# Toxic Substances – Focus on Children

## Developing a Canadian List of Substances of Concern to Children's Health

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# Executive Summary

## Background

We know that children are often more vulnerable and more exposed to environmental contaminants; but which ones? We can choose from a possible list, in Canada at least, of more than 33,000 substances, and groups of substances, not even including pesticides.

This project arose from a desire to make sense of these many thousands of substances and to set some child-focused priorities. It has been a scoping exercise, drawing upon a wide array of information sources, to devise a list of substances of concern to children. In fact, due to the limitations of the information sources, it was concluded that the results should include several lists. The work has provided some answers to the question: which substances are harmful or suspected of being harmful to children? The research focused on substances and associated health effects. The diverse circumstances of exposure to these substances was not a major focus of this work, and it became clear that data on exposure were very limited.

With a short list, or short lists, it is reasonable and necessary to ask how, where, and under what circumstances, are children exposed? Understanding the conditions of exposure to the substances in the lists generated by this research became the focus of many of this report's recommendations.

## Scope of Work

In the past decade or so, the scientific literature has exploded with the results of investigations into the issue of child health and environmental contaminants. The greater vulnerability and exposure of children to lead, mercury, PCBs, radiation, environmental tobacco smoke, certain air pollutants, and many pesticides, have figured prominently in this literature. Throughout roughly the same time, regulatory agencies and others from around the world have devised various lists of substances, mainly for the purposes of regulating, or otherwise evaluating or controlling, environmental emissions. Both the scientific literature and these many lists of chemicals comprise two very large streams of information. The research for this report tapped into these two information streams to devise short-lists of substances of concern to children. As a scoping exercise for an extremely large topic, the research also resulted in numerous recommendations.

The regulation of contaminants applies the tools of Risk Assessment. Using these tools, the results of scientific inquiry are evaluated in order to set environmental standards for allowable or recommended levels of contaminants in air, water, soil, food, consumer products, waste, etc. An initial project objective was to conduct a comprehensive review of how Risk Assessment approaches account for child health during the regulation of chemical substances. It became clear that such a review was far too large within the boundaries of this project. Instead, a more scoped review was done to complement the findings of the rest of the project and

assist with the preparation of recommendations for further work.

Finally, the project was scoped to exclude pesticides since the focus was primarily on children's exposures to chemical substances in the context of the funder's risk assessment work under the *Canadian Environmental Protection Act, 1999*, which does not apply to pesticides. This requirement resulted in some challenges, which are explained in the report, and it created a significant gap in describing or listing substances of concern to children since there is a large body of literature investigating the greater vulnerability and exposure of children to a wide range of pesticides. This exclusion of pesticides is another reason for maintaining several lists in the results, rather than one final list.

## Information Sources for Developing a List of Substances of Concern

### Literature Reviews on Child Health and Environment

A scan was undertaken of nineteen recent publications by credible sources that reviewed various aspects of the literature on child health and environment. Several of these sources conducted comprehensive reviews of the entire subject area (e.g., WHO-EEA, 2002, Wigle, 2003, etc.); others focused on key areas, such as indoor air, persistent organic pollutants, or exposure factors, to highlight a few. These sources were used to summarize the level of scientific consensus that exists with respect to several aspects of this large topic.

The literature reviews were scanned to confirm consensus points about the greater vulnerability and greater exposure of children to environmental contaminants. The literature reviews reveal convergence of scientific opinion about six categories of health effects of concern in children. The six categories are respiratory system effects, reproductive system effects, developmental effects, neurodevelopmental effects, cancer and endocrine system effects. Environmental contaminants are suspected in (and, more rarely, directly associated with) these six categories of health effects in children, or health effects for which childhood exposures are a concern. The reviews often emphasize that these effects are, in almost all cases, complex conditions with multiple causes and the relative contribution of environmental factors is poorly understood and very difficult to isolate.

