

**Environmental Penalties –
Code of Toxic Substances**

(as referred to in O.Reg. 222/07 and O.Reg. 223/07)

May 2007

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Please note that the regulations will take precedence where a conflict or ambiguity exists between this Procedure Document and the requirements of the regulations. While every effort has been made to ensure the accuracy of the information contained within this Procedure Document, it should not be construed as legal advice.

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1.0 Introduction

Environmental penalty (EP) orders were introduced through the *Environmental Enforcement Statute Law Amendment Act* (Bill 133), passed in June 2005. This legislation amended the *Environmental Protection Act* (EPA) and the *Ontario Water Resources Act* (OWRA), establishing the overall framework for EP orders. Two regulations (one under each Act) provide details of how, when and to which types of violations EPs will be applied. The enabling provisions in the Acts and the EP regulations came into force on August 1, 2007.

EP orders are a new Ministry of the Environment (Ministry) abatement tool to encourage companies to strive for a higher level of environmental performance. As set out in the purpose section (s.1) of O. Reg. 222/07¹ (“the regulation” or “the EP regulation”), EP orders are to be assessed in a manner that will encourage companies to prevent things from happening that harm or have the potential to harm the environment or human health. If an incident does occur, it is the aim of EP orders to encourage companies to return to compliance quickly and take steps to ensure the violation does not happen again.

There are thousands of substances in use or generated at industrial plants in Ontario that have the potential to cause varying degrees of human health effects and ecosystem health risks. The Ministry’s mandate requires that it take a precautionary approach to spills of pollutants that can lead to harmful, long-term, cumulative impacts on human health and the environment.

To advance this mandate and to discourage spills that may have potentially long-term harmful consequences to human health and the Province’s natural environment, the EP regulations provide industrial plants subject to the regulations with a disincentive to cause or permit the discharge of toxic substances.

Under the EP regulation,

http://www.e-laws.gov.on.ca/DBLaws/Source/Regs/English/2007/R07222_e.htm

“toxic substance” is defined in section 2 to mean a substance listed in this Code. If an unlawful discharge (including a violation of limits in MISA regulations, orders or an OWRA approval) or a violation of a person’s duty to restore the natural environment following a spill involves a substance listed in Table 1 to this Code, paragraphs 4 and 5 of subsection 9(1) of the EP regulation require the Director, when determining the amount of the EP order for the violation, to increase the gravity component of the penalty by 35%.

The approach used to develop the Code’s List of Toxic Substances relies on the criteria which the federal government use to classify substances under the *Canadian Environmental Protection Act*, 1999 (CEPA) (see section 73 Categorization of Substances

¹ There are two EP regulations: O. Reg. 222/07 made under the EPA and O.Reg. 223/07 made under the OWRA. The substance of the two regulations is the same. Therefore, for ease of reference this Code will refer only to O. Reg. 222/07 made under the EPA.

on Domestic Substances List <http://laws.justice.gc.ca/en/C-15.31/text.html>). The federal government is using this classification in their new Chemicals Management Plan (CMP) that was launched in September 2006.

The CMP identifies substances of high concern due to their hazard characteristics by drawing on three criteria: (a) persistence (commonly denoted as “P”), (b) bioaccumulative properties (commonly denoted as “B”), and (c) toxicity (commonly denoted as “T”), including the substance’s inherent toxicity to humans and non-humans.

Applying these criteria from the CMP, a substance has been included in the EP Code of Toxic Substances if, under the Federal Policy, one of the following three circumstances apply:

1. The substance satisfies the criteria for persistence and is inherently toxic to humans.
2. The substance satisfies the criteria for bioaccumulative properties and is inherently toxic to humans.
3. The substance satisfies the criteria for persistence and bioaccumulative properties and is inherently toxic to humans.

