FINAL CONSOLIDATED

Municipal Hazardous or Special Waste

Program Plan

Volume II: Material-Specific Plans

This plan includes information on the methodology that was used by the planning team to forecast program costs, including the key assumptions, and the sources of data and expertise that were used for the analysis. While the aggregated results of the analysis are included, specific details are confidential. This confidentiality is necessary to maintain the integrity of tendering and negotiation for future service contracts, and ensure that Stewardship Ontario obtains full value for money from these contracts.

July 30, 2009

The Consolidated MHSW Program Plan is presented in two volumes:

Volume I provides an overview of the overall program design; how stewards may discharge their legal obligations under the Waste Diversion Act; preliminary program cost estimates; how Stewardship Ontario proposes to recover these costs; and how the program will be delivered.

Volume II provides a break-out of key information related to each of the twenty MHSW material groupings established under the program plan.

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1.0 Aerosols

1.1 Definition

An aerosol is defined as any non-refillable means of containment that:

- Contains a substance (product) under pressure;
- Contains a propellant in gaseous form;
- Is fitted with a self-closing device allowing the contents to be ejected:
- As solid or liquid particles in suspension in a gas,
- As a foam, paste or powder, or
- As a liquid or a gas.

Aerosols are used to dispense a variety of products including paint, cleaners, foodstuff, hairsprays, air fresheners and insecticides.

1.2 Market & Product Information

The aerosol package is a self-contained dispensing system with three main elements:

1. Active ingredients (soap or disinfectant, paint, etc.) ;
2. Inert or inactive ingredients (water);
3. Propellant

The propellant is a gaseous compound which pushes the product out of the container and produces a spray or foam. In most cases, the propellant also acts as a solvent to keep the product at the proper strength. In the United States, the most common propellants are naturally occurring hydrocarbons. A few products, about 10% of today's aerosols, use compressed gases like carbon dioxide and nitrous oxide as propellants.

The final element is the container, which is usually a steel or aluminum can. The leak-proof can protects the product from contamination and evaporation and is available in a variety of sizes. Both the steel and aluminum cans are common materials collected through the Blue Box Program.

1.3 IC&I Generators

The Consolidated Plan targets waste aerosol from both residential and small quantity IC&I generators. As the estimates for aerosols were developed from municipal residential curbside waste audits, they do not reflect aerosols from IC&I sources.

1.4 Quantity Supplied for Use

The MHSW program will manage both empty and non-empty aerosol containers, regardless of their contents[1].

[1] Note: It is the aerosol container that is classified as "special waste" and not the contents

An estimated 54,061,693 aerosol containers were introduced into the Ontario market in 2007, which equates to 12 aerosols per household. The estimate was developed from the 2007 WDO Datacall information and Stewardship Ontario waste audit results.

Table 1.1: Estimated Quantities of Aerosol Containers Supplied into the Ontario Market

[3]Sales into Market	[1]2007	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Units	54,061,693	54,764,495	54,764,495	54,764,495	55,476,433	56,197,627
Tonnes[4]	6,131	6,210	6,210	6,210	6,291	6,373
% growth[5]	0%	0%	0%	1%	1%	1%

Table 1.1 Notes:

1. The most recent available Datacall information is for 2007
2. MHSW Program Plan Year 1 is the first 12 months after Commencement date
3. Aerosol containers supplied into the market developed based on quantities identified in Ontario household blue box and garbage waste audits
4. Weight of empty aerosol can is estimated at 4 oz according to the Oregon Ministry of Transportation Environmental Management System Handbook
5. Growth in use of aerosols has been flat for the last two years in Canada and is expected to remain so for the next two years (as reported by stewards.)

1.5 Quantity Available for Collection

Aerosol containers are not consumable products and therefore 100% are available for collection through the MHSW program. Table 1.2 below summarizes quantities available for collection.

Table 1.2: Estimated Quantities of Aerosol Containers Available for Collection

Available for Collection	2007	Year 1	Year 2	Year 3	Year 4	Year 5
Units (kg)	54,061,693	54,764,495	55,476,433	56,197,627	56,928,196	57,668,263
Tonnes	6,131	6,210	6,291	6,373	6,456	6,540
% of Sales	100%	100%	100%	100%	100%	100%

Notes:

1. MHSW Program Plan Year 1 is the first 12 months after Commencement date
2. Estimates of quantities of aerosol containers supplied into the market developed based on quantities identified in Ontario household blue box and garbage waste audits
3. Weight of empty aerosol can is estimated at 4 oz according to the Oregon Ministry of Transportation Environmental Management System Handbook.
4. Estimate reflects the weight of empty aerosols.

1.6 Current Management Infrastructure & Performance

According to the 2007 WDO Datacall, 105 of 211 municipal programs offered collection services for empty aerosols through the blue box program. These programs service approximately 4.6 million households.

According to the same source, 354 tonnes of aerosols were collected in 2007 through the Ontario municipal MHSW system. Furthermore, it is estimated that 2,550 tonnes of aerosol containers were collected through the Blue Box system in 2007.

Aerosol containers are made of steel or aluminum which can be recycled entirely.

1.7 Barriers and Opportunities to Increased Diversion & Research and Development Requirements

Barriers to increased diversion of aerosol containers include:

- Currently there is inconsistency in the way in which municipalities collect aerosol waste – some (but not all) municipalities will collect empty aerosols in their blue box program
- Some products used by the consumer in areas of the house other than the kitchen (e.g. air freshener, hair spray) are less likely to be recycled through the Blue Box system in those municipalities that accept aerosols as part of their Blue Box program[2]

Opportunities to increase diversion of aerosol containers include:

- Encouraging more municipalities to add empty aerosol containers to their blue box program
- Encouraging greater recycling efforts of personal care and cosmetic products used in areas of the house other than the kitchen
- Providing greater access for aerosol containers with residual content through MHSW collection systems

Further work is required to accurately quantify the number of aerosol containers both being disposed and recycled through waste audits.

1.8 Accessibility Strategy

The strategy to increase accessibility for aerosol containers will follow the general accessibility strategy outlined in section 5 of the Consolidated MHSW Program Plan. In addition to the depot, event, DIB, and Toxic Taxi channel, Stewardship Ontario will rely on the collection of aerosol containers through the Blue Box program.

1.9 Promotion and Education

As described in Section 5.5 of the Consolidated MHSW plan, Promotion and Education activities will be implemented at three levels.

The province-wide “branding the behaviour” P&E program will continue to build on the Do What You Can campaign urging people to think about 3Rs objectives when it comes to managing MHSW. The message will be an overarching, motivational call to action, driving people to the Do What You Can website to find material specific and collection information.

The second layer of P&E is targeted as “educating about specifics” which will provide people with the information they need to take action. The approach to this P&E will depend on whether the product is a consumable or durable and what the desired end-of-life might be. Many products and containers will be collected at events, depots or depots-in-a-box.

As well, for some materials, targeted collection programs will require point of sale P&E tactics.

[2] See Essex-Windsor Solid Waste Authority Envirotips Vol 28

The recovery of aerosol containers will be mainly promoted as part of province-wide generic campaign. Promotion and education efforts related to aerosols could also include encouraging consumers to recycle empty aerosols in the Blue Box system, where possible. A material specific budget is deferred in year one pending research and development activities.

1.10 Targets

1.10.1 Reduction

The introduction of the ban on the use of pesticides in Ontario from April 21, 2009, will have some impact on the use of aerosols, as aerosols are one of the delivery mechanisms used for these products (even if a relatively small one). Additionally, the education programs associated with paint, and other materials, to encourage consumers "to buy what they need and use what they buy" will also have an impact, particularly on the number of non-empty aerosols that are collected.

1.10.2 Collection

The following five-year collection targets have been developed for aerosol containers. The Year 1 collection target was derived using quantities collected reported in the 2007 Datacall and extrapolating this based on the general accessibility strategy presented in Section 5 of Volume 1 of the Consolidated Plan. In addition, waste audit results were used to confirm the reasonableness of the targets.

The collection target reflects both the weight of the can and any contents. The cans collected through the Blue Box program are largely empty (this program may only accept empty cans). At this time, there are no estimates available for the relative composition of aerosol waste collected, i.e., cans versus contents.

Table 1.3: Year 1 Collection Target for Aerosol Containers

Target	Year 1	Year 2	Year 3	Year 4	Year 5
Tonnes	3035	3160	3470	3829	4196
% of Available for Collection	49%	50%	54%	59%	64%

The collection target is expected to be met through a combination of various collection channels, as outlined in Table 1.4 below

Table 1.4: Collection Channels for Aerosol Containers

Collection Channel	Tonnage
Depot, Event, DiB, Toxic Taxi	485
Blue Box Program	2,550
Total	**3,035**

1.10.3 Recycling

According to service providers, it is not technically feasible to recycle about 15% of all the aerosols handle. This is the case for foam aerosols, corrosive aerosols, odd size aerosols and

propellant aerosols. The five-year recycling targets for aerosol containers are presented in Table 1.5.

Table 1.5: Five-Year Recycling Targets for Aerosol Containers

Target	Year 1	Year 2	Year 3	Year 4	Year 5
Qty Available for Collection (tonnes)	6,210	6,291	6,373	6,456	6,540
Collection target (tonnes)	3035	3160	3470	3829	4196
Recycling Performance Rate	85%	87%	89%	91%	93%
Recycling Target (tonnes)	2,580	2,749	3,088	3,484	3,902
Recycling Efficiency Rate	42%	44%	48%	54%	60%

1.11 Year 1 Costs and Fee Rate

The total costs attributable to aerosol containers and the fee rate are outlined in Table 1.6 below. Further information on the cost categories presented in Table 1.6 is available in Section 7 of Volume 1 of the Consolidated MHSW Program Plan.

Table 1.6: Year 1 Costs and Fee Rate for Aerosol Containers

Description	Cost
Material Management	$1,340,100
Contingency	$100,500
Material-Specific R&D	$0
Material-Specific P&E	$0
Common Costs	$477,600
Deficit Recovery	$0
Total	**$1,918,200**
Tonnes managed	3,035
Total cost/tonne	$632
Fee Rate ($/unit)	$0.036

Notes:

1) The costs reflect the costs for aerosols collected through both MHSW and Blue Box programs.
2) For the purposes of estimating material management costs, a contingency of 7.5% has been applied.
3) For the purposes of calculating a fee rate, a contingency of 3% has been applied to the estimated quantity of Aerosols supplied for use in Year 1 of the Consolidated MHSW Program Plan.

2.0 Antifreeze

2.1 Definition

Antifreeze is defined as products used or intended for use as a vehicle engine coolant. This includes:

- Ethylene or propylene glycol
- Antifreeze sold in all containers sizes including fluid supplied in bulk format

The following products are excluded from this category. Please note that exclusion from a category does not signify exclusion from the MHSW program. The products listed below are likely to be captured under other categories (i.e. flammables, toxics)

- Plumbing antifreeze
- Vehicle windshield antifreeze
- Product marketed as industrial heat transfer fluid
- Fuel (gasoline & diesel) antifreeze
- Lock De-Icer antifreeze
- Air Brake antifreeze
- Initial “factory fill” product

2.2 Market & Product Information

Referred to as coolant, is used exclusively in combustion engines as a heat transfer fluid. The main ingredient is ethylene glycol or propylene glycol.

It is sold in concentrate form that is diluted with water to desired concentration by the user, for “flush and fill” fluid changes. It is sold also premixed with water (ready to use – RTU) generally intended for “top ups” to replenish lost fluid due to evaporation and leaks.

Pre-packaged antifreeze is sold primarily in a 3.78L format, but also in 1L, 1.89L, 9.46L and 18.9L containers that are made of HDPE plastic, as well as in bulk format. Antifreeze can be purchased from retailers, service stations, gas stations, automotive shops, dealerships, etc.

Antifreeze is manufactured by a limited number of companies but sold under numerous private label and national brand names. Motor and coolant technology improvements are extending the interval between fluid changes. Antifreeze is installed and replaced in vehicles either by the vehicle owner – “Do-it-yourself” (DIY). Most commonly the antifreeze is replaced by an automobile service business – referred to as “Do-it-for-me” (DIFM). The DIFM channel falls into the Stewardship Ontario’s Special Service Channels (SSC).

2.3 IC&I Generators

The MHSW program for antifreeze and antifreeze containers encompass the management of all antifreeze regardless of category of user, i.e., whether generated by a consumer or a large or small IC&I business. The revised MHSW program now also includes all antifreeze sold, whether in packaged or bulk form.

2.4 Quantity Supplied for Use

Industry representatives estimate 4 million containers of pre-packaged antifreeze were sold in Ontario in 2007, containing approximately 15 million litres of product, half of which was "premix" and half of which was "concentrate". In addition 5 million litres were sold in bulk volume of a combination of premix and concentrate. In total, this translates to approximately 26,828,760 litres of diluted product sold into the Ontario market in 2007. Pre-packaged antifreeze is used by DIYs, but is also often used by automobile service centres where a bulk system is not installed, or when a customer specifies a brand of product.

Despite an estimated annual 2% growth in the number of motor vehicles, extended service intervals are expected to result in a gradual net decline in future sales of antifreeze. As the industry makes significant efforts to improve product lifespan, customers' acceptance of the extended product lifespan is expected to grow, thereby resulting in a projected decrease of sales of 5% per year.

Industry representatives estimate that in 2010 there will be 3.36 million antifreeze containers, containing 12,700,800 litres of product as sold, some in concentrate form, some pre-mixed, plus, approximately 5 million litres of antifreeze sold in bulk quantities, both in concentrated and pre-mixed form. In total, this translates to 25,551,200 litres of diluted product sold into the Ontario market, at a total weight of 27,467,540 kg.

Table 2.1: Estimated Quantities of Antifreeze supplied into the Ontario Market

[3]Sales into Market	[1]2007	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Units (litres)	26,828,760	25,551,200	24,273,640	23,059,958	21,906,960	20,811,612
[4]Tonnes	28,841	27,468	26,095	24,790	23,550	22,373
% growth	-	-5%	-5%	-5%	-5%	-5%

Table 2.2: Estimated Quantities of Antifreeze Containers supplied into the Ontario Market

[3]Sales into Market	[1]2007	[2]Year 1	Year 2	Year 3	Year 4	Year 5
[5]Units (kg)	493,920	470,400	446,880	424,536	403,309	383,144
Tonnes	494	470	447	425	403	383
% growth	-	-5%	-5%	-5%	-5%	-5%

Notes:

1. Year 2007 is the baseline year for MHSW Program Plan
2. MHSW Program Plan Year 1 is 12 months after program commencement date
3. Sales into the market and market growth forecast provided by stewards. Based on 2007 forecast and adjusted for current economic conditions.
4. Conversion from volume to weight is based on a typical density for a 50-50 diluted antifreeze provided by the stewards (1.075 kg/l).
5. The average weight of an antifreeze container is estimated to be 0.140 kg

2.5 Quantity Available for Collection

The quantities available for collection are based on product use. Premix product is generally used to replenish lost antifreeze. Waste antifreeze is not created during this kind of "top up" service. Concentrate is generally used, after dilution with water, for "flush and fill" service resulting in the increased volume of waste antifreeze typically drained from the cooling system.

Taking into account these factors, the Leading Edge Reports and other industry reports advise that for packaged antifreeze the loss factor is 50% and for bulk shipments the loss factor is 70%.This translates to a weighted average loss factor of 55%, leaving 45% available for collection.

Antifreeze containers are not consumables and therefore 100% available for collection.

Table 2.3: Estimated Quantities of Antifreeze Available for Collection

Available for Collection	[1]2007	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Tonnes	12,979	12,361	11,743	11,156	10,598	10,068
% of introduced into the market	45%	45%	45%	45%	45%	45%

Table 2.4: Estimated Quantities of Antifreeze Containers Available for Collection

Available for Collection	[1]2007	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Tonnes	494	470	447	425	403	383
% of introduced into the market	100%	100%	100%	100%	100%	100%

Notes:

1. Year 2007 is the baseline year for MHSW Program Plan, along with updates form the recent performance of the automotive incentive program
2. MHSW Program Plan Year 1 is 12 months after program commencement date

2.6 Current Management Infrastructure & Performance

According to the 2007 WDO Datacall, 55 municipalities offered collection services for antifreeze. This represents 3.7M households served. The 2007 WDO Datacall reports that 161 tonnes of antifreeze were collected through the municipal MHSW depot system.

In accordance with the Automobile Industry Association, there are approximately 12,500 automobile service provider outlets in Ontario. Of these approximately 7,500 locations throughout Ontario that generate auto MHSW from onsite operations currently participate in the MHSW Phase 1 antifreeze transportation incentive program[3]. These locations are the service centres that provide oil changes and radiator services to private vehicles as well as commercial sites that manage fleet vehicles. It is estimated that the total number of Ontario automotive locations that provide vehicle services and generate auto MHSW is 12,500. Based on this estimate, Stewardship Ontario is providing incentives to companies that provide transportation and processing services for these auto wastes to approximately 60% of service.

Furthermore, as part of the implementation of the Phase 1 MHSW Program, Stewardship Ontario has entered into agreement with Jiffy Lube and Oil Pro Change to collect antifreeze and antifreeze containers from DIYs. Currently, 39 Jiffy Lube and 2 Oil Pro Change locations are participating in the program.

Under Phase 1, 690 tonnes of antifreeze and 8 tonnes of antifreeze containers have been reported as collected from July 2008 to March 2009. Using current available for collection estimates, these collection amounts would represent only a 10% collection rate for antifreeze, and 1% for antifreeze containers. These collection rates fall far short of Phase 1 targets of 35%

[3] Under the MHSW Program, transportation incentives are paid based on the type of automotive MHSW and the geographic zones in which it is being transported. Incentive payments are also made for the processing of used oil and antifreeze containers. More information is available in the Manual for Transporters and Processors available at http://www.stewardshipontario.ca/mhsw/pdf/transporters_processors/T_P_Manual.pdf

for both antifreeze and antifreeze containers. However, these collection numbers are likely significantly understated, as there is currently a large amount of collected antifreeze awaiting shipment to processors, and therefore not yet reported as collected, and, in the case of antifreeze containers, they have, in the majority of cases, been collected along with oil containers, and have not been reported separately. Furthermore, accurate numbers for volumes of antifreeze and containers collected at municipal depots over the past nine months is not yet available.

2.7 Accessibility Strategy & Targets

The accessibility strategy for antifreeze for Year 1 of the program includes:

- Increase the number of service centres accepting waste antifreeze from DIY from the current 41 to at least 75 locations.
- Increase the number of service centres participating in the Stewardship Ontario incentive program from 7,500 to 8,500.
- Increase the collection through depots, events, Depot in a Box and toxic taxi as outlined in Section 5 of the MHSW Plan.

2.8 Promotion and Education

As described in section 5.5 of the Consolidated MHSW plan, Promotion and Education activities will be implemented at three levels.

The province-wide “branding the behaviour” P&E program will continue to build on the Do What You Can campaign urging people to think about 3Rs objectives when it comes to managing MHSW. The message will be an overarching, motivational call to action, driving people to the Do What You Can website to find material specific and collection information.

The second layer of P&E is targeted as “educating about specifics” which will provide people with the information they need to take action. The approach to this P&E will depend on whether the product is a consumable or durable and what the desired end-of-life might be. Many products and containers will be collected at events, depots or depots-in-a-box.

As well, for some materials, targeted collection programs will require point of sale P&E tactics.

The recovery of antifreeze and antifreeze containers will be promoted as part of the province-wide campaign. As well, material specific P&E activities will be used to encourage greater awareness of opportunities to recycle antifreeze and antifreeze containers at service centres. Also, it may be possible to promote the recovery of empty containers through the blue box system. For Year 1 of the Consolidated MHSW Program Plan, a P&E budget of $133,333 has been allocated to antifreeze and antifreeze containers.

2.9 Barriers and Opportunities to Increased Diversion & Research and Development Requirements

Opportunities to increase diversion of antifreeze include:

- Increase the number of service centres that participate in the Stewardship Ontario province-wide transportation incentive program.

- Increase the number of service centres that accept waste automotive from DIYs.

Barriers to increased diversion of antifreeze include:

- Contamination levels of antifreeze
- Technology to deal with sediments remaining after recycling process

As part of the implementation of Phase 1, a Research and Development plan has been developed for antifreeze. The priorities that have been identified under this plan, as well as the status of each priority, are outlined below.

Table 2.5: Antifreeze Research and Development Priorities and Status

Priority	Status
Establish and document procedures to ensure that all results from any used antifreeze R&D projects and investigations are consolidated into a series of technical reports for future use by Stewardship Ontario.	Complete
Review and documentation of province-wide collection infrastructure.	Complete
Review and documentation of province-wide generation and recovery and end-use.	Complete
Recommend improvements to the collection and recycling process for continuous improvement.	In progress, completion June 2009
Investigate markets and/or diversion opportunities for spent solids.	In progress, completion Oct. 2009
Determine the proportion of antifreeze that is sold in bulk quantities to service centres, and assess the potential container reduction impact of providing incentives to support incremental bulk dispensing.	In progress, completion June 2009
Develop preliminary mechanisms (feedback loop) by which Stewardship Ontario can ensure continuous improvements within the province-wide transportation and processing fee-system.	In progress, completion June 2009
Investigation and analysis of sale/distribution using Steward's Reports submitted by antifreeze Stewards.	In progress, completion June 2009
Pilot study to survey and assess available markets and capacity for collected antifreeze specific to small engine (off-road), heavy duty (on/off road) and farming mobile or stationary equipment, in cooperation with collection sites and participating municipalities.	In progress, completion June 2009
Field Study to determine compliance with "Packaged Only" TI claims, and to determine degree of product extension/contamination, and to recommend remedial measures, as required.	In progress, completion June 2009

In addition to following through on the original Phase 1 R&D priorities, the impact of co-managing Phase 1 antifreeze and other types of antifreeze (e.g. windshield washer, fuel antifreeze, lock de-icer and antifreeze, air brake antifreeze) will also be examined. Additional consideration will be given to the following activities:

- Field study to analyze quantities available for collection. The impact of the addition of bulk will need to be analyzed on the available for collection ratio.
- Field study to analyze the collection ratio between antifreeze and oil containers. The study will investigate the possibility to combine the collection targets for all plastic containers.

- Field study to gather information on quantities collected via the Blue Box and MHSW programs.

For Year 1 of the Consolidated MHSW Program Plan, a budget of $100,000 has been allocated to R&D activities for antifreeze and antifreeze containers.

2.10 Targets

2.10.1 Reduction

Extended service intervals are expected to result in a gradual net decline in future sales of antifreeze. Promotion and Education efforts will aim to educate motorists to observe antifreeze service intervals which are generally lengthening for vehicles, reducing waste volume generated.

2.10.2 Collection

The collection target for Year 1 has been derived from the 2007 WDO Datacall and the information reported by transporters and processors via Stewardship Ontario's Material Tracking System, adjusted using best estimates of amounts of materials collected, but not yet reported. Tables 2.6 and 2.7 outline the collection targets. Table 2.8 outlines the projected tonnage collected per channel.

Table 2.6: Year 1 Collection Targets for Antifreeze

Target	Year 1	Year 2	Year 3	Year 4	Year 5
Tonnes	3069	4110	4462	4769	5034
% of Available for Collection	25%	35%	40%	45%	50%

Table 2.7: Year 1 Collection Targets for Antifreeze Containers

Target	Year 1	Year 2	Year 3	Year 4	Year 5
Tonnes	118	156	170	181	192
% of Available for Collection	25%	35%	40%	45%	50%

Table 2.8: Year 1 Collection Targets for Antifreeze and Antifreeze Containers by Channel

Channel	Tonnage
Events, Depot, DIB, TT	232
Return to Retail and Specialty Channels	2,955
Total	3,187

2.10.3 Recycling

Technology currently exists and is employed by larger scale "off-site" recycling systems for the distillation and recovery of glycol from antifreeze. Recovered glycol can be used in other markets and industries for heat transfer, de-icing or dehumidifying applications. Containers are recyclable. The recycling target for this material is therefore to recycle 100% of what will be collected. Five-year recycling targets are presented in tables 2.9 and 2.10 below.

Table 2.9: Five-Year Recycling Targets for Antifreeze

Target	Year 1	Year 2	Year 3	Year 4	Year 5
Qty Available for Collection (tonnes)	12,361	11,743	11,156	10,598	10,068
Collection target (tonnes)	3,069	4,110	4,462	4,769	5,034
Recycling Performance Rate	100%	100%	100%	100%	100%
Recycling Target (tonnes)	3,069	4,110	4,462	4,769	5,034
Recycling Efficiency Rate	25%	35%	40%	45%	50%

Table 2.10: Five-Year Recycling Targets for Antifreeze Containers

Target	Year 1	Year 2	Year 3	Year 4	Year 5
Qty Available for Collection (tonnes)	470	447	425	403	383
Collection target (tonnes)	118	156	170	181	192
Recycling Performance Rate	100%	100%	100%	100%	100%
Recycling Target (tonnes)	118	156	170	181	192
Recycling Efficiency Rate	25%	35%	40%	45%	50%

2.11 Year 1 Costs and Fee Rate

Table 2.11 below outlines the total costs to manage antifreeze waste and the fee rate for antifreeze in Year 1 of the program. Further information on the cost categories presented in Table 2.11 is available in Section 7 of Volume 1 of the Consolidated MHSW Program Plan.

Table 2.11: Year 1 Total Cost for Antifreeze and Antifreeze Containers and Fee Rate

Description	Cost
Material Management	$1,448,700
Contingency	$66,700
Material-Specific R&D	$100,000
Material-Specific P&E	$133,333
Common Costs	$399,500
Deficit Recovery	$54,200
Total	**$2,202,433**
Tonnes managed	3,187
Total cost/tonne	$691
Fee Rate ($/L)	
Bulked	$0.077
Packaged	$0.090

Notes:

1) For the purposes of estimating material management costs, a contingency of 3.5% has been applied to antifreeze and a contingency of 10.5% to antifreeze containers.
2) For the purposes of calculating a fee rate, a contingency of 1% has been applied to the estimated quantity of Antifreeze supplied for use in Year 1 of the Consolidated MHSW Program Plan and a contingency of 5% has been applied to the estimated quantity of antifreeze containers supplied for use in Year 1 of the Consolidated MHSW Program Plan.
3) Stewardship Ontario incurred a deficit from the operation of the first year of Phase 1 of the MHSW program that will be recovered as part of the fees for the Consolidated Plan. Allocated only to Phase 1 Materials on a material-specific basis, the deficit shown in the table includes any deficits in common costs (start-up, plan development, and program management costs) as well as material-specific operating costs and fees owing.

3.0 Batteries – Consumer-Type Portable

3.1 Definition

In accordance with the Minister's Program Request Letter, the Consolidated MHSW Program Plan incorporates all batteries, except for lead-acid batteries from vehicles. For the purposes of this Plan, "batteries" means any battery or accumulator device designed to store and convert chemical energy as an independent supply of electrical energy by means of an electrochemical reaction. This includes both single-use and rechargeable batteries, and all battery technologies. Excluded from this Program are lead-acid batteries/ accumulators from vehicles.

This Section addresses those batteries defined as Consumer-Type Portable batteries.

3.2 Definition of Consumer-Type Portable Batteries

Table 3.1 outlines the details of the Consumer-Type Portable batteries category. This battery category was established based on extensive consultation and discussion with industry representatives and stewards, and provides the basis for the proposed management strategy for the batteries program.

Table 3.1: Consumer-Type Portable Batteries

Battery Category	Proposed Definition	Examples of Battery Chemistries
Consumer-Type Portable	• All batteries that weigh equal to, or less than 5kg. • Typically used in consumer household and IC&I applications. • Includes all battery chemistries.	• Alkaline-manganese • Zinc-carbon • Silver Oxide • Zinc Air • Oxyride • Nickel Cadmium (NiCd) • Nickel-metal Hydride (NiMH) • Lithium Primary • Lithium Ion (Li Ion) • Lithium Polymer • Small Sealed Lead Acid (SSLA)

Stewards of Consumer-Type Portable batteries will be required to report information regarding the units supplied for use in Ontario each reporting period, in accordance with Stewardship Ontario requirements. This includes, as a minimum, the number of units based on size/application and battery chemistry.

3.3 Market and Product Information

3.3.1 Consumer-Type Portable Batteries

Consumer-Type Portable batteries refers to batteries of all chemistry-types that weigh equal to or less than 5kgs, and that can be used in any application: household and IC&I. Consumer-Type Portable batteries are easily carried by a single adult, and are typically found to be within a

standard size range. Common examples of Consumer-Type Portable batteries include, but are not limited to:

- Button cell batteries
- AAA batteries;
- AA batteries;
- C batteries;
- D batteries;
- 9V batteries;
- Lantern batteries;
- Cellular phone batteries;
- Laptop batteries;
- Power tool batteries; and
- Small sealed lead acid (SSLA) batteries.

Consumer-Type Portable batteries are typically supplied in either of two ways: as replacement units that are sold separately (e.g. a package of AAA alkaline batteries) by retailers and by wholesale distributors; or embedded in other products such as portable computers, cordless power tools, and cellular phones. Embedded batteries can typically be replaced, however these embedded batteries often come in non-standard sizes and as such, consumers are often required to purchase replacement units directly from the original equipment manufacturer (OEM).

The market for Consumer-Type Portable batteries includes a number of companies that manufacture Consumer-Type Portable batteries under their own national brands, but which may also manufacture Consumer-Type Portable batteries sold under another brand name or a retailer's private label. Comments from the National Electrical Manufacturers Association (NEMA) suggest that the primary battery industry is growing at 2% - 3% per year[4]. Many of the companies that manufacture rechargeable Consumer-Type Portable batteries are primarily engaged in the electronics and power tools sector.

Following the European experience, the North American battery industry voluntarily removed mercury from alkaline dry cell batteries. This initiative was largely completed by 1993 and fully completely by major North American manufacturers in 1996. Unlike Europe, maximum mercury levels have not been regulated in Canada. Even in Europe, there is a measurable level of mercury in the waste battery stream that must be managed in end-of-life (EOL) programs. The North American battery manufacturers support Canada adopting similar restrictions on mercury in primary batteries.

Mercury remains an issue for the Consolidated MHSW Program as some companies and retailers continue to import Consumer-Type Portable batteries from non-North American manufacturing sources. Although the presence of mercury in Consumer-Type Portable alkaline batteries is believed to be declining, there is still a risk that Consumer-Type Portable batteries collected under the Program may contain mercury. The potential presence of mercury in Consumer-Type Portable batteries further complicates the post-collection processing of batteries collected in Ontario under the Program; environmental risk and management costs increase.

[4] Kelleher Environmental. "Ontario Battery Lifespan Model 2009 – 2013". April 2009.

3.4 IC&I Generators

Consumer-Type Portable batteries, as designated in this Plan, can be utilized in many capacities in residential, commercial, industrial and institutional applications, including the military. Industrial, Commercial and Institutional (IC&I) generators of Consumer-Type Portable batteries could include factories, shopping centres, office buildings, hospitals and universities. The Minister's Program Request Letter specifies inclusion of batteries from all sources and accordingly the batteries program targets batteries generated in residential and IC&I locations.

Given the numerous applications of rechargeable batteries in the IC&I sector in particular, the inclusion of rechargeable Consumer-Type Portable battery chemistries under the Consolidated MHSW Program Plan has dramatically broadened the scope of the batteries program by opening up the IC&I sector. IC&I Consumer-Type Portable battery applications vary greatly, and include not only common rechargeable battery technologies used for such things as emergency lighting, and communication devices, but also standard applications for cellular phones, laptops, cordless tools, and flashlights.

Stewardship Ontario will target the collection of Consumer-Type Portable batteries from IC&I generators around Ontario using its existing and proposed collection channels: depots, events, Depot in a Box, Toxic Taxi, and return to retail.

3.5 Quantity Supplied for Use

There are a variety of channels by which Consumer-Type Portable batteries reach Ontario consumers. Standard size replacement Consumer-Type Portable batteries are sold separately at most general retail locations and non-standard (e.g. laptop, cell-phone and power tool) replacement battery packs are typically sold by electronics, hardware, and cell-phone retail locations. Increasingly, non-standard Consumer-Type Portable batteries can be purchased as replacements from the OEM via the internet. Consumer-Type Portable batteries also enter into the Ontario market embedded in other products, such as electronic devices, power tools, and cellular phones.

3.6 Calculating Supplied for Use in Ontario

To determine the quantity of Consumer-Type Portable batteries supplied for use in Ontario, Stewardship Ontario utilized data from the final Environment Canada and Natural Resources Canada report: Battery Recycling in Canada – 2008 Update[5]. Please note that this Report will be referenced as the "national 2008 Update" for the remainder of this document.

Canadian sales data documented in that Report were applied to the Ontario Battery Lifespan Model[6], and a ratio of Ontario population to Canadian population was applied to Canadian sales units. From 1981 to 2009 the population ratio ranges from 34.8% to 38.8%. Table 3.2 outlines the estimated number of units of Consumer-Type Portable Batteries supplied for use in Ontario.

5 Kelleher Environmental in association with Robins Environmental. "Battery Recycling in Canada – 2008 Update". May 2009

6 Kelleher Environmental. "Ontario Battery Lifespan Model 2009 – 2013". April 2009.

Table 3.2: Estimated Consumer-Type Portable Batteries Supplied into Ontario (1000s of Units)

	Baseline	Year 1	Year 2	Year 3	Year 4	Year 5
Primary Consumer-Type Portable Batteries						
Zinc Carbon	68,958	65,791	62,501	58,333	54,442	50,811
Alkaline	167,289	173,988	180,182	186,488	193,015	199,770
Zinc Air	59	60	62	63	65	66
Lithium	11,058	11,383	11,667	11,959	12,258	12,564
Silver Oxide Button Cell	4,065	4,185	4,289	4,397	4,507	4,619
Zinc Air Button Cell	10,433	10,740	11,008	11,284	11,566	11,855
Sub-total Primary	261,862	266,147	269,709	272,524	275,853	279,685
Rechargeable Consumer-Type Portable Batteries						
NiCd	7045	7851	8682	6614	5040	4095
NiMH	2912	3445	4069	3981	3895	3800
Lithium Ion	1174	1412	1664	1720	1777	1832
Lithium Polymer	108	128	140	148	158	167
SSLA	142	148	145	147	148	148
Sub-total Rechargeable	11,381	12,984	14,700	12,610	11,018	10,042
Total Consumer-Type Portable Batteries	**273,243**	**279,131**	**284,409**	**285,134**	**286,871**	**289,727**

Consumer-Type Portable batteries data were further extrapolated to calculate the tonnes supplied for use in Ontario. Unit weights for each chemistry-type of Consumer-Type Portable battery were assumed and used to project the total tonnes supplied for use in Ontario, as outlined in Table 3.3.

Table 3.3: Estimated Consumer-Type Portable Batteries Supplied into Ontario (Tonnes)

	Unit Weight (kg)	Baseline	Year 1	Year 2	Year 3	Year 4	Year 5
Primary Consumer-Type Portable Batteries							
Zinc Carbon	0.027	1,862	1,862	1,776	1,688	1,575	1,470
Alkaline	0.028	4,684	4,684	4,872	5,045	5,222	5,404
Zinc Air	0.033	2	2	2	2	2	2
Lithium	0.016	177	177	182	187	191	196
Silver Oxide Button Cell	0.0012	5	5	5	5	5	5
Zinc Air Button Cell	0.0009	9	9	10	10	10	10
Sub-total Primary		6,739	6,739	6,847	6,937	7,005	7,087
Rechargeable Consumer-Type Portable Batteries							
NiCd	0.203	1,430	1,430	1,594	1,762	1,343	1,023
NiMH	0.093	271	271	320	378	370	362
Lithium Ion	0.04	47	47	56	67	69	71
Lithium Polymer	0.04	4	4	5	6	6	6
SSLA	1.045	149	149	155	152	153	155
Sub-total Rechargeable		1,901	1,901	2,130	2,365	1,941	1,617
Total Consumer-Type Portable Batteries		**8,640**	**8,640**	**8,977**	**9,302**	**8,946**	**8,704**

3.7 Quantity Available for Collection

In order to ascertain the potential quantities of Consumer-Type Portable batteries available for collection in Ontario, assumptions had to be made regarding the lifespan and hoarding of Consumer-Type Portable batteries. These assumptions for Ontario were incorporated in the Battery Flow Model that was developed for the national 2008 Update.

3.7.1 Lifespan Assumptions for Consumer-Type Portable Batteries

As reported in the national 2008 Update, lifespan assumptions for Consumer-Type Portable batteries have been reviewed and generally deemed reasonable by the Canadian Battery Association (CHBA), the Rechargeable Battery Recycling Corporation (RBRC) and Environment Canada staff[7]. These assumptions include:

- An average three years lifespan for primary batteries;
- An average five years lifespan for nickel cadmium batteries;
- An average lifespan of five years was originally used for lithium ion batteries but was changed to 1.75 years in the final version of the national 2008 Update, based on comments from NEMA;
- An average lifespan of seven years was originally used for nickel-metal hydride batteries but was changed to three years based on comments from NEMA that seven years was too high by "at least a factor of 2" – a 3-year lifespan was therefore chosen for the estimates presented in the national 2008 Update;
- An average five year lifespan for SSLA batteries.

3.7.2 Hoarding Assumptions for Consumer-Type Portable Batteries

Hoarding refers to the time period for which consumers tend to store Consumer-Type Portable batteries before discarding them. For the purposes of this Plan, Stewardship Ontario has assumed the same hoarding assumptions that were incorporated into the Battery Flow Model for the national 2008 Update. International sources indicate that there should be different hoarding assumptions for primary and rechargeable batteries, and the national 2008 Update assumes that 30% of primary batteries are hoarded after the end of their operational life; and 60% of rechargeable batteries are hoarded after the end of their operational life.

Two different scenarios were run through the Battery Flow Model for the national 2008 Update: a low hoarding rate of 5 years; and a higher hoarding rate of 15 years.

It is important to note that these assumptions are based on best available information. The Portable Rechargeable Batteries Association (PRBA) maintains that further study on hoarding assumptions, such as a scientifically valid household survey, will need to occur in order to establish a valid hoarding rate[8]. Stewardship Ontario has proposed a detailed vintage analysis of Consumer-Type Portable batteries to be initiated in Year 1 of the Consolidated MHSW Program Plan[9].

7 Meeting was held on February 3, 2006. CHBA, RBRC and Environment Canada staff were in attendance.

8 Comments provided on the March 2008 Draft Report for technical review: Battery Recycling in Canada – 2008 Update.

9 There are a variety of options to assess battery age, including some assessment of date-stamped batteries at the point of collection; qualitative studies including consumer surveys; and research into existing knowledge about battery use and discard from international and commercial sources that were unavailable at the time of the development of

3.7.3 Consumer-Type Portable Batteries Available for Collection

Please note that, in accordance with the national 2008 Update, 'available for collection' implies that the battery will no longer be reused or stored, and has been discarded for recycling. Table 3.4 and Table 3.5 present data for both Scenario 1 (5 year hoarding) and Scenario 2 (15 year hoarding) as per section 3.7.2 above.

Table 3.4: Estimated Consumer-Type Batteries Available for Collection (1000s of Units)

	Year 1		Year 2		Year 3		Year 4		Year 5	
Primary Consumer-Type Portable Batteries										
Hoarding Scenarios	5yr	15yr	5yr	15yr	5yr	15yr	5yr	15yr	5yr	15yr
Zinc Carbon	70,666	66,127	69,466	63,882	68,791	61,816	68,209	59,819	66,507	57,720
Alkaline	144,528	144,528	150,817	150,817	157,812	157,812	164,345	164,345	170,902	170,902
Zinc Air	54	54	56	56	54	54	55	55	56	56
Lithium	9,297	9,297	9,778	9,778	10,105	10,105	10,494	10,494	10,978	10,978
Silver Oxide Button Cell	3,890	3,890	4,000	4,000	4,109	4,109	4,151	4,151	4,188	4,188
Zinc Air Button Cell	9,250	9,250	9,386	9,386	9,772	9,772	10,224	10,224	10,625	10,625
Sub-total Primary	237,685	233,146	243,503	237,919	250,643	243,668	257,478	249,088	263,256	254,469
Rechargeable Consumer-Type Portable Batteries										
Hoarding Scenarios	5yr	15yr	5yr	15yr	5yr	15yr	5yr	15yr	5yr	15yr
NiCd	3933	3933	4199	4199	4563	4563	5025	5025	5550	5550
NiMH	1441	1441	1694	1694	1995	1995	2344	2344	2640	2640
Lithium Ion	639	639	769	769	920	920	1091	1091	2091	2091
Lithium Polymer	59	59	71	71	83	83	93	93	108	108
SSLA	Not available									
Sub-total Rechargeable	6,072	6,072	6,733	6,733	7,561	7,561	8,553	8,553	10,389	10,389
Total Consumer-Type Portable Batteries	**243,757**	**239,218**	**250,236**	**244,652**	**258,204**	**251,229**	**266,031**	**257,641**	**273,645**	**264,858**

The estimated total tonnes of Consumer-Type Portable batteries were calculated using the assumed average per-unit weights presented in Table 3.5.

Table 3.5: Estimated Consumer-Type Batteries Available for Collection (Tonnes)

	Year 1		**Year 2**		**Year 3**		**Year 4**		**Year 5**	
Primary Consumer-Type Portable Batteries										
Hoarding Scenarios	5yr	15yr	5yr	15yr	5yr	15yr	5yr	15yr	5yr	15yr
Zinc Carbon	1,908	1,785	1,876	1,725	1,857	1,669	1,842	1,615	1,796	1,558
Alkaline	4,047	4,047	4,223	4,223	4,419	4,419	4,602	4,602	4,785	4,785
Zinc Air	2	2	2	2	2	2	2	2	2	2
Lithium	149	149	156	156	162	162	168	168	176	176
Silver Oxide Button Cell	5	5	5	5	5	5	5	5	5	5
Zinc Air Button Cell	8	8	8	8	9	9	9	9	10	10
Sub-total Primary	6,119	5,996	6,270	6,119	6,454	6,266	6,628	6,401	6,774	6,536
Rechargeable Consumer-Type Portable Batteries										
Hoarding Scenarios	5yr	15yr	5yr	15yr	5yr	15yr	5yr	15yr	5yr	15yr
NiCd	798	798	852	852	926	926	1020	1020	1127	1127
NiMH	134	134	158	158	186	186	218	218	246	246
Lithium Ion	26	26	31	31	37	37	44	44	84	84
Lithium Polymer	2	2	3	3	3	3	4	4	4	4
SSLA	122	122	130	130	135	135	133	133	137	137
Sub-total Rechargeable	1,082	1,082	1,174	1,174	1,287	1,287	1,419	1,419	1,598	1,598

this Program Plan. The specific details of how a vintage analysis will be conducted is yet to be determined, and will be included in the Battery R&D Workplan.

