Technical Approach for "Rapid Screening" of Substances of Lower Ecological Concern

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Issue

This paper describes the approach that Environment Canada has developed as the basis for rapid and efficient screening assessment of existing substances anticipated to be of low ecological concern. Recognizing that the approach is based on the use of conservative assumptions and readily available data, it is applied only to decide either that the substance requires further assessment (beyond the rapid screening approach), or that the substance is unlikely to meet the criterion set out in paragraph 64(a) of CEPA 1999, which states that a substance is considered "toxic" if it 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.

The approach has been applied to a subset of substances that were identified through the categorization process. The first results of this application of the rapid screening approach are described in a separate document[1].

Background

During the categorization of substances on the Domestic Substances List (DSL), Environment Canada has identified a subset of the PiT (persistent and inherently toxic to non-human organisms) or BiT (bioaccumulative and inherently toxic to non-human organisms) substances that are expected to have a low likelihood of causing harmful effects (based on toxicity to aquatic organisms), as it is believed that low volumes are in commerce.

[1] Environment Canada. 2007. Rapid Screening of Substances of Lower Ecological Concern: Results of the Ecological Screening Assessment. Existing Substances Division, Environment Canada, Gatineau, QC, Canada.

Environment Canada has developed a pragmatic approach to rapidly identify substances that have a low likelihood of meeting the criterion set out in paragraph 64(a) of the *Canadian Environmental Protection Act, 1999* (CEPA 1999). This allows the Government of Canada and stakeholders to focus resources on those substances that have a higher probability of causing harm.

Environment Canada is addressing these substances now, as it will facilitate the further prioritization of substances for assessment, by:

- rapidly identifying those substances that may have a higher potential for concern than was anticipated;
- focusing data gap filling on higher priority substances by rapidly identifying those that are not of concern;
- facilitating planning for efficient industry stewardship practices for substances of higher concern;
- improving the ability of government program managers to do long-term strategic planning - including identification of resource needs for risk assessment and risk management; and
- rapidly providing information concerning a large fraction of substances meeting the categorization criteria, and thereby generally focusing the attention and actions of parties involved on substances likely of higher concern.

All substances that were identified by the categorization process as being PBiT (substances that are persistent *and* bioaccumulative *and* inherently toxic) are excluded from consideration under this approach, due to particular concerns identified for substances having this combination of properties.

Approach

Overview

The following approach has been developed by Environment Canada for the rapid screening of low volume substances. The approach, as illustrated in Figure 1, consists of multiple steps that address different factors relating to the potential for a substance to cause ecological harm. The approach is intended to be pragmatic, protective and fairly rapid, largely making use of available or easily obtainable data and either “mechanical” or simple “manual” evaluation of this data. The approach ensures consistent handling of all substances and is based in part on estimation techniques similar to those used by the New Substances Program when evaluating substances proposed to be introduced into commerce in Canada.

The first step consists of identifying substances that belong to categories that are considered higher priorities for further evaluation as part of a category assessment. For example, this includes substances whose chemical structure is similar to those of substances that were identified as PBiT through the categorization process. These

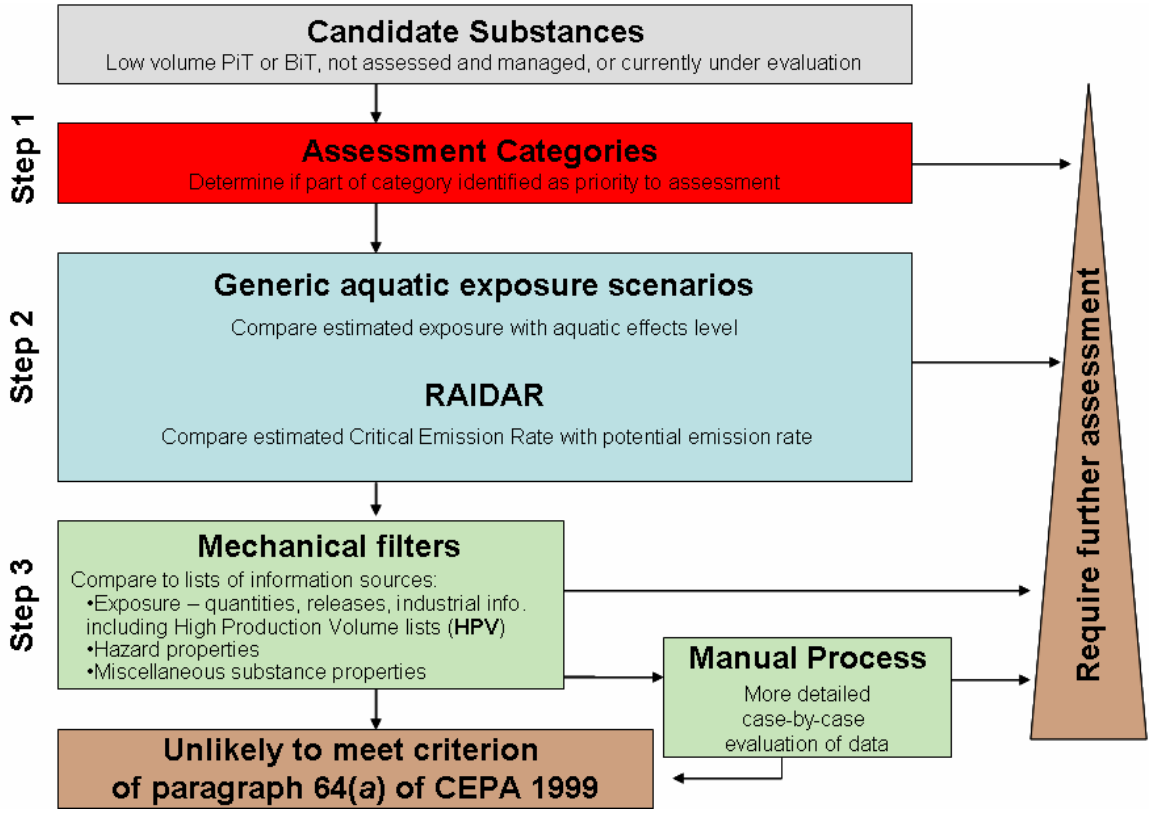
substances are identified at this step as requiring further assessment (beyond the rapid screening process), and do not proceed further through rapid screening.

The second step in the approach involves applying different exposure scenarios through use of environmental fate models. First, two generic aquatic exposure scenarios are applied (described further on as scenarios A and B) to identify potential concerns near the point of discharge of a substance to the environment. This involves comparing conservative estimates of exposure in receiving waters with an effects threshold to evaluate whether a chemical is expected to cause harm to the local aquatic environment. A regional multi-media model named RAIDAR (Risk Assessment, IDentification And Ranking) is also applied. This fugacity-based model (described further on as scenario C) takes into account the combined characteristics of the substance in estimating potential harm in different environmental media, as well as in food chains.

There are two possible outcomes from Step 2:

- if the scenarios indicate a potential harmful effect to aquatic or terrestrial organisms, the substance is identified as requiring further assessment; or
- if the scenarios indicate a low likelihood of harm to these organisms, then the substance proceeds to the third step of rapid screening.

Figure 1: Overview of the rapid screening approach



The third step of the approach uses “filters” (i.e., various information sources) and involves identifying whether or not a substance appears on different lists or sources of information relating to hazard or exposure (including quantity in commerce). This flags substances that have been identified by domestic or international sources as being of greater concern due to their hazard properties, or which may now be in commerce at greater quantities than was believed to be the case based on the available information.

Depending on the nature of the information sources, substances flagged by the filters may be further evaluated within rapid screening using a “manual process”. This step involves case-by-case evaluation to decide, for example, whether the information in the source that flagged the substance is relevant to the situation in Canada. This may also involve collection and review of information from other sources that are not as amenable to evaluation using a mechanical approach. The manual process involves evaluation of the weight and relevance of information obtained from the full range of sources identified.

Depending on the conclusion from consideration of all information that was obtained, substances are either identified as requiring further assessment (beyond the rapid screening approach), or as being unlikely to cause harm.

A more detailed description of each of these steps is provided in the following sections.

First step: Assessment categories

The first step of the rapid screening approach is to determine whether candidate substances have chemical structures similar to those for substances identified for priority actions as a category. At this time, such chemical categories have been identified based on substances that were concluded to be PBiT under the categorization process. These include discrete organics and UVCBs (Unknown or Variable composition, Complex reaction products or Biological substances) that meet the PBiT categorization criteria. At this stage of the rapid screening process, substances that fall into one of the identified chemical categories are directed to the group of substances that require further screening assessment.

Second step: Exposure Estimation

Three different exposure scenarios are applied as part of the rapid screening approach. Figure 2 illustrates these exposure estimation approaches. These approaches are used to conservatively estimate local and regional ecological exposure, making use of available data from the DSL notification and from DSL categorization activities.

