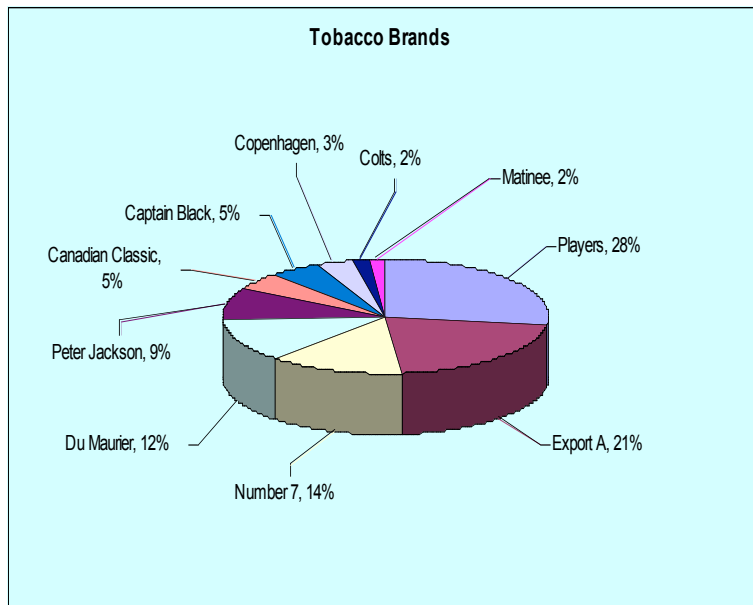


1. Note: Includes paper food wrap & paper/ foil composite wraps

## 4.12 Tobacco Brands

### Tobacco Packaging Brands

Brand Name	# Items	% of Brands
Players	16	28%
Export A	12	21%
Number 7	8	14%
Du Maurier	7	12%
Peter Jackson	5	9%
Canadian Classic	3	5%
Captain Black	3	5%
Copenhagen	2	3%
Colts	1	2%
Matinee	1	2%
	58	100%



# Appendix 1 - Large Litter Site Characterization Form

Site ID Number: \_\_\_\_\_ Date: \_\_\_\_\_ Photos Taken: \_\_\_ Y/N

Start Time: \_\_\_\_\_ Finished Time: \_\_\_\_\_ Tape #: \_\_\_\_\_

Surveyor's Name: \_\_\_\_\_ FIXED or VARIABLE \_\_\_\_\_ F / V (circle one)

**If variable:**

Width 1 :Beginning: \_\_\_\_\_ ft. (up to 18ft.)

Width 2: Middle: \_\_\_\_\_ ft. (up to 18ft.)

Width 3: End \_\_\_\_\_ ft. (up to 18ft.) **Always 200 feet long**

Road type: Major highway  Paved Rural Road  Unpaved Rural Road  Major City Street

Minor City Street  Laneway  Other  \_\_\_\_\_ (describe)

Lanes: 2, 4, 6, other (explain)

Is roadway / highway divided: \_\_\_\_\_ Y / N

**Area Attribute:**

Built up / urban area  Is the area Residential  Industrial  Parkland  
 Rural setting

Grass Height: a. < 3 inches:  b. 3" – 6":  c. over 6 ":  (Check one)

Catch point: fence  hedge  curb  mower line  tree line  other   
\_\_\_\_\_ details

Visual rating of site: ( 1 = cleanest ; 4 = dirtiest) \_\_\_\_\_

Is there a Fast food store within 1 KM? \_\_\_\_\_ Y/N

Convenience store within 1 KM \_\_\_\_\_ Y/N

Traffic light / stop sign or major intersection within sight? \_\_\_\_\_ Y/N

Evidence of Litter Clean up? \_\_\_\_\_ Y/N

Cleanup details \_\_\_\_\_  
\_\_\_\_\_ (text)