	Year 1		Year 2		Year 3		Year 4		Year 5	
Total Consumer-Type Portable Batteries	**7,201**	**7,078**	**7,444**	**7,293**	**7,741**	**7,553**	**8,047**	**7,820**	**8,372**	**8,134**

3.8 Current Management Infrastructure and Performance

Consumer-Type Portable batteries refers to batteries of all chemistry-types that weigh less than 5kgs, and that can be used in any application: household and IC&I. Consumer-Type Portable batteries are easily carried by a single adult, and are typically found to be within a standard size range. Both of these factors ensure that Stewardship Ontario will be able to reasonably target Consumer-Type Portable batteries for collection across Ontario using the established permanent depots, mobile collection, and special collection event strategies for multi-material collection. In addition, various programs designed to collect and manage end-of-life Consumer-Type Portable batteries have been successfully implemented in many international jurisdictions, specifically in countries of the European Union (EU) and in the United States and Canada.

There are currently two steward-supported battery recycling programs operating in Ontario: Stewardship Ontario's Phase 1 MHSW Program, which targets only single-use dry cell batteries; and the Rechargeable Battery Recycling Corporation of Canada (RBRCC) Program, which targets consumer rechargeable batteries including: nickel-metal hydride, nickel-cadmium, lithium ion, and small lead acid consumer batteries.

In 2006, a series of waste audits were conducted by RBRC to assess the presence of Consumer-Type Portable batteries in municipal solid waste landfills in North America. The study, which included a Niagara Region municipal landfill, revealed that Consumer-Type Portable batteries account for an average of 0.142% of the total weight of municipal solid waste[10].

3.8.1 Current Stewardship Ontario Phase 1 MHSW Program

The Ontario Phase 1 MHSW Program has been in operation since July 1, 2008. To date, Stewardship Ontario has established a total of 171 permanent municipal and commercial collection locations for waste single-use dry cell batteries:

- 82 municipalities collecting batteries for recycling;
- 89 Home Depot retail collection sites

Single-use dry cell batteries collected at these locations are directed to Stewardship Ontario's approved battery processor for sorting and recycling. The guidelines by which Stewardship Ontario operates the battery program are outlined in the Interim Program Guidelines for Waste Primary Batteries, and can be found on the Stewardship Ontario website: http://www.stewardshipontario.ca/mhsw/materials/materials.html. Please note that the Interim Program Guidelines will be updated to reflect special considerations for the introduction of rechargeable battery chemistries into the collection stream. These updates will be incorporated prior to commencement of the approved Consolidated MHSW Program Plan.

To date, Stewardship Ontario has collected more than 180 tonnes of waste single-use dry cell batteries to be sent for recycling over the initial 9 months of the Phase 1 MHSW Program.

[10] "A Cooperative Study of the Rechargeable Battery Content of Consumer Municipal Solid Waste in North America". RBRC. February 2007.

3.8.2 Rechargeable Battery Recycling Corporation of Canada (RBRCC Program)

The RBRCC is a non-profit, public service organization that is actively engaged in the diversion of rechargeable consumer-type batteries for recycling. The RBRCC Program operates across North America, utilizing five distinct collection channels to collect specific consumer rechargeable batteries. RBRCC's collection channels in Ontario include business, retail, community, public agency, and special generators, amounting to a total of approximately 1,900 collection sites in Ontario.

In 2008, the RBRCC Program collected for recycling approximately 129 tonnes of batteries in Ontario, 125 tonnes of which consisted of their targeted rechargeable battery chemistries.

3.9 Barriers and Opportunities to Increased Diversion, and Research & Development Requirements

3.9.1 Barriers to Increased Diversion of Consumer-Type Portable Batteries

There are a number of characteristics unique to Consumer-Type Portable batteries that present barriers to increased diversion. First and foremost of these barriers is the argument against the diversion of primary batteries (e.g. alkaline and manganese) on the grounds: 1) safety; and 2) that disposal via secure landfill provides the lowest environmental and economic footprint of any end of life management option that currently exists for batteries[11]. Compounding these issues is the lack of clear direction and education for consumers regarding the risks of improper batteries management.

The introduction of rechargeable batteries and various battery chemistries into the Consolidated MHSW Program Plan also introduces an increased need to ensure the highest safety and risk-mitigation measures. Despite Stewardship Ontario's diligent efforts to establish and enforce battery management Guidelines, there will always be inherent risk of accidental current discharge and leaking/corrosion of batteries under any waste Consumer-Type Portable battery collection program.

While experience has shown that consumers welcome the opportunity to drop off all forms of batteries at approved collection sites, there remain too few locations in Ontario to ensure substantially higher collection rates. Furthermore, there appears to be a lack of consumer awareness of opportunities to divert waste batteries for recycling, and programs include confusing restrictions on the types of batteries accepted (e.g. only non-rechargeable batteries). As a result, many existing collection sites may not be utilized to their full capacity. Establishing an integrated, cohesive and clear message via province-wide promotion and education campaigns efforts will be a crucial element for increasing the diversion of Consumer-Type Portable batteries.

[11] Presentations made by 1) U.S. Department of Transportation, and 2) NEMA at the 13th International Battery Materials Recycling Seminar & Exhibit. March 2009.

3.10 Opportunities to Increase Diversion of Consumer-Type Portable Batteries

The expansion of the MHSW Program to include rechargeable Consumer-Type Portable batteries will substantially increase the overall diversion of waste Consumer-Type Portable batteries. Under the Phase 1 Program Plan, the exclusion of rechargeable batteries resulted in confusion and inefficiencies for the collection system. For instance, consumers, unaware of the MHSW Program limitations, would deposit both single-use and rechargeable batteries into collection containers. Alternately, confusion may have also led consumers to continue disposing of their batteries into the garbage. The acceptance of both single-use and rechargeable Consumer-Type Portable batteries in the same place, and the cohesive and clear message that will be established under the Consolidated MHSW Program will work to remove these barriers, while at the same time increasing the quantities of Consumer-Type Portable batteries collected under the Program.

Despite being 'rechargeable', many specialized Consumer-Type Portable batteries contained within certain electronic devices such as cell-phones and laptop computers are increasingly being discarded prior to their end-of-life as these units are upgraded and/or replaced by the user. Working with stewards to capture, divert, and report the diversion of these batteries will increase diversion of Consumer-Type Portable batteries under the Program.

Ontario Electronic Stewardship (OES) is the designated Industry-Funding Organization for Waste Electrical and Electronic Equipment (WEEE). Under the Phase 1 WEEE Program Plan, many WEEE recyclers currently remove batteries to be shipped for recycling. There is an opportunity for Stewardship Ontario to work cooperatively with OES and approved WEEE processors to incorporate Consumer-Type Portable batteries removed at the point of WEEE processing under the Consolidated MHSW Program.

3.11 Research and Development for Consumer-Type Portable Batteries

As part of the implementation of Phase 1, a research and development plan was outlined for single-use dry cell batteries. The priorities that were identified for Phase 1 MHSW R&D are outlined in Table 3.6 below.

Table 3.6: R&D Priorities and Status Update for Phase 1 Single-Use Dry Cell Batteries

Priority	Status/Expected Completion Date
Award contract for Waste Battery Sampling study: monitor and assess results of study	Complete
Benchmark against the experiences and results of international waste primary battery programs	Complete
Review performance of Stewardship Ontario's return-to-retail battery collection stream and the municipal depot battery collection stream to assess any barriers to generator participation, and to increase generator accessibility and battery recovery	Dec. 2009
A vintage analysis study of both primary batteries by chemistry in order to resolve the "hoarding" issue and enable the proper modeling of battery discard rates	Dec. 2009
Consultation with industry and stakeholders regarding the further evolution of battery vendor guidelines to include Phase 1 batteries; goal to establish final waste	Dec. 2009

battery vendor standards	
Establish and document procedures to ensure that all results from waste batteries R&D projects and investigations are consolidated into a series of technical reports	Complete

The priorities for R&D for both single-use and rechargeable Consumer-Type Portable batteries under the Consolidated MHSW Program Plan are outlined below.

R&D activities for Consumer-Type Portable batteries during Year 1 of the Consolidated MHSW Program will be coordinated with R&D efforts of other interested stakeholders and may include, but are not limited to, the activities identified below:

- Investigate options for packaging and containers to allow efficient, safe and compliant transport of mixed waste Consumer-Type Portable batteries
- Review the effectiveness and efficiency of Ontario-based Consumer-Type Portable battery collection alternatives including return-to-retail, depots, events, depot in a box, toxic taxi, etc.
- Research to determine best practices collection systems
- Benchmark Ontario battery recycling performance against applicable international Consumer-Type Portable battery collection activities and performance experience.
- Design and implement a pilot program in cooperation with a willing Ontario School Board and/or college or university to assess the potential for recovering used batteries and the cost effectiveness of this approach for Consumer-Type Portable batteries in Ontario elementary and secondary schools.
- Conduct a waste battery sampling study to assess the composition of different Consumer-Type Portable battery chemistries collected at permanent collection depots vs. special collection events vs. mobile collection. This study will be conducted in cooperation with battery collection sites and approved battery processors.
- Investigate the performance and accuracy of automated battery sorting systems designed to separate batteries by chemistry and/or size, in cooperation with battery processors.
- Assess the implications of online Consumer-Type Portable battery sales, specifically the status of stewards, and volume of sales into Ontario (materiality of online battery sales).
- Investigate current capacity and opportunities to increase the number of OES-approved battery processors.
- Investigate options to use slag from battery recycling processes as economic input (shared with R&D for Industrial Stationary and Non-Lead Acid Motive batteries).

Table 3.7 outlines the estimated cost for R&D activities associated with Consumer-Type Portable batteries in Year 1.

Table 3.7: R&D Activities for Consumer-Type Portable Batteries

R&D Activity	Estimated Year 1 Cost
Alternative Shipping Containers/ Packaging Options	$20,000.00
Industry and Document Research - Infrastructure and Best Practices	$5,000.00
Vintage Analysis - Lifespan and Hoarding Assumptions	$75,000.00
Pilot Program with Ontario School Boards	$20,000.00
Battery Sampling Study	$15,000.00
Assessment of Innovation and New Technology	$5,000.00
Investigate Options for Slag as Economic Input	$15,000.00

Total R&D for Consumer-Type Portable Batteries	**$155,000.00**

3.12 Accessibility Strategy for Consumer-Type Portable Batteries

Stewardship Ontario will collect Consumer-Type Portable batteries through a variety of multi-material MHSW collection channels, as outlined in Section 5 of Volume 1 of the Consolidated MHSW Program Plan. The proposed collection channels and strategies for batteries under this Program include:

- Permanent collection sites;
  - Increasing collection from depots
  - Maintain existing retail collection sites,
  - Actively pursue registration of IC&I collection sites,
- Mobile collection Events and Depots in a Box;
- Special collection;
  - Collection from waste electronics recycling and/or processing sites,
- Return to retail;
  - Incorporates all existing RBRCC collection locations, commercial locations and institutional locations, and converting these where possible to include all Consumer-Type Portable batteries.

3.13 Promotion and Education for Consumer-Type Portable Batteries

The province-wide P&E program will continue to build on the Do What You Can campaign that urges consumers to think about 3Rs objectives when it comes to managing MHSW. The message will be an overarching, motivational call-to-action, directing people to the Do What You Can website to find material-specific and collection information.

Consumers will be provided with the information they need to take action to ensure that Consumer-Type Portable batteries are diverted from landfill. This may include targeted education at the point of sale, such as brochures, displays and collection containers. Consumer-Type Portable batteries will also be included as collected MHSW at every permanent depot, collection event, and depots-in-a box.

The collection of Consumer-Type Portable batteries will be promoted as part of province-wide generic campaign.

For Year 1 of the Consolidated MHSW Program Plan, a P&E budget of $150,000 has been allocated to consumer-type portable batteries.

3.14 Targets for Consumer-Type Portable Batteries

Targets for Consumer-Type Portable batteries have been calculated using an accessibility-based approach that considers the expected collection of batteries at each potential collection site and event across Ontario. Material-specific considerations for the recycling of batteries have been factored in to allow for the calculation of Consumer-Type Portable battery recycling targets.

3.14.1 Accessibility Targets

Consumer-Type Portable batteries will be collected through the multi-material collection channels as outlined in Section 5.0 of Volume 1 of the Consolidated MHSW Program Plan. This includes depots, events, depot in a box and toxic taxi. Accessibility for Consumer-Type Portable batteries also specifically addresses opportunities for other collection channels including retail, public agency, and business/industrial generation sites. It is estimated that in Year 1 there will be approximately 2,170 combined Return to Retail and Speciality Service Channel collection sites. This includes RBRCC's 1,903 collection sites, as all RBRCC sites will be welcomed under the Program provided that they accept both single-use and rechargeable Consumer-Type Portable batteries. Table 3.8 outlines accessibility targets for the collection of Consumer-Type Portable batteries, and provides a breakdown of the number of sites accessible to the general public (e.g. retail sites) versus those that are not (e.g. business/industrial generation sites).

Table 3.8: Five Year Accessibility Targets – Return to Retail and Specialty Service Channel Sites

	Year 1	Year 2	Year 3	Year 4	Year 5
Total combined Return to Retail and Specialty Service Channel Collection Sites[12]	2,170	2,240	2,320	2,380	2,410
Return to Retail Sites (Accessible to the Public)	2,040	2,105	2,181	2,237	2,265
Specialty Service Channel Sites (not Accessible to the Public)	130	135	139	143	145

3.15 Collection Targets

As previously mentioned, collection targets for Consumer-Type Portable batteries have been determined using an accessibility-based approach, and take into consideration existing collection sites and activities operated by other programs and enterprises. These collection targets are outlined in Table 3.9. Table 3.10 presents the Year 1 collection target by collection channel.

Collection targets for the depots, events, depot in a box and toxic taxi channel are based upon the overall accessibility strategy outlined in Section 5 of Volume 1 of Consolidated MHSW Program Plan.

Commercial collection targets were calculated using current collection data from Stewardship Ontario's Phase 1 MHSW Program as well as other operating programs including RBRCC's operations in Ontario. Current collection rates indicate that each retail and commercial collection site generates an average of 42.4 kilograms of primary batteries each month. Current RBRCC collection data indicates that each site generates an average of 5.7kgs of rechargeable batteries every month.

Specialty collection reflects the anticipated quantities of Consumer-Type Portable batteries that will be removed from waste electronic devices by recyclers of waste electronics, and includes consideration of increased volumes of waste electronics recycling occurring as a result of the Ontario WEEE Program.

[12] This includes return-to-retail sites, specialty channel (e.g. WEEE Processors) as well as other commercial collection activities such as property management groups, and institutions.

Stewardship Ontario's Waste Battery Sampling study, conducted in August 2008, revealed the weight-based composition of batteries collected under commercial collection programs that accept both single-use and rechargeable Consumer-Type Portable batteries: Single-use Consumer-Type Portable batteries account for 70.25%, and rechargeable Consumer-Type Portable batteries account for 29.75% of the total weight collected.

Based on these assumptions, collection targets were established. Table 3.9 outlines the collection targets for Consumer-Type Portable batteries, reflecting the implementation over the year of existing sites to collect all designated battery types. These collection targets are aligned with the European Union Battery Directive collection targets: 25% by 2012 and 45% by 2016. Note that the quantity of Consumer-Type Portable batteries available for collection was only calculated for the first five years of the Consolidated Program, however Stewardship Ontario has still established a target collection rate of 45% of Consumer-Type Portable batteries available for collection in Year 6.

Table 3.9: Six-Year Collection Targets for Consumer-Type Portable Batteries

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Collection Target (Tonnes)	1452	1848	2306	2797	3326	n/a
Collection Target* (%)	20%	25%	30%	35%	40%	45%

* Collection targets for Year 1 to Year 5 are calculated as a percentage of Batteries Available for Collection, assuming a hoarding scenario of 5 years.

Table 3.10: Year 1 Collection Target for Consumer-Type Portable Batteries by Collection Channel

Collection Channel	Total Tonnes
Depots, Events, Depot in a Box, Toxic Taxi Channel	425
Return to Retail Channel	791
Specialty Service Channel	236
Total	**1,452**

3.16 Recycling Targets

The Phase 1 MHSW Program anticipated a recycling rate between 25% (if only steel is recycled) and 50% (if other material components are recycled) for waste single-use dry cell batteries. Through Stewardship Ontario's contracted battery processor, a recycling rate of approximately 80% can be achieved for alkaline-manganese, zinc carbon, and zinc air batteries[13]. It is important to note that alkaline-manganese, zinc carbon and zinc air batteries account for an estimated 83% by weight of collected single-use batteries.

BatteryBack, the national battery program for the United Kingdom, reports a current recycling rate of 37% for these batteries. This recycling rate does not include energy-from-waste or slag applications, and therefore reflects a reasonable recycling target for single-use Consumer-Type Portable batteries under the Consolidated MHSW Program Plan.

The introduction of rechargeable Consumer-Type Portable batteries under the Consolidated MHSW Program Plan allows for slightly higher recycling targets, as the material components of Consumer-Type Portable rechargeable batteries tend to have higher secondary market value

[13] The 80% recycling rate for these types of batteries is based on quoted recycling performance by Stewardship Ontario's contracted battery processor, Raw Materials Processor, in September 2008.

and market demand. As such, a conservative recycling rate target of 60% is appropriate, when compared with existing European recycling programs[14].

As mentioned previously, Stewardship Ontario's Waste Battery Sampling study, conducted in August 2008, revealed the weight-based composition of Consumer-Type Portable batteries collected under commercial collection programs that accept both single-use and rechargeable batteries: Single-use batteries account for 70.25%, and rechargeable batteries account for 29.75% of the total weight collected.

Table 3.11 outlines the recycling performance targets for single-use and rechargeable Consumer-Type Portable batteries under the Consolidated MHSW Program. Please refer to Table 3.9 for collection targets.

Table 3.11: Five-Year Recycling Performance Targets for Consumer-Type Portable Batteries

	Year 1	Year 2	Year 3	Year 4	Year 5
Recycling Target (Tonnes)	1,039	1,322	1,650	2,001	2,379
Alkaline-manganese; Zinc Carbon; Zinc Air[2]	*740*	*941*	*1,175*	*1,425*	*1,694*
Other Single-Use Consumer-Type Portable Batteries	*38*	*48*	*60*	*73*	*87*
Rechargeable Consumer-Type Portable Batteries	*261*	*332*	*415*	*503*	*598*
Recycling Target[1] (%)	71%	71%	71%	71%	71%
Alkaline-manganese; Zinc Carbon; Zinc Air[2]	*80%*	*80%*	*80%*	*80%*	*80%*
Other Single-Use Consumer-Type Portable Batteries	*37%*	*37%*	*37%*	*37%*	*37%*
Rechargeable Consumer-Type Portable Batteries	*60%*	*60%*	*60%*	*60%*	*60%*

1) Recycling performance target is calculated as a percentage of Consumer-Type Portable batteries collected, as per Table 3.9
2) Note that Alkaline-manganese, zinc-carbon and zinc air batteries constitute approximately 83% by weight of total single-use batteries collected. The 80% recycling rate for these types of batteries is based on quoted recycling performance by Stewardship Ontario's contracted battery processor.

Table 3.12 outlines the recycling efficiency targets for single-use and rechargeable Consumer-Type Portable batteries under the Consolidated MHSW Program, assuming a hoarding scenario of 5 years. Please refer to Table 3.5.

Table 3.12: Estimated Five-Year Recycling Efficiency Targets for Consumer-Type Portable Batteries

	Year 1	Year 2	Year 3	Year 4	Year 5
Recycling Target (Tonnes)	1,039	1,322	1,650	2,001	2,379
Alkaline-manganese; Zinc Carbon; Zinc Air[2]	*740*	*941*	*1,175*	*1,425*	*1,694*
Single-Use Consumer-Type Portable Batteries	*38*	*48*	*60*	*73*	*87*
Rechargeable Consumer-Type Portable Batteries	*261*	*332*	*415*	*503*	*598*
Recycling Target[1] (%)	14.4%	17.8%	21.3%	24.9%	28.4%
Alkaline-manganese; Zinc Carbon; Zinc Air[2]	*10.3%*	*12.6%*	*15.2%*	*17.7%*	*20.2%*
Single-Use Consumer-Type Portable Batteries	*0.5%*	*0.6%*	*0.8%*	*0.9%*	*1.0%*
Rechargeable Consumer-Type Portable Batteries	*3.6%*	*4.5%*	*5.4%*	*6.2%*	*7.1%*

14 "Success Monitor." Stiftung Gemeinsames Rucknahmesystem (GRS) Batterien. March 2007.

1) Recycling efficiency target is calculated as a percentage of Consumer-Type Portable batteries available for collection, as per Table 3.5
2) Note that Alkaline-manganese, zinc-carbon and zinc air batteries constitute approximately 83% by weight of total single-use batteries collected. The 80% recycling rate for these types of batteries is based on quoted recycling performance by Stewardship Ontario's contracted battery processor.

3.17 Year 1 Costs and Fee Rate

Total costs for Consumer-Type Portable batteries in Year 1 and the fee rate are outlined in Table 3.13. Further information on the cost categories presented in Table 3.13 is available in Section 7 of Volume 1 of the Consolidated MHSW Program Plan.

Table 3.13: Year 1 Total Costs and Fee Rate for Consumer-Type Portable Batteries

Description	Cost
Material Management	$4,301,000
Contingency	$580,700
Material-Specific R&D	$155,000
Material-Specific P&E	$150,000
Common Costs	$1,246,900
Deficit Recovery	($144,000)
Total	**$6,289,600**
Tonnes managed	1,452
Total cost/tonne	$4,331
Fee Rate ($/kg)	
Alkaline, Manganese, Alkaline (Al), Silver Oxide (Ag2O)	$0.410
Zinc Carbon (ZnC) and Zinc Air (ZnAir)	
Lithium Metal (Li)	$0.730
Lithium Ion (Li-Ion) and Lithium Polymer (Li Polymer)	$1.569
Nickel-Metal Hydride (NiMH)	
Nickel Cadmium (NiCd)	
Small Sealed Lead Acid (SSLA/Pb)	$6.149

Notes:

1) For the purposes of estimating material management costs, a contingency of 13.5% has been applied.
2) For the purposes of calculating a fee rate, a contingency of 3% has been applied to the estimated quantity of Consumer-Type Portable Batteries supplied for use in Year 1 of the Consolidated MHSW Program Plan.
3) Stewardship Ontario incurred a deficit from the operation of the first year of Phase 1 of the MHSW program that will be recovered as part of the fees for the Consolidated Plan. Allocated only to Phase 1 Materials on a material-specific basis, the deficit shown in the table includes any deficits in common costs (start-up, plan development, and program management costs) as well as material-specific operating costs and fees owing.

4.0 Batteries - Industrial Stationary and Non-Lead Acid Motive

4.1 Definition

In accordance with the Minister's Program Request Letter, the Consolidated MHSW Program Plan incorporates all batteries, except for lead-acid batteries from vehicles. For the purposes of this Plan, "batteries" means any battery or accumulator device designed to store and convert chemical energy as an independent supply of electrical energy by means of an electrochemical reaction. This includes both single-use and rechargeable batteries, and all battery technologies. Excluded from this Program are lead-acid batteries/ accumulators from vehicles.

This Section addresses those batteries defined as Industrial Stationary and Non-Lead Acid Motive batteries.

4.2 Definition of Industrial Stationary and Non-Lead Acid Motive Batteries

Table 4.1 outlines the details of the Industrial Stationary and Non-Lead Acid Motive batteries category. This battery category was established based on extensive consultation and discussion with industry representatives and stewards, and provides the basis for the proposed management strategy for the batteries program.

Table 4.1: Industrial Stationary and Non-Lead Acid Motive Batteries

Battery Category	Proposed Definition	Examples of Battery Chemistries
Industrial Stationary	• All stationary batteries weighing greater than 5kg. • Typically used in industrial applications including uninterrupted power supply and load leveling, telecommunications, emergency lighting and fire protection, control switching, and other similar applications. • Includes all battery chemistries.	• Lead Acid • Nickel Cadmium (NiCd) • Lithium Ion (Li Ion) • Sodium-sulfur • Vanadium redox flow • Hybrid flow • Zinc-bromine flow • Nickel-salt • Silver-zinc • Molten-electrolyte
Non-Lead Acid Motive	• All non-lead acid batteries for motive application, weighing greater than 5kg. • Used in motive-power applications, including automobile, lift-truck, marine, railway, and aircraft. • Includes all battery chemistries, excluding lead-acid.	• Lithium Ion (Li Ion) • Nickel-metal Hydride (NiMH) • Nickel Cadmium (NiCd) • Lithium Phosphate • Lithium Iron Phosphate • Lithium Ion Phosphate • Lithium Ion Polymer

4.3 Proposed Management of Industrial Stationary and Non-Lead Acid Motive Batteries

There is little formal or documented information available on the categories defined as Industrial Stationary and Non-Lead Acid Motive batteries. Neither have these types of batteries been formally researched or documented in any known international jurisdictions.

Working Group members provided information and data on Industrial Stationary and Non-Lead Acid Motive batteries to Stewardship Ontario independently and through Batteries Working Group sessions. However Stewardship Ontario was unable to acquire complete and sufficient information during the planning period, and as a result, was unable to generate a cohesive set of data and information on these battery categories with any confidence.

To address the limitations of available information for Industrial Stationary and Non-Lead Acid Motive Batteries, Stewardship Ontario will address Industrial Stationary and Non-Lead Acid Motive batteries differently than other batteries under the Consolidated MHSW Program.

Rather than physically manage Industrial Stationary and Non-Lead Acid Motive batteries, Stewardship Ontario will accommodate partial Program management that will include services to discharge steward obligations such as reporting, and to undertake substantial research and development (R&D) activities. The differentiated approach to the management of "all" batteries under the Consolidated MHSW Program Plan is outlined in Table 4.2 below.

Stewards of Industrial Stationary and Non-Lead Acid Motive batteries will be required to report information regarding the units supplied for use in Ontario and the units managed directly by the steward through take-back or OEM service programs each reporting period, in accordance with Stewardship Ontario requirements. This includes, as a minimum, the number of units (e.g. one battery unit consisting of 36 cells should be reported as one unit), the weight per unit, and the battery chemistry.

Table 4.2: Battery Management Approach Year 1

Battery Category	Proposed Management Approach
Consumer-Type Portable	Full MHSW Program management: Includes collection, transportation, and processing of collected batteries.
Industrial Stationary and Non-Lead Acid Motive	Partial MHSW Program management: Includes services to discharge steward obligations, such as reporting, and to undertake required R&D work.

4.4 Market and Product Information

4.4.1 Industrial Stationary Batteries

Industrial Stationary batteries refers to batteries designed to provide non-motive power, typically for industrial, commercial and institutional applications, and that weigh greater than 5kgs.These batteries are actually multiple battery cells combined, in circuit, into battery 'packs'. Industrial Stationary Batteries are not typically sold to consumers, but instead through business-to-business transactions that may include professional servicing over the life of the battery. Sectors that utilize Industrial Stationary batteries include, but are not limited to, banks,

universities, utilities providers, telecommunications providers, and property management organizations.

Due to the highly technical and specific applications of Industrial Stationary batteries, there are no standard size metrics. Client companies often engage Industrial Stationary battery manufacturers in the design of their own products and equipment in order to accommodate the specific needs of each client.

While a diminutive number of Industrial Stationary batteries are small in size, it is common for these batteries to be large enough in size that replacement of an Industrial Stationary battery requires specialized equipment and professional installation/removal. As such, stewards have indicated that most Industrial Stationary batteries are managed via 'closed-loop' systems: the removal and EOL management of an old Industrial Stationary battery, and the installation of a new Industrial Stationary battery, are services that are typically provided when an Industrial Stationary battery is purchased by a client company.

An additional aspect of the Industrial Stationary battery market is that although sales are typically business-to-business, only an estimated 25% of manufacturers' sales are directly to a client; the remaining approximate 75% of Industrial Stationary battery sales are to resellers and distributors[15]. For this reason, although manufacturers strive to ensure 'closed-loop' management of their Industrial Stationary batteries, many of these units cannot be tracked by the steward for EOL management once sold to a reseller or distributor.

Stewards of Industrial Stationary batteries have indicated that the 'closed-loop' management systems are not designed to track and monitor the location and status of Industrial Stationary batteries for EOL management, but that these services are instead provided for customer convenience, and in accordance with applicable regulatory requirements[16].

4.5 Non-Lead Acid Motive Batteries

Non-Lead Acid Motive batteries refers to non-lead acid batteries designed to provide motive power that weigh greater than 5kgs. For the purposes of this Plan, motive power includes automotive, lift-truck, marine, rail, and aircraft applications. Non-Lead Acid Motive batteries are actually multiple battery cells combined, in circuit, into battery 'packs'.

4.5.1 Growing Market Demand for Non-Lead Acid Motive Batteries

Although lead-acid batteries dominate the motive power market, there is rapid expansion and growth in demand for Non-Lead Acid Motive batteries. Much of this growth is driven by the increased demand for Hybrid Electric Vehicles (HEV) for both consumer and commercial application.

Almost every major car manufacturer is, or has already, introduced HEVs into their product lines. HEVs may utilize lead-acid batteries, however the majority of HEVs in the consumer

15 Conversation with Industrial Stationary battery manufacturer. February 27, 2009.

16 The movement of some batteries is regulated by Environment Canada. The export of batteries outside of Canada requires approved export permits from Environment Canada. The interprovincial movement of certain chemistries of batteries requires waste manifests from the Ontario Ministry of Environment. All transportation of Industrial Stationary batteries must be in compliance with the requirements of the Transportation of Dangerous Goods Act (TDGA). Other regulatory requirements may exist that are not specified here, particularly for lead-acid, nickel-cadmium, and mercury-containing batteries.

market currently employ Nickel-Metal Hydride or Lithium Ion batteries that provide more efficient power sources. Commercial transportation sectors, including public transit systems and taxi companies, are also beginning to make the transition to hybrid technology to improve on cost efficiency, among other reasons.

Incentives to purchase HEVs have been introduced in some jurisdictions, and may be helping to drive the trend. In Ontario, consumers that purchase HEVs may be entitled to rebates of up to $2,000[17]. Additional benefits for drivers of HEVs have been announced by the Ontario government, but are not yet specified[18].

4.5.2 Non-Lead Acid Motive Batteries

Typically, Non-Lead Acid Motive batteries are not sold directly to consumers but are instead embedded as part of the power supply system in both consumer and IC&I vehicles. As a result, consumers tend to purchase these batteries as replacements for existing batteries that are at the end of life. As with most Industrial Stationary batteries, Non-Lead Acid Motive Batteries can be sold directly to consumers, however service providers, such as automotive centres, have existing programs that charge the consumer a small fee to cover the cost to remove and manage the old end-of-life battery.

These batteries are then typically returned to the OEM for end-of-life management. Similarly, Non-Lead Acid Motive Batteries utilized for larger applications, such as rail and aircraft, are typically purchased in business-to-business transactions, and at end-of-life the battery is returned to the OEM. There is little formal information on the systems that industry, both manufacturers and users of Non-Lead Acid Motive Batteries, currently utilize when managing these units at end-of-life. While individual stewards have indicated that the management system for Non-Lead Acid Motive Batteries is ‘closed-loop’, there is little documented evidence to support such a claim at this time.

4.6 IC&I Generators

Industrial Stationary and Non-Lead Acid batteries, as designated in this Plan, can be utilized in many capacities in industrial, commercial and institutional (IC&I) applications, including the military. The Minister’s Program Request Letter specifies inclusion of batteries from all sources and accordingly the batteries program targets batteries generated in IC&I locations.

The inclusion of rechargeable battery chemistries under the Consolidated MHSW Program Plan has dramatically broadened the scope of the batteries program by opening up the IC&I sector. IC&I battery applications vary greatly, and include not only common rechargeable battery technologies used for such things as emergency lighting and fire prevention, but also larger stationary batteries that provide critical energy supplies for the electric utility and telecommunications sectors.

Due to their nature, it is very unlikely that Stewardship Ontario could reasonably expect to collect Industrial Stationary batteries and Non-Lead Acid Motive batteries for end-of-life management through current and proposed Year 1 MHSW Program collection channels. Industrial Stationary and Non-Lead Acid Motive batteries utilized for larger applications, such as

17 Ministry of Revenue. “Vehicles Powered by Alternative Fuels”.
http://www.rev.gov.on.ca/english/refund/vpaf/index.html
18 “Environmentally-Friendly Motorists Will Get "Perks": Ontario Says” CityNews.ca. August 8, 2007.

rail and aircraft, are typically purchased in business-to-business transactions, and are returned to the OEM at the end of life.

There is little formal information on the systems that industry, including manufacturers and users of Industrial Stationary and Non-Lead Acid Motive batteries, currently utilizes when managing these units at end-of-life. While individual stewards have indicated that the management systems for Industrial Stationary and Non-Lead Acid Motive batteries are 'closed-loop', there is limited documented information or data on such systems available at this time.

4.7 Quantity Supplied for Use

Please note that, for reasons outlined in Section 2.0, Stewardship Ontario has not included estimates of the quantities of Industrial Stationary and Non-Lead Acid Motive batteries supplied for use in Ontario. Stewards of Industrial Stationary and Non-Lead Acid Motive batteries will be required to report the quantities of Industrial Stationary and Non-Lead Acid Motive batteries supplied into Ontario to Stewardship Ontario as part of their steward obligations. Stewardship Ontario will utilize data from Steward's Reports to establish estimates of the quantity of Industrial Stationary and Non-Lead Acid Motive batteries supplied for use in Ontario.

4.8 Quantity Available for Collection

Please note that, for reasons outlined in Section 2.0, Stewardship Ontario has not included estimates of the quantities of Industrial Stationary and Non-Lead Acid Motive batteries available for collection in Ontario. Substantial R&D efforts will be initiated in Year 1 of the Program to address outstanding information needs related to the quantities Industrial Stationary and Non-Lead Acid Motive batteries available for collection in Ontario.

4.9 Current Management Infrastructure and Performance

4.9.1 Industrial Stationary Batteries

Industrial Stationary batteries refers to batteries designed to provide non-motive power, typically for industrial, commercial and institutional applications, and that weigh greater than 5kgs. Industrial Stationary batteries are not typically sold to consumers, but instead through business-to-business transactions that include professional servicing over the life of the battery. While some Industrial Stationary batteries are small in size, the replacement of an Industrial Stationary battery typically requires specialized equipment and professional installation/ removal.

While individual stewards have indicated that the management systems for Industrial Stationary batteries are 'closed-loop', there is insufficient documented evidence to ensure confidence that all of these batteries are being managed at end-of-life in an appropriate and acceptable manner.

Substantial R&D efforts to research, assess and document these systems will be initiated in Year 1 of the Consolidated MHSW Program Plan. These activities are outlined in Section 4.10.

4.9.2 Non-Lead Acid Motive Batteries

Non-Lead Acid Motive batteries refers to non-lead acid batteries designed to provide motive power that weigh greater than 5kgs. For the purposes of this Plan, motive power includes automotive, lift-truck, marine, rail, and aircraft applications. Non-Lead Acid Motive Batteries have

many applications, and are becoming increasingly common in non-IC&I applications such as hybrid cars. Non-Lead Acid Motive Batteries can be sold to consumers, however many service providers, such as automotive centres, have existing programs that charge the consumer a small fee to cover the cost for the centre to manage the end-of-life battery.

While individual stewards have indicated that the management systems for Non-Lead Acid Motive batteries are 'closed-loop', there is insufficient documented evidence to ensure confidence that all of these batteries are being managed at end-of-life in an appropriate and acceptable manner.

Substantial R&D efforts to research, assess and document these systems will be initiated in Year 1 of the Consolidated MHSW Program Plan. These activities are outlined in Section 4.10.

4.10 Research and Development for Industrial Stationary and Non-Lead Acid Motive Batteries

Stewardship Ontario will perform services to discharge the obligations of stewards of Industrial Stationary and Non-Lead Acid Motive batteries. Stewardship Ontario will work to establish and document existing EOL management practices, including quantities currently diverted, for Industrial Stationary and Non-Lead Acid Motive batteries in Ontario. The primary intent of R&D activities for Industrial Stationary and Non-Lead Acid Motive batteries will be to ascertain whether the current management of these batteries at end-of-life meets the intent and requirements of the Minister's MHSW Program Request Letter. Stewardship Ontario will continue these R&D activities until sufficient evidence has been collected to support a decision regarding the future management of Industrial Stationary and Non-Lead Acid Motive batteries under the Program.

R&D activities for Industrial Stationary and Non-Lead Acid Motive batteries during Year 1 of the Consolidated MHSW Program may include, but are not limited to, the activities outlined below:

- Research to assess the following for 1) all chemistries of Industrial Stationary batteries and 2) all chemistries of Non-Lead Acid Motive batteries:
  - quantities available for collection; quantities of these currently diverted; and related EOL management practices.
  - Primary applications for each;
  - Market trends including new and replacement technologies for each;
  - International battery program experiences;
  - Lifespan assumptions for each, by chemistry;
  - Status of markets for recycled components (e.g. lead; nickel; etc.) of each.
- Assess various options for recycling of Industrial Stationary and Non-Lead Acid Motive batteries.
- Develop appropriate materials tracking system for these batteries, including consideration of the requirements for tracking for transported Industrial Stationary and Non-Lead Acid Motive batteries as required by the Transportation of Dangerous Goods Act (TDGA).
- Investigate and assess the scope of battery refurbishment and reuse activities currently taking place in Ontario.
- Investigate options to use slag from battery recycling processes as economic input (shared with R&D for Consumer-Type Portable batteries).

Table 4.3 outlines the estimated cost for R&D activities associated with Industrial Stationary and Non-Lead Acid Motive batteries in Year 1.

Table 4.3: R&D Activities for Industrial Stationary and Non-Lead Acid Motive Batteries

R&D - Industrial Stationary & Non-Lead Acid Motive Batteries	Estimated Year 1 Cost
Industry and Document Research - Infrastructure and Best Practices	$8,000
Development of EOL Tracking System	$32,000
Investigation into Battery Refurbishment Activities in Ontario	$5,000
Investigate Options for Slag as Economic Input	$15,000
Total Industrial Stationary & Non-Lead Acid Motive Batteries	**$60,000**

4.11 Collection Targets

As outlined above, it is believed that the collection of Industrial Stationary and Non-Lead Acid Motive batteries is managed by the battery manufacturers and sales groups. Due to the size and hazardous nature of Industrial Stationary and Non-Lead Acid Motive batteries, it is expected that at least 96% are collected for recycling[19]. This high rate may be reflective of lead commodity values, however high collection and recycling rates are consistent with other jurisdictions including British Columbia, the United States and some European countries[20].Table 4.4 outlines estimated five-year collection targets for Industrial Stationary and Non-Lead Acid Motive batteries. Please note that no targets have been established for Year 1, as Stewardship Ontario will be undertaking R&D to assess collection activities for Industrial Stationary and Non-Lead Acid Motive batteries in Ontario.

Table 4.4: Collection Targets for Industrial Stationary and Non-Lead Acid Motive Batteries (% of Available for Collection)

	Year 1	Year 2	Year 3	Year 4	Year 5
Collection Target (%)	n/a	96.0%	96.5%	97.0%	97.5%

4.12 Recycling Targets

The recycling of Industrial Stationary and Non-Lead Acid batteries is believed to be a similar process to the recycling of lead acid vehicle batteries, such as starter batteries. As such, Stewardship Ontario has based estimated recycling targets for Industrial Stationary and Non-Lead Acid batteries on the results of the WDO report “Management of Vehicle Lead Acid Batteries in Ontario”, published in February 2009. The recycling rate results presented in the WDO Report (2009) are aligned with information received from the Batteries Working Group. Although the WDO Report (2009) was conducted for Vehicle Lead Acid batteries, the recycling rates reported by smelting activities in Ontario included lead-acid stationary batteries which make up the vast majority of industrial stationary batteries in use, according to Batteries Working Group members. Table 4.5 outlines estimated five-year recycling targets for Industrial Stationary and Non-Lead Acid Motive batteries. Please note that no targets have been established for Year 1, as Stewardship Ontario will be undertaking R&D to assess collection activities for Industrial Stationary and Non-Lead Acid Motive batteries in Ontario.

[19] Waste Diversion Ontario “Management of Vehicle Lead Acid Batteries in Ontario.” February 2009. Note that although this study was conducted for Vehicle Lead Acid batteries, recycling rates for lead-acid batteries include lead-acid stationary batteries.
[20] Waste Diversion Ontario “Management of Vehicle Lead Acid Batteries in Ontario.” February 2009.

Table 4.5: Recycling Performance Targets for Industrial Stationary and Non-Lead Acid Motive Batteries

	Year 1	Year 2	Year 3	Year 4	Year 5
Recycling Performance Target	n/a	97%	97.5%	98%	98.5%

Table 4.6: Recycling Efficiency Targets for Industrial Stationary and Non-Lead Acid Motive Batteries

	Year 1	Year 2	Year 3	Year 4	Year 5
Recycling Efficiency Target	n/a	93%	94%	95%	95.5%

4.13 Year 1 Cost and Fee Rate

Please note that as Stewardship Ontario does not anticipate physically managing Industrial Stationary and Non-Lead Acid Motive batteries in Year 1, no material management cost will be assessed against stewards of Industrial Stationary and Non-Lead Acid Motive batteries.

However, as outlined in Section 1.2, a share of the common Program costs, as well as material-specific R&D will be assessed against stewards of Industrial Stationary and Non-Lead Acid Motive batteries on a per-steward basis. Estimated total costs for Industrial Stationary and Non-Lead Acid Motive batteries in Year 1 and the fee rate are outlined in Table 4.7. Further information on the cost categories presented in Table 4.7 is available in Section 7 of Volume 1 of the Consolidated MHSW Program Plan.

Table 4.7: Year 1 Total Costs and Fee Rate for Industrial Stationary and Non-Lead Acid Motive Batteries

Description	Cost
Material Management	$0
Contingency	$0
Material-Specific R&D	$60,000
Material-Specific P&E	$0
Common Costs	$50,000
Deficit Recovery	$0
Total	**$110,000**
Tonnes managed	-
Total cost/tonne	-
Fee Rate ($/steward)	$1,111

Note: For the purposes of calculating a fee rate, a contingency has been applied to the estimated quantity of MHSW supplied for use in Year 1 of the Consolidated MHSW Program Plan. In the case of Industrial Stationary and Non-Lead Acid Motive Batteries, this contingency has been applied to the estimated number of stewards and has been set at 1%.

5.0 Corrosives – Corrosives

5.1 Definition

Corrosives are defined by one or more of the following:

- Consumer Chemical & Container Regulations (CCCR); or
- C.S.A. Standard Z752-03; or
- Ont. Regulation 347.

This definition includes:

Products that (1) meet the definition of “corrosive products” in the CCCR, 2001 and (2) which can only be sold if their containers display information prescribed in the CCCR, 2001.

This definition excludes:

The sub-category of products defined or classified as an "irritant" in the CCCR regulations (Refer to Section 6.0 for information on Corrosives – Irritants).

