

# TORONTO STAFF REPORT

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August 8, 2005

To: Administration Committee  
From: Treasurer  
Subject: Feasibility of Establishing a Toner Cartridge Refilling Station

Purpose:

The purpose of this report is to respond to the Administration Committee's request to report on the feasibility of establishing a refilling station or facility for refilling toner cartridges.

Financial Implications and Impact Statement:

There are no financial implications arising from this report.

Recommendations:

It is recommended that the City of Toronto continue to purchase replacement toner cartridges to meet its operational requirements by awarding blanket contracts through the competitive bidding process and not establish a refilling station or facility for refilling toner cartridges.

Background:

At its meeting of October 26, 2004 Council approved the recommendations in Administration Committee Report 6, Clause 10a. One of the recommendations read as follows:

*"That the Chief Financial Officer and Treasurer be requested to report back to the Administration Committee:*

- (1) on the feasibility of establishing a refilling station or facility for refilling existing toner cartridges; and*
- (2) in one year's time, providing a review and evaluation of the City of Toronto's experience using remanufactured toner cartridges."*

This report responds to item one only. A report addressing item two will be forwarded to Administration Committee after information has been collected for a one-year period and then reviewed and evaluated.

Comments:

Remanufactured replacement toner cartridges are currently being purchased through a competitive bidding process administered by Purchasing and Materials Management Division (PMMD). These replacement toner cartridges are available to City staff through PMMD Stores. Divisions wishing to purchase replacement toner cartridges that are not stocked by PMMD Stores can do so through the City's supplier of stationary products. In 2004, the volume of replacement toner cartridges purchased was 7,345. Approximately 6,348 of those through PMMD Stores and 997 through the City's stationary supplier.

The current PMMD Stores Blanket Contracts for remanufactured toner cartridges were awarded to eight different suppliers based on lowest cost per cartridge meeting City specification. The Blanket Contracts include 39 different types of replacement toner cartridges, all of which are remanufactured. Based on estimated annual line usage, the total award value for these contracts is \$357,606.87 excluding taxes.

Empty toner cartridges discarded by City staff are collected from various City locations and recycled by selling them to a toner cartridge remanufacturer. In 2004, 76% of the replacement toner cartridges issued by PMMD were recycled through this process. Total dollar value reclaimed through this recycling program was \$8,392.12. This revenue is used by Purchasing and Materials Management Division to support the toner cartridge recycling program.

As requested by Council, staff has investigated the feasibility of establishing a refilling station or facility for refilling existing toner cartridges. The following section of this report provides information regarding the practices of other municipalities and school boards, the process and costs for refilling toner cartridges, facility requirements, staffing requirements and costs, and safety and environmental information

Survey of Municipalities and School Boards:

A survey was undertaken of sixteen municipalities and two School Boards across Canada and the United States (Appendix A) to determine if any were operating an in-house toner cartridge refilling station or facility, or had conducted a feasibility study relating to this subject. They were also asked whether they were aware of such a study being undertaken by anyone else in their organization.

The survey revealed that none of the respondents operate an in-house toner cartridge refilling station or facility, have not conducted or are aware of anyone else in their organization having undertaken a study to determine the feasibility of establishing a refilling station or facility. Opinions provided by the respondents were that this was not considered a core function of a municipal government, that the private sector is much better

positioned for remanufacturing toner cartridges, the economics of doing so would not be feasible for a municipal government, and, that suppliers provide remanufactured toner cartridges at a financial rate that their organization would not be able to replicate.

#### Remanufactured Toner Cartridge Process and Associated Costs:

Consultation and site visits with two toner cartridge remanufacturing facilities in the Greater Toronto Area were undertaken in order to gain an understanding of the procedures and associated costs of the toner cartridge remanufacturing process. The general requirements of a cartridge remanufacturing process include sorting, inspection, dismantling, recharging, assembly and performance testing. A brief description of the process used in these facilities, which would be the process the City would also use, is outlined below. A more detailed process description and associated costs is provided in Appendix B.

