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Consultation Document

Proposed Risk Management Measure for Tetrabutyltin

Environment Canada

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Canada

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1 Introduction

Organotin substances are tin compounds having 1, 2, 3 or 4 organic groups attached and are designated as mono-, di-, tri- or tetraorganotin depending on the number of tin-carbon bonds in the molecule. Organotins are mainly used in the vinyl processing industry and as pesticides. Tetrabutyltin, the substance which is the subject of this consultation document, has the chemical formula $(C_4H_9)_4Sn$ and is used in Canada as a starting material for the synthesis of mono- and dibutyltin compounds for use in polyvinyl chloride (PVC) processing.

The final follow-up ecological assessment report for non-pesticidal organotin compounds was published by Environment Canada in the *Canada Gazette*, Part I, on August 8, 2009, under section 68 of the *Canadian Environmental Protection Act, 1999* (CEPA 1999) [EC, 2009a]. With respect to tetrabutyltin, this assessment report concluded that tetrabutyltin has the potential to cause environmental harm since it is a precursor to tributyltins, which are persistent and bioaccumulative compounds. Furthermore, it concluded that tetrabutyltin is entering, or may enter, the environment in a quantity or concentration or under conditions that have or may have an immediate or long-term harmful effect on the environment or its biological diversity, as defined in paragraph 64(a) of CEPA 1999.

In the *Risk Management Approach for Non-Pesticidal Organotin Compounds* that was published in August 2009 (EC, 2009b), the Government of Canada indicated it would consider issuing a Code of Practice for tetrabutyltin under paragraph 54(1)(d) of CEPA 1999 for the purpose of minimizing releases of tetrabutyltin to the aquatic environment by identifying best management procedures and practices for activities involving the import, distribution, manufacture and use of the substance.

Environment Canada is developing a Code of Practice for tetrabutyltin. This is being proposed to meet the risk management objective of achieving the lowest level of releases that are technically and economically feasible. A draft of the Code of Practice is presented in Annex A.

This consultation focuses on the environmental and economic issues associated with the proposed Code of Practice. The purpose of this consultation is to:

- Inform interested stakeholders of the proposed Code of Practice; and
- Provide an opportunity for interested stakeholders to comment on the proposed Code of Practice.

The Government of Canada is committed to providing interested and affected parties with the opportunity to take part in consultations at all stages of the Code's development. All interested parties may comment on the proposed Code of Practice in writing to the contact provided in section 4 of this document.

2 Industrial Use of Tetrabutyltin

2.1 Current Uses and Industrial Sectors

Tetrabutyltin is used as a raw material for the production of mono- and dibutyltin compounds in Canada. The tetrabutyltin used as the raw material can contain up to 20% tributyltins as an impurity.

2.2 Releases and Exposure Sources to the Environment

In Canada, releases of tetrabutyltin to the environment could occur as a result of manufacturing, formulation and blending processes, principally during equipment cleaning operations, the handling of tetrabutyltin, and during cleaning of liquid residue remaining in shipping containers.

3 Existing Risk Management Activities for Tetrabutyltin

3.1 Canada

Ministerial Condition No. 13618 is in place for tetrabutyltin under paragraph 84(1)(a) of CEPA 1999. The Ministerial Condition imposes conditions restricting its use and prescribing handling and disposal procedures to control its release to the environment. At present, one company processing tetrabutyltin is subject to the conditions. As the Code of Practice will incorporate the requirements of the Ministerial Condition already in place and will now apply to all importers, distributors, manufacturers and users of tetrabutyltin in Canada, the Ministerial Condition would no longer be necessary and therefore Environment Canada will consider rescinding it once the Code of Practice is in place.

Although tetrabutyltin is not believed to be persistent in the environment, it is expected to degrade, producing tributyltins. As a precursor to persistent and bioaccumulative compounds that have the potential to cause environmental harm, tetrabutyltin is, in itself, considered to have potential to cause harm. Furthermore, commercial grades of tetrabutyltin may contain tributyltins as impurities. Therefore, the proposed Code of Practice for tetrabutyltin is intended to reduce potential environmental releases of tetrabutyltin along with any release of tributyltins present as an impurity or resulting from the degradation of tetrabutyltin.