5.2 Market & Product Information

Most corrosives are either acids or bases used primarily for cleaning purposes. Common acids include hydrochloric acid, sulphuric acid, nitric acid, chromic acid, acetic acid and hydrofluoric acid. Common bases are ammonium hydroxide, potassium hydroxide (caustic potash) and sodium hydroxide (caustic soda). Corrosive materials cover a wide range of distinct products and container types (e.g., tubes, tubs, tins) and sizes (e.g., 800 ml, 1 L, 2.8 L).

Corrosive products are sold through home improvement stores, mass merchandisers and general retailers and are available in brand name and private label formats.

5.3 IC&I Generators

The quantity of corrosive waste generated by the IC&I generators is of unknown magnitude, though, as IC&I generators should only be utilizing products that are labelled in conformance to WHMIS regulations, these materials should not be collected in the MHSW waste stream. However, it is recognized that quantities do (and will) appear in the municipal stream, and this is reflected in the quantities and estimates collected for this plan, (i.e., it has been assumed that IC&I material has been reflected in the base year data).

5.4 Quantity Supplied for Use

Using Nielsen Research data for categories where common corrosive products are found and working with the assistance of the Canadian Consumer Specialty Products Association (CCSPA) to reach out to stewards to provide estimated percentages of corrosive products within each Nielsen category, estimates of quantities into the market were calculated. An estimated 10,327,194 units of corrosives were introduced into the Ontario market in 2007 and 10,317,905 units in 2008. The Nielsen data adjusted to incorporate the stewards’ feedback indicates a market trend of an annual decrease of 0.1% in sales into the Ontario market. The estimated quantity supplied into the market includes sales information for the following products:

Table 5.1: Estimated Percentage of Corrosive Products by Nielsen Category

Product Type	% CCCR Regulated Corrosive[1]
Bathroom cleaners	~ 5 %
Drain cleaners	~ 86 %
Household bleaches	~ 45 %
Toilet bowl cleaner products	~ 70 %

Note:
1. Estimated percentage of corrosive products within each Nielsen category provided by stewards via CCSPA.

The above list is not an exhaustive product list, and is not intended to exclude other corrosive products that are captured by the corrosive definition under the Consolidated MHSW Program Plan. Early results from the lab pack analysis completed in May 2009 indicate that in addition to the categories identified above products such as rust removers, wallpaper strippers, jewellery cleaners, pool and spa chemicals, acids (muriatic, sulphuric) and bases (e.g. sodium hydroxyde), de-scalers, tire cleaners, drain openers, paint removers, masonry products (cement powers) and others are collected through the municipal channels. The estimates of quantities supplied for use do not include these products. Further data gathering is required in the first year of the program to estimate these quantities. The Neilson data does not include sales figures for those products excluded from the program as per the Corrosive definition.

NOTE: Some corrosives will also qualify as flammable, solvents and toxic materials; these figures have not been adjusted to remove the potential for double counting.

Table 5.2 presents estimates of quantities supplied into the market for Years 1 through 5.

Table 5.2: Estimated Quantities of Corrosives Supplied into the Ontario Market

[3]Sales into Market	[1]2007	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Units	10,327,194	10,296,243	10,285,947	10,275,661	10,265,385	10,255,120
[4]Tonnes	16,359	16,310	16,294	16,277	16,261	16,245
[5]% growth	-	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%

Notes:
1. Year 2007 is the baseline year for MHSW Program Plan.
2. MHSW Program Plan Year 1 is the 12 months after program commencement date.
3. Sales into the market and market growth forecast derived from Nielsen's data and steward's input.
4. Conversion factor based on average container provided by stewards for each of the Nielsen categories and density of 1kg/litre.
5. Although only two years of sales information are available, a -0.1% decrease is assumed here. This trend will be revisited as the program matures and information is gathered.

5.5 Quantity Available for Collection

Corrosives are a consumable product and are meant to be used up. It is therefore very difficult to estimate the quantity that is available for collection. The lab pack sampling study undertaken by Stewardship Ontario in May 2009 indicates that a small quantity of residual corrosive products is collected through the municipal infrastructure. The available for collection quantities have been derived from the quantities in the 2007 WDO Datacall and the data collected through the lab pack analysis. An estimated 5% is available for collection.

Table 5.3: Quantity of Corrosives Available for Collection

Available for Collection	[1]2007	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Tonnes	818	816	815	814	813	812
[3]% of introduced into the market		5%	5%	5%	5%	5%

Notes:

1. Year 2007 is the baseline year for MHSW Program Plan.
2. MHSW Program Plan Year 1 is the first 12 months after the program commencement date.
3. Available for collection is derived from May 2009 lab pack sampling and collected quantities reported in the 2007 WDO Datacall.

5.6 Current Management Infrastructure & Performance

The 2007 WDO Datacall captures corrosives in multiple categories: alkaline solutions/sludge, inorganic bases, oxidizers (approximately 10%) and pesticides (approximately 2%). In the 2007 Datacall over 84 municipal programs offered collection services for corrosives. This represents over 4.1M households served. The 2007 WDO Datacall reports that 416 tonnes of corrosives were collected through the municipal MHSW system. There are no non-municipal channels collecting corrosive products at this time.

The corrosive waste that is currently collected through the municipal infrastructure is solidified and landfilled or sent to water treatment facilities. The containers are landfilled.

5.7 Barriers and Opportunities to Increased Diversion & Research and Development Requirements

Barriers to increased diversion of corrosives include:

- There is limited knowledge on the products captured by this material group. In the first year of the program, a study will be undertaken to identify all product groups and stewards.
- Lack of data on quantities that are available for collection; field study required.
- Further analysis is needed to identify the actual amounts collected in the municipal waste stream, and how they are currently being managed.

Opportunities to increase diversion of corrosives include an assessment of the chemical composition of corrosives to determine impact of bulking together different corrosives.

As part of the implementation of the Consolidated MHSW Plan, a Research and Development plan will be developed for corrosives. The priorities that have been identified under this plan are as follows:

- A process to better understand the volumes of these materials in the waste stream.
- Research to identify the chemical mix of the materials that include corrosives that are consolidated at collection centres. The chemical composition of this mixture of materials will have an impact on how that material can be managed.
- For containers, confirm the ratio of different plastic types used HDPE, PVC and PET) and carry out a study of methods of separating the various plastic types - either for intact containers, or for shredded material (current method is hand sorting - very labour intensive, very expensive).

For Year 1 of the Consolidated MHSW Program Plan, an R&D budget of $7,500 has been allocated to Corrosives – Corrosives.

5.8 Promotion and Education

As described in Section 5.5 of the Consolidated MHSW plan, Promotion and Education activities will be implemented at three levels.

The province-wide “branding the behaviour” P&E program will continue to build on the Do What You Can campaign urging people to think about 3Rs objectives when it comes to managing MHSW. The message will be an overarching, motivational call to action, driving people to the Do What You Can website to find material specific and collection information.

The second layer of P&E is targeted as “educating about specifics” which will provide people with the information they need to take action. The approach to this P&E will depend on whether the product is a consumable or durable and what the desired end-of-life might be. Many products and containers will be collected at events, depots or depots-in-a-box.

As well, for some materials, targeted collection programs will require point of sale P&E tactics.

The recovery of corrosives will be promoted as part of a province-wide generic campaign in year one, encouraging people to buy only as much as they need and to use it up. For Year 1 of the Consolidated MHSW Program Plan, a P&E budget of $30,277 has been allocated.

5.9 Accessibility Strategy

Corrosives are expected to be collected through the event, depot, DIB and toxic taxi channels. The strategy for increasing the accessibility through those channels is laid out in section 5 of the MHSW Plan.

5.10 Reduction, Collection & Recycling Targets

5.10.1 Reduction

The corrosives category is made up of multiple product groups that consumers purchase with the intent to consume. The current estimate of the quantity of residual material that is available for collection is 5 percent of sales. Promotion and education efforts will aim to reduce the quantity of residual material by educating consumers to buy only what they need (see section 5.8 above).

5.10.2 Collection

Collection targets are presented in Table 5.4. The collection target for Year 1 has been derived from the 2007 WDO Datacall and accessibility strategy outlined in Section 5 of the MHSW Plan. The collection target may need to be revised as products are identified and as data on the MHSW collection waste stream is gathered.

Table 5.4: Five-Year Collection Targets for Corrosives

Target	Year 1	Year 2	Year 3	Year 4	Year 5
Tonnes	511	525	539	555	570
% of Available for Collection	63%	64%	66%	68%	70%

5.10.3 Recycling

As there are currently no known processes for recycling corrosives, no recycling target has been set for Year 1 of the program. The research and development activities outlined in section 5.7 above will enable Stewardship Ontario to set recycling targets for Year 2 of the program.

5.11 Year 1 Costs and Fee Rate

Table 5.5 below outlines the total costs to manage corrosives and the fee rate in Year 1 of the program. Further information on the cost categories presented in Table 5.5 is available in Section 7 of Volume 1 of the Consolidated MHSW Program Plan.

Table 5.5: Year 1 Total Costs and Fee Rate for Corrosives

Description	Cost
Material Management	$938,300
Contingency	$164,200
Material-Specific R&D	$7,500
Material-Specific P&E	$30,277
Common Costs	$332,200
Deficit Recovery	$0
Total	**$1,472,477**
Tonnes managed	511
Total cost/tonne	$2,882
Fee Rate ($/unit)	$0.151

Notes

1) For the purposes of estimating material management costs, a contingency of 17.5% has been applied.
2) For the purposes of calculating a fee rate, a contingency of 5% has been applied to the estimated quantity of Corrosives supplied for use in Year 1 of the Consolidated MHSW Program Plan.

6.0 Corrosives – Irritants

6.1 Definition

The sub-category of products defined or classified as an "irritant" in the CCCR regulations. This definition includes:

> Products that (1) meet the definition of “irritant products” in the CCCR, 2001 and (2) which can only be sold if their containers display information prescribed in the CCCR, 2001.

6.2 Market & Product Information

Irritants captured by the MHSW program are those captured under the CCCR definition. These are either mild acids or bases used primarily for cleaning purposes. Common irritant products include laundry detergent, dishwashing cleaners, glass cleaners etc. These products are purchased with the intent to be completely consumed. Irritant materials cover a wide range of distinct products and container types (e.g., tubes, tubs, tins) and sizes (e.g., 500 ml, 750 L, 1 L, 3L).

Irritants products are sold through home improvement stores, mass merchandisers and general retailers and are available in brand name and private label formats.

6.3 IC&I Generators

The quantity of Irritant waste generated by the IC&I generators is of unknown magnitude, though, as IC&I generators should only be utilizing products that are labelled in conformance to WHMIS regulations, these materials should not be collected in the MHSW waste stream. However, it is recognized that quantities do (and will) appear in the municipal stream, and this is reflected in the quantities and estimates collected for this plan, (i.e., it has been assumed that IC&I material has been reflected in the base year data).

6.4 Quantity Supplied for Use

Using Nielsen Research data for categories where common irritant products are found and working with the assistance of the Canadian Consumer Specialty Products Association (CCSPA) to reach out to stewards to provide estimated percentages of irritant products within each Nielsen category, estimates of quantities into the market were calculated. An estimated 98,180,944 units of irritants were introduced into the Ontario market in 2007 and 97,746,666 units in 2008. The Nielsen data adjusted to incorporate the stewards’ feedback indicates a market trend of an annual decrease of 0.5% in sales into the Ontario market. Into the market quantities includes sales information for the products on the following page:

Table 6.1: Estimated Percentage of Irritant Products by Nielsen Category

Product Type	% CCCR Regulated Irritant[1]
Abrasive cleaners	~ 90 %
Air care	~ 33 % (0% for some brands)
Automotive cleaning products	~ 1 – 5 %
Bathroom cleaners	~ 65 %

Product Type	% CCCR Regulated Irritant[1]
Cleaning solvents	100 %
Dishwashing products	~ 90 – 95 %
Drain cleaners	~ 7 %
Glass cleaners	~ 10 %
Household bleaches	~ 55 %
Household cleaners	~ 70 %
Laundry detergent	~ 95 – 99 %
Spot removers	~ 66 %
Toilet bowl cleaners	~ 25 %

Note:
1. Estimated percentage of irritant products within each Nielsen category provided by stewards via CCSPA.

The above list is not an exhaustive product list, and is not intended to exclude other irritant products that may be captured by the Irritant definition under the Consolidated MHSW Program Plan. Early results from the lab pack analysis completed in May 2009 indicate that in addition to the categories identified above products such as pool chemical, spa chemicals and others are collected at the municipal collection channels. The quantities for these products supplied into the market have not been included. Further data gathering is required in the first year of the program.

NOTE: Some irritants will also qualify as flammable, solvents and toxic materials; these figures have not been adjusted to remove the potential for double counting.

Table 6.2 below present estimates of quantities of Corrosives – Irritants supplied into the market for Years 1 through 5.

Table 6.2: Estimated Quantities of Irritants Supplied into the Ontario Market

[3]Sales into Market	[1]2007	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Units	98,180,944	96,715,581	96,232,003	95,750,843	95,272,089	94,795,728
[4]Tonnes	174,154	171,555	170,697	169,844	168,995	168,150
[5]% growth		-0.5%	-0.5%	-0.5%	-0.5%	-0.5%

Notes:
1. Year 2007 is the baseline year for MHSW Program Plan.
2. MHSW Program Plan Year 1 is the 12 months after program commencement date.
3. Sales into the market and market growth forecast derived from Nielsen's data and steward's input.
4. Conversion factor based on average container provided by stewards for each of the Nielsen categories and density of 1kg/litre.
5. Although only two years of sales information are available, a -0.5% decrease is assumed here. This trend will be revisited as the program matures and information is gathered.

6.5 Quantity Available for Collection

Irritants are a consumable product and are meant to be used up. It is therefore very difficult to estimate the quantity that is available for collection. The lab pack sampling study undertaken by Stewardship Ontario in May 2009 indicates that a small quantity of residual irritant products is collected through the municipal infrastructure. The available for collection quantities have been derived from the quantities in the 2007 WDO Datacall and the data collected through the lab pack analysis. An estimated 0.06% is available for collection.

Table 6.3: Quantities of Irritants Available for Collection

Available for Collection	[1]2007	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Tonnes	104	103	102	102	101	101
[3]% of introduced into the market		0.06%	0.06%	0.06%	0.06%	0.06%

Notes:

1. Year 2007 is the baseline year for MHSW Program Plan.
2. MHSW Program Plan Year 1 is the first 12 months after the program commencement date.
3. Available for collection is derived from May 2009 lab pack sampling and collected quantities reported in the 2007 WDO Datacall.

6.6 Current Management Infrastructure & Performance

As irritants are considered to be a sub-category of the Corrosive category, a ratio of irritants vs. corrosives (as defined in the CCCR) was determined using preliminary results from the May 2009 lab pack analysis conducted by Stewardship Ontario. It is estimated that about 11% of the collected corrosive products meet the irritant definition.

The 2007 WDO Datacall captures corrosives in multiple categories: alkaline solutions/sludge, inorganic bases, oxidizers (approximately 10%) and pesticides (approximately 2%). According to the Datacall, over 84 municipal programs offered collection services for corrosives (including irritants) in 2007. This represents over 4.1M households served. Using the ratio mentioned above, it is estimated that 51 tonnes of irritants were collected through the municipal MHSW system in 2007.

There are no non-municipal channels collecting irritant products at this time.

The irritant waste that is currently collected through the municipal infrastructure is solidified and landfilled or sent to water treatment facilities. The containers are landfilled.

6.7 Barriers and Opportunities to Increased Diversion & Research and Development Requirements

Barriers to increased diversion of irritants include:

- There is limited knowledge on the products captured by this material group. In the first year of the program, a study will be undertaken to identify all product groups and stewards.
- Lack of data on quantities that are available for collection; field study required.
- Further analysis is needed to identify the actual amounts collected in the municipal waste stream, and how they are currently being managed.

Opportunities to increase diversion of irritants include:

- Assessment of the chemical composition of irritants to determine impact of bulking together different irritants.
- Increase P&E to encourage consumers to buy only what they need and to completely use the product.

As part of the implementation of the Consolidated MHSW Plan, a Research and Development plan will be developed for irritants. Where R&D initiatives will benefit, activities between corrosives and irritants may be combined. The priorities that have been identified under this plan are as follows:

- A process to better understand the volumes of these materials in the waste stream.
- Research to identify the chemical mix of the materials including irritants that are consolidated at collection centres. The chemical composition of this mixture of materials will have an impact on how that material can be managed.
- For containers, confirm the ratio of different plastic types used HDPE, PVC and PET) and carry out a study of methods of separating the various plastic types - either for intact containers, or for shredded material (current method is hand sorting - very labour intensive, very expensive).

For Year 1 of the Consolidated MHSW Program Plan, an R&D budget of $7,500 has been allocated to Irritants.

6.8 Promotion and Education

As described in Section 5.5 of Volume 1 of the Consolidated MHSW plan, Promotion and Education activities will be implemented at three levels.

The province-wide “branding the behaviour” P&E program will continue to build on the **Do What You Can** campaign urging people to think about 3Rs objectives when it comes to managing MHSW. The message will be an overarching, motivational call to action, driving people to the **Do What You Can** website to find material specific and collection information.

The second layer of P&E is targeted as “educating about specifics” which will provide people with the information they need to take action. The approach to this P&E will depend on whether the product is a consumable or durable and what the desired end-of-life might be. Many products and containers will be collected at events, depots or depot-in-a-box.

As well, for some materials, targeted collection programs will require point of sale P&E tactics.

The recovery of irritants will be promoted as part of a province-wide generic campaign in year one, encouraging consumers to buy only as much as they need and to use it up. For Year 1 of the Consolidated MHSW Program Plan, a P&E budget of $14,761 has been allocated to Irritants.

6.9 Accessibility Strategy

Irritants are expected to be collected through the event, depot, DIB and toxic taxi channels. The strategy for increasing the accessibility through those channels is laid out in Section 5 of the MHSW Plan.

6.10 Reduction, Collection & Recycling Targets

6.10.1 Reduction

The irritants category is made up of multiple product groups that consumers purchase with the intent to consume. The current estimate of the quantity of residual material that is available for collection is 0.06% of sales. Promotion and education efforts will aim to reduce the quantity of residual material by educating consumers to buy only what they need and to completely use what they buy (see section 6.8 above).

6.10.2 Collection

The collection target for Year 1 has been derived from the 2007 WDO Datacall and accessibility strategy outlined in Section 5 of the MHSW Plan. The collection target may need to be revised as products are identified to be captured as per the definition and as data on the MHSW collection waste stream is gathered.

Table 6.4: Five-Year Collection Targets for Irritants

Collection Target	Year 1	Year 2	Year 3	Year 4	Year 5
Tonnes	65	67	68	70	72
% of Available for Collection	63%	65%	67%	69%	71%

6.10.3 Recycling

As there are currently no known processes for recycling irritants, no recycling target has been set for Year 1 of the program. The research and development activities outlined in Section 6.7 above will enable Stewardship Ontario to set recycling targets for Year 2 of the program.

6.11 Year 1 Costs and Fee Rate

Table 6.5 below outlines the total costs to manage irritants and the fee rate in Year 1 of the program. Further information on the cost categories presented in Table 6.5 is available in Section 7 of Volume 1 of the Consolidated MHSW Program Plan.

Table 6.5: Year 1 Total Costs and Fee Rate for Irritants

Description	Cost
Material Management	$119,400
Contingency	$20,900
Material-Specific R&D	$7,500
Material-Specific P&E	$14,761
Common Costs	$97,100
Deficit Recovery	$0
Total	**$259,661**
Tonnes managed	65
Total cost/tonne	$3,995
Fee Rate	$0.003

Notes:

1) For the purposes of estimating material management costs, a contingency of 17.5% has been applied.
2) For the purposes of calculating a fee rate, a contingency of 5% has been applied to the estimated quantity of Irritants supplied for use in Year 1 of the Consolidated MHSW Program Plan.

7.0 Fertilizers

7.1 Definition

The Minister's Program Request Letter for Phase 1 listed fertilizers, fungicides, herbicides, insecticides, or pesticides together. For the purposes of this plan, fertilizers have been separated from pesticides. The rationale for this is that fertilizers and pesticides are completely different products and regulated under different pieces of legislation. Fertilizers are regulated by the Canadian Food Inspection Agency (CFIA) under the Fertilizers Act and Fertilizers Regulations. Pesticides are regulated by the Pest Management Regulatory Agency under the Pest Control Products Act under the authority of Health Canada.

While Phase 1 of the MHSW program focused solely on the collection of Registered Fertilizers – namely those that contained pesticides – both registered and unregistered fertilizers are captured under this Consolidated MHSW plan.

"**Fertilizer**" means any substance or mixture of substances defined as a fertilizer in the *Fertilizers Act* (Canada) and *Fertilizers Regulations* (Canada) and which is regulated under the *Fertilizer Regulations*. This includes any substance manufactured, sold or represented as a plant nutrient. For greater certainty, this includes, but is not limited to:

a) Fertilizers requiring registration under the *Act* and *Regulations*
b) Registration exempt fertilizers as outlined in Schedule II of the *Regulations*
c) Any product making a nutrient claim

But excludes:

- Unregistered supplements, including composts, for use only in improving the physical condition of the soil and where no nutrient claim is made
- Fibrous organic materials including peat, peat moss, sphagnum moss, tree bark and other materials for use only in improving the physical condition of the soil and where no nutrient claim is made
- Animal and vegetable manures sold in their natural condition which are exempt from the *Fertilizer Act* and *Regulations*, as outlined in section 3 (1) (a) of the *Regulations*, which generally refers to unaltered, unpackag*ed manures sold* only *by the far*mer directly to the end-user , which was p*roduced by* the farm's herd
- Any substance not meeting the definition of Fertilizer as defined in the *Fertilizers Act* and *Regulations*

For the purpose of this plan, the fertilizer category has been split into the following sub-categories:

1) Fertilizers Containing Banned Pesticides
2) Synthetically derived fertilizers
3) Naturally derived fertilizers

The addition of these sub-categories will support separate tracking and may allow, in future fee setting processes, differential fees to reflect the actual costs to manage each type of fertilizer sub-category.

7.2 Market & Product Information

Fertilizer products are sold to the agricultural market (products used by farmers), commercial market (lawn care applicators, golf courses, etc.) and homeowners (consumers). There are no formal product classifications (i.e. domestic, commercial, and agricultural) for fertilizer products under the Fertilizers Act. However, large quantities of commercial and agricultural fertilizers typically are sold in bulk or in containers (reusable bulk bags) greater than 30 kg through agricultural supply wholesale and distribution centres.

Domestic fertilizers are sold through traditional hardware, garden supply centres and retail outlets. Fertilizers used by consumers are typically sold in plastic containers for liquids (ranging from 250 grams to 5 kg) or cardboard boxes or plastic bags for dry or granular products (1 kg – 30 kg). Some fertilizers are sold to commercial landscapers in containers less than 30 kg through wholesalers and dealers. For the purposes of this plan, all fertilizers in packages of 30 kg or less are included.

Fertilizers are a seasonal product. The large percentage of sales occurs in the spring and summer.

7.3 Small Quantity IC&I Generators

Small quantity IC&I generators in Ontario are expected to include the wide variety of landscape, maintenance, contractor, landscape design & lawn care operating companies in the province. Small quantity IC&I generators will be able to use depots, events, and DiB to dispose of unwanted fertilizers.

7.4 Quantity Supplied for Use

According to three quarters of stewards' reports, 1245 tonnes of Phase 1 fertilizers were supplied into the Ontario market over a nine month period (from July 1st 2008 to March 31st 2009).

At this time, it is not possible to estimate the quantity of fertilizers to be supplied into the market in Year 1 of the Consolidated MHSW Program Plan due to the following:

- Expansion of the fertilizer definition – a percentage of the new fertilizers included in the Consolidated MHSW Program Plan is attributable to naturally-derived fertlizers, for which no sales data were available
- The provincial ban on cosmetic pesticides, which impacts those fertilizers that contain banned pesticides – it is estimated that this is the case for the great majority of Phase 1 fertilizers

7.5 Quantity Available for Collection

The quantity of fertilizers available for collection is difficult to estimate as the product is intended to be used up by the consumer. In addition, there is not one fertilizer category in the WDO Datacall, but rather multiple categories in which fertilizers are reported (e.g. organic oxidizers). Estimates of the fraction of those other categories that fall under the fertilizer category were made based on best available information. Clear and consistent classification of products and materials will be required by stewards as well as collection and processing service providers. The estimates will be reviewed and confirmed during year 1 of the MHSW Consolidated Plan.

7.6 Current Management Infrastructure & Performance

According to the 2007 WDO Datacall, 85 municipal programs offered collection services for fertilizers. This represents about 4.3 M households served, collecting about 450 tonnes of fertilizers. This quantity includes both Phase 1 and non Phase 1 fertilizers.

Most fertilizers are packed at municipal sites, and then sent to service providers for sorting and/or bulking. Waste fertilizers are either sent to hazardous landfill, or sent for incineration. Fertilizers that can clearly be identified as not being a registered fertilizer are sometimes reused by the municipality. Empty fertilizer containers are sent to landfill or hazardous landfill by service providers.

Under Phase 1, 110 tonnes of fertilizers have been collected by municipalities from July 2008 to March 2009. According to lab pack sampling studies undertaken by Stewardship Ontario in the spring of 2008, it is estimated that 27% of oxidizers collected by municipalities meet the Phase 1 definition of fertilizers.

7.7 Barriers and Opportunities to Increased Diversion & Research and Development Requirements

Reuse options where packaged fertilizers are available to the public must consider consumer liability and labelling issues. There are, however, opportunities to explore on-site reuse practices at depots by municipalities.

There is a lack of recycling options for empty plastic fertilizer containers. Most packaging is in plastic film bags. However, the residual product found in the bags (e.g. dust, dirt) has typically been a contaminant to film recyclers.

As part of the implementation the Consolidated MHSW Plan, a Research and Development Workplan that takes into account the R&D activities already taking place under Phase 1 will be developed. The priorities that have been identified under this R&D plan are as follows:

- Consultation with existing waste fertilizer handlers, including municipalities, hazardous waste handlers, and others to determine current processing, capacity and opportunities;
- Consultation with experts and associations, including the Canadian Fertilizers Institute (CFI), Compost Council of Canada, Urban Fertilizer Council regarding generation and opportunities for alternatives to disposal;
- Identify all container material types used to contain fertilizers distributed into the Ontario market;
- Assess processes for recycling fertilizer containers, both within and outside of Ontario;

- Research to determine 'acceptable' quantities and concentrations of fertilizers that could be added to a residential, municipal or commercial compost system;
- Development of handler training and education materials to assist in differentiating between fertilizers safe for a compost system and those that require special handling;
- Investigation into the potential to implement regulations requiring standardized labelling for fertilizers to assist in consumer and handler identification, to improve potential for use as an alternative to disposal.

7.8 Accessibility Strategy

Fertilizers will be collected through the depot, event, depot in a box and toxic taxi channel, as outlined in section 5 of the MHSW plan

7.9 Promotion and Education

As described in Section 5.5 of Volume 1 of the Consolidated MHSW plan, Promotion and Education activities will be implemented at three levels.

The province-wide "branding the behaviour" P&E program will continue to build on the **Do What You Can** campaign urging people to think about 3Rs objectives when it comes to managing MHSW. The message will be an overarching, motivational call to action, driving people to the **Do What You Can** website to find material specific and collection information.

The second layer of P&E is targeted as "educating about specifics" which will provide people with the information they need to take action. The approach to this P&E will depend on whether the product is a consumable or durable and what the desired end-of-life might be. Many products and containers will be collected at events, depots or depots-in-a-box.

As well, for some materials, targeted collection programs will require point of sale P&E tactics.

The recovery of fertilizers will be promoted as part of a province-wide generic campaign, encouraging consumers to buy only as much as they need and to use it up. For Year 1 of the Consolidated MHSW Program Plan, a P&E budget of $34,123 has been allocated to fertilizers.

7.10 Targets

More research is necessary to determine the amount of fertilizers that is available for collection. As the program matures, and as public education encourages consumers to store fertilizers properly for future use and ultimately use up their fertilizer, it is anticipated that the volume of fertilizers available for collection will decrease.

7.10.1 Reduction

Reduction strategies for the residential fertilizer users include the following.

- Nutrient Management Planning strategies based on the Right Rate, Right Time, Right Place™ system are recommended.
- Education to buy what you need, buy the right product for the desired purpose, promote appropriate options, how to store unused fertilizer in order to avoid spoilage, and ultimately enable the consumer to use all of the product they have purchased.

- Pulling weeds by hand or spot treating are alternatives to fertilizer/herbicide combinations.
- Enhanced advice on appropriate usage provided at point of sale is recommended.

7.10.2 Collection

Table 7.11 below outlines the five year collection targets for fertilizers. The collection target for fertilizers in Year 1 is 616 tonnes. The collection target tonnage for Year 1 was set based on quantities collected to date under Phase 1, the increase in accessibility as outlined in section 5 of the MHSW plan, and the expanded fertilizer definition under the Consolidated MHSW Plan. The collection targets for years 2-5 assume a 2% growth in collection year over year.

Table 7.1: Five-Year Fertilizer Collection Targets

Collection Target	Year 1	Year 2	Year 3	Year 4	Year 5
Tonnes	616	628	640	653	666

7.10.3 Recycling

No Year 1 recycling target has been set for fertilizers due to the lack of technically feasible recycling options.

7.11 Year 1 Costs and Cost Recovery

The Year 1 total costs and cost recovery model for fertilizers are outlined in Table 7.22 below. Further information on the cost categories presented in Table 7.22 is available in Section 7 of Volume 1 of the Consolidated MHSW Program Plan.

Table 7.2: Year 1 Total Costs and Cost Recovery for Fertilizers

Description	Cost
Material Management	$1,141,300
Contingency	$199,700
Material-Specific R&D	$0
Material-Specific P&E	$34,123
Common Costs	$409,700
Deficit Recovery	$185,000
Total	**$1,969,823**
Tonnes managed	616
Total cost/tonne	$3,200
Fee Rate	Measured Return Share

Notes:

1. For the purposes of estimating material management costs, a contingency of 17.5% has been applied.
2. While the material-specific cost to manage this group of products has been estimated as per table 7.2 above, “measured return share” means that the actual management cost, as well as a share of the budgeted common costs and deficit recovery, will be charged to stewards of those product categories. It is Stewardship Ontario’s intention to move to a set fee rate as soon as reliable data on sales into market and quantity available for collection are obtained.

3. Stewardship Ontario incurred a deficit from the operation of the first year of Phase 1 of the MHSW program that will be recovered as part of the fees for the Consolidated Plan. Allocated only to Phase 1 Materials on a material-specific basis, the deficit shown in the table includes any deficits in common costs (start-up, plan development, and program management costs) as well as material-specific operating costs and fees owing.

8.0 Fire Extinguishers (Portable)

8.1 Definition

A portable Fire Extinguisher is defined as a portable device, carried or on wheels, and operated by hand, containing an extinguishing agent that can be expelled under pressure for the purpose of suppressing or extinguishing a fire. This definition includes the following:

- Fire extinguishers designed to suppress Class A, B or C fires whether or not they have been discharged.
- All fire extinguishers listed and/or labelled by ULC (Canada) or UL (United States) as non-refillable.
- All extinguishers with no dial type gauge to indicate if the extinguisher is in an operable condition.
- All extinguishers manufactured with an aluminum shell.
- All dry chemical extinguishers less than 1 KG agent weight. (Dry Chemical defined as ABC, BC, PK)
- All dry chemical extinguishers sold in shelf talking retail packaging aimed specifically at retail consumers.
- All dry chemical fire extinguishers (ABC, BC, PK) with UL/ULC ratings less than 10B:C
- All Halogenated extinguishers less than 1KG agent weight

Exclusions from the MHSW Consolidated Program:

Fire extinguishers sold exclusively for commercial and/or industrial applications (and therefore not available for retail consumption) and in inspection / life-cycle management programs, such as:

- All Wet Chemical extinguishers (Class K)
- All Class D extinguishers
- All BC dry chemical extinguishers greater than 1kg agent weight
- All halogenated extinguishers greater than 1kg agent weight
- All foam extinguishers
- All ABC extinguishers with a ULC / UL rating of greater than 3A:10BC

8.2 Market & Product Information

Portable extinguishers are rated according to their fire extinguishing potential which is indicated by NUMERAL and LETTER designations. The LETTER designates the general class of fire for which the extinguisher is suitable, and the NUMERAL indicates the approximate relative extinguishing potential of the device.

- **Class A** fires are defined as fires in ordinary combustible materials such as wood, cloth, and paper where the "quenching-cooling" effect of quantities of water or solutions containing large percentages of water is most effective in reducing the temperature of the burning material below the ignition temperature and is, therefore, of first importance.
- **Class B** fires are defined as fires in flammable liquids, combustible liquids, petroleum greases, tars, oils, oil-based paints, solvents, lacquers, alcohols and flammable gases.

- **Class C** fires are defined as fires involving electrical equipment where the electrical non-conductivity of the extinguishing agent is of first importance.
- **Class D** fires are defined as fires in combustible metals, such as magnesium, titanium, zirconium, sodium, potassium, etc.
- **Class K** fires are defined as fires in cooking appliances that involve combustible cooking media (vegetable or animal oils and fats).

Portable fire extinguishers are available in a variety of sizes including 1lb, 2lb, 2.5lb, 3lb, 5lb, 6lb, 10lb, 20lb and 30lb. Typically, extinguishers for residential consumption are sold through hardware stores, automotive mass merchandisers, and home improvement retailers.

Fire extinguishers targeted towards the residential market are provided by relatively few manufacturers and are often of a single-use (non-rechargeable) form.

8.3 IC&I Generators

Fire extinguishers are required by both federal and provincial legislation to be provided for IC&I environments (including commercial vehicles) and are subject to regular certified inspection. Fire extinguishers from this environment are "typically" managed, recharged and replaced under maintenance contracts. The extinguisher in a commercial or IC&I environment forms an important part of the owner's obligation to meet fire codes and therefore is not likely to be disposed of in the municipal waste stream.

8.4 Quantity Supplied for Use

Based on a Red Cross study conducted in the US in 2007, it was estimated that 87,460 portable fire extinguishers (for largely household use) were sold in Ontario in 2007.

Currently, as there are no regulations that require households to have fire extinguishers available, it is not anticipated that the prevalence of fire-extinguishers within Ontario households will change significantly over the next five years. In developing this plan, it has been assumed that the growth in sales of fire-extinguishers to households will be tied to the growth in number of households.

Based on estimates into the market for 2007, an estimate of 90,228 units for 2010 has been derived, or an approximate weight of 180 tonnes.

In the absence of actual sales information from fire extinguisher stewards, the number of fire extinguishers supplied for use was estimated using a study conducted by the Red Cross for the American market. In the last stages of plan development, fire extinguisher stewards have reported that sales are significantly higher than presented in the Consolidated MHSW Program Plan and have requested that differential fees be based on weight or unit size (e.g. < 2 lbs; > 2 lbs). Stewardship Ontario will adjust the fee rate for fire extinguishers when more accurate information on the sales of this product becomes available.

Table 8.1: Estimated Quantities of Fire Extinguishers into the Ontario Market

[3]Sales into Market	2007[1]	Year 1[2]	Year 2	Year 3	Year 4	Year 5
Units	87,460	90,228	91,645	93,083	94,545	96,029
Tonnes[4]	175	180	183	186	189	192
% growth		2%	2%	2%	2%	2%

Notes:

1. Year 2007 is the baseline year for MHSW Program Plan
2. MHSW Program Plan Year 1 is the 12 months after program commencement date
3. Sales into the market and market growth estimated based on such factors as the growth in households
4. Average weight of a fire extinguisher is estimated to be 2kg.

8.5 Quantity Available for Collection

Portable fire extinguishers are not consumable products and therefore 100% are available for collection through the MHSW program. However, as a non-refillable fire extinguisher has an average life expectancy of 7 years, there is a lag in when a fire extinguisher is sold into the market and when it becomes available for collection. The estimates of quantities available for collection presented in Table 8.2 below take into account the seven year life of the fire extinguisher (and associated lag in when a fire extinguisher would likely be disposed) and the growth in the number of Ontario households).

Table 8.2: Estimated Portable Fire Extinguishers Available for Collection

Available for Collection	[1]2007	[2]Year 1	Year 2	Year 3	Year 4	Year 5
[3]Units (kg)	79,589	82,107	83,397	84,706	86,036	87,387
Tonnes	159	164	167	169	172	175
% of Sales	91%	91%	91%	91%	91%	91%

Notes

1. Year 2007 is the baseline year for MHSW Program Plan
2. MHSW Program Plan Year 1 is the 12 months after program commencement date
3. Average weight of a fire extinguisher is estimated to be 2kg.

8.6 Current Management Infrastructure & Performance

According to the 2007 WDO Municipal Datacall, 20 of 211 municipal programs offered collection services for fire extinguishers. This represented approximately 2.7 M households served. According to the same source, 18.5 tonnes of waste fire extinguishers were collected through the municipal system.

Depending on arrangements that municipalities may have made, “good quality” re-chargeable fire extinguishers may be inspected and refilled by a third-party service. If the fire extinguisher cannot be re-charged, the fire suppressant and charge may be removed and recycled. Non-rechargeable fire extinguishers are typically emptied, crushed and recycled in an appropriate metal-stream or will be landfilled. The management of non-rechargeable fire extinguishers is similar to pressurized containers.

8.7 Accessibility Strategy

The strategy to increase accessibility for consumers to divert fire extinguishers will follow the general accessibility principles and approach outlined in Section 5 of Volume 1 of the Consolidated MHSW Program Plan.

8.8 Promotion and Education

As described in Section 5.5 of Volume 1 of the Consolidated MHSW plan, Promotion and Education activities will be implemented at three levels.

The province-wide "branding the behaviour" P&E program will continue to build on the Do What You Can campaign urging people to think about 3Rs objectives when it comes to managing MHSW. The message will be an overarching, motivational call to action, driving people to the Do What You Can website to find material specific and collection information.

The second layer of P&E is targeted as "educating about specifics" which will provide people with the information they need to take action. The approach to this P&E will depend on whether the product is a consumable or durable and what the desired end-of-life might be. Many products and containers will be collected at events, depots or depots-in-a-box.

As well, for some materials, targeted collection programs will require point of sale P&E tactics.

The recovery of fire extinguishers will be promoted as part of province-wide generic campaign. A material specific P&E budget is deferred to Year Two pending research and development activities.

8.9 Barriers and Opportunities to Increased Diversion & Research and Development Requirements

Barriers to increased diversion of portable fire extinguishers include:

- While a fire extinguisher may have a useful life of 7 years, in the residential environment there is no requirement to check and replace the unit when it is no longer serviceable
- Some fire extinguishers will be "consumed" by fire
- Currently, no consistent approach to dealing with unserviceable fire extinguishers across Ontario

Opportunities to increase diversion of fire extinguishers include standardizing the approach to dealing with un-serviceable fire extinguishers.

For Year 1 of the Consolidated MHSW Program Plan, an R&D budget of $5,000 has been allocated to portable fire extinguishers.

8.10 Targets

8.10.1 Reduction

There is no reduction strategy at this time as the use of fire extinguishers is a safety need for households. The use of fire extinguishers is currently being promoted by the Ontario Fire Marshal's office and local Fire Departments.

8.10.2 Collection

The following collection targets have been developed for portable fire extinguishers. The Year 1 target has been set using the collected quantity reported in the 2007 WDO Datacall, and

growing this number according to the accessibility strategy outlined in section 5 of the Consolidated MHSW plan.

Table 8.3: Year 1 Collection Target for Fire Extinguishers

Collection Target	Year 1	Year 2	Year 3	Year 4	Year 5
Tonnes	25	29	33	41	56
% of Available for Collection	15%	17%	19%	24%	32%

8.10.3 Recycling

Some municipalities have entered into contracts with Fire Extinguisher Service Providers to collect, inspect, re-charge, recycle or scrap fire extinguishers(e.g., Thunder Bay with Superior Safety). However, changes to NFPA 10 Standard for Portable Fire Extinguishers in 2007 have designated that certain extinguishers older than 1984 are now obsolete and cannot be re-charged.

Generally speaking, approximately 85% of non-rechargeable fire extinguishers are recycled. Five-year recycling targets are presented in Table 8.4 below

Table 8.4: Five-Year Recycling Targets for Fire Extinguishers

Target	Year 1	Year 2	Year 3	Year 4	Year 5
Qty Available for Collection (tonnes)	159	164	167	169	172
Collection Target (tonnes)	25	29	33	41	56
Recycling Performance Rate	85%	87%	89%	91%	93%
Recycling Target (tonnes)	21	25	29	38	52
Recycling Efficiency Rate	13%	15%	17%	22%	30%

8.11 Year 1 Costs and Fee Rate

The Year 1 total costs for fire extinguishers (blended for both re-chargeable and non-rechargeable types) and the fee rate are presented in Table 8.5 below. Further information on the cost categories presented in table 8.5 is available in Section 7 of Volume 1 of the Consolidated MHSW Program Plan.

Table 8.5: Total costs attributable to fire extinguishers

Description	Cost
Material Management	$46,700
Contingency	$5,400
Material-Specific R&D	$5,000
Material-Specific P&E	$0
Common Costs	$138,300
Deficit Recovery	$0
Total	**$195,400**
Tonnes managed	25
Total cost/tonne	$7,691
Fee Rate ($/unit)	$2.279

Notes:

1) For the purposes of estimating material management costs, a contingency of 11.5% has been applied.
2) For the purposes of calculating a fee rate, a contingency of 5% has been applied to the estimated quantity of Fire Extinguishers supplied for use in Year 1 of the Consolidated MHSW Program Plan.
3) Please note that, in the absence of actual sales information from fire extinguisher stewards, the number of fire extinguishers supplied for use was estimated using a study conducted by the Red Cross for the American market. In the last stages of plan development, fire extinguisher stewards have reported that sales are significantly higher than presented in the Consolidated MHSW Program Plan and have requested that differential fees be based on weight or unit size (e.g. < 2 lbs; > 2 lbs). Stewardship Ontario will adjust the fee rate for fire extinguishers when more accurate information on the sales of this product becomes available.

9.0 Flammables & Solvents

9.1 Definition

Flammable products are defined by one or more of:

- Consumer Chemical & Container Regulations;
- C.S.A. Standard Z752-03;
- Ont. Reg. 347

Representative products include*:

- Solvents (including those materials defined as Solvents under the Phase I MHSW Program Plan)
- Camping fuel, kerosene, gasoline,
- Adhesives, automotive additives & cleaners,
- Coatings, caulking, filler, grout, fibreglass resins,
- Solvents, thinners, sealers, strippers, undercoating,
- Patches, driveway sealers,
- Waxes, polishes, wood preservatives,
- Solid fuels.
- Propane, butane, cigarette lighter fluid, acetylene
- Calcium hypochlorite, Sodium peroxydisulfate, MEK peroxide

Notes:
1) This is not an exhaustive list
2) Engine Antifreeze is covered under section 2.0

Also included in this program plan are the containers in which flammable materials were contained

9.2 Market & Product Information

The flammable product category is very broad, covering a wide range of distinct products (e.g., kerosene, fibre-glass resins, sealers, adhesives, automotive additives, gasoline), container types (e.g., tubes, tubs, tins) and sizes (e.g., 946 ml, 3.78 L, 10 L, 15L, 18.9 L).