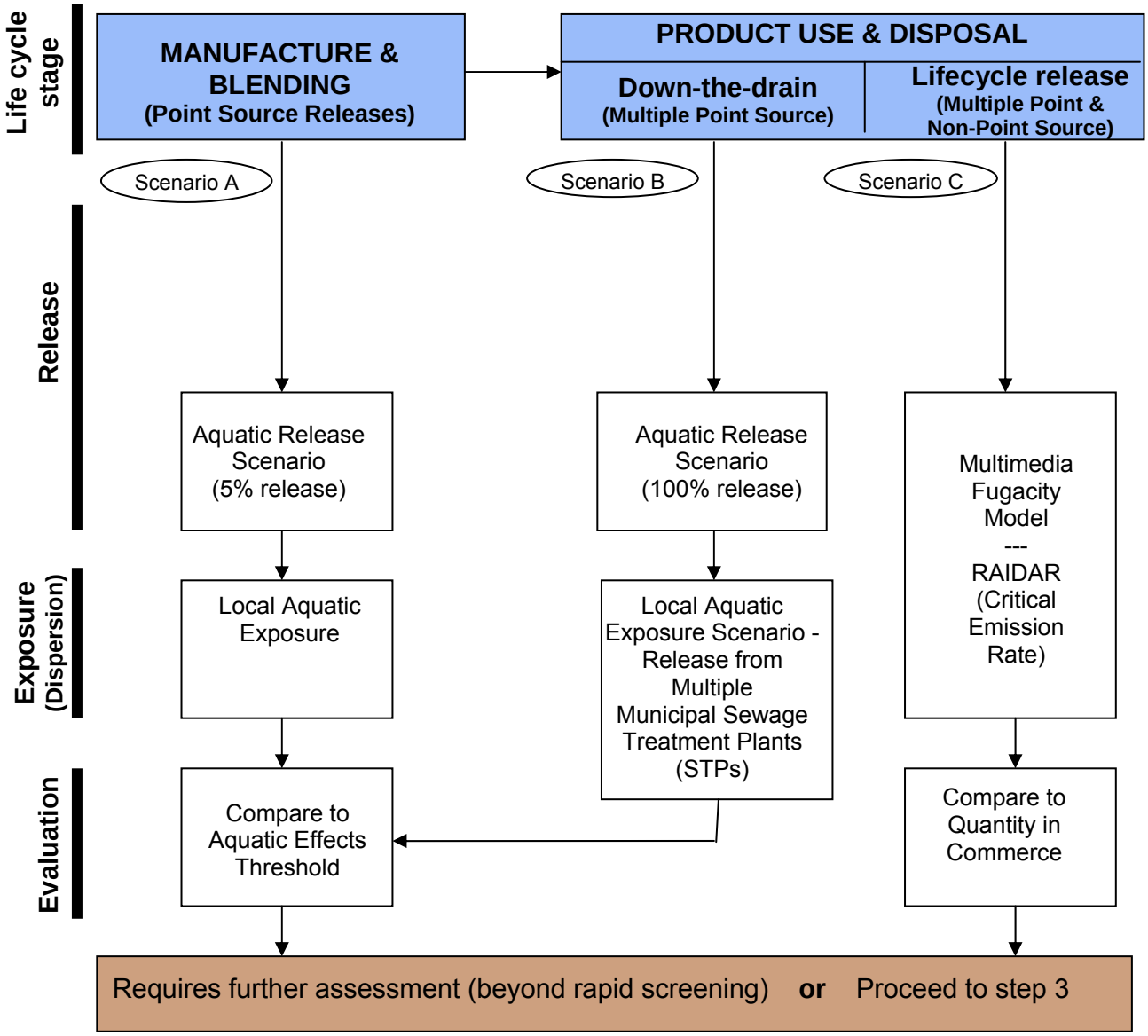
Data from DSL notification includes use and quantity information from each reporting facility. Data collected or estimated during categorization includes “pivotal” values for acute aquatic toxicity (iT), persistence and bioaccumulation, as well as physical/chemical properties.

While the generic aquatic exposure scenarios (A and B) have been developed to be conservative overall, the level of conservatism applied to individual parameters is moderate, since it is recognized that:

- a high level of conservatism applied to each parameter can easily compound into an excessively conservative overall exposure scenario;
- it is very unlikely that each parameter would be "worst case" at the same time; and
- interdependency of some parameters exists.

Rather, values in keeping with an overall realistic worst case scenario have been used.

Figure 2 Exposure Scenarios



Scenario A - Industrial Point-Source Aquatic Release

Scenario A is based on release from an industrial facility that is manufacturing the substance, or blending it into products. A conservative estimate of exposure resulting from the release of the substance to the aquatic environment from such an industrial point source is calculated as shown in the following equation. The aquatic estimated no-effect level is derived as shown in the second equation. Parameters used in Exposure Scenario A are described in Table 1.

$$\text{Exposure (mg/L)} = \frac{\text{Qty x Loss x (1-Remov)}}{\text{Dur x (Rflow + Sflow)}} \times \frac{1000}{86400}$$

$$\text{Aquatic Estimated No Effect Value (mg/L)} = \frac{\text{CTV}}{\text{AF}}$$

The exposure value is then compared to the estimated no effect value to determine a risk quotient (Exposure / Effect). If the risk quotient is greater than one, this indicates that the conservatively estimated concentration in water exceeds the aquatic estimated no-effect level and that there exists a potential to cause harm in the aquatic ecosystem. On the contrary, a value below one indicates that concentrations that may cause an effect to sensitive aquatic organisms are not reached and therefore harm to aquatic organisms is unlikely under this scenario.

Table 1 - Parameters used in Exposure Scenario A

Abbrev.	Parameter	Value	Units	Notes
Qty	Maximum quantity of substance used at one facility	100 or 1000	kg	Substance specific
Loss	Loss of substance during manufacturing or handling	5	%	Based on New Substances Program and US EPA conservative estimates of loss from cleaning of container residues (3%), transfer lines (1%) and reactors (1%)
Remov	Sewage Treatment Plant (STP) removal efficiency	70	%	Conservative value for secondary treatment, recognizing biodegradation and sludge adsorption
Dur	Duration over which substance is released	150	days	Assumes seasonal use of substance
Sflow	STP flow rate	0.04	m^3/s	10th percentile of municipal STP flow rates

Abbrev.	Parameter	Value	Units	Notes
Rflow	Flow of receiving watercourse	1.84	m^3/s	15th percentile of the distribution of receiving watercourse flows in the country (based on the distribution of the 50th percentile of flow rates); weighted by number of industries releasing to the receiving watercourse
-	Factor combining conversion from kg to mg and m^3 to L	1000		
-	Conversion factor from days to seconds	86400		
CTV	Critical Toxicity Value		mg/L	Substance specific; acute aquatic toxicity from categorization (iT pivotal value)
AF	Application factor	100		Acute-to-chronic; lab to field; inter-species

Scenario B - Down-the-Drain Aquatic Release from Products

Under Scenario B, a value for aquatic exposure from down-the-drain release of a substance contained in products (such as soaps) is calculated, as well as a value for the aquatic estimated no-effect level, as defined in the equations below. Parameters used in the Exposure Scenario B are described in Table 2 below.

$$\text{Exposure (mg/L)} = \frac{\text{Qty x Loss x (1-Remov) x Pop}}{\text{Dur x RPE x (Rflow + Sflow)}} \times \frac{1000}{86400}$$

$$\text{Aquatic Estimated No Effect Value (mg/L)} = \frac{\text{CTV}}{\text{AF}}$$

As was the case for Scenario A, the exposure value and the effects value are combined to determine a risk quotient (Exposure / Effect), which indicates a potential risk if the value is above 1 in this conservative scenario.

Table 2 - Parameters used in Exposure Scenario B

Abbreviation	Parameter	Value	Units	Notes
Qty	Total quantity of substance used in Canada	Up to 1000	kg	Substance specific
Loss	Loss of substance from product during use	100	%	Complete loss for down-the-drain products
Remov	STP removal efficiency	70	%	Conservative value for secondary treatment, recognizing biodegradation and sludge adsorption
Pop	Population of representative community	100,000	persons	Value corresponding to the 10^{th} percentile of the distribution of receiving watercourses weighted by population
Dur	Duration over which substance is released	150	days	Assuming seasonal use of substance
RPE	Regional product effect	2,000,000	persons	Value set to represent population of a Canadian region in which total quantity of product could be used
Sflow	STP flow rate	0.66	m^3/s	Value corresponding to the 10^{th} percentile of the distribution of receiving watercourses weighted by population
Rflow	Flow of receiving watercourse	3.58	m^3/s	Value corresponding to the 10^{th} percentile of the distribution of receiving watercourses weighted by population
-	Factor combining conversion from kg to mg and m^3 to L	1000		
-	Conversion factor from days to seconds	86400		
CTV	Critical Toxicity Value	---	mg/L	Substance specific; acute aquatic toxicity from categorization (iT pivotal value)
AF	Application factor	100		Acute-to-chronic; lab to field; inter-species

Note that river flow distributions used in the two scenarios are different. Likelihood of harm from industrial releases (scenario A) is dependent on the number of industrial facilities releasing to a water body. Therefore, for that scenario, a distribution of the dilution capacities of receiving waters (receiving watercourse flow rates) was generated with a weighting by the number of industrial facilities releasing to the water body. Likelihood of harm from down-the-drain release of consumer products (scenario B) is dependent on the human population that may be releasing a substance to a municipal sewage treatment plant. In this scenario, a distribution of the ratio of population of the community to the dilution capacity of the receiving water body was generated. As a result, the parameters "population of representative community", "STP flow rate" and "flow of receiving water course" are inter-connected. In this scenario, it is this ratio that is important, not the actual values of the population or flow rates.

Scenario C - Life-Cycle Release

Scenario C uses a fugacity-based multimedia modelling approach to address possible release of the substance over its full life-cycle. Such models allow substances released to the environment to be distributed throughout a unit world – and are thus suitable for a disperse release scenario from all stages of the substance life-cycle[2].

This modelling approach also provides a "safety net" scenario, since it accounts for combined effects of a substance's physical/chemical and hazard properties as well as considerations for different environmental media (water, air, soil, sediment) and organisms.

Description of the model

RAIDAR is a peer-reviewed fugacity-based model developed by the Canadian Environmental Modelling Network (CEMN) to assess chemicals for risk by estimating environmental fate and transport, bioaccumulation and exposure to organisms, and determining a critical emission rate[3].

Representative food webs are included to assess chemical exposure routes to organisms in the environment. The food web models take the output from the fate and transport calculations for the substance (the concentration in the different environmental media) and estimate internal concentrations in some 20 biotic groups including plankton, vegetation, domestic animals, fish and wildlife. This uses data on the nature and quantity of diets, and respiration and growth rates. Essentially, each organism absorbs the chemical by respiring air (or by exchange at the gill-water interface in the case of fish) or by consuming water and other organisms (plants or animals). The concentration of the

[2] Mackay, D. 2001. "*Multimedia Environmental Models: The Fugacity Approach - Second Edition",* Lewis Publishers, Boca Raton, pp.1-261.

[3] Arnot, J.A., D. Mackay, E. Webster and J. Southwood. 2006. Screening level risk assessment model for chemical fate and effects in the environment. Environ. Sci. Technol. 40:2316-2323

substance in each organism is generally calculated using these rates, absorption efficiencies, and the concentration in the respective media. The steady-state concentration in the organism is calculated from an input-output mass balance. The result is an estimate of fugacity and concentrations in the biota.

Using a multi-level, multi-media foodchain, the most sensitive endpoint is identified (based on toxicity and exposure potential) and a “critical emission rate” is then calculated based on that sensitive endpoint. The estimated critical emission rate is then compared with an estimated potential emission rate (based on quantities in commerce) to determine a “risk assessment factor” or RAF.