It should be noted that Environment Canada is currently proposing a separate risk management action that would prohibit the manufacture, use, sale and offer for sale, and import of tributyltins. Stakeholders will have an opportunity to provide comments on the proposed regulatory proposal for tributyltins. To that effect, a separate consultation document is also available to stakeholders at the following website:

www.ec.gc.ca/lcpe-cepa/eng/participation/default.cfm

3.2 International

No risk management actions for tetrabutyltin have been proposed by other countries at this time.

4 Next Steps

Please submit comments on the proposed Code of Practice presented in Annex A of this consultation document by **February 18, 2011**. All comments submitted by that date will be taken into consideration while drafting the final Code of Practice. Environment Canada welcomes the distribution of this consultation document to any interested and affected parties. A copy of this consultation document is available on the CEPA registry website:
www.ec.gc.ca/lcpe-cepa/eng/participation/default.cfm

Pursuant to section 313 of CEPA 1999, any person who provides information to the Minister of the Environment under CEPA 1999 may submit with the information a request that it be treated as confidential. Comments and information submissions on this proposed Code of Practice should be submitted either by mail, email or fax to:

Director
Chemical Production Division
Environment Canada
Place Vincent Massey, 11th Floor
351 St. Joseph Boulevard
Gatineau QC K1A 0H3
Fax: 819-994-5030
Email: pgpc-cmp.dppc-cpd@ec.gc.ca

Please type "Consultation on Proposed Tetrabutyltin Code of Practice" in the subject line of your message.

Following the current consultation, comments received will be considered during the development of the final Code of Practice. Environment Canada will then publish a notice in the *Canada Gazette*, Part I, indicating that the final Code of Practice is available. Please note that there is no comment period after such a publication.

5 References

[EC], Environment Canada, 2009a. Follow-up to the 1993 Ecological Risk Assessment of Organotin Substances on Canada's Domestic Substances List. Environment Canada website: www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=B3B78BAF-1

[EC], Environment Canada, 2009b. Proposed Risk Management Approach for Non-Pesticidal Organotin Compounds. Environment Canada website: www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=98F99990-1

Annex A



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Proposed Code of Practice for the Management of Tetrabutyltin in Canada

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Glossary of Terms

ASTM	American Society for Testing and Materials
CCBFC	Canadian Commission on Building and Fire Codes
CEPA 1999	<i>Canadian Environmental Protection Act, 1999</i>
CSA	Canadian Standards Association
DSL	Domestic Substances List
MSDS	Material Safety Data Sheet
NFPA	National Fire Protection Association
PPE	Personal Protective Equipments
PVC	Polyvinyl Chloride
TDG	Transportation of Dangerous Goods
ULC/ORDs	Underwriters' Laboratories of Canada/Other Recognized Documents

Preface

Background

Organotin substances are tin compounds having 1, 2, 3 or 4 organic groups attached and are designated as mono-, di-, tri- or tetraorganotin depending on the number of tin-carbon bonds in the molecule. Organotins are mainly used in the vinyl processing industry and as pesticides. Tetrabutyltin, the substance which is the subject of this proposed Code of Practice, has the chemical formula $(C_4H_9)_4Sn$ and is used in Canada as a starting material for the synthesis of mono- and dibutyltin compounds for use in polyvinyl chloride (PVC) processing.

Between August 1994 and March 2000, the Minister of the Environment received notifications for nine organotin substances as “new” and/or “transitional” substances pursuant to subsection 26(2) of the 1988 *Canadian Environmental Protection Act* (CEPA), now subsection 81(1) of the *Canadian Environmental Protection Act, 1999* (CEPA 1999, the statute that has repealed and replaced CEPA). These substances were proposed for importation or manufacture in Canada as stabilizers for PVC products, as intermediates used in the manufacture of organotin stabilizers and as material preservatives for building material formulations.