Additional comments : \_\_\_\_\_



	<b>WRAPS &amp; TRAYS</b>				
43	Paper Food Wrap				
44	Paper / Foil composite wrap				
45	Plastic wrap				
46	Polystyrene Trays				
47	Paper Trays				
48	Other Mat'l Trays				
	<b>CANDY &amp; GUM &amp; SNACKS</b>				
49	Gum wrappers				
50	Candy bar wraps				
51	Candy pouches				
52	Sweet packaging (describe)				
53	Other confectionery (describe)				
63	Snack food packaging (chips / peanuts etc)				
	<b>FAST FOOD ITEMS</b>				
54	Condiment package (salt, ketchup, vinegar etc.)				
55	Utensils				
56	Name Brand (Fast Food etc.) Towels / Napkins / Serviettes				
57	Paper Fast Food Plates				
58	Poly Fast Food Plates				
59	Other Plastic Fast Food Plates				
60	Plates - Other Materials				
68	No Brand Name Towels / Napkins / Serviettes				
	<b>HOUSHOLD ARTICLES</b>				
61	Clothing or clothing pieces				
62	Other cloth				

81	Vehicle & Metal Road Debris				
82	Construction debris				
83	Tire & Rubber debris				
84	Home Articles				
	<b>PRINTED MATERIALS</b>				
69	Lottery ticket debris				
70	Printed material (newspapers, flyers, books etc.)				
71	Stationary(school, bus. etc.)				
72	Receipts (business forms , bus transfers etc. )				
	<b>TOBACCO PRODUCTS</b>				
73	Cigarette / cigar debris (>4")				
74	Tobacco other (packs, matches, cellophane)				

**Milk Container Observations**

( Mark a tick mark for each milk container seen)

Polycoat milk cartons	Paper construction	Over 1 L
		1 Litre
		500 ml
		250 ml
Plastic Milk Containers	High Density Polyethylene (white opaque plastic)	4 litre jugs
		2 Litre jugs
		1 Litre jugs
		500 ml. containers
		325 ml. containers
		200 ml. containers
	Plastic milk bags	