##### (a) Sorting:

Used cartridges are sorted by cartridge type during which time they are checked for physical damage. Only undamaged cartridges are chosen for the remanufacturing process. The costs for sorting are for labour and depend on the number of cartridges processed through this step. A summary of staffing requirements, which include sorting, is included in the Staff Requirements and Costs section on page 4 of the report.

##### (b) Inspection, Disassembly, Maintenance and Reassembly:

After sorting, the undamaged cartridges are inspected to determine the remanufacturing cycle life remaining for the cartridge and if they are in an acceptable condition to be remanufacturing. The used toner cartridge reject rate during this process is relatively low, estimated at approximately 10% requiring the source of used cartridges to be higher than the volume of the finished product. Those used toner cartridges that are acceptable for remanufacture after the initial inspection are dismantled, cleaned, recharged with new toner, and reassembled.

##### (c) Performance Testing:

A performance test consists of loading the remanufactured toner cartridge into a test printer and printing 25 copies of test pattern on white xerographic copy paper. This test is performed to ensure that the remanufactured cartridge operates properly and is producing copies that meet the requirements of printing quality such as no blasting, streaking, smudging or adhesion.

##### (d) Packaging:

Packaging is required to protect the finished product during handling and storage. This includes a sealed foil type packaging to eliminate effects of moisture and an outer package for physical protection.

(e) Yield Test:

A yield test is performed to determine the number of prints of acceptable quality that can be obtained from a remanufactured toner cartridge under normal conditions of use as described in testing standards such as Canadian General Standards Board (CGSB) -53.148-2004 – Remanufactured Toner Cartridges. Yield tests are only performed periodically as a method to ensure the quality of the remanufacturing process is meeting requirements.

Facility Requirements:

A facility of approximately 1,200 sq. ft. would be required to accommodate the equipment necessary to remanufacture approximately 7,345 toner cartridges per year, store the used cartridges until they are required by City departments, and store an inventory of replacement toner and parts. The facility would require a heating, ventilation and air conditioning system capable of maintaining a climate-controlled environment and adequate air exchange, a clean room with ventilation equipment to maintain positive pressure, and electrical outlets for all process and test printing equipment. For the purpose of this feasibility study it was assumed that the space for the facility could be provided from within an existing City facility. The Facility and Real Estate Division has estimated initial costs to convert such space into a refilling facility would be approximately \$50,000. This cost includes items such as constructing the clean room and the supply and installation of mechanical ventilation, lighting and electrical outlets. The annual operation and maintenance cost of the facility is estimated to be approximately \$10,000.

Staffing Requirements and Costs:

Based on discussions with staff at one of the private facilities visited, processing an estimated annual requirement of 7,345 used toner cartridges through the toner cartridge remanufacturing process would require approximately three trained and qualified full time equivalent staff. The annual labour cost to meet this requirement is estimated to be approximately \$155,000.00.

Safety & Environmental Concerns:

The toner cartridge remanufacturing process exposes workers to toner powder during the cleaning and recharging phases of the process. Exposure can be controlled through the use of mechanical ventilation and personal protective equipment.

Disposal of waste toner and used toner cartridges is subject to local, provincial and federal regulations. Processing used toner cartridges through a remanufacturing process will result in waste toner and used toner cartridges that will require disposal. It is expected that this will not result in added costs to the City.

Cost Summary:

Based on the process and requirements described in the previous section of this report, the estimated initial set up cost for the facility and equipment is estimated to be approximately \$73,280.00.

In addition, the annual maintenance and operations costs for a toner cartridge refilling station or facility is \$531,011.12. The cost breakdown is summarized below.

