Report on Workshop to Consider DSL Industrial Sector and Functional Use Codes as Indicators of Potential Human Exposure

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Introduction

The revised *Canadian Environmental Protection Act* (CEPA 1999) received Royal Assent in September 1999 and established additional responsibilities for the Minister of the Environment and the Minister of Health with respect to the assessment of risks from existing substances, including:

> **73.** (1) The Ministers shall, within seven years from the giving of Royal Assent to this Act, categorize the substances that are on the Domestic Substances List by virtue of section 66, for the purpose of identifying the substances on the List that, in their opinion and on the basis of available information,
> (a) may present, to individuals in Canada, the greatest potential for exposure; or
> (b) are persistent or bioaccumulative in accordance with the regulations, and inherently toxic to human beings or to non-human organisms, as determined by laboratory or other studies.

The Domestic Substances List (DSL) is the basis for determining whether a substance is "new" for the purposes of CEPA. Substances not appearing on the DSL are subject to pre-notification and assessment by the Government of Canada prior to domestic manufacture or importation. Substances appearing on the DSL are "existing substances."

Industrial sector and functional use codes were established by Environment Canada for creation of the DSL. Individual submitters (e.g., companies) were required to use these codes in their submissions. A separate code (i.e., amount code) was used to reflect the amount of a substance imported, manufactured or used by the submitter. Together with the substance identification, this is the only information "available" for *all* of the approximately 23 000 substances on the DSL. Although it is expected that the quantity in commerce information for each DSL substance will also be used in the categorization exercise, the manner in which this information will be used has yet to be determined, and this aspect is not addressed in this report.

An overview of the process for developing approaches for categorization of the DSL is included at http://www.hc-sc.gc.ca/hecs-sesc/exsd/index.htm. The "Workshop to Consider DSL Industrial Sector and Functional Use Codes as Indicators of Potential Human Exposure," which is the subject of this report, was held to further explore the feasibility of one of several proposed approaches to the categorization of the DSL on the basis of the potential for human exposure. The approach considered is based on the premise that some qualitative indication of the potential human exposure to a specific DSL substance can be inferred by consideration of some or all of the specific use codes reported by companies that were importing, manufacturing or using that substance when the DSL was compiled.

The workshop held on October 18, 2002, was the second of two workshops held to date for the purpose of further developing and evaluating the proposed approach. Both workshops were conducted by staff of the Exposure Assessment Section, Existing Substances Division, Bureau of Environmental Contaminants, within the Safe Environments Programme of the Healthy Environments and Consumer Safety Branch (HECS) of Health Canada. The first workshop was conducted in Ottawa on Wednesday, May 30, 2001. Twenty individuals, mainly Health Canada staff in the National Capital Region, participated in this earlier "exploratory" workshop and subsequently received the workshop report (Existing Substances Division, 2001).

These workshops were envisioned as opportunities to access desired technical expertise, in order to evaluate whether certain DSL use codes could reasonably be expected to suggest "greatest," "intermediate" or "least" potential for human exposure, on the basis of "expert judgement" when evaluated against predefined criteria. The degrees of agreement concerning the potential for human exposure that might be inferred by each of the industrial sector and functional use codes were assessed by post-workshop analyses of worksheets completed by the participants. The results of these analyses, for the workshop held on October 18, 2002, are presented in this report. A comparison of the results of both the May 30, 2001, and October 18, 2002, workshops is *not* included in the current report.

The Domestic Substances List

"The Domestic Substances List (DSL) is the sole basis for determining whether a substance is new for the purposes of CEPA. Substances on the DSL are considered to exist in Canadian commerce and do not require notification. Substances not appearing on the DSL are considered new to Canada and are subject to notification" (Government of Canada, 1993). The DSL includes the information items identified below:

1) the Chemical Abstracts Service (CAS) Registry Number[1];
2) the substance name according to CAS nomenclature rules[2];
3) the molecular formula, when the substance is well defined;
4) the commercial use(s) of the substance, represented by DSL industrial category and functional use codes; and
5) the quantity of substance in Canadian commerce, in the form of quantity codes representing order-of-magnitude ranges of quantities.

The "strawman" approach to categorization under consideration at the workshop involves only items 1), 4) and 5) from those listed above and is based on two assumptions:

- that the information in all DSL records for items 4) and 5) was approximately accurate when recorded in the mid-1980s; and
- that this information adequately reflects current commercial uses and quantities in commerce in Canada.

Item 4) was the focus of the "Workshop to Consider DSL Industrial Sector and Functional Use Codes as Indicators of Potential Human Exposure." It is expected that the quantity in commerce information (i.e., item 5)) for each DSL substance will also be used in the categorization of the DSL; however, the precise manner in which this information will be used has yet to be determined.

The DSL Use Codes

Ninety-eight use codes were established for reporting for the DSL (Environment Canada, 1988). There are three types of use codes: a) special use (codes 00 and 01); b) functional use (codes 02–51); and c) industrial sector (codes 52–98). The two special use codes are 00 for research and development and 01 for site-limited substance (i.e., manufactured within a particular plant site and not distributed, either unaltered or in any mixture or article, for commercial purposes outside that site). If a substance has *only* codes 00 and/or 01, the potential for human exposure that this infers must be low, due to the limited opportunities for human contact. Two of the 98 codes are reserved for miscellaneous uses, not captured by other codes. These are functional use code 51 (for a function other than those listed in codes 02–50) and industrial sector code 98 (for use in an industry other than those specified in codes 52–97). It was proposed that codes 51 and 98 not be used for categorization, due to their non-specific nature. This leaves 95 DSL use codes for further consideration (i.e., 49 functional use codes and 46 industrial sector codes).

Prior to both workshops, considerable effort was made to learn more about these DSL use codes. Information was sought concerning the origin of these codes, largely in order to understand the original intent in

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[1] Certain substances, notably polymers and UVCBs, do not have CAS Registry Numbers or molecular formulas.

[2] French language names are according to IUPAC nomenclature rules.

requiring submitters to specify codes for the individual substances that they were reporting.[3] It was also hoped that there might be definitions or descriptions that might help delineate what specific uses or industrial activities were included in or excluded from any given code. These continuing efforts have been largely unsuccessful in revealing additional useful information, as outlined below.

The DSL use codes were derived by staff at Environment Canada from U.S. Environmental Protection Agency (USEPA) use codes that were available to compile the *Toxic Substances Control Act* (TSCA) inventory. This larger list of codes was reduced following comparison with use codes in the *Environmental Contaminants Act* (i.e., the predecessor to CEPA) and in new chemicals notifications received by Environment Canada (Atkinson, 2001). No written report or background documentation is available from this activity.

No information was identified that indicates that these codes were intended to capture information relevant to exposure of human or non-human populations to individual DSL substances. Whether or not the DSL use codes were originally intended to reflect aspects of exposure, it is clear that these codes have not been used for this purpose in a systematic manner in Canada.

On the other hand, it is evident that similar codes have been or are used to infer or assess exposures in international jurisdictions. Fifty-four codes are assigned to functional categories of substances for notification of new substances in the European Community (van der Poel, 1994). In many cases, examples or inclusions are identified in parentheses following the main functional category entries. This same information appears as “Use Categories” in the EEC-OECD HEDSET (Harmonized Electronic Data Set) for existing chemicals (European Commission, 1996). HEDSET also includes codes for 16 industrial categories and the following “Main Categories” (which were discussed briefly during the workshop):

I Used in closed systems (Note: includes three sub-categories)
II Use resulting in inclusion into or onto a matrix
III Non-dispersive use
IV Wide dispersive use

Definitions of the 54 functional categories of substances are available (i.e., pages 580–587 in European Commission, 1996). There is also a cross-listing of the 54 functional categories of substances to 383 ChemUSES functions identified by the USEPA in 1980 (RIVM, VROM and VWS, 1999). This information was made available to workshop participants as background information. In contrast, little useful additional information was identified concerning the DSL industrial sector codes.

Workshops to Consider DSL Use Codes

The May 30, 2001, workshop involving federal government staff was conducted with 20 individuals who were specifically pre-identified and invited to participate. The workshop participants were knowledgeable in chemistry, but were not exclusively involved in exposure assessment activities. An effort was made to include individuals with diverse work experience, to best address the multifaceted nature of human exposures to chemical substances. The number of participants solicited (i.e., 20) was considered to be the minimum required to reasonably assess the degrees of agreement concerning “potentials for exposure” from the completed worksheets.

[3] It was felt that if the original intent of these codes was to record information that might be useful in assessing the exposure of human or non-human populations to individual substances, then this would lend support to the proposed use of these codes for identifying those DSL substances with the “greatest potential” for human exposure. On the other hand, if the original intent was for another purpose (e.g., economic analysis), then a valid argument would exist for not trying to infer “potential for exposure” for each of the individual use codes.

It was hoped that the October 2002 workshop involving representatives from industry stakeholders would also be conducted with a minimum of 20 participants. However, only 13 individuals participated, as identified in **Attachment 1**. In addition to the preferred numbers of representatives, Health Canada also specified optimum composition in terms of expertise to the CEPA Industry Coordinating Group, which coordinated attendance of industrial representatives to include individuals familiar with:

- industrial processes, process emissions and/or industrial hygiene;
- formulation and use;
- distribution of consumer products, including retail; and/or
- similar initiatives in other countries (e.g., the European Union).

Pre-workshop background information (i.e., **Attachment 2**) was provided to each of the identified participants concerning the categorization and screening of substances on Canada's DSL as required by the recently revised CEPA 1999. A "strawman" proposal outlined in this pre-workshop background information suggests that the DSL use codes and quantity in commerce information alone could be used to categorize the substances on the DSL, "for the purpose of identifying the substances on the List" that, on the basis of available information, "may present, to individuals in Canada, the greatest potential for exposure" (i.e., CEPA 73(1)(a)). This "strawman" proposal is illustrated by the schematic on the following page.

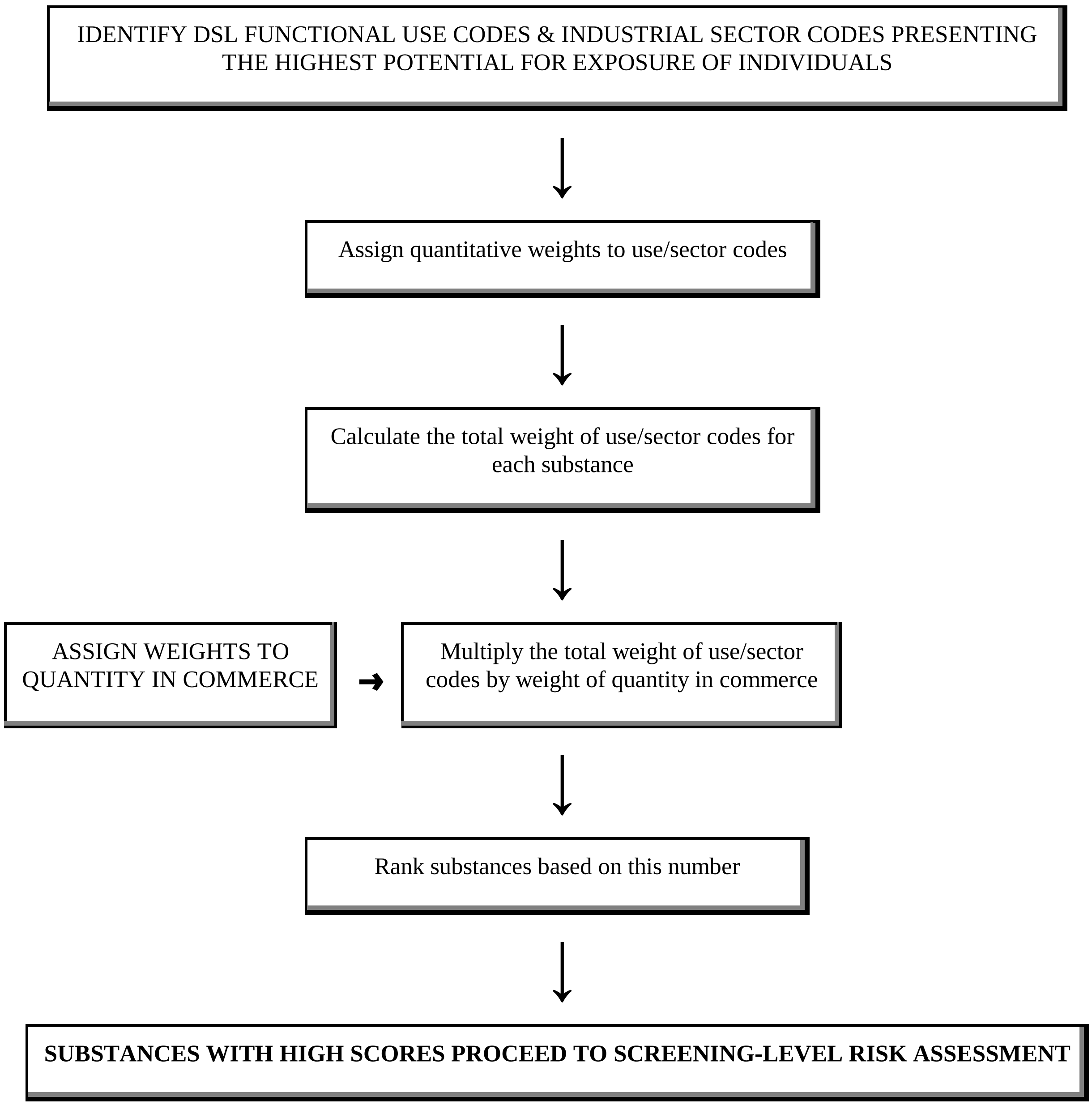
The proposed "strawman" approach is based on the premise that some qualitative indication of the potential human exposure to a specific DSL substance can be inferred by consideration of some or all of the specific use codes reported by companies that were importing, manufacturing or using that substance when the DSL was compiled. A one-day workshop was envisioned as a forum to access desired technical expertise, in order to evaluate whether certain DSL use codes could reasonably be expected to suggest "greatest," "intermediate" or "least" potential for human exposure, on the basis of "expert judgement" when evaluated against predefined criteria. Specifically, the degrees of agreement concerning the potential for human exposure that might be inferred by each industrial sector and functional use code were to be assessed by post-workshop analyses of worksheets completed by the participants. The results of these analyses are presented in the following pages.