The literature reviews also reveal convergence of scientific opinion about substances, or groups of substances, that are known or suspected to be associated with these six health effect categories. A first list of substances, and groups of substances, is drawn from this review (Table Four). Great care was taken to only include on the list those substances for which the literature reviews consistently and repeatedly report on the scientific evidence demonstrating associations, or suspected associations, with health effects in children. The list is sub-divided into lists of substances for which there is evidence in support of known or suspected associations, and those for which evidence is emerging. This list includes pesticides since it would not be an accurate reflection of this scan of the literature to exclude them.

Finally, most of the literature reviews took care to place the issue of child health and the environment in the context of child health in general. Fortunately, children in Canada are generally quite healthy. The health effects of concern with respect to environmental contaminants can be roughly divided into those for which incidence is quite rare, but seems to be increasing, and those for which

increasingly large numbers of children are affected.

Health effects in the first category would include those for which the incidence of rare events (cancer, birth defects and other complications of pregnancy, immune system problems, etc.) is increasing in ways that are still rare, but seem to be beyond the realm of chance.

For the second category, large numbers of children are affected by respiratory and neurodevelopmental effects. Cancer might reasonably be included in both categories. Fortunately, large numbers of children are not affected, but there are unexplained increases of certain cancers among young adults, and there are high rates of cancer in the adult population generally, raising the concern that exposures to substances with latent effects could have occurred during childhood, particularly during sensitive life stages.

Drawing direct relationships between environmental contaminants and any of these health effects in children is exceptionally difficult. Tragically, the only way that clear, causal relationships have yet been drawn has been where effects are clearly obvious or dramatic (e.g., thalidomide) or where large numbers of children have been exposed for extended periods of time and the scientific evidence has been collected to demonstrate the causal relationship. For example, this causal relationship was drawn with the evidence of harm from lead in gasoline, but only after millions of children were affected. Similarly, strong evidence is emerging about the contribution of air pollution to childhood asthma. This "wait and see" approach is what has prompted pediatrician and lead expert, Dr. Herbert Needleman to conclude, "we are conducting a vast toxicological experiment in which our children and our children's children are the experimental subjects."

Recurring themes and recommendations across all of the literature reviews that were scanned for this project included the need for precaution and the need to learn from past mistakes. Strong recommendations were made for increased research and monitoring, including the need for indicators, biomonitoring and a longitudinal study of the effects on children of large numbers of contaminants. In particular, recommendations were made for vastly enlarged epidemiologic research on child health, beginning before conception and following through adolescence, supported by major initiatives to monitor and track population exposures. Substantial international collaborative effort was considered valuable. All reviews noted that childhood poverty is associated with worse conditions for exposure and health outcomes, that boys seem to be more affected by neurodevelopmental effects than girls (for reasons unknown), and that more research must be directed towards understanding multiple effects and multiple exposures.

### Database of Lists

The second major information stream used in this project was the creation of a database that combined more than 80 lists of substances obtained from all over the world. A great deal of care was taken to avoid comparing "apples to oranges" by ensuring that lists were cleaned up to remove, or correct, inconsistent or incomplete identifying information about individual substances, or groups of substances. Care was also taken to avoid making unreasonable comparisons among lists prepared for a variety of purposes. Most of the lists were created by regulatory agencies. The availability of a credible source of lists assigning known or suspected health effects to substances, and groups of substances, (e.g., see www.scorecard.org), was enormously valuable. To refine the

exercise to one that addressed only Canadian content, three key lists were used. These included the Domestic Substances List (the DSL, ~23,000 substances) and the non-Domestic Substances List (the nDSL, ~10,000 substances), as well as a list based on a preliminary attempt by Health Canada to determine substances having the greatest potential for exposure (the GPE list, which currently contains 849 substances).

In order to pare down the DSL and nDSL (together comprising about 33,000 substances) to a list of substances of concern to children, these lists were queried against a list created from ten health effect-based lists. The ten lists included nine lists obtained from the www.scorecard.org website and a tenth list of thyroid hormone disruptors. These health effect-based lists, the nine Scorecard lists in particular, were created from comprehensive and credible reviews of the scientific literature.