Flammable products can be sold through home improvement stores, gas stations, mass merchandisers, auto-part stores and general retailers and are available in brand name and private label format.

Solvent products are in liquid form and mostly sold in HDPE bottles and steel containers and most often range in size from 1 litre to 5 litre. A very limited amount of solvent is sold through retail in sizes of 5 to 20 litre, typically in steel containers. These products can be sold under manufacturer brand names or retailer private labels.

9.3 IC&I Generators

The quantity of flammable and solvents waste generated by the IC&I generators is of unknown magnitude, though, as IC&I generators should only be utilizing products that are labelled in conformance to WHMIS regulations, these materials should not be collected in the MHSW waste stream. However, it is recognized that quantities do (and will) appear in the municipal stream, and this is reflected in the quantities and estimates collected for this plan, (i.e., it has been assumed that IC&I material has been reflected in the base year data).

9.4 Quantity Supplied for Use

The MHSW program will manage flammable & solvent waste and the containers in which they were contained. As data are more readily available for some materials than others, the flammable category has been sub-divided into the following four groups:

- "Assorted" flammable materials and their containers;
- Solvents and their containers;
- Gasoline;
- Automotive additives and their containers; and,
- Windshield washer fluid and containers.

An estimated 690 million litres of assorted flammable materials were sold in Ontario in 2008, together with 4.2 million litres of solvents, 6,496 million litres of gasoline, 22.7 million litres of windshield washer fluid and 1.77 million litres of automotive additives[21]. The weight of each of these materials has been calculated using an estimate of 1 litre = 0.85 kg[22].

From figures provided by industry stewards, an estimate was derived for the empty weight of the containers used to house the solvents sold in the Ontario market. The estimate is based on an average container volume of 3.78L and reflects a mix of 70% plastic and 30% metal. Based on these figures, the estimate for the weight of solvent containers in 2008 was 212 tonnes.

The following quantities supplied into the Ontario market have been estimated for these material groups.

Table 9.1: Quantities of "assorted" flammable material supplied into the Ontario Market

[3]Sales into Market	[1]2008	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Units (litres)	690,480,000	718,375,392	732,742,900	747,397,758	762,345,713	777,592,627
Tonnes	586,908	610,619	622,831	635,288	647,994	660,954
% growth		2%	2%	2%	2%	2%

Table 9.2: Quantities of solvents supplied into the Ontario Market

[3]Sales into Market	[1]2008	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Units (litres)	4,246,701	4,331,635	4,418,268	4,506,633	4,596,766	4,688,701
Tonnes	3,610	3,682	3,756	3,831	3,907	3,985
% growth		2%	2%	2%	2%	2%

[21] Source: Industry producers
[22] Industry and Stewardship Ontario estimate

Table 9.3: Estimated Quantities of Solvent Containers Supplied into the Ontario Market

[3]Sales into Market	[1]2008	[2]Year 1	Year 2	Year 3	Year 4	Year 5
kg	212,335	216,582	220,913	225,332	229,838	234,435
Tonnes	212	217	221	225	230	234
% growth		2%	2%	2%	2%	2%

Table 9.4: Quantities of gasoline supplied into the Ontario Market

[3]Sales into Market	[1]2008	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Units (litres)	6,496,000,000	6,423,000,000	6,493,653,000	6,565,083,183	6,637,299,098	6,710,309,388
Tonnes	5,521,600	5,459,550	5,519,605	5,580,321	5,641,704	5,703,763
% growth		1%	1%	1%	1%	1%

Table 9.5: Quantities of automotive additives supplied into the Ontario Market

[3]Sales into Market	[1]2008	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Units (litres)	1,771,300	1,810,000	1,829,910	1,850,039	1,870,389	1,890,964
Tonnes	1,506	1,539	1,555	1,573	1,590	1,607
% growth		1%	1%	1%	1%	1%

Table 9.6: Quantities of automotive additive containers supplied into the Ontario Market

[3]Sales into Market	[1]2008	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Units (kg)	144,349	147,540	149,015	150,506	152,011	153,531
Tonnes	144	148	149	151	152	154
% growth		1%	1%	1%	1%	1%

Table 9.7: Quantities of windshield washer fluid supplied into the Ontario Market

[3]Sales into Market	[1]2008	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Units (litres)	22,700,000	23,200,000	23,455,200	23,713,207	23,974,052	24,237,767
Tonnes	19,295	19,720	19,937	20,156	20,378	20,602
% growth		1%	1%	1%	1%	1%

Table 9.8: Quantities of windshield washer fluid containers supplied into the Ontario Market

[3]Sales into Market	[1]2008	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Units (kg)	690,000	705,260	712,313	719,436	726,630	733,896
Tonnes	690	705	712	719	727	734
% growth		1%	1%	1%	1%	1%

Notes:

1. MHSW Program Plan Year 1 is the 12 months after program commencement date
2. Sales into the market and market growth forecast provided by estimates from other jurisdictions (e.g., BC) and industry

9.5 Quantity Available for Collection

Flammable materials are generally consumable products and, particularly in the case of automotive products are emptied into a tank for use, e.g., gas, additives. Experience in the BC market suggests that approximately 1.7% of the “assorted” flammable material is available for collection. However, this plan reflects an estimate from stewards of 1% (as it was felt the BC figure is higher as the BC program excludes water miscible material and windshield washer fluid).

Although the program covers the containers in which flammable materials are stored, container estimates have only been developed for some automotive products, as the range of flammable products and containers was considered too broad to accurately estimate containers at this time. The estimates for "assorted" flammable materials in the following sections include the weight of those containers that are returned with residual material.

The containers associated with automotive flammable materials are not consumable products and therefore are 100% available for collection through the MHSW program.

The tables below summaries the available for collection quantities:

Table 9.9: Quantities of "assorted" flammable material available for collection

[4]Available for Collection	[1]2008	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Units (litres)	6,904,800	7,183,754	7,327,429	7,473,978	7,623,457	7,775,926
Tonnes	5,869	6,106	6,228	6,353	6,480	6,610
% of Sales		1.0%	1.0%	1.0%	1.0%	1.0%

Table 9.10: Estimated Quantities of Solvents Available for Collection

[4]Available for Collection	[1]2008	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Units (litres)	1,911,016	1,949,236	1,855,673	1,802,653	1,746,771	1,687,932
Tonnes	1,624	1,657	1,577	1,532	1,485	1,435
% of Sales	45%	45%	42%	40%	38%	36%

Table 9.11: Estimated Quantities of Solvent Containers Available for Collection

[3]Available for Collection	[1]2008	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Units (kg)	212,335	216,582	220,913	225,332	229,838	234,435
Tonnes	212	217	221	225	230	234
% of Sales	100%	100%	100%	100%	100%	100%

Table 9.12: Quantities of gasoline available for collection

[3]Available for Collection	[1]2008	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Units (litres)	51,968	51,384	51,949	52,521	53,098	53,682
Tonnes	44	44	44	45	45	46
% of Sales	0.00085%	0.00085%	0.00085%	0.00085%	0.00085%	0.00085%

Table 9.13: Quantities of automotive additives available for collection

[3]Available for Collection	[1]2008	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Units (litres)	17,713	18,100	18,299	18,500	18,704	18,910
Tonnes	15	15	16	16	16	16
% of Sales	1%	1%	1%	1%	1%	1%

Table 9.14: Quantities of automotive additive containers available for collection

[3]Available for Collection	[1]2008	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Units (kg)	144,349	147,540	149,015	150,506	152,011	153,531
Tonnes	144	148	149	151	152	154
% of Sales	100%	100%	100%	100%	100%	100%

Table 9.15: Quantities of windshield washer fluid available for collection

[3]Available for Collection	[1]2008	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Units (litres)	227,000	232,000	234,552	237,132	239,741	242,378
Tonnes	193	197	199	202	204	206
% of Sales	1%	1%	1%	1%	1%	1%

Table 9.16: Quantities of windshield washer fluid containers available for collection

[3]Available for Collection	[1]2008	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Units (kg)	690,000	705,260	712,313	719,436	726,630	733,896
Tonnes	690	705	712	719	727	734
% of Sales	100%	100%	100%	100%	100%	100%

Table 9.17: Total Quantities of all Flammable Material Available for Collection

[3]Available for Collection	[1]2008	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Tonnes	8,792	9,089	9,147	9,242	9,338	9,434

Notes:

1. MHSW Program Plan Year 1 is the 12 months after program commencement date
2. Sales into the market forecast derived from estimates from other jurisdictions (e.g., BC) and industry
3. Available for collection as estimated by programs in other jurisdictions (e.g., 1.7% in BC)

9.6 Current Management Infrastructure & Performance

According to the 2007 WDO Datacall, 105 municipal programs offered collection services for flammable materials (94 programs for solvents) to some 4.4 M households. According to the same source 2,877 tonnes of flammables and 369.5 tonnes of solvents were collected in 2007 through the Ontario municipal MHSW depot and event system.

As part of the implementation of the Phase 1 MHSW program, 1,600 tonnes of solvents have been collected from July 2008 to March 2009, as reported by the Material Tracking System (MTS). Extrapolating over 12 months, this results in an estimated 2,133 tonnes of solvents collected yearly.

The solvent products collected likely vary from pure solvent to solvent mixed with solute (e.g. paint, grease, oil, sediment), or could be products that have flammable characteristics. Solvents can be recycled depending on the quality of the material and the level and type of contamination. These contaminants can be removed through processes, and the new solvent is sold back to manufacturers.

Due to the inconsistency of the waste received by recyclers from the municipal MHSW collection system, and to the presence of large amounts of solids in the waste on occasion, it is sometimes unsuitable for recycling. Further research and development is needed to increase the amount of solvent that is recycled.

A fraction of collected solvents is sent for energy recovery depending on its fuel value and chlorinated solvent content, while solvents not suitable for energy recovery are sent for incineration. Empty solvent containers are sent to landfill or hazardous landfill. More R&D is required to assess the recyclability of empty solvent containers.

At this time, aside from municipal services, there are no other collection channels for residential residual solvents. Waste management companies provide services for solvent products generated by IC&I businesses registered under O. Reg. 347.

9.7 Accessibility Strategy

The accessibility strategy to increase the collection of flammable and solvent waste and their containers includes:

- Building on the willingness of some municipal programs to accept empty automotive additive containers in the Blue Box Program;
- Increasing the accessibility strategy as outlined in Section 5 of Volume 1 of the Consolidated MHSW Plan.

9.8 Promotion and Education

As described in section 5.5 of Volume 1 of the Consolidated MHSW plan, Promotion and Education activities will be implemented at three levels.

The province-wide “branding the behaviour” P&E program will continue to build on the Do What You Can campaign urging people to think about 3Rs objectives when it comes to managing MHSW. The message will be an overarching, motivational call to action, driving people to the Do What You Can website to find material specific and collection information.

The second layer of P&E is targeted as “educating about specifics” which will provide people with the information they need to take action as well as providing any necessary information about appropriate transportation of flammable material, e.g., using a container approved for gasoline. The approach to this P&E will depend on whether the product is a consumable or durable and what the desired end-of-life might be. Many products and containers will be collected at events, depots or depots-in-a-box.

As well, for some materials, targeted collection programs will require point of sale P&E tactics.

The recovery of flammables and solvents will be promoted as part of a province-wide generic campaign in year one, encouraging people to buy only as much as they need and to use it up. For Year 1 of the Consolidated MHSW Program Plan, a P&E budget of $149,150 has been allocated to flammables and solvents.

9.9 Barriers and Opportunities to Increased Diversion & Research and Development Requirements

Barriers to increased collection of flammables and solvents include:

- Establish clear guidelines with regards to the categorization of those products that overlap categories. For example, some paint, solvent and pesticide products are also flammable.

Opportunities to increase diversion of flammable and solvent materials include:

- Expanding collection services

- Increasing the use of 3Rs options for product management
- Further exploring opportunities to use material for industrial plant fuel, (e.g., in cement plants). This will require investigation into the acceptability with MOE regulations, and waste diversion objectives.

As part of the implementation of Phase 1, a Research and Development plan has been developed for solvents. Under the Consolidated MHSW Program Plan, the priorities that have been identified under this plan will also apply to flammables and are as follow:

Table 9.18: R&D Development Plan and Progress for solvents and flammables

Priority	Status
Establish and document procedures to ensure that all results from any waste solvents R&D projects and investigations are consolidated into a series of technical reports for future use by Stewardship Ontario;	Completed
Consult with Fielding Technologies, Newalta, Hotz Environmental, and other service providers to investigate solvent recycling technologies;	In progress, anticipated completion by June 30, 2009
Determine the composition of waste solvents collected through different channels, including municipal and non-municipal sources; identify presence and concentration of other compounds, including solid materials encapsulated within waste solvents ;	In progress, anticipated completion by June 30, 2009
Investigate options, technologies, to remove and manage non-solvent compounds from collected waste solvents in an economically viable and environmentally sound manner;	In progress, anticipated completion by June 30, 2009
Determine potential secondary markets, including “parts washer” industry, manufacturing industry, and others; as well as determine whether outputs of solvent recycling meet the demands of these markets;	In progress, anticipated completion by June 30, 2009
Assess the current capacity and specification requirements of existing solvent recyclers both within, and outside of Ontario;	In progress, anticipated completion by June 30, 2009
Identify current recycling processes and destinations employed by municipalities, service providers, etc, both within and outside of Ontario;	In progress, anticipated completion by June 30, 2009
Identify the current interest and processes for recycling solvent containers, both within and outside of Ontario;	In progress, anticipated completion by June 30, 2009
Investigate the current regulatory definitions and classifications of ‘hazardous’ waste (i.e. – min.% of residue) that may impact SO’s ability to utilize potential options for recycling solvents.	In progress, anticipated completion by June 30, 2009

With the merger of solvents and flammables into a single material group, the further priorities that have been identified under the Consolidated MHSW Plan are as follows:

- The development of a list of flammables and solvents that can be recycled jointly without potentially reducing the potential for recycling.
- Using this detailed list to consolidate for transportation purposes without potentially reducing the potential for recycling.
- Conduct testing of drums of consolidated solvents to determine whether the material can be recycled or must be fuel blended.

For Year 1 of the Consolidated MHSW Program Plan, an R&D budget of $25,000 has been allocated to flammables and solvents.

9.10 Targets

Generally, flammable and solvent materials are products intended to be consumed entirely through use.

9.10.1 Reduction

There are no current programs aimed at the reduction in the quantity of flammable and solvent waste. In certain municipalities there has been greater education about using public transit, however the impact of these programs on gasoline collection in the MHSW waste stream is likely negligible. An education program targeted at the complete use of the product by consumers will assist in reduction and improving diversion (see section 9.8 above).

9.10.2 Collection

The five year collection targets for all flammables and solvents sub-categories are presented in the Tables that follow.

Table 9.19: Annual Collection Targets for "assorted" Flammable Materials

Collection Target	Year 1	Year 2	Year 3	Year 4	Year 5
Tonnes	2825	3086	3372	3822	4288
% of Available for Collection	46%	50%	53%	59%	65%

Table 9.20: Annual Collection Targets for Solvents

Collection Target	Year 1	Year 2	Year 3	Year 4	Year 5
Tonnes	754	729	708	686	663
% of Available for Collection	46%	46%	46%	46%	46%

Table 9.21: Annual Collection Targets for Solvent Containers

Collection Target	Year 1	Year 2	Year 3	Year 4	Year 5
Tonnes	77	80	84	90	94
% of Available for Collection	35%	36%	37%	39%	40%

Table 9.22: Annual Collection Targets for Gasoline

Collection Target	Year 1	Year 2	Year 3	Year 4	Year 5
Tonnes	19	22	24	27	29
% of Available for Collection	43%	51%	52%	60%	64%

Table 9.23: Annual Collection Targets for Automotive Additives

Collection Target	Year 1	Year 2	Year 3	Year 4	Year 5
Tonnes	7	8	8	9	11
% of Available for Collection	47%	51%	51%	58%	66%

Table 9.24: Annual Collection Targets for Automotive Additive Containers

Collection Target	Year 1	Year 2	Year 3	Year 4	Year 5
Tonnes	70	75	81	90	100
% of Available for Collection	47%	50%	53%	59%	65%

Table 9.25: Annual Collection Targets for Windshield Washer Fluid

Collection Target	Year 1	Year 2	Year 3	Year 4	Year 5
Tonnes	91	99	108	121	134
% of Available for Collection	46%	50%	53%	59%	65%

Table 9.26: Annual Collection Targets for Windshield Washer Fluid Containers

Collection Target	Year 1	Year 2	Year 3	Year 4	Year 5
Tonnes	333	353	383	429	477
% of Available for Collection	47%	50%	53%	59%	65%

Table 9.27: Annual Collection Targets for all Flammable Material Categories

Collection Target	Year 1	Year 2	Year 3	Year 4	Year 5
Tonnes	4,176	4,452	4,768	5,184	5,696
% of Available for Collection	46%	49%	52%	56%	60%

9.10.3 Recycling

No known process currently exists to recycle solvents and flammables. As mentioned previously, a fraction of collected solvents is sent for energy recovery depending on its fuel value and chlorinated solvent content. Energy recovery does not qualify as diversion under the Waste Diversion Act. Empty solvent containers are sent to landfill or hazardous landfill. By Year 3 of the Consolidated MHSW Program Plan, Stewardship Ontario will aim to recycle 10% of the quantity of flammables and solvents collected. This information is presented in Table 9.28 below.

Table 9.28: Five Year Recycling Targets for Flammables and Solvents

	Year 1	Year 2	Year 3	Year 4	Year 5
Quantity Available for collection (tonnes)	**9078**	**9086**	**9169**	**9257**	**9493**
Collection Target (Tonnes)	4,176	4,452	4,768	5,184	5,696
Recycling Performance Target	--	--	10%	10%	10%
Recycling target (tonnes)	--	--	477	518	570
Recycling Efficiency Target			5%	6%	6%

9.11 Year 1 Costs and Fee Rate

The Year 1 total costs and fee rate for flammable & solvent materials and containers are outlined in Table 9.29 below. Further information on the cost categories presented in table 9.29 is available in Section 7 of Volume 1 of the Consolidated MHSW Program Plan.

Table 9.29: Year 1 Total Costs and Fee Rate for Flammable & Solvent Materials and Containers

Description	Cost
Material Management	$7,669,800
Contingency	$805,300
Material-Specific R&D	$25,000
Material-Specific P&E	$149,150
Common Costs	$2,196,200
Deficit Recovery	$0
Total	**$10,845,450**
Deficit Recovery for Solvents	$638,300
Tonnes managed	4,176
Total cost/tonne	$2,750
Fee Rate	
Assorted flammables ($/L)	$0.015
Automotive additives ($/L)	$0.015
Windshield washer fluid ($/L)	$0.015
Solvents ($/L)	$0.167
Gasoline ($/location)	$21.652

Notes:

1) For the purposes of estimating material management costs, a contingency of 10.5% has been applied to flammables and a contingency of 11.5% has been applied to solvents.
2) For the purposes of calculating a fee rate, a contingency of 3% has been applied to the estimated quantity of Flammables supplied for use in Year 1 of the Consolidated MHSW Program Plan and a contingency of 3% has been applied to the estimated quantity of Solvents supplied for use in year 1 of the Consolidated MHSW Program Plan.
3) Stewardship Ontario incurred a deficit from the operation of the first year of Phase 1 of the MHSW program that will be recovered as part of the fees for the Consolidated Plan. Allocated only to Phase 1 Materials on a material-specific basis, the deficit shown in the table includes any deficits in common costs (start-up, plan development, and program management costs) as well as material-specific operating costs and fees owing.

10.0 Fluorescent Bulbs and Tubes

10.1 Definition

Means a fluorescent lamp that is a low pressure mercury electric-discharge source in which a fluorescing coating transforms ultraviolet energy generated by the mercury discharge into visible light. Both those fluorescents that are meant to be removed by the user and those that are embedded into a product are captured under the program.

Examples of fluorescents meant to be removed by the user include:

- Compact fluorescent lights (CFLs);
- Fluorescent tubes (e.g. 4 ft. T12 Fluorescent Lamp).

Fluorescents lamps are also found as components of larger products, mainly in electronics and automotive applications. These types of fluorescents are referred to as cold-cathode fluorescent lamps (CCFL) and are used for backlighting in liquid crystal displays (LCDs). Examples of products containing CCFL include:

- LCD monitors
- LCD televisions
- Laptop computers
- Display panels in automotive applications

10.2 Market and Product Information

Mercury is an essential element of how fluorescent lamps generate light. Fluorescent lamps produce light when electric current passes between two electrodes in a phosphor-lined tube filled with low-pressure mercury vapour and inert gases. Electric current excites the mercury vapour in the tube, which then "fluoresces," or emit energy in the visible range.

10.2.1 Fluorescent lamps designed to be removed by the user

Fluorescent lamps used for general lighting may be divided into two categories: compact fluorescent lights (CFLs), which fit into standard incandescent lighting sockets, and fluorescent tubes, which require dedicated sockets. CFLs are folded or spiralled in order to approximate the physical volume of an incandescent bulb. Linear fluorescents lamps are straight tubes that can range widely in length, width, and output.

CFLs use 75% less energy than standard incandescent light bulbs while delivering the same light output. Their energy efficiency performance and long lifespan, in addition to increased availability, continuous product improvement, and a fall in their unit price has resulted in a tremendous growth of the CFL market in recent years. This trend is expected to be maintained, especially given the lighting efficiency standards, announced by the provincial and federal governments and due to be implemented in 2012. These are expected to prompt an increase in the demand for CFLs at the expense of less efficient incandescent bulbs. Total replacement is difficult to predict, however. Industry representatives have noted that not all incandescent bulbs are subject to the 2012 regulations, decorative lamps being a notable example. Compliant halogen lamps are already sold in major chain stores.

It is expected that fluorescent tubes will not diverge significantly from current market share. It is generally agreed that they are less subject to major variations, as they are heavily connected with commercial development.

10.2.2 Fluorescent lamps as components of larger products

Fluorescents are also commonly use for backlighting in a number of applications, including electronics and the automobile industry. There are three popular types of LCD backlight source, EL, CCFL and LED at present. CCFL has become the mainstream as LCD is becoming brighter, lighter and thinner[23]. While EL and LED are used in small size and single color display (red or green), CCFL is well adopted in large and middle scale (19-3 inches) LCD screens.

NEWMOA/IMERC[24] reports that since 2004, there has been a significant increase in the number of electronics utilizing fluorescent lamps. Stand-alone LCD monitors are now standard with many new computers, and a wide variety of home and office equipment now utilize LCD screens, including televisions, global positioning system (GPS) units, hand-held communications and entertainment systems, and digital cameras.

Use of fluorescents lamps in automobiles has also increased significantly over the last few years. Many automobiles now come with entertainment systems, navigation systems, and instrument panels that utilize LCD screens or backlighting that contain CCFLs.

In recent years, light-emitting diode (LED) lights have emerged as an alternative in both the electronics and automotive applications. According to a supplier of CCFLs[25], although some electronics manufacturers have began replacing CCFLs with LED in their products (e.g. Apple), over 90% of electronics still contain CCFLs. According to this same source, the transition from one technology to the other will likely happen in the short to medium term. As is the case with electronics, the automobile industry is slowly transitioning to LED but over 90% of current use remains CCFCs.

Given the numerous fluorescent applications in the electronics field, the MHSW program will focus on those fluorescents contained in products destined for the residential sector, and that are designated under the Waste Electrical and Electronic Equipment (WEEE) Program Plan.

10.3 IC&I Generators

The Minister's Program Request Letter specifies that the fluorescent bulbs and tubes to be managed under the program are limited to generators of no more than 5 kg/month. This is equivalent to about 20 lamps. Given this relatively low threshold, the MHSW program will focus primarily on managing waste lamps from residential generators.

The Minister's letter includes a request for the Plan to provide a clear description of how the MHSW Program for fluorescent bulbs will work in conjunction with the Recycling Council of Ontario's "Take Back the Light" program for diverting fluorescent lamps from the waste stream.

[23] http://www.j-right.com/html/ccfl_lcd_backlighting.htm
[24] Trends in Mercury Use in Products, Summary of the Inter-State Mercury Education & Reduction Clearinghouse (IMERC) Mercury Added-Products DataBase, NorthEast Waste Management Officials' Association, June 2008
[25] Personal communication, Larry Rushefsky, JKL Components, April 2009

While the primary focus of the MHSW program as it pertains to fluorescents will be to service the residential sector as mentioned above, TBTL's main program recipients are large IC&I generators (e.g. Ontario Government, Toronto District School Board). Similarly, while stewards of fluorescents under MHSW will be obligated for their residential and small IC&I sales, suppliers participating in the TBTL at present are large commercial lighting distributors which would not be obligated under MHSW. It is therefore anticipated that there will be little overlap between the programs in terms of service recipients and supplier/obligated party (steward).

Stewardship Ontario and TBTL will exchange information periodically on the stewards that have registered under the MHSW program and those participating in TBTL.

10.4 Quantity Supplied for Use & Available for Collection

The following section presents information on quantities supplied for use and available for collection for both those fluorescent lamps meant to be removed by the user and those that are components of larger products.

10.4.1 Fluorescent lamps meant to be removed by the users

a) Residential and Small IC&I Fluorescent Sales Data

CFL and fluorescent tube sales data for Ontario for the period 2003-2008 were supplied to Stewardship Ontario by the Electrical Equipment Manufacturers Association of Canada (EEMAC), a Council of Electro Federation Canada, and are presented in Table 10.1 below.

Based on discussions with EEMAC representatives, residential sales were assumed to be 90% of the reported consumer retail sales totals. Small IC&I sales were assumed to be 10% of the consumer retail sales plus 10% of the professional sales supplied by EEMAC.

Table 10.1: Residential and IC&I Ontario Fluorescent Sales for 2003 to 2008 (1000s units)

	2003		2004		2005		2006		2007		2008	
	Res	sm ICI	Res	sm ICI	Res	sm ICI	Res	sm ICI	Res	sm ICI	Res	sm ICI
CFL	1,342	293	3,208	502	4,566	460	9,667	853	9,990	1,250	6,930	890
Tube	4,660	1,822	4,532	1,622	2,790	474	3,825	565	3,960	1,600	3,870	1,610

As the data in Table 10.1 reflects, there was a substantial increase in annual sales of CFLs reported for 2006 and 2007. As Working Group members indicated, this is in part due to Ontario Power Authority incentives for consumers to switch over to fluorescents, as well as to the addition of a number of new outlets such as drug stores and grocery stores which started selling CFLs during this period. This settled down somewhat in 2008, reflecting the market transformation to a much longer lasting product, compared to incandescent bulbs. Sales figures in 2008 were still substantially higher than in 2005.

Working Group participants were not able to provide projected sales data for 2009 and beyond. For fee setting purposes, no increase in sales in Year 1 of the plan were assumed.

b) Estimates of Fluorescents Available for Collection

Estimates of the quantity of fluorescents available for collection were developed using a Fluorescent Product Flow Model which combines historical sales data with information on the

lifespan of the product. The model assumes no storage of bulbs after end of life and no reuse after end of first life.

The lifespan of CFLs has been increasing over time as the design has improved and more have become Energy Star compliant. Fluorescent Working Group participants indicated that virtually all CFLs now meet Energy Star requirements. While the average lifespan of a product sold in 2003 was assumed to be 4.3 years[26], it is assumed that by 2006 the great majority of the market met Energy Star standards. The following data was provided by the Working Group on current CFL lifespan:

- 44% of CFLs last 10,000 hours
- 30% of CFLs last 8,000 hours
- 20% last 6,000 hours
- It was assumed the final 6% last 4,000 hours.

Assuming that CFLs are turned on an average of 3 hours per day, the weighted average of the lifespan data outlined above is 7.5 years. Energy Star ratings above refer to the point at which 50% of the CFLs burn out, therefore we increased from a lifespan of 4.3 years for products sold in 2003 to 7.5 years by 2006, when most of the market was reportedly transformed to Energy Star CFLs and increasing to a lifespan of 10.5 years after that point. The distribution of lifespans required to meet the average is presented in Table 10.2.

The Fluorescent Product Flow Model distributes the lifespans among products sold in a given year by assuming some last longer and some last a shorter length than the average lifespan as shown in Table 10.2.

While the Fluorescent Working Group felt that the lifespan of fluorescent tubes is an order of magnitude longer than that of CFLs, probably more like 20,000 hours per unit, the same lifespan was used as the tubes were considered to be in a residential-like setting. Many IC&I locations implement re-lamping projects on a regular basis which would shorten the lifespan from the maximum.

Table 10.2: Assumptions on Fluorescent Lamp Lifespan Distribution

Year Sold	Percentage Lasting 12 years	Percentage Lasting 9 years	Percentage Lasting 6 years	Percentage Lasting 3 years	Average Lifespan (years)
2002	0%	0%	43%	57%	4.3
2003	0%	0%	43%	57%	4.3
2004	10%	10%	35%	45%	5.6
2005	15%	20%	30%	35%	6.5
2006	20%	30%	30%	20%	7.5
2007	35%	40%	15%	10%	9.0
2008	55%	40%	5%	0%	10.5

Table 10.3 presents results from the *Fluorescent Product Flow Model* on the units available for collection from 2009 to 2014.

[26] Reference: Ontario Energy Board

Table 10.3: Fluorescent Bulbs Available for Collection (1,000s of units) From Residential and Small IC&I Sources in Ontario, 2008 to 2015

Year	Small IC&I		Residential		Total	
	CFL	Fluor. Tubes	CFL	Fluor. Tubes	CFL	Fluor. Tubes
2008	285	940	2,168	2,957	2,454	3,897
2009	297	897	2,510	2,769	2,807	3,665
2010	301	728	2,122	1,982	2,423	2,710
2011	138	142	1,370	837	1,508	979
2012	256	170	2,900	1,148	3,156	1,317
2013	238	402	1,819	1,047	2,057	1,449
2014	137	175	1,260	752	1,396	927
2015	299	223	3,290	1,343	3,589	1,566

10.4.2 Fluorescent lamps as part of larger products

A literature search has identified the following electronics application as likely to contain CCFLs.

- LCD computer monitor
- LCD television
- Laptop/notebook
- Fax
- Scanner
- Copier

The products identified above are captured in either Phase 1 or Phase 2 of the WEEE program. However, the categories of fluorescent containing products are not exactly equivalent to the WEEE categories. For example, while the Display Device category under WEEE refers to a device that displays an image, using a variety of technologies including CRT, LCD, plasma and rear projection, only LCD display monitors include CCFLs. Moreover, CCFLs are not present in a one to one ratio in electronics. For example a 6" monitor typically has one CCFL; a 10" monitor has two; and a 15" monitor has four.

a) Estimate of fluorescents embedded in Electrical and Electronic Equipment (EEE) Supplied Into the Market

In order to estimate the quantities of fluorescents embedded in WEEE supplied for use into the market, information was taken from the Preliminary Revised (Phase 1 and 2) Waste Electrical and Electronic Equipment (WEEE) Program Plan submitted to WDO May 20, 2009. Assumptions were made on the average number of fluorescents for each given Electrical and Electronic Equipment (EEE) category, as shown in Table 10.4 below.

Table 10.4: Estimated Quantities of Fluorescents Embedded in EEE Supplied Into the Market

EEE Material Category		Average number of fluorescents per product[1]	Year 2 EEE Supplied Into Ontario (000' units)[2]	total no. of fluorescent sales in Yr 2 of WEEE Program (000' units)
Display Devices	≤29" Display Device Total	4	1,649	6,595
	> 29" Display Device Total	8	902	7,217
Portable Computers		1.5	1,567	2,350
Printing, Copying & Multi-Function Devices	Desktop and Portable Printing, Copying and Multi-Function Devices	2	3,588	7,177
	Floor-Standing Printing Devices	2	8	16
	Floor-Standing Copying Devices	2	8	17
Total				23,372

Notes:

1. Information provided by L. Rushefsky, JKL Components
2. Taken from Table 3.1of Revised (Phase 1 and 2) WEEE Program Plan. It was assumed that Yr 1 of the Consolidated MHSW Program would be Yr 2 of the WEEE Program.

b) Estimate of fluorescents embedded in WEEE Available for Collection

In order to estimate the quantities of fluorescents embedded in WEEE available for collection, one of the approved OES processor under the WEEE Program provided information on the quantity of fluorescents collected to date this year and the total quantity of WEEE processed. This was used to calculate the percentage of fluorescents collected relative to WEEE tonnage processed, taking into account the fact that CRT display devices do not contain fluorescents (it is estimated that 90% of display devices currently processed are CRT and that the remainder – 10% - contain fluorescents). The ratio of fluorescents relative to total WEEE processed (0.025%) was then applied to the baseline and Year 1 quantity of WEEE available for collection as outlined in Table 3.4 of the Revised WEEE Program Plan, as outlined in Table 10.5 below.

Table 10.5: Estimated Quantity of Fluorescents Embedded in WEEE Available for Collection (tonnes)

WEEE Material Category	Baseline (tonnes)	Year 1 (tonnes)	Year 2 (tonnes)	Year 3 (tonnes)	Year 4 (tonnes)	Year 5 (tonnes)
Desktop and Portable Computers	10,421	12,309	12,293	13,095	14,722	13,095
Display Devices	*38,441*	*41,751*	*43,367*	*44,631*	*47,299*	*44,582*
Display Devices Total (Minus CRT weight)[1]	3,844	4,175	4,337	4,463	4,730	4,458
Other Phase 1 and 2 WEEE	35,945	42,695	48,936	55,115	62,069	59,787
Floor-Standing Copiers and Printers	540	637	709	939	1,189	1,330
Total	**50,750**	**59,816**	**66,275**	**73,612**	**82,710**	**78,670**
Fluorescents Available for Collection (0.025%)	**13**	**16**	**17**	**19**	**21**	**20**

Note: The estimated quantity of CRT display devices was subtracted from the total estimated quantity of display devices to reflect the fact that CRTs do not contain fluorescents. It is assumed that 90% of display devices currently processed are CRTs.

10.5 Current Management Infrastructure & Performance

10.5.1 Existing Infrastructure

a) Collection and Transportation

Fluorescent lamps meant to be removed by the user are currently collected through the municipal channel and through the retail channel.

Retail Channel

- All Home Depot locations across Ontario (84) collect fluorescent bulbs and tubes[27]
- All RONA corporate stores and several independent stores that carry the RONA banner (90 locations in total) collect CFLs and those tubes that fit inside the collection units (longer neon tubes are not accepted)
- All IKEA stores in the province (5) collect CFLs

Currently, each Home Depot and RONA store ships its fluorescent lamps to Aevitas for recycling via FedEx. The in-store collection buckets are used for shipping and Aevitas sends back empty buckets to the store upon receiving the spent lamps. According to the Product Stewardship Institute, "shipping from the store" is currently the most common method for recycling fluorescents. The advantage of this option is its convenience. The disadvantage is that it is relatively expensive depending on the number of lamps shipped. The main challenge currently facing fluorescent return to retail programs is logistics. No lamp recycling depot/consolidation centres currently exist in the province.

Municipal Channel

According to the 2007 municipal Datacall, 62 municipal programs provide collection services for fluorescents, servicing 10.6 million people

27 Bulbs are collected via in-store units while tubes are handled by staff at the back of the store

Limited information is available on how fluorescents lamps embedded in electronic products are currently managed. Those fluorescents embedded in waste electronics processed by the approved processor in Ontario under the WEEE program are removed and shipped to Aevitas for processing.

b) Processing[28]

Aevitas
Located in Ayr, Ontario, Aevitas is the only full-service fluorescent lamp processing facility. Aevitas reports their processing equipment has capacity for 100,000 lamps per day. In 2008, they report processing 4.5 million lamps operating 3 shifts (2 shifts at 5 days/week and a third shift that is scaled back)[29]. Aevitas has indicated that they could potentially ramp up to 7 million lamps per year if they increased staff and training.

Lamps are broken in the negative pressure machine to allow separation of glass, aluminum, brass, and phosphor-mercury powder.

- Individual components are cleaned, tested for mercury content and then forwarded to downstream recycling outlets.
- The broken glass is transported to Nexcycle Industries in Guelph where it is processed prior to sale to Owens Corning as feedstock in the manufacture of fibreglass products.
- The metals are transported to Woznuk Brothers Metal Recycling in Cambridge for further processing and sale to metal smelters.
- CFL bases are transported to Sims (formerly Noranda) for metal recovery.
- Phosphoric powder is separated from glass via mechanical separation.
- The phosphoric powder is heated in a retort unit to separate the mercury from the phosphor powder either at Aevitas or at Bethlehem Apparatus.

Virtually 100% of lamps processed are recycled. Should supply of CFLs increase, Aevitas has indicated they would add processing equipment dedicated to CFLs and these will be segregated from tubes. Should Aevitas install dedicated CFL processing equipment, processing capacity for fluorescent tubes and for CFLs would both increase.

Recyclage de Lampes Fluorescent AAZ Inc. (RLF)
RLF is a fully licensed lamp recycling subsidiary of ChemTECH Environment Inc. RLF was established in 1996 in Coteau-du-Lac, Quebec, and offers a lamp recycling service to clients in Quebec, eastern Ontario and the north eastern United States.

International Marine Salvage Inc.
International Marine Salvage Inc is located in Port Colborne, Ontario. The company consolidates fluorescent lamps for shipment to Bethlehem Apparatus in Pennsylvania.

Lamp Crushers
There is a separate category of fluorescent lamp recyclers referred to as “lamp crushers”. These companies have equipment such as Bulb Eater™ which crush and shred fluorescent lamps on a small scale, onsite. The shredding equipment is located on top of a container such as a barrel or

28 Unless noted otherwise, the reference for this section is Fluorescent Lighting in Ontario – Lifespan Model and Research, Report to Waste Diversion Ontario, August 2007 (Kelleher Environmental)
29 Personal Communication, Dan Powers, March 2009

drum, and lamps are hand-fed through the shredding equipment. The shredded materials are stored in barrels or drums for transportation to more comprehensive processing facilities. Emissions from the shredding operation are captured through various filters located on the top of the drum. A three stage filtering process removes hazardous particulates and gases.

Although this processing method presents the advantage of freeing up valuable storage space normally filled with boxes of spent whole lamps, reduced handling and related labour costs, concerns have been expressed by some regarding escape of mercury during the bulb crushing operation.

It should also be noted that an Environment Canada Working Group is currently elaborating a set of recommendations on EPR programs for fluorescents. The document will cover issues such as labelling, public education, and recycling norms. These norms would apply to lamp crushers. As part of this endeavour, the Bureau de Normalisation du Quebec (BNQ) is working on the development of a National Standard of Canada (NSC) for the proper collection and recycling of mercury containing lamps. The NSC is expected to be ready in 18 to 24 months[30].

10.6 Baseline System Performance

10.6.1 Fluorescents meant to be removed by the user

Retail Channel

Aevitas has provided the following numbers on the quantity of fluorescents processed from the retail channel. Aevitas has indicated that the numbers of units shipped are increasing by a few percentage points from one month to the next.

Total units collected by THD & RONA monthly (2009)	5,000
Number of THD and RONA locations in ON	84 THD locations 90 RONA locations
Average units collected per store per month	29
Average units collected per store per year	348

Municipal Channel

2007 municipal collection (tonnes)[31]	71.31
Conversion factor	0.24 kg/unit[32]
2007 municipal collection (units)	~300,000 units

Total baseline collection

Return to retail channel (2009)	60,000 units
Municipal channel (2007)	300,000 units
total	360,000 units

Available for collection in 2008	6,351,000

Current collection rate	~6%

[30] Personal Communication, Daniel Langlais, ing. BNQ, April 24th 2009
[31] WDO Datacall
[32] The average between the average unit weight of a tube and the average unit weight of a CFL as reported in WDO datacall

As described above, the technology for recycling fluorescents achieves a recycling rate that is close to 100%. For the purposes of this plan, it will therefore be assumed that the recycling rate is the same as the collection rate.

10.6.2 Fluorescents embedded in larger products

The current baseline collection for fluorescents embedded in WEEE was estimated using the baseline collection as presented in Table 5.4 of the Revised WEEE Program Plan, and by applying the ratio of fluorescents relative to total WEEE processed

Table 10.6: Current baseline collection for fluorescents embedded in WEEE

WEEE Material Category	Tonnes
Desktop and Portable Computers	5,607
Display Devices	*22,170*
Total (Minus CRT weight)	2,217
Other Phase 1 and 2 WEEE	11,423
Floor-Standing Copiers and Printers	351
	19,598
Mercury bulbs by weight (0.025%)	5

The current collection corresponds to a 38% collection rate, based on the estimated quantity that is available for collection.

10.7 Accessibility Strategy and Targets

10.7.1 Fluorescents meant to be removed by the user

The accessibility strategy for fluorescents will rely on the following channels:

- Retail channel: double the current collection (from 60,000 to 120,000 units)
- As per accessibility strategy outlined in Section 5 of the plan, it is expected that 100 tonnes of fluorescents will be collected through a combination of permanent depots, event days, Depot in a Box, and toxic taxi. This is equivalent to approximately 420,000 units.

The Year 1 collection target for fluorescents meant to be removed by the user is presented in Table 10.7 below.

Table 10.7: Year 1 collection target for fluorescents meant to be removed by the user

Channel	Unit target	Weight target (tonnes)
Return to Retail	120,000	28
Depot, event, DiB, Toxic Taxi	412,000	98
Total	532,000	126

Table 10.8 below presents the collection targets for fluorescents meant to be removed by the user for Years 1-5. Stewardship Ontario will strive to grow the collection rate for fluorescents meant to be removed by the user by 5% yearly, as shown in Table 10.8 below. Given that fluorescents are entirely recyclable, the recycling targets for fluorescents meant to be removed by the user are the same as the collection targets.

Table 10.8: Five-Year Collection and Recycling Targets for Fluorescents Meant to be Removed by the User

	Current	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
Collection and Recycling Target						
Units	360,000	532,000	373,050	894,600	876,500	696,900
Tonnes	86	126	90	215	210	167
Quantity available for collection						
Units	6,472,000	5,133,000	2,487,000	4,473,000	3,506,000	2,323,000
Tonnes	1,553	1,232	597	1,074	841	558
Rate	6%	10%	15%	20%	25%	30%

10.7.2 Fluorescents Embedded in Larger Products

The collection targets for fluorescents embedded in WEEE have been set by applying the ratio of fluorescents relative to total WEEE processed (0.025%) to the five year collection targets outlined in Table 5.4 of the Revised WEEE Program Plan. The five year targets for fluorescents embedded in larger products are outlined in Table 10.9 below. Given that fluorescents are entirely recyclable, the recycling targets for fluorescents embedded in larger products are the same as the recycling targets.