Substances are ranked according to their critical emission rates and their RAF values. Substances identified as having greater potential for harm are thus identified as requiring further assessment. The model output also indicates substances which are unlikely to be of concern owing to release to the environment through their life-cycle.

Features and limitations

RAIDAR can be applied to substances for which little or no empirical property data are available and emission rates are known only approximately. Although the uncertainties in output may be high, the results may be used to sort substances into groups of similar concern and thus compare lower and higher risk potential.

RAIDAR can be applied as a Level II fugacity model (L II; where results do not depend on media of release) or as a Level III model (L III; where results are affected by the media of release). Typically, for the Level III model, four release scenarios are considered, as the principle medium of release is often not known: 1) 100% release to air (A); 2) 100% release to water (W); 3) 100% release to soil (S) and 4) 33% release to each of air, water and soil (AWS). The scenario that has been chosen for detailed evaluation in rapid screening is the LIII with releases to AWS. It is the individual scenario that is most sensitive to releases to any of the three media (which are generally not known without detailed evaluation), and is never more than a factor of three away from the most conservative scenario (i.e., assumed 33% release to a medium, versus a maximum possible release of 100% to the medium).

RAIDAR also allows two options for addressing possible chemical biotransformation in food webs. The first approach assumes no metabolic biotransformation. The second includes estimated rates of metabolic biotransformation in fish, birds and mammals. For the purpose of rapid screening, it is assumed that there is no metabolism of the substance, as this is the more conservative approach.

It must be recognized that for RAIDAR, as for all models, there are limits to the range of suitable application of the model. As with other fugacity models, RAIDAR is intended for use at a regional geographic scale, and its results can not be meaningfully interpreted at a local scale (i.e., in the area immediately surrounding a point-source of discharge). As

such, its results are complementary to those provided by generic exposure scenarios A and B. Further, as outlined in a report on the application of RAIDAR in rapid screening[4], there are some classes of substances (e.g. inorganic substances) for which application of the model was not designed or may not be appropriate. Substances belonging to such classes are identified and the model is not applied to them.

Applicability for rapid screening

The RAIDAR model is considered to be relevant in the context of the rapid screening approach. Estimates produced by the model are based on partitioning of substances between environmental media as a function of their physical/chemical properties, food chain transfer, persistence, bioaccumulation potential and toxicity (critical body residue). This allows the integration of different fate and exposure considerations that cannot necessarily be, or have not been, included in the single-medium exposure scenarios A and B (which were focused on aquatic releases and effects). RAIDAR can therefore provide additional information on each substance, by providing a multi-media representation of fate and exposure potential for aquatic and terrestrial organisms.

For the purpose of the rapid screening approach, the critical emission rate, the RAF and the media of concern are the most important outputs of RAIDAR. The use of the critical emission rate and RAF allow identification of chemicals that are unlikely to be of concern because of their limited potential for exposure. For example, even if the currently available quantity in commerce information for certain chemicals is uncertain, if the critical emission rate for that substance is well above the maximum potential emission rate (therefore showing a low RAF), the substance is unlikely to be released in quantities that could lead to ecological effects. Additionally, the identification of the most sensitive ecological endpoint allows consideration of environmental media and/or types of organisms that may not have been previously addressed in the rapid screening exposure scenarios A and B.

Third Step: Mechanical filters and Manual process

The purpose of this step is to locate substance-specific information that would either support or question the assumption that the candidate substances for rapid screening are in commerce in low quantities, or that indicate that there may be particular concern associated with the hazard characteristics of some substances, and would indicate whether it is justified, given the available information, to conclude that:

- the substance is unlikely to cause harm; or
- further assessment of the substance is required (beyond rapid screening).

[4] CEMC (Canadian Environmental Modelling Centre). 2007. Risk Prioritization for a Subset of Domestic Substances List Chemicals using the RAIDAR Model. Prepared by the CEMC, Trent University, ON, for the Existing Substances Division, Environment Canada, Gatineau, QC, Canada. Available on request from the Existing Substances Division of Environment Canada.

A two-part approach was developed that involves searching through different available information sources relating to quantities of substances in commerce or to their hazard properties. This approach involves initially the "mechanical" use of filters to flag substances of potential concern, and secondly a "manual" approach in which further details are sought on selected substances.

Mechanical filters

The mechanical filters stage involves comparison of CAS numbers of substances subject to rapid screening, with those that have been extracted from a wide range of lists or information sources on chemicals. Use of the filters involves a number of different steps. Firstly, different domestic and international sources of information or different lists of substances (relating to quantity in commerce, release quantity, hazardous substances, regulations, etc.) were identified. Information sources were identified based on past experience in the Existing Substances Program as well as through discussion with various stakeholders. This initial list of information sources is aimed at representing a good cross-section of the types of available information.

The second step involved understanding the basis of each list or information source – for example, the criteria that a substance must meeting in order to be included on a specific regulatory list. This information was used to determine if the list or information source is relevant to the rapid screening exercise. Lists or information sources that are judged to provide appropriate information are retained for use whereas other sources are put aside. Information sources relating to quantity in commerce or industrial information pertinent to Canada (or the US) are judged particularly relevant; however, information from other countries is also taken into account. Hazard information (e.g., lists of substances of concern) is judged on whether the endpoints are relevant to ecological receptors, and on whether new information is provided that was not necessarily considered at a previous stage of rapid screening. Other sources of information, such as technical databases, are also considered as indicators of the amount of information potentially available for a substance, as this may reflect the level of commercial interest in it.

Many sources of information have been evaluated. In selecting which lists or information sources to apply in rapid screening, there was an effort to limit the amount of overlap between lists. For example, clear secondary sources of information were removed if the primary source of information was also included. Thus, some sources of information have been retained for the purpose of rapid screening (see appendix A) and others have not (see appendix B). Each appendix explains the basis for retaining or excluding a list or source of information for the purpose of rapid screening.

A number of information sources were judged to be relevant for rapid screening, but were not amenable to being searched mechanically. These sources were directed to the manual process stage, discussed below.

The last step was to develop, based on the available information concerning the basis of each list or information source, a weighted approach to account for overall significance of the information. In order to make these decisions, lists and information sources were separated into three categories: 1) exposure – quantities, releases and industrial information, 2) hazardous substances lists or substance profiles, and 3) miscellaneous databases on physical-chemical and hazard properties of substances.

- "Exposure – quantities, releases and industrial information" – These lists or sources of information are considered very relevant in the context of the rapid screening approach, because they could provide new information indicating whether or not the assumption that a substance is currently in use in Canada at low quantities is correct.

- "Hazardous substances lists or substance profiles" – The presence of a substance on one of these lists indicates the possible existence of information relating to toxicological endpoints or other concerns that deserve additional consideration. Hazard information is judged on whether the endpoints are relevant to ecological receptors, the level of their applicability to Canada and whether they provided new information not considered at a previous stage of rapid screening.

- "Miscellaneous properties and hazard databases" – The presence of a substance on one of these lists or information sources will in most cases only indicate that some information concerning it is available. However, presence on such a list or data source is still considered as a flag, because, typically, data are available for substances of higher interest. Several different sources of information have been selected to represent a good overview of what information is available.

The use of the mechanical filters only indicates whether a list or source of information includes a given substance. The overall significance of hits that a substance receives from the mechanical filters is evaluated according to a simple weighting system. The weight given to a list or source of information is based on the level of relevance of the information it contains. Some lists or information sources are considered to be of sufficient relevance that it is immediately concluded that a substance that appears on them requires further assessment (beyond the rapid screening process). Other lists or sources of information in the first and in the second category of filters are given a weight of one. One "hit" in one of these lists or sources is sufficient to conclude that further evaluation of the information is needed as part of the manual process. The third category ("*Miscellaneous properties and hazard databases*") are given a weight of one half, recognizing their more anecdotal nature. Two hits in this category are needed to proceed to the manual process for further evaluation. Appendix C summarizes the path resulting from a hit, for each of the mechanical filters.

Manual process

Substances subject to the manual process have already been flagged by one or more of the information sources at the mechanical filters stage, as described above. The manual process provides an opportunity to look in more depth and on a substance-by-substance basis at:

- the relevance of the information source to the specific substance,
- any substance-specific data contained in the information sources that flagged it (e.g., evaluation of temporal trends from international data on quantities of a substance in commerce), and
- whether the substance is listed in an information source that was not amenable to mechanical search.

Other, more general sources of information are also considered at the manual process stage.

Information sources used at this stage are grouped as follows:

A. Information on substances from specific sources of information that were flagged at the mechanical filter stage (e.g. NPRI data, information collected under S.71 of CEPA 1999)
    a. Exposure - quantities, releases and industrial information
    b. Hazardous substances lists or substance profiles
    c. Miscellaneous properties and hazard databases

B. Information from additional sources that were not part of the mechanical filter stage:
    a. General quantities and release information for substances
    b. General use and industrial information (e.g. industry or use sector) and other related information
    c. Hazard, properties and other

Not all sources of information listed for the manual process are consulted for all substances. The approach involves examining applicable sources of information from group A, and then moving to group B only if sufficient information to make a conclusion has not yet been identified. Using this approach, relevant information is obtained without the need to consult all the listed information sources for all substances - only substances for which very little information is identified are searched on all databases.

Appendix A describes the groups of information sources that are used at the mechanical filters stage to first flag substances. These sources are also used at the manual process stage to evaluate any substance specific information contained in them. Appendix D lists the groups of additional sources of information that are consulted at the manual process stage only.

Once relevant information sources have been consulted at the manual process stage, the information is evaluated and weighed, and a conclusion is reached that:

- the substance is unlikely to meet the criterion set out in paragraph 64(*a*) of CEPA (1999); or
- further assessment of the substance is required.

Discussion

The results of application of the rapid screening approach to substances that were identified as PiT or BiT through the categorization process and which are believed to be in commerce at low quantities are discussed in a separate document[5].

It is recognized that conclusions resulting from use of this approach have associated uncertainties, as the approach makes use only of data that is relatively easy to obtain. However, it is believed that the number of false negative conclusions will be low, due to the use of a wide range of filters relating to both use quantity and ecological hazard concerns identified for a substance, as well as the use of different conservative exposure scenarios.