2.0 Rationale for Substances on the List

The severity of the impact of an unlawful discharge incident (spill) to water or land has on human health and the environment is dependent upon the type and amount of substances present in the discharged material. For spills of large quantities of moderately toxic substances or smaller quantities of highly toxic substances, it is easier to show impairment of (or prove potential to impair) the environment and human health and the impacts often occur fairly quickly. It is more difficult to prove impairment of the ecosystem and human health resulting from the discharge of low quantities of substances, especially from substances that persist for long periods of time, or bioaccumulate in biota to the point that they are a cause for concern. It is also difficult to prove impairment of human health when the discharge of a substance is a carcinogen, where the harm may not show for many years. While one small release of such substances may not cause any obvious harm to the environment (because of dilution, etc), the cumulative effect of many discharges can cause harm to the environment and human health.

Substances were selected for inclusion in Table 1 to this Code that have long-term effects on health and the environment, for example substances with low biodegradability (*persistence*), a high potential for *bioaccumulation*, and substances known or suspected to cause *toxic* effects such as carcinogenicity, mutagenicity or teratogenicity (affects reproduction). Such substances are known as ‘PBTs’. Because of these risks, special caution in use, manufacturing, storage or waste management of PBT substances should

be exercised and where such caution is not exercised and there are uncontrolled releases of these types of substances into the natural environment, the EP regulations require the Director to impose a higher penalty for certain violations involving such substances.

3.0 Federal-Provincial Lists Used for Selecting EP Toxic Substances

The Code of EP Toxic Substances is a compilation of “PBT” substances from the following federal-provincial lists:

1. **Schedule 1 to CEPA**: EP toxic substances include all non-gaseous substances on Schedule 1 to CEPA which have persistent, bioaccumulative and toxic (human and non-human) properties in addition to those that are bioaccumulative and toxic (human and non-human) or persistent and toxic (human and non-human) properties;
2. **Municipal/Industrial Strategy for Abatement (MISA) regulations**²: EP toxic substances include all non-gaseous parameters in the MISA regulations which have persistent and toxic properties or bioaccumulative and toxic properties;
3. **Canada – Ontario Agreement Respecting the Great Lakes Basin Ecosystem (2002)**: EP toxic substances include all Tier 1 or Tier 2 substances which have persistent and toxic properties or bioaccumulative and toxic properties; or
4. **Great Lakes Binational Toxics Strategy (1997)**: EP toxic substances include all Level 1 or Level 2 substance which have persistent and toxic properties or bioaccumulative and toxic properties.
5. **Domestic Substances List (DSL)**: In order to take an approach which is consistent with the precautionary principle, the Code of EP Toxic Substances also includes “PBT” substances from the DSL. The EP toxic substances drawn from the DSL categorization and screening program results includes all non-gaseous substances which have persistent and ‘inherently toxic to humans’ properties (PiT) or bioaccumulative and ‘inherently toxic to humans’ properties (BiT) or persistent and bioaccumulative and ‘inherently toxic to humans’ properties (PBiT).

4.0 Detailed Explanation of Criteria

4.1 General

² O. Reg. 63/95; 64/95; 214/95; 215/95; 537/93; 560/94; 561/94; 562/94; 760/93.

The criteria used to identify substances from the federal-provincial lists set out in section 3 are related to individual substances rather than complex effluent mixtures. Similarly, the focus of the selection process for substances included in the Code was substances that are released into the natural environment as a result of human activity (anthropogenic sources), as opposed to natural sources. These differences are explained below in addition to the criteria for persistence and bioaccumulation.

4.2 Criteria for Persistence

Substances are categorized under CEPA as being persistent by the federal Minister of the Environment if any of the following criteria are satisfied. These criteria are set out in the CEPA regulations. (<http://laws.justice.gc.ca/en/C-15.31/SOR-2000-107/index.html>)

Criteria for Persistence	
Medium	Half-life
Water	≥ 6 months
Sediment	≥ 1 year
Soil	≥ 6 months

Persistence is related to the length of time that a substance resides in the natural environment. The most common measure of persistence is a substance's half-life, or time it takes for the concentration of a substance to be reduced to half of its original concentration in a specific media (air, water, sediment, soil). Persistence is based on a consideration of all environmental media. A substance is considered persistent if the transformation half-life is met in any one medium. Degradation processes that are taken into consideration by Environment Canada when determining the half-life of a substance are limited to substance, biochemical and photochemical processes.