As in the literature reviews described above, the Scorecard lists identify substances suspected or associated with health effects. However, the Scorecard lists are particularly useful in that they identify substances using the internationally accepted Chemical Abstract Service numbering system, or CAS# system, which uniquely identifies chemical substances. Since most regulatory lists in the database (including the DSL and nDSL) also use the CAS numbering system, the health effect lists could be queried against the regulatory lists.

Another key advantage of the Scorecard lists is that they include groups of substances. Throughout this work, deciding how to accurately deal with the issue of groups of substances was very challenging. Approaches were inconsistent across the source lists. The DSL and nDSL do not include group entries. In order to accurately compare group entries across lists, the choice was made to follow, and expand upon, the "NA" numbering system used in Environment Canada's National Pollutant Release Inventory (NPRI) — an approach that is also followed in the list of the Canadian Chemical Producers Association (CCPA) and the two Accelerated Reduction and Elimination of Toxics (ARET) lists. To apply this system consistently, all lists had to be scanned for group entries and the NA system applied to them. It was crucial to include, and be able to compare across lists, the group entries since these included some of the most toxic substances, such as dioxins and furans, lead compounds, mercury compounds, inorganic arsenic compounds, polybrominated biphenyls and phthalates. Moreover, the NA system could be used to assign consistent numbering to individual substances that do not have a CAS#, but which are very important to include in lists of concern for children, such as $PM_{2.5}$ and $PM_{10}$.

The Scorecard lists of health effects contained both individual substances uniquely identified by CAS#, as well as group entries. These lists could then be directly compared to regulatory lists in a way that the results of the literature review could not. An important qualifier on the Scorecard health effect lists is that only four of the nine lists were prepared with a focus specifically on effects in children. These were lists of recognized and suspected developmental toxins, and recognized and suspected reproductive toxins. The additional five lists included suspected carcinogens, suspected neurotoxins, suspected respiratory toxins, suspected endocrine toxins, and suspected immunotoxins. The implication here is that the list of suspected neurotoxins, for example, could be different from a list of suspected developmental neurotoxins.

Using the database to winnow down to short-lists of concern, two lists were created, called Canadian List #1 and Canadian List #2. Due to limitations in the data used to create these lists, both were retained in the results. Further combining of these results would have meant the loss of useful information, as well as undue reliance on Health Canada's preliminary, and significantly qualified, data on greatest potential for exposure (the GPE list).

Canadian List #1 includes just over 1,400 substances and 29 groups of substances. The list includes substances, and groups of substances, that are suspected or associated with one or more of the ten health effects in the health effect lists. Within the 1,400 substances, just over 1,000 are on the DSL and 318 are on the nDSL.

Canadian List #2 was created by screening Canadian List #1 against Health Canada's GPE list, a list of 849 substances on the DSL for which Health Canada has made a preliminary determination that there is the greatest potential for (human) exposure. With this screen against the GPE data, the number of substances on the DSL dropped to 250. Hence, Canadian List #2 includes these 250 DSL substances, the 318 substances on the nDSL and the 29 groups of substances. Further querying was then undertaken on the two Canadian Lists.

First, the two lists were summarized in terms of the number of substances on each list associated with the health effect categories. In both lists, more than 50 per cent of the substances were suspected neurotoxins. Similarly high percentages (45 per cent in Canadian List #1 and 54 per cent in Canadian List #2) of the substances on the lists were suspected respiratory toxins. This finding is striking and provocative since these are the two health effects that are affecting very large, and increasing, numbers of Canadian children. While is it not possible to draw an association between these results and the incidence levels of these effects in the child population, this finding should inform further research and regulatory action.