Rapid screening is based in part on use and quantity data that were submitted when the DSL was first created 20 years ago. In many cases, the age of this information adds uncertainty in making decisions about whether and how to manage a given substance without investing in the collection of new information. By contrast, the US Toxic Substances Control Act mandates a regular update (every five years) of the quantities and uses of each of the substances on its equivalent to the DSL. Adoption of a similar requirement in Canada, as announced in December 2006 by the Government as part of the Chemicals Management Plan, will ensure that the most current information is available for decision making. Conclusions resulting from application of this rapid screening approach will be revisited as new information on quantities and uses becomes available.

In the meantime, it is important to recognize that the Government of Canada uses seven different “feeders” (categorization, new substances notifications, industry submissions, international assessment and data collection, emerging science, public nominations, and provincial or international decisions) to identify existing substances that may require assessment under CEPA 1999. Substances may be subject to assessment whether or not they meet categorization criteria, and whether or not the Existing Substances Program has previously concluded that the substance did not meet criteria in section 64 of CEPA 1999.

The Government of Canada would like to emphasize that while the categorization process is an important mechanism to set priorities, information from the other six feeders will continue to be collected and evaluated, on an on-going basis. Substances that are

[5] Environment Canada. 2007. Rapid Screening of Substances of Lower Ecological Concern: Results of the Ecological Screening Assessment. Existing Substances Division, Environment Canada, Gatineau, QC, Canada.

identified through these other feeder mechanisms will be integrated into the prioritization scheme along with other substances that have been identified through categorization as priorities for assessment.

Substances for which it is proposed, based on the outcome of the rapid screening approach and other considerations, that they do not meet the criteria in section 64 of CEPA 1999 and that no further action is required at this time, remain subject to re-assessment if information is identified that indicates that further evaluation of the substance is warranted. Examples of the types of information that may trigger further evaluation of a substance include:

- **Evidence of higher quantities in commerce.** Since the rapid screening approach is driven in part by use quantity information, updated information suggesting that higher quantities of a substance are now in use could indicate that a substance should be subject to further evaluation.
- **Evidence of higher releases.** The exposure scenarios used assumptions that are expected to be conservative for most substances. Updated information indicating that the assumed conditions are not protective for a particular substance owing to its routine handling and use could indicate that a substance should be the subject of further evaluation.
- **Evidence of ecological exposure.** Monitoring data demonstrating the detectable presence of a substance in environmental media could indicate that a substance should be the subject for further evaluation.
- **Evidence of other possible ecological risk.** Information that was not considered in the rapid screening approach, but that could be of significance in establishing an ecological risk from a substance could trigger further evaluation of the substance.
- **Evidence that a substance is a PBiT.** Since PBiTs are not candidates for the rapid screening approach, any information to suggest that the substance is PBiT could trigger further evaluation of the substance.
- **Identification as part of a category undergoing assessment.** If the substance is part of a group that is prioritized for a category assessment at some time in the future, the substance may be subject to this further evaluation.

Information of these types may be identified from a number of different sources, including:

- direct submission of information by stakeholders;
- research, monitoring and DSL update activities taking place under the Federal Chemicals Management Plan;
- other assessment or regulatory activities in Canada or in foreign or international forum.

Conclusion

Canada is a world leader in systematically reviewing its complete list of existing substances and committing to assess those of greatest concern. Recognizing the magnitude of this task and the limited availability of data, the Government of Canada believes that the use of a range of assessment approaches is essential. In this way, the complexity of the various approaches and the use of assessment resources may be appropriately scaled to the expected level of concern for the different substances being evaluated.

The approach for rapid screening of substances anticipated to have a low likelihood of adverse effects is an effective way to identify substances not requiring further assessment. Application of this simplified approach is warranted and necessary, since it accelerates the application of resources to assessment issues that require greater attention.

The rapid screening approach outlined in this document has been applied to substances believed to be used in low quantities in Canada. It should be noted that a modified version of this approach may ultimately be applied to other groups of substances if judged applicable and relevant.

In summary, rapid screening is a stepwise approach that makes use of both qualitative and quantitative information using different models, scenarios and information sources to inform a decision as to whether a substance may likely be of concern and, as such, should be further assessed. It is important to recognize that rapid screening supports allocation of resources to where they are most beneficial, and represents a pragmatic and reasonable approach for dealing with substances believed to be of lower concern.

Appendix A

Sources of Information Used as Mechanical Filters

Information Source	Description (Summary of the contextual information from the source)	Interpretation / Significance
Exposure – quantities, releases and industrial information		
OECD HPV	The OECD List of HPV Chemicals serves as the overall priority list from which chemicals are selected for Screening Information Data Set (SIDS) data gathering and testing and initial hazard assessment. The HPV list is compiled for substances which are produced or imported at levels ≥ 1000 tons per year in at least one Member country or in the European Union region. http://www.oecd.org/dataoecd/55/38/33883530.pdf	These international lists of high production volume (HPV) chemicals, particularly the US lists, are judged as important indicators of a substance potentially being in commerce in Canada in higher quantities.
ICCA HPV	The global chemical industry, through the International Council of Chemical Associations (ICCA), has undertaken to provide, as a first step, harmonized data sets on the intrinsic hazards of and initial hazard assessments for approximately 1,000 HPV substances by the end of 2004. The information will be submitted to the OECD for international agreement as part of its refocused HPV Chemicals Program. http://www.cefic.org/activities/hse/mgt/hpv/ICCA%20Working%20List%20-%20October%202005.xls	
US HPV	The U.S. high production volume (HPV) chemicals are those which are manufactured in or imported into the United States at levels ≥ 1000000 pounds per year. The U.S. HPV chemicals were identified through information collected under the Toxic Substances Control Act (TSCA) Inventory Update Rule (IUR). Reporting these organic chemicals is required every four years, leading to four lists of substances : http://www.epa.gov/chemrtk/pubs/update/hpv_1990.pdf ; http://www.epa.gov/chemrtk/pubs/update/hpv_1994.pdf; http://www.epa.gov/chemrtk/pubs/update/hpvadds.pdf; http://www.epa.gov/chemrtk/pubs/general/hpvunspn.pdf	
US EXTENDED HPV	A chemical industry initiative that broadens current work on US HPV chemicals. The companies are being asked to provide health and environmental information for 574 “new” HPV chemicals (which now meet the volume threshold according to EPA’s 2002 Inventory). The companies will be asked to provide also information on use and exposure for both the “Extended” HPV as well as the original “Challenge Program” substances. http://www.americanchemistry.com/s_acc/bin.asp?CID=432&DID=1708&DOC=FILE.PDF	

Information Source	Description (Summary of the contextual information from the source)	Interpretation / Significance
Japan HPV	In 2005 the Japan HPV Challenge Program was started in partnership between Japanese government agencies and the Japanese Chemical Industry Association (JCIA), to collect and make public information on the safety of Japan's HPV chemicals which are not yet subject to the assessment by existing international and national programs. The target chemicals are organic substances produced or imported in Japan over 1,000 tons per year. www.safe.nite.go.jp/english/db.html	
Australia HPV	National Industrial Chemicals Notification and Assessment Scheme (NICNAS) have compiled a list of industrial chemicals (mixtures/products) that are manufactured and imported in Australia in quantities of ≥ 100 tonnes during 2001 and 2002. A number of categories were exempt (articles, radioactive, incidentally and naturally chemicals and polymers). http://www.nicnas.gov.au/industry/High_Volume_Industrial_Chemicals/HVICL_Final_2002_AllRanges_XLS.	
CEPA 1999 Pilot Project (CA)	A Pilot Project for screening assessments was initiated by Environment Canada and Health Canada in 2001. The project identified 123 substances which had the potential to meet the categorization criteria 1) for persistence and/or bioaccumulation and inherent toxicity to non-human organisms or 2) for high potential for exposure to Canadians. Additionally, a survey for all pilot substances was conducted in 2002 under authority of Section 71 of the *Canadian Environmental Protection Act,1999* (CEPA, 1999), requiring all parties to report use, import or manufacture in Canada. http://www.ec.gc.ca/substances/ese/eng/dsl/pilpro.cfm	These sources provide recent Canadian information that merits further evaluation. Information was collected under the authority of CEPA 1999, or in relation to activities conducted under it.
CEPA 1999 Section 71 Notices (CA)	Other notices under Section 71 of CEPA, 1999 require submission of data regarding the presence of listed substances in the Canadian market and associated industry sectors. Substances covered by these Notices are identified, through categorization of the Domestic Substances List (DSL), to have potential for hazard to the environment or human health or as representing greatest potential for human exposure; or as substances of emerging concern and international interest. http://www.ec.gc.ca/substances/ese/eng/dsl/notices_avis.cfm	
Categorization Industry Submission (CA)	Substances are included on this list if industry voluntarily provided data on the substance in support of categorization of the DSL, or if industry mentioned that the substance was of interest to them. This list was compiled during categorization. http://www.ec.gc.ca/substances/ese/eng/dsl/cat_index.cfm	
Toxic Substances Control Act – Inventory Update Rule (US)	The Environmental Protection Agency (EPA) promulgated a rule in 1986 for the partial updating of the Toxic Substances Control Act (TSCA) Chemical Inventory database (75,000 industrial chemicals currently produced or imported into the United States). Manufacturers and importers of chemicals already on the TSCA Inventory which are being produced at one plant site or imported at production volume levels of 10,000 or more pounds (changed to 25,000 pounds in 2006) must report, unless either their chemical is excluded from the Inventory Update Rule (IUR) or they fall under the Small Business exemption. http://www.epa.gov/opptintr/iur/tools/data/index.htm	These sources provide information on quantities of substances in commerce in other countries. Several include data from multiple years, which can indicate temporal trends in quantity of substances in commerce or in the number of uses.