4.3 Criteria for Bioaccumulation

Substances are categorized under the CEPA as being bioaccumulative by the federal Minister of the Environment if any of the following criteria are satisfied. These criteria are also set out in the CEPA regulations. (<http://laws.justice.gc.ca/en/C-15.31/SOR-2000-107/index.html>)

Criteria for Bioaccumulation
BAF \geq 5000 or BCF \geq 5000 or log K_{ow} \geq 5

Bioaccumulation refers to the uptake of substances by biota through consumption of food sources contaminated with the substance, as well as uptake directly from the surrounding media (e.g. water, sediment). There are three characteristics (as listed in the box above) that can be referred to in order to determine if a substance is bioaccumulative. These include (in order of priority) the bioaccumulation factor (BAF), bioconcentration factor (BCF), as well as the log of the octanol-water partition coefficient (log K_{ow}) of a specific substance. The BAF is the amount of a substance within an organism (e.g. in its tissues) that has been taken up either via exposure to the surrounding media (e.g. water) or through ingestion of contaminated organisms on which it feeds. The BCF is the amount of a substance within an organism (e.g. in its tissues) that has been taken up following exposure to contaminated media in which it resides. The log K_{ow} is a laboratory derived value which provides indication of a substance's bioaccumulation potential based on how much of the substance enters into the octanol phase (e.g. lipid surrogate) compared with the water phase.

4.4 CEPA Toxic

Furthermore, the criteria used to identify substances from the federal-provincial lists set out in section 3 are focussed on inherent toxicity to humans, with the exception of the Schedule 1 CEPA substances where the meaning of "toxic" is not inherently toxic to humans but "CEPA toxic" to humans and/or nonhumans. Under s.64 of CEPA, a substance is considered toxic if it meets or is equivalent to the definition of "toxic" found in CEPA, as determined through a systematic, risk-based assessment. CEPA states "a substance is toxic if it is entering or may enter the environment in a quantity or concentration or under conditions that (a) have or may have an immediate or long-term harmful effect on the environment or its biological diversity; (b) constitute or may constitute a danger to the environment on which life depends; or (c) constitute or may constitute a danger in Canada to human life or health."