Second, Canadian List #2 was short-listed further to those substances, and groups of substances, that are suspected or associated with four or more of the health effects. The resulting list contains 73 entries and could be considered a "dirty six dozen" of substances for which significant concern exists and to which high priority should be given for further research and regulatory action. Additional queries were done to determine sub-sets of substances associated with a variety of health effect combinations. These latter results are an indication of the wide range of options that exist for further querying of the database.

The two Canadian lists were also compared to the bulk of regulatory lists in the database to see how many substances, and groups of substances, matched. The results provide information that flows in two directions. First, the two Canadian lists provide an interesting perspective on the large preponderance of these contaminants on certain lists, such as the NPRI lists, the two ARET lists, the CCPA list, the Voluntary Children's Chemical Evaluation Program (VCCEP) list and the DSL Pilot (123 substances on the DSL for which Environment Canada sought, via regulation, detailed data from the chemical industry). As well, the regulatory lists provide interesting information about the nature of substances on the two Canadian lists. For example, large numbers of substances on the two Canadian lists appear on the Organization for Economic Cooperation and Development (OECD) high production volume list of chemicals, many are hazardous air pollutants and many appear on lists of hazardous waste. Very large numbers of substances on the

two Canadian lists are in the Nordic Countries database of substances in products and on European Economic Community (EEC) lists of hazardous substances.

## Choosing a Final List

To accomplish the project objective of paring down the roughly 33,000 substances in commercial use in Canada to a list of substances of concern to children, several "short-lists" have resulted that are, in many ways, very similar. The literature review results (Table Four) contain many of the same individual and, in particular, groups of substances in Canadian Lists #1 and #2. These latter two lists provide specific information as to which of the individual substances are on either the DSL or the nDSL. Likewise, Canadian List #2A, prepared by focusing even more closely on substances associated with four or more of the health effects, closely mirrors the results of the literature review scan.

It was assumed during the research and database querying that further aggregation of these "short-lists" into a single list could be done to choose a final list. However, given the many qualifications noted above with respect to the data sources, it seems counter-productive to do so. Information would be lost that instead should prompt further investigation. The results of each exercise provide interesting and varied information that raises many questions.

For example, the list in Table Four resulting from the scan of literature reviews provides broad coverage of existing information and emerging issues. But, it lacks specificity about individual chemicals. The database exercise provides much the same information and fills in some useful details about specific substances that can be keyed directly into lists generated by regulatory agencies. But, when it is pared down with the use of the GPE data, it appears that important data are lost. For example, the GPE data do not include some important emerging areas in which exposure is known to be high and increasing, such as flame retardants (polybrominated diphenyl ethers or PBDEs). Also, many questions arise with respect to the substances on the nDSL for which there are no exposure data.

The "final list" is therefore a series of lists: Table Four, Canadian List #1 (Appendix Four), Canadian List #2 (Appendix Five) and Canadian List #2A (Table Six). The results include many individual substances, but also retain the contextual information provided by describing substances as members of groups. Such groups often have common mechanisms of toxicity, and there is value in addressing the group as a whole, both in a regulatory sense, as well as in choosing individual substances on which to either focus further attention, or to illustrate characteristics about the group as a whole.

In summary, the results of the literature review lack specificity with respect to individual chemicals (via the unique CAS# identifier), but the review is entirely child-specific with respect to noting concerns about health effects and the substances, and groups of substances, surveyed. It also, appropriately, includes pesticides. The database exercise is almost entirely CAS#-specific, with additional useful information about groups of substances, but it relies upon lists of health effects, half of which were not developed solely with children in mind. The results also rely upon a foundation of exposure data (Health Canada's GPE list), that is still a very preliminary work in progress, and a complete lack of exposure data for the nDSL substances. It is therefore appropriate to retain separate results from both exercises, use the information together where it is complementary, seek the lessons that can be

learned from this work, and tease out the many research questions that it presents.

The brief review of Risk Assessment undertaken for this report reinforces this conclusion.