These new and transitional substances were assessed, and it was concluded that the nine substances are entering or may enter the environment in a quantity or concentration or under conditions that have or may have an immediate or long-term harmful effect on the environment or its biological diversity. Therefore, these substances are meeting the criterion set out in paragraph 64(a) of CEPA 1999.

On March 23, 2005, a Notice under subsection 84(5) of CEPA 1999 specifying the conditions under Ministerial Condition No. 13618 pertaining to the use, release and disposal of tetrabutyltin in Canada was published in the *Canada Gazette*, Part I [1].

In light of the assessment of the nine organotins, Environment Canada decided to do a follow-up ecological assessment on all organotins listed on the DSL. The DSL is a compilation of all known substances that were in Canadian commerce between 1984 and 1986 or that are added to the DSL in accordance with CEPA 1999. A Notice summarizing the scientific considerations of the final follow-up ecological assessment report for organotin substances was published by Environment Canada in the *Canada Gazette*, Part I, on August 8, 2009, pursuant to section 68 of CEPA 1999 [2]. The final follow-up ecological assessment report concluded that tetrabutyltin meets the criterion set out in paragraph 64(a) of CEPA 1999 [3]. It was found that tetrabutyltin can be harmful to sensitive aquatic organisms at low concentrations. There is further concern for this substance because it can break down by dealkylation into tributyltins. In addition, commercial grades of tetrabutyltin may contain up to 20% of tributyltins as an impurity. Tributyltins were also found to meet the criterion set out in paragraph 64(a) and also meets the criteria for persistence and bioaccumulation as defined by the *Persistence and Bioaccumulation Regulations* made under CEPA 1999.

Based on the results of the final ecological assessment, Environment Canada decided to develop a Code of Practice which would help minimize the risk associated with the release of tetrabutyltin to the environment by implementing best management procedures and practices [3].

Purpose

The purpose of this proposed Code of Practice (herein referred to as the “proposed Code”) is to minimize releases of tetrabutyltin to the aquatic environment by identifying best management procedures and practices for activities involving the import, distribution, manufacture and use of tetrabutyltin. However, all applicable municipal, provincial, territorial and federal legal requirements must be met, and a commitment by any person to implement the practices and procedures set out in the proposed Code’s requirements does not remove obligations to comply with all applicable statutory and regulatory requirements. While the only current application of tetrabutyltin in Canada is for the production of tin stabilizers, the Code will also apply to any new activities involving tetrabutyltin. The owner/operator of a facility where tetrabutyltin is used may attain several benefits by implementing the Code, for instance:

- Reduced environmental releases
- Reduced tetrabutyltin waste generation
- Improved product quality
- Enhanced community relations and overall operating performance

1 Applicability

This proposed Code of Practice applies to all importers, distributors, manufacturers and users of tetrabutyltin in Canada, but does not apply to importers of the substance as a component of dry blended vinyl compounds.

Figure 1 is a flow chart demonstrating the tetrabutyltin handling and disposal process with the potential routes of releases into the environment. As shown in Figure 1, there may be a potential for uncontrolled, unplanned or accidental releases (which, for simplicity, will be referred to as “spills” in this proposed Code) and leaks in the packaging, shipment, delivery, storage and handling of the substance as well as in the manufacturing and the processing steps of the substance itself. Therefore, this proposed Code of Practice provides guidance for the management of tetrabutyltin to limit such potential releases. The proposed Code provides best management practices for the following activities:

- Packaging, storage, and secondary containment
- Handling and dispensing
- Uncontrolled, unplanned or accidental releases
- Reusable and non-reusable packaging
- Waste disposal
- Record keeping and reporting
- Training and management system

The best management practices outlined below may not apply in all circumstances, therefore individual companies using tetrabutyltin should determine which of the best management practices are most appropriate to their unique situation.