Attachment 3 is the workshop agenda. The workshop opened with brief presentations concerning the systematic evaluation of "existing substances" by Health Canada and Environment Canada through the processes of categorization of the DSL and screening-level risk assessments. This was followed by a presentation outlining the nature of the multimedia and multi-pathway exposures considered during human risk assessments of existing substances under Health Canada's Priority Substances Assessment Program, i.e.,

- indirect exposure (i.e., following environmental transport and distribution) of the general population to substances present as contaminants in air, water, food and beverages;
- direct human exposure for subpopulations in the vicinity of industrial discharges; and
- exposures of consumers resulting from the use of various products available at the retail level.

The latter presentation was also used to provide some background and introduction to the two sets of criteria proposed (i.e., in the pre-workshop background information) to evaluate the industrial sector and functional use codes, respectively.

DSL EXPOSURE CATEGORIZATION - STRAWMAN #1 APPROACH



Functional use code numbers (i.e., 02–51) precede industrial sector code numbers (i.e., 52–98) in the numeric listing of DSL use codes. However, it was decided to address the industrial sector codes first during the workshops. The decision was based largely on the expectation that relatively more useful information would result from consideration of the functional use codes. Assigning descriptors first to the industrial sector codes was viewed as somewhat of a training activity, i.e., to familiarize the participants with the worksheets and to allow them to become comfortable with the application of the predefined criteria.

A third set of worksheets was completed by participants of the October 2002 workshop only. These worksheets addressed the "problem" of the "multiple-use functional use codes," as discussed in a later section of this report.

Criteria for and Analysis of Industrial Sector Codes

Note that the DSL industrial sector codes provide no information concerning the nature or quantities of emissions, releases, discharges, etc., during industrial use of any substance or during any stage in the life cycle of products resulting from the use of the substance. A substance on the DSL may be an intended or an unwanted component of a commercial or consumer product.

The criteria proposed in the pre-workshop background information (i.e., **Attachment 2**) were based on the assumptions that, in non-workplace environments,[4] human exposure to a DSL substance may occur due to contact with:

1) process emissions and/or effluents (i.e., either directly due to proximity to a source or indirectly following environmental transport and distribution);
2) the substance or its residue in product(s) used or consumed; and/or
3) the substance having entered environmental media following use of the product.

These were described as "contact scenarios." The numerical order of these criteria generally follows the stages of a product life cycle. Worksheets including these criteria and the list of industrial sector codes were provided. Participants were instructed to assign the descriptors "low," "medium" or "high" for each of these three contact scenarios, for each of the DSL industrial sector codes.

Table 1 - Criteria for assigning descriptors for "potential for exposure" for industrial sector codes

"Potential for human exposure" inferred is:	Criteria proposed in pre-workshop background information	Post-workshop "rankings" for three contact scenarios
"greatest"	at least one "high" and one "medium" contact	(n = 5) HHH, HHM, HHL, HMM, HML
"intermediate"	at least two "medium" contacts (and no "high"contacts)	(n = 3) HLL, MMM, MML
"least"	two or more "low" contacts (and no "high" contacts)	(n = 2) MLL, LLL

[4] Human exposures in workplace settings were excluded from consideration due to the high probability that there will always be some workers for whom potential exposure to DSL substances will be high. Also, such exposures are more appropriately addressed under other legislation or jurisdictions.

It was indicated in the pre-workshop background information that the overall degree of potential human exposure would be assessed (i.e., post-workshop) as indicated in the centre column of **Table 1**. This scheme was further elaborated as indicated in the rightmost column of this table for the post-workshop analysis of the worksheets for the industrial sector codes. It is recognized that this proposed rating assignment provides more opportunities for ranking as "greatest" potential (n = 5) than as "intermediate" potential (n = 3) or as "low" potential (n = 2) for human exposure. Consequently, other aspects of the rating of industrial sectors codes were also investigated in the post-workshop analysis.

The post-workshop analysis involved recording each participant's worksheet entries to a worksheet of an Excel™ workbook. **Attachment 4** is a summary of the overall ranking of the 46 DSL industrial sector codes on the basis of "potential for exposure" that might be inferred, when evaluated as outlined in **Table 1**. Note that for this analysis, participants' worksheet responses were assumed to be "medium" unless clearly indicated otherwise (e.g., when the entry was illegible). The industrial sector code worksheets from two participants were excluded from the post-workshop analysis. These participants apparently misunderstood the written instructions provided on these worksheets. Consequently, only 11 completed industrial sector code worksheets were available from the 13 workshop participants.

The objective of the workshop was to assess the degrees of agreement that might exist that any of the DSL use codes might infer a "greatest" potential for human exposure. The term "degrees of consensus" was used during the May 2001 exploratory workshop and in pre-workshop background information for both the May 2001 and October 2002 workshops. Strong objections to the use of the word "consensus" were voiced by several representatives of the industry stakeholders during the October 2002 workshop. These participants apparently equate the word "consensus" with "unanimity" (i.e., complete agreement). Consequently, the term "degrees of agreement" is used in this report.

In **Attachment 4**, the industrial sector codes are ranked by the number of times the descriptor "greatest" was assigned in the post-workshop analysis (i.e., according to the criteria outlined in **Table 1**). The relative proportion that the descriptor "greatest" was assigned for each code (i.e., from a total of 11 possible responses, from the 13 participants) is indicated as a percentage (i.e., proportion of total for "greatest"). These percentages decrease from 91% to 0%. An industrial sector code with a percentage of 91% means that 10 of 11 workshop participants would consider that code to infer a "greatest" potential for human exposure. Similarly, if two of three workshop participants considered a code to infer a "greatest" potential for human exposure, the percentage (appearing in **Attachment 4**) would be 66%.

As indicated in **Attachment 4**, there are nine industrial sector codes for which the proportion of the total for "greatest" exceeds 66%. These codes are identified in **Table 2** below. As an alternative ranking procedure, the weights 1, 2 and 3 were arbitrarily assigned to the descriptors "least," "intermediate" and "greatest," respectively, and the sums of these weights were calculated for each industrial sector code. The resulting rankings by this procedure are also indicated (i.e., in parentheses) in **Table 2**. Note that the first seven industrial sector codes are ranked in the same order by each procedure. Both procedures identified the same four industrial sector codes (i.e., as inferring "greatest' potential for exposure) for ranks 8 through 10, although the rank order was different by the two procedures.

Table 2 - Nine industrial sector codes for which agreement is high that potential exposure is "greatest"

Relative ranking[a]	Industrial sector code		No. of times descriptor was assigned:			Proportion of total for "greatest"
	no.	description	"least"	"intermediate"	"greatest"	
1 (1)	93	soap and cleaning products	1	0	10	91%

Relative ranking[a]	Industrial sector code		No. of times descriptor was assigned:			Proportion of total for "greatest"
	no.	**description**	**"least"**	**"intermediate"**	**"greatest"**	
2 (2)	53	agriculture, field crops	0	2	9	82%
3 (3)	65	food, feed, and beverage	0	2	9	82%
4 (4)	82	petroleum and natural gas	0	2	9	82%
5 (5)	59	construction materials	0	3	8	73%
6 (6)	91	refined petroleum and coal products	1	2	8	73%
7 (7)	95	textile product	1	2	8	73%
8 (9)	54	agriculture, other	2	1	8	73%
9 (10)	64	forestry/wood products/wood treatment	2	1	8	73%

[a] The relative ranking is according to the proportion of "greatest" descriptor assigned, by the process outlined in **Table 1**. The relative ranking for the complete list of 46 industrial sector codes appears as **Attachment 4**. The rankings indicated in parentheses result if the weights 1, 2 and 3 are assigned to the descriptors "least," "intermediate" and "greatest," respectively, and the sums of these weights are calculated for each code. The code (i.e., 96 transportation; 64% for "greatest") that ranked eighth by this alternative procedure ranked 10th (i.e., see **Attachment 4**) by the process outlined in **Table 1**.

The nine industrial sector codes identified above are examined further in **Table 3**, from the perspective of the relative contributions of the three contact scenarios established as criteria. The number of low (L), medium (M) and high (H) responses recorded by the 11 participants for each code for each of the three scenarios is indicated. The relative ranking for each code under each scenario (when sorted first by the number of "high" responses, then by the number of "medium" responses) is also indicated in **Table 3**. The relative rankings of all 46 industrial sector codes under each of the three contact scenarios are presented in **Attachment 5**.

Table 3 - Rankings by contact scenarios for first nine industrial sector codes with "greatest" exposure potential

Relative ranking[a]	Industrial sector code		Rankings and scores of industrial sector codes under three contact scenarios		
	no.	**description**	1) process emissions and/or effluents (i.e., either directly due to proximity to a source or indirectly following environmental transport and distribution)	2) the substance or its residue in product(s) used or consumed	3) the substance having entered environmental media following use of the product
1 (1)	93	soap and cleaning products	ranking = 42nd of 46 L = 5, M = 6, H = 0	ranking = 3rd of 46 L = 0, M = 1, H = 10	ranking = 3rd of 46 L = 1, M = 4, H = 6
2 (2)	53	agriculture, field crops	ranking = 8th of 46 L = 4, M = 4, H = 3	ranking = 5th of 46 L = 1, M = 2, H = 8	ranking = 2nd of 46 L = 2, M = 2, H = 7
3 (3)	65	food, feed, and beverage	ranking = 40th of 46 L = 5, M = 6, H = 0	**ranking = 1st of 46** L = 0, M = 0, H = 11	ranking = 10th of 46 L = 4, M = 2, H = 5

Relative ranking[a]	Industrial sector code		Rankings and scores of industrial sector codes under three contact scenarios		
	no.	**description**	1) process emissions and/or effluents (i.e., either directly due to proximity to a source or indirectly following environmental transport and distribution)	2) the substance or its residue in product(s) used or consumed	3) the substance having entered environmental media following use of the product
4 (4)	82	petroleum and natural gas	**ranking = 1st of 46** L = 1, M = 4, H = 6	ranking = 11th of 46 L = 1, M = 3, H = 7	ranking = 22nd of 46 L = 4, M = 5, H = 2
5 (5)	59	construction materials	ranking = 7th of 46 L = 3, M = 5, H = 3	ranking = 12th of 46 L = 2, M = 2, H = 7	ranking = 9th of 46 L = 4, M = 2, H = 5
6 (6)	91	refined petroleum and coal products	ranking = 4th of 46 L = 3, M = 4, H = 4	ranking = 7th of 46 L = 2, M = 1, H = 8	ranking = 5th of 46 L = 1, M = 5, H = 5
7 (7)	95	textile product	ranking = 32nd of 46 L = 5, M = 5, H = 1	ranking = 8th of 46 L = 2, M = 1, H = 8	ranking = 18th of 46 L = 4, M = 4, H = 3
8 (9)	54	agriculture, other	ranking = 11th of 46 L = 5, M = 3, H = 3	ranking = 9th of 46 L = 1, M = 3, H = 7	ranking = 6th of 46 L = 3, M = 3, H = 5
9 (10)	64	forestry/wood products/wood treatment	ranking = 15th of 46 L = 2, M = 7, H = 2	ranking = 28th of 46 L = 2, M = 5, H = 4	ranking = 11th of 46 L = 2, M = 5, H = 4

[a] The relative ranking is according to the proportion of “greatest” descriptor assigned, by the process outlined in **Table 1**. The relative ranking for the complete list of 46 industrial sector codes appears as **Attachment 4**. The rankings indicated in parentheses result if the weights 1, 2 and 3 are assigned to the descriptors “least,” “intermediate” and “greatest,” respectively, and the sums of these weights are calculated for each code. The code (i.e., 96 transportation; 64% for “greatest”) that ranked eighth by this alternative procedure ranked 10th (i.e., see **Attachment 4**) by the process outlined in **Table 1**.