## Risk Assessment and Children's Health

This part of the report provides a brief commentary on Risk Assessment, first in its broader context of Risk Assessment and Risk Management, and then in terms of a longstanding and well-developed critique. The critique of Risk Assessment relates largely to the scientific "data gap" that exists with respect to toxic substances, particularly the knowledge gap related to the effects on children.

The comments on Risk Assessment complement the more detailed reviews in this report about environmental contaminants and children's health. Both lead to common conclusions and recommendations about closing the data gap. There is an urgent need for more research and better monitoring, including biomonitoring, of chemical exposures, with a child health focus. The overwhelming lack of monitoring that occurs following what is widely considered to be the inexact "science" of Risk Assessment, is a major omission. It is an understatement to say that Risk Assessment lacks accuracy. The corresponding lack of basic data collection is a serious gap in the knowledge-development chain. Problems exist not only with basic data collection, but also with the lack of methods to assess multiple exposures to substances with multiple effects.

To illustrate some of the scientific frontiers and challenges in Risk Assessment, a summary is provided of a recent report on developmental toxicology and Risk Assessment, with related commentary drawn from a recent and comprehensive international review of Risk Assessment of chemicals in products that was prepared by a UK Royal Commission.

In an effort to continue to scope a very large topic, an overview is provided on how a variety of national and multi-lateral agencies are converging in their application of Risk Assessment techniques, including the increasing ways in which children are taken into account. This convergence in Risk Assessment approaches is contrasted with the observation that there is an overall lack of integration across regulatory approaches. Instead, regulatory approaches are largely one-sided, focusing on individual chemical releases and emissions, and largely ignoring the full life-cycle and environmental fate of harmful substances, a point also illustrated by the regulatory lists gathered to construct the database of lists for this project.

Many calls have been made for a paradigm shift towards precaution and away from the "analysis paralysis" of Risk Assessment; that is, towards pollution prevention, chemical and product substitution, finding safer alternatives, removing entire classes of substances on the basis of their inherent toxicity, etc. These latter issues were beyond the scope of this review.

What should be noted from the results of this review of Risk Assessment, and the rest of the project results, is the recurring challenge of dealing with individual substances versus groups of substances. Part of the criticism of Risk Assessment is the ponderously slow evaluation of one chemical at a time. In the comprehensive review of Risk Assessment and children's health envisioned within upcoming research to be done for Health Canada's Applied Research and Analysis Directorate (ARAD), it would be valuable for this

work to include focused reviews of the results of the combined package of Risk Assessment and Risk Management so that an evaluation is conducted of the actual final results of this regulatory tool. Criteria to measure success should include an evaluation of whether or not the regulatory responses accomplish measurable reductions in exposure and prevention of harm, including whether or not health concerns associated with entire groups of substances are being efficiently, or even adequately, addressed.

The brief survey of Risk Assessment done for this project highlights a clear role for government in information generation and collection. Within the constraints of limited government resources, priorities and clear roles should be set. There is a logical, if not ethical, imperative that those wanting to use (and profit from) chemicals should be responsible for demonstrating their safety. While the chemical industry may not agree with such an imperative, it is increasingly accepted, and it is impossible for government to muster the resources to conduct the required evaluations. What government can and should do is monitor results and demand via legislative tools, if necessary, the data demonstrating chemical safety, assist with the coordination and some of the funding of research, and facilitate pollution prevention and chemical and product substitution.

## Main Conclusions

Children are clearly at greater risk than adults to environmental contaminants. There is international scientific consensus, even among high profile scientists whose research is frequently funded by the chemical and/or pesticides industry, that the developing fetus and infants up to the age of six months are more vulnerable than adults to environmental contaminants. This vulnerability arises from higher exposure to contaminants that can then affect highly sensitive developing systems.