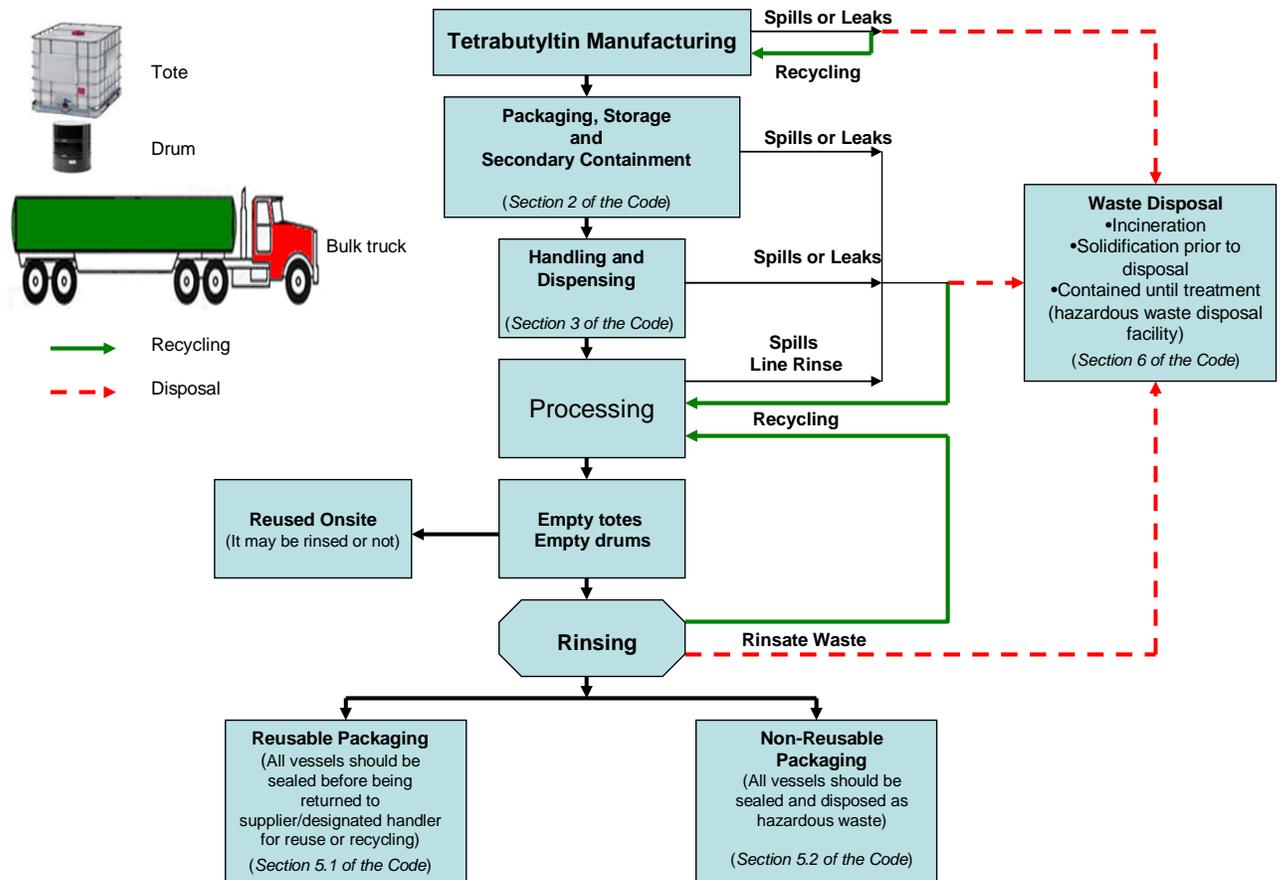


Figure 1: Tetrabutyltin Handling Process Flow Chart with Potential Releases into the Environment and Disposal

2 Recommended Practices for Packaging, Storage and Secondary Containment

Tetrabutyltin is commercially available in different packaging and is shipped to the facility by bulk trucks (20 000 kg), which are typically dedicated, or in totes (1 000 kg), drums (220 kg) or small pails (20 kg or less). The packaging material should be non-reactive to tetrabutyltin.