The sum of the ranks indicated for each of the three contact scenarios in **Table 3** are: scenario 1) = 160; scenario 2) = 84; and scenario 3) = 86. The lower sums indicate higher proportions of codes for which contact was considered likely.

In general, for these nine industrial sector codes, the first contact scenario was considered of least importance with respect to “potential for exposure” by the workshop participants (i.e., sum of ranks = 160). However, industrial sector code 82 (petroleum and natural gas) ranked highest under the first contact scenario (i.e., contact with process emissions and/or effluents (i.e., either directly due to proximity to a source or indirectly following environmental transport and distribution)).

For the nine industrial sector codes identified in **Tables 2** and **3**, the second contact scenario (i.e., contact with the substance or its residue in product(s) used or consumed) was considered important with respect to “potential for exposure” by the workshop participants (i.e., sum of ranks = 84). Three of these nine codes were among the first five (including the number one ranking) when ranked against this criterion, as indicated in **Attachment 5**.

Similarly, for the nine industrial sector codes identified in **Tables 2** and **3**, the third contact scenario (i.e., contact with the substance having entered environmental media following use of the product) was considered important with respect to “potential for exposure” by the workshop participants (i.e., sum of ranks = 86). Six of these nine codes were among the first 10 when ranked against this criterion, as indicated in **Attachment 5**.

As indicated in **Attachment 4**, for the next seven industrial sector codes, the proportion of the total for “greatest” is 64%. These proportions are considered here to indicate “near” agreement. These next seven codes are identified in **Table 4** below. Again, as an alternative ranking procedure, the weights 1, 2 and 3 were arbitrarily assigned to the descriptors “least,” “intermediate” and “greatest,” respectively, and the sums of these weights were calculated for each industrial sector code. The resulting rankings by this alternative procedure are also indicated (i.e., in parentheses) in **Table 4**.

Table 4 - Seven industrial sector codes for which there was near agreement that potential exposure is “greatest”

Relative ranking	Industrial sector code		No. of times descriptor was assigned:			Proportion of total for “greatest”
	no.	description	“least”	“intermediate”	“greatest”	
10 (8)	96	transportation	0	4	7	64%
11 (11)	60	cosmetics	1	3	7	64%
12 (12)	80	paint and coating	1	3	7	64%
13 (13)	83	pharmaceuticals	1	3	7	64%
14 (14)	89	printing and publishing	1	3	7	64%
15 (15)	97	water and waste treatment	1	3	7	64%
16 (16)	81	pest control products/formulating and manufacture	2	2	7	64%

These “next seven” industrial sector codes are examined further in **Table 5**, from the perspective of the relative contributions of the three contact scenarios established as criteria. The number of low (L), medium (M) and high (H) responses recorded by the 11 participants for each code for each of the three scenarios is indicated. The relative ranking for each code under each scenario (when sorted first by the number of “high” responses, then by the number of “medium” responses) is also indicated in **Table 5**. As previously noted, the relative rankings of all 46 industrial sector codes under each of the contact scenarios are presented in **Attachment 5**.

For these “next seven” industrial sector codes, the first contact scenario (i.e., contact with process emissions and/or effluents (i.e., either directly due to proximity to a source or indirectly following environmental transport and distribution)) was also considered of relatively lesser importance with respect to “potential for exposure” by the workshop participants (i.e., sum of ranks = 155).

The second contact scenario (i.e., contact with the substance or its residue in product(s) used or consumed) was considered by participants to be more important with respect to “potential for exposure” (i.e., sum of ranks = 78). The second and fourth highest-ranking industrial sector codes for this contact scenario are included among these “next seven” industrial sector codes.

The third contact scenario (i.e., contact with the substance having entered environmental media following use of the product) was considered by participants to be of intermediate importance with respect to “potential for exposure” (i.e., sum of ranks = 89). The first, seventh and eighth highest ranking of the 46 industrial sector codes for this contact scenario are included among these “next seven” industrial sector codes.

Table 5 - Rankings by contact scenarios for seven industrial sector codes with “near” agreement

Relative ranking[a]	Industrial sector code		Rankings and scores of industrial sector codes under three contact scenarios		
	no.	**description**	1) process emissions and/or effluents (i.e., either directly due to proximity to a source or indirectly following environmental transport and distribution)	2) the substance or its residue in product(s) used or consumed	3) the substance having entered environmental media following use of the product
10 (8)	96	transportation	ranking = 3rd of 46 L = 1, M = 6, H = 4	ranking = 19th of 46 L = 1, M = 5, H = 5	ranking = 8th of 46 L = 3, M = 3, H = 5
11 (11)	60	cosmetics	ranking = 44th of 46 L = 9, M = 2, H = 0	ranking = 2nd of 46 L = 0, M = 1, H = 10	ranking = 19th of 46 L = 5, M = 3, H = 3
12 (12)	80	paint and coating	ranking = 18th of 46 L = 4, M = 5, H = 2	ranking = 6th of 46 L = 2, M = 1, H = 8	ranking = 14th of 46 L = 5, M = 2, H = 4
13 (13)	83	pharmaceuticals	ranking = 34th of 46 L = 8, M = 2, H = 1	ranking = 4th of 46 L = 0, M = 2, H = 9	ranking = 23rd of 46 L = 4, M = 5, H = 2
14 (14)	89	printing and publishing	ranking = 24th of 46 L = 5, M = 4, H = 2	ranking = 18th of 46 L = 5, M = 0, H = 6	ranking = 7th of 46 L = 3, M = 3, H = 5
15 (15)	97	water and waste treatment	ranking = 5th of 46 L = 4, M = 3, H = 4	ranking = 14th of 46 L = 2, M = 2, H = 7	**ranking = 1st of 46** L = 2, M = 1, H = 8
16 (16)	81	pest control products/ formulating and manufacture	ranking = 27th of 46 L = 7, M = 2, H = 2	ranking = 15th of 46 L = 1, M = 4, H = 6	ranking = 17th of 46 L = 4, M = 4, H = 3

[a] The relative ranking is according to the proportion of "greatest" descriptor assigned, by the process outlined in **Table 1**. The relative ranking for the complete list of 46 industrial sector codes appears as **Attachment 4**. The rankings indicated in parentheses result if the weights 1, 2 and 3 are assigned to the descriptors "least," "intermediate" and "greatest," respectively, and the sums of these weights are calculated for each code.

There was no agreement among workshop participants that the remaining 30 industrial sector codes listed in **Attachment 4** infer a "greatest" potential for human exposure when evaluated against the criteria established.

Criteria for and Analysis of Functional Use Codes

Note that the DSL functional use codes provide no information concerning the nature or quantities of emissions, releases, discharges, etc., during industrial use of a substance or during any stage in the life cycle of products resulting from the use of the substance. For example, the fact that the functional use code indicates that a substance is used as a monomer (i.e., code 28) provides no information regarding the release of the monomer during production of a polymer or its subsequent release from a manufactured article incorporating that polymer. Therefore, the proposed categorization is based on attempting to assess the degree of potential human exposure to whatever is the result of the particular functional use category. For example, when the result of a functional use category is a manufactured article or consumer product, the likelihood is greater that humans will be exposed to the result of the use category, and by inference to the substance, if it is likely to still remain intact within the manufactured article or consumer product.

The objective set for the workshop participants was to separate the 49 functional use codes into three classes representing the "greatest," an "intermediate" and the "least" potential for human exposure. Note that attention was directed to two aspects of the potential for human exposure:

- For the "*fate of substance aspect*," workshop participants were instructed to use their expert judgement regarding what happens to a substance having a particular functional use, considering, for example, the possibility that the substance may be partially or totally reacted, consumed, tightly bound or otherwise altered by that use.

- For the "*human contact parameter aspect*," workshop participants were instructed to use their expert judgement regarding the frequency and/or magnitude of direct human contact (i.e., in non-workplace environments) with the substance itself or, more frequently, with media containing the substance (i.e., with contact media, as previously described).

The six subjective criteria proposed to separate the functional use codes into these three classes are identified in **Table 6**. These criteria had been included in the pre-workshop background information. Worksheets including these criteria and the list of functional use codes were provided. Participants were instructed that both criteria must be satisfied for the "greatest" and "intermediate" classes (i.e., if only one criterion was satisfied, then the functional use code was assigned to the nearest lower class).

Table 6 - Criteria for assigning descriptors for "potential for exposure" for DSL functional use codes

Potential for human exposure	**Aspect of potential exposure**	**Criteria for inclusion based on functional use codes**
"greatest"	fate of substance	a) high certainty that a substance used in this manner will be present as or in a consumer product related to the functional use category; *and*
	human contact parameter	b) greater than 10% of individuals are likely to have contact with consumer products related to the functional use category on any given day.
"intermediate"	fate of substance	a) functional use is more related to a process occurring during manufacture, production or formulation; *and*
	human contact parameter	b) a substance used in this manner may remain in a product to which humans may be exposed.
"least"	fate of substance	a) substance related to the functional use category is likely to be altered or consumed during use; *or*
	human contact parameter	b) substance related to the functional use category is likely to be used only in closed systems or restricted areas (i.e., workplaces).

Note that it was *not* intended that participants speculate as to the availability (e.g., bioavailability, "extractability") of a substance present in products or formulations on the basis of its functional use code(s), since this "availability" is thought to be more dependent on the nature of the substance and the matrix (i.e., specific product or formulation) than on the nature of the specific functional use of a substance.

The completed worksheets were analysed after the workshop. The analysis involved recording each participant's worksheet entries to a worksheet of an Excel™ workbook. All participants correctly completed the worksheets for functional use codes. Consequently, there were 13 worksheets available for the post-workshop analysis.

The number of times each functional use code was assigned each descriptor (i.e., "least," "intermediate" or "greatest") was counted. The theoretical maximum was 13, if there were no "least" or "intermediate" descriptors recorded. The proportion of this total representing the number of times the descriptor "greatest" was assigned was expressed as a percentage. The functional use codes were then sorted in descending order by the number of "greatest" descriptors recorded. The number of "intermediate" descriptors recorded was used for additional sorting when required. The overall ranking of the 49 functional use codes on this basis is presented in **Attachment 6**. As for the industrial sector codes, 66% (i.e., proportion of total for "greatest") indicates that two of three workshop participants considered a code to infer a "greatest" potential for human exposure. On this basis, there was a moderate to high degree of agreement among workshop participants (i.e., 69–100%) that the seven functional use codes identified in **Table 7** should infer a "greatest" potential for human exposure.

As an alternative to ranking on the basis of the number of "greatest" responses recorded by workshop participants, a weighting similar to that outlined previously for the industrial sector codes was applied. The weights 1, 2 and 3 were arbitrarily assigned to the descriptors "least," "intermediate" and "greatest," respectively, and the sums of these weights were calculated for each functional use code. The ranking of these first seven functional use codes was unchanged from that presented in **Table 7** when this alternative procedure was applied.

Table 7 - Functional use codes for which there was the most agreement that potential exposure is "greatest"

Relative ranking	Functional use code		Number of times descriptor was used:			Proportion of total for "greatest"
	no.	description	"least"	"intermediate"	"greatest"	
1	46	surfactant - detergent/emulsifier/wetting agent/dispersant	0	0	13	100%
2	22	fragrance/perfume/deodourizer/ flavouring agent	0	1	12	92%
3	44	solvent/carrier	0	3	10	77%
4	35	polymer, component of an article	1	2	10	77%
5	23	fuel/fuel additive	0	4	9	69%
6	39	preservative	1	3	9	69%
7	30	paint/coating additive	2	2	9	69%

The next seven use codes in the overall ranking of the 49 functional use codes appearing in **Attachment 6** are identified in **Table 8.**

Table 8 - Functional use codes for which there was no clear agreement that potential exposure is "greatest"

Relative ranking	Functional use code		Number of times descriptor was used:			Proportion of total for "greatest"
	no.	description	"least"	"intermediate"	"greatest"	
8	31	pesticide/herbicide/biocide/disinfectant/ repellant/attractant	0	5	8	62%
9	16	fertilizer	1	5	7	54%
10	21	formulation component	1	5	7	54%
11	13	colourant - pigment/stain/dye/ink	2	4	7	54%
12	32	photosensitive agent - fluorescent agent/ brightener/UV absorber	2	4	7	54%

Relative ranking	Functional use code		Number of times descriptor was used:			Proportion of total for "greatest"
	no.	description	"least"	"intermediate"	"greatest"	
13	2	absorbent/adsorbent	3	3	7	54%
14	4	adhesive/binder/sealant/filler	4	2	7	54%

Once again, the weights 1, 2 and 3 were arbitrarily assigned to the descriptors "least," "intermediate" and "greatest," respectively, and the sums of these weights were calculated for each functional use code identified in **Table 8**. The ranking of these seven functional use codes was unchanged from that presented in **Table 8** when this alternative procedure was applied.

By the 15th overall ranking, the proportion of the total number of times the descriptor "greatest" was recorded by participants was less than 50%, indicating little agreement among workshop participants that these codes infer a "great" potential for human exposure.