## Appendix 2 – Detailed Site Descriptions

Site Id	Directions	TEAM	Site name
2007-001	Intersection of Highway 41 North and Highway 631. Site on North side of Highway 41 North	Darlene Barr	Highway 41 North
2007-002	Intersection of Highway 41 South and Twp. 530 West.	Darlene Barr	Highway 41 South.
2007-003	Intersection of Highway 41 North and Twp. 530.	Darlene Barr	Highway 41 North
2007-004	Site was closest to Castor Town.	Velma Schofield	Not Provided
2007-005	Closest to Town of Cator.	Velma Schofield	Not Provided
2007-006	Site in ditch on Hwy. #4 on west side from intersection of Highway #4 and Secondary railway.	Karen Ellert Garber	Highway #4
2007-007	Site is 5km west of Hwy. #4	Karen Ellert Garber	Hwy 501
2007-008	Site on Hwy. 5 in east bound ditch beginning at junction of Hwy 4.	Karen Ellert Garber	Hwy. 501
2007-009	Site in Red Deer County	Kim Cressey	Hwy 11A
2007-010	Red Deer County Twp. Site at intersection of RR 285 and Twp. 390 South.	Kim Cressey	RR 285
2007-011	Red Deer County. At intersection of RR 11 and Highway 11A	Kim Cressey	RR 11
2007-012	Site on south side of RR 12 at intersection of RR12 and Twp. Rd. 390. Site in ditch on f side.	Kim Cressey	RR 12
2007-013	Red Deer County. Site at intersection of RR 284 North and Hwy. 11A	Kim Cressey	RR 284 North
2007-014	Details of Location unknown	Terry Unruh	Not Provided
2007-015	Details of Location unknown	Terry Unruh	Not Provided
2007-016	Details of Location unknown	Terry Unruh	Not Provided
2007-017	Details of Location unknown	Terry Unruh	Not Provided
2007-018	Intersection of Hwy 8 and Hwy 2.	Sharon Riley	Hwy. 8
2007-019	Site on secondary Hwy. 855 on the east side of the road near Hwy. 53	Caroline Boddy	Hwy 855
2007-020	Site on secondary Hwy. 855 North of Heisler between Twp. Roads 430 and 432 on the side of the road.	Caroline Boddy	Hwy 855
2007-021	Site was done on secondary Hwy 855 east side of the road near the turnoff to Hwy 53	Caroline Boddy	Hwy 855
2007-022	Site on Hwy 855 between Township Roads 432 and 430 on east side of road.	Caroline Boddy	Hwy 855
2007-023	Site on Secondary Hwy. 855 on a section near the turnoff to Hwy 53 on the west side of road.	Caroline Boddy	Hwy 855
2007-024	Site on Hwy. 833 North of Twp. Rd 474	Joyce Wrubleski	Hwy 833
2007-025	Site on Hwy. 833 1.2km from Twp road 480.	Sheralyn Dobos	Hwy 833
2007-026	Site on Hwy 833 across from Hutterete Colony	Sherlyn Dobos	Hwy 833
2007-027	Site on Hwy. 833 North of Twp. Rd. 482.	Judy Summer	Hwy 833
2007-028	Site on the south side of RR#155 heading east 200 feet at lone tree.	April Brower	RR #155
2007-029	Site is 12.6km from the Town of Warner. Site is on the north side of the road heading east 200 feet.	April Brower	RR# 160
2007-030	Site on north side of RR#163 heading east for 200 feet. Site is 10K east of the Town of Warner and less than 1K west of 2 house farmyard on southside of road and large feedlot on north side of road.	April Brower	RR #163
2007-031	Site is on the south side of secondary hwy. #504 at intersection of Hwy. #36 heading east from the stop sign.	April Brower	Hwy. 504
2007-032	Site on north side of secondary Hwy. 504 at intersection of Hwy. 36 heading west and east from stop sign. Site is less than 1 km from Hwy 4 and Hwy 36 intersection and less than 1 km to town.	April Brower	Hwy. #504
2007-033	Site on Hwy. 41 at Twp. Rd. #180	Marianne Wells	Hwy. 41
2007-034	Site on Hwy. 41 at Twp. Rd. 184.	Marianne Wells	Hwy. 41
2007-035	Site on Hwy. 41 at 50 degrees 30 minutes and 0.73 seconds North and 110 degrees 05 minutes and 46.5 seconds West	Marianne Wells	Hwy. 41
2007-036	Site on Hwy. 41 at Twp. Rd 174.	Marianne Wells	Hwy 41
2007-037	Site on Hwy 41 North at intersection of Moosehills Rd. and Hwy 41 North	Shelley Tymofichuk	Hwy 41 North
2007-038	Site on Moose Hills Rd. between Murphy Pond and Hwy 41 North.	Donna Ockerman	Moose Hills Road
2007-039	Site on Moose Hill Road beginning at intersection of Murphy Rd.	Wanda Cochrane	Moose Hill Road
2007-040	Site on Hwy. 580 starts 0.5 km from junction of Hwy. 580 and Hwy. 5	Andrea Vaxvick	Hwy 580
2007-041	Site on Hwy. 5 at Twp Rd. 8-2	Andrea Vaxvick	Hwy. 5
2007-042	Site at intersection of 58 St. S (just at City limits)	Andrea Vaxvick	Hwy 4
2007-043	Site at rest stop just before town of Coalhurst heading West.	Andrea Vaxvick	Hwy 3
2007-044	site on Hwy 3 East at intersection of Ring Rd 21-1	Andrea Vaxvick	Hwy 3
2007-045	None given		Hwy #11
2007-046	Not given.		Hwy #11
2007-047	Not given		Hwy #11