Tetrabutyltin is a corrosive liquid that is sensitive to moisture and contamination by iron. The Material Safety Data Sheet (MSDS) for tetrabutyltin should be checked for the potential for incompatibility with other stored materials like oxidizing agents and should thus be stored away from such materials. Storage tanks, totes, drums and pails containing tetrabutyltin should also be kept well away from sources of flame or heat and should be inspected for leaks, structural integrity and any sign of deterioration on a routine basis.

To achieve the lowest level of releases to the environment, accidental spills should be prevented. Drums and totes need to be protected during storage and use to prevent a container from being accidentally damaged by mechanical devices or vehicular traffic. This can be achieved by storing the containers in designated secure storage areas inside the facility where there is a low volume of forklift and personnel traffic. The storage of totes or drums should be limited to a maximum of two stacks when they are full or three stacks when they are empty. It is recommended to identify the storage area for tetrabutyltin as “Tetrabutyltin storage area” as well as to label the containers with “Contains tetrabutyltin.”

Potential release of tetrabutyltin from improper drainage to the environment should be prevented through the use of secondary containment (e.g. a container, structural barrier placed around a vessel or dikes), berms, spill pallets and the closing of floor drains. Secondary containment should be sized so as to provide a minimum impoundment volume equal to or greater than:

- a) 110% of the volume of the largest tank; or
- b) 100% of the volume of the largest tank plus the greater of 10% of the largest tank or 10% of the aggregate volume of all remaining tanks.

It is recommended to design dikes that will not allow tetrabutyltin to accumulate around the bottom of tanks or equipment in case of a spill. It is recommended to design the dikes in a way to direct spills to an area away from the storage tank and install a firewall to protect the storage tank from flames if a fire occurs.

Applicable standards for bulk storage tanks should be followed (e.g. American Petroleum Institute (API), Underwriters’ Laboratories of Canada/Other Recognized Documents (ULC/ORDs), Canadian Standards Association (CSA), American Society for Testing and Materials (ASTM), Canadian Commission on Building and Fire Codes (CCBFC), National Fire Protection Association (NFPA)). Note that handling and storage activities must be in compliance with all applicable municipal, provincial, territorial and federal legislation, such as but not limited to provincial and territorial fire and building codes and occupational health and safety requirements. Companies should also check and follow any provincial or territorial environmental guidelines or other requirements for chemical and waste storage such as the Ontario Guidelines for Environmental Protection Measures at Chemical and Waste Storage Facilities [4].

3 Recommended Practices for Handling and Dispensing

Transfer lines used to transfer tetrabutyltin to and from storage tanks, totes or drums should be made from stainless steel tubing/piping or special chemical transfer hoses. All hoses should be non-reactive to tetrabutyltin. Transfer lines, pipes and hoses should be periodically inspected to ensure there are no leaks.

To achieve the lowest level of releases to the environment, proper precautions should be exercised in all transfer operations (including but not limited to drum to drum, tote to tote, bulk truck to tote) to prevent spills and should be documented in work instructions or protocols. Adequate containment by using drip pans is recommended to prevent residual product drips from valves and connections from entering the environment. Transfers from bulk trucks should be constantly attended and monitored for leaks. Audible alarms should be used to ensure that action can be immediate should a transfer line be breached or a tank be filled to its capacity.

Bulk unloading procedures should include a reference to appropriate Personal Protective Equipment (PPE) as described in the MSDS, required spill prevention and appropriate spill containment steps. Staff involved in handling and dispensing of tetrabutyltin should be trained in all procedures and records of training should be maintained.

4 Uncontrolled, Unplanned or Accidental Releases

In the event of a spill, the company should immediately take all measures necessary to contain and prevent any release into the environment. The first priority is to minimize the amount of the spill and to cover all drains in the surrounding area. The spill should also be minimized by isolating or interrupting the flow by immediately closing a valve, rotating a drum or transferring the contents, etc. It is advisable to keep a spill kit and an empty tote or drum available and accessible near high-risk areas for this transfer purpose.