The "Problem" of "Multiple-Use Functional Use Codes"

DSL use code numbers 02–50 describe functional uses of substances. For less than one-half of these 49 codes, the descriptions of the functional uses are quite specific (e.g., "03" abrasive, "05" analytical reagent). However, there are 28 of the DSL functional use codes whose descriptions include two or more of 84 specific uses under a single functional use code number. These are referred to here as "multiple-use functional use codes." As a result of the combining of specific applications, it can be difficult to determine exactly how a DSL substance is actually used, especially when the specific applications included within a "multiple-use functional use code" appear to be quite different and when four or five specific applications are included within a multiple-use code.

It is likely that the various functional uses of DSL substances will need to be considered carefully during the screening-level assessments of substances identified (i.e., "screened in") through the various "streams" of DSL categorization. Since human exposure to the same substance can vary significantly with different uses of the substance, the assessment of exposure requires that potential uses be correctly identified. It is anticipated that the range of chemical types associated with specific functional uses may be limited in many cases, and preliminary work has been undertaken to explore this aspect. This information may be sufficient to decide which specific functional use among a "multiple-use functional use code" is the most likely (e.g., realistic; predominant) use of a DSL substance.

Using a worksheet provided for this purpose, workshop participants were instructed to assess the degrees of potential human exposure to whatever is the result of the functional use(s) described by each DSL functional use code by applying sets of criteria related to the "fate of substance" aspect and "human contact parameter" aspect of these potential exposures.

The 28 multiple-use codes were identified in the centre column of the worksheet. Each multiple-use code was separated into the specific functional uses comprising it (i.e., a), b), c), etc., in the centre worksheet column). For this additional exercise, workshop participants were instructed to **assume that each of the 28 "multiple-use functional use codes" infers a "medium" potential for human exposure**. Participants were then asked, on the basis of their professional judgement, to identify those specific "single" uses that infer to them a "potential for exposure" that is "lower" or "higher" than the "medium" potential assumed for the overall "multiple-use functional use code(s)."

Two alternatives for completion of this worksheet were identified:

1) The phrases "*fate of substance*" aspect and "*human contact parameter*" aspect appeared as headings over the leftmost and rightmost worksheet columns, respectively. Participants were requested to check the appropriate cells (e.g., "lower exposure potential" (lower e.p.) or "higher exposure potential" (higher e.p.)) for any specific single use that they felt infers a "potential for exposure" that is "lower" or "higher" than the "medium" potential assumed for the overall "multiple-use functional use code(s)," when assessed by the "fate of substance" aspect and "human contact parameter" aspect as previously described.

or

2) Alternatively, participants could choose to ignore the "fate of substance" aspect and "human contact parameter" aspect and instead indicate the "lower" or "higher" exposure potentials inferred by each specific use by simply entering a down arrow (↓) or an up arrow (↑) next to the specific use in the centre column of the worksheet provided. The absence of an arrow next to a specific use was interpreted as an indication that a "medium" potential for exposure was inferred by the single use *or* that the participant had chosen to not render additional judgement in this regard.

Of the 13 workshop participants, 10 selected the first alternative identified above. The distributions of the descriptors (i.e., L (low), M (medium), H (high)) for both the "fate of substance" and the "human contact parameter" aspects for the 84 codes are summarized in **Attachment 7**.

Each "multiple-use functional use code" must be considered separately to determine whether there is any agreement that any of the specific subcode(s) infers a "potential for exposure" that is "lower" or "higher" than the "medium" potential assumed overall in this exercise. In general, when the distributions of descriptors for all of the specific uses within a "multiple-use functional use code" are similar, there is relatively less concern that the "potential for exposure" for any specific subcode is different from that inferred from the "multiple-use functional use code."

For example, functional use code 04 "adhesive/binder/sealant/filler" appears as entries 3 through 6 in **Attachment 7**. A total of six "H" (high) descriptors (of a maximum of 20) were assigned for subcode 04a "adhesive" when both the "fate of substance" and the "human contact parameter" aspects are counted. This total is considerably greater than for the remaining three subcodes of functional use code 04 (i.e., "H" = 1 for subcode 04b "binder," "H" = 1 for subcode 04c "sealant" and "H" = 1 for subcode 04d "filler"). On this basis, it is not unreasonable to suggest that the subcode 04a "adhesive" infers a "greater" potential for exposure than that inferred by the overall functional use code 04 "adhesive/binder/sealant/filler."

In the analysis of these worksheets, 12 of the 28 DSL "multiple-use functional use codes" were observed to have significant differences in the distributions of descriptors assigned. These codes are identified in **Table 9**. The listings of the subcodes within the "multiple-use functional use codes" have been reordered in **Table 7**, and the individual subcodes appearing to infer a "greater potential for exposure" are highlighted in **boldface** type.

Table 9 - Twelve "multiple-use functional use codes" with significant differences among subcodes

Attach. 7 entry no.	Subcode of "multiple-use functional use code" No.	Description	Total no. of "H" descriptors assigned	Number of times descriptor was assigned for: "fate of substance" L	M	H	"human contact parameter" L	M	H
3	**04a**	**adhesive**	**6**	1	7	2	1	5	4
4	04b	binder	1	1	8	1	2	8	0
5	04c	sealant	1	3	7	0	2	7	1
6	04d	filler	1	1	8	1	2	8	0
7	**06a**	**antifreeze**	**5**	2	5	3	2	6	2
9	**06c**	**deicer**	**5**	5	2	3	4	4	2
8	06b	coolant	1	4	5	1	5	5	0
27	**13c**	**colourant - dye**	**6**	2	5	3	2	5	3
28	**13d**	**colourant - ink**	**6**	2	6	2	2	4	4
25	13a	colourant - pigment	3	3	6	1	4	4	2
26	13b	colourant - stain	3	1	8	1	2	6	2
34	**18a**	**flame retardant**	**4**	3	5	2	3	5	2
35	18b	fire extinguishing agent	0	4	6	0	5	5	0
43	**23a**	**fuel**	**7**	2	5	3	1	5	4
44	23b	fuel additive	4	3	5	2	3	5	2
45	**24a**	**functional fluid - hydraulic**	**6**	1	6	3	4	3	3
47	24c	functional fluid - (or their) additives	2	2	7	1	6	3	1
46	24b	functional fluid - dielectric	1	3	6	1	6	4	0
60	**31d**	**disinfectant**	**6**	0	8	2	0	6	4
61	**31e**	**repellant**	**4**	2	7	1	1	6	3
57	31a	pesticide	2	0	9	1	0	9	1
58	31b	herbicide	2	0	9	1	0	9	1
59	31c	biocide	1	0	9	1	1	9	0
62	31f	attractant	0	2	8	0	4	6	0

Attach. 7 entry no.	Subcode of "multiple-use functional use code"		Total no. of "H" descriptors assigned	Number of times descriptor was assigned for:					
				"fate of substance"			"human contact parameter"		
	No.	Description		L	M	H	L	M	H
66	**38a**	**propellant**	**6**	0	9	1	0	5	5
67	38b	blowing agent	2	2	7	1	5	4	1
68	**44a**	**solvent**	**8**	1	7	2	0	4	6
69	44b	carrier	2	2	7	1	2	7	1
70	**45a**	**stripper**	**7**	2	6	2	1	4	5
73	45d	de-inker	2	1	7	2	5	5	0
72	45c	discharge printing agent	1	1	8	1	6	4	0
71	45b	etcher	0	3	7	0	5	5	0
74	**46a**	**surfactant - detergent**	**9**	1	6	3	0	4	6
75	46b	surfactant - emulsifier	4	2	7	1	1	6	3
76	46c	surfactant - wetting agent	2	3	6	1	3	6	1
77	46d	surfactant - dispersant	2	3	6	1	3	6	1
83	**50a**	**water treatment chemical**	**7**	0	7	3	0	6	4
84	50b	waste treatment chemical	2	3	6	1	3	6	1

Comments from Workshop Participants

Written comments were solicited from workshop participants concerning the use codes and their proposed application to the categorization of the DSL. Ample space was provided on the three worksheets for this purpose. Many participants opted to provide written comments, and both general and more specific comments and suggestions were received. These handwritten comments are transcribed in **Attachment 8** and are discussed briefly below.

Workshop participants were of the view that many of the use code descriptions are too vague, too general or too ambiguous to be used with confidence in decision-making processes. There were references to seemingly overlapping code descriptions.

Conclusions and Recommendations

1. The number of workshop participants was considerably less than the minimum target number of 20. Correctly completed worksheets were available from 13 participants for the functional use codes, but only from 11 participants for the industrial sector codes.

2. The workshop and subsequent analyses were successful in demonstrating that a high degree of agreement could be realized among knowledgeable staff that certain functional use codes or industrial sector codes could reasonably be expected to infer a “greater potential” for exposure than other codes when evaluated systematically against relevant criteria. High degrees of agreement were realized for only a few of the functional use codes (i.e., 7 of 49 codes) and industrial sector codes (i.e., 9 of 46 codes).

3. There was considerably more agreement among workshop participants that relatively larger numbers of the DSL use codes infer little potential for human exposure.

4. Relative rankings of the potential for human exposure inferred by 49 functional use codes and by 46 industrial sector codes were established through analysis of the completed worksheets by the procedures outlined in this report. Alternative ranking procedures were also investigated for each set of codes and resulted in some very minor differences in the rank order for some codes, but the same subsets of codes (i.e., for which a high degree of consensus exists that a “greater potential” for exposure is inferred) were identified following application of the different procedures.

5. Some workshop participants were of the view that many of the use code descriptions are too vague, too general or too ambiguous to be used with confidence for categorization of substances on the DSL.

6. The exercise involving the “multiple-use functional use codes” confirmed that, in many cases, the “potential for exposure” inferred from certain specific subcodes could be considerably different from the “potential for exposure” inferred from the “multiple-use functional use codes” including those subcodes.

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Attachment 1

List of Workshop Participants

Participant	Organizational information
Ilse Bacchus	PPG Canada Inc.
Ed Berry	CCSPA
Jim Bird	Univar Canada
Geoff Granville	Shell Canada
Bert Hakkinen	TERA (Toxicology Excellence for Risk Assessment)
Louis Hamel	Dow Chemical
Rick Hilton	INCO Ltd.
Roger Keefe	Imperial Oil
Marshall Kern	Dow Chemical
Alan MacDonald	Unilever (HPC)
Khanh Pham-Huu	Henkel Surface Technologies
Jack Soule	Dupont Canada Inc.
Don Wilke	Procter and Gamble

Attachment 2

Pre-Workshop Background Information Provided to Participants

Introduction and Background Information

The revised *Canadian Environmental Protection Act* (CEPA 1999) received Royal Assent in September 1999 and established additional responsibilities for the Minister of the Environment and the Minister of Health with respect to the assessment of risks from existing substances, including:

> **73.** (1) The Ministers shall, within seven years from the giving of Royal Assent to this Act, categorize the substances that are on the Domestic Substances List by virtue of section 66, for the purpose of identifying the substances on the List that, in their opinion and on the basis of available information,
> (a) may present, to individuals in Canada, the greatest potential for exposure; or
> (b) are persistent or bioaccumulative in accordance with the regulations, and inherently toxic to human beings or to non-human organisms, as determined by laboratory or other studies.

CEPA 1999 provides no additional guidance concerning the phrase “potential for exposure.” However, human risk assessments of existing substances (i.e., under Health Canada’s Priority Substances Assessment Program) have focused on:

- indirect exposure (i.e., following environmental transport and distribution) of the general population to substances present as contaminants in air, water, food and beverages;
- direct human exposure for subpopulations in the vicinity of industrial discharges; and
- exposures of consumers resulting from the use of various products available at the retail level.

Traditionally, in the assessment program mentioned above, exposures to substances in workplaces have not been considered, since these substances are governed by more specific legislation or by other jurisdictions.

It is expected that the categorization of the approximately 23 000 substances on the Domestic Substances List (DSL) will provide only an initial rough sorting between substances requiring priority for additional consideration and those that do not. Substances identified through the categorization of the DSL (and possibly through other “streams” not considered here) will be subjected to screening-level assessments for human and/or ecological risks. The outcome of a screening-level risk assessment (SLRA) will determine whether a DSL substance is:

1) set aside (i.e., not considered a priority for further evaluation, based on currently available information);
2) identified as a Priority Substance (and therefore requiring more comprehensive and resource-intensive human and/or ecological risk assessments); or
3) added to the List of Toxic Substances in Schedule 1 of CEPA (and therefore requiring that options for risk management be considered within mandated time-frames).

Although there are other mechanisms under CEPA to permit identification of Priority Substances or for additions to the List of Toxic Substances, the most pressing tasks involve the categorization of the substances that are on the DSL.

> The DSL includes substances that were, between January 1, 1984, and December 31, 1986, in Canadian commerce, used for manufacturing purposes, or manufactured in or imported into Canada in a quantity of 100 kg or more in any calendar year. The purpose of the List was to define what was “New to Canada” and it has been amended from time to time following assessments under the New Substances Notification Regulations and currently contains approximately 23,000 substances.