Information Source	Description (Summary of the contextual information from the source)	Interpretation / Significance
Toxic Substances Control Act – 12(b) Export Notification (US)	TSCA section 12(b) export notification requirements delineated at 40 CFR part 707, subpart D. It requires any person who exports or intends to export a chemical substance or mixture to notify the Environmental Protection Agency (EPA) of such exportation if any of the cited actions have been taken under TSCA with respect to that chemical substance or mixture. Current list as of November 14, 2006 is found at: http://www.epa.gov/opptintr/chemtest/pubs/main12b.pdf	
Chemical Industries Association List (UK)	In 2004 United Kingdom Chemical Industries Association (UK CIA) unveiled plans to develop a database of chemicals marketed in the UK. This database is the first output of that work and covers the previous calendar year 2005. This database involves pure chemical substances that were marketed in the UK by CIA member companies at greater than 1 ton per company during 2005. http://www.cia.org.uk/newsite/sustainability/Chemicals_database.pdf	
Research Institute for Fragrance Materials	The Research Institute for Fragrance Materials (RIFM) is an international organization that evaluates and distributes scientific data on the safety assessment of fragrance raw materials found in perfumes, cosmetics, shampoos, creams, detergents, air fresheners, candles and other personal and household products. RIFM's database contains information on chemical structure, quantity in commerce (0 to > 1000 000 kg/y) and consumer exposure. This database is operated with the full cooperation of the Flavor and Extracts Manufacturing Association (FEMA) and is only available by subscription to RIFM and FEMA member. http://rifm.org/default.htm	
SPIN database (Scandinavian countries)	Substances in Preparations in Nordic Countries (SPIN) database contains information on products on the market reported to each of the Nordic products registers (data on amounts of substances and in number of products and sectors the substances are used in). It provides data on the use of chemical substances in Norway, Sweden, Denmark and Finland over the years 1999 to 2004. http://www.spin2000.net/spin.html	
KEMI Index - surface water, air, soil, STP (SE)	The Swedish Chemicals Inspectorate, KemI, is a supervisory authority under the Ministry of the Environment. KemI works in Sweden and in the EU to promote legislation and rules which contribute to achieving a non-toxic environment. The KemI Index provides knowledge and information about important environmental aspects when diffuse emissions from articles are a component in efforts to reduce chemical risks. This index is made up of seven categories with emission levels going from low to high. http://www.kemi.se/templates/page.aspx?id=3420	

Information Source	Description (Summary of the contextual information from the source)	Interpretation / Significance
National Pollutant Release Inventory (CA)	National Pollutant Release Inventory (NPRI) provides information on releases of listed substances to air, water, land and underground injection and off-site transfers for disposal or recycling. The current list (2005) consists of 323 substances or groups of substances. The NPRI is the only legislated, nation-wide, publicly-accessible inventory of its type in Canada. One of the fundamental objectives of the NPRI is to provide Canadians with access to pollutant release information for facilities located in their communities. http://www.ec.gc.ca/pdb/npri/	Presence of a substance on a pollutant release and transfer register (PRTR) demonstrates concern in at least some countries with the substance, as well as the existence of detailed information concerning it. The NPRI is particularly relevant, as it provides annual, Canada-specific data.
Toxics Release Inventory (US)	The Toxics Release Inventory (TRI) is a publicly-available database that contains information on chemical emissions from almost 23,000 facilities in the United States. The TRI contains information from companies and government facilities that report their air, land, and water releases and other waste management activities. TRI also contains some information about source reduction efforts. The reporting thresholds for most chemicals are 25,000 pounds for manufacturing or processing and 10,000 pounds for other uses. Persistent bioaccumulative toxic (PBT) chemicals have reporting thresholds of 10 or 100 pounds except for the dioxin and dioxin-like compounds category that has a reporting threshold of 0.1g. http://www.epa.gov/tri/	
National Pollutant Inventory (AU)	The National Pollutant Inventory is an Internet pollutant release and transfer register (PRTR) database that gives information on the types and amounts of pollutants being emitted to the environment. The reporting threshold is 10 tons (use). http://www.npi.gov.au/	
Pollutant Release & Transfer Register (JN)	Japan started its pollutant release and transfer register (PRTR) program in 2001. Reporting is done annually for any chemical that is “difficult to decompose, is bioaccumulative, and may be harmful to human health (Class I) or those which have low accumulation but do not readily decompose and may be harmful to human health when continually taken (Class II). www.safe.nite.go.jp/english/db.html	
Hazardous substances lists or substance profiles		
CEPA 1999 Section 200 Environmental Emergencies List (CA)	Section 200 of CEPA 1999 allows the federal government to establish a list of substances that, if they enter the environment as a result of environmental emergency (E2): a) have or may have an immediate or long-term harmful effect on the environment or its biological diversity b) constitutes or may constitute a danger to the environment on which human life depends, or c) constitutes or may constitute a danger in Canada to human life or health. An E2 plan would be required of all facilities that store or use any of these substances at or above specified threshold quantities. http://www.ec.gc.ca/ee-ue/home/home_e.asp	Substances on these lists have been identified through activities under CEPA as being of potential concern for the environment and/or human health in Canada.

Information Source	Description (Summary of the contextual information from the source)	Interpretation / Significance
PSL2 Nomination Dossiers (CA)	The Priority Substances List (PSL2) Information dossiers are documents that were prepared for substances nominated for PSL2. They contain: physicochemical data, environmental fate and behavior, toxicity, production and use in Canadian commerce, and release data. Data selected in the draft dossiers has been reviewed and selected based upon quality of the study and credibility of the source.	
Forest Products Industry List (CA)	This list of substances on the DSL were identified by the Forest Products Section (Environment Canada) and the Forest Products Association of Canada (FPAC) as representing substances of potential interest to that sector. http://www.fpac.ca	This list is judged relevant as it identifies substances that have been labeled as being of interest to this sector in Canada, but this does not imply that these substances are necessarily of particular ecological concern.
ARET List (CA)	The concept of ARET (Accelerated Reduction/Elimination of Toxics) was developed in the early 1990's as a challenge to Canadian industry to voluntarily reduce or eliminate releases of 117 substances found in the Great Lakes Basin. Substances were scored based on available toxicity, persistence and bioaccumulation data. This listing was meant to guide priorities and was not meant to imply that actual harm was being caused by these substances. http://www.ec.gc.ca/nopp/aret/	Substances on these lists have been identified as being of potential concern for the environment and/or human health in the Great Lakes region.
Great Lakes 211 Air Toxics (CA/US)	The Great Lakes Commission is a binational agency that promotes the orderly, integrated and comprehensive development, use and conservation of the water and related natural resources of the Great Lakes basin and St. Lawrence River. This list includes compounds listed as Hazardous Air Pollutants (HAPs) within the 1990 Clean Air Act Amendments. It also includes several substances that have been identified as posing a potential threat to the Great Lakes ecosystem and human health within the region. http://www.glc.org/air/Substances_April06.pdf	
Great Lakes Binational Toxics List (CA/US)	The Great Lakes Binational Toxics Strategy was developed by the U.S. EPA and Environment Canada to implement the Revised Great Lakes Water Quality Agreement of 1978. The purpose of this binational strategy is to set forth a collaborative process by which Environment Canada and the United States Environmental Protection Agency, in consultation with other federal departments and agencies, Great Lakes states, the Province of Ontario, Tribes, and First Nations, work in cooperation with their public and private partners toward the goal of virtual elimination of persistent toxic substances resulting from human activity, particularly those which bioaccumulate, from the Great Lakes Basin. The strategy uses multiple screening criteria to identify substances that are present in the water, sediment, or aquatic biota of the Great Lakes system and that are exerting, singly or in synergistic or additive combinations, a toxic effect on aquatic, animal, or human life. http://www.epa.gov/glnpo/bns/index.html	

Information Source	Description (Summary of the contextual information from the source)	Interpretation / Significance
NAPS (CA)	National Air Pollution Surveillance Network (NAPS) includes Semi-Volatile Organic Target List, Species Measured in Particulate Samples, and VOC (Volatile Organic Compound) Target List. http://www.etc-cte.ec.gc.ca/etchome_e.html	Canadian environmental monitoring data is available for substances on these lists.
ETC Air Monitoring (CA)	This provides a list of chemicals monitored by Environment Canada's Environmental Technology Centre.	
Pest Control Products Act Registered Active Ingredients (CA)	Pesticides imported into, or sold or used in Canada are regulated federally under the *Pest Control Products Act* (PCP Act) and Regulations. http://www.pmra-arla.gc.ca/english/pdf/fact/fs_pestreg-e.pdf	Substances on these lists have recognized toxic properties as they are used as pesticides. Although pesticides and their uses are not covered under CEPA, non-pesticidal uses of the substances do fall under the Act.
Banned or Severely Restricted Pesticides (US)	The U.S. EPA maintains the list of banned or severely restricted pesticides as part of its participation in a voluntary international program known as the Prior Informed Consent (PIC) procedure. http://www.epa.gov/oppfead1/international/piclist.htm	
UNEP/FAO/ WHO Inchem Pesticide Classification (UN)	The classification distinguishes between the more and the less hazardous forms of each pesticide in that it is based on the toxicity of the technical compound and on its formulations. The classification is based primarily on the acute oral and dermal toxicity to the rat since these determinations are standard procedures in toxicology. http://www.inchem.org/documents/pds/pdsother/class.pdf	
PBT List (US)	The U.S. EPA maintains a list of persistent, bioaccumulative, and toxic (PBT) chemicals to identify chemicals and chemical categories which may be found in hazardous wastes regulated under the Resource Conservation and Recovery Act (RCRA). http://www.epa.gov/ebtpages/polltoxicpersistentbioaccumulativetox.html	Substances on these lists have been identified as being of concern for the environment and/or human health in other countries.
Air Toxics / Hot Spots Chemicals (California)	California's Air Toxics "Hot Spots" Information and Assessment Act of 1987 (AB 2588) requires the California Air Resources Board (CARB) to compile and maintain a list of substances that pose chronic or acute threats to public health when present in the air. http://www.arb.ca.gov/ab2588/final96/guide96a.pdf	