In addition, the company must notify the appropriate federal, provincial/territorial or municipal authorities in accordance with applicable legislation. With respect to federal requirements, in the event of a spill or environmental emergency, the following Environment Canada website provides information on who to notify:

www.ec.gc.ca/ee-ue/default.asp?lang=En&n=EED2E58C-1

For spill cleanup, an absorbent or other medium may be used, and the spilled tetrabutyltin may be recycled into the facility's process if applicable. All spills and liquid wastes should be collected and either recycled or placed in a sealed container labelled "Waste for disposal – contains tetrabutyltin" prior to disposal as per section 6 of this proposed Code. It is recommended to keep a record of all the spills that have occurred at the facility. These records should include, but not be limited to, the following:

- a) the name, civic address and telephone number of the person who owns or has the charge, management or control of the substance released
- b) the date, time and location of the release
- c) the date of notification of the spill
- d) the name and CAS registry number of the substance released
- e) the quantity of the substance released or, if the quantity cannot be determined, an estimate of the quantity
- f) the identification of the container from which the substance was released and a description of its condition
- g) the location of the release and description of potential negative effects on the environment or on human life or health
- h) a description of the circumstances and of the cause of the release (if known) and of the measures taken to mitigate any negative effects on the environment or on human life or health
- i) the identification of all persons and agencies notified as a result of the release
- j) all measures taken or planned to prevent similar releases

The company should have a spill response plan prepared in the event of a spill, and staff should have current training to contain, mitigate, and report spills.

5 Recommended Practices for Reusable and Non-Reusable Packaging

5.1 Reusable Packaging

5.1.1 Preparing the Packaging

Prior to returning packaging that contained tetrabutyltin to the supplier, the packaging should be rinsed with a solvent capable of removing any residual tetrabutyltin that may remain in the packaging. Once the packaging has been rinsed, and before returning the packaging, it is important to seal the empty package to prevent leaks. It is recommended to close valves, caps, lids, etc. to prevent loss of residual product in the package to the environment. This also eliminates the possibility of foreign materials or objects entering the container.

Rinsate from package cleaning may contain hazardous material and should be disposed of as detailed in section 6 of this proposed Code. If cleaning is not feasible or practical, the packaging should be sealed before being returned to the supplier in a manner that will eliminate any leaks of residual product.

5.1.2 Returning the Packaging

It is recommended to store all packaging according to section 2 of this proposed Code, and when returned to the supplier or designated handler, ensure that it is evident on the bill of lading that the packaging contained tetrabutyltin. In most cases, reusable totes are managed by a designated handler. Contact information is available on the container or from the tetrabutyltin supplier.

5.2 Non-Reusable Packaging

5.2.1 Preparing the Packaging

Prior to disposing of packaging that contained tetrabutyltin, the packaging should be rinsed with a solvent capable of removing any residual tetrabutyltin that may remain in the packaging.

Once the packaging has been rinsed, it is important to seal the empty package to prevent leaks. It is recommended to close valves, caps, lids, etc. to prevent loss of residual product in the package to the environment. This also eliminates the possibility of foreign materials or objects entering the container.

If cleaning is not feasible or practical, the packaging should be sealed in a manner that will eliminate any leaks of residual product prior to disposal.

5.2.2 Disposing of the Packaging

The packaging should then be disposed of as hazardous waste as permitted under laws of jurisdiction where the disposal facility is located.

It is important not to dispose of non-reusable packaging in municipal waste landfill sites, but to send it only to authorized packaging disposal companies. This is because such disposal companies would have the capability of not releasing their rinsate into the aquatic environment.

When containers are shipped to a hazardous waste disposal facility, it should be verified that the procedures used are in accordance with provincial and territorial requirements. For interprovincial and international shipping of hazardous waste, appropriate documentation such as a movement document, a manifest or an export permit may be required by federal legislation [5, 6].