Substances listed on the DSL are considered "existing substances." The text that is quoted above appears on a page of Environment Canada's internet site (http://www.ec.gc.ca/substances/ese/eng/dsl/dslprog.cfm; accessed April 23, 2002). This site also provides an overview of Environment Canada's responsibilities and planned activities with respect to categorization and screening of the DSL. Within Health Canada, responsibilities for DSL categorization and screening-level human risk assessments lie within:

Existing Substances Division	(formerly Priority Substances Section)
Environmental Contaminants Bureau	(formerly Bureau of Chemical Hazards)
Safe Environments Programme	(formerly Environmental Health Directorate)
Healthy Environments and Consumer Safety Branch	(formerly Health Protection Branch)

Information on the CEPA existing substances categorization and assessment program at Health Canada may be found on the Existing Substances Division internet site at http://www.hc-sc.gc.ca/hecs-sesc/exsd/index.htm.

Preliminary discussions among staff of the Existing Substances Division have resulted in several proposed approaches to the categorization of the DSL on the basis of the potential for human exposure. The proposed "Workshop to Consider DSL Industrial Sector and Functional Use Codes as Indicators of Potential Human Exposure" is a step to further explore the feasibility of one of these approaches.

A Proposed Approach to Categorization

One approach currently being considered is to use *only* the historic DSL use codes and quantity in commerce information for categorization of the DSL as required by CEPA 73(1)(a). This is the information that was specifically solicited from industry when the DSL was originally compiled, i.e., as described in Environment Canada (1988).

The word "only" is italicized above to distinguish the approach under consideration currently from other possible approaches to categorization of the DSL on the basis of greatest potential for human exposure. These other approaches (e.g., categorization on the basis of chemical structure) are anticipated to be much more resource-intensive, in that they would require consideration of quantitative structure–property relationships (QSPRs) for prediction of physical and chemical properties and considerable consultation with various industries and/or industry groups to identify the DSL substances with the greatest potential for human exposure from within chemical categories established on the basis of elemental composition and/or structural similarities.

Information available from the DSL databases with which to assess the potential for human exposure is very limited. The DSL record for a substance contains a minimum amount of information, which generally includes:

1) the Chemical Abstracts Service (CAS) Registry Number;
2) the substance name according to CAS nomenclature rules;
3) the molecular formula, when the substance is well defined;
4) the commercial use(s) of the substance, represented by DSL industrial category and functional use codes; and
5) the quantity of substance in Canadian commerce, in the form of quantity codes representing order-of-magnitude ranges of quantities.

The approach under consideration here involves only items 1), 4) and 5) from those listed above and is based on the assumptions that the information in all DSL records for items 4) and 5) was approximately accurate when recorded in the mid-1980s and adequately reflects current commercial uses and quantities in commerce in Canada.

Ninety-eight use codes were established for the DSL reporting. There are three types of use codes: a) special use (codes 00 and 01); b) functional use (codes 02–51); and c) industrial sector (codes 52–98). The approach being considered here is based on the premise that some qualitative indication of the potential human exposure to a specific DSL substance can be inferred by consideration of some or all of the specific use codes reported by companies that were importing, manufacturing or using that substance when the DSL was compiled. A one-day workshop will provide a forum to access desired technical expertise, in order to evaluate whether certain DSL use codes can reasonably be expected to suggest “greatest,” “intermediate” or “least” potential for human exposure, on the basis of “expert judgement.” It is expected that the quantity in commerce information for each DSL substance will also be used in the categorization of the DSL, and various options have been identified in this regard.

The two special use codes are 00 for research and development and 01 for site-limited substance (i.e., manufactured within a particular plant site and not distributed, either unaltered or in any mixture or article, for commercial purposes outside that site). As such, these codes suggest a “low” potential for human exposure (i.e., stressing again that exposures in workplaces should not be considered) for substances having only these special use codes (i.e., and no other industrial sector or functional use codes).

Two of the 98 codes are reserved for miscellaneous uses not captured by other codes (i.e., functional use code 51, for uses other than those listed in codes 02–50, and industrial sector code 98, for industries other than those specified in codes 52–97). Due to the non-specific nature of codes 51 and 98, they will not be used for this exercise.

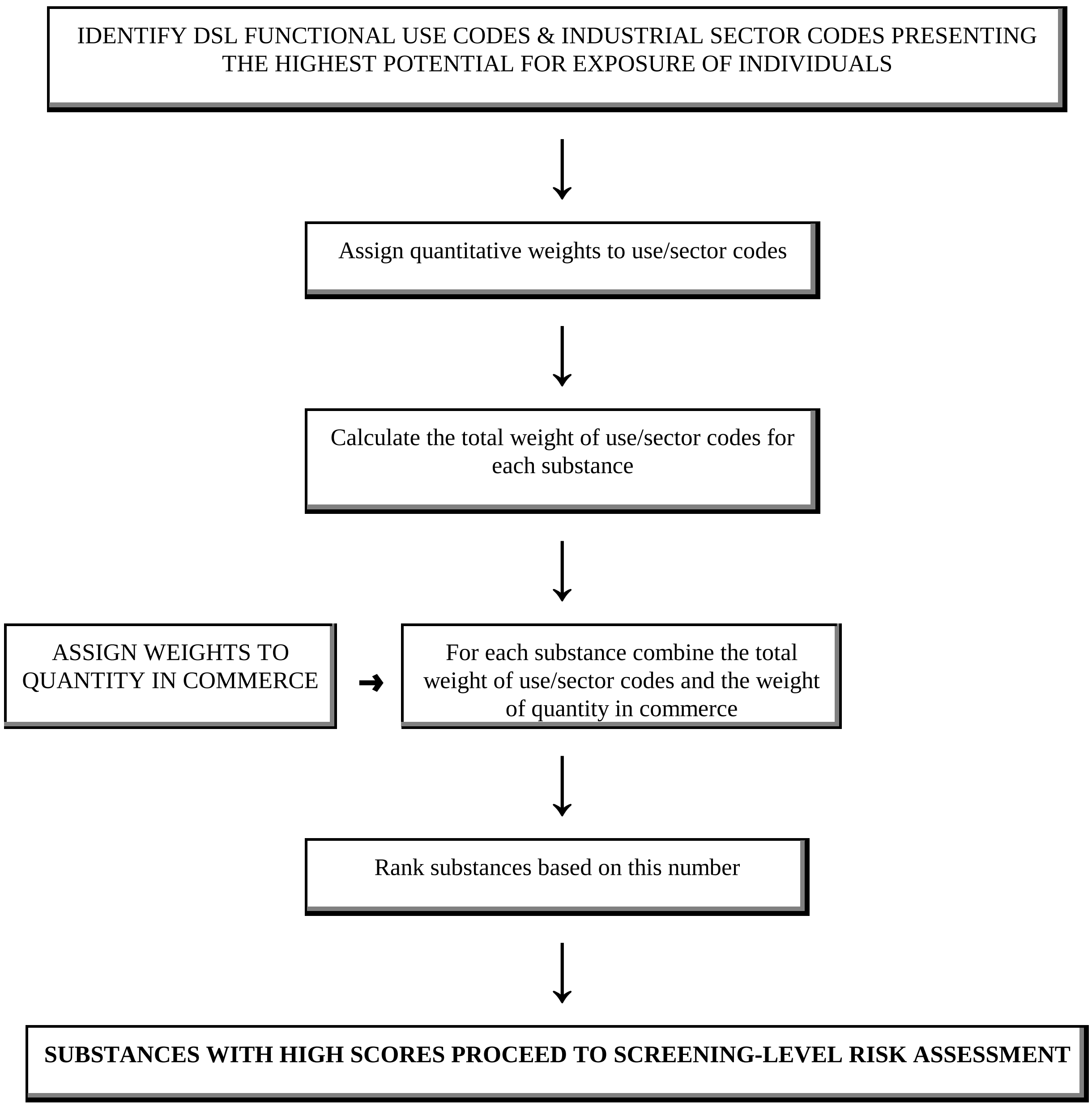
Health Canada’s approaches to the DSL categorization and to screening-level and comprehensive human health risk assessments should include consideration of human exposures potentially occurring at all stages of the life cycles of these substances. Exposure implies human contact with a substance or with a medium or media containing the substance. These contact media may be environmental media (i.e., ambient air, surface water, groundwater, soil), food, beverages or potable water, various products such as clothing, personal care products (e.g., cosmetics, sun screens) or household or automotive cleaning and maintenance products. Another contact medium to be considered is residential indoor air, which may contain substances emitted from building materials, manufactured articles and other sources.

Separate sets of criteria have been developed for the industrial sector and functional use reporting codes. Workshop participants will be asked to assess the DSL reporting codes with respect to these criteria, by drawing on their specific knowledge and by applying professional judgement. Additional printed background material (e.g., definitions of terms, etc.) will be available for use at the workshop. The ideal composition of the proposed workshop would be individuals from a broad range of industrial sectors with a wide range of expertise regarding chemical substances and their uses in industry in Canada.

If considerable consensus is demonstrated concerning relative ranking of individual codes as qualitative indicators of the degree of potential human exposure, this should permit the identification of specific codes that might serve as qualitative indicators of the degree of human contact with DSL substances by the various exposure pathways identified on the following pages. These indicators would be used to predict the overall (i.e., multi-pathway) extent or degree of human contact with a DSL substance and, together with quantity of use information, would be key factors in the categorization of listed substances on the basis of the potential for human exposure.

A schematic summarizing this proposed approach follows.

DSL EXPOSURE CATEGORIZATION - STRAWMAN #1 APPROACH



Selection of **industrial sector codes** representing uses presenting the highest potential for exposure for individuals:

Note that the DSL industrial sector codes provide no information concerning the nature or quantities of emissions, releases, discharges, etc. during industrial use of the substance or during any stage in the life cycle of products resulting from the use of the substance. A substance on the DSL may or may not be an intended component of a commercial or consumer product. In non-workplace environments, it is presumed that a potential for human exposure to a DSL substance may occur due to contact with:

1) industrial process emissions and/or effluents (i.e., either directly due to proximity to a source or indirectly following environmental transport and distribution);

2) a substance or its residue in product(s) used or consumed; and/or

3) a substance having entered environmental media following use and/or disposal of the product.

(Human exposures in workplace settings should be excluded from consideration due to the high probability that there will always be some workers for whom potential exposure is high. Note also that such exposures are more appropriately considered under other jurisdictions/legislation.)

Each industrial sector code must be considered individually with respect to each of the three *contact scenarios* identified above. Participants will be asked to rank the likelihood for human exposure to process emissions or effluents, products, substance residues or contaminated environmental media from activities of that industrial sector, by assigning the descriptors "low," "medium" or "high" to each of the three contact scenarios. The overall degree of potential human exposure for an industrial sector could be assessed as follows:

- "greatest" potential for human exposure — at least one "high" and one "medium" contact
- "intermediate" potential for human exposure — at least two "medium" contacts (and no "high" contacts)
- "least" potential for human exposure — two or more "low" contacts (and no "high" contacts)

Two specific examples illustrating possible thought processes involved follow.

The first example involves consideration of industrial sector code 52 "adhesive and sealant production." A workshop participant might consider the likelihood of human exposure as follows:

- to 1) industrial process emissions and/or effluents from this sector: "low" (e.g., perhaps reasoning that the processes involved are likely to be well-contained, resulting in few emissions and/or effluents);
- to 2) a substance or its residue in product(s) used or consumed: "medium" (e.g., perhaps reasoning that there is a low likelihood of human exposure to an adhesive once it is applied but a high likelihood of exposure during application of the adhesive); and
- to 3) a substance having entered environmental media following use and/or disposal of the product: "low" (e.g., perhaps reasoning that it is more likely that only set or hardened adhesives would be disposed of).

In this case (i.e., two "low" and one "medium" ratings), application of the criteria suggested results in the conclusion that there is "least" potential for human exposure for the industrial sector "adhesive and sealant production."

As a second example, consider industrial sector code 60 "cosmetics." A workshop participant might consider the likelihood of human exposure as follows:

- to 1) industrial process emissions and/or effluents from this sector: "low" (e.g., perhaps again reasoning that the processes involved are likely to be well-contained, resulting in few emissions and/or effluents);
- to 2) a substance or its residue in product(s) used or consumed: "high" (e.g., in recognition that cosmetic

and similar personal care products are intentionally applied to the skin by many individuals); and
- to 3) a substance having entered environmental media following use and/or disposal of the product: "medium" (e.g., perhaps reasoning that some portion of products may be disposed of down the drain to ultimately contaminate surface water).

In this case (i.e., one "high" and one "medium" ratings), application of the criteria suggested results in the conclusion that there is "greatest" potential for human exposure for the industrial sector "cosmetics."

Following discussion and/or questions concerning the criteria and their application, participants will be asked to complete worksheets during the workshop. The worksheets will be assessed afterwards to determine the degree of consensus among participants and the overall usefulness of the suggested approach.