Information Source	Description (Summary of the contextual information from the source)	Interpretation / Significance
Clean Water Act Priority Pollutants (US)	Section 307 of the U.S. federal Clean Water Act (CWA), defines a list of priority pollutants for which the U.S. EPA must establish ambient water quality criteria and effluent limitations. Decisions to expand the list must take into account the toxicity, persistence, and degradability of the pollutant; the potential presence and the importance of affected organisms in any waters; and the nature and extent of the effect of the toxic pollutant on such organisms. http://oaspub.epa.gov/wqsdatabase/wqsi_epa_criteria.rep_parameter	
Superfund Site Chemicals (US)	The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) created the Superfund Program to clean up uncontrolled or abandoned hazardous-waste sites and to respond to accidents, spills, and other emergency releases of pollutants and contaminants. Section 101 defines a list of hazardous chemicals for which the U.S. EPA must establish regulations. http://www.epa.gov/ceppo/pubs/title3.pdf	
Hazardous Constituents Under RCRA (US)	The Hazardous Constituents list (Appendix VIII) of the Resource Conservation and Recovery Act (RCRA) is used to identify the universe of chemicals of concern under RCRA, the primary environmental law governing the proper disposal of hazardous wastes. http://www.access.gpo.gov/nara/cfr/cfrhtml_00/Title_40/40cfr261_00.html	
Nordic Council List of Chemicals Hazardous to Environment (EU)	The European Economic Community first created a List of Dangerous Substances in 1967, classifying substances according to health hazards and physico-chemical properties. The list has subsequently been expanded, and the Nordic Council of Ministers conducted a special project to review available toxicity data in order to identify substances that should be classified as dangerous to the environment. http://apps.kemi.se/nclass/default.asp	
OSPAR List (EU)	The Convention for the Protection of the Marine Environment of the North-East Atlantic was opened for signature at the Ministerial Meeting of the Oslo and Paris Commissions. The OSPAR List of Substances of Possible Concern is a dynamic working list and is regularly revised, as new information becomes available. This may lead to deletion of some substances on the current version of the OSPAR List of Substances of Possible Concern and to the addition of other substances if data on persistence, toxicity, ability to bioaccumulate, etc., show that they should be added. http://www.ospar.org/eng/html/welcome.html	
Priority Substances List (EU)	Article 8 of the Regulation states that the Commission, in consultation with the Member States of the European Union, will regularly draw up lists of priority substances which require immediate attention because of their potential effects to man or the environment. The Commission and Member States utilize the information collection during step 1 of the regulation as a basis for selecting priority substances. http://ecb.jrc.it/existing-chemicals/	

Information Source	Description (Summary of the contextual information from the source)	Interpretation / Significance
Toxic Chemicals List (China)	This is a list of toxic chemicals banned or severely restricted in the People's Republic of China. http://www.crc-sepa.org.cn/English/e024.htm	
PIC List (UN)	In 1989, the Food and Agriculture Organization (FAO) of the United Nations and the United Nations Environment Programme (UNEP) introduced provisions for Prior Informed Consent (PIC) procedures for banned or severely restricted chemicals in international trade. The purpose of the provisions was to protect countries from importing chemicals that have been banned or severely restricted for health or environmental reasons. http://www.pic.int/	The PIC list is used as a mechanism to identify substances that are prohibited or substantially restricted in other jurisdictions, the basis of which must be reviewed as required under section 75 of CEPA 1999.
Camford Product Information Profiles (CA)	Each chemical process industries (Camford Product Information (CPI)) profile is a handy market study covering a single chemical product. In a few pages, it provides the key information needed for effective marketing - data for the most recent five years and a three-year forecast. http://www.camfordinfo.com/pdfs/cpipp_order_form.pdf	These sources may contain information about production, uses, releases, exposure and hazard. The fact that a chemical is included in these sources does not necessarily indicate that it is of ecological concern.
BUA Reports (DE)	Comprehensive chemical monographs are published on chemicals suspected of having a hazardous potential. The BUA Reports serve the German federal government as a basis for measures to regulate environmental and health hazards. The reports present Information on physico/chemical properties, toxicity, environmental fate, etc. http://www.hirzel.de/bua-report/	
UNEP EHC (UN)	The International Program on Chemical Safety publishes Environmental Health Criteria Documents on many industrial chemicals. The reports offer a comprehensive information source for: physicochemical data, environmental fate and behavior, environmental releases and concentrations, production and usage, aquatic, terrestrial and human toxicity (both acute and chronic), as well as further action/measures, if necessary, needed to mitigate harm caused by the substance. http://www.inchem.org/pages/ehc.html	
RAIS Tox Profile (US)	The Risk Assessment Information System (RAIS) toxicity profiles in this database were developed using information taken from the United States Environmental Protection Agency's Integrated Risk Information System (IRIS) and Health Effects Assessment Summary Tables (HEAST) and other regulatory sources. http://risk.lsd.ornl.gov/tox/rap_toxp.shtml	

Information Source	Description (Summary of the contextual information from the source)	Interpretation / Significance
TSCATS (US)	Toxicity studies are submitted by U.S. industry to EPA under several sections of the Toxic Substances Control Act (TSCA – TS or Test Submission). The database contains non-confidential studies covering chemical testing results and adverse effects of chemicals on health and ecological systems. http://www.syrres.com/esc/tscats.htm	
Right-to know fact sheets (New Jersey)	Hazardous Substance Fact Sheets are prepared for substances listed on the New Jersey Right to Know Hazardous Substance List. The Fact Sheets are prepared on pure substances and contain information on health hazards, exposure limits, personal protective equipment, proper handling, first aid, and emergency procedures for fires and spills. http://www.state.nj.us/health/eoh/rtkweb/rtkhsfs.htm	
Miscellaneous properties and hazard databases		
HSDB Record (US)	HSDB (Hazardous Substances Data Bank) is a Toxicology Data File on the National Library of Medicine's (NLM) TOXNET® system. It focuses on the toxicology of potentially hazardous chemicals. The HSDB records represent a comprehensive data peer reviewed information source. It is enhanced with information on human exposure, industrial hygiene, emergency handling procedures, environmental fate, regulatory requirements, and related areas. http://toxnet.nlm.nih.gov/	These sources may contain information about physical-chemical and hazard properties. Availability of such data does not mean that a listed substance is of concern. However, such data is generally only produced for substances of higher commercial interest or of ecological or human concern.
NTP Reports / Studies (US)	The National Toxicology Program (NTP) was established in 1978 by the Secretary of Health and Human Services to coordinate toxicology research and testing activities within the Department, to provide information about potentially toxic chemicals to regulatory and research agencies and the public, and to strengthen the science base in toxicology. http://ntp-server.niehs.nih.gov/	
IUCLID (EU)	IUCLID (International Uniform Chemical Information Database) is the basic tool for data collection and evaluation within the EU-Risk Assessment Programme. In October 1999, IUCLID was accepted by the OECD as the data exchange tool under the OECD Existing Chemicals Programme. The data structure has been designed to describe the effects of substances on human health and the environment, in close collaboration between Member States, Industry and the European Chemicals Bureau (ECB). http://ecb.jrc.it/existing-chemicals/	

Information Source	Description (Summary of the contextual information from the source)	Interpretation / Significance
AQUIRE (US)	AQUIRE (Aquatic Toxicity Information Retrieval) is part of the US EPA's ECOTOX database. The AQUIRE database was established in 1981 by the United States Environmental Protection Agency (US EPA), Mid-Continent Ecology Division, Duluth, MN. Scientific papers published both nationally and internationally on the toxic effects of chemicals to aquatic organisms and plants are collected and reviewed for AQUIRE. Lethal, sublethal and bioconcentration effects are recorded for freshwater and marine organisms. http://www.epa.gov/ecotox/	
TERRETOX (US)	TERRETOX is part of the US EPA's ECOTOX database. TERRETOX is a terrestrial wildlife toxicity database established to provide data linking quantified chemical exposures with observed toxic effects. TERRETOX includes results for lethal, sublethal and bioaccumulation effects. http://www.epa.gov/ecotox/	
PHYTOTOX (US)	PHYTOTOX is part of the US EPA's ECOTOX database. The PHYTOTOX database is a computerized information resource that permits the rapid retrieval and comparison of data pertaining to lethal and sublethal responses, excluding residue effects, of terrestrial plants to the application of chemicals. Both natural and synthetic organic compounds administered to native, crop, or weed species have been considered. http://www.epa.gov/ecotox/	
ChemFate – Syracuse Research Corporation (US)	ChemFate is Syracuse Research Corporation's Chemical fate Database. ChemFate is a data value file containing 25 categories of environmental fate and physical/chemical property information on commercially important chemical compounds. Actual experimental values are abstracted and retained in the file. http://www.syrres.com/esc/chemfate.htm	
Datalog – Syracuse Research Corporation (US)	DATALOG is a bibliographic file indexed by CAS Registry number that contains eighteen types of environmental fate data. Data is indexed by such fields as: octanol-water partition coefficient, Henry's Law Constant, hydrolysis, biodegradation, bioaccumulation, water solubility, vapour pressure, and effluent concentrations. http://www.syrres.com/esc/datalog.htm	
CESARS – Ontario Database (CA/US)	CESARS (Chemical Evaluation Search and Retrieval System) is provided by the Michigan Department of Natural Resources and the Ontario Ministry of the Environment. The database contains comprehensive environmental and health information on chemicals. Each record consists of chemical identification information and provides descriptive data on up to 23 topic areas, ranging from chemical properties to toxicity to environmental transport and fate. http://www.ccohs.ca/products/databases/cesars.html	

Appendix B

Sources of Information Not Used as Mechanical Filters

Information Source	Description (Summary of the contextual information from the source)	Reason for exclusion
CEPA 1999 Schedule 1 (CA)	Schedule of CEPA 1999 ("List of Toxic Substances") includes substances that are considered to be "toxic" under the Act. http://www.ec.gc.ca/CEPARegistry/the_act/Schedules_1.cfm	Risks from the substances identified by these sources are currently being addressed under Government of Canada programs.
Montreal Protocol Ozone Depleting Substances	The Montreal Protocol is the first worldwide agreement designed to protect human health and the environment against the adverse effects of the depletion of the stratospheric ozone layer. The protocol is administered by the United Nations Environment Programme (UNEP), which maintains the list of ozone-depleting substances that are targeted for control practices, reductions, or total phase-outs. http://www.unep.ch/ozone/pdf/Montreal-Protocol2000.pdf	
IPCC Greenhouse Gas List (UNEP)	In 1990, the Intergovernmental Panel on Climate Change (IPCC) released a report that outlines the contribution of individual greenhouse gases to the greenhouse effect. The greenhouse gases identified by the IPCC are both natural and anthropogenic substances that have been recognized by the international scientific community as having the potential to bring about climate change. Under the Kyoto Protocol, industrialized countries and those in transition to a market economy have agreed to limit or reduce their emissions of these greenhouse gases. http://www.ipcc.ch/	
Known Carcinogens and Reproductive Toxicants (California)	California's Safe Drinking Water and Toxic Enforcement Act of 1986 requires that the Governor publish, revise and republish at least once per year the list of chemicals known to the State to cause cancer, birth defects or other reproductive harm, and to inform citizens about exposures to such chemicals. A substances listing denotes a prohibition of discharge to sources of potential drinking water, and a requirement of prior disclosure to public exposure. http://www.oehha.ca.gov/prop65/prop65_list/Newlist.html	Information pertains to human health and carcinogenicity. Carcinogenicity endpoints, along with genotoxicity, reproductive toxicity, and developmental toxicity, have been addressed by Health Canada during categorization of the DSL.
IARC Carcinogen Group	The mission of the International Agency for Research in Cancer (IARC) is to coordinate and conduct research on the causes of human cancer, the mechanisms of carcinogenesis, and to develop scientific strategies for cancer control. The Agency disseminates scientific information and classifies chemicals in regard to their carcinogenicity. http://monographs.iarc.fr/ENG/Classification/crthall.php	