Facility Maintenance Cost	\$ 10,000.00
Materials and Supplies Cost (toner, replacement parts, used cartridges, packaging)	\$357,619.00
Labour Cost	\$155,000.00
Lost Revenue from current recycling contract	\$8,392.12
Approximate Total Annual Cost	<hr/> \$531,011.12

Feasibility of Establishing a Refilling Station or Facility for Existing Toner Cartridges

As discussed, an estimated set up cost of \$73,280.00 is required for a 1,200 square foot toner refilling station or remanufacturing facility. The estimated annual maintenance and operating costs that includes facility maintenance, materials and labour is \$531,011.12 (includes lost revenue from recycled toner cartridges). This translates to a cost of approximately \$604,291.12 in the initial year and approximately \$531,011.12 in subsequent years of operation.

The current blanket contracts for remanufactured toner cartridges awarded by the Purchasing and Materials Management Division for the City's estimated annual volume totals \$357,606.87 excluding taxes. It would cost the City approximately \$246,684.25 more in the initial year and approximately \$173,404.25 more in subsequent years to meet its replacement toner cartridge requirement by maintaining and operating a toner cartridge refilling facility than it would to purchase remanufactured toner cartridges from suppliers through the competitive bid process.

Conclusion:

Toner cartridge remanufacturing is a relatively new industry. Printer manufacturers introduce new printer models to the market on a consistent basis that often require new toner cartridge models. It can take up to a full year before the toner cartridge remanufacturing capability is developed. It would be difficult to keep up with the pace of this technology and would require continual upgrading to stay current.

The total annual additional costs for establishing a refilling station or facility would be \$173,404.25. Given these costs, it is recommended that the City continue to purchase replacement toner cartridges and not establish a refilling station or facility for refilling cartridges.

The annual volume of toner cartridges used by the City of Toronto is too low to realize the advantage for economies of scale as it relates to an in-house refilling station or facility. The associated costs of setting up and maintaining an operation to refill toner cartridges would be greater than purchasing them. The most cost effective method of providing replacement toner cartridges to meet the City's needs is to purchase them on Blanket Contracts awarded through the City's competitive bid process.

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Attachments:

Appendix A: Survey list of municipalities, school boards and toner cartridge remanufacturers

Appendix B: Remanufactured Toner Cartridge Process and Associated Costs

## APPENDIX A

### Survey List of Municipalities, School Boards and Toner Cartridge Remanufacturers

1. Toronto District School Board
2. York Region District School Board
3. Region of Peel
4. City of Ottawa
5. City of Calgary
6. Town of Ajax
7. City of Oshawa
8. City of Montreal
9. City of Vancouver
10. City of Moncton
11. Greater Vancouver Regional District
12. City of Winnipeg
13. City of Mississauga
14. City of New York
15. City of Bangor
16. City of Los Angeles
17. State of New Mexico
18. State of Utah

### Toner cartridge remanufacturing facilities visited during study.

1. Laser Cartridge Services Inc  
850 Brock Road, Unit 1  
Pickering, ON
2. 24 Hour Toner Service  
127 Sunrise Ave., Unit 4  
Toronto, ON

## APPENDIX “B”

### Remanufactured Toner Cartridge Process and Associated Costs

Consultation and site visits with two toner cartridge remanufacturing facilities in the Greater Toronto Area was undertaken in order to gain an understanding of the steps procedures and associated costs of the toner cartridge remanufacturing process. The general requirements of a cartridge remanufacturing process include sorting, inspection, dismantling, recharging, assembly and performance testing. A detailed description of each step and the associated costs are outlined below.

#### (a) Sorting:

Used cartridges are sorted by cartridge type during which time they are checked for physical damage. Only undamaged cartridges are chosen for the remanufacturing process. Once sorted, the cartridges are staged for dismantling, maintenance and reassembling. The costs for sorting are for labour and depend on the number of cartridges. A summary of staffing requirements including sorting is included in the Staff Requirements and Costs section on page 4 of the report.

#### (b) Inspection, Disassembly, Maintenance and Reassembly:

After sorting, the undamaged cartridges are inspected to determine the remanufacturing cycle life remaining for the cartridge. Toner cartridges can be recycled 8 to 10 times or until the cartridge body weakens from fatigue and fixed parts such as electrical contacts becoming loose. If these conditions exist, the toner cartridge is rejected and removed from the remanufacturing process.