Assuming that there is general agreement on the separation of industrial sector codes into classes suggesting "greatest," "intermediate" or "least" potential for human exposure, the application of this information to the individual DSL substances could be as follows. It is proposed that weights of 3 ("greatest"), 2 ("intermediate") or 1 ("least") could replace these codes in a record of a DSL substance. A semi-quantitative ranking of substances is then possible by summing the assigned weights for each DSL substance. On this basis, the highest-ranking DSL substances would be those having the greatest number of industrial sector codes suggesting the "greatest" potential for exposure.

Selection of **functional use codes** representing uses presenting the highest potential for exposure for individuals:

Note that the DSL functional use codes provide no information concerning the nature or quantities of emissions, releases, discharges, etc. during industrial use of the substance or during any stage in the life cycle of products resulting from the use of the substance. For example, the fact that the functional use code indicates that a substance is used as a monomer (i.e., code 28) provides no information regarding the release of the monomer during production of a polymer or its subsequent release from a manufactured article incorporating that polymer. Therefore, the proposed categorization is based on attempting to assess the degree of potential human exposure to whatever is the result of the particular functional use category. For example, when the result of a functional use category is a manufactured article or consumer product, the likelihood is greater that humans will be exposed to the result of the use category, and by inference to the substance, if it is likely to still remain intact within the manufactured article or consumer product.

The objective is to separate the 49 functional use codes into three classes representing the "greatest," an "intermediate" and the "least" potential for human exposure. Six criteria are proposed to separate the functional use codes into these three classes, as indicated in the grid that follows. Note that attention is directed to two aspects of the potential for human exposure.

For the "*fate of substance aspect*," workshop participants should try to speculate as to what happens to a substance having a particular functional use, considering, for example, the possibility that the substance may be partially or totally reacted, consumed, tightly bound or otherwise altered by that use.

For the "*human contact parameter aspect*," workshop participants should speculate as to the frequency and/or magnitude of direct human contact (i.e., in non-workplace environments) with the substance itself or, more frequently, with media containing the substance (i.e., with contact media, as previously described).

Potential for human exposure	Aspect of potential exposure	Criteria for inclusion based on functional use codes
“greatest”	fate of substance	a) high certainty that a substance used in this manner will be present as or in a consumer product related to the functional use category; *and*
	human contact parameter	b) greater than 10% of individuals are likely to have contact with consumer products related to the functional use category on any given day.
“intermediate”	fate of substance	a) functional use is more related to a process occurring during manufacture, production or formulation; *and*
	human contact parameter	b) a substance used in this manner may remain in a product to which humans may be exposed.
“least”	fate of substance	a) substance related to the functional use category is likely to be altered or consumed during use; *or*
	human contact parameter	b) substance related to the functional use category is likely to be used only in closed systems or restricted areas (i.e., workplaces).

Note that in the approach proposed here, both criteria must be satisfied for the “greatest” and “intermediate” classes. It is suggested that if only one criterion is satisfied, then the functional use code should be placed in the nearest lower class.

Two specific examples illustrating the possible thought processes are offered. Consider, for example, functional use code 22 “fragrance/perfume/deodourizer/flavouring agent.” A workshop participant considering the “fate of substance” aspect might conclude that a DSL substance with this type of functional use is quite likely to be present in various types of consumer products. Considering the “human contact parameter” aspect,” a participant might conclude that there is likely to be a high proportion of individuals likely to have contact with these consumer products on any given day. Application of the criteria suggested would lead to the conclusion that there is “greatest” potential for exposure to DSL substances for which functional use code 22 has been reported.

As a second example, consider functional use code 27 “lubricating agent/lubricant additive/mould release agent.” A workshop participant considering the “fate of substance” aspect might conclude that a DSL substance with this type of functional use is likely used in a process occurring during production of a manufactured article. If, when considering the “human contact parameter” aspect, the participant also concluded that some of a substance used in this manner may remain in a product to which humans may be exposed, then application of the criteria suggested would lead to the conclusion that there is “intermediate” potential for exposure to DSL substances for which functional use code 27 has been reported. On the other hand, if the participant concluded that it was unlikely that any of the substance remained on or in a product to which humans may be exposed, then application of the criteria suggested would lead to the conclusion that there is “least” potential for exposure to DSL substances for which functional use code 27 has been reported (i.e., since both criteria for an “intermediate” degree of potential human exposure are no longer satisfied).

Following discussion and/or questions concerning the criteria and their application, participants will be asked to complete worksheets on which they assign the descriptors “greatest,” “intermediate” or “least” to each functional use. The worksheets will be assessed afterwards to determine the degree of consensus among participants and the overall usefulness of the suggested approach.

Assuming that there is general agreement on the separation of functional use codes into classes suggesting “greatest,” “intermediate” or “least” potential for human exposure, the application of this information to the individual DSL substances could be as follows. It is proposed that weights of 3 (“greatest”), 2 (“intermediate”) or 1 (“least”) could replace these codes in a record of a DSL substance. A semi-quantitative ranking of substances is then possible by summing the assigned weights for each DSL substance. On this basis, the highest-ranking DSL substances would be those having the greatest number of functional use codes suggesting the “greatest” potential for exposure.

May 2001 Exploratory Workshop

The proposed approach to categorization of the DSL on the basis of potential for human exposure as outlined here was examined in an exploratory workshop to test its feasibility and to assess the degrees of consensus that could be achieved concerning ranking of individual DSL use codes as indicators of the degree of potential human exposure. Twenty individuals, mainly Health Canada staff in the National Capital Region, were invited to participate in a one-day workshop conducted in Ottawa on Wednesday, May 30, 2001. The workshop was conducted by staff of the Exposure Assessment Section, Existing Substances Division, Environmental Contaminants Bureau, within the Safe Environments Programme of the Healthy Environments and Consumer Safety Branch (HECS) of Health Canada.

The participants of this May 2001 workshop were knowledgeable in chemistry, but were not exclusively involved in exposure assessment activities. An effort was made to include individuals with diverse work experience, to best address the multifaceted nature of human exposures to chemical substances. Pre-workshop background information was provided to each of the invited participants concerning the categorization and screening of existing substances and outlining the proposed approach.

The workshop opened with brief presentations concerning the systematic evaluation of “existing substances” by Health Canada and Environment Canada through the processes of categorization of the DSL and screening-level risk assessments. This was followed by a presentation outlining the nature of the multimedia and multi-pathway exposures considered during human risk assessments of existing substances under Health Canada’s Priority Substances Assessment Program. The latter presentation was also used to introduce the two sets of criteria proposed for evaluation of the industrial sector and functional use codes, respectively.

Each participant completed two worksheets by applying the criteria established and using his or her professional judgement with respect to the individual industrial sector and functional use codes. The completed worksheets were analysed after the workshop. Among the key conclusions of these analyses were:

1. A high degree of consensus could be realized among knowledgeable staff that certain functional use codes or industrial sector codes could reasonably be expected to infer a “greater potential” for exposure than other codes when evaluated systematically against relevant criteria. However, a high degree of consensus was realized for only a few of the functional use codes and industrial sector codes.

2. There was considerably more consensus among workshop participants that relatively larger numbers of the DSL use codes infer little potential for human exposure. In the absence of any other information for categorization purposes, consideration should be given to inferring that the potential for human exposure will not be great for substances having only these codes.

3. Relative rankings of the potential for human exposure inferred by 49 functional use codes and by 46 industrial sector codes were established through analysis of the completed worksheets by the procedures outlined in the pre-workshop background information. Alternative ranking procedures were also investigated for each set of codes and resulted in some differences in the rank order for some codes, but the same subsets of codes (i.e., for which a high degree of consensus exists that a “greater potential” for exposure is inferred) were identified following application of the different procedures.

The results of the May 2001 exploratory workshop were presented to management to guide their decision-making concerning Health Canada’s approach to the categorization of the DSL. A second workshop involving participants from industry was proposed.

Summary

Categorization of substances included on the DSL for the purpose of identifying substances presenting the greatest potential for exposure of individuals in Canada should be considered in the context of priority setting to ensure sufficient use of resources — i.e., full risk assessments will be conducted only for substances that have been systematically examined in the context of their potential for both exposure and toxicological effect(s).

The May 2001 exploratory workshop and the proposed “Workshop to Consider DSL Industrial Sector and Functional Use Codes as Indicators of Potential Human Exposure” involving participants from industry are initial steps to explore the feasibility of one approach among several suggested by Health Canada staff. This approach is considered to be the most straightforward and the least resource-intensive among several approaches proposed for the categorization of the DSL.

This pre-workshop background information is provided to each workshop participant to communicate the nature of the information to be considered and to indicate how the criteria developed might be applied. There will be opportunity for additional discussion of the proposed approaches and criteria at the workshop. Participants will be required to complete worksheets by applying the criteria established and using their professional judgement with respect to the individual industrial sector and functional use codes. The completed worksheets will be analysed after the workshop.

Afterwards, a brief report of this analysis and the resulting conclusions will be provided to each workshop participant. The results of the workshop will be presented to management to further guide their decision-making concerning Health Canada’s approach to the categorization of the DSL.

Attachment 3

Workshop Agenda

Date: October 18, 2002

Location: Health Canada Departmental Boardroom
Room 0115C, Brooke Claxton Building
Tunney's Pasture, Ottawa

08:30 Registration / Coffee

09:00 Opening and background presentations - Exposure assessments under CEPA and status of DSL categorization and screening

09:30 Potential role of DSL Use Codes in categorization of substances with "greatest potential for human exposure"

10:00 Introduction/discussion of proposed criteria (i.e., provided pre-workshop) for DSL Industrial Sector Codes as indicators of potential for direct/indirect environmental exposures - DSL categorization

10:30 Application of criteria to Industrial Sector Codes by workshop participants (i.e., completion of worksheets)

Coffee

11:30 Introduction/discussion of proposed criteria (i.e., provided pre-workshop) for DSL Functional Use Codes as indicators of potential for product-related exposures - DSL categorization

12:00 Application of criteria to Functional Use Codes by workshop participants (i.e., completion of worksheets)

13:00 Lunch

14:00 Ranking specific functional uses within "multiple functional use codes" (i.e., completion of worksheets)

Coffee

15:00 Discussion - Potential refinements to proposal for categorization for "greatest potential for human exposure," identification of relevant sources of information/expertise, follow-up

17:00 Close of workshop

Attachment 4

DSL Industrial Sector Codes Ranked by Number of “Greatest” Descriptors Assigned

Relative ranking	Industrial sector code		No. of times descriptor was assigned:			Proportion of total for “greatest”
	no.	description	“least”	“intermediate”	“greatest”	
1	93	soap and cleaning products	1	0	10	91%
2	53	agriculture, field crops	0	2	9	82%
3	65	food, feed, and beverage	0	2	9	82%
4	82	petroleum and natural gas	0	2	9	82%
5	59	construction materials	0	3	8	73%
6	91	refined petroleum and coal products	1	2	8	73%
7	95	textile, product	1	2	8	73%
8	54	agriculture, other	2	1	8	73%
9	64	forestry/wood products/wood treatment	2	1	8	73%
10	96	transportation	0	4	7	64%
11	60	cosmetics	1	3	7	64%
12	80	paint and coating	1	3	7	64%
13	83	pharmaceuticals	1	3	7	64%
14	89	printing and publishing	1	3	7	64%
15	97	water and waste treatment	1	3	7	64%
16	81	pest control products/formulating and manufacture	2	2	7	64%
17	63	fertilizer	1	4	6	54%
18	70	leather/tanning	1	4	6	54%
19	90	pulp and paper	1	4	6	54%
20	86	plastics	2	3	6	54%
21	79	packaging	1	5	5	45%
22	57	biotechnology	2	4	5	45%
23	61	electrical or electronic products	2	4	5	45%
24	66	health and veterinary	2	4	5	45%
25	87	plastic and synthetic resin	3	3	5	45%

Relative ranking	Industrial sector code		No. of times descriptor was assigned:			Proportion of total for "greatest"
	no.	description	"least"	"intermediate"	"greatest"	
26	85	pigment, dye and printing ink	1	6	4	36%
27	74	non-metallic mineral products, ceramic and glass	2	5	4	36%
28	72	mining, metal and non-metal	4	3	4	36%
29	94	textile, primary manufacture	4	3	4	36%
30	71	metallurgical	3	5	3	27%
31	58	chlor-alkali	4	4	3	27%
32	92	rubber products	4	4	3	27%
33	73	non-metallic mineral products, abrasive	5	3	3	27%
34	56	automotive, aircraft and watercraft	6	2	3	27%
35	75	non-metallic mineral products, other	6	2	3	27%
36	88	plating and surface finishing	2	7	2	18%
37	84	photographic/photocopier	4	5	2	18%
38	69	magnetic tape manufacture	6	3	2	18%
39	78	organometallic chemicals	6	3	2	18%
40	67	industrial gas production	7	2	2	18%
41	68	inorganic chemicals	3	7	1	9%
42	77	organic chemicals, speciality	4	6	1	9%
43	76	organic chemicals, industrial	5	5	1	9%
44	52	adhesive and sealant production	6	5	0	0%
45	55	article manufacture	6	5	0	0%
46	62	explosive materials	10	1	0	0%

Attachment 5

Rankings of DSL Industrial Sector Codes Under the Three Contact Scenarios

In non-workplace environments, human exposure to a DSL substance may occur due to contact with:	
Scenario 1	process emissions and/or effluents (i.e., either directly due to proximity to a source or indirectly following environmental transport and distribution)

For each industrial sector code, rank the likelihood (i.e., low, medium, high) for human exposure for the contact scenario identified above.