Information Source	Description (Summary of the contextual information from the source)	Reason for exclusion
IARC Monograph (and Volume)	The IARC Monographs series publishes authoritative independent assessments by international experts of the carcinogenic risks posed to humans by a variety of agents, mixtures and exposures. http://monographs.iarc.fr/ENG/Classification/index.php	
Endocrine Disrupting Chemical List (EU)	The European Union (EU) creates a list of chemicals that are endocrine disruptor or suspected to be. This priority list was established in two phases, first an independent review of evidence of endocrine disrupting effects and human/wildlife exposure and second a priority-setting exercise in consultations with stakeholders and the Commission Scientific Committees. http://ec.europa.eu/environment/endocrine/strategy/substances_en.htm	Endocrine disruption is being addressed in the existing substances program as a standard ecological effects endpoint.
Great Lakes BCCs	The Great Lakes Bio-accumulative Chemicals of Concern list contains bioaccumulative chemicals of concern (BCCs) that have the potential to cause adverse effects after release to surface waters due to bioaccumulation in aquatic organisms. These chemicals are further regulated by the mixing zone ban in the Great Lakes. http://www.epa.gov/EPA-WATER/1995/March/Day-23/pr-82.html	The substances found on these lists are also found on other more robust or Canadian-specific lists (e.g. Great Lakes Binational Toxics List; Great Lakes 211 Air Toxics List; Air Toxics / Hot Spots chemicals (California); PBT List (US); OPSAR List (EU)). Therefore, these sources of information are considered as redundant.
Clean Air Act Hazardous Pollutants (US)	The U.S. Congress amended the federal Clean Air Act in 1990 to address a large number of air pollutants that are known to cause or may reasonably be anticipated to cause adverse effects to human health or adverse environmental effects. http://www.epa.gov/ttn/atw/188polls.html	
Toxic Air Contaminants (California)	The California Air Toxics Program establishes the process for the identification and control of toxic air contaminants and includes provisions to make the public aware of significant toxic exposures and for reducing risk. All hazardous air pollutants (HAPs) identified by the U.S. EPA are included in California's list of toxic air contaminants. Chemicals have also been added to the list by the California Air Resources Board (CARB), based on toxicity and potential exposure. http://www.arb.ca.gov/toxics/toxics.htm	
OSPAR Chemicals for Priority Action and Commercial Status (EU)	The substances on the List of Chemicals for Priority Action are those which the OSPAR Commission has determined to require priority action. The Commission was established by the Convention for the Protection of the Marine Environment of the North-East Atlantic that was opened for signature at the Ministerial Meeting of the Oslo and Paris Commissions in Paris on 22 September 1992. http://www.ospar.org/eng/html/welcome.html	
DFAIT Export Control List (CA)	The Export Control List (ECL) is a nondiscretionary list, multi and bilaterally developed, to monitor the sale and export of strategic or dual use goods. The Department of Foreign Affairs and International Trade (DFAIT) may require export permits for specific goods and technology found on this list. http://www.international.gc.ca/eicb/military/documents/exportcontrols2003-en.pdf	The mandates of the Federal Departments or organisations that are responsible for these sources of information are largely focused on human

Information Source	Description (Summary of the contextual information from the source)	Reason for exclusion
Chemical Weapons Convention Implementation Act - Annex on Chemicals (CA)	The annex on chemicals of the *Chemical Weapons Convention Implementation Act* (1995, c. 25) lists the toxics chemicals and, precursors and their mixtures in order to fulfill Canada's Chemical Weapons Convention (CWC) obligations, export (and import) controls. http://laws.justice.gc.ca/en/showdoc/cs/C-27.6/sc:ONCHEMICALS/20070301/en#anchorsc:ONCHEMICALS	health and have specific purposes (e.g. international trade, industry awareness, occupational safety). Thus, they are not likely to possess information relevant to an ecological risk assessment. However, some substances found in these sources of information may reach the environment through disposal or "down the drain" use, which has been addressed by the generic exposure scenarios component of rapid screening.
Hazardous Products Act – Ingredients Disclosure List (CA)	The Ingredient Disclosure List (IDL) is a regulation (SOR 88-64) under the Hazardous Products Act (R.S., 1985, c. H-3). This regulation lists chemicals with a concentration "cut-off" of either 0.1% or 1.0% (weight/weight). Ingredients included in the IDL are one of the four categories of ingredients whose identity and concentration must be disclosed on a Material Safety Data Sheet (MSDS) if found in a controlled product above the concentration cut-off. http://laws.justice.gc.ca/en/showdoc/cr/SOR-88-64/sc:1//en#anchorsc:1	
Hazardous Inhalation Substance List (US)	The U.S. Department of Transportation (DOT) maintains a list of materials which have been designated as hazardous materials (inhalation) for purposes of transportation. Chemicals must be either gases or volatile liquids and must meet certain toxicity thresholds to be placed on the DOT list. http://www.access.gpo.gov/nara/cfr/waisidx_00/49cfr172_00.html	
OSHA Air Contaminants (US)	Occupational Safety and Health Administration (OSHA) sets enforceable permissible exposure limits (PELs) to protect workers against the health effects of exposure to hazardous substances. PELs are regulatory limits on the amount or concentration of a substance in the air. They may also contain a skin designation. http://www.osha.gov/SLTC/pel/	
Regulated, Toxic, Explosive, or Flammable Substances (US)	The federal Clean Air Act establishes the regulatory framework for the control of air pollutants. Section 112(r) established a list of substances which, if present in a process in a quantity in excess of a threshold, require that the facility establish a Risk Management Program to prevent chemical accidents and to prepare a risk management plan and submit the plan to the state and to the local emergency planning organization. http://iaspub.epa.gov/srs/srs_proc_qry.navigate?P_REG_AUTH_ID=1&P_DATA_ID=166&P_VERSION=1	
List of precursors and chemicals frequently used in the manufacture of illicit drugs (UN)	This list has been prepared by the International Narcotics Control Board (INCB) as a tool to be used for the identification of substances scheduled in Tables I and II of the United Nations Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances, 1988. These chemicals require pre-export notification in Canada. http://www.incb.org/pdf/e/list/red.pdf	

Information Source	Description (Summary of the contextual information from the source)	Reason for exclusion
Cosmetics Hot List (CA)	The Cosmetic Ingredient Hotlist is a science-based document that is reviewed and updated a few times per year as new scientific data become available. In this way, the Hotlist serves to keep the cosmetic industry aware of new substances of concern, in regards to section 16 of the *Foods and Drugs Act*. http://www.hc-sc.gc.ca/cps-spc/person/cosmet/hotlist-liste_e.html	
Cosmetics Directive (EU)	European Union Cosmetics Directive 76/768/EEC with 6th Amendment and 24th Adaptation (March 2000) regulates use of substances in cosmetics in regards to consumer health in Europe. The list of colouring agents allowed for use in cosmetic products is presented in Annex IV on the following website: http://www.greencouncil.org/doc/ResourcesCentre/Annex_4_colouring_agents_in_cosmetic_products.pdf	
FDA- Everything Added to Food List (US)	This is an informational database maintained by the U.S. FDA Center for Food Safety and Applied Nutrition (CFSAN) under an ongoing program known as the Priority-based Assessment of Food Additives (PAFA). It contains administrative, chemical and toxicological information on substances directly added to food. http://vm.cfsan.fda.gov/~dms/eafus.html	
FDA- Indirectly added to Food List (US)	This database is maintained by the U.S. Food and Drug Administration (FDA) Center for Food Safety and Applied Nutrition (CFSAN) under an ongoing program known as the Priority-based Assessment of Food Additives (PAFA). In general, these are substances that may come into contact with food as part of packaging or processing equipment, but are not intended to be added directly to food. http://www.cfsan.fda.gov/~dms/opa-indt.html	
List of Permissible Colourants (AU)	Colourants for cosmetics are not regulated in Australia for specific cosmetic applications. For any new colourant, an application for assessment under the National Industrial Chemicals Notification and Assessment Scheme (NICNAS) must be submitted to Worksafe Australia with all of the chemical, safety and environmental data required under this scheme. http://www.ascc.com.au/position/position/colourants.html	
Drink Water Contaminant Candidate Substance List (US)	The drinking water Contaminant Candidate Substance List (CCL) is the primary source of priority contaminants for which the EPA conducts research to make decisions about whether regulations are needed. The contaminants on the list are known or anticipated to occur in public water systems. However, they are currently unregulated by existing US national primary drinking water regulations. http://www.epa.gov/safewater/ccl/index.html	
Drinking Water Maximum Contaminant Level (US)	The Drinking Water Maximum Contaminant Levels, listed under the National Primary Drinking Water Regulations (NPDWRs or primary standards) are legally enforceable standards that apply to public water systems by limiting the levels of contaminants in drinking water. The Maximum Contaminant Level is the highest level of a contaminant that is allowed in drinking water. http://www.epa.gov/safewater/mcl.html	