For children older than six months of age, the industry-funded literature no longer concurs with the still very large scientific consensus that the vulnerability of children continues, in various ways, through the rest of childhood and adolescence. This field of inquiry is enormous and encompasses every single aspect of human development, and multiple health effects that are complex, not fully understood, and multi-factorial in origin. It also includes the exposure circumstances and health effects of tens of thousands of different chemical substances routinely released to the environment or incorporated into consumer products. The level of scientific ignorance across this vast field, in the opinion of many health and environmental professionals and organizations, is frighteningly high. Yet, what is known about the toxic effects of a relatively small number of environmental contaminants and the constituents of consumer products is deeply troubling. While scientific inquiry continues, exposure also continues, and data collection about chemical exposure is inadequate.

Some children's health trends are troubling. Fortunately, most Canadian children are quite healthy. However, there are very high levels of respiratory illness and neurodevelopmental or neurobehavioural effects among Canadian children. The findings in this project demonstrate that the vast majority of substances of concern are associated with these two health effects. While a direct causal relationship cannot be drawn between these health effect trends and this report's findings about substances of concern, this result should inform future detailed investigation. Rare, but serious, health effects, such as cancer, birth defects and other complications of pregnancy, are suspected or associated with environmental contaminants. Their occurrence and trends in children and young adult populations are also of concern.

The strength of the evidence linking contaminants and health effects varies. There is fairly solid evidence of associations between environmental contaminants and respiratory effects, developmental and reproductive effects, neurodevelopmental effects and cancer. However, the evidence is strong for only a few substances. A great deal of evidence is emerging for many more substances, but links are still tenuous. The evidence is also tenuous, but increasing, about effects in the immune system and endocrine system. In looking at this evidence, an overall impression arises of chemical substances interfering with the integrating systems of the body; those that contribute to development and good health by using naturally-occurring chemicals to "communicate" messages within and across bodily systems. The investigation of the effects of chemical exposures is often about interference by synthetic chemicals, or excess levels of natural substances (such as metals), with the chemical messages that continuously occur across these integrating systems. Beyond some of the very thoroughly studied substances, such as lead and PCBs, some of the strongest evidence of associations exists for air pollution links to respiratory effects. It also seems clear that exposures from indoor air (including substances released from consumer products) appear to be strongly implicated. However, the relative importance of biological factors (pet dander, moulds, dust mites) versus other indoor exposures (environmental tobacco smoke — ETS, consumer products, etc.) must be carefully examined.

While a detailed review was not included here about exposure sources and pathways, this is an obvious next step. Air pollution appears to be the most significant source of environmental contamination, outweighing water emissions by a considerable margin. It also seems generally true from this review that areas, or substances, of emerging concern are often related to consumer products and others for which exposure is occurring via food, or exposures indoors, in house dust, air or dermal exposure. This general conclusion requires further investigation to be verified. Examples include flame retardants, perfluorochemicals (PFCs) used in non-stick and non-stain surfaces on products, phthalates, etc.

The results of the literature review and queries of the database of lists for this report reveal a very large number of substances, and groups of substances, of concern for children. These include:

- metal groups (lead, mercury, arsenic, cadmium, Chromium VI) and numerous compounds within each group;
- dozens of pesticides and, therein, several key groups of pesticides;
- all the persistent organic pollutants identified in the recent Persistent Organic Pollutants (POPs) Treaty and several additional POPs;

- dozens, and more likely hundreds, of indoor and outdoor air pollutants, including those associated with vehicular emissions and other sources of combustion, as well as many additional hazardous air pollutants;
- phthalates;
- various sources of radiation;
- a range of additional substances, mostly in consumer products, including flame retardants, specifically PBDEs, nonylphenol and its ethoxylates, perfluorochemicals, as well as (drinking water) disinfection by-products.

A list of substances of concern to children would be incomplete without also including environmental tobacco smoke (ETS). The database of lists presented in this report assists with identifying specific substances within these groups. This specificity is useful for further tracking of regulatory action since regulatory lists are routinely characterized by uniquely identified, individual substances. Reasons for placing substances into groups varies, but it is often useful contextual information that can be used to inform decisions about policy and/or regulatory responses.