Relative ranking	Industrial sector code		No. of times descriptor was assigned under scenario:		
	no.	**description**	**"low"**	**"medium"**	**"high"**
1	82	petroleum and natural gas	1	4	6
2	72	mining, metal and non-metal	2	3	6
3	96	transportation	1	6	4
4	91	refined petroleum and coal products	3	4	4
5	97	water and waste treatment	4	3	4
6	58	chlor-alkali	3	5	3
7	59	construction materials	3	5	3
8	53	agriculture, field crops	4	4	3
9	63	fertilizer	4	4	3
10	71	metallurgical	4	4	3
11	54	agriculture, other	5	3	3
12	92	rubber products	5	3	3
13	85	pigment, dye and printing ink	6	2	3
14	90	pulp and paper	1	8	2
15	64	forestry/wood products/wood treatment	2	7	2
16	76	organic chemicals, industrial	3	6	2
17	74	non-metallic mineral products, ceramic and glass	4	5	2
18	80	paint and coating	4	5	2
19	52	adhesive and sealant production	5	4	2
20	56	automotive, aircraft and watercraft	5	4	2

Relative ranking	Industrial sector code		No. of times descriptor was assigned under scenario:		
	no.	description	"low"	"medium"	"high"
21	70	leather/tanning	5	4	2
22	75	non-metallic mineral products, other	5	4	2
23	88	plating and surface finishing	5	4	2
24	89	printing and publishing	5	4	2
25	57	biotechnology	7	2	2
26	67	industrial gas production	7	2	2
27	81	pest control products/formulating and manufacture	7	2	2
28	73	non-metallic mineral products, abrasive	4	6	1
29	94	textile, primary manufacture	4	6	1
30	61	electrical or electronic products	5	5	1
31	86	plastics	5	5	1
32	95	textile, product	5	5	1
33	78	organometallic chemicals	8	2	1
34	83	pharmaceuticals	8	2	1
35	69	magnetic tape manufacture	9	1	1
36	55	article manufacture	3	8	0
37	79	packaging	3	8	0
38	68	inorganic chemicals	4	7	0
39	87	plastic and synthetic resin	4	7	0
40	65	food, feed, and beverage	5	6	0
41	77	organic chemicals, speciality	5	6	0
42	93	soap and cleaning products	5	6	0
43	84	photographic/photocopier	7	4	0
44	60	cosmetics	9	2	0
45	66	health and veterinary	9	2	0
46	62	explosive materials	10	1	0

In non-workplace environments, human exposure to a DSL substance may occur due to contact with:	
Scenario 2	the substance or its residue in product(s) used or consumed

For each industrial sector code, rank the likelihood (i.e., low, medium, high) for human exposure for the contact scenario identified above.

Relative ranking	**Industrial sector code**		**No. of times descriptor was assigned under scenario:**		
	no.	**description**	**"low"**	**"medium"**	**"high"**
1	65	food, feed, and beverage	0	0	11
2	60	cosmetics	0	1	10
3	93	soap and cleaning products	0	1	10
4	83	pharmaceuticals	0	2	9
5	53	agriculture, field crops	1	2	8
6	80	paint and coating	2	1	8
7	91	refined petroleum and coal products	2	1	8
8	95	textile, product	2	1	8
9	54	agriculture, other	1	3	7
10	57	biotechnology	1	3	7
11	82	petroleum and natural gas	1	3	7
12	59	construction materials	2	2	7
13	66	health and veterinary	2	2	7
14	97	water and waste treatment	2	2	7
15	81	pest control products/formulating and manufacture	1	4	6
16	70	leather/tanning	2	3	6
17	86	plastics	2	3	6
18	89	printing and publishing	5	0	6
19	96	transportation	1	5	5
20	79	packaging	2	4	5
21	61	electrical or electronic products	3	3	5
22	63	fertilizer	3	3	5
23	74	non-metallic mineral products, ceramic and glass	4	2	5
3424	92	rubber products	5	1	5

Relative ranking	Industrial sector code		No. of times descriptor was assigned under scenario:		
	no.	**description**	**"low"**	**"medium"**	**"high"**
25	71	metallurgical	6	0	5
26	90	pulp and paper	6	0	5
27	85	pigment, dye and printing ink	1	6	4
28	64	forestry/wood products/wood treatment	2	5	4
29	87	plastic and synthetic resin	2	5	4
30	94	textile, primary manufacture	6	1	4
31	84	photographic/photocopier	4	4	3
32	73	non-metallic mineral products, abrasive	5	3	3
33	88	plating and surface finishing	5	3	3
34	77	organic chemicals, speciality	4	5	2
35	55	article manufacture	6	3	2
36	56	automotive, aircraft and watercraft	7	2	2
37	69	magnetic tape manufacture	7	2	2
38	78	organometallic chemicals	5	5	1
39	75	non-metallic mineral products, other	6	4	1
40	52	adhesive and sealant production	7	3	1
41	72	mining, metal and non-metal	8	2	1
42	76	organic chemicals, industrial	8	2	1
43	68	inorganic chemicals	6	5	0
44	58	chlor-alkali	7	4	0
45	62	explosive materials	9	2	0
46	67	industrial gas production	10	1	0

In non-workplace environments, human exposure to a DSL substance may occur due to contact with:	
Scenario 3	the substance having entered environmental media following use and/or disposal of the product

For each industrial sector code, rank the likelihood (i.e., low, medium, high) for human exposure for the contact scenario identified above.

Relative ranking	Industrial sector code		No. of times descriptor was assigned under scenario:		
	no.	**description**	**"low"**	**"medium"**	**"high"**
1	97	water and waste treatment	2	1	8
2	53	agriculture, field crops	2	2	7
3	93	soap and cleaning products	1	4	6
4	63	fertilizer	3	2	6
5	91	refined petroleum and coal products	1	5	5
6	54	agriculture, other	3	3	5
7	89	printing and publishing	3	3	5
8	96	transportation	3	3	5
9	59	construction materials	4	2	5
10	65	food, feed, and beverage	4	2	5
11	64	forestry/wood products/wood treatment	2	5	4
12	79	packaging	3	4	4
13	57	biotechnology	5	2	4
14	80	paint and coating	5	2	4
15	86	plastics	5	2	4
16	87	plastic and synthetic resin	5	2	4
17	81	pest control products/formulating and manufacture	4	4	3
18	95	textile, product	4	4	3
19	60	cosmetics	5	3	3
20	61	electrical or electronic products	5	3	3
21	94	textile, primary manufacture	6	2	3
22	82	petroleum and natural gas	4	5	2
23	83	pharmaceuticals	4	5	2
24	90	pulp and paper	4	5	2
25	66	health and veterinary	5	4	2
26	72	mining, metal and non-metal	6	3	2
27	73	non-metallic mineral products, abrasive	7	2	2
28	74	non-metallic mineral products, ceramic and glass	7	2	2

Relative ranking	Industrial sector code		No. of times descriptor was assigned under scenario:		
	no.	**description**	**"low"**	**"medium"**	**"high"**
29	67	industrial gas production	8	1	2
30	68	inorganic chemicals	2	8	1
31	70	leather/tanning	4	6	1
32	85	pigment, dye and printing ink	5	5	1
33	88	plating and surface finishing	5	5	1
34	58	chlor-alkali	6	4	1
35	69	magnetic tape manufacture	6	4	1
36	76	organic chemicals, industrial	7	3	1
37	84	photographic/photocopier	7	3	1
38	92	rubber products	9	1	1
39	56	automotive, aircraft and watercraft	6	5	0
40	75	non-metallic mineral products, other	6	5	0
41	77	organic chemicals, speciality	6	5	0
42	78	organometallic chemicals	7	4	0
43	71	metallurgical	8	3	0
44	52	adhesive and sealant production	9	2	0
45	55	article manufacture	9	2	0
46	62	explosive materials	10	1	0

Attachment 6

DSL Functional Use Codes Ranked by the Number of "Greatest" Descriptors Recorded

Relative ranking	Functional use code		Number of times descriptor was used:			Proportion of total for "greatest"
	no.	description	"least"	"intermediate"	"greatest"	
1	46	surfactant - detergent/emulsifier/ wetting agent/dispersant	0	0	13	100%
2	22	fragrance/perfume/deodourizer/ flavouring agent	0	1	12	92%
3	44	solvent/carrier	0	3	10	77%
4	35	polymer, component of an article	1	2	10	77%
5	23	fuel/fuel additive	0	4	9	69%
6	39	preservative	1	3	9	69%
7	30	paint/coating additive	2	2	9	69%
8	31	pesticide/herbicide/biocide/ disinfectant/repellant/attractant	0	5	8	62%
9	16	fertilizer	1	5	7	54%
10	21	formulation component	1	5	7	54%
11	13	colourant - pigment/stain/dye/ink	2	4	7	54%
12	32	photosensitive agent - fluorescent agent/brightener/UV absorber	2	4	7	54%
13	2	absorbent/adsorbent	3	3	7	54%
14	4	adhesive/binder/sealant/filler	4	2	7	54%
15	36	polymer, component of a formulation	1	6	6	46%
16	45	stripper/etcher/discharge printing agent/de-inker	3	4	6	46%
17	33	plasticizer	5	2	6	46%
18	47	tarnish remover/rust remover/ descaling agent	2	6	5	38%
19	6	antifreeze/coolant/deicer	3	5	5	38%
20	50	water or waste treatment chemical	3	5	5	38%
21	3	abrasive	4	4	5	38%
22	18	flame retardant/fire extinguishing agent	4	4	5	38%

Relative ranking	Functional use code		Number of times descriptor was used:			Proportion of total for "greatest"
	no.	description	"least"	"intermediate"	"greatest"	
23	38	propellant/blowing agent	5	3	5	38%
24	7	antioxidant/corrosion inhibitor/ tarnish inhibitor/scavenger/ antiscaling agent	7	1	5	38%
25	27	lubricating agent/lubricant additive/mould release agent	3	6	4	31%
26	29	oxidizing agent	3	6	4	31%
27	49	water repellant/drainage aid	4	5	4	31%
28	12	coagulant/coalescent	5	4	4	31%
29	25	humectant/dewatering aid/ dehumidifier/dehydrating agent	6	3	4	31%
30	37	polymer, crosslinking agent	8	1	4	31%
31	48	viscosity adjuster	3	7	3	23%
32	19	flocculating/precipitating/clarifying agent	5	5	3	23%
33	41	reducing agent	5	6	2	15%
34	24	functional fluid i.e., hydraulic, dielectric, or their additives	6	5	2	15%
35	43	sequestering agent	6	5	2	15%
36	17	finishing agent	9	2	2	15%
37	42	refrigerant	10	1	2	15%
38	28	monomer	11	0	2	15%
39	14	defoamer/emulsion breaker	5	7	1	8%
40	34	polymer additive	5	7	1	8%
41	20	flotation agent	6	6	1	8%
42	40	processing aid	3	10	0	0%
43	26	ion exchange agent	9	4	0	0%
44	10	chemical intermediate - organic	11	2	0	0%
45	11	chemical intermediate - inorganic, organometallic	11	2	0	0%
46	5	analytical reagent	12	1	0	0%

Relative ranking	Functional use code		Number of times descriptor was used:			Proportion of total for “greatest”
	no.	**description**	**“least”**	**“intermediate”**	**“greatest”**	
47	8	catalyst/accelerator/initiator/ activator	12	1	0	0%
48	9	catalyst support/chromatography support	12	1	0	0%
49	15	drilling mud additive/oil recovery agent/oil well treating agent	13	0	0	0%

Attachment 7

Analysis of "Multiple-use Functional Use Codes" Worksheets

Subcode of "multiple-use functional use code"			Number of times descriptor was assigned for:					
			"fate of substance" aspect			"human contact parameter" aspect		
	No.	Description	L	M	H	L	M	H
1	02a	absorbent	2	7	1	1	7	2
2	02b	adsorbent	3	6	1	5	5	0
3	04a	adhesive	1	7	2	1	5	4
4	04b	binder	1	8	1	2	8	0
5	04c	sealant	3	7	0	2	7	1
6	04d	filler	1	8	1	2	8	0
7	06a	antifreeze	2	5	3	2	6	2
8	06b	coolant	4	5	1	5	5	0
9	06c	deicer	5	2	3	4	4	2
10	07a	antioxidant	3	6	1	3	5	2
11	07b	corrosion inhibitor	4	5	1	6	4	0
12	07c	tarnish inhibitor	2	7	1	4	5	1
13	07d	scavenger	4	6	0	5	5	0
14	07e	antiscaling agent	4	5	1	5	4	1
15	08a	catalyst	3	6	1	5	5	0
16	08b	accelerator	4	6	0	4	5	1
17	08c	initiator	4	5	1	5	5	0
18	08d	activator	4	5	1	3	6	1
19	09a	catalyst support	3	7	0	6	4	0
20	09b	chromatography support	5	4	1	6	4	0
21	11a	chemical intermediate - inorganic	4	5	1	4	6	0
22	11b	chemical intermediate - organometallic	5	5	0	4	6	0