5.2.3 Disposal Permitting

Criteria for waste disposal vary from province to province. Waste haulers, receivers of cleanup products after a spill, or companies accepting empty packaging and/or contaminated items may require appropriate permits to handle these materials. It is the responsibility of the company using tetrabutyltin to ensure that the contracted waste management provider is operating in accordance with the laws of the jurisdiction where the disposal facility is located.

6 Recommended Practices for Waste Disposal

Waste containing tetrabutyltin should not be disposed of in a municipal waste landfill site. Companies should dispose of any waste containing tetrabutyltin at any hazardous waste disposal facility.

Any waste containing the substance, including wastes resulting from rinsing the packaging that held the substance, process effluents and any residual amount of the substance, should either be reintroduced into the formulation process, incinerated as permitted under laws of the jurisdiction where the disposal facility is located, or solidified, prior to disposal, as permitted under the laws of the jurisdiction where the disposal facility is located. However, if none of these three options is possible, the waste containing the substance should be contained and clearly labelled until treatment is possible.

Spilled material and liquid wastes should be collected and placed in a sealed and labelled container for later reuse or disposal. Where possible, rinsate, recovered solids or spilled materials should be reused in the manufacturing process. If reuse is not possible, then these materials should be collected, packaged to prevent leaks, and disposed of at any hazardous waste disposal facility.

Under no circumstances should rinsate be released to municipal sewer systems, municipal storm water collection systems, other water treatment systems, receiving water or surface watercourses.

All waste should be assessed against the Transportation of Dangerous Goods (TDG) criteria (TDG Regulations [7]), and classified, packaged, labelled and transported accordingly. When handling wastes, it is important to wear the personal protective equipment that is described in the MSDS .

Depending on the nature of the waste product, the company may also be required by legislation to obtain a waste generator number.

It is recommended to keep copies of the following documents relating to waste:

- a) The waste manifest, the movement document or a permit, if applicable, showing the date, amount, waste class and receiver of any rinsate or liquid waste containing tetrabutyltin;
- b) The bill of lading and any other documentation showing the date, number of pieces and the designated receiver of any solid waste containing tetrabutyltin (absorbent materials, rags, contaminated clothing, etc.);
- c) The bill of lading and any other documentation relating to the shipment of waste packaging to a supplier showing the date, number of pieces and the designated receiver;
- d) The bill of lading and any other documentation relating to the shipment of waste packaging showing the type and number of pieces, the original product in the waste package and the designated receiver.

7 Record Keeping and Reporting

7.1 Record Keeping

It is recommended that the electronic or paper records, with any documentation supporting the validity of the information outlined below and contained in these records, be maintained at the company principal place of business in Canada, for a period of at least five years after they are made. These records should include the following information:

- a) The quantity of the substance that the company imports, sells, uses, manufactures or disposes of per year;
- b) The use of the substance (starting material for synthesis of PVC stabilizers, etc.);
- c) The name and civic address of each facility where the substance is handled;
- d) The name and civic address of the facility, in Canada, that disposed of the wastes as well as records that the wastes were disposed of in conformity with this proposed Code;
- e) The preventive actions implemented to minimize the potential for release of tetrabutyltin to the environment;
- f) Records of any spill incident including the root cause analysis of the spill, remedial actions taken and steps taken to prevent future incidents;
- g) Waste manifests, movement document, or a permit, if applicable, showing the date, amount, waste class and receiver of any rinsate or liquid waste containing tetrabutyltin;
- h) Any paper or electronic record and bill of lading showing the date, number of pieces and the designated receiver of any solid waste containing tetrabutyltin (absorbent materials, rags, contaminated clothing, etc.);
- i) Any paper or electronic record and bill of lading relating to the shipment of waste packaging (i.e. non-bulk) to a supplier showing the date, number of pieces and the designated receiver;
- j) Any paper or electronic record and bill of lading relating to the shipment of waste packaging showing the type and number of pieces, the original product in the waste package and the designated receiver;
- k) Work instructions and training records;
- l) Spill response plan for a spill in or outside the facility.