Table 10.9: Five-Year Collection and Recycling Targets for Fluorescents Embedded in WEEE (tonnes)

WEEE Material Category	Year 1	Year 2	Year 3	Year 4	Year 5
Desktop and Portable Computers	7,092	8,244	10,000	12,131	14,722
Display Devices	*25,060*	*26,762*	*29,867*	*33,685*	*38,383*
Display Devices Total (Minus CRT weight)	2,506	2,676	2,987	3,369	3,838
Other Phase 1 and 2 WEEE	14,027	16,953	20,940	26,159	33,130
Floor-Standing Copiers and Printers	438	548	685	857	1,071
Total	24,063	28,421	34,612	42,516	52,761
Collection and Recycling Performance Target (tonnes)	7	8	9	11	14
Qty Available for Collection (tonnes)	16	17	19	21	20
Collection and Recycling Efficiency Target	44%	45%	49%	54%	70%

10.8 Promotion and Education

As described in Section 5.5 of Volume 1 of the Consolidated MHSW Plan, Promotion and Education activities will be implemented at three levels.

The province-wide “branding the behaviour” P&E program will continue to build on the **Do What You Can** campaign urging people to think about 3Rs objectives when it comes to managing MHSW. The message will be an overarching, motivational call to action, driving people to the **Do What You Can** website to find material specific and collection information.

The second layer of P&E is targeted as “educating about specifics” which will provide people with the information they need to take action. The approach to this P&E will depend on whether

the product is a consumable or durable and what the desired end-of-life might be. Many products and containers will be collected at events, depots or depot-in-a-box.

As well, for some materials, targeted collection programs will require point of sale P&E tactics.

The recovery of fluorescents will be promoted as part of province-wide generic campaign in year one, as well as through the retailers offering collection services. For Year 1 of the Consolidated MHSW Program Plan, a P&E budget of $250,000 has been allocated to fluorescents meant to be removed by the user.

10.9 Research and Development

Research and Development is required to estimate the quantity of fluorescents not captured under the WEEE plan, as well as those fluorescents present in automotive applications. It is anticipated that a program for the management of these would be included in Year 2 of the program. For Year 1 of the Consolidated MHSW Program Plan, an R&D budget of $12,500 has been allocated to each sub-category.

10.10 Year 1 Total Costs and Fee Rate

10.10.1 Year 1 Total Cost and Fee Rate for fluorescents meant to be removed by the user

The Year 1 total cost and fee rate for fluorescents meant to be removed by the user is presented in Table 10.10 below. Further information on the cost categories presented in table 10.10 is available in Section 7 of Volume 1 of the Consolidated MHSW Program Plan.

Table 10.10: Year 1 Total Cost and Fee Rate for Fluorescents Meant to be Removed by the User

Description	Cost
Material Management	$299,400
Contingency	$31,400
Material-Specific R&D	$12,500
Material-Specific P&E	$250,000
Common Costs	$143,600
Deficit Recovery	$0
Total	**$736,900**
Tonnes managed	126
Total cost/tonne	$5,863
Fee Rate ($/unit)	$0.057

Notes:

1) The cost to manage fluorescents through the retail channel was estimated using estimates provided by the current service provider.
2) For the purposes of estimating material management costs, a contingency of 10.5% has been applied.

3) For the purposes of calculating a fee rate, a contingency of 3% has been applied to the estimated quantity of Fluorescents Meant to be Removed by the User supplied for use in Year 1 of the Consolidated MHSW Program Plan.

10.10.2 Year 1 Total Cost and Fee Rate for Fluorescents Embedded in Electronics

The Year 1 total cost and fee rate fluorescents embedded in electronics is outlined in Table 10.11. Further information on the cost categories presented in Table 10.11 is available in Section 7 of Volume 1 of the Consolidated MHSW Program Plan.

Table 10.11: Year 1 Total Cost and Fee Rate for Fluorescents Embedded in Electronics

Description	Cost
Material Management	$175,600
Contingency	$18,400
Material-Specific R&D	$12,500
Material-Specific P&E	$0
Common Costs	$110,200
Deficit Recovery	$0
Total	**$316,700**
Tonnes managed	7
Total cost/tonne	$45,243
Fee Rate ($/unit)	
Display devices < 29"	$0.056
Display devices > 29"	$0.112
Portable computers	$0.021
Printing, copying & multi-function devices	$0.028

Notes:

1) The cost to manage fluorescent embedded in electronics was estimated using estimates provided by the current service provider.
2) For the purposes of estimating material management costs, a contingency of 10.5% has been applied.
3) For the purposes of calculating a fee rate, a contingency of 3% has been applied to the estimated quantity of Fluorescents: Embedded in Electronics supplied for use in Year 1 of the Consolidated MHSW Program Plan.

11.0 Leachate Toxics

11.1 Definition

Leachate toxics are those materials which upon extraction produce a toxic substance in a quantity greater than the limit identified by the regulation.

The extraction method used is the Ontario Ministry of the Environment's Toxicity Characteristic Leaching Procedure, method 1311. Toxic substances targeted by the program are those listed in Schedule 4 of Ontario Regulation 347:
http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_900347_e.htm#BK30

11.2 Product Identification

There is currently no known listing of products which would be captured in this product category, as the presence of a Schedule 4 substance in a product does not necessarily indicate that the concentration exceeds the legal threshold set in Regulation 347 after extraction.

Products which contain substances regulated in Regulation 347, Schedule 4 include toothpaste (fluoride), herbicides containing glyphosate, anti-dandruff shampoos (selenium, benzopyrene), some cleaning agents (Cresol), mothballs (1,4-Dichlorobenzene) and paint remover (Methyl Ethyl Ketone). In order to determine whether the substances exceed allowable levels – and would thus be captured in the program – an extraction test would need to be performed on each product.

The identification of products and materials for this category is incomplete. As such, estimating quantities into the market, available for collection and associated percentages would be highly inaccurate. The research and development strategy will address the challenge.

11.3 Current Management Infrastructure & Performance

According to the 2007 WDO Datacall, 9,586 kilograms or 10 tonnes of Leachate Toxic materials were collected by the municipalities. These quantities represented the collection of asbestos, transformers and ballasts. This tonnage was collected entirely through the depot, event, and Toxic Taxi channels.

11.4 Research and Development Strategy

As products captured by the program under the Leachate Toxic category are currently unknown, research and development and testing in this category would focus on identifying a range of products for potential inclusion in the program and performing the Ministry of the Environment's Toxicity Characteristic Leaching Procedure. This process would generate a definitive list of obligated products, and ongoing testing throughout the program would ensure that an increasing range of products would be identified on a go-forward basis.

In addition, as there is potential overlap with other categories in the program, materials which would be prioritized for testing would be those which are not captured by any of the other material groupings in the MHSW program. A research and development budget of $15,000 has been set for this material.

11.5 Promotion and Education

As Research & Development is required to identify a range of products that could be included in this category, no P&E activities are specified in year one.

11.6 Targets

11.6.1 Reduction

Reduction targets for the leachate toxics are not available until the material and products are better understood.

11.6.2 Collection

Five-year collection targets are presented below. The target for Year 1 is based on the accessibility strategy outlined in section 5 of the Consolidated MHSW Plan. Targets for Years 2-5 assume a 2% growth yearly.

Table 11.1: Leachate Toxic Collection Targets

Collection Targets	[2]Year 1	Year 2	Year3	Year4	Year 5
Tonnes	13	14	15	15	15
% of available for collection	N/A	N/A	N/A	N/A	N/A

Notes:

1. Year 2007 is the baseline year for MHSW Program Plan
2. MHSW Program Plan Year 1 are the twelve months after commencement date
3. Year 1 Target based on growing the 2007 municipal collection (10 tonnes) as per the Year 1 accessibility strategy.

11.6.3 Recycling

Recycling of leachate toxic material is not possible at this time. As the products and materials are better understood it may be possible to recycle components of the products being returned as leachate toxic.

11.7 Year 1 Costs and Cost Recovery

The total costs related to leachate toxics are outlined in Table 11.2. Further information on the cost categories presented in Table 11.2 is available in Section 7 of Volume 1 of the Consolidated MHSW Program Plan.

Table 11.2: Year 1 Total Costs for Leachate Toxics

Description	Cost
Material Management	$24,100
Contingency	$4,200
Material-Specific R&D	$15,000
Material-Specific P&E	$0
Common Costs	$132,500
Deficit Recovery	$0
Total	**$175,800**
Tonnes managed	13.13
Total cost/tonne	$13,385
Fee Rate	Measured return share

Notes:

1) If a commercial connection cannot be established between this material and a steward, these materials would be categorized as "orphan" products and these costs would not be accepted under the program.
2) While the material-specific cost to manage this group of products has been estimated as per table 11.2 above, "measured return share" means that the actual management cost, as well as a share of the budgeted common costs and deficit recovery, will be charged to stewards of those product categories.
3) For the purposes of estimating material management costs, a contingency of 17.5% has been applied.

12.0 Mercury Devices - Measuring Devices

12.1 Definition

Mercury Thermometer means an instrument for measuring temperature, having a graduated glass tube with a bulb containing mercury that expands and rises in the tube as the temperature increases.

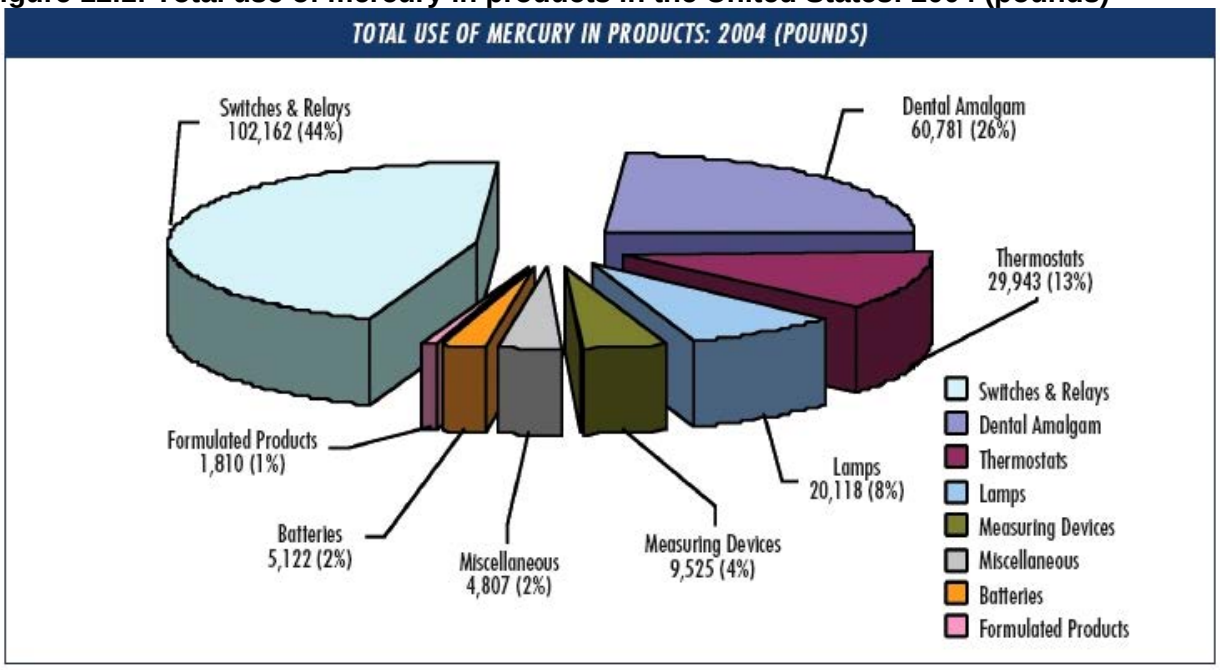
Mercury Barometer means an instrument containing mercury used for measuring atmospheric pressure

Other measuring devices that contain mercury means manometers, sphygmomanometers, psychrometers/hygrometers, hydrometers, and flow meters

12.2 Market and Product Information

Mercury is widely used in a variety of products utilized in residential, commercial and industrial environments. Mercury is a heavy liquid at room temperature and tends to be popular on account of its ability to conduct electricity and its standard responsiveness to changes in temperature and level. Figure 2.1 below provides a breakdown of mercury use by product category in the United States for 2004. According to this, measuring devices accounted for 4% of the total mercury use in products in the United States that year. It is reasonable to assume that the situation in Canada is comparable.

Figure 12.1: Total use of mercury in products in the United States: 2004 (pounds)



Source: Interstate Mercury Education & Reduction Clearinghouse (IMERC)

In 2006, Environment Canada published a Risk Management Strategy for Mercury-containing products. The strategy outlines options available to Environment Canada to prohibit or limit the

use of mercury in products. This prohibition is expected to include all products containing mercury, with the exception of fluorescent lights and dental amalgams, and is expected to come into force in 2012[33].

Notwithstanding this, due to legislation restricting the use of mercury passed in the United States, and overall health concerns associated with this substance, the vast majority of manufacturers have discontinued the use of mercury in their products[34]. For this reason, all the products designated under this category are obsolete in nature, that is to say, the material is no longer supplied or sold for use in Ontario.

12.3 IC&I generators

The Minister's Program Request Letter designates measuring devices that contain mercury from residential and IC&I small quantity generators. In the case of mercury, the quantity permitted from IC&I businesses under the MHSW Program is defined by the small quantity exclusion in Regulation 347 and is set at 5 kg of mercury containing waste per month.

Measuring devices used primarily in large industrial settings such as hydrometers (used to measure the specific gravity of liquids in the dairy and alcohol industries among others) are assumed to be over the small quantity IC&I threshold and are therefore excluded from this program.

12.4 Quantities Available for Collection - Thermometers

Data was obtained from Frost and Sullivan market research on U.S. Mercury Temperature Monitors Market (2003). This report covers the fever thermometer market only. Using 2002 as the base year, the Frost and Sullivan report forecasted unit shipment for the mercury thermometer market during the period 1996 to 2009 for the U.S. residential sector. Data for Ontario was estimated by applying a conversion factor based on population[35].

The report noted that the sharp decline in shipments reflects the concerns surrounding health hazards associated with mercury contamination, and the bans on mercury products that have been implemented in the recent years by a number of US jurisdiction, as well as the rise of other technologies (digital in particular).

As indicated in Table 12.1 below, it is assumed that no new mercury thermometers are entering the Ontario market as of 2009.

[33] Personal Communication, Denis Pineault, Environment Canada, January 2009

34 See http://www.newmoa.org/prevention/mercury/imerc/productban.cfm for a list of States' Mercury-Added Product Bans and http://www.newmoa.org/prevention/mercury/imerc/factsheets/measuring_devices.pdf for a list of companies and measuring device products that have reportedly been eliminated from the U.S. market since 2000.

35 It is estimated that the Canadian market represents 10% of the American market and that the Ontario market accounts for 38.8% on the Canadian market.

Table 12.1: Shipments of mercury fever thermometers 1996-2009

Year	Unit shipment US (million)	Unit shipment ON (estimated)
1996	8.9	345,320
1997	8.3	322,040
1998	7.8	302,640
1999	4.0	155,200
2000	3.2	124,160
2001	2.7	104,760
2002	2.7	104,760
2003	1.8	69,840
2004	0.9	34,920
2005	0.7	27,160
2006	0.5	19,400
2007	0.4	15,520
2008	0.2	7,760
2009	0.0	0
TOTAL	**42.1**	**1,633,480**

It is very difficult to estimate the quantity of mercury thermometers becoming available for collection yearly. Generally speaking, this product has a very long lifespan and would only reach end of life upon breakage (i.e. there is no mechanism in a mercury thermometer that eventually fails as is the case with non-mercury thermometers).

The US Environmental Protection Agency (EPA)'s modelling work on yearly mercury outflow assumes that of the household thermometers disposed of, 80% of the thermometers purchased five years ago were broken. Of those 20% that are unbroken, the EPA assumes that 25% were recycled in 2000 and 75% went to solid waste.

Alternatively, however, a survey conducted by Environics on behalf of Environment Canada suggested that the breakage rate of mercury thermometers is about 10% per year. This would mean that, of thermometers sold in a given year, none remain in-service in ten years' time. Based on the figures presented in Table 12.1 above, an annual breakage rate of 10% would indicate that approximately 66,000 mercury thermometers would remain in service in Ontario today.

Since this calculation does not factor in how many thermometers are returned due to environmental awareness and public take-back programs, it is likely that the number of thermostats available for collection is slightly lower.

12.5 Other mercury containing measuring devices

This sub-category includes non-fever thermometers, manometers, sphygmomanometers, psychrometers/hygrometers, hydrometers, and flow meters. All of these have viable alternatives to mercury that, in many cases, offer cost savings or improved performance. Table 12.2 below provides a description of the device as well as the types of applications where it is likely to be found. Those devices used mainly in laboratories, the medical field, and large industrial applications, are assumed to fall outside the scope of this program. The last column uses this information to indicate whether this device is included or not in the MHSW program.

Table 12.2: Mercury Containing Measuring Devices

Product type	Alternatives	Description	Included in MHSW program?
Sphygmomanometers	Aneroid Sphygmomanometer	Sphygmomanometers are manometers used to measure human blood pressure. Mercurial sphygmomanometers have been the standard in the medical field for many years but are being phased out and replaced with aneroid and digital products due to liability associated with mercury spills	NO
Manometers	Digital manometer, needle burdon gauge	Manometers are used to measure air, water and gas pressure. Those containing mercury are almost exclusively used to measure gas pressures. They are used also as primary pressure standards in laboratories, meteorology and industry, and to calibrate secondary pressure measuring instruments like electronic and aneroid gauges.	NO
Barometer	Aneroid barometer, digital barometer	Barometers are used to measure atmospheric pressure. Applications include schools, households and for airport, weather monitoring and farming.	YES
Psychrometer/hygrometer	Spirit filled pshchrometer, digital psychrometer	Although not common in most workplaces, hygrometers/psychrometers are found in workplaces where ambient moisture measurements are used for predicting weather and atmospheric conditions.	NO
Hydrometer	Spirit filled hydrometer	Hydrometers measure the specific gravity and density of a liquid. They are most commonly used in laboratories, the petroleum and dairy industries and in the production of alcohol.	NO
Flow meter	Majority of flow meters	Measure the rate of flow of gas, water, air and streams. Flowmeters are used in water and sewage treatment plants, power stations, and many other industrial applications. Mercury-containing flowmeters are generally no longer manufactured and have been replaced by electronic or digital units (Galligan et al., 2002).	NO
Pyrometer	Digital and optical pyrometer	Pyrometers are used to measure extremely hot materials in foundry applications and exhaust temperatures for large engines. Mercurial pyrometers are becoming obsolete as nitrogen probes or digital instruments are replacing them.	NO
Non-fever thermometers	Digital and liquid (e.g. alcohol)	Non-fever thermometers are used to measure the temperature of liquids and vapours. Common household uses of mercury thermometers (other than fever thermometers) are oven, candy and meat thermometers. In educational and medical institutions, mercury thermometers may be used in many applications, including chemical experiments, water and acid baths, blood banks, ovens and incubators cooking thermometers. Examples of industrial applications where mercury thermometers may be found include power plants and piping and chemical tanks and vats.	YES

References:
http://www.newmoa.org/prevention/topichub/index.cfm?page=subsection&hub_id=101&subsec_id=1&

http://www.ec.gc.ca/MERCURY/SM/EN/sm-mcp.cfm?SELECT=SM

As indicated in Table 12.2 above, the other measuring devices captured under this program are mercury barometer and non-fever thermometers. No information is available on when these devices stopped being introduced into the Ontario market and how many were introduced before then.

A study commissioned by Environment Canada estimated that Canadian sales comprised between 0.7% and 2% of the North American sales of leading manufacturers of mercury measuring devices. Based on this datum, an estimated 3.6 tonnes of mercury remained in-service nationally in 2002. According to a parallel calculation that estimated the tonnage of mercury in thermometers at 1.5 tonnes in 2003, the report concluded that 2.1 tonnes of mercury (excluding mercury from thermometers) remained in measuring devices nationwide. Prorating for Ontario, this suggests that, as of 2003, 0.82 tonnes of mercury was contained in measuring devices in Ontario.

However, due to the variable amount of mercury contained in measuring devices, and uncertainty about product lifespans as well as the breakdown of sales into the Ontario marketplace, this calculation provides little insight into the number of measuring devices available for collection.

12.6 Current Management Infrastructure & Performance

Very little is known about the current management of mercury thermometers and other mercury containing measuring devices. Although the WDO Datacall includes a reporting category for thermostats, it does not include a category for other measuring devices. Notwithstanding this, conversations with individual municipalities having reported tonnages under the Datacall's mercury switch category have revealed that measuring devices are often recorded in the mercury switch category. For purposes of planning, it has therefore been assumed that 113 kg of measuring devices were collected by municipalities in 2007.

Although it was not possible to identify current return to retail programs for thermometers, a Mercury Fever Thermometer Take Back pilot program was implemented in collaboration with Environment Canada in the cities of London, Ottawa and Thunder Bay in 2002[36]. Residents in these cities could return their unbroken mercury fever thermometers to participating retailers during a month. Over 100 pharmacies participated including major retailers such as Wal-Mart, Shoppers Drug Mart, Rexall and Pharma Plus. In total, 1400 thermometers were returned (0-115 thermometer per pharmacy). Household participation rates were: 2.9% in London; 0.7% in Ottawa and 2.5% in Thunder Bay.

Aevitas in Ayr, ON, processes mercury thermometers and other measuring devices. The mercury is tripled distilled and sent to Bethlehem, Pennsylvania, for final distilling. The glass is crushed, purified in a retort system, and sent for recycling in applications such as fibre glass.

12.7 Accessibility Strategy

It is anticipated that measuring devices will be collected through depots, events, Depot in a Box, and toxic taxi as described in Section 5 of Volume 1 of the Consolidated MHSW Program Plan.

[36] Information taken from http://www.c2p2online.com/documents/johnclarke.pdf

The accessibility strategy for measuring devices will therefore follow the general accessibility strategy for this channel, as outlined in Section 5 of Volume 1 of the Consolidated MHSW plan.

Experience has found that the main trigger for mercury thermometers to come back is consumer awareness of the hazard posed by mercury. This awareness is usually raised by running targeted mercury thermometer exchange events. Drawing upon this, as part of the accessibility strategy for fever thermometers, a return to retail pilot through pharmacies will be considered. (possibly in conjunction with sharps and pharmaceuticals).

12.8 Promotion and Education

As described in section 5.5 of the MHSW plan, Promotion and Education activities will be implemented at three levels.

The province-wide "branding the behaviour" P&E program will continue to build on the **Do What You Can** campaign urging people to think about 3Rs objectives when it comes to managing MHSW. The message will be an overarching, motivational call to action, driving people to the **Do What You Can** website to find material specific and collection information.

The second layer of P&E is targeted as "educating about specifics" which will provide people with the information they need to take action. The approach to this P&E will depend on whether the product is a consumable or durable and what the desired end-of-life might be. Many products and containers will be collected at events, depots or depot-in-a-box.

As well, for some materials, targeted collection programs will require point of sale P&E tactics.

The recovery of mercury thermometers and other measuring devices will be promoted as part of province-wide generic campaign and potentially targeted for a specific P&E pilot program to take them back to pharmacies, possibility with pharmaceuticals and sharps. This campaign would comprise point-of-sale prompts (e.g. stickers, shelf talkers, brochures) to encourage proper end-of-life management for these materials. For Year 1 of the Consolidated MHSW Program Plan, a P&E budget of $37,500 has been allocated.

12.9 Targets

The Year 1 collection target for measuring devices has been derived from the accessibility strategy outlined in Section 5 of the MHSW Consolidated Plan, and has been set at 170 kg.

Five year collection targets for measuring devices will aim to increase the collection by 2% annually, as presented in Table 12.3 below. The recycling performance targets that have been set assume that measuring devices are entirely recyclable.

Table 12.3: Five-Year Collection and Recycling Performance Targets for Measuring Devices

Collection and Recycling Performance target	Year 1	Year 2	Year 3	Year 4	Year 5
Kilograms	170	173	177	180	184

As was mentioned in Sections 12.5 and 12.6 above, consideration will be given to implementing a Mercury Fever Thermometer Take Back pilot program in the first year of the program. Should this pilot move forward, a 2% household participation rate (the average participation rate for the

three communities where such a pilot was run in 2002) would be considered as a target for the pilot.

The recycling target for measuring devices is 100% of what is collected.

12.10 Research and Development

As part of the Research and Development efforts for this material group, consideration will be given to the implementation of a mercury thermometer return pilot with a number of targeted pharmacies, in conjunction with sharps and pharmaceuticals. A budget of $25,000 has been allocated to this effect.

12.11 Year 1 Costs and Cost Recovery

The Year 1 Total Cost and Cost Recovery for measuring devices are presented in Table 12.4 below. Further information on the cost categories presented in Table 12.4 is available in Section 7 of Volume 1 of the Consolidated MHSW Program Plan.

Table 12.4: Year 1 Total Cost and Cost Recovery for measuring devices

Description	Cost
Material Management	$4,500
Contingency	$500
Material-Specific R&D	$25,000
Material-Specific P&E	$37,500
Common Costs	$32,600
Deficit Recovery	$0
Total	**$100,100**
Tonnes managed	0.17
Total cost/tonne	$588,824
Fee Rate	Measured return share

Notes:

1) For the purposes of estimating material management costs, a contingency of 10.5% has been applied.
2) While the material-specific cost to manage this group of products has been estimated as per table 12.4 above, “measured return share” means that the actual management cost, as well as a share of the budgeted common costs and deficit recovery, will be charged to stewards of those product categories.

13.0 Oil Containers

13.1 Definition

Oil containers with a volume of 30 litres or less, produced or arriving into the province, and which are used for sale in Ontario for the containment of lubricating oil products including:

- Petroleum-derived or synthetic crankcase, engine and gear oils, and hydraulic, transmission and heat transfer fluids; and
- Fluids used for lubricating purposes in machinery or equipment.

Examples include containers that contained:

- Synthetic crankcase or engine oil
- Hydraulic fluid
- Polyolester fluids
- Circulating oil or turbine oil
- Paper machine oil
- Transmission fluid
- Power steering fluid
- Gear oil
- Vegetable oil for lubrication
- Re-refined oil
- Electrical insulating oil
- Refrigeration system oil
- Compressor oil
- Mineral heat transfer fluid
- Marine engine oil for vessels
- Operating domestically
- Metal working oil
- Form release oil
- Textile oil
- Chain oil
- Rock drill oil
- 2-cycle engine oil
- Gasoline / 2-cycle engine oil mixes
- Saw guide oil
- Drawing, stamping and shaping oil
- Process oil
- Dedusting oil
- Marine cylinder oil
- Machine tool and slideway lubricant
- Natural gas compressor oil
- Conveyor lube
- Drip less lube
- Quenching oil
- Pneumatic system oil
- Rustproof oil
- Food grade white mineral oil

Examples of exclusions include containers that contained:

- Ethylene glycol heat transfer fluid
- Propylene glycol heat transfer fluid
- Silicone heat transfer fluid
- Synthetic aromatic hydrocarbon heat
- Transfer fluid
- Glycol-based heat transfer fluid
- Water glycol hydraulic fluid
- Phosphate ester hydraulic fluid
- Hydraulic oil dye
- Polyglycol synthetic compressor oil
- Base oil, including re-refined base oil
- Grease
- Oil additive
- Oil treatment
- Diesel fuel treatment
- Cleaning/flushing fluids for motors/equipment
- Winter start fluid
- Brake fluid
- Undercoating
- Penetrating oil
- Hydraulic jack oil
- 3-in-1 household oil
- Aerosol propelled lubricant
- Gun oil
- Kerosene
- Urethane coating
- Sewing machine oil
- Export oil sales
- Cooking oil
- Windshield washer fluid
- Emulsified oil

13.2 Market & Product Information

Oil containers are sold as the packaging for lubricating oil and not sold solely as a container. Oil is typically sold in container sizes of 500 ml, 946 ml, 1L, 3.78L, 4L, 4.4L, 4.73L 5L, 10L, 18.9L, and 20L. They are primarily manufactured from HDPE plastic.

Oil containers containing lubricating oil are used and emptied by the vehicle owner – "Do-it yourself" (DIY), or more commonly, by an automobile service provider – "Do-it-for-me" (DIFM).

13.3 IC&I Generators

The MHSW program for used oil containers encompass the management of all used oil containers regardless of category of user, i.e. whether generated by a consumer or a large or small IC&I business.

13.4 Quantity Supplied for Use

The scope of the MHSW program is to manage all oil containers of 30 litres or less regardless of the waste generator. Industry resources estimate that 3,659 tonnes of oil containers were sold into Ontario in 2007.

Market trends indicate that quantities into the market will decrease by 2% on a yearly basis as service intervals generally lengthen for new vehicles therefore reducing the number of oil changes/oil containers needed. Also an additional 2% decrease is due to the increasing percentage of bulk dispensed oil. Estimates for Year 1 were developed based on actual sales reported by stewards from July-December 2008 and accounting for seasonality.

Table 13.1: Estimated Quantities of Oil Containers Supplied into the Ontario Market

Sales into Market	[1]2007	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Units (kg)	3,658,740	3,515,260	3,374,650	3,239,664	3,110,077	2,985,674
Tonnes	3,659	3,515	3,375	3,240	3,110	2,986
% growth		-4%	-4%	-4%	-4%	-4%

Notes:

1. Year 2007 is the baseline year for MHSW Program Plan, with updates from recent data.
2. MHSW Program Plan Year 1 is the 12 months after program commencement date
3. Sales into the market based on actual sales reported by stewards from July-Dec. 2008 and accounting for seasonality.

13.5 Estimated Quantity Available for Collection

Oil containers are not consumable product and therefore available for collection through the MHSW program. A small percentage of the 20 litre pails are used and diverted by the agricultural industry. Given that about 34% of the total oil containers (by weight) are 20 litre pails and estimating that about 20% of that amount is used by the agricultural sector, the available for collection is 93%. The table below summarizes the available for collection quantities:

Table 13.2: Estimated Quantities of Oil Containers Available for Collection

Available for Collection	[1]2007	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Units (kg)	3,402,628	3,269,192	3,138,424	3,012,887	2,892,372	2,776,677
Tonnes	3,403	3,269	3,138	3,013	2,892	2,777
% of Sales	93%	93%	93%	93%	93%	93%

Notes:

1. Year 2007 is the baseline year for MHSW Program Plan, with updates from recent data.
2. MHSW Program Plan Year 1 is 12 months after program commencement date

13.6 Current Management Infrastructure & Performance

According to the 2007 WDO Datacall, no municipalities offered collection services for oil containers with used oil. Many municipalities do accept used oil which sometimes arrives in oil containers. Some municipalities accept empty oil containers as part of their Blue Box program.

Accordingly, of the containers brought to depots by householders with the 2,365 tonnes of used oil reported in the 2007 WDO Datacall, an estimated 103 tonnes of used oil containers are in effect collected at MHSW depots and events. It must be noted that the majority of these containers are not currently being recycled due in part to limited processing capacity.

In accordance with the Automobile Industry Association there are approximately 12,500 automobile services provider outlets in Ontario that manage oil containers generated from vehicles serviced. Of these, approximately 7,500 locations currently participate in the MHSW Phase 1 oil container incentive program[37].

Furthermore, as part of the implementation of the Phase 1 MHSW Program, Stewardship Ontario has entered into agreements with Jiffy Lube and Oil Pro Change to collect oil containers from DIYs. Currently, 39 Jiffy Lube and 2 Oil Pro Change locations are participating in the program. Over the last 9 months of the initial Phase I program, approximately 253 tonnes of oil containers have been collected and processed.

Some oil containers are recycled with other plastic containers, however most plastics recyclers limit or do not accept oil containers because of problems associated with treatment of the oil residue. Currently most oil containers are landfilled.

13.7 Accessibility Strategy & Targets

The accessibility strategy for oil containers for Year 1 of the program includes:

- Increase the number of service centres accepting waste oil containers from DIY from the current 41 to 75.
- Increase the number of service centres participating in the Stewardship Ontario incentive program from 7,500 to 8,500.
- Increase the number of municipal and private sector depots, events, Depot in a Box as outlined in Section 5 of the MHSW Plan.

[37] Under the MHSW Program, incentive payment are given for the transportation of oil filters. More information is available in the Manual for Transporters and Processors at http://www.stewardshipontario.ca/mhsw/pdf/transporters_processors/T_P_Manual.pdf

13.8 Promotion and Education

As described in Section 5.5 of Volume 1 the Consolidated MHSW plan, Promotion and Education activities will be implemented at three levels.

The province-wide "branding the behaviour" P&E program will continue to build on the **Do What You Can** campaign urging people to think about 3Rs objectives when it comes to managing MHSW. The message will be an overarching, motivational call to action, driving people to the **Do What You Can** website to find material specific and collection information.

The second layer of P&E is targeted as "educating about specifics" which will provide people with the information they need to take action. The approach to this P&E will depend on whether the product is a consumable or durable and what the desired end-of-life might be. Many products and containers will be collected at events, depots or depots-in-a-box.

As well, for some materials, targeted collection programs will require point of sale P&E tactics.

The recovery of oil containers will be promoted as part of the province-wide campaign. As well, material specific P&E activities will be used to encourage greater awareness of opportunities to recycle oil filters at service centres. For Year 1 of the Consolidated MHSW Program Plan, a P&E budget of $133,333 has been allocated.

13.9 Barriers and Opportunities to Increased Diversion & Research and Development Requirements

There are insufficient locations for DIYs to take oil containers for recycling. Opportunities to increase diversion of oil containers include:

- Increase the number of municipal and non-municipal/private sector sites accepting used oil containers from DIYs
- Increase the capacity for recycling collected oil containers through the oil container processing incentive program (See Manual for Transporters & Processors)

Research and development specific to oil containers is needed to review and adjust as necessary the transportation incentive system by which haulers are paid an incentive to pick up used oil containers from any location (including automobile service providers, municipalities, farms, fleet operators etc.) upon proof of recycling.

In addition, a significant R&D investment will be required over a period of years to develop processing technology, capacity and markets in Ontario for managing the used oil containers after they have been collected. The program will capitalize on the experience gained in the used oil product programs in other provinces.

Barriers to increased diversion of oil containers include:

- Current low rate of recovery indicates that barriers may exist at the consumer, retailer, or processor level, such as awareness
- Oil residue on bottles makes it difficult to process this material
- Lack of an oil container capable processor in southern Ontario (virtually all Ontario auto plastics are currently being processed in Quebec)

Opportunities to increase diversion of oil containers include:

- Increased collection at retail (e.g., automotive retailers)
- Expanded processing capacity in Ontario
- Increased transportation and processing incentives
- Technology to remove the oil residue to enable the material to be recycled together with other HDPE
- Densification of oil containers in order to make transportation more economically sound.

As part of the implementation of the MHSW Phase I Plan, a Research and Development plan was developed for oil containers. The priorities that have been identified under this plan are as follows in Table 13.3.

Table 13.3: R&D priorities and status for oil containers

Priority	Status
Establish and document procedures to ensure that all results from any used oil containers R&D projects and investigations are consolidated into a series of technical reports for future use by Stewardship Ontario.	Completed
Review and documentation of province-wide collection infrastructure	Completed
Review and documentation of province-wide recovery rates and end-use	Completed
Assess Reduction potential available through incentives to support incremental bulk dispensing	In progress, completion by June 2009
Develop preliminary mechanisms (feedback loop) by which Stewardship Ontario can ensure continuous improvements within the province-wide transportation and processing fee-system	In progress, completion by June 2009
Investigate the generation of oil containers by Do It Yourself (D.I.Y.) and Do It For Me (D.I.F.M) to determine whether, and how much of D.I.Y. oil containers are being recovered through MHSW Program collection in order to assess any barriers	In progress, completion by June 2009
Benchmark against the experiences and results from used oil product programs operating in other provincial and state jurisdictions to identify any barriers and any opportunities to improve performance in Ontario resulting from Program structure	In progress, completion by June 2009
Conduct Pilot Study of Gas Bar oil container collection and diversion to assess diversion potential (currently at zero)	In progress, completion by December 2009
Conduct lab and pilot plant studies to identify all potential processing methodologies, associated costs, projected end market potential by processing methodology and end product(s)	In progress, completion December 2009

Additional consideration will be given to the following activities:

- Field study to analyze the collection ratio between antifreeze and oil containers. The study will investigate the possibility to combine the collection targets for all plastic containers.
- Field study to gather information on quantities collected via the Blue Box and MHSW programs.

- Conduct economic analysis to determine if establishing processing facilities within Ontario is valuable.

For Year 1 of the Consolidated MHSW Program Plan, an R&D budget of $100,000 has been allocated to oil containers.

13.10 Targets

13.10.1 Reduction

Reduction is occurring with oil containers due to:

- Service intervals generally lengthening for new vehicles, thus reducing the number of oil changes/oil containers needed
- Reduction in containers due to the continuing shift to bulk dispensing

The MHSW program will educate owners regarding appropriate oil change intervals in accordance with the recommendations in their owner's manual.

There is a declining trend in the number of DIYs, likely resulting in more bulk oil used and less packaged oil.

13.11 Collection

The Collection Rate for Oil Containers during the first nine months of the MHSW Program operation is 12%, versus the MHSW Phase 1 Plan objective of 30%. The shortfall is due to the absence of plastics processors capable of processing used oil containers located in Ontario. Ongoing discussions with plastics processors with existing processing facilities in other provinces indicate a strong probability that at least one of these firms will establish processing facilities in Ontario within the year that this program was written.

Furthermore, the existing primary processor for oil containers within Ontario (plant is located in Quebec) has recently established direct collection and baling operations in Ontario. As a result collection rates have been increasing significantly.

In addition, a plan will be set in place to increase accessibility for DIYs, both through the municipal channel and through increased acceptance of DIY MHSW by automotive service providers. Taking all the above factors into account, the Year 1 Collection Target has been set at 32%.

Table 13.4: Year 1 Collection Targets for Oil Containers

Collection Target	Year 1	Year 2	Year 3	Year 4	Year 5
Tonnes	1,055	1,161	1,265	1,359	1,444
% of Available for Collection	32%	37%	42%	47%	52%

Table 13.5: Year 1 Collection Targets for Oil Containers by Channel

Channel	Tonnage
Events, Depot, DIB, TT	141
Return to Retail and Specialty Channels	914
Total	1,055

13.12 Recycling

Specialized systems to recycle plastic from oil containers have developed in provinces with oil container stewardship programs where fees are provided to recyclers. These systems include consolidation, shred/grind, washing and marketing as a commodity.

Ongoing discussions with plastics processors with existing processing facilities in other provinces indicate a strong probability that at least one of these firms will establish processing facilities in Ontario.

Oil containers are entirely recyclable. Therefore, five-year recycling performance rate targets for oil containers will strive to recycle 100% of what is collected, as presented in Table 13.6 below.

Table 13.6: Five year recycling targets for oil containers

Target	Year 1	Year 2	Year 3	Year 4	Year 5
Qty Available for Collection (tonnes)	3,269	3,138	3,013	2,892	2,777
Collection target (tonnes)	1,055	1,161	1,265	1,359	1,444
Recycling Performance Rate	100%	100%	100%	100%	100%
Recycling Target (tonnes)	1,055	1,161	1,265	1,359	1,444
Recycling Efficiency Rate	32%	37%	42%	47%	52%

13.13 Year 1 Costs and Fee Rate

The Year 1 total cost and fee rate for oil containers are outlined in Table 13.7 below. Further information on the cost categories presented in Table 13.7 is available in Section 7 of Volume 1 of the Consolidated MHSW Program Plan.

Table 13.7: Year 1 Costs and Fee Rate for Oil Containers

Description	Cost
Material Management	$2,214,900
Contingency	$77,500
Material-Specific R&D	$100,000
Material-Specific P&E	$133,333
Common Costs	$439,200
Deficit Recovery	$144,000
Total	**$3,108,933**
Tonnes managed	1,055
Total cost/tonne	$2,947
Fee Rate ($/L)	$0.046

Notes:

1) For the purposes of estimating material management costs, a contingency of 3.5% has been applied.
2) For the purposes of calculating a fee rate, a contingency of 1% has been applied to the estimated quantity of Oil Containers supplied for use in Year 1 of the Consolidated MHSW Program Plan.
3) Stewardship Ontario incurred a deficit from the operation of the first year of Phase 1 of the MHSW program that will be recovered as part of the fees for the Consolidated Plan. Allocated only to Phase 1 Materials on a material-specific basis, the deficit shown in the table includes any

deficits in common costs (start-up, plan development, and program management costs) as well as material-specific operating costs and fees owing.

14.0 Oil Filters

14.1 Definition

Means oil filters produced and/or arriving into the province, and which are for sale, directly or as part of a product, in Ontario

Examples of filters include:

- Spin-on or element style filter that is used in hydraulic, transmission or internal combustion engine applications including;
- Diesel fuel filters;
- Household furnace fuel filter;
- Storage tank diesel fuel filter;
- Sump type automatic transmission filter;
- Plastic/paper element style filter;
- Diesel fuel filter used at retail & commercial pump islands;
- Coolant filter.

Examples of filters excluded from the program are:

- Gasoline fuel filter;
- Air filter;
- Household furnace air filter;
- Sock-type filter.

14.2 Market & Product Information

Oil filters are mainly used in automotive engines and other equipment for the purpose of filtering out contaminates from the various oils and coolants. They come in various sizes, makes and shapes. For the purposes of this plan, it is assumed that 85% of oil filters sold are less than 8" (203 mm) in length (mainly for use in automobiles), and 15% are equal to or greater than 8" (usually for heavy duty vehicle applications, predominately diesel engines, farm equipment, and on or off road vehicles).

Oil filters are installed and replaced in vehicles either by the vehicle owner – "Do-it-yourself" (DIY), or more commonly, by an automobile service business – "Do-it-for-me" (DIFM). The number of oil filters used in the life of a motor vehicle is expected to reduce gradually over time due to technology improvements.

14.3 IC&I Generators

The MHSW program for oil filters encompass the management of all used oil filters regardless of category of user, i.e. whether generated by a consumer or a large or small IC&I business.

14.4 Quantity Supplied for Use

Based on industry sources, an estimated 13,744 tonnes of oil filters were sold in Ontario in 2007.

Market trends indicate that quantities introduced into the market will decrease by 2% on a yearly basis as service intervals generally lengthen for new vehicles therefore reducing the number of oil changes needed. Estimates for Year 1 were developed based on actual sales reported by stewards from July-December 2008 and accounting for seasonality.

Table 14.1: Quantities of Oil Filters Supplied into the Ontario Market

Sales into Market	[1]2007	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Units (filters)	19,804,688	18,683,667	18,309,994	17,943,794	17,584,918	17,233,220
[3]Tonnes	13,744	12,966	12,707	12,453	12,204	11,960
% growth		-2%	-2%	-2%	-2%	-2%

Notes:

1. Year 2007 is the baseline year for MHSW Program Plan
2. MHSW Program Plan Year 1 is the 12 months after program commencement date
3. Based on dry weight of 0.694 kg per filter. Information provided by the National Used Oil Management Association Council (NUOMAC).