Subcode of "multiple-use functional use code"			Number of times descriptor was assigned for:					
			"fate of substance" aspect			"human contact parameter" aspect		
	No.	Description	L	M	H	L	M	H
23	12a	coagulant	2	8	0	3	7	0
24	12b	coalescent	3	7	0	5	4	1
25	13a	colourant - pigment	3	6	1	4	4	2
26	13b	colourant - stain	1	8	1	2	6	2
27	13c	colourant - dye	2	5	3	2	5	3
28	13d	colourant - ink	2	6	2	2	4	4
29	14a	defoamer	2	6	2	3	6	1
30	14b	emulsion breaker	3	6	1	4	6	0
31	15a	drilling mud additive	3	6	1	6	4	0
32	15b	oil recovery agent	2	7	1	4	6	0
33	15c	oil well treating agent	3	6	1	5	5	0
34	18a	flame retardant	3	5	2	3	5	2
35	18b	fire extinguishing agent	4	6	0	5	5	0
36	19a	flocculating agent	2	7	1	3	7	0
37	19b	precipitating agent	2	7	1	3	7	0
38	19c	clarifying agent	2	7	1	2	8	0
39	22a	fragrance	0	6	4	0	5	5
40	22b	perfume	1	6	3	1	4	5
41	22c	deodourizer	0	7	3	4	2	4
42	22d	flavouring agent	1	5	4	0	3	7
43	23a	fuel	2	5	3	1	5	4
44	23b	fuel additive	3	5	2	3	5	2
45	24a	functional fluid - hydraulic	1	6	3	4	3	3
46	24b	functional fluid - dielectric	3	6	1	6	4	0

Subcode of "multiple-use functional use code"			Number of times descriptor was assigned for:					
			"fate of substance" aspect			"human contact parameter" aspect		
	No.	Description	L	M	H	L	M	H
47	24c	functional fluid - (or their) additives	2	7	1	6	3	1
48	25a	humectant	4	6	0	3	5	2
49	25b	dewatering aid	3	7	0	3	7	0
50	25c	dehumidifier	2	7	1	2	7	1
51	25d	dehydrating agent	3	7	0	3	7	0
52	27a	lubricating agent	1	7	2	1	8	1
53	27b	lubricant additive	3	6	1	3	6	1
54	27c	mould release agent	3	6	1	7	3	0
55	30a	paint additive	0	10	0	0	10	0
56	30b	coating additive	0	10	0	1	9	0
57	31a	pesticide	0	9	1	0	9	1
58	31b	herbicide	0	9	1	0	9	1
59	31c	biocide	0	9	1	1	9	0
60	31d	disinfectant	0	8	2	0	6	4
61	31e	repellant	2	7	1	1	6	3
62	31f	attractant	2	8	0	4	6	0
63	32a	photosensitive agent - fluorescent agent	3	7	0	2	7	1
64	32b	photosensitive agent - brightener	1	8	1	1	7	2
65	32c	photosensitive agent - UV absorber	2	7	1	2	6	2
66	38a	propellant	0	9	1	0	5	5
67	38b	blowing agent	2	7	1	5	4	1
68	44a	solvent	1	7	2	0	4	6
69	44b	carrier	2	7	1	2	7	1

Subcode of "multiple-use functional use code"			Number of times descriptor was assigned for:					
			"fate of substance" aspect			"human contact parameter" aspect		
	No.	Description	L	M	H	L	M	H
70	45a	stripper	2	6	2	1	4	5
71	45b	etcher	3	7	0	5	5	0
72	45c	discharge printing agent	1	8	1	6	4	0
73	45d	de-inker	1	7	2	5	5	0
74	46a	surfactant - detergent	1	6	3	0	4	6
75	46b	surfactant - emulsifier	2	7	1	1	6	3
76	46c	surfactant - wetting agent	3	6	1	3	6	1
77	46d	surfactant - dispersant	3	6	1	3	6	1
78	47a	tarnish remover	2	7	1	2	6	2
79	47b	rust remover	2	7	1	3	6	1
80	47c	descaling agent	1	7	2	1	8	1
81	49a	water repellant	2	7	1	3	6	1
82	49b	drainage aid	4	6	0	4	5	1
83	50a	water treatment chemical	0	7	3	0	6	4
84	50b	waste treatment chemical	3	6	1	3	6	1

Attachment 8

Written Comments Provided by Workshop Participants

Written comments were solicited from workshop participants concerning the use codes and their proposed application to the categorization of the DSL. Ample space was provided on the three worksheets for this purpose. Many participants opted to provided written comments, and both general and more specific comments and suggestions were received. Note that not all participants recorded comments (as requested) on the worksheets.

These handwritten comments are transcribed below, but are not attributed to the individual workshop participants (i.e., the order of the comments is *not* in the same order as the workshop participants listed in **Attachment 1**). Since the industrial sector codes were addressed first at the workshop, comments recorded on these worksheets appear first below.

In transcribing these handwritten comments, words were sometimes added for completeness or clarity and are enclosed in {these brackets}. When comments referred to use code numbers only (without the code description), the descriptions corresponding to these code numbers are also indicated in {these brackets}.

Comments recorded by workshop participants on Industrial Sector Code worksheets

This information is somewhat difficult to rank because it is difficult to quantify use patterns. Based on personal perception and knowledge of different sectoral uses greatly influences ranking, for example inorganic chemicals used in coatings or inks is very controlled from an exposure perspective versus use in cosmetics or textiles.

One of the other factors to consider is that as technology advances, the potential for human exposure to products supporting advancing electronic use increases dramatically. As a result, while actual tonnage may be one reflection of exposure, product type is another variable that may influence the potential for human exposure.

One other factor that should be considered is that during manufacture, an inter-relationship of various substances (synergistic effects) cannot be easily accounted for in trying to determine what “human exposure” actually exists. For example, refined carbon used in printing inks and potential for exposure along with the use of anti-release agents influences whether inks actually transfer to a person’s hand. If looking strictly at “potential,” then it would all be equal, but the question of validity needs exploration.

- -

Codes 55 {article manufacture}, 56 {automotive, aircraft and watercraft}, 68 {inorganic chemicals}, 69 {magnetic tape manufacture} are too ill-defined to permit scoring in any scenario. Codes 96 {transportation}, 78 {organometallic chemicals} also.

Code 97 {water and waste treatment} combines incompatible uses - water exposure probability high after treatment - reverse is true for waste.

(Code) 79 {packaging} is too broad to consider - paper, board, aluminum, steel, plastic (many) all are used in packaging.

Blanks {i.e., left on this participant’s worksheet} indicate lack of sufficient information or knowledge.

Use codes do not reflect changes since 1986.

- -

Not being able to see the big picture of exposure to each code makes assignment of rank a big guess at best.

Very largely based on perception.

I would like this process to work but would be concerned about the integrity of the resulting information.
- -

a) not very discriminating - I could have been more "extreme" and moved most H ⇒ M and many M ⇒ L, because the justification for either case is largely perception based

b) with one or two exceptions, this use of Industrial Sector Codes is not very helpful, particularly when one considers that substances are: i) used across Industrial Sector Codes; ii) the input is for year 1986; and iii) the quality of the DSL submissions was very variable.

c) My conclusions: not a useful indicator except in specific circumstances. Will need a lot of case-by-case analysis, in which case why not just perform the case-by-case analysis anyway.
- -

I ranked per "potential for *some*", low or medium or high levels of exposure.

Paul Slovic and colleagues have published on "intuitive toxicology." This (today's) exercise is really "intuitive exposure," very much based on the expert (professional) judgement of each individual in this room. The background and expertise and specific knowledge/experience about a particular use code can vary greatly, and thus there can be a wide range (L, M, H) of responses. I would {illegible} ["defer"?] to the experts in each category for the best professional judgement.

In the future, I would suggest adding a column next to each use code asking the person to rank his/her level of expertise/knowledge about that use code.
- -

Very difficult to do. One makes the assignment based on personal perception of how the industry behaves and/or specific product knowledge.
- -

I completed this by considering one column at {a} time. There may be different results if one considers one row at a time. I made this quite personal: how often do *I* fit in scenario 1? How often am *I* exposed to representative substances or products in scenario 2? When might I knowingly be exposed to a substance through air, water or something else I do?

The legal mandates and overall process of managing toxic substances implies many adverse impacts. Please consider this in your communications. An alternate statement could be: "Health Canada and Environment Canada will consider all the substances Canadians use, and fulfil their mandate of helping Canadians keep healthy, and protect the environment."
- -

re. cosmetics {i.e., Industrial Sector Code = 60) - This category is very broad and includes products for oral use (e.g., teeth whiteners), washing (dermal rinse-off), dermal (leave-on) and aerosols/inhalation (e.g., deodorants). It also overlaps with {Industrial Sector Code} 93 {soap and cleaning products}.

Responses should be restricted to persons with *some* knowledge of the sector; otherwise, provide an indicator of the confidence.
- -

Likelihood of exposure is NOT the same as amount (or extent or quantity) of exposure - you really want to assess *quantity* of exposure. Many items/substances with high likelihood of exposure (plastics, electronic devices, articles, etc.) have a very low extent of exposure.
- -

Comments recorded by workshop participants on Functional Use Code worksheets

Descriptions of codes are too non-discriminating - most have multiple uses in multiple products.

- -

I found that with these Functional Use Codes there was a strong tendency to assign only a "G" or an "L."

- -

a) Huge areas of "uncertainty" in many of these use codes (e.g., water treatment chemical can be totally industrial or largely consumer driven).

b) the functional uses are not discriminating - although if I were to focus on why my industrial sector provided certain codes back in 1986, they would make sense. My point is that the codes were prepared by all industry sectors (e.g., solely industrial use - mixed use - largely consumer uses), so the information is very "mixed." Yet Health Canada is trying to use them from a consumer perspective. So a large amount of variability/uncertainty is to be expected.

c) My conclusion - not very discriminating! If you proceed: i) proceed very cautiously; ii) use this as part of a larger process of input into the "greatest potential for exposure," and include other inputs (e.g., HPV lists; case-by-case reviews; exposure/monitoring databases) as part of a long term process that identifies some High Exposure Substances (e.g., 10–200 in number) plus an ongoing "monitoring program" to include future priorities. The latter program is not just analytical monitoring - it includes political + technical sensing & awareness, etc.

- -

The "greater than 10%" {i.e., referring to one of the criteria on the worksheet} is problematic. Many potential high exposure products are used periodically, i.e., once a week or every several days (laundry detergent and nail polish and shampoos and hard surface cleaner products and paint are examples).

I found the criteria for inclusion to be difficult to use, even with good knowledge about the functional use code.

- -

Reference to European Union activities in this area of screening assessments can be misleading. EU regulatory philosophy and geography {are} considerably different than Canada's and should not be applied to the Canadian setting. For example, EU outcomes are based on little or no input from stakeholders in contrast to Canada where there is a strong administrative process to include stakeholders.

- -

It is clear that the Functional Use Codes are oriented to industrial use of a substance. And the criteria are for consumer product exposure. This means that where there are "Greatest" or "Intermediate" descriptors applied, there is a significant difference from any "Least" descriptor.

- -

{Functional Use Code} 21 formulation component is very broad and could encompass several other codes (e.g., 46{surfactant - detergent/emulsifier/wetting agent/dispersant}, 48 {viscosity adjuster}, 43 {sequestering agent}, 44 {solvent/carrier}, etc.).

- -

{Functional Use Code} 21 formulation component is duplicated in other components.

The functional use code is not distinctive enough.

- -

Comments recorded by workshop participants on Multiple-Use Functional Use Code worksheets

In a number of categories present, there was no clear difference between individual functional uses listed. In other words, the likelihood that one use would be more prevalent does not suggest the multiple-use functional use code is inappropriate. What will be of greater interest is whether more than one functional use code can be applied for the same substance - this would be a more robust indicator of prevalence in the environment from a multimedia perspective. Additionally, although some specific uses were scored as more likely than others, this cannot be easily quantified - is the likelihood 75% one use and 25% the second use - or vice versa.

- -

I think that splitting the "multiple-use functional use codes" up into subcodes is the only way to do it. The data that come from this will be much more meaningful.

- -

I don't think that this is useful - not really discriminating - also - potential to over-analyse very approximate input data.

- -

This is a useful exercise. Should yield useful information.

- -

In many cases, I could not see any difference.

- -

This {is} somewhat like the Sesame Street song: "some of these things belong together." I've tried to offer an opinion of which of the multiple codes might represent greater or lesser potential exposure than the others in the group.

- -

"Formulation component" {i.e., Functional Use Code = 21} has been left out, however, this is probably the code with the most multiple uses.

- -

I do not know at what you are driving? If a "multiple-use functional use code" is involved, can you just list them in different column or "functional use code"?

- -