# Appendix 3 – Alberta Litter Ranked by Items/ Site

## Alberta Sites - Ranked by Items / Site Observed

<u>Site Id</u>	<u>Site Name</u>	<u>Field Observer</u>	<u>Items / Site</u>
2007-039	Moose Hill Road	Wanda Cochrane	91
2007-018	Hwy. 8	Sharon Riley	82
2007-045	Hwy #11	Unknown	81
2007-047	Hwy #11	Unknown	80
2007-042	Hwy 4	Andrea Vaxvick	66
2007-041	Hwy. 5	Andrea Vaxwick	65
2007-046	Hwy #11	Unknown	61
2007-012	RR 12	Kim Cressey	50
2007-043	Hwy 3	Andrea Vaxvick	50
2007-044	Hwy 3	Andrea Vaxvick	50
2007-021	Hwy 855	Caroline Boddy	48
2007-011	RR 11	Kim Cressey	45
2007-013	RR 284 North	Kim Cressey	43
2007-010	RR 285	Kim Cressey	41
2007-032	Hwy. #504	April Brower	36
2007-004	Not Provided	Velma Schofield	30
2007-023	Hwy 855	Caroline Boddy	30
2007-026	Hwy 833	Sherlyn Dobos	30
2007-017	Not Provided	Terry Unrah	27
2007-024	Hwy 833	Joyce Wrubleski	25
2007-016	Not Provided	Terry Unrah	23
2007-025	Hwy 833	Sheralyn Dobos	21
2007-037	Hwy 41 North	Shelley Tymofichuk	21
2007-002	Highway 41 South.	Darlene Barr	20
2007-009	Hwy 11A	Kim Cressey	20
2007-031	Hwy. 504	April Brower	20
2007-019	Hwy 855	Carolne Boddy	19
2007-027	Hwy 833	Judy Summer	19
2007-003	Highway 41 North	Darlene Barr	18
2007-006	Highway #4	Karen Ellert Garber	18
2007-036	Hwy 41	Marianne Wells	18
2007-038	Moose Hills Road	Donna Ockerman	18
2007-020	Hwy 855	Caroline Boddy	16
2007-028	RR #155	April Brower	14
2007-040	Hwy 580	Andrea Vaxvick	14
2007-014	Not Provided	Terry Unruh	13
2007-015	Not Provided	Terry Unruh	12
2007-029	RR# 160	April Brower	12
2007-001	Highway 41 North	Darlene Barr	9
2007-022	Hwy 855	Caroline Boddy	8
2007-005	Not Provided	Velma Schofield	7
2007-007	Hwy 501	Karen Ellert Garber	7
2007-035	Hwy. 41	Marianne Wells	7
2007-034	Hwy. 41	Marianne Wells	5
2007-033	Hwy. 41	Marianne Wells	4
2007-008	Hyw. 501	Karen Ellert Garber	3
2007-030	RR #163	April Brower	3

## Appendix 4 - About MGM Management

MGM Management has conducted, or is contracted for 15 major litter audits including:

- Ontario – conducted under supervision of Dan Syrek, 1990
- Ontario – Toronto area 1994, done by McKenney with Syrek assistance
- Newfoundland Litter Audit - 1994
- City of Toronto - Street Litter Audit 2002
- Regional Municipality of Peel - Street Litter Audit 2003
- Regional Municipality of York - Street Litter Audit 2003
- Regional Municipality of Durham - Street Litter Audit 2003
- City of Toronto – Street Litter Audit 2004
- City of Toronto – Parks Litter Audit 2004
- City of Toronto - Street Litter Audit 2005
- City of Toronto - Street Litter Audit 2006
- City of San Francisco Street Litter Audit – April 2007
- City of Edmonton - Street Litter Audit 2007 (June 2007)
- City of Toronto - Street Litter Audit 2007 (Scheduled July 2007)
- City of Hamilton - Street Litter Audit 2007 (Scheduled October 2007)

The Toronto 2002; 2004, 2005 and 2006 Litter Audits were conducted using our methodology. The Regions of Peel, York and Durham are major urban municipalities around Toronto – these surveys were also conducted in 2003 using our methodology. We are also conducting audits in 2007 for the City of San Francisco, CA; and the City of Edmonton and we expect that we will be repeating a litter audit in Toronto, ON this year. Our survey methodology uses proven and recognized techniques to randomly locate litter survey sites and for counting 84 types of large litter, and 16 categories of small litter (small litter will not be included in the Alberta RCA project).

MGM Management is an environmental consulting company headed by Mark McKenney. Mark is a Canadian citizen holding a college diploma in Chemical Engineering Technology, 1971; as well as a Bachelor of Arts, in Law & Justice.

MGM Management is an incorporated company providing its clients with extensive experience in environmental research and analysis, project management, market development and environmental policy advice. The company has been in business since 1996, providing environmental management assistance to our clients.

The three main sectors of expertise of MGM Management are in waste management (recycling & packaging stewardship, litter management, industrial and hazardous wastes), water and wastewater management (wells, water treatment, water distribution systems and wastewater), and environmental investigations supporting litigations.

Mark has been working in the chemical and environmental fields for over 35 years. Beginning with a career in industrial chemistry he has been involved with the development of pollution abatement strategies dealing with air, water, and waste management. He has worked on pollution problems affecting forest products industries, pulp & paper, mining, chemical manufacturing, municipal waste management, recycling programs, wastewater treatment, municipal water treatment, supply and distribution.

Positions that he has held have included industrial chemical research postings, 16 years with the Ontario Ministry of the Environment (MOE) in progressively responsible positions

including the administration of municipal waste management (recycling) grants (\$30 million per year), environmental enforcement, legal orders and legally binding programs including C of A's, water and wastewater projects, air emissions, and Environmental Assessments exemptions.