The Risk Assessment of toxic substances has too often involved a "wait and see" approach in which exposure continues until enough evidence of harm exists before regulatory action is taken. The history of lead in gasoline is a case in point. After sixty years of exposure and nearly thirty years of research, amid repeated calls for the precautionary step of eliminating a developmental neurotoxin from the environment, regulatory action to eliminate lead from gasoline did not occur until compelling evidence existed that millions of children were affected. History is repeating itself with mercury. As with lead, the neurological effects of high-level mercury poisoning were learned unexpectedly, via the tragedies of Minimata, Japan, and other situations of unintended but widespread poisoning. Debate about low-level effects continues in the scientific literature. The recommended levels for mercury in food, particularly in fish, continue to drop as new evidence emerges. Meanwhile, widespread exposure continues.

Risk Assessment continues to use a ponderously slow process of evaluating one chemical at a time. Even though steps have been taken in the past to ban entire groups of substances because of their inherent problems (toxicity, persistence, etc.), such as the banning of PCBs in the 1970s, we tend not to repeat the efficiency of this approach. PCBs are much like flame retardants, specifically the polybrominated diphenyl ethers (PBDEs). This group of substances demonstrates the same kinds of properties as PCBs, that is, persistence, bioaccumulation, and various kinds of serious toxicity, including cancer and neurotoxicity. Yet, ponderously slow evaluations continue for each substance within this group. Similarly, there are entire groups of pesticides that are strongly implicated as developmental neurotoxins. Attempts to evaluate entire groups of substances continue, slowly, but the individual assessments also continue. Across all of these examples, it can be said that regulatory action, derived from Risk Assessment, is only beginning to partially address these concerns. The usual response is selected product or emission controls, such that exposures will drop slowly over a long time. The result, for example, is that rates of asthma among children might rise slightly less quickly than would otherwise occur without emission controls.

It seems clear that an overall paradigm shift is necessary. There is an urgent need to consider the use and emissions of toxic substances much more broadly than simply as end-of-pipe environmental

contaminants. Consideration of environmental and human health impacts is necessary across the entire life-cycle of substances, from their extraction from natural sources, their synthesis in the lab, and through all manner of manufacture, use, reuse, recycling and disposal. Risk Assessment involves a "science-based" regulatory response at a narrow point in this cycle, and demands a high degree of scientific proof of harm at the same time as the information base upon which it relies is extremely limited.

Some progress is occurring and Canada appears to be at the forefront of using efficiency measures, such as Quantitative Structure Activity Relationships (QSARs), to categorize groups of substances for their dangerous properties. Regulatory agencies around the world face a backlog of tens of thousands of substances that require evaluation, many that will require regulatory control. It is essential that the tools of Risk Assessment are not used to address this enormous challenge in a way in which mistakes of the past are repeated.

## Recommendations

The following recommendations are grouped within eight categories of activity. They are accompanied by additional brief discussion in the Recommendations section of this report.

### Monitoring, Longitudinal Study and International Coordination

1. The federal government should be directly involved in research into monitoring (including exposure and body burdens) of chemical substances and longitudinal study of child health. This work should be coordinated with international efforts already under development.

### Further Database Queries — Including Pesticides and Further DSL Categorization Results

2. The database constructed for this project and the short-listing exercise should be expanded to include pesticides and further results of DSL categorization.

3. The ongoing results of efforts by Health Canada and Environment Canada to categorize the DSL should be compared to the results of this project. How are the results comparable? What is different and why?

### Drilling into Canadian Lists #1, #2 and #2A

4. The lists of substances of concern generated from the database exercise in this project should be scanned to determine whether list entries are inappropriately or needlessly on the list.

5. The 834 substances in Canadian List #1 that were not included in Health Canada's Greatest Potential for Exposure (GPE) list should be investigated to determine whether emissions or exposure warrant further concern. This review should inform an assessment of the reliability of the GPE data.