14.5 Quantity Available for Collection

Oil filters are not consumable products and therefore 100% available for collection. The table below summaries the available for collection quantities:

Table 14.2: Quantities of Oil Filters Available for Collection

Available for Collection	[1]2007	[2]Year 1	Year 2	Year 3	Year 4	Year 5
[3]Units (filters)	19,804,688	18,683,667	18,309,994	17,943,794	17,584,918	17,233,220
Tonnes	17,428	16,442	16,113	15,790	15,475	15,165
% of Sales into market	100%	100%	100%	100%	100%	100%

Notes:

1. Year 2007 is the baseline year for MHSW Program Plan
2. MHSW Program Plan Year 1 is the 12 months after program commencement date
3. Based on wet weight of 0.88 kg per filter. Information provided by the National Used Oil Management Association Council (NUOMAC)

14.6 Current Management Infrastructure & Performance

Oil Filters are typically drained to recover oil, and then sent for metal recycling. Some operations may send oil filters without draining to recyclers providing turn key service that recovers oil prior to metal recycling as part of the service.

According to the 2007 WDO Datacall, 55 municipalities offered collection services for oil filters. This represents 3,725,978 households served. The 2007 WDO Datacall reports that 302 tonnes of oil filters were collected through the municipal MHSW depot system.

In accordance with the Automobile Industry Association there are approximately 12,500 automobile services provider outlets in Ontario that manage the oil filters generated from

vehicles serviced. Of these, approximately 7,500 locations are serviced by companies currently participating in the MHSW Phase 1 oil filter incentive program[38].

Furthermore, as part of the implementation of the Phase 1 MHSW Program, Stewardship Ontario has entered into agreements with Jiffy Lube and Oil Pro Change to collect oil filters from DIYs. Currently, 39 Jiffy Lube and 2 Oil Pro Change locations are participating in the program.

Since Phase 1 implementation (July 2008-March 2009) 5,091 tonnes of oil filters have been collected from the municipal channel and the commercial channel. This represents a collection rate of 47% for the year. However, this rate is somewhat understated due to incomplete municipal reporting over the past nine months. Additionally, it is possible that use of a conversion factor of 0.88 kg/filter leads to an under-estimate of the number of filters collected, as fully drained or crushed filters likely weigh less. Actual average weights of used oil filters will be confirmed through field research.

14.7 Accessibility Strategy

The accessibility strategy for oil filters for Year 1 of the program includes:

- Increase the number of service centres accepting waste oil filters from DIY from the current 41 to 75.
- Increase the number of service centres participating in the Stewardship Ontario incentive program from 7,500 to 8,500.
- Increase the number of municipal and private sector depots, events, Depot in a Box as outlined in Section 5 of the MHSW Plan.

14.8 Promotion and Education

As described in Section 5.5 of Volume 1 of the Consolidated MHSW plan, Promotion and Education activities will be implemented at three levels.

The province-wide “branding the behaviour” P&E program will continue to build on the Do What You Can campaign urging people to think about 3Rs objectives when it comes to managing MHSW. The message will be an overarching, motivational call to action, driving people to the Do What You Can website to find material specific and collection information.

The second layer of P&E is targeted as “educating about specifics” which will provide people with the information they need to take action. The approach to this P&E will depend on whether the product is a consumable or durable and what the desired end-of-life might be. Many products and containers will be collected at events, depots or depots-in-a-box.

As well, for some materials, targeted collection programs will require point of sale P&E tactics.

The recovery of oil filters will be promoted as part of the province-wide campaign. As well, material specific P&E activities will be used to encourage greater awareness of opportunities to recycle oil filters at service centres. For Year 1 of the Consolidated MHSW Program Plan, a P&E budget of $133,333 has been allocated.

[38] [1]Under the MHSW Program, incentive payment are given for the transportation of oil filters. More information is available in the Manual for Transporters and Processors at
http://www.stewardshipontario.ca/mhsw/pdf/transporters_processors/T_P_Manual.pdf

14.9 Barriers and Opportunities to Increased Diversion & Research and Development Requirements

Barriers to increased diversion for oil filters include the small number of service centres that are currently accepting used oil filters from the DIYs.

Opportunities to increase diversion of oil filters include:

- Strategic review of overall collection system
- Alternative processing systems
- Investigate oil filter collection and processing systems in other jurisdictions to establish best practices

As part of the implementation of the Phase 1 MHSW Program, a Research and Development plan has been developed for oil filters. The priorities that have been identified under this plan, as well as the status for each of these, is outlined below. These priorities will be maintained under the Consolidated MHSW program.

Table 14.3: R&D Priorities and status for oil filters

Priority	Status
Establish and document procedures to ensure that all results from any used oil filters R&D projects and investigations are consolidated into a series of technical reports for future use by Stewardship Ontario	Completed
Review and documentation of province-wide collection infrastructure	In progress, completion June 2009
Review and documentation of province-wide recovery rates and end-use	In progress, completion June 2009
Investigate whether, and how much of Do-It-Yourself (D.I.Y.) used oil filters are being recovered through MHSW Program collection in order to assess any barriers	In progress, completion June 2009
Develop preliminary mechanisms (feedback loop) by which Stewardship Ontario can ensure continuous improvements within the province-wide transportation and processing fee-system	In progress, completion June 2009
Assess short and long term potential for Reduction through public education (extended drain intervals) and through filter re-design opportunities	In progress, completion Dec. 2009
Survey and assess potential markets and capacity for collected small engine (off road), heavy duty (on/off road) and farming mobile or stationary equipment used oil filters	In progress, completion Dec. 2009
Field audit of diverted filters to determine contamination rates, and to determine diversion rates by filter type (auto, off-road, H.D.)	In progress, completion June 2009

14.10 Targets

14.10.1 Reduction

- Service intervals are generally lengthening for new vehicles, thus reducing the number of oil changes/oil filters needed

- The MHSW program will educate owners regarding appropriate oil filter change intervals in accordance with the recommendations in their owner's manual (see section 8 – Promotion and Education).

14.10.2 Collection

The collection rates achieved in the five Canadian provinces where oil filter stewardship programs exist were, in every case, higher than the 50% originally estimated in these plans. The existing used oil filter programs have achieved as high as 70% collection in year one and, after 8-10 years, these programs are achieving as high as 92% collection. Based on these results, it is estimated that given the awareness developed by other provincial programs and building on the existing filter hauler and processor infrastructure, a 65% collection rate will be achieved in Year 1. More information on the five existing used oil product management programs including diversion rates is available at www.usedoilrecycling.com.

Improvement of the current collection rate of approximately 47% to the Year 1 target rate of 65% will be achieved through increased accessibility for DIYs through depots, events, depot in a box, and toxic taxi, and increased acceptance of DIY MHSW by automotive services providers, and an estimated increase of 1,000 automotive service providers participating in the MHSW Program.

Table 14.4: Year 1 Collection Targets for Oil Filters

Collection Target	Year 1	Year 2	Year 3	Year 4	Year 5
Tonnes	10,687	11,279	11,843	12,380	12,890
% of Available for Collection	65%	70%	75%	80%	85%

Table 14.5: Year 1 Collection Targets for Oil Filters by Channel

Channel	Tonnage
Events, Depot, DIB, TT	414
Return to Retail and Specialty Channels	10,273
Total	10,687

14.10.3 Recycling

Oil filters are collected and transported to waste management facilities where they are crushed and recycled as scrap metal. The recycling performance target for Year 1 is 100% of the oil filters that will be collected (i.e. 10,687 tonnes). Five-year recycling targets are presented in Table 14.6.

Table 14.6: Five-Year Recycling Targets for Oil Filters

Target	Year 1	Year 2	Year 3	Year 4	Year 5
Qty Available for Collection (tonnes)	16,442	16,113	15,790	15,475	15,165
Collection target (tonnes)	10,687	11,279	11,843	12,380	12,890
Recycling performance rate	100%	100%	100%	100%	100%
Recycling Target (tonnes)	10,687	11,279	11,843	12,380	12,890
Recycling efficiency rate	65%	70%	75%	80%	85%

14.11 Year 1 Costs and Fee Rate

The Year 1 total cost and fee rate for oil filters are outlined in Table 14.7 below. Further information on the cost categories presented in table 14.7 is available in Section 7 of Volume 1 of the Consolidated MHSW Program Plan.

Table 14.7: Year 1 Total Costs and Fee Rate for Oil Filters

Description	Cost
Material Management	$8,681,100
Contingency	$303,800
Material-Specific R&D	$0
Material-Specific P&E	$133,333
Common Costs	$1,576,700
Deficit Recovery	$432,400
Total	**$11,127,333**
Tonnes managed	10,687
Total cost/tonne	$1,041
Fee Rate ($/unit)	
Less than 8"	$0.523
Greater than 8"	$1.046

Notes

1) For the purposes of estimating material management costs, a contingency of 3.5% has been applied
2) For the purposes of calculating a fee rate, a contingency of 1% has been applied to the estimated quantity of Oil Filters supplied for use in Year 1 of the Consolidated MHSW Program Plan.
3) Stewardship Ontario incurred a deficit from the operation of the first year of Phase 1 of the MHSW program that will be recovered as part of the fees for the Consolidated Plan. Allocated only to Phase 1 Materials on a material-specific basis, the deficit shown in the table includes any deficits in common costs (start-up, plan development, and program management costs) as well as material-specific operating costs and fees owing.

15.0 Paints and Coatings

15.1 Definition

Paints and Coatings means latex, oil and solvent-based architectural, consumer automotive and consumer marine coatings including paints and stains sold as consumer products or designated IC&I business products, whether tinted or untinted.

Examples include:

- Alkyd paints and coatings;
- Latex paint and coatings;
- Stains.

Exclusions include:

- Products sold in containers with a volume greater than 30 litres.

15.2 Market & Product Information

Architectural, automotive and marine paints and coatings are used for both protective and decorative purposes and can be water-based or solvent-based. They can be purchased at dedicated paint stores, hardware stores, and larger retailers and are sold under manufacturer brand names or retailer private labels. Other paints and coatings are developed for the IC&I market for a variety of purposes. Some paints manufactured for the IC&I market require special handling or training due to higher health and safety risks.

Paints and coatings are typically sold in 250ml, 0.945L, 3.78L and 18.9L size containers as well as in aerosol containers (aerosols managed\reported under the aerosol material category). Water based paints are packaged in plastic containers (HDPE or polypropylene), steel containers and also in containers made of plastic with steel parts. Solvent based paints are typically packaged in steel containers. There is a continued trend in the marketplace from solvent based paints to water based paints.

15.3 IC&I Generators

The small quantity IC&I sector for paints & coatings is of unknown magnitude. Due to the weather conditions small painting businesses may be more active in the spring and summer months resulting in a seasonal fluctuation in sales and collection quantities.

It should be noted that IC&I collection data are difficult to track and few municipalities accept IC&I paints and coatings.

15.4 Quantity Supplied for Use

The MHSW program will manage paints & coatings and the containers in which they were contained. An estimated 136,615 tonnes of architectural paint and containers were sold in

Ontario in 2007. An additional amount of architectural paint products formulated for the IC&I market is also expected to be returned to the program by small quantity IC&I generators.

The Canadian Paint and Coatings Association (CPCA) outlook on market growth is as follows:

- Quantities supplied for use in 2009 to decrease by 2.1% from 2008 quantities;
- Quantities supplied for use in 2010 to return to 2008 levels;
- Quantities supplied for use in 2011 a 1% increase over 2010 levels and
- Quantities supplied for use in 2012 a 2% increase over 2011 levels.

Based on supplies into the market for 2008, quantities for Year 1 are estimated to be 115,182 tonnes for paints and coatings and 10,754 tonnes for containers. Estimated quantities into the Ontario market up to 2012 are provided by CPCA. Data beyond 2012 are estimates that will need to be verified as information becomes available.

Table 15.1: Quantities of Paint & Coatings Contents Supplied for Use in the Ontario Market

[3]Sales into Market	[1]2007	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Units (kg)	124,950,000	115,182,162	116,333,984	118,660,663	121,033,877	123,454,554
Tonnes	124,950	115,182	116,334	118,661	121,034	123,455
% growth		1%	2%	2%	2%	2%

Table 15.2: Quantities of Paint & Coatings Containers Supplied for Use into the Ontario Market

[3]Sales into Market	[1]2007	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Units (kg)	11,665,332	10,754,424	10,861,968	11,079,208	11,300,792	11,526,808
Tonnes	11,665	10,754	10,862	11,079	11,301	11,527
% growth		1%	2%	2%	2%	2%

Notes:

1. Year 2007 is the baseline year for MHSW Program Planning
2. MHSW Program Plan Year 1 is the first 12 months after the program commencement date
3. Sales into the market and market growth forecast provided by CPCA up to 2012

15.5 Quantity Available for Collection

Paints and coatings are consumable products; based on studies for the Product Stewardship Institute it is estimated that 10% of the original quantity sold becomes leftover paint. Paints and coatings containers are not consumable products and therefore 100% are available for collection through the MHSW program. Estimates are based on data provided by the CPCA for up to year 2012. Data beyond 2012 are estimates that will need to be verified as information becomes available. The tables below summarize the available for collection quantities.

Table 15.3: Quantities of Paint & Coatings Contents Available for Collection

[4]Available for Collection	[1]2007	[2]Year 1	Year 2	Year 3	Year 4	Year 5
[3]Units (kg)	12,495,000	11,518,216	11,633,398	11,866,066	12,103,388	12,345,455
Tonnes	12,495	11,518	11,633	11,866	12,103	12,345
% of Sales	10%	10%	10%	10%	10%	10%

Table 15.4: Quantities of Paint & Coatings Containers Available for Collection

[4]Available for Collection	[1]2007	[2]Year 1	Year 2	Year 3	Year 4	Year 5
[3]Units (kg)	11,665,332	10,754,424	10,861,968	11,079,208	11,300,792	11,526,808
Tonnes	11,665	10,754	10,862	11,079	11,301	11,527
% of Sales	100%	100%	100%	100%	100%	100%

Notes:

1. Year 2007 is the baseline year for MHSW Program Plan
2. MHSW Program Plan Year 1 is assumed to be 2010
3. Sales into the market provided by CPCA up to 2012
4. Available for collection as estimated from studies conducted for the Product Stewardship Institute

15.6 Current Management Infrastructure & Performance

In 2007 112 municipalities offered collection services for leftover paint, an increase of 20 municipalities from 2005. This represents 4,644,240 households served. The WDO Datacall reports 6,640 tonnes of paint collected in 2007 through the Ontario municipal system.

Outside the municipal channel, latex paint is accepted in the Ottawa “take it back” program (new or unopened only) and most paint retailers will accept the return of “mis-tints” of products they sell. Since January 2009 Stewardship Ontario has entered into agreements with Home Depot and RONA to collect used paint and coatings and containers. As of April 2009, 85 Home Depots and 95 RONA locations were participating in the Return to Retailer program.

Given that there was an estimated 12,495 tonnes of architectural paint available for collection in 2007, the amount collected through the municipal system represents a 53% collection rate for leftover paint.

Collection through the Return to Retailer program was implemented in January of 2009. 781 tonnes have been collected through the end of March 2009. The municipalities have reported the following quantities as collected:

- In Q3 2008 88 municipalities reported a total of 1,655 tonnes collected
- In Q4 2008 60 municipalities reported a total of 943 tonnes collected
- In Q1 2009 19 municipalities reported a total of 113 tonnes collected

A total of 2,711 tonnes of paints and coatings (including containers) for three quarters was collected through the municipal channel.

15.7 Barriers and Opportunities to Increased Diversion & Research and Development Requirements

Barriers to increased diversion of paints and coatings include:

- Reuse options and recycled paint must consider consumer liability and labelling issues
- There is a lack of recycling options for some plastic paint containers

Opportunities to increased diversion of paint and coatings include:

- Expanding municipal and private sector collection and reuse services
- Increasing the use of 3Rs options for product management
- Developing markets for plastic paint containers

As part of the implementation of Phase 1, a Research and Development plan has been developed for paints and coatings. The priorities that have been identified under this plan are as follows in Table 15.5.

Table 15.5: R&D priorities and status for paints and coatings

Priority	Status
Establish and document procedures to ensure that all results from any waste paint and coatings R&D projects and investigations are consolidated into a series of technical reports for future use by Stewardship Ontario.	Completed
Consult with the University of Western Ontario in follow-up to the "latex in concrete "study in which waste latex paint was considered as a concrete-additive.	In progress, anticipated completion: June 30, 2009.
Investigate market options and the potential to promote waste latex paint as additive in concrete both within and outside of Ontario, and consult with ready-mix companies and other potential stakeholders.	In progress , anticipated completion: June 30, 2009.
Consult with Hotz Environmental, Peintures Récupérées and other paint recyclers to determine the percentage of waste paint that is suitable for recycling and current capacity of existing paint recyclers both within, and outside of Ontario.	In progress, anticipated completion: June 30, 2009.
Consult with current service providers to assess current options for recycling and/or diversion of containers in which waste paint and coatings are contained.	In progress, anticipated completion: June 30, 2009.
Determine alternative recycling opportunities for latex and solvent-based (oil) paints that are not suitable for recycling under existing options, both within and outside of Ontario.	Completion Dec. 2009.
Investigate possibility of solvent extraction from solvent-based paints; consult with Fielding Technologies, Newalta, and others.	
Formulate a testing protocol to ascertain the composition of contaminates and regulated ingredients in recycled paint as compared to WHMIS, Consumer Chemicals and Containers Regulation (2001) and the Surface Coating Materials Regulation.	Initial report (by June, 2009): Statistician report on sampling parameters; Final report Dec. 2009.
Assess the current capacity of existing paint recyclers both within, and outside of Ontario;	In progress, complete by June 30, 2009.
Assess the implications of Phase 2 and Phase 3 implementation as it relates to the structure of Stewardship Ontario's waste paint and coatings program.	completed

A research and development budget of $100,000 has been set for this material.

15.8 Accessibility Strategy

Paints and coatings will be collected through a combination of the channels laid out in section 5 of the Consolidated MHSW Plan (depots, events, Depot in a Box, Toxic Taxi, and return to retail) according to the proportional allocation per channel estimated in section 15.10.2 below.

15.9 Promotion and Education

As described in Section 5.5 of Volume 1 of the Consolidated MHSW Program Plan, Promotion and Education activities will be implemented at three levels.

The province-wide “branding the behaviour” P&E program will continue to build on the **Do What You Can** campaign urging people to think about 3Rs objectives when it comes to managing MHSW. The message will be an overarching, motivational call to action, driving people to the **Do What You Can** website to find material specific and collection information.

The second layer of P&E is targeted as “educating about specifics” which will provide people with the information they need to take action. The approach to this P&E will depend on whether the product is a consumable or durable and what the desired end-of-life might be. Many products and containers will be collected at events, depots or depots-in-a-box.

As well, for some materials, targeted collection programs will require point of sale P&E tactics.

Consumers have demonstrated that they are ready and willing to take left over paint to collection sites. While this is good behaviour to establish, it is important to educate consumers about the need to reduce the generation of unused paint. The recovery of paints and coatings will be promoted as part of province-wide generic campaign, encouraging consumers to buy only as much as they need and to use it up. Point-of-sale materials to facilitate the delivery of educational messages into consumers’ hands may also be required.

For Year 1 of the Consolidated MHSW Program Plan, a P&E budget of $250,735 has been allocated.

15.10 Reduction, Collection, and Recycling Targets

15.10.1 Reduction

Paint is a product intended to be consumed entirely through use. Leftover paint is often retained by the user for other surfaces, or for later “touch up” of the originally painted surface. It is estimated that 10% of architectural paint sold in a given year is available for collection. Ideally all paint purchased should be used by the consumer.

Reduction of the quantity of leftover paint will be an objective of the program, in order to lower the amount available for collection below 10%. Strategies to accomplish this will include better education of consumers regarding the computation of the amount of paint needed.

As has been observed in other jurisdictions with existing paint stewardship programs, it is expected in the first years of the program, as consumers become aware of the return programs, there will be minimal reduction as reduction efforts will be offset by high return rates. It is expected that as the program matures the reduction efforts will take effect and the quantity of paint available for collection will hold for the years moving forward.

15.10.2 Collection

To derive the collection targets, quantities for both contents and containers have been combined. Paints and coatings contents and containers are collected in the same manner. The table below outlines the collection targets. These have been set based on; 1) the experience from municipal collection programs, 2) the return to retail program statistics, and 3) the accessibility strategy outlined in Sections 5 of the MHSW Plan for Year 1. Targets beyond the first year need to be verified as the program matures and gains the benefit and knowledge from the promotion and education efforts, R&D projects, and the significant increase in the

accessibility (the return to retail program is only 3 months old at the point of the writing of this plan).

Table 15.6: Year 1 Collection Targets for Paint & Coatings Contents and Containers

Collection Target	Year 1	Year 2	Year 3	Year 4	Year 5
Tonnes	8,296	10,573	13,079	15,681	18,381
% of Available for Collection	37%	47%	57%	67%	77%

Table 15.7: Year 1 Collection Targets for Paint & Coatings Contents and Containers by Channel

Channel	Tonnage
Events, Depot, DIB, TT	6,696
Return to Retail	1,600
Total	8,296

15.10.3 Recycling

Stewardship Ontario has entered into agreements with Hotz Environmental and Peintures Recuperees to process unused paints and coatings into reusable products. It is estimated that 85% of leftover latex and alkyd paint is re-useable/recyclable using existing technology. Given that a broader range of paint and coatings will be managed under the Consolidated MHSW Program Plan, the recycling performance rate will be lower than this value.

About 70% of the products captured by the paints and coating definition are alkyd and latex, therefore only 85% of 70% will be recyclable. The overall performance recycling rate for Year 1 is therefore 60%. As the program matures and consumers' awareness increases the material in storage may be newer, increasing the potential recycling rate. Where reuse and recycling options are not available and/or technically feasible, some quantity or collected material may require disposal.

Table 15.8: Five-Year Recycling Targets for Paint & Coatings Contents and Containers

Target	Year 1	Year 2	Year 3	Year 4	Year 5
Qty Available for Collection (tonnes)	22,272	22,495	22,945	23,404	23,872
Collection target (tonnes)	8,296	10,573	13,079	15,681	18,381
Recycling performance rate	60%	65%	70%	75%	80%
Recycling Target (tonnes)	4,978	6,872	9,155	11,761	14,705
Recycling efficiency rate	22%	31%	40%	50%	62%

15.11 Year 1 Costs and Fee Rate

The Year 1 total costs and fee rate for paints and coatings are presented in Table 15.9 below. Further information on the cost categories presented in Table 15.9 is available in Section 7 of Volume 1 of the Consolidated MHSW Program Plan.

Table 15.9: Year 1 Total Costs and Fee Rate for Paint & Coatings Contents and Containers

Description	Cost
Material Management	$14,275,800
Contingency	$499,700
Material-Specific R&D	$100,000
Material-Specific P&E	$250,735
Common Costs	$3,147,400
Deficit Recovery	$4,934,700
Total	**$23,208,335**
Tonnes managed	8,296
Total cost/tonne	$2,798
Fee Rate ($/unit)	
< = 250 mL	$0.066
> 250 ml – 1 L	$0.250
> 1 – 5 L	$1.001
> 5 L	$5.001

Notes:

1) For the purposes of estimating material management costs, a contingency of 3.5% has been applied.
2) For the purposes of calculating a fee rate, a contingency of 1% has been applied to the estimated quantity of Paint & Coatings and their containers supplied for use in Year 1 of the Consolidated MHSW Program Plan.
3) Stewardship Ontario incurred a deficit from the operation of the first year of Phase 1 of the MHSW program that will be recovered as part of the fees for the Consolidated Plan. Allocated only to Phase 1 Materials on a material-specific basis, the deficit shown in the table includes any deficits in common costs (start-up, plan development, and program management costs) as well as material-specific operating costs and fees owing.

16.0 Pesticides

16.1 Definition

Pesticides include fungicides, herbicides, insecticides and certain repellents registered under the Pest Control Products Act (Canada) bearing the “DOMESTIC” classification. By definition, commercial, agricultural and restricted classifications are excluded.

16.2 Market & Product Information

Pesticides are regulated under the Pest Control Products Act by the Pest Management Regulatory Agency (PMRA), a division of Health Canada. Pesticides are registered by the PMRA as “domestic”, “commercial” (including “agricultural” and “industrial”), or “restricted”. These products are required to be labelled according to the type. For example, the domestic products must say “domestic” on the front panel of the product label. Pesticides contain a variety of active ingredients and are sold to the consumer (residential) market, commercial market (which includes lawn care companies, golf courses), and agricultural market (products used by farmers). Domestic products are sold through retail stores, farm supply stores, greenhouses, etc. These products can be sold under manufacturer brand names or retailer private labels.

Commercial and agricultural pesticides are already handled under a program managed by CropLife Canada. The program manages the recycling of empty pesticide containers and collection and disposal of obsolete pesticides from the farm and other commercial uses.

A majority of domestic pesticides are in liquid format and sold in HDPE bottles and aerosols. They can range in size from 1 gram up to 5 L. Some pesticides are sold in a dry format (powder, dust, solid, granular) in plastic film bags, pouches, boxes, etc. These products can range in size from 50 g to 500 g. Some pesticide products, typically insecticides, are sold in an aerosol form ranging in size from 350 g to 500 g.

Beginning April 22, 2009, all cosmetic pesticides were banned for use and sale in the province of Ontario. While there are still pesticides allowable for use, none are permitted for cosmetic purposes. Pest control products for use inside the home are still permitted for sale in the province, as are certain specified outdoor pesticides.

16.3 IC&I Generators

Small quantity IC&I generators in Ontario – including lawn care companies and agricultural generators – participate in an existing stewardship program administered by CropLife Canada designed to collect and manage empty pesticide containers and obsolete pesticides. The Stewardship Ontario plan will only address pesticides classified and labelled as “DOMESTIC” class.

16.4 Quantity Supplied for Use

As a result of the Pesticide ban of April 2009, quantities supplied for use into the Ontario market are expected to drop dramatically. While some pest control products for use in the home and

certain specified outdoor pesticides are still approved for sale, a wide variety of standard pesticides will no longer be permitted to be sold in the province.

Table 16.1: Quantity of Pesticides Supplied into the Ontario market

[2]Sales into Market	2008 Baseline	[1]Year 1	Year 2	Year 3	Year 4	Year 5
Units (kg)	[3]542,962	137,000	138,468	139,853	141,252	142,664
Tonnes	543	137	138	140	141	143
% growth			1%	1%	1%	1%

Notes:

1. Based on estimate from Phase 1 Program plan, adjusted for change in definition scope and the cosmetic pesticide ban.
2. Sales into market based on Phase 1 reporting, Industry Working Group input, and extrapolated to full year
3. Numbers based on Phase 1 estimate; actual reported quantities were lower than forecasted levels.

16.5 Quantity Available for Collection

Based on quantities reported in Phase 1, an estimated 136,000 litres of domestic pesticides meet the definition laid out in this plan. This estimate is approximately equivalent to 136 tonnes. Adjustments to these estimates will be made through more accurate sales information reported by stewards covered under the plan. The pesticides volume available for collection is difficult to estimate as the product is intended to be used up by the consumer. There is also a one or two year lag expected between the sales and the amount that is returned. This explains the figures that show available for collection quantities close to the quantity sold in the same year (for Year 1) in Table 16.2 below.

Table 16.2: Estimated Quantity of Pesticides Available for Collection

Available for Collection	[1]2008	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Units (kg)		135,741	100,000	70,000	35,313	35,666
Tonnes	N/A	136	100	70	35	36
% of sales	N/A	[3]99%	72%	55%	25%	25%

Notes:

1. Estimated quantity for MHSW Program Plan Phase I
2. Quantities based on Phase 1 reports
3. As a result of the pesticide ban, there will be a period in which sales will decrease dramatically, while quantities available for collection may rise significantly, as consumers attempt to return banned products. The relationship between sales into market and quantity available for collection should eventually normalize.

16.6 Current Management Infrastructure & Performance

According to the 2007 WDO Datacall, 95 municipalities offered collection services for pesticides representing 4.3 M households served. An estimated 417 tonnes of pesticides were collected in 2007 through the Ontario municipal system.

Most pesticides collected in this system are packed in shipping containers at municipal sites, then sent to service providers for sorting and/or bulking, or possibly directly to the end disposal. Pesticides are sent to hazardous landfill or for incineration. Most empty pesticide containers are sent to landfill or secure hazardous landfill by service providers. While agricultural and commercial pesticides are not covered under this program plan, Stewardship Ontario will look for opportunities to work with CropLife Canada and draw on their considerable expertise and

experience in managing obsolete pesticides and pesticide containers. CropLife Canada operates a collection program for obsolete agricultural and commercial pesticides approximately every 4 years. The last program in Ontario was in 2005, and there were 17 collection points in the province. There was approximately 116,000 kg of obsolete commercial and agricultural pesticide collected for disposal in the province. It is difficult to measure the actual collection rate that this represents, as it is not known how much obsolete/unwanted pesticide was available for collection in Ontario during this period. These pesticides were disposed of largely by high temperature incineration.

While commercial and agricultural pesticides are not targeted in the Stewardship Ontario plan, Stewardship Ontario will explore opportunities to work with CropLife Canada on R&D and P&E activities in the future.

CropLife Canada also operates an empty pesticide container recycling program for commercial and agricultural products. In 2004, containers were collected at approximately 250 Agrichemical Warehouse Standards Association certified Ag-retail facilities throughout the province; 680,310 containers were recycled by Crop Life through this program. The granulated plastic is recycled into fence posts for agricultural use, highway guardrail posts, field drainage tile or used for energy.

CropLife Canada does not account for provincial collection or diversion rates (only a national rate). Its national rate shows a recovery rate of about 70% for containers.

The Stewardship Ontario Phase I municipal report for pesticides in the first six months of the program (July 2008 to March 2009) indicate that 19 tonnes were collected. This was for the latter half of the year and may not reflect 50% of an annualized estimate, due to the seasonality of the product. As stated earlier, this material category is under considerable flux and will require monitoring and adjusting targets and diversion efforts to ensure that the optimal diversion is met and reporting is accurate.

16.7 Accessibility Strategy

Pesticides will be returned through municipal and private sector depots, events, DiB, and Toxic Taxi. The accessibility strategy will provide for increase collection rates returned through these channels.

16.8 Promotion and Education

As described in Section 5.5 of Volume 1 of the Consolidated MHSW plan, Promotion and Education activities will be implemented at three levels.

The province-wide “branding the behaviour” P&E program will continue to build on the Do What You Can campaign urging people to think about 3Rs objectives when it comes to managing MHSW. The message will be an overarching, motivational call to action, driving people to the Do What You Can website to find material specific and collection information.

The second layer of P&E is targeted as “educating about specifics” which will provide people with the information they need to take action. The approach to this P&E will depend on whether the product is a consumable or durable and what the desired end-of-life might be. Many products and containers will be collected at events, depots or depots-in-a-box.

As well, for some materials, targeted collection programs will require point of sale P&E tactics.

The recovery of pesticides will be promoted as part of the Province-wide generic campaign to buy what is needed and to use it up. For Year 1 of the Consolidated MHSW Program Plan, a P&E budget of $20,954 has been allocated.

16.9 Barriers and Opportunities to Increased Diversion & Research and Development Requirements

As part of the implementation of a Consolidated Plan, a Research and Development Workplan will be further developed to include the expanded scope of pesticide products now covered under the program. The priorities that have been identified under this plan, and that are expected to be pursued under the Consolidated MHSW plan, are as follows in Table 16.3.

Table 16.3: R&D priorities and status for pesticides

Priority	Status
Establish and document procedures to ensure that all results from pesticide R&D projects and investigations are consolidated into a series of technical reports that will be reviewed by the Pesticides Advisory Group;	Completed
Assess the impacts that existing and potentially expanded bans on the used of pesticides will have upon the MHSW Program;	In progress, completion June 2009
Consultation with existing waste pesticide handlers to determine current processing methods and capacity;	In progress, completion June 2009
Specifications and regulations outlining the standards by which a pesticide is deemed to be suitable for energy recovery purposes; Energy recovery options for mixed pesticides, or separated residual substances, that are suitable for energy recovery, both within and outside of Ontario;	
Identify all container material types used to contain pesticides distributed into the Ontario market;	In progress, completion June 2009
Creation of a Pesticides Advisory Group, consisting of pesticide industry experts, pesticide stewards, and other stakeholders, that will make recommendations to Stewardship Ontario for future action, based on the results of various R&D projects and investigations;	Completed
Consultation with stakeholders, including municipal, provincial and federal governments, as well as associations and MHSM pesticide stewards regarding generation and opportunities for alternatives to disposal;	In progress, completion June 2009
Current capacity and specification requirements of existing energy recovery operations, both within, and outside of Ontario;	
Recycling options for mixed pesticides, or separated residual substances and contaminants, that are not suitable for energy recovery, both within and outside of Ontario;	In progress, completion June 2009
Current interest and processes for recycling pesticide containers, both within and outside of Ontario.	In progress, completion June 2009
Investigation into the bioremediation of pesticides utilizing specific bugs to "eat" specific classes of pesticides.	Completion Aug 2009

Priority	Status
Investigation into thermal decomposition treatment for specific pesticides.	Completion Aug 2009
Investigation into UV radiation treatment for the treatment of pesticides.	Completion Aug 2009

16.10 Targets

More research is required to determine the amount of pesticides that is available for collection. As the program matures, and as public education encourages consumers to store non-cosmetic pesticides properly for future use and ultimately use up their non-cosmetic pesticides, it is anticipated that the volume of pesticides available for collection will decrease. This is in addition to the reduction as a result of the cosmetic pesticides ban.

The collection target will be reviewed on an annual basis as operational experience is gained. Container recycling targets may be possible, however more information is required to determine the quantity of containers covered in the plan and determine available processors and markets.

16.10.1 Reduction

Reduction efforts will be focused on consumer education; buying the right product for the right problem and buying only what is needed or what can be used in a season. The recent banning of cosmetic pesticides will reduce the residential quantity significantly in the first few years.

16.10.2 Collection

As part of the Ministry's announcement of the Cosmetic Pesticide Ban in the Province of Ontario, the MHSW program was indicated as the proper channel for consumers to return banned pesticides. While the initial surge in returns is expected to take place before the MHSW Consolidated Plan is implemented, increased collection volumes in the first year of the program are possible. This also contributes to the unique situation for pesticides sales, available and collection target numbers that were identified previously in Sections 16.4 and 16.5.

Table 16.4: Pesticides Collection Target

Collection Target	Year 1	Year 2	Year 3	Year 4	Year 5
(kg)	242,717	100,000	38,500	19,775	20,330
Tonnes	243	100	19	20	20
% of Available for Collection	N/A	100%	55%	56%	57%

Notes

1. The Yr 1 collection target was derived based on initial Phase 1 reporting data for July-December 2008, and taking into account that quantities of pesticides sold into market were considerably lower than anticipated, while collection was higher than projected.
2. Future collection years are skewed by residual quantities of pesticides being returned in the wake of the pesticide ban.
3. The collection rate would be over 100% as a result of the dramatic change in the market as a result of the ban. A collection rate is therefore unavailable at this time.

16.10.3 Recycling

There are no known options are available for recycling pesticides at this time.

16.11 Year 1 Costs and Cost Recovery

The Year 1 total costs and cost recovery model for pesticides are outlined in Table 16.5 below. Further information on the cost categories presented in Table 16.5 is available in Section 7 of Volume 1 of the Consolidated MHSW Program Plan.

Table 16.5: Total Costs for Pesticides in Year 1

Description	Cost
Material Management	$446,200
Contingency	$78,100
Material-Specific R&D	$0
Material-Specific P&E	$20,954
Common Costs	$209,000
Deficit Recovery	$149,500
Total	**$903,754**
Tonnes managed	243
Total cost/tonne	$3,719
Fee Rate ($/unit)	
Banned	Measured return share
Not banned ($/L or kg)	Measured return share

Notes

1) While the material-specific cost to manage pesticides, both banned and non-banned, has been estimated as per table 16.5 above, “measured return share” means that the actual management cost, as well as a share of the budgeted common costs and deficit recovery , will be charged to stewards of banned pesticides. It is Stewardship Ontario’s intention to move to a set fee rate as soon as reliable data on sales into market and quantity available for collection are obtained..
2) For the purposes of estimating material management costs, a contingency of 17.5% has been applied.
3) Stewardship Ontario incurred a deficit from the operation of the first year of Phase 1 of the MHSW program that will be recovered as part of the fees for the Consolidated Plan. Allocated only to Phase 1 Materials on a material-specific basis, the deficit shown in the table includes any deficits in common costs (start-up, plan development, and program management costs) as well as material-specific operating costs and fees owing.

17.0 Pharmaceuticals

17.1 Definition

Pharmaceuticals means all drugs, as defined in section 2 of the *Food and Drugs Act (Canada)*, without regard to paragraph (c) of that definition and "Natural Health Products", as defined in section 1 of the *Natural Health Products Regulations (Canada)*, and, for greater certainty, includes:

- Drugs used or intended for use in both human and animals;
- Prescription drugs as set out in Schedule F or the *Food and Drug Regulations (Canada)*
- Biological drugs and radiopharmaceuticals as set out in Schedules C and D of the *Food and Drugs Act (Canada)*;
- Controlled substances, as defined in section 2 to the *Controlled Drugs and Substances Act (Canada)* and controlled and restricted drugs as defined in Schedules G and J of the *Food and Drug Regulations* (Canada);
- Narcotics, as defined in section 2 to the *Narcotic Control Regulations (Canada;*
- Non-prescription orally ingested drugs and orally ingested Natural Health Products but not those listed in paragraphs (h) and (j) of this definition; and
- Non-prescription topical antibiotic and anti-fungal creams,

But excludes:

- "Food", as defined under section 2 of the *Food and Drugs Act(Canada),* and non-prescription drug products in food format and Natural Health Products in food format, including probiotics sold in food format, that are primarily sold and marketed as a food;
- Non-orally ingested non-prescription drugs and Natural Health Products including non-prescription topical creams but not those listed in paragraph (g) of this definition; and
- Orally ingested non-prescription drug and Natural Health Product drops, lozenges and chewing gum, such as for coughs, sore throats or halitosis.

17.2 Market & Product Information

Pharmaceuticals are regulated in Canada under the Food and Drugs Act and the Natural Health Products Regulations.

Pharmaceuticals are divided into three principle categories; prescription, non-prescription and pet medications. Prescription pharmaceuticals constitute a wide range of products, including those in tablet form, as well as gels, liquids, topical creams, and gases. These products are available from pharmacies only with a written prescription from a practitioner. As these medications are dispensed by physicians according to the quantity prescribed by the physician, the containers and quantities received by consumers often differ from those used by brand owners and first importers of the drugs. In the case of tablets and pills, consumers receive the prescribed number of doses in containers that range from 20cc's to 200cc's. Ointments and creams are provided in containers ranging from 15mL to 500mL, while liquids are dispensed in bottles ranging from 60mL to 500mL. Liquids may also be dispensed in their original bottles, which are typically less than 500mL. Gases, such as inhalers, are dispensed in their original containers and packaging.

Non-prescription pharmaceuticals encompass over-the-counter drugs. These are sold in tablet, gel-cap, liquid and powdered form.

Pet medications and veterinary drugs prescribed for household pets are also captured under the program.

Since industry data is tracked entirely in units – i.e. bottles – and are not tracked by weight, and as dispensation methods and quantities vary, tracking of quantities in the program will be done by units.

17.3 IC&I Generators

As per the Minister's Program Request Letter, only pharmaceutical waste from residential generators is included under the program.

17.4 Estimated Quantity Supplied for Use

Table 17.1: Estimated Quantity of Pharmaceuticals (both prescription and over the counter medication) Supplied into the Market

[3]Sales into Market	[2]2007	Year 1	Year 2	Year 3	Year 4	Year 5
[1]Units	244,040,085	244,040,085	253,227,651	262,814,306	272,818,799	283,260,793
Tonnes	[5]6,589	6,589	6,837	7,096	7,366	7,648
% growth	-	[4]2%	2%	2%	2%	2%

Notes:

1. Based on unit of sale, i.e. one bottle, tube or canister.
2. Year 2007 is the baseline year for MHSW Program Plan
3. Based on industry data from IMS & Neilson
4. Sales growth based on industry/category averages in CMI and Neilson data
5. Weight conversion based on average 12 grams of contents and 15 grams for container per unit, from unit sampling

While the number of prescriptions issued in Ontario yearly was used to estimate the quantity of prescription drugs supplied for use, this product is typically introduced to the market in large format containers (i.e. bulk) by pharmaceutical companies. Stewardship Ontario will adjust the fee rate for prescription drugs when more accurate information on the number of large format containers used as the basis for sales by Pharmaceutical brand owners and first importers becomes available.

17.5 Estimated Quantity Available for Collection

As medication is intended to be consumed fully, it is difficult to estimate the quantity that is available for collection. According to the Pharmaceutical Working Group, approximately 10% of pharmaceuticals introduced into the market are not consumed, and therefore theoretically available for collection.

Table 17.2: Quantities Available for Collection for Pharmaceuticals

Available for Collection	[2]2007	Year 1	Year 2	Year 3	Year 4	Year 5
[1]Units	[3,6]24,404,009	24,404,009	25,322,765	26,281,431	27,281,880	28,326,079
Tonnes	[5]659	659	684	710	737	765
% of sales	10%	[4]10%	10%	10%	10%	10%

Notes:

1. Based on unit of sale, i.e. one bottle, tube or canister.
2. Year 2007 is the baseline year for MHSW Program Plan
3. Based on industry data from IMS & Neilson
4. 10% available for collection based on industry source
5. For weight conversion, see note 5 in Table 17.1 above
6. Figure includes both prescription and over the counter medications

17.6 Current Management Infrastructure & Performance

According to the 2007 WDO Datacall, 72 municipalities had programs in place to accept pharmaceutical waste, with collection totalling 42 tonnes.

Collection through non-municipal channels is extensive. According to the primary industry removal service provider, 90% of all chain and banner pharmacies in Ontario provide a take back service for pharmaceutical waste. According to IMS Health, 3,181 pharmacies operate in Ontario. This would mean that approximately 2,860 pharmacies collect pharmaceutical waste. This program is operated on a volunteer basis and is fully funded by the pharmacies. The service is provided mainly to pharmacy customers and little promotion and education is provided. The total weight collected through this channel was 250 tonnes in 2008.

17.7 Barriers and Opportunities to Increased Diversion & Research and Development Requirements

Barriers to increased diversion of pharmaceuticals include:

- Pharmaceuticals must be managed in keeping with MOE rules which limit management options in the interest of public safety.
- Lack of public awareness and understanding of the problems caused by improper disposal of pharmaceuticals (i.e., in solid waste or sanitary sewer)
- Convenient public access to diversion programs for pharmaceuticals

Opportunities to increase diversion of pharmaceuticals include:

- Establish program to accept unused pharmaceuticals at every point of sale/dispense. This goes beyond return to retail programs as it would include anywhere that dispenses pharmaceuticals – e.g., retail pharmacies in clinics and hospitals.
- Build public awareness of program and educate on issues of improper disposal

17.8 Accessibility Strategy

Pharmaceuticals will be returned primarily through the retail channel, by providing medication return bins to a large percentage of the 3,181 pharmacies in the province. This intuitive approach to returns will give broad access to the public, while safeguarding against privacy violations. As prescription medications include personal information on the label, it is preferable that they are returned to a pharmacist, who will ensure that personal information is removed before containers are disposed of. Further, this approach leverages an existing infrastructure;

approximately 2,800 pharmacies in the province already participate in a voluntary program, and removal, transport and processing is currently performed province-wide by Stericycle.