http://www.ec.gc.ca/CEPARegistry/subs_list/Toxicupdate.cfm

4.5 Greatest Potential for Human Exposure and Inherent Toxicity to Humans

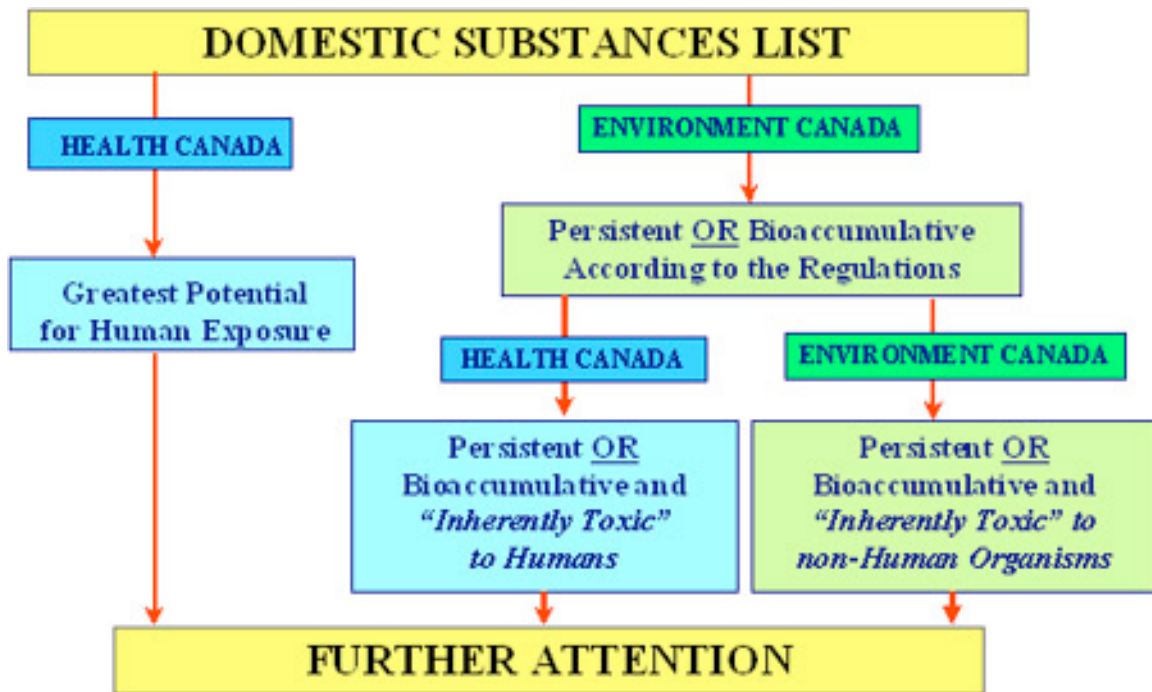
Under CEPA 1999, the Existing Substances Program at Health Canada is responsible for identifying substances that have the Greatest Potential for Exposure and are Inherently Toxic to Humans. Health Canada has developed a number of models of varying

complexity to determine which substances have the most likelihood of human exposure through their use and which could be classified as inherently toxic to humans. (http://www.hc-sc.gc.ca/ewh-semt/contaminants/existsub/categor/approach-approche_e.html)

Greatest Potential for Exposure: Those substances on the DSL to which people are expected most likely to be exposed.

Inherently Toxic to Humans: Those substances that are known or suspected of having harmful effects on humans, including cancer, birth defects and damage to genetic material.

Under the DSL Categorization process, substances that can potentially affect human health were placed in a priority sequence so the Government of Canada can first deal with those suspected of presenting the highest hazard and greatest potential for exposure. The EP List of Toxic Substances includes DSL substances rated by Health Canada as having a Greatest Potential for Exposure and categorized as either a 'Low', 'Moderate' or 'High' priority.



5.0 The Process for Amending the List of Toxic Substances

The Ministry will, from time to time, review and amend the substances listed in Table 1 to this Code (List of Toxic Substances) to reflect new information it receives. Substances may be added or removed from the List of Toxic Substances based on whether the substances satisfy the characteristics discussed in this document.

Starting in February 2007, and continuing over the next three to four years, the federal government will “challenge” industry to provide new information to enable the completion of screening assessments of selected DSL substances and potentially result in further federal regulatory action under CEPA. Screening assessments of all “challenged” DSL substances will be completed in three years which could result in substances being removed from the DSL. If this happens to a substance on the List of Toxic Substances, the Ministry would then propose to remove the substance from the list.

Likewise, the federal government plans to amend the DSL to apply the Significant New Activity provisions under s. 81 of CEPA (1999) to substances of concern but currently not entering, or likely to enter, the environment as a result of commercial activity in Canada. This will ensure that industries intending to reintroduce a listed substance into commercial activity will be screened in a similar manner to existing DSL substances. If these substances are being used by industrial plants to which the EP scheme applies and they are not included in the List of Toxic Substances, then the Ministry would propose amending the list to add these substances. Where substances are added to the DSL through the New Substances Notification process, the Ministry may find that these new substances satisfy the characteristics discussed in this document and the Ministry would also propose amending the List of Toxic Substances to add these substances.