6. Particular emphasis in further research should be placed on the "dirty six dozen" results (Canadian List #2A, Table Six) of substances suspected or associated with four or more of the health effects noted.

7. For the fourteen substances from the nDSL in Canadian List #2A, further research should include detailed review of these individual substances for data on the amount and circumstances of emissions, exposure and biomonitoring data (if any), and a determination of why and how substances suspected or associated with so many health effects have been approved for use in Canada during the time that (supposedly) stringent evaluation criteria have been in place.

8. For the 318 substances on the nDSL in Canadian Lists #1 and #2, similar questions should be asked about emissions, exposure, monitoring and the child health aspects of the evaluation procedure that approved the use of these substances in Canada.

9. Research questions for subsequent evaluation of the substances of concern identified from this research should include: where are these substances used; how are emissions and/or exposures occurring; can specific facilities and/or consumer products be identified; are some exposures of greater significance to children than others; and for the latter, which ones and why? What kind of child-specific data and methodologies have been, or are being, employed in the setting of regulatory limits? Have precautionary measures to prevent exposure or harm, or both, been incorporated in the setting of regulatory limits. If so, how, and if not, why not?

### Respiratory Toxins and Neurotoxins

10. Priority should be placed on respiratory toxins and developmental neurotoxins, including ensuring that substances suspected or associated with developmental neurotoxicity are caught during DSL categorization for inherent toxicity and evaluation of nDSL substances.

11. The findings of high levels of respiratory effects and neurodevelopmental effects in the child population and the parallel findings, in this research, of very large numbers of substances of concern associated with or suspected of contributing to respiratory and neurotoxic effects, should prompt routine evaluation of these effects during Risk Assessments of toxic substances.

### Seeking Efficiencies — Dealing with Groups of Substances

12. Evaluations of substances contained in consumer products and in environmental emissions must include the efficiency of making decisions about entire groups of substances, particularly when entire groups of substances are suspected or associated with health effects of concern.

13. Given that the results of this exercise include many groups of substances of concern, as well as substances on the non-Domestic Substances List, it should be investigated whether and how the evidence of harm about entire groups of substances is being incorporated into the DSL categorization efforts? Alongside the DSL work, how are Health Canada and Environment Canada addressing groups of substances of concern on the non-Domestic Substances List?

### Informing the CEPA Review and the Proposed Canada Health Protection Act

14. The many research questions raised in this report and its recommendations should be focused on various ways to assist with an evaluation of the effectiveness of the *Canadian Environmental Protection Act* (CEPA) and to formulate recommendations for the proposed Canada Health Protection Act (CHPA).

15. Given the recent changes to the *Pest Control Products Act,* (to be proclaimed during 2004), with respect to ensuring the evaluation of exposure and toxicity to children, as well as reversing the onus of proof about pesticide safety, an evaluation should include whether and how these measures could or should be incorporated into CEPA and the proposed CHPA.

### Comparing Substances of Concern with Exposure Data

16. A longer-term research goal should include aggregating information about substances of concern to be able to compare exposure data (from environmental levels, biomonitoring, etc.) with health-based reference levels.

### Health Canada ARAD's Child Health Policy Review — Risk Assessment Research Priorities

17. The research scheduled to begin in the fall of 2004 for Health Canada's Applied Research and Analysis Directorate to analyze domestic and international governance tools that address the protection of children's health from exposure to environmental contaminants should include a comprehensive review of Risk Assessment approaches as they address the vulnerability of children.

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CELA and Pollution are solely responsible for the contents of this publication. Any errors or omissions are the responsibility of the author and noting the above individuals or organizations does not imply their endorsement of this report or its conclusions and recommendations.

# Part One — Introduction

## 1.1 Purpose and Background

This project arose from a desire to make sense of, and set priorities among, the tens of thousands of chemicals to which children are exposed in air, water, food, soil, waste streams and consumer