While the retail channel (pharmacies) would be the primary return channel for this category, pharmaceutical waste would also be accepted at events, depots and depots in a box, as outlined in the Accessibility Strategy in section 5 of the MHSW Program Plan.

17.9 Promotion and Education

As described in section 5.5 of the Consolidated MHSW plan, Promotion and Education activities will be implemented at three levels.

The province-wide "branding the behaviour" P&E program will continue to build on the Do What You Can campaign urging people to think about 3Rs objectives when it comes to managing MHSW. The message will be an overarching, motivational call to action, driving people to the Do What You Can website to find material specific and collection information.

The second layer of P&E is targeted as "educating about specifics" which will provide people with the information they need to take action. The approach to this P&E will depend on whether the product is a consumable or durable and what the desired end-of-life might be. Many products and containers will be collected at events, depots or depots-in-a-box.

As well, for some materials, targeted collection programs will require point of sale P&E tactics.

The recovery of pharmaceuticals will be promoted as part of province-wide generic campaign and targeted for specific P&E to take them back to pharmacies, possibly with obsolete thermometers and sharps. This campaign would comprise point-of-sale prompts (e.g. stickers, shelf talkers, brochures) to encourage proper end-of-life management for these materials. For Year 1 of the Consolidated MHSW Program Plan, a P&E budget of $200,000 has been allocated.

17.10 Targets

17.10.1 Reduction

Reduction targets for pharmaceuticals are not applicable, as prescribed medicines are purchased in quantities suggested by prescribers, and OTC medicines are generally purchased according to need.

17.10.2 Collection

Five year collection targets for pharmaceuticals are presented in Table 17.3.

Table 17.3: Five Year Collection Targets for Pharmaceuticals

Collection Targets	Year 1	Year 2	Year 3	Year 4	Year 5
Units	11,555,556	14,042,066	16,655,451	19,495,069	22,275,983
Tonnes	312	379	450	526	601
% of available for collection	47%	54%	61%	68%	74%

Notes:

1) MHSW Program Plan Year 1 is the first 12 months after program commencement date.

2) Target based on growing the 2007 municipal collection adjusted for increased availability of collection points (58 tonnes) and growing access to the current return to retail channels (250 tonnes growing to 254 tonnes).

The collection target is expected to be met through a combination of depots, events, depot in a box and toxic taxi and return to retail channels, as outlined in Table 17.4 below.

Table 17.4: Collection Channels for Pharmaceuticals

Channel	Quantity (tonnes)
Depots, events, DiB, toxic taxi	58
Return to Retail	254
Total	**312**

17.10.3 Recycling

Due to health and safety concerns, recycling of pharmaceuticals is prohibited.

17.11 Year 1 Costs and Fee Rate

The Year 1 total costs and fee rate for pharmaceuticals are outlined in Table 17.5 below. Further information on the cost categories presented in Table 17.5 is available in Section 7 of Volume 1 of the Consolidated MHSW Program Plan.

Table 17.5: Year 1 Total Costs and Fee Rate for Pharmaceutical

Description	Cost
Material Management	$1,030,200
Contingency	$139,100
Material-Specific R&D	$0
Material-Specific P&E	$200,000
Common Costs	$411,300
Deficit Recovery	$0
Total	**$1,780,600**
Tonnes managed	312
Total cost/tonne	$5,713
Fee Rate ($/unit)	
Prescription	$0.008
Over-the-counter	
Natural Health Products	

Notes:

1) Costing of the return to retail channel is based on Stericycle waste removal and processing fees for 2,860 locations.
2) For the purposes of estimating material management costs, a contingency of 13.5% has been applied.
3) For the purposes of calculating a fee rate, a contingency of 3% has been applied to the estimated quantity of Pharmaceuticals supplied for use in Year 1 of the Consolidated MHSW Program Plan.
4) Please note that, while the number of prescriptions issued in Ontario yearly was used to estimate the quantity of prescription drugs supplied for use, this product is typically introduced to the

market in large format containers (i.e. bulk) by pharmaceutical companies. Stewardship Ontario will adjust the fee rate for prescription drugs when more accurate information on the number of large format containers used as the basis for sales by Pharmaceutical brand owners and first importers becomes available.

18.0 Pressurized Containers

18.1 Definition

The MHSW program covers all refillable and non-refillable pressurized containers that are identified with the following Transport Canada approval markings:

- Seamless Cylinders and Tubes: TC-3AAM, TC-3AAXM, TC-3ALM, TC-3AM, TC-3ANM, TC-3ASM, TC-3AXM, TC-3EM, and TC-3HTM.
- Welded Cylinders and Spheres: TC-4AAM-33, TC-4BM, TC-4BM17ET, TC-4BAM, TC-4BWM, TC-4DM, TC-4DAM, TC-4DSM and TC-4EM.
- Non-refillable Containers: TC-39M
- Composite Cylinders: TC-3FCM and TC-3HWM.
- Insulated Cylinders: TC-4LM
- Cylinders for Acetylene Service: TC-8WM, TC-8WAM

Examples include containers holding:

- Acetylene
- Propane
- Isocyanate resins
- Helium
- Nitrogen
- Oxygen

Exclusions from the MHSW Consolidated Program include:

- Pressurized containers sold exclusively for commercial / industrial applications and in inspection / life-cycle management programs
- Containers for refrigerants regulated under the Ontario Environmental Protection Act regulation 189/94

18.2 Market & Product Information

Pressurized cylinders include a wide range of cylinder sizes for industrial and domestic uses. Commercial uses include gas cylinders for industrial, welding, medical and laboratory uses for gases such as helium, argon, hydrogen, oxygen and acetylene.

While there are various sizes and applications where pressurized cylinders are used, they generally fall into three broad categories:

- Refillable cylinders for industrial gases
- Refillable containers for domestic applications
- Non-refillable containers for domestic applications

For the purposes of this plan, the pressurized containers captured under this plan are the domestic refillable and non-refillable pressurized containers. The industrial gas cylinders are not

included in the program as these are all managed outside of the municipal MHSW stream through exchange systems with the gas suppliers.

Domestic refillable pressurized containers include portable breathing air supply, carbon dioxide (used to attract and capture mosquitoes) and most commonly the refillable propane cylinders (typically holding 9 kg or 20 lbs. of propane). These cylinders are known in the industry as TC-4BAM. The vast majority of these cylinders are used for storing propane for barbeques and for cooking and heating application on recreational vehicles. While the 9 kg size is most common, other sizes in 13.5 kg and 18 kg (30 and 40 lbs) are also provided to the market.

The other domestic pressurized cylinders include TC-39M cylinders (commonly referred to as the single use cylinders). The most common application is the portable propane cylinder used for barbeques and heating appliances (typically holding 400 to 600 grams of compressed gas). Other portable applications include portable welding torches.

The Transportation of Dangerous Goods (TDG) Regulations require that compressed gas cylinders and tubes be manufactured, re-qualified, repaired, re-heat treated and rebuilt at facilities that are registered with Transport Canada, in accordance with CAN/CSA-B339-96, "Cylinders, Spheres and Tubes for the Transportation of Dangerous Goods".

In Canada, all refillable pressurized cylinders must be inspected and re-qualified, or replaced every 10 years. The date on which the cylinder was last qualified is stamped on the collar of the cylinder. It is also possible that a cylinder less than 10 years old may need replacing. A rusty or damaged cylinder would result in the cylinder not being recertified. If the cylinder cannot be recertified it is purged, the valve mechanism is removed and both it and the empty steel container are recycled.

In Canada, only a properly trained and certified attendant is permitted to fill a tank. An attendant is not permitted to fill an outdated cylinder, or fill any cylinder tank beyond 80% of its capacity. New propane cylinders must be purged to release all of the air and moisture within before it is filled with propane.

Additionally, regulation 189/94 of the EPA requires that containers for refrigerants must be refillable / recyclable with a deposit (currently approximately $80) being charged when they are sold.

18.3 IC&I Generators

Large IC&I establishments using industrial gas cylinders (e.g. welding gases) are not expected to utilize the MHSW system as they would use the exchange system provided through their gas supplier. However, while the vast majority of domestic pressurized containers requiring management at the end of their useful life are generated from homes, it is recognized that some of these containers are generated at small IC&I establishments (e.g. soldering torches or portable heaters for job sites).

18.4 Quantity Supplied for Use

The number of domestic pressurized containers sold falls into two categories: refillable propane cylinders and single-use pressurized cylinders.

18.4.1 Refillable Pressurized Containers

The number of domestic refillable containers sold annually in Ontario is estimated to be 250,000 to 285,000[39]. With each container weighing approximately 8.5 to 9 kg, the weight of empty propane cylinders that comes into the marketplace annually is estimated at between 2,200 to 2,565 tonnes. For the purpose of this plan, the higher sales and tonnage estimates will be used. The cylinders have a mandated ten year first life span. Once the ten years has passed, the tanks are removed from service, typically when the consumer attempts to refill the cylinder. There are a number of exchange programs available at hundreds of propane distributor locations across the province. The empty cylinders are purged and in many instances any residual propane is recovered. The empty cylinder is pressure tested and either recertified and sold back into the domestic market or removed from service and recycled. At this time, the exact quantities of empty propane cylinders recycled through this system are unknown, however the industry believes that it is above 90% of what is available in any given year.

In Phase I, Stewards reported that 980 of refillable pressurized containers were sold into the Ontario market from Q3 2008 to Q1 2009. On an annualized basis (adjusting for seasonality), this is estimated to be equivalent to 2,450 tonnes of refillable containers sold yearly. This information is summarized in table 18.1 below.

Table 18.1: Estimated Quantities of Refillable Pressurized Containers supplied into the Ontario Market

[3]Sales into Market	[1]2008	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Units	280,050	288,452	297,105	306,018	315,199	324,655
Tonnes	2,450	2,524	2,600	2,678	2,758	2,841
% growth		3%	3%	3%	3%	3%

Notes:

1. Estimates developed from figures reported by stewards in Phase I of MHSW Program
2. MHSW Program Plan Year 1 is the 12 months after program commencement date
3. Sales into the market and market growth forecast generated from industry estimates

18.4.2 Non-Refillable Pressurized Containers

In Phase I, Stewards reported that 440 tonnes of non-refillable pressurized containers were sold into the Ontario market from Q3 2008 to Q1 2009. On an annualized basis (adjusting for seasonality), this is estimated to be equivalent to 733 tonnes of non-refillable containers sold yearly. This information is summarized in table 18.2 below.

Table 18.2: Estimated Non-Refillable Pressurized Containers into the Ontario Market

[3]Sales into Market	[1]2008	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Units	1,628,628	1,661,201	1,694,425	1,728,313	1,762,880	1,798,137
Tonnes	733	748	762	778	793	809
% growth		2%	2%	2%	2%	2%

Notes:

1. Estimates developed from figures reported by stewards in Phase I of MHSW Program
2. MHSW Program Plan Year 1 is the 12 months after program commencement date
3. Sales into the market and market growth forecast generated from industry estimates

[39] Estimate developed from stewards reporting in Phase I.

18.5 Quantity Available for Collection

The tables below summaries the available for collection quantities, which have been developed using data collected in Phase I.

Table 18.3: Estimated Quantities of Refillable Pressurized Containers Available for Collection

[4]Available for Collection	[1]2008	[2]Year 1	Year 2	Year 3	Year 4	Year 5
[3]Units	84,015	86,535	89,132	91,805	94,560	97,396
Tonnes	735	757	780	803	827	852
% of Sales	30%	30%	30%	30%	30%	30%

Table 18.4: Estimated Quantities of Non-Refillable Pressurized Containers Available for Collection

[4]Available for Collection	[1]2008	[2]Year 1	Year 2	Year 3	Year 4	Year 5
[3]Units	1,628,628	1,661,201	1,694,425	1,728,313	1,762,880	1,798,137
Tonnes	733	748	762	778	793	809
% of Sales	100%	100%	100%	100%	100%	100%

Notes:

1. Estimates developed from figures reported by stewards in Phase I of MHSW Program
2. MHSW Program Plan Year 1 is the 12 months after program commencement date
3. Sales into the market and market growth forecast generated from industry estimates
4. Available for collection as estimated by industry
5. For refillable containers, the available for collection quantity does not include those containers that are returned to industry exchange locations.

18.6 Current Management Infrastructure & Performance

According to the 2007 Datacall, 88 municipal programs reported that they collected either Propane Tanks or Propane Cylinders. This represents about 4.5 million households served. According to the same source 609 tonnes of these cylinders and tanks were collected in 2007 through the Ontario municipal MHSW system.

In 2004, Ontario Parks received private industry funding to operate a collection and recycling program for non-refillable pressurized containers used in parks. However, in 2008, this funding was discontinued and as such Ontario Parks discontinued the program due to lack of funds (it was estimated that 50,000 containers would be collected annually and would cost approximately $2.50 per container for a total cost of $125,000).

With the implementation of the Phase 1 MHSW program, Ontario Parks has agreed to work with Stewardship Ontario in 2009 to manage the “heritage” (i.e. abandoned) pressurized containers and those that are being dropped by campers. Stewardship Ontario has received information on the quantities of heritage containers expected to be generated and has established transportation and processing contracts to manage this specific source of pressurized containers. Following the 2009 clean up effort, Ontario Parks is planning to re-evaluate their current policy and practice of having clients take pressurized containers home. Subject to further assurance from Stewardship Ontario, Ontario Parks may continue to support the pressurized container collection program in the parks by formally accepting the containers and managing them on an ongoing basis.

The largest quantity of refillable pressurized containers collected for re-certification and recycling is through the exchange programs propane distributors have established with non-municipal channels such as retail stores (e.g. Canadian Tire, Home Depot) and automotive and propane distributors (e.g. Petro Canada, Esso, Pioneer Gas, Sunoco, etc.) across Ontario. The number of collection locations is not accurately known at this time, but it is estimated at close to 1,000 establishments – the quantities of refillable containers returned through and collected by these programs have been excluded from the estimates in this plan.

In Phase I of the MHSW Program, 335 tonnes of refillable containers and 61 tonnes of non-refillable containers were reported collected by municipalities. These figures have been grossed up for an annual figure of 628 tonnes of refillable and 104 tonnes of non-refillable containers respectively.

18.7 Accessibility Strategy

The strategy to increase accessibility for consumers to divert pressurized containers includes:

- Increasing the number of municipal and private sector programs accepting refillable and expired refillable containers;
- Increasing the accessibility as per section 5 of the Consolidated MHSW plan
- Investigate the possibility of reinstating the Ontario Parks collection programs (as per section 18.6 above)

18.8 Promotion and Education

As described in Section 5.5 of Volume 1 of the Consolidated MHSW plan, Promotion and Education activities will be implemented at three levels.

The province-wide “branding the behaviour” P&E program will continue to build on the **Do What You Can** campaign urging people to think about 3Rs objectives when it comes to managing MHSW. The message will be an overarching, motivational call to action, driving people to the **Do What You Can** website to find material specific and collection information.

The second layer of P&E is targeted as “educating about specifics” which will provide people with the information they need to take action. The approach to this P&E will depend on whether the product is a consumable or durable and what the desired end-of-life might be. Many products and containers will be collected at events, depots or depots-in-a-box.

As well, for some materials, targeted collection programs will require point of sale P&E tactics.

The recovery of pressurized containers will be promoted as part of province-wide generic campaign. The P&E activities will also include consideration of working with specific channels, e.g. Ontario Parks, where unwanted containers are generated. These activities will focus on non-refillable pressurized containers. For Year 1 of the Consolidated MHSW Program Plan, a P&E budget of $150,000 has been allocated.

18.9 Barriers and Opportunities to Increased Diversion & Research and Development Requirements

For refillable cylinders there appear to be few opportunities to increase diversion as they are managed in a well known and well used exchange type system through propane distributors. Cylinders that are not returned through an exchange system are typically prohibited from disposal and are removed for separate collection. The market for the refillable cylinders is strong and competitive and it appears as though the number of cylinders that are not eventually captured and diverted is very small.

The opportunity to increase collection and diversion of non-refillable cylinders is much greater. While the possibility is there to build on the exchange style program currently in place throughout Ontario, the pathways for the non-refillable cylinders are different than the refillable cylinders.

The empty non-refillable containers tend to become available for collection away from the home at campgrounds, picnic locations, parks, beaches, conservation authority sites, etc. Consumers either deposit empty cylinders there or bring them home for management. As mentioned in section 18.6 above, Stewardship Ontario will work with Ontario Parks on reinstating the non-refillable pressurized container collection program. Based on the outcome of this, Stewardship Ontario will seek to establish similar agreements with federal parks located in Ontario, conservation authorities and private camp grounds. It is not anticipated that these locations would become collection sites for the general public.

Once collected, a barrier to recycling has been the cost associated with handling the containers that are regulated under the TDG and therefore have special storage, handling and transportation requirements.

As part of the implementation of Phase 1, a Research and Development plan has been developed for pressurized containers. The priorities that have been identified under this plan are as follows in Table 18.5.

Table 18.5: R&D priorities and status for pressurized containers

Priority	Status
Establish and document procedures to ensure that all results from pressurized containers R&D projects and investigations are consolidated into a series of technical reports that will reviewed by the Pressurized Containers Advisory Group.	Completed
Develop and implement Stewardship Ontario guidelines for end-of-life pressurized container management;	TBD
Creation of a Pressurized Containers Advisory Group that will make recommendations to SO for future action, based on the results of various R&D projects and investigations. Advisory Group will consist of collectors and handlers, processors, industry experts, government agents, and stewards of Pressurized Containers, yet to be identified;	Completed
Define and assess recycling opportunities for non-refillable pressurized containers, as well as for refillable pressurized containers, both within and outside of Ontario;	In progress, completion date June 2009
Consultation with existing waste pressurized container handlers, including Hotz Environmental Services, Caledon Propane, and other registered and approved processors, to determine current	In progress, completion by June 2009

Priority	Status
technologies, as well as recycling processes and capacity;	
Assessment of opportunities for expansion of evacuation process and shearing technology (similar to Hotz) for use by other MHSW service providers.	In progress, completion by October 2009
Consultation with stakeholders, including municipal, provincial and federal governments, as well as associations and MHSM pressurized container stewards regarding generation and opportunities for alternatives to disposal;	In progress, completion by June 2009
Assessment and consultation with Ontario municipalities, provincial parks, federal parks to determine potential for SO to provide transportation to consolidation/sorting location as a means to increase recovery;	In progress, completion June 2009
Identify technologies, processes, and current and potential capacity for recycling pressurized containers, both within and outside of Ontario.	In progress, completion June 2009
Investigate the feasibility of portable extraction systems to reduce transportation and processing costs of pressurized containers as evacuated and sheared containers are scrap metal and not subject to TDG or EPA .	In progress, completion October 2009
Assess the implications of Phase 2 & Phase 3 implementation as it relates to the structure of the pressurized containers collection program.	In progress, completion June 2009

The additional priorities that have been identified as part of the Consolidated MHSW plan are as follows:

- Identification of the number and type of pressurized containers currently in the residential market.
- Identification of the typical lifespan of pressurized containers to determine the anticipated volume of pressurized that will be returned to MHSW sites in the ensuing years.

18.10 Targets

This document continues to reflect the targets for the refillable cylinders from Phase I, in which data from the industry and municipalities suggested that the overall collection rate is very high (likely exceeding 80%) – these assumptions are in line with the data collected during the first three quarters of the Phase I program.

The MHSW program will continue to work to achieve a collection and diversion target for non-refillable program cylinders of 60% by Year 5 of the new program – even though the Parks recovery channel is not available at this time.

18.10.1 Reduction/Reuse

A reduction/reuse strategy that will be investigated and considered will be to encourage the increased use of refillable containers.

18.10.2 Collection

For refillable / recyclable refrigerant containers, an extended producer responsibility program (Refrigerant Management Canada) is in place that collects surplus refrigerants and ensures their safe destruction.

The table below outlines the collection targets for both refillable and non-refillable pressurized containers. The targets were derived from the quantities collected under Phase 1. In Phase I of the MHSW Program, 335 tonnes of refillable containers and 61 tonnes of non-refillable containers were reported collected by municipalities. These figures have been grossed up for an annual figure of 628 and 104 tonnes respectively.

Table 18.6: Collection Targets for Refillable Pressurized Containers

Collection Target	Year 1	Year 2	Year 3	Year 4	Year 5
Tonnes	628	686	747	802	835
% of Available for Collection	83%	88%	93%	97%	98%

Note: Collection targets do not reflect those quantities of refillable containers that are returned through industry exchange programs.

Table 18.7: Collection Targets for Non-Refillable Pressurized Containers

Collection Target	Year 1	Year 2	Year 3	Year 4	Year 5
Tonnes	104	122	198	280	365
% of Available for Collection	14%	16%	26%	36%	46%

18.10.3 Recycling

Once the pressurized containers have been evacuated of any residual gases, the cylinders are fully recyclable. The recycling performance targets are therefore the same as the collection targets. Five-year recycling targets for both refillable and non-refillable pressurized containers are presented in Tables 18.8 and 18.9 below.

Table 18.8: Five-Year Recycling Targets for Refillable Pressurized Containers

Target	Year 1	Year 2	Year 3	Year 4	Year 5
Qty Available for Collection (tonnes)	757	780	803	827	852
Collection target (tonnes)	628	686	747	802	835
Recycling performance rate	100%	100%	100%	100%	100%
Recycling Target (tonnes)	628	686	747	802	835
Recycling efficiency rate	83%	88%	93%	97%	98%

Table 18.9: Five-Year Recycling Targets for Non-Refillable Pressurized Containers

Target	Year 1	Year 2	Year 3	Year 4	Year 5
Qty Available for Collection (tonnes)	748	762	778	793	809
Collection target (tonnes)	104	122	198	280	365
Recycling performance rate	100%	100%	100%	100%	100%
Recycling Target (tonnes)	104	122	198	280	365
Recycling efficiency rate	14%	16%	26%	36%	46%

18.11 Year 1 Costs and Fee Rate

The Year 1 Costs and Fee Rate for Refillable and Non-Refillable Pressurized Containers are presented in Tables 18.10 and 18.11 respectively. Further information on the cost categories presented in Tables 18.10 and 18.11 is available in Section 7 of Volume 1 of the Consolidated MHSW Program Plan.

Table 18.10: Year 1 Total Costs and Fee Rate for Refillable Pressurized Containers

Description	Cost
Material Management	$145,100
Contingency	$21,000
Material-Specific R&D	$0
Material-Specific P&E	$0
Common Costs	$81,800
Deficit Recovery	$38,200
Total	**$286,100**
Tonnes managed	104
Total cost/tonne	2750.961538
Fee Rate ($/unit)	$1.022

Notes:

1) For the purposes of estimating material management costs, a contingency of 14.5% has been applied.
2) For the purposes of calculating a fee rate, a contingency of 3% has been applied to the estimated quantity of Pressurized Containers - Refillable supplied for use in Year 1 of the Consolidated MHSW Program Plan.
3) Stewardship Ontario incurred a deficit from the operation of the first year of Phase 1 of the MHSW program that will be recovered as part of the fees for the Consolidated Plan. Allocated only to Phase 1 Materials on a material-specific basis, the deficit shown in the table includes any deficits in common costs (start-up, plan development, and program management costs) as well as material-specific operating costs and fees owing.

Table 18.11: Year 1 Total Costs and Fee Rate for Non-Refillable Pressurized Containers

Description	Cost
Material Management	$191,000
Contingency	$22,000
Material-Specific R&D	$0
Material-Specific P&E	$150,000
Common Costs	$77,900
Deficit Recovery	$200,200
Total	**$641,100**
Tonnes managed	628
Total cost/tonne	$1,021
Fee Rate ($/unit)	$0.398

Notes:

1) For the purposes of estimating material management costs, a contingency of 11.5% has been applied.
2) For the purposes of calculating a fee rate, a contingency of 3% has been applied to the estimated quantity of Pressurized Containers - Non Refillable supplied for use in Year 1 of the Consolidated MHSW Program Plan
3) Stewardship Ontario incurred a deficit from the operation of the first year of Phase 1 of the MHSW program that will be recovered as part of the fees for the Consolidated Plan. Allocated only to Phase 1 Materials on a material-specific basis, the deficit shown in the table includes any deficits in common costs (start-up, plan development, and program management costs) as well as material-specific operating costs and fees owing.

19.0 Reactives

19.1 Definition

Reactives are those materials that react with air and/or water producing a gas, and materials that explode.

19.2 Product Identification

There is currently no definitive listing of products captured in this product category. Examples include isocyanate foams, metal powders, and potentially, a small subgroup of pesticides. Reactive materials, as defined by the Regulation, are mostly managed under other categories (isocyanate paints captured under paints, foam insulation aerosol captured under aerosols, medical inhalers captured under pharmaceuticals).

19.3 Research and Development Strategy

Identifying products to be obligated under the reactives category should be undertaken through two primary avenues:

- Ongoing product research should be undertaken to identify products in the marketplace which fall within the reactives material category definition, but which do not fit the definitions of the other material categories
- Ongoing analyses of collected materials composition (labpack) should also be conducted to identify materials and products that are in the waste stream.

These two channels of input should generate a list of reactive materials and stewards that are selling MHSM into the marketplace and also what is available for collection and what is actually collected.

In order to cover the costs associated with this research, funds have been allocated under the Common Cost category, as outlined in section 19.4 below.

19.4 Costs

The total costs attributed to Reactives are outlined in Table 19.1 below.

Table 19.1: Total Costs attributable to Reactives

Description	Cost
Material Management[1]	$0
Contingency	$0
Material-Specific R&D	$0
Material-Specific P&E	$0
Common Costs	$25,000
Deficit Recovery	$0
Total	**$25,000**
Tonnes managed	-
Total cost/tonne	-
Fee Rate	Measured return share[2]

Notes:

1) If a commercial connection cannot be established between this material and a steward, these materials would be categorized as “orphan” products and these costs would not be accepted under the program.
2) For the purposes of estimating material management costs, a contingency of 17.5% has been applied.
3) While the material-specific cost to manage this group of products has been estimated as per table 19.1 above, “measured return share” means that the actual management cost, as well as a share of the budgeted common costs and deficit recovery, will be charged to stewards of those product categories.

20.0 Sharps & Syringes

20.1 Definition

Waste sharps are materials consisting of needles, syringes and lancets in the administration of healthcare for humans and companion animals (i.e., pets).

Including:

- Human and veterinary sharps from the residential sector.

Excludes:

- Sharps from the commercial and institutional sector

20.2 Market & Product Information

Sharps and syringes can be sold as individual units, in a larger pack size, or as part of a prescription as a pre-filled medication. These can be obtained from the pharmacist at your local pharmacy, doctor, or health clinic.

20.3 IC&I Generators

The Minister's request letter explicitly indicates that the collection of sharps and syringes is limited to waste generated by households. The Consolidated MHSW program will not include waste sharps and syringes generated by small quantity IC&I.

20.4 Quantity Supplied for Use

It is estimated that in 2007 approximately 184 tonnes of sharps and syringes were sold into the Ontario market.

The quantities into the market were derived using estimated sales of units sold to the pharmacy channel from participating stewards and extrapolating to the rest of the market based on steward's market share (as per IMS Health). The estimated sale quantities were further adjusted to account for sales of units used on companion animals that may have been sold at veterinarian clinics. Further analysis is required to obtain accurate sales into the Ontario market and projected market growth.

Sharps and syringes come in a variety of sizes and styles that have been designed for specific use. This leads to a range of weights per sharp and syringe. An estimated average weight for syringes, pen needles and lancets was derived by stewards and used to convert units to tonnes. Further analysis is required to obtain an accurate weight representation of sharps and syringes.

Table 20.1: Estimated Quantities of Sharps and Syringes into the Ontario Market

[3]Sales into Market	[1]2007	[2]Year 1	Year 2	Year 3	Year 4	Year 5
Units (Sharps & Syringes)	131,086,287	186,857,544	209,280,449	234,394,103	262,521,396	294,023,963
[4]Tonnes	184	230	258	289	323	362
% growth		12%	12%	12%	12%	12%

Notes:

1. Year 2007 is the baseline year for MHSW Program Plan
2. MHSW Program Plan Year 1 is the first 12 months after the program commencement date
3. Sales into the market and market growth forecast are derived from industry sources
4. Average weight from sample of sharps and syringes is 0.256 oz which converts to 0.0073 kg.

20.5 Quantity Available for Collection

Sharps and syringes are not a consumable product and therefore 100% is available for collection. The available for collection quantities may be under-estimated as a field study is required to determine if estimates of quantities of sharps and syringes collected should be adjusted with a 'wet' factor. It is possible that sharps and syringes collected contain liquid that increase the collection weight.

Table 20.2: Estimated Quantities of Sharps and Syringes Available for Collection

Available for Collection	[1]2007	[2]Year 1	Year 2	Year 3	Year 4	Year 5
[3]Tonnes	184	230	258	289	323	362
% of introduced into the market	100%	100%	100%	100%	100%	100%

Notes:

1. Year 2007 is the baseline year for MHSW Program Plan
2. MHSW Program Plan Year 1 is the first 12 months after the program commencement date
3. Average weight from sample of syringes, pen needles and lancets.

20.6 Current Management Infrastructure & Performance

According to the 2007 WDO Datacall, 33 municipalities offered collection services for sharps and syringes. This represents approximately 3.38 M households served. The 2007 WDO Datacall reports that 28 tonnes of sharps and syringes were collected through the municipal MHSW system.

According to surveys conducted by the Canadian Association of Chain Drug Stores (CACDS) and the Ontario Pharmacists' Association (OPA), an estimated 90% of all pharmacies in Ontario provide a take back service for biomedical (sharps and syringes). According to IMS Health, 3,181 pharmacies operate in Ontario. This would mean that an estimated 2,863 pharmacies collect sharps and syringes. This program is operated on a volunteer basis and is fully funded by the pharmacies. The service is provided mainly to pharmacy customers and little promotion and education is provided. There are a few municipalities, e.g., Halton Region, with 'Take Back' programs that provide promotion and education along with directions to the participating pharmacies. Some pharmacies charge a fee to take back the sharps. The total weight collected through this channel is currently about 175 tonnes per year. Collected weight through this

channel requires verification to identify components included in the total weight (may include collection container).

To encourage consumers to bring back sharps and syringes, the program will provide the appropriate sharps and syringes disposal containers as part of the collection mechanism.

An additional non-municipal collection channel is the Ontario Harm Reduction Distribution Program (OHRDP) which administers a provincial wide Needle Exchange Program (NEP). OHRDP operates 34 NEPs operations distributing over 3.2 million clean syringes annually to an estimated 41,000 people. The return rate through this channel is 98% of what they distribute (approximately 3.1 million). More information can be accessed at http://www.ohrdp.ca/ .

20.7 Barriers and Opportunities to Increased Diversion & Research and Development Requirements

The current non-municipal collection channels are extensive and have the potential of high accessibility. Since they are run on a volunteer basis and are funded by the pharmacies or grants, they determine whether to limit or expand the program promotion and education. While the infrastructure for extensive collection is in place, the limited consumer awareness of such programs limits the effectiveness of this collection channel. In addition, the inconsistency of providing appropriate collection containers to consumers has the potential to reduce collection.

The key opportunity to increase diversion of sharps and syringes is the development of a P&E program, so that when somebody buys a syringe or sharp they receive information on proper management including where to take them when used (see Section 8 – Promotion and Education).

Additional consideration will be given to the following activities:

- Verify supplied into the market data for syringes, pen needles and lancets
- Conduct a study to identify the ratio between syringes, pen needles and lancets at collection.
- Conduct a field study to verify weight of syringes, pen needles and lancets at collection. It is possible that sharps and syringes are collected ‘wet’.
- Conduct a study to identify an appropriate container that will be given to customers as part of the take back program.

For Year 1 of the Consolidated MHSW Program Plan, an R&D budget of $20,000 has been allocated.

20.8 Accessibility Strategy & Targets

The accessibility and target strategy for sharps and syringes includes:

- Maintaining current return to retail collection channel (2,863 pharmacies)
- Maintain and expand the number of depots, events, depot in a box and toxic taxi as outlined in section 5 of the MHSW Plan when appropriate.

20.9 Promotion and Education

As described in Section 5.5 of Volume 1 of the Consolidated MHSW plan, Promotion and Education activities will be implemented at three levels.

The province-wide "branding the behaviour" P&E program will continue to build on the **Do What You Can** campaign urging people to think about 3Rs objectives when it comes to managing MHSW. The message will be an overarching, motivational call to action, driving people to the **Do What You Can** website to find material specific and collection information.

The second layer of P&E is targeted as "educating about specifics" which will provide people with the information they need to take action. The approach to this P&E will depend on whether the product is a consumable or durable and what the desired end-of-life might be. Many products and containers will be collected at events, depots or depots-in-a-box.

As well, for some materials, targeted collection programs will require point of sale P&E tactics.

Recovery of sharps will be promoted as part of province-wide generic campaign and targeted for a specific P&E program to take them back to pharmacies, possibly with obsolete thermometers and pharmaceuticals. This campaign would comprise point-of-sale prompts (e.g. stickers, shelf talkers, brochures) to encourage proper end-of-life management for these materials. As part of the Consolidated MHSW Program Plan, a P&E budget of $200,000 has been allocated.

20.10 Reduction, Collection & Recycling Targets

20.10.1 Reduction

There are no reduction targets as sharps and syringes are normally associated with a medical requirement.

20.10.2 Collection

Collection targets presented in Table 20.3 are based on the 2007 WDO Datacall, return to retail collection rates and the accessibility plan outlined in the Consolidated MHSW program plan. Table 20.4 provides a breakdown of the Year 1 collection target by channel.

Verification of sales into the market and quantities (including components that compose the total weight) collected is required in Year 1 of the program in order to confirm the appropriateness of the collection targets.

Table 20.3: Collection Targets for Sharps and Syringes

Collection Target	Year 1	Year 2	Year 3	Year 4	Year 5
Tonnes	213	241	273	309	349
% of Available for Collection	93%	93%	94%	96%	97%

Table 20.4: Year 1 Collection Targets for Sharps and Syringes by Channel

Channel	Tonnage
Events, Depot, DIB, TT	38
Return to Retail	175

Total	213

20.10.3 Recycling /Disposal

There are no recycling options for sharps and syringes. The returned sharps, syringes, and lancets, are treated and disposed of in secure landfill.

20.11 Year 1 Costs and Fee Rate

The Year 1 total cost and fee rate for sharps and syringes is presented in table 20.5 below. Further information on the cost categories presented in Table 20.5 is available in Section 7 of Volume 1 of the Consolidated MHSW Program Plan.

Table 20.5: Year 1 Total Costs and Fee Rate for Sharps and Syringes

Description	Cost
Material Management	$1,280,000
Contingency	$185,600
Material-Specific R&D	$20,000
Material-Specific P&E	$200,000
Common Costs	$483,700
Deficit Recovery	$0
Total	**$2,169,300**
Tonnes managed	213
Total cost/tonne	$10,199
Fee Rate ($/unit)	$0.012

Notes:

1) For the purposes of estimating material management costs, a contingency of 14.5% has been applied.
2) For the purposes of calculating a fee rate, a contingency of 5% has been applied to the estimated quantity of Sharps & Syringes supplied for use in Year 1 of the Consolidated MHSW Program Plan.

21.0 Mercury Devices - Switches

21.1 Definition

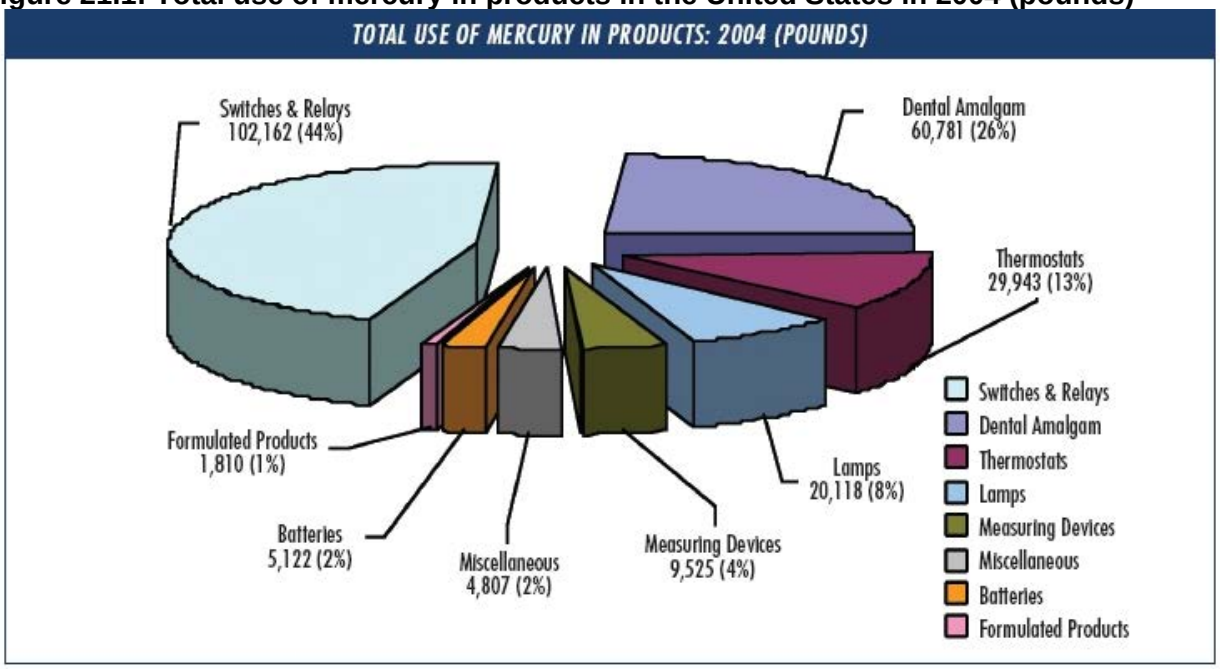
Switches containing mercury means products or devices that open or close an electrical circuit or a liquid or gas valve.

21.2 Market and Product Information

Mercury is widely used in a variety of products utilized in residential, commercial and industrial environments. Mercury is a heavy liquid at room temperature and tends to be popular on account of its ability to conduct electricity and its standard responsiveness to changes in temperature and level. Typically, measuring devices contain the largest amount of mercury on a unit basis. Mercury containing switches and relays, however, account for a far greater share of the total mercury in the marketplace, due to the very high number of products that contain switches and relays.

Figure 21.1 below provides a breakdown of mercury use by product category in the United States for 2004. According to this, mercury switches accounted for 44% of the total mercury use in products in the United States that year. It is reasonable to assume that the situation in Canada is comparable.

Figure 21.1: Total use of mercury in products in the United States in 2004 (pounds)



Source: Interstate Mercury Education & Reduction Clearinghouse (IMERC)

In late 2006 Environment Canada published a Risk Management Strategy for Mercury-containing products. The strategy outlines options available to Environment Canada to prohibit or limit the use of mercury in products. This prohibition is expected to include all products containing mercury, with the exception of fluorescent lights and dental amalgams, and is

expected to come into force in 2012[40]. Notwithstanding this, due to legislation restricting the use of mercury passed in the United States, and overall health concerns associated with this substance, the vast majority of manufacturers have discontinued the use of mercury in their products. For this reason, all the products designated under this category are obsolete in nature, that is to say, the material no longer supplied or sold for consumer use in Ontario.

21.3 Small quantity IC&I generators

The Minister's Program Request Letter designates switches and measuring devices that contain mercury from residential and IC&I small quantity generators. In the case of mercury, the quantities permitted from IC&I businesses are defined by the small quantity exclusion or Regulation 347 and is set at 5 kg of mercury containing waste per month.

As both automobile recyclers removing mercury switches from cars and white goods recyclers typically generate less than 5 kg of mercury switches per month, products from these sources are therefore included in this program. Some of these generators are already being serviced through existing programs, and the strategy for servicing these generators will be discussed in greater details in the sections that follow.

21.4 Quantities Available for Collection

Mercury switches were used in numerous different applications. For the purposes of this document, they have been organization according to automotive, white goods, and others.

21.4.1 Automotive Mercury Switches

Automakers ended their use of mercury switches in new vehicles beginning with model year 2003. Under the Canadian Environmental Protection Act, a federal Pollution Prevention notice requires vehicle manufacturers to participate in and fund a mercury switch management programme. The Notice calls for the development of annual targets in consideration of an ultimate goal of achieving an annual capture rate of 90% within the first four years of the program[41].

The vehicle manufacturers affected by this Notice are meeting their obligation through funding of the Clear Air Foundation's Switch Out Program, under the auspices of the Canadian Vehicle Manufacturers Association. This is a national program that was initially developed in Ontario. As part of their reporting requirements, automakers have filed information on the number of switches that are estimated to be available for collection, as presented in Table 21.1 on the following page.

Table 21.1: Estimated number of automotive switches available for collection in Ontario

Year	Units (Ontario)[1]
2007	0
2008	126,100
2009	116,400

[40] Personal Communication, Denis Pineault, Environment Canada, January 2009
[2] The numbers for Ontario were obtained by pro-rating the Canadian number using a 0.388% population conversion factor
[41] Notice regarding Pollution Prevention Planning in respect of Mercury Releases from Mercury Switches in End-of-life Vehicles Processed by Steel Mills.

Year	Units (Ontario)[1]
2010	108,640
2011	100,104
2012	91,457
2013	83,697
2014	75,383
2015	67,069
2016	59,309
2017	52,103

Reference: Schedule 1: Declaration That a Pollution Prevention Plan Has Been Prepared and Is Being Implemented in Respect of Mercury Releases from Mercury Switches in End-of-Life Vehicles Processed by Steel Mills.
Note: Ontario estimates were obtained by pro-rating the national numbers using a population-based conversion factor (0.388%)

21.4.2 Mercury Switches in White Goods

Mercury switches were used in the following appliances:

- In chest freezers until the year 2000
- In gas pilot-light ranges until the year 2008
- In clothes washers until 1972

Using a Weibull distribution of end-of-life incidence probability by year from manufacturing date, Electro Federation Canada (EFC)/Canadian Appliance Manufacturers Association (CAMA) has estimated the quantities of mercury-containing white goods entering the waste stream on an annual basis. For probability calculations, a 40 year lifespan has been assumed. The projected quantities are presented in Table 21.2 below.