Before adding or removing a substance to Table 1, the Ministry will post a notice of proposal to amend Table 1 to this Code on the EBR Registry, seek public and stakeholder input, and consider that input before making a final decision. The Code would then be updated, and an amendment to the Table 1 would not have legal effect under the EP scheme until notice of the amendment has been posted on the EBR Registry or in the Ontario Gazette (see section 177 of the *Environmental Protection Act*).

To obtain the most up to date copy of this document, please visit the Ministry’s Public Information Centre or the Ministry’s website (www.ene.gov.on.ca).

Table 1 – List of Toxic Substances

Contaminant Name	CAS Number
2,7-Naphthalenedisulfonic acid, 4-amino-3-[[4'-(2,4-diaminophenyl) azo][1,1'-biphenyl]-4-yl]azo]-5-hydroxy -6-(phenylazo)-, disodium salt	1937-37-7
2-Naphthalenesulfonic acid, polymer with formaldehyde, sodium salt	36290-04-7
2-Naphthalenol, 1-(phenylazo)-	842-07-9
2-Naphthalenol, 1-[(2-methylphenyl)azo]-	2646-17-5
2-Naphthalenol, 1-[(4-methyl-2-nitrophenyl)azo]-	2425-85-6
4,4'-methylenebis(2-chloroaniline)	101-14-4
4-chloro-3-methylphenol	59-50-7
Anthracene	120-12-7
Benz(a)anthracene	56-55-3
Benzenamine, 2,6-dinitro-N,N-dipropyl-4-(trifluoromethyl)-	1582-09-8
Benzidine	92-87-5
Benzo(a)pyrene	50-32-8
Benzo(b)fluoranthene	205-99-2
Benzo(g,h,i)perylene	191-24-2
Butanamide, 2,2'-[(3,3'-dichloro[1,1'- biphenyl]-4,4'-diyl)bis(azo)]bis[3-oxo-N-phenyl-	6358-85-6
Butanamide, 2,2'-[(3,3'-dichloro[1,1'- biphenyl]-4,4'-diyl)bis(azo)]bis[N-(2,4-dimethylphenyl)-3-oxo-	5102-83-0
Cadmium & compounds	7440-43-9
chlorophenol. 2-	95-57-8
cyanide (total, as HCN)	57-12-5
Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1 α ,2 α ,3 β ,4 α ,5 α ,6 β)-	58-89-9
Cyclotetrasiloxane, octamethyl-	556-67-2
Dibenzofuran	132-64-9
Dibenzo-p-dioxin	262-12-4
dichlorobenzene (p-dichlorobenzene), 1,4-	106-46-7
dichlorobenzene, 1,2-	95-50-1
dichlorophenol, 2,4-	120-83-2
dichlorophenol, 2,6-	87-65-0
dinitro-o-cresol, 4,6	534-52-1
dinitrophenol, 2,4-	51-28-5
Dinitropyrene	several congeners
Distillates (petroleum), acid-treated light naphthenic	64742-19-4
Distillates (petroleum), chemically neutralized light naphthenic	64742-35-4
Distillates (petroleum), clay-treated heavy naphthenic	64742-44-5
Distillates (petroleum), heavy catalytic cracked	64741-61-3
Distillates (petroleum), heavy hydrocracked	64741-76-0
Distillates (petroleum), heavy thermal cracked	64741-81-7
Distillates (petroleum), hydrotreated heavy naphthenic	64742-52-5