Additionally he held positions as Executive Assistant to the Deputy Minister and as Executive Assistant to the Minister of the Environment, participating in MOE decisions at the highest levels, thus he understands government.

While at MOE, Mark was a senior manager assisting in the creation of the Investigations & Enforcement Branch of the Ministry of the Environment. He also managed over 60 investigative staff, conducting thousands of environmental investigations over the term of his tenure, many leading to high profile environmental court cases.

Returning to the private sector in 1989, he was Executive Director of Ontario Multi-Material Recycling Inc. (OMMRI) and also President of a national organization of beverage container recyclers (Beverage Recovery in Canada Inc.).

As President of BRinC, he assisted in creating beverage container management companies that operate collection systems (bottle bill – deposit systems), on behalf of brand owners, in several Canadian provinces. While at OMMRI and BRinC, Mark led these organizations efforts in understanding litter. Beginning in 1990, Mark sought out the best and most effective litter programs in North America. This was the Don't Mess With Texas program. He toured that program extensively in 1990, and then hired the Texas Department of Transportation's consultant Mr. Dan Syrek to conduct a litter survey in Ontario in 1990.

McKenney worked directly with Syrek to conduct a litter survey in Newfoundland. Mark McKenney, now President of MGM Management, was project manager of that work. Mark led the efforts by BRinC in Canada to find a simpler, more cost-effective approach for auditing litter.

In 1993, after the legislature of Florida directed the Center for Solid and Hazardous Waste Management, located at University of Florida in Gainesville, FL to develop simple litter audit methodology based upon their proposal, Mark contacted them to train him on how the methodology worked and to do a mini-survey in Ontario in 1994.

MGM Management's - Mark McKenney was trained in the use of this methodology by Center for Solid and Hazardous Waste Management staff, in 1994. Litter survey work has been done by McKenney in Ontario (1994), Newfoundland in 1996, The Regions of Peel, York & Durham in 2003 and in 2002, 2004, 2005, and 2006 for the City of Toronto based upon the current methodology.

Mark McKenney created and is the President of MGM Management (1996), an environmental consultancy. MGM Management provides services in the environmental and waste management areas, recycling, secondary materials marketing, environmental audits, stewardship program audits and compliance management and environmental program evaluations for private and governmental organizations. His client list includes major international corporations across Canada, the USA and Europe.

In August 2000, he was retained as a key member of the legal team defending the Town of Walkerton (Brockton), in regards to the waterborne disease outbreak that occurred in that community in May 2000. Mark was a policy advisor to the legal team and head of research for their efforts in defending the Town of Walkerton, its Council members and Mayor during the Walkerton Inquiry and in civil suits arising from that matter.

Mark is also a Past President of the Canadian Environmental Industry Association - Ontario Chapter, and is a past-member of the City of Toronto, Sustainability Roundtable, reporting to City Council.

Core proficiencies include: environmental-regulatory-governmental affairs, drinking water and wastewater management, air resources management, Certificate of Approvals, waste management including recycling and producer responsibility systems, litter surveys & programs, environmental and packaging audits. He has significant and numerous contacts throughout the environmental community across North America and in Europe. He brings extensive governmental and business experience to assist clients.

Mr. McKenney has conducted litter audits in the City of Toronto (Streets Litter Surveys in 2002 & 2004, 2005 and 2006 as well as conducting a litter audits for Toronto Parks in 2004). Litter audits were also conducted in 2003 for the Regions of Peel, Region of York, Region of Durham, (large suburban municipalities adjacent Toronto) as well as two major surveys in parts of Ontario. Two additional litter audits have been done by Mark McKenney in the Canadian Province of Newfoundland (Atlantic Canada). Additionally unsolicited litter audit mini-surveys have been completed in the Cities of Niagara Falls, Hamilton, Burlington, Oakville, London, St. Catherine's, Barrie, Kitchener, and Waterloo.

Additional details about the company are available at: [www.mgm-management.com](http://www.mgm-management.com)

Mark is a regular speaker at environmental conferences on the subjects of recycling, producer responsibility, water services and due diligence in preparing corporate entities to meet their environmental responsibilities. He has served as an independent Director of a private plastics recycling company in Nova Scotia - NovaPET Inc. He is a regular guest advisor to Boards of major recycling system operating companies across Canada, including those in BC, Alberta, and the Canadian Atlantic provinces.