Information Source	Description (Summary of the contextual information from the source)	Reason for exclusion
PCPA Toxicity Status for Formulants (CA)	The Pest Management Regulatory Agency's (PMRA) Formulants program and lists, has categorized the formulants in Canadian pest control products based on the level of concern with respect to human health and the environment. The criteria and structure is similar to the USEPA List of Inert Ingredients, with some variation resulting from Canadian legislative/policy requirements. http://www.pmra-arla.gc.ca	These lists include substances other than the active pesticidal ingredient. They are intentionally added to a pest control product to improve its physical characteristics (e.g., sprayability, solubility, spreadability and stability). By themselves, they are not primarily responsible for the effect of the pesticide products. The presence of a substance on one of these lists does not necessarily indicate that it has hazardous properties.
List of Pesticide Inerts Ingredients (US)	The Northwest Coalition for Alternatives to Pesticides (NCAP) compared the 1995 list of inert ingredients with EPA's chemical ingredient database on the World Wide Web and EPA's Register of Lists (RoL) database. http://www.pesticide.org/ActiveInertsRpt.pdf	
List of Inert Pesticide Ingredients (US)	The Office of Pesticide Programs (OPP) published a policy statement on inert ingredients in 1987. The policy established four categories of toxicological concern for the inert ingredients in existence at that time. http://www.epa.gov/opprd001/inerts/lists.html	
Inert Pesticide Ingredient at Superfund /CERCLA sites (US)	The Environmental Protection Agency (EPA) implements the laws that regulate pollutants in our air and our water as well as laws that identify chemicals found at Superfund sites, which must be reported to state and local emergency planning and response committees, or which must be reported to EPA's Toxic Chemical Release Inventory. http://www.pesticide.org/knight.html	
DIPPR Database (Physchem Database)	The Design Institute for Physical Properties has developed a set of critically evaluated thermophysical and environmental property data to satisfy industry needs. http://www.aiche.org/TechnicalSocieties/DIPPR/About/index.aspx	The purpose of these databases is to provide information on a substance's physical properties for industrial uses and purposes. They were judged as containing limited information of relevance to rapid screening.
STN Database CSChem	The STN Database CSChem is a subscription based catalog file for commercially available chemicals. The records contain names of chemicals and chemical products, names of suppliers, and classifications for trade name products. CAS Registry Numbers and structures are also included for a majority of the chemicals in CSChem. http://www.cas.org/ONLINE/DBSS/cschemss.html	
STN Database: CSCorp	The STN Database CSCorp is a subscription based directory for the chemical industry. The Chem Sources Company Directory contains directory information for chemical companies in over 130 countries. Subject Coverage include: business, chemistry and manufacturers. http://www.cas.org/ONLINE/DBSS/cscorpss.html	

Information Source	Description (Summary of the contextual information from the source)	Reason for exclusion
STN Database: CHEMCATS	The STN Database CHEMCATS (Chemical Catalogs Online) is a subscription based catalog file containing information about commercially available chemicals as well as their worldwide suppliers. Records contain catalog information for the substance provided by the supplier, e.g., the catalog name, chemical and trade names, grade information, CAS Registry Number, structure diagram, properties, regulatory information, prices. Additionally, records contain the company names and addresses, as well as supplier information, e.g., pricing terms, products and services, packaging and shipping information, safety and handling information. http://www.cas.org/ONLINE/DBSS/chemcatsss.html	

Appendix C

Paths Associated With the Mechanical Filters

Information Source	Resulting path
Exposure – quantities, releases and industrial information	
OECD HPV	**Further assessment**
ICCA HPV	
US HPV	
US EXTENDED HPV	
Japan HPV	
Australia HPV	
CEPA 1999 Pilot Project (CA)	**Manual process**
CEPA 1999 Section 71 Notices (CA)	
Categorization Industry Submission (CA)	
Toxic Substances Control Act – Inventory Update Rule (US)	
Toxic Substances Control Act – 12(b) Export Notification (US)	
Chemical Industries Association List (UK)	
Research Institute for Fragrance Materials	
SPIN database (Scandinavian countries)	
KEMI Index - surface water, air, soil, STP (SE)	
National Pollutant Release Inventory (CA)	
Toxics Release Inventory (US)	
National Pollutant Inventory (AU)	
Pollutant Release & Transfer Register (JN)	
Hazardous substances lists or substance profiles	
CEPA 1999 Section 200 Environmental Emergencies List (CA)	**Manual process**
PSL2 Nomination Dossiers (CA)	
Forest Products Industry List (CA)	
ARET List (CA)	
Great Lakes 211 Air Toxics (CA/US)	
Great Lakes Binational Toxics List(CA/US)	**Further assessment**

Information Source	Resulting path
NAPS (CA)	**Manual process**
ETC Air Monitoring (CA)	
Pest Control Products Act Registered Active Ingredients (CA)	
Banned or Severely Restricted Pesticides (US)	
PBT List (US)	
Air Toxics / Hot Spots Chemicals (California)	
Clean Water Act Priority Pollutants (US)	
Superfund Site Chemicals (US)	
Hazardous Constituents Under RCRA (US)	
Nordic Council List of Chemicals Hazardous to Environment (EU)	
OSPAR List (EU)	
UNEP/FAO/WHO Inchem Pesticide Classification (UN)	
PIC List (UN)	**Further assessment**
Priority Substances List (EU)	**Manual process**
Toxic Chemicals List (China)	
Camford Product Information Profiles (CA)	
BUA Reports (DE)	
UNEP EHC (UN)	
RAIS Tox Profile (US)	
TSCATS (US)	
Right-to know fact sheets (New Jersey)	
Miscellaneous properties and hazard databases	
HSDB Record (US)	**Manual process** only if the substance is flagged by more than one filter
NTP Reports / Studies (US)	
IUCLID (EU)	
AQUIRE (US)	
TERRETOX (US)	
PHYTOTOX (US)	
ChemFate – Syracuse Research Corporation (US)	
Datalog – Syracuse Research Corporation (US)	
CESARS – Ontario Database (CA/US)	

Appendix D

Additional Sources of Information Used at the Manual Process Stage

Information Source	Description (Summary of the contextual information from the source)	Interpretation / Significance
General quantities and release information		
EPER (EU)	EPER is the European Pollutant Emission Register, which was established by a Commission Decision of 17 July 2000. According to the EPER Decision, Member States have to produce a triennial report on the emissions of industrial facilities into air and waters. http://www.eper.cec.eu.int/eper/emissions_pollutants.asp?i	These international sources may contain information on quantities in commerce, uses, releases, etc. They were not amenable to searching by CAS number as part of the mechanical process.
KemI-stat (SE)	KemI-stat is a tool for compiling statistical information on the basis of data in the Swedish Chemicals Inspectorate´s (KemI) products register and pesticides register. The Swedish Chemicals Inspectorate (KemI) statistics are based on information from Statistics Sweden (the SCB) and KemI's own registers. The data is supplied to KemI by the registered companies on a yearly basis. http://apps.kemi.se/kemistat/start.aspx?sprak=e	
Toxic Products in the Home (US)	Data reported under programs for New Jersey and Massachusetts between 1995 and 2000 show that more than one billion pounds of over 100 chemicals known or suspected to be neurotoxins, carcinogens, or reproductive or developmental toxins were included in products shipped from certain manufacturing facilities in those states. These facilities produce products that are likely found in the home, although some products from individual facilities may also be intended for industrial or manufacturing purposes. http://www.net.org/health/Cabinet_Confidential.pdf	
General use and industrial information		

Information Source	Description (Summary of the contextual information from the source)	Interpretation / Significance
ChemIndustry.com	ChemIndustry.com is the leading comprehensive directory and search engine for chemical and related industry professionals. ChemIndustry.com provides specialized search services for chemical names, jobs, market research and consultants. http://www.chemindustry.com/about_us.html	These sources may provide general information about uses, releases and properties of substances.
Chemfinder.com	ChemFinder.Com is a portal of free and subscription scientific databases: Reference Databases, Chemical Databases, Reaction Databases, Safety Databases. ChemFinder contains information about chemical structures, physical and chemical properties and hyper links to other websites. http://chemfinder.cambridgesoft.com/about/	
ChemicalLand21	ChemicalLand21 is the website of a supplier of worldwide chemicals. The website offers some information on products of CHEMICAL LAND21. http://www.chemicalland21.com/	
Environmental Defense Fund – Scorecard	Scorecard provides detailed information, including all the chemicals used in large amounts in the United States and all the chemicals regulated under major environmental laws. Scorecard presents information on who is polluting, what pollutants do the most harm, where is the worst pollution, etc. http://www.scorecard.org/chemical-profiles/	
InfoChems	Infochems Inc. is a world-wide chemical trading company. They provide chemical product trading information through their website accompanied with off-line business for chemical trading. http://www.infochems.com/aboutus/default.asp	
Chemical House	Chemical House has a website containing information on chemical (buying and selling, manufacture, MSDS, etc.). http://www.chemicalhouse.com/index.htm	

Information Source	Description (Summary of the contextual information from the source)	Interpretation / Significance
Kirk-Othmer Encyclopedia	The Kirk-Othmer Encyclopedia of Chemical Technology brings together and treats systematically facts on the properties, manufacturing, and uses of chemicals and materials, processes, and engineering principles, coupled with insights into current research, emerging technologies and economic aspects. Environmental and health concerns are also addressed. http://www.mrw.interscience.wiley.com/emrw/0471238961/home	
Merck Index	The Merck Index provides information on chemical and generic names, trademarks and associated companies, CAS Registry Numbers, chemical structures, molecular formulae, weights and percentage composition, capsule statements identifying compound classes and scientific significance, scientific and patent literature references, physical and toxicity data, therapeutic and commercial uses and caution and hazard information. http://library.dialog.com/bluesheets/html/bl0304.html	
Google internet search engine	This internet search engine was searched using CAS number.	This search engine can be used to obtain information from the internet about individual chemicals or groups of chemicals.
Hazard, properties and other		
Chem ID Plus	ChemIDplus provides access to structure and nomenclature information for the identification of chemical substances cited in NLM databases. ChemIDplus Lite is available for Name and CAS searching. http://www.chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp	These references may contain toxicity and hazard information.
INCHEM	INCHEM provides chemical safety information from intergovernmental organizations (UN/WHO/OECD/FAO). It provides rapid access to internationally peer reviewed information on chemicals commonly used throughout the world, which may also occur as contaminants in the environment and food. http://www.inchem.org/	

Information Source	Description (Summary of the contextual information from the source)	Interpretation / Significance
MSDS database	MSDS Online developed unique web-enabled services that make it easier to access, manage and deploy material safety data sheets (MSDS). Material Safety Data Sheets identify hazards associated with a material and describe how a hazardous material can be safely handled, used, and stored. http://www.msdsonline.com/Default.asp	