7.2 Reporting

All records specified in section 7.1 of this proposed Code should be provided to the Minister upon request.

The person submitting the records should specify the civic address at which the records, reports and other information can be inspected and identify each facility to which each of those records, reports and other information pertains.

8 Training and Management System

It is recommended that individuals handling tetrabutyltin to be trained in the use of the practices contained in this proposed Code. Employers should ensure that employees are familiar with the MSDS and any other health and safety documents. It is also recommended to keep a set of training records which would include, but not be limited to, the following:

- a) type of training
- b) description
- c) date of completion
- d) employees in attendance
- e) any expiry dates

Records must be maintained in accordance with the requirements of applicable legislation, or in the absence of a regulatory requirement, training records should be maintained for a minimum of five years after the expiry of a training certificate. In the event where there is no expiry date, these records should be kept for a minimum of five years after the completion date of the training. If no certificate is issued, records should be retained to demonstrate that employees have full and current training in accordance with identified training needs.

Only individuals with current training should be permitted to use, handle and transport tetrabutyltin and waste containing tetrabutyltin. Access to tetrabutyltin and waste storage areas containing tetrabutyltin should be limited to trained individuals. In addition to training required for tetrabutyltin and waste containing tetrabutyltin, specialized training courses may be required for select tasks such as:

- forklift truck operation
- working in confined spaces
- service of equipment
- use of equipment containing tetrabutyltin and/or waste containing tetrabutyltin

Only individuals with current training should install, repair, service or remove storage systems and equipment that contain or have contained tetrabutyltin.

All facilities where tetrabutyltin is handled should have a set of work instructions concerning the material, with appropriate documentation. These work instructions should be accessible to all employees and should address the following:

- a) Receiving, storage and handling procedures for tetrabutyltin
- b) Health and Safety, and other applicable training
- c) Handling of empty packaging
- d) Waste material collection, storage and disposal procedures
- e) Spill containment and spill reporting procedures

9 References

1. *Canada Gazette* Part I, Notice, under subsection 84(5) of the *Canadian Environmental Protection Act, 1999*, of the Ministerial Condition, No 13618, Vol. 139, No. 13, March 26, 2005. Government of Canada website:
<http://gazette.gc.ca/archives/p1/2005/2005-03-26/html/notice-avis-eng.html>
2. *Canada Gazette* Part I, Notice, Publication of results of investigations and recommendations for the substances organotins (monomethyltins, monobutyltins, mono-octyltins, dimethyltins, dibutyltins, dioctyltins, fluorotriphenyltin, tetraphenyltin, tributyltins, and tetrabutyltin) pursuant to paragraphs 68(b) and 68(c) of the *Canadian Environmental Protection Act, 1999*, Vol. 143, No. 32, August 8, 2009. Government of Canada website:
<http://gazette.gc.ca/rp-pr/p1/2009/2009-08-08/html/notice-avis-eng.html#d116>
3. Environment Canada/Health Canada, Proposed risk management approach for non-pesticidal organotin compounds, August 8, 2009. Environment Canada website:
www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=98F99990-1
4. Ministry of the Environment, Government of Ontario, Waste Management Policy Branch, Guidelines for Environmental Protection Measures at Chemical and Waste Storage Facilities, May, 2007. Pub. # 5113e. Government of Ontario website:
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5. Environment Canada, Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (EIHWHRMR). Environment Canada website:
www.ec.gc.ca/gdd-mw/default.asp?lang=En&n=39D0D04A-1
6. Environment Canada, Interprovincial Movement of Hazardous Waste Regulations. Environment Canada website:
www.ec.gc.ca/gdd-mw/default.asp?lang=En&n=4379B169-1#imhwr
7. Transport Canada, Transportation of Dangerous Goods, TDG Regulations, SOR/2008-34. Transport Canada website:
www.tc.gc.ca/eng/tdg/clear-download-372.htm