Table 21.2: Estimate of quantities of mercury-containing white goods entering the waste stream on an annual basis

	2008	2009	2010	2011	2012	2013	2014
Freezers	19,570	18,760	17,910	17,050	16,140	15,190	13,220
Gas ranges	7,200	6,910	6,570	6,220	5,860	5,480	5,090
Washing machine	80	50	30	10	0	0	0
Total		**25,720**	**24,510**	**23,280**	**22,000**	**20,670**	**18,310**

Source: EFC/CAMA

21.4.3 Other Mercury Switches

Mercury switches have been used in many other major household appliances, including gas furnaces and boilers. The Canadian Institute of Plumbing & Heating has indicated that no boilers or furnaces introduced into the Ontario market contain or has contained mercury switches.

Float switches were commonly used in bilge pumps on pleasure boats. Bilge pumps are used to remove excess waster from pleasure boats. Activation and deactivation of these pumps has traditionally been accomplished with a mercury-containing float switch, or tilt switch. Almost all pleasure boats sold contain a bilge pump. According to a report by Pollution Probe published in 2000[42], at that time, 90% of all bilge pumps contained mercury. ITT Rules, who claims to control

[42] A Study of the Use of Mercury Switches in Bilge Pumps of Pleasure Boats in Ontario, Pollution Probe, March 2000

90% of the bilge pump market in North America, indicated they stopped using mercury in their products in July 2006.

Research that was carried out for Waste Diversion Ontario estimates that in 2007 alone, 70,000 boats were registered in the province. Table 21.3 presents information on the sales of boats in Ontario from 2000 to 2007.

Table 21.3: Sales of boats in Ontario for the period 2000-2007

2000	2001	2002	2003	2004	2005	2006	2007
18,720	16,967	27,229	29,245	27,067	27,454	25,976	28,973

Data source: National Marine Manufactures Association

Given the information provided by ITT Rules, it can be assumed that no mercury bilge pumps entered the Ontario market from 2007 onwards. It is not known, however, what fraction of the boat sales outlined in Table 21.3 contained bilge pumps. Furthermore, it is not known what fraction of those boat sales containing bilge pumps contained mercury.

In order to estimate the quantity of pumps becoming available for collection every year, information regarding the product's estimated lifespan is required. According to a staff person at the Florida Department of Environmental Protection[43], boats used in salt water typically replace their pump every year due to the corrosion of electrical connections caused by salt water. Fresh water boats do not need to replace their pump as often.

Sump pumps are used to remove excess water from the sump pit of basements that experience flooding or are at risk of flooding due to situation below the water level. The excess water is pumped out of the sump pit and deposited at some distance from the basement. Traditionally a mercury float switch was used to sense water level and to trigger the pump when the water level increased sufficiently.

Conversations with manufacturers and distributors of this product indicate that sump pumps containing mercury switches have not been sold in the Ontario marketplace since 2002 at the latest. As most sump pumps sold in Ontario are manufactured in the United States, the bans on mercury in products there was cited as a major reason for the phasing out of mercury switches in sump pumps. Due to this fact, it has also been difficult to obtain sales data from years prior to 2002.

21.5 Current Management Infrastructure & Performance

The range of products covered in this material group each present unique management characteristics. While mercury switches from automobiles and appliances can only be collected through dismantlers, the most likely collection channel for bilge pumps are marinas.

21.5.1 Automotive Mercury Switches

The Clean Air Foundation's Switch Out program has been running in Ontario since 2001. The program went nation-wide in September, 2007 and is designed to remove, collect and manage mercury-containing convenience lighting switches and anti-lock braking system (ABS) sensor modules in end-of-life vehicles before they are recycled into new steel. The program is funded and supported by Canada's steel and automotive industries through the Canadian Steel

[43] Prince, J. Personal Communication April 2nd 2009

Producers Association (CSPA) and the Canadian Vehicle Manufacturers' Association (CVMA), and currently works in partnership with the Automotive Recyclers of Canada (ARC) and the Canadian Association of Recycling Industries (CARI). In Ontario, 195 recyclers and dismantlers are registered as collection sites with the program.

The switches are sent to Aevitas in Ayr, Ontario, for processing. The steel is sent for smelting to a steel processor and the mercury is triple distilled and sent to Bethlehem for final distillation after which it can be reused in new products, such as lighting.

Nationally, 104,334 automotive mercury switches have been collected since September 2007. This represents an estimated 40,481.6 switches for Ontario using a 38.8% population conversion factor. Assuming that these switches were collected over a 19 month period (Sept. 2007 to end of March 2009), this corresponds to 25,567 switches collected in Ontario in 2008. According to the data filed by the automotive industry under the Pollution Prevention Notice requirements, there were 126,100 automotive switches available for collection in Ontario in 2008. This corresponds to a 20% collection rate.

21.5.2 Mercury Switches in White Goods & Other Appliances

A variety of stakeholders participate in the collection and recycling of white goods. The system is driven by the market demand for their composite materials, mainly steel. A study commissioned by EFC identifies the following dismantler groups, where mercury switches would be most likely to be removed:

- Scrap collectors and scrap dealers
- Contracted agents
- Municipalities
- Small scale processors

White goods collection programs are delivered by a great number of municipalities. As part of some background research carried out by the AMRC in late 2006 for the OPA's Refrigerator Retirement Program[44], 249 municipalities (from a total of 343) were contacted. Of this group, 94% (234) operated white goods programs. Based on this, it is estimated that at least 275 municipal programs operate white goods collection programs.

With very few exceptions then, Ontario municipalities operate white goods collection programs. These range from weekly free[45] curbside pickup to drop off programs at waste sites or transfer facilities, to annual drop off or 'clean-up' days. The relatively few municipalities that do not operate white goods programs refer residents to local scrap dealers or haulers.

Notwithstanding this, the report states that very few municipalities remove mercury-containing switches or sensors. The following nine municipal programs indicated they had a mercury switch removal program from white goods:

- Ottawa Valley Waste Recovery Centre
- Peterborough County
- Peterborough City
- City of Kawartha Lakes

[44] Ontario Municipal White Goods Collection Program, 2006 (AMRC, Feb. 2007)
[45] i.e., residents are not charged a direct fee at time of disposal; program costs are covered by property taxes.

- Toronto
- Peel Region
- Markham
- Niagara Region
- Hamilton

Although the WDO Datacall includes a mercury switch reporting category, it has been determined through follow up conversations with targeted municipal programs that the quantities reported under this category are for the most part mercury measuring devices (e.g. thermometers), as opposed to switches. Indeed, generally speaking, municipalities do not report quantities of switches from white goods collected in the WDO Datacall. It is therefore not possible to establish the quantity that is currently being collected.

As stated above, municipalities are only one of the stakeholders who consolidate and pre-process white goods. No information is currently available on how other stakeholders (scrap collectors and dealers, contracted agents, etc.) handle white goods and whether they typically remove mercury switches from the appliances they handle.

The Ontario Power Authority's Great Refrigerator Roundup initiative, a program designed to remove older, inefficient fridges and freezers from the electricity system, offers free pick-up service of these appliances (15 years or older) in working condition as well as window air conditioners and dehumidifiers and fully decommission them in an environmentally friendly manner. According to the OPA, 400 kg of mercury switches have been collected through this program since roll-out (June 18, 2007) to Feb 2009[46]. This value includes the weight of the actual switch, as well as any other component that is likely to be attached to the switch (e.g. electric wires, plastic). Although industry sources were not able to provide average switch weight information, one of the municipalities collecting switches indicated that the weight was 40 grams, including the plastic housing, and 18g without the casing. Using this later value, approximately 22,000 mercury switches would have been collected under the OPA's program. Prorating to twelve months, this represents 13,200 switches per year.

OPA has indicated that funding for their program has been secured to the end of 2010. There is an expectation that it will continue beyond 2010, but as yet there are no firm plans or commitments. Under an approved plan, Stewardship Ontario would enter into agreement with the OPA and would reimburse costs associated with the removal, transport, and processing of the switches removed from the chest freezers collected.

Finally, a nine month pilot was carried out in 2001 at the Regional Municipality of Niagara to investigate the amount and type of appliances that contain mercury switches[47]. Of the 1,314 appliances received, 120, or 9% were found to contain mercury switches. Virtually all of the appliances were old chest freezers, although three gas ranges were also found. It is estimated that the Region of Niagara served 170,500 households at that time.

21.5.3 Other Mercury Switches

There is no known collection program in place for mercury containing bilge pumps. The Ontario Marine Operators Association indicated that they were not aware of any mercury bilge pump

[46] Personal Communication, Bill Wylie, April 6th 2009
[47] Ontario White Goods Collection & Mercury Switch/Sensor Removal Pilot, Final Report, Prepared for Environment Canada by the Association of Municipal Recycling Coordinators (2001)

collection program in the province. Similarly, no collection program was identified for any of the other products containing mercury switches.

21.6 Accessibility Strategy and Targets

21.6.1 Automotive Switches

Automotive switches are removed by automotive recyclers and dismantlers prior to shredding and shipping to a smelter. In Ontario, 195 recyclers and dismantlers are registered as collection sites with the Switch Out Program. According to the Ontario Automotive Recyclers Association, there are approximately 400 auto dismantlers in Ontario.

The CVMA has submitted collection targets under the federal Pollution Prevention notice. These are presented in **Error! Reference source not found.**.

The Clean Air Foundation has indicated that these targets are supported by a projected increase in the number of active participants in the Switch Out program. CAF estimates that approximately 30% of the current 195 participants are active (i.e. collect and ship switches). The target for 2010 is to increase this to 50%, and to 75% for 2011.

Under the Consolidated MHSW Program Plan, Stewardship Ontario has set collection targets that conform to the CEPA Notice, which requires the "development of annual targets for the number of mercury switches to be collected and for the capture rate of mercury switches, in consideration of an ultimate goal of achieving an annual capture rate of 90% within the first four years of participation in the mercury switch management program"[48]. Given that mercury switches are entirely recyclable, the recycling performance targets are assumed to be the same as the collection targets.

In the last stages of plan development, automotive switch stewards have reported that the total numbers of automotive switches available for collection are significantly lower than presented in the Consolidated MHSW Program Plan and have requested that targets be revised downwards. Stewardship Ontario understands that the targets set in Table 21.4 may have to be recalibrated once more operational experience is gained. To that end, Stewardship Ontario will review the targets for automotive switches at the end of Year 1 when more accurate information on the quantity available for collection and the return rate of this product becomes available.

Table 21.4: Automotive Switch Targets under the Federal Pollution Prevention Notice and the Consolidated MHSW Program Plan

PP Notice Year	Corresponding Year of the MHSW Program	Anticipated Number of Mercury Switches to be Managed Under the Program (Nationally)	Anticipated Number of Mercury Switches Available for Collection (Nationnally)	Anticipated Number of Mercury Switches to be Managed Under the Program (Ontario)	Anticipated Number of Mercury Switches Available for Collection (Ontario)	Anticipated Capture Rate of the National Program (%) (under the PP Notice)	Target Capture Rate of the Consolidated MHSW Program Plan (%)
2010	Year 1	112000	280,000	76048	108,640	40%	70%
2011	Year 2	129000	258,000	90094	100,104	50%	90%
2012	Year 3	165000	235,714	83226	91,457	70%	91%

[48] http://canadagazette.gc.ca/archives/p1/2007/2007-12-29/html/notice-avis-eng.html#i1 section 4) 3) e)

PP Notice Year	Corresponding Year of the MHSW Program	Anticipated Number of Mercury Switches to be Managed Under the Program (Nationally)	Anticipated Number of Mercury Switches Available for Collection (Nationnally)	Anticipated Number of Mercury Switches to be Managed Under the Program (Ontario)	Anticipated Number of Mercury Switches Available for Collection (Ontario)	Anticipated Capture Rate of the National Program (%) (under the PP Notice)	Target Capture Rate of the Consolidated MHSW Program Plan (%)
2013	Year 4	151000	215,714	77001	83,697	70%	92%
2014	Year 5	136000	194,286	70860	75,383	70%	94%

Methodology Used to Calculate the Numbers in Table 21.4:

1) Used the target capture rate and the anticipated number of switches to be managed under the federal program to calculate the quantity of switches available for collection nationally
2) Applied a population conversion factor of 38.8% to the number of switches available federally to obtain a number of switches available for collection in Ontario
3) Applied the target capture rate to the number of switches available for collection in Ontario to obtain the anticipated number of switches to be managed under the Consolidated MHSW Program Plan program.

The accessibility strategy will include pursuing both an increase in the number of active participants (i.e. increasing the number of switches collected by those dismantlers already registered in the program) and increasing the number of participants in the program. By year five of the program, Stewardship Ontario will strive to have all estimated 400 car dismantlers in the province participating in the program. These targets are presented in table 21.5 below.

Table 21.5: Accessibility Targets for Automotive Mercury Switches

	Current (2009)	Year 1	Year 2	Year 3	Year 4	Year 5
Target number of auto dismantlers participating in the program	195	236	277	318	359	400

Discussions with representatives of the National Vehicle Mercury Switch Recovery Programs in the United States have revealed that the success of such programs is the results of a combination of factors. NVMRP representatives have looked at the top performing programs within the United States and have identified the following common attributes of those programs:

1) Switch Program Longevity
2) Communication & Outreach Program
3) State Legal Framework
4) Switch Payment > $1

While the first factor is beyond the reach of Stewardship Ontario, the fact that the Switch Out program has been operating in Ontario for eight years bodes well for its performance

In regards to the second factor, a Promotion and education budget of $37,500 has been allocated to this category for direct educational/promotional materials to auto dismantlers (see Section 21.7)

In regards to the third factor, it refers to having in place the following legislative requirements:

a. Law Requires Removal of Switches
b. Law Requires Collection and Outreach Program
c. Law Requires Dismantler Participation In Program

While the CEPA Notice meets point b), no legislative requirement currently exist for either the removal of switches or the participating of dismantlers.

With regards to point 4 above, discussions with auto dismantling industry representative have indicated that the principle of compensating dismantlers for pulling switches, even if the incentive amount does not cover their costs fully, would likely result in many more of them doing it. The US experience demonstrates that a $1 incentive is not sufficient to incentivize dismantler participation. For these reasons, Stewardship Ontario will provide a $3 incentive for each mercury switch collected. Stewardship Ontario will review collection performance against targets on an annual basis and will consider various remedial options, including increasing the amount of this bounty, if targets are not met.

Lastly, a factor of success that has not been identified by US sources but that has been highlighted by the Clean Air Foundation is the role that steel mills can play in putting pressure on dismantlers to supply them with mercury-free scrap steel. CAF is currently looking into how best to go about sharing information on program registrants and level of activity with steel mills. As part of the Consolidated MHSW Program Plan, Stewardship Ontario will carry out outreach and will actively engage the steel industry to act as leverage in the removal of mercury switches.

21.6.2 White Goods

As of 2006, 9 municipal programs removed mercury switches as part of their white goods collection program. In Year 1 of the program, the target will be to set up agreements with those nine municipal programs. These municipalities service a total population of 2,039,000 households. Using the Niagara pilot results, an average number of mercury white goods that can be expected to be collected on a household basis was developed. This value was then applied to the total number of households serviced by the nine municipal programs to generate the target number of mercury switches from municipalities in Year 1 of the program (1,913 switches).

As identified in section 5.2 above, mercury switches from white goods are removed by a variety of agents, including private waste management companies. A study conducted by SBR on behalf of EFC/CAMA found that the top five waste management companies in Ontario had eighteen white good dismantling points in the province. Based on this, the target for the first year of the program will be to establish agreements with these service providers to ensure that mercury switches are removed from white goods at their 18 locations. The target will be to service an additional 1,000,000 households through these service providers. The total households served through both municipal and private dismantlers will over half of the households in Ontario. Based on the average number of switches collected on a household basis referred to above, a further 938 mercury switches are targeted from the private dismantler channel.

Finally, those switches collected from chest freezers under the OPA's Great Refrigerator Roundup will also be included in the target for Yr 1. It is assumed that the same number of switches will be collected in Year 1 (13,200).

The total target for switches from white goods in Year 1 is therefore 16,051. Comparing this against what is estimated to be available for collection in 2010 as per Table 21.1 (24,510 units), this represents a 65% collection rate.

By the fifth year of the Consolidated MHSW Program Plan, Stewardship Ontario will strive to have agreements in place for the removal of mercury switches from white goods with all dismantlers, which would allow it to reach a 100% capture rate. Five-year targets are presented in Table 21.6 below. Since mercury containing switches are entirely recyclable, the five-year recycling targets are equivalent to the collection targets.

Table 21.6: Five-Year Collection and Recycling Targets for Mercury Switches in White Goods

	Year 1	Year 2	Year 3	Year 4	Year 5
No. of switches to be collected (includes switches collected through the Great Refrigerator Roundup Program)	16,051	16,994	17,820	18,603	18,310
No. of switches to be recycled (includes switches collected through the Great Refrigerator Roundup Program)	16,051	16,994	17,820	18,603	18,310
Collection and Recycling Efficiency Rate	65%	73%	81%	90%	100%

The targets will require revision based on research to determine the number of white good dismantlers in the province, and their geographic location. It is anticipated that this work will be carried out in the first year of the program.

In order to incentivize the removal of mercury switches from white goods and to achieve the targets outlined above, a $2.30 financial incentive will be offered for every switch collected. This incentive is meant to compensate dismantlers for the time spent removing the switches. According to the 2002 AMRC study, removal of mercury-containing chest freezers averaged 1 – 2 minutes, while removal of mercury switch containing gas ranges averaged 10 minutes. The incentive amount was set assuming an hourly rate of $34.50, and assuming that 75% of mercury appliances processed would be chest freezers and the remainder (25%) would be gas ranges.

21.6.3 Other Mercury Switches

More information is required (see Section 21.8 – Research and Development below) in order to set targets for this sub-category of materials.

21.7 Promotion and Education

As described in Section 5.5 of Volume 1 of the Consolidated MHSW plan, Promotion and Education activities will be implemented at three levels.

The province-wide “branding the behaviour” P&E program will continue to build on the **Do What You Can** campaign urging people to think about 3Rs objectives when it comes to managing MHSW. The message will be an overarching, motivational call to action, driving people to the **Do What You Can** website to find material specific and collection information.

The second layer of P&E is targeted as “educating about specifics” which will provide people with the information they need to take action. The approach to this P&E will depend on whether

the product is a consumable or durable and what the desired end-of-life might be. Many products and containers will be collected at events, depots or depots-in-a-box.

As well, for some materials, targeted collection programs will require point of sale P&E tactics.

The recovery of mercury switches will be promoted as part of province-wide generic campaign, and will also include direct educational/promotional materials to auto and appliance dismantlers. For Year 1 of the Consolidated MHSW Program Plan, a P&E budget of $37,500 has been allocated to both sub-categories.

21.8 Research and Development Requirements

21.8.1 21.8.1 Mercury Switches in White Goods

In Year 1 of the Consolidated MHSW Program Plan, Research and Development activities for switches in white goods will focus on compiling information on how mercury switches in white goods are currently being handled (i.e. who are the main dismantlers, how do they operate, and where are they located). A budget of $25,000 has been assigned for this.

21.8.2 21.8.2 Other Switches

In Year 1 of the Consolidated MHSW Program Plan, Research and Development activities for switches in bilge pumps and sump pumps will focus on quantifying the number of pumps collected for recycling in collaboration with the service provider, and determining the physical locations where they are being discarded (e.g. marinas for bilge pumps; contractors for sumps pumps). A budget of $15,000 has been assigned for this

21.9 Year 1 Costs and Cost Recovery

21.9.1 Automotive Switches

The Year 1 total cost and cost recovery for automotive switches is presented in Table 21.7. Further information on the cost categories presented in Table 21.7 is available in Section 7 of Volume 1 of the Consolidated MHSW Program Plan.

Table 21.7: Year 1 Total Cost and Cost Recovery for Automotive Switches

Description	Cost
Material Management	$247,600
Contingency	$8,700
Material-Specific R&D	$0
Material-Specific P&E	$37,500
Common Costs	$94,000
Deficit Recovery	$0
Total	**$387,800**
Tonnes managed	0.25
Total cost/tonne	$1,545,266
Fee Rate	Measured return share

Notes:

1) Cost estimates were derived from Clean Air Foundation and Aevitas, the current switch processor, and include:
    - $3 financial incentive per switch, as described in section 21.6.1
    - the cost of collection containers, assuming 2 containers per participating dismantler
    - round-trip shipping costs (average for Ontario)
    - processing costs
2) The unit weight of an automotive switch is estimated at 3.3 grams.
3) For the purposes of estimating material management costs, a contingency of 3.5% has been applied.
4) While the material-specific cost to manage this group of products has been estimated as per table 21.7 above, "measured return share" means that the actual management cost, as well as a share of the budgeted common costs and deficit recovery, will be charged to stewards of those product categories.

21.9.2 Switches in White Goods

The Year 1 total costs and cost recovery for switches in white goods 1 is presented in Table 21.8 below. Further information on the cost categories presented in Table 21.8 is available in Section 7 of Volume 1 of the Consolidated MHSW Program Plan.

Table 21.8: Year 1 Total Cost and Cost Recovery for Switches in White Goods

Description	Cost
Material Management	$33,300
Contingency	$5,800
Material-Specific R&D	$25,000
Material-Specific P&E	$37,500
Common Costs	$41,000
Deficit Recovery	$0
Total	**$142,600**
Tonnes managed	0
Total cost/tonne	$493,554
Fee Rate	Measured return share

Notes:

1) The cost estimates were derived from the 2002 Niagara pilot project study, and include
    - capital cost per location (tools, personal protection equipment, mercury spill kit, collection pail, training on mercury spill procedure, and lab pack containers)
    - operating cost per mercury appliance (transportation and recycling costs)
    - financial incentive of $2.30 per mercury switch removed (assumes average time required to remove a switch from a chest freezer and gas range is 2 minutes and 10 minutes respectively; assumes 75% of appliances processed will be chest freezers; assumes a $34.50 hourly rate)

    An annual inflation rate of 2% was applied to estimate the current cost. The estimated cost also includes that fraction of the OPA's Great Refrigerator Roundup Program associated with the transportation and disposal of mercury switches collected through this Program.
2) For the purposes of estimating material management costs, a contingency of 17.5% has been applied.

3) While the material-specific cost to manage this group of products has been estimated as per table 21.8 above, “measured return share” means that the actual management cost, as well as a share of the budgeted common costs and deficit recovery, will be charged to stewards of those product categories.

21.9.3 Other Switches

The Year 1 total costs and cost recovery for switches in white goods 1 is presented in Table 21.810 below. Further information on the cost categories presented in Table 21.9 is available in Section 7 of Volume 1 of the Consolidated MHSW Program Plan.

Table 21.9: Year 1 Total Cost and Cost Recovery for Other Mercury Switches

Description	Cost
Material Management	$0
Contingency	$0
Material-Specific R&D	$15,000
Material-Specific P&E	$0
Common Costs	$25,000
Deficit Recovery	$0
Total	$40,000
Quantity managed	-
Fee Rate	Measured Return Share

Notes

1) While the material-specific cost to manage this group of products has been estimated as per table 21.9 above, “measured return share” means that the actual management cost, as well as a share of the budgeted common costs and deficit recovery, will be charged to stewards of those product categories.

22.0 Mercury Devices - Thermostats

22.1 Definition

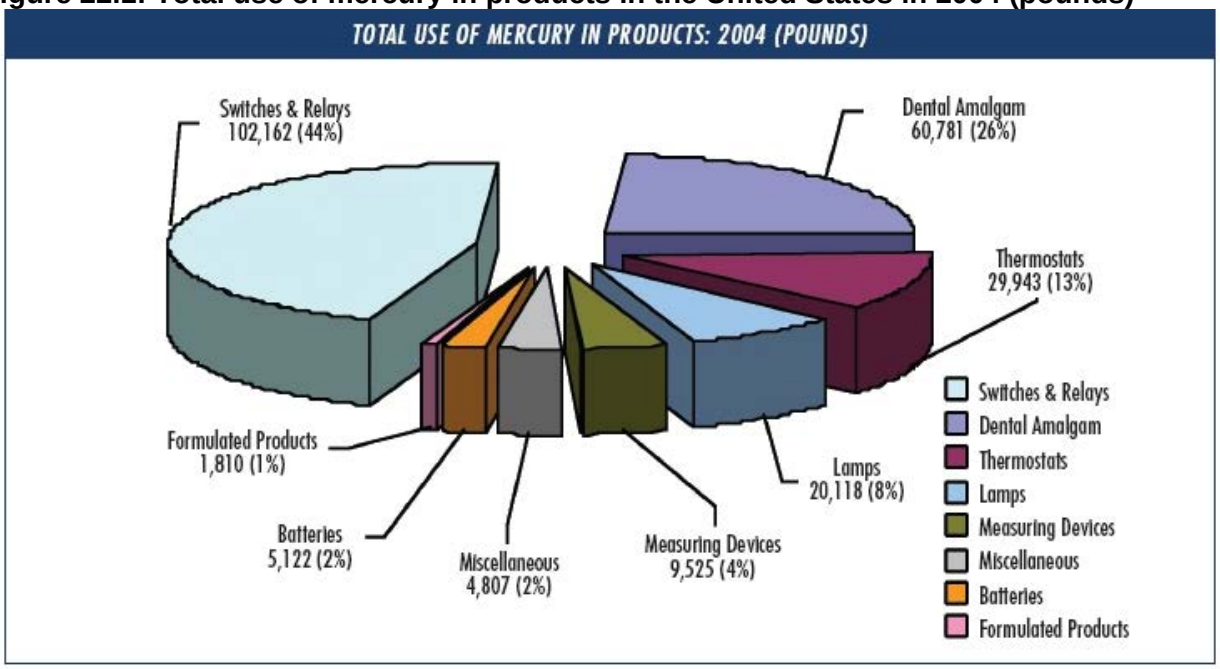
Mercury Thermostats means a product that uses a mercury switch to sense and control room temperature through communication with heating, ventilation and air conditioning equipment

22.2 Market and Product Information

Mercury is widely used in a variety of products utilized in residential, commercial and industrial environments. Mercury is a heavy liquid at room temperature and tends to be popular on account of its ability to conduct electricity and its standard responsiveness to changes in temperature and level. Typically, measuring devices contain the largest amount of mercury on a unit basis.
Mercury containing switches and relays, however, account for a far greater share of the total mercury in the marketplace, due to the very high number of products that contain switches and relays.

Figure 22.1 below provides a breakdown of mercury use by product category in the United States for 2004. According to this, thermostats represented 13% of the total use of mercury in products in the United States that year. It is reasonable to assume that the situation in Canada is comparable.

Figure 22.1: Total use of mercury in products in the United States in 2004 (pounds)



Source: Interstate Mercury Education & Reduction Clearinghouse (IMERC)

In late 2006, Environment Canada published a Risk Management Strategy for Mercury-containing products. The strategy outlines options available to Environment Canada to prohibit or limit the use of mercury in products. This prohibition is expected to include all products

containing mercury, with the exception of fluorescent lights and dental amalgams, and is expected to come into force in 2012[49]. Notwithstanding this, due to legislation restricting the use of mercury passed in the United States, and overall health concerns associated with this substance, the vast majority of manufacturers have discontinued the use of mercury in their products. For this reason, all the products designated under this category are obsolete in nature, that is to say, the material no longer supplied or sold for consumer use in Ontario.

22.3 Small Quantity IC&I Generators

The Minister's Program Request Letter designates waste thermostat that contain mercury from residential and IC&I small quantity generators. In the case of mercury, the quantities permitted from IC&I businesses is defined by the small quantity exclusion or Regulation 347 and is set at 5 kg of mercury containing waste per month.

22.4 Quantities Available for Collection

According to a report by Environment Canada, Honeywell, General Electric and White Rodgers are the main suppliers of thermostats into the Ontario market. Honeywell discontinued the sale of mercury thermostats in 2006[50]. White Rodgers ceased importation of mercury thermostats into Canada as of December 31, 2008[51].

There is no source of information available to estimate the quantities of mercury thermostats sold into Ontario up until 2008. An Environment Canada report estimates that the national domestic demand for mercury-containing thermostats in 2003 was approximately 195,000 units. In 2002, Union Gas and Enbridge estimated there were approximately 1.25 million mercury thermostats in use by natural gas consumers in the province of Ontario that year[52].

In addition to the lack of thermostat sales information, the challenge in attempting to determine the quantity of thermostats that become available for collection each year is that while the design lifespan of a mercury thermostat is considered to be 20-30 years, in practical use it is replaced more frequently, generally in 7-10 years. This is related to homeowner's upgrading their thermostat for energy efficiency, remodelling their home, and replacing or repairing HVAC systems. It also coincides with the average re-sale period of a home – a likely time for homeowner's to renovate and upgrade their systems.

Notwithstanding these limitations, an attempt has been made to estimate the quantity of thermostats available for collection for the baseline year of the Consolidated MHSW Program Plan, using information on the number of Central Air Conditioning (CAC) and Furnace Shipments into Ontario for 2008. Using data on the number of new home constructs for that time period, the number of CAC and furnace replacements attributable to the retro fit market has been estimated, as presented in Table 22.1

[49] Personal Communication, Denis Pineault, Environment Canada, January 2009
[50] Personal communication, Dan O'Donnell, Honeywell, March 2009
[51] Personal communications, Bill Gombos, Emmerson White Rodgers, May 2009
[52] Mercury Use in Switches in Canada and Estimating the Release of Mercury from these Sources at Electric Arc Furnaces, Leah Hagreen & Bruce Lourie, March 2002

Table 22.1: Number of Central Air Conditioning (CAC) and Furnace Shipments into Ontario for 2008

Description	2008
Ontario CAC Shipment	124,683
new home construct	76,025
New homes with AC (65%)	49,416
Retro Fit Market	**75,267**
Ontario Furnace Shipments	161,203
Fixed	102,712
ECM	58,491
New Homes	76,025
Retro Fit market	**85,178**

Source: New Home Construction Data from CMHC
Shipment data from HRAI

According to industry sources[53], a reasonable assumption regarding the incidence of thermostat replacement is that half of the replacements occur when both the CAC and furnace are replaced, and the other half occurs when only one of the two (either the CAC or the furnace) are replaced. Using this assumption and using CAC shipment numbers as the most conservative of the two types of replacements, an estimated 117,500 thermostats were replaced in 2008.

The next step is to estimate the fraction of these that would be likely to contain mercury. A survey conducted by the Heating, Refrigeration, and Air Conditioning Institute (HRAI) asked contractors what percentage of the programmable thermostats they installed were replacing mercury thermostats. Respondents were asked to specify a percentage range (i.e. less than 10%; 10-25%; 25-50%, etc). The average value for the 145 respondents who answered this question was 57%. An alternate and perhaps more statistically significant source of information is Statistics Canada's Households and the Environment Survey (2007)[54], which reported that 53% of households in Ontario had a programmable thermostat as their main thermostat – meaning that 47% had a non programmable thermostat as their main thermostat.

The non-programmable thermostat segment is made up of electronic and mechanical categories. While mercury thermostats are part of the mechanical category, not all mechanical thermostats do contain mercury. Because of this, it is difficult to estimate the fraction of non programmable thermostats that are likely to contain mercury. This is compounded by the fact that manufacturers' transition to all non-mercury thermostats took place over a long period of time, and mercury thermostat sales decreased significantly as more accurate, more efficient all-electronic models became available.

Notwithstanding these challenges, and recognizing that the numbers presented here are meant to be used for baseline establishment purposes only, one option is to use Frost and Sullivan data on the split of mechanical vs. electronic thermostat sales in 2003. Table 22.2 provides the number of mechanical and electronic thermostats sold in North America for residential markets.

[53] Personal Communication, Bill Wylie, Manager, OPA Programs, June 2009
[54] http://www.statcan.gc.ca/daily-quotidien/090210/dq090210a-eng.htm

Table 22.2: North American sales of thermostats to the residential market (2003)

Type of Thermostat	Units Sold	Percent of total sales
Mechanical	5,180,000	36%
Electronic	9,100,000	74%
Total	**14,280,000**	

Source: Information provided by Product Stewardship Institute, using Frost & Sullivan 2003 data.

Assuming that 36% of the 47% of non-programmable thermostats replaced in 2008 contained mercury, an estimated 19,881 mercury thermostats were available for collection that year.

22.5 Current Management Infrastructure & Performance

The Clean Air Foundation (CAF) has been running Switch the Stat, a program for the recovery of mercury thermostats, since 2006. Participating contractors are provided with a collection container and a pre-paid return Purolator waybill. Participants are asked to bring the collection container with them on jobs and to place the old thermostats they are replacing in the collection container. When the container is full, or when CAF conducts is bi-yearly "sweep" (i.e. requests all participants to send their containers in), participants call Purolator and ship the container to Aevitas in Ayr, Ontario for recycling using the pre-paid waybill.

The mercury is triple distilled and sent to Bethlehem in Pennsylvania for final distillation. The body of the thermostat is sent to WEEE processors for recycling. The glass vile originally containing the mercury is crushed, distilled, and sent for recycling in fiberglass applications.

Currently, 1,332 contractors/wholesalers in Ontario participate in the program. Between April 1, 2008 and March 31, 2009, 11,668 thermostats were collected through the program. The program is funded by the Ontario Ministry of the Environment, the Ontario Power Authority, Union Gas Limited, Enbridge Gas Distribution and Imperial Oil Foundation. The Heating Refrigeration and Air Conditioning Institute (HRAI) is a delivery partner to the project.

In 2007, two municipalities (Hamilton and Wellington County) collected mercury thermostats. The WDO Datacall reports that 49 kg of thermostats were collected. This is equivalent to approximately 430 thermostats[55]. However, as the WDO Datacall provides a default conversion factor of 1 kg per unit, caution should be exercised in interpreting this number as it may be under-representative. The current baseline for thermostats is summarized in Table 22.3 below.

Table 22.3: Baseline thermostat collection

	Units	Weight (kg)
Municipal collection (2007)	430	49
Switch the Stat (April 1, 2008 and March 31, 2009)	11,668	1,330
Total collection	**12,098**	**1,379**
Estimated quantity available for collection (as per section 22.4)	19,881	
Estimated collection rate	**~ 61%**	

22.6 Accessibility Strategy and Targets

Because of the obsolete nature of mercury thermostats, the quantities available for collection will necessarily decline over time. The program will therefore attempt to collect an increasing amount of a declining universe of available thermostats. With a lack of hard data, US states that

[55] Using a conversion factor of 114 g per thermostat (personal communication, Martin Luymes, HRAI)

are passing legislation now are incorporating language that allows for state agencies to re-examine the need for collection programs in approximately 7-10 years after sales of the products was discontinued.

Given this situation, the Year 1 collection target for thermostats proposes to build on the current collection numbers. During the first year of the program, a methodology will be developed for conducting a survey and determining the quantity of thermostats available for collection yearly. Targets for subsequent years will be set accordingly. This approach is similar to that which has been taken in the State of California and is discussed in further detail in Section 22.8.

In setting a target for Year 1, the collection performance of the Switch the Stat program (referred to as a "Specialty Service Channel" throughout the MHSW plan), as outlined in Table 22.4 below, was considered.

Table 22.4: Collection Performance for Switch the Stat Program

Timeframe	No. of thermostat switches collected[56]	No. of thermostats collected	No. of contractors participating in the program	Average number of thermostats collected per participant
April 1, 2008 - March 31, 2009	15,396	11,668	1,332	8.8
April 1, 2007 - March 31, 2008	9,068	6,872 (estimated)	935	7.3
Few months in 2006 (pilot)	1,141	865 (estimated)	125	6.9

HRAI estimates that all of its residential contractors participate in the Switch the Stat program[57], but that a very small number of its commercial contractors – which represent 40% of their total membership – participate in the program. HRAI has 800 members in Ontario and estimates that its members collectively represent two-thirds of the business in the province. According to the Technical Standard and Safety Authority (TSSA), there are approximately 3,000 heating and refrigeration contractors in the province (this includes very small and one-person companies).

The target will be to add an additional 100 participants to the program for the next five years. This increase would come through the HRAI's commercial contractors (who are not currently participating in the program), and reaching out to non-HRAI members (the remaining one-third of contractors in the Province). Using the current average number of thermostats collected per participants, it is estimated that an additional 880 thermostats would be collected yearly.

In addition to the Switch the Stat "specialty channel", the collection of mercury thermostats though events, depots, depot in box, and toxic taxi is expected to grow according to the general accessibility strategy outlined in Section 5 of Volume 1 of the Consolidated MHSW plan.

Table 22.5 below summarizes the Year 1 target for mercury thermostats.

[56] Thermostat contain on average 1.5 mercury switches

[57] HRAI makes participation in Switch the Stat a condition of participation in the Cool Rebates Saving Program. Participation in the CRSP allows contractors to have their customers benefit from financial rebates when they replace their old central air conditioning or heating systems with ENERGY STAR® qualified models.

Table 22.5: Year 1 Thermostat Collection Target

	Units	Kg
Collection target from Switch the Stat	12,548	1,430
Collection target from event, depots, Depot in a Box, Toxic Taxi	614 (est.)	70
Total collection target	13,162	1,500

Five-year collection targets presented in Table 22.6 assume an additional 880 thermostats collected per year resulting from the additional of 100 participants to the Switch the Stat program, as well as a growth in collection through depots, events, depot in a box and toxic taxi, as outlined in Section 5 of Volume 1 of the Consolidated MHSW Program Plan. Given that thermostats are entirely recyclable, a 100% recycling performance rate has been assumed.

Table 22.6: Five-Year Thermostat Collection and Recycling Performance Targets

	Baseline (2007/08)	Year 1 (kg)	Year 2 (kg)	Year 3 (kg)	Year 4 (kg)	Year 5 (kg)
Kg	1,379	1,500	1,632	1,775	1,931	2,100
units	12,096	13,158	14,316	15,570	16,939	18,421

Mercury thermostats are entirely recyclable, as outlined in Section 22.5 above. The recycling target for year 1 has therefore been set at 100% of what is collected.

Finally, consideration will be given to conducting a pilot though the retail channel to capture the "Do It Yourself" segment of the population (i.e. those individuals who replace their thermostat themselves, as opposed to using the services of a contractor).

22.7 Promotion and Education

As described in Section 5.5 of Volume 1 of the Consolidated MHSW plan, Promotion and Education activities will be implemented at three levels.

The province-wide "branding the behaviour" P&E program will continue to build on the **Do What You Can** campaign urging people to think about 3Rs objectives when it comes to managing MHSW. The message will be an overarching, motivational call to action, driving people to the **Do What You Can** website to find material specific and collection information.

The second layer of P&E is targeted as "educating about specifics" which will provide people with the information they need to take action. The approach to this P&E will depend on whether the product is a consumable or durable and what the desired end-of-life might be. Many products and containers will be collected at events, depots or depots-in-a-box.

As well, for some materials, targeted collection programs will require point of sale P&E tactics.

The recovery of mercury thermostats will be promoted as part of province-wide generic campaign. Specific P&E materials would also be required to support a potential pilot program encouraging Do-it-Yourselfers to return obsolete thermometers to retail. For Year 1 of the Consolidated MHSW Program Plan, a P&E budget of $37,500 has been allocated.

22.8 Barriers and Opportunities to Increased Diversion & Research and Development Needs

Due to the obsolete nature of mercury thermostats, research and development activities will focus on identifying the quantities available for collection and establishing how these quantities are likely to decline over time.

This will require the development and implementation of a survey to determine the prevalence of mercury thermostats in the Province. The study would likely follow the approach taken in the State of California, which itself draws on the approach taken by King County in the State of Washington. While the Washington study used a field-study approach, California's study includes surveys of contractors. An R&D budget of $75,000 has been allocated for this.

Another element of the Research and Development strategy for this material will be to give consideration to conducting a pilot though the retail channel to capture the "Do It Yourself", as mentioned in section 22.5 above.

22.9 Year 1 Costs and Cost Recovery

The Year 1 total cost and cost recovery for thermostats is presented in Table 22.7 below. Further information on the cost categories presented in table 22.7 is available in Section 7 of Volume 1 of the Consolidated MHSW Program Plan.

Table 22.7: Year 1 Total Thermostat Costs and Cost Recovery

Description	Cost
Material Management	$120,400
Contingency	$12,600
Material-Specific R&D	$75,000
Material-Specific P&E	$37,500
Common Costs	$63,900
Deficit Recovery	$0
Total	**$309,400**
Tonnes managed	1.50
Total cost/tonne	$206,620
Fee Rate	Measured return share

Notes:

1) Cost estimates for Switch the Stat program were obtained from Clean Air Foundation and Aevitas.
2) For the purposes of estimating material management costs, a contingency of 10.5% has been applied.
3) While the material-specific cost to manage this group of products has been estimated as per table 22.7 above, "measured return share" means that the actual management cost, as well as a share of the budgeted common costs and deficit recovery, will be charged to stewards of those product categories.

23.0 Toxics

23.1 Definition

Toxic and harmful liquids, solids, pastes, gels, and gases, as defined by CCCR, and CSA Std Z752-03.

23.2 Product Identification

Products identified as toxic under the CCCR fall broadly within the categories of

- Adhesives,
- Automotive additives and cleaners,
- Coatings, sealers, strippers, undercoating,
- Waxes, polishes
- Household cleaning agents,
- Numerous pesticides and pest control products.

From a program perspective, however, products in these categories are largely captured within one of the other material categories in the MHSW program, namely the categories for Paints and Coatings, Corrosives, Flammables and Pesticides. As these categories align with product classes and disposal methods and requirements, it is preferable to capture products under those definitions.

A preliminary review of consumer retail products did not identify toxic products that were not included in the other categories. Isolating individual products which are excluded from the definitions of the above mentioned material categories in the MHSW program but which are, nonetheless, toxic, requires specific waste stream composition research.

23.3 Category Research and Development Strategy

Identifying products to be obligated under the toxics category should be undertaken through two primary avenues:

1. Ongoing product research should be undertaken to identify products in the marketplace which fall within the toxic material category definition, but which do not fit the definitions of the other material categories
2. Ongoing analyses of collected materials composition (labpack) should also be conducted to identify materials and products that are in the waste stream.

These two channels of input should generate a list of Toxics materials and stewards that are selling MHSM into the marketplace and also what is available for collection and what is actually collected.

In order to cover the costs associated with this research, funds have been allocated under the Common Cost category, as outlined in Section 23.4 below.

23.4 Year 1 Costs and Cost Recovery

The Year 1 total costs and cost recovery for toxics are outlined in Table 23.1 below.

Table 23.1: Year 1 Total Costs and Cost Recovery for Toxics

Description	Cost
Material Management	$0
Contingency	$0
Material-Specific R&D	$0
Material-Specific P&E	$0
Common Costs	$25,000
Deficit Recovery	$0
Total	**$25,000**
Tonnes managed	-
Total cost/tonne	**-**
Fee Rate	Measured Return Share

Notes:

1) If a commercial connection cannot be established between this material and a steward, these materials would be categorized as “orphan” products and these costs would not be accepted under the program.
2) For the purposes of estimating material management costs, a contingency of 17.5% has been applied.
3) While the material-specific cost to manage this group of products has been estimated as per table 23.1 above, “measured return share” means that the actual management cost, as well as a share of the budgeted common costs and deficit recovery, will be charged to stewards of those product categories.