The used toner cartridge reject rate during this process is relatively low, estimated at approximately 10% requiring the source of used cartridges to be higher than the volume of the finished product. The City’s estimated annual requirement on the current blanket contracts is 7,345 replacement toner cartridges. Based on the reject rate described earlier, the City would require a source of approximately 8,500 used toner cartridges to supply the remanufacturing process. Approximately 5,600 of this requirement could be satisfied internally but would require the City to cancel its current toner cartridge recycling program contract to reuse them internally. However, this will provide less than the total volume of used toner cartridges required for the remanufacturing process. An additional 2,900 used toner cartridges would have to be obtained through an external source at an approximate cost of \$6,090.00. Cancelling the current toner cartridge recycling program contract would result in lost revenues of approximately \$8,392.12 annually.

Those used toner cartridges that are acceptable for remanufacture after the initial inspection are dismantled, cleaned, recharged, and reassembled. This includes removal of screws, pins, and the separation of joints. The waste toner in the used cartridge is emptied into a dump station. A dump station is piece of equipment used to collect the waste toner and prevent it from being spread throughout the work area. Based on the City’s volume of cartridges being processed, only one dump station would be needed. The cost of a dump station is approximately \$5,500.00.

Once the waste toner has been emptied from the cartridge, the toner compartment, waste bin and all other cartridge components are thoroughly cleaned using a compressed air system. The waste toner is removed from the dump station through a vacuum and waste bin system. The used toner



collected in the waste bin system would require disposal. The approximate cost of a waste toner vacuum and waste bin collection system is \$6,000.00.

The cleaned cartridge bodies and components are then moved to a clean room for further processing. The clean room is maintained at a positive pressure using mechanical ventilation equipment to minimize dirt and toner dust contaminants during the maintenance, charging and reassembly phases. All parts of the cartridge are examined for wear and replaced as necessary. The average cost for replacement parts required to remanufacture a toner cartridge is approximately \$30.00/cartridge. Based on the City's estimated annual usage of 7,345 cartridges, the annual cost would be approximately \$220,350.00. The toner compartment is then recharged with new toner and the cartridge is reassembled including the installation of the magnetic roller, doctor blade and computer microprocessor chip. The average cost to recharge a toner cartridge with new toner is \$11.00/cartridge. Based on the City's estimated annual usage of 7,345 cartridges, the annual cost to recharge toner cartridges with new toner would be approximately \$96,954.00

(c) Performance Testing:

A performance test consists of loading the remanufactured toner cartridge into a test printer and printing 25 copies of test pattern on white xerographic copy paper. This test is performed to ensure that the remanufactured cartridge operates properly and is producing copies that meet the requirements of printing quality such as no blasting, streaking, smudging or adhesion. Each remanufactured cartridge has a test print performed prior to being sent forward for packaging. A minimum of six medium volume monochrome printers would be required for this step in the process at an approximate cost of \$8,280.00.

(d) Packaging:

Packaging is required to protect the finished product during handling and storage. This includes a sealed foil type packaging to eliminate effects of moisture and an outer package for physical protection. The cost for packaging is approximately \$4.00 per cartridge. Based on the City's estimated annual usage of 7,345 cartridges, the estimated annual cost for packaging materials would be approximately \$29,380.00

(e) Yield Test:

A yield test is performed to determine the number of prints of acceptable quality that can be obtained from a remanufactured toner cartridge under normal conditions of use as described in testing standards such as Canadian General Standards Board (CGSB) -53.148-2004 – Remanufactured Toner Cartridges. Yield tests are only performed periodically as a method to ensure the quality of the remanufacturing process is meeting requirements. The average cost to perform a yield test is \$125.00/test. On the basis of conducting one yield test per cartridge per year for the 39 cartridge models the City uses the approximate annual cost would be \$4,875.00.