Contaminant Name	CAS Number
Distillates (petroleum), intermediate vacuum	70592-76-6
Distillates (petroleum), light naphthenic	64741-52-2
Distillates (petroleum), light vacuum	70592-77-7
Distillates (petroleum), petroleum residues vacuum	68955-27-1
Distillates (petroleum), solvent-dewaxed heavy naphthenic	64742-63-8
Distillates (petroleum), solvent-dewaxed light naphthenic	64742-64-9
Distillates (petroleum), solvent-refined heavy naphthenic	64741-96-4
Distillates (petroleum), solvent-refined light naphthenic	64741-97-5
Distillates (petroleum), vacuum	70592-78-8
Fuel oil, no. 4	68476-31-3
Fuel oil, no. 6	68553-00-4
Gas oils (petroleum), heavy atmospheric	68783-08-4
Gas oils (petroleum), hydrotreated vacuum	64742-59-2
Gasoline	86290-81-5
Heptachlor + Heptachlor epoxide	76-44-8
Hexachloro-1,3-butadiene	87-68-3
Hexachlorobenzene	118-74-1
Hexachloroethane	67-72-1
hexavalent chromium	7440-47-3
Hydrocarbons, C ₃₋₁₁ , catalytic cracker distillates	68476-46-0
Hydrocarbons, hydrocracked paraffinic distn. residues, solvent-dewaxed	93763-38-3
Inorganic arsenic	7440-38-2
Lead	7439-92-1
Lubricating oils	74869-22-0
Mercury & compounds	7439-97-6
Naphtha (petroleum), catalytic dewaxed	64742-66-1
Naphtha (petroleum), chemically neutralized heavy	64742-22-9
Naphtha (petroleum), full-range coker	68513-02-0
Naphtha (petroleum), full-range straight-run	64741-42-0
Naphtha (petroleum), heavy hydrocracked	64741-78-2
Naphtha (petroleum), heavy thermal cracked	64741-83-9
Naphtha (petroleum), hydrodesulfurized full-range	92045-52-8
Naphtha (petroleum), hydrodesulfurized heavy	64742-82-1
Naphtha (petroleum), hydrotreated heavy	64742-48-9
Naphtha (petroleum), sweetened	64741-87-3
Naphtha (petroleum), unsweetened	68783-12-0
Naphthalenesulfonic acid, polymer with formaldehyde, sodium salt	9084-06-4
Naphthalenesulfonic acid, sodium salt, polymer with formaldehyde	9008-63-3
Naphthenic oils (petroleum), complex dewaxed light	64742-76-3
Natural gas condensates (petroleum)	64741-47-5
Octachlorostyrene	29082-74-4
PCBs	1336-36-3
PCDD	many congeners

Contaminant Name	CAS Number
PCDF	many congeners
Pentachlorobenzene	608-93-5
Pentachlorophenol	87-86-5
Perylene	198-55-0
Petroleum	8002-05-9
Phenanthrene	85-01-8
Polycyclic Aromatic Hydrocarbons	many congeners
Residual oils (petroleum), clay-treated	64742-41-2
Residual oils (petroleum), hydrotreated	64742-57-0
Residual oils (petroleum), solvent deasphalted	64741-95-3
Residual oils (petroleum), solvent-dewaxed	64742-62-7
Residual oils (petroleum), solvent-refined	64742-01-4
Residues (petroleum), atmospheric	68333-22-2
Residues (petroleum), catalytic reformer fractionator	64741-67-9
Residues (petroleum), heavy coker gas oil and vacuum gas oil	68478-17-1
Residues (petroleum), light vacuum	68512-62-9
Residues (petroleum), steam-cracked	64742-90-1
Residues (petroleum), topping plant, low-sulfur	68607-30-7
Siloxanes and Silicones, di-Methyl	63148-62-9
Sulfonic acids, petroleum, barium salts	61790-48-5
Tetrachlorobenzene (1,2,3,4- and 1,2,4,5-)	634-66-2
Tetrachlorodibenzofuran, 2,3,7,8-	51207-31-9
Tetrachlorophenol, 2,3,4,5 -	4901-51-3
Tetrachlorophenol, 2,3,4,6-	58-90-2
Tetrachlorophenol, 2,3,5,6-	935-95-5
Tetraethyl lead	78-00-2
Tetra-methyl lead	75-74-1
Tributyl tin	688-73-3
Trichlorobenzene, 1,2,4-	120-82-1
Trichlorophenol, 2,3,4-	15950-66-0
Trichlorophenol, 2,3,5-	933-78-8
Trichlorophenol, 2,4,5-	93-76-5
Trichlorophenol, 2,4,6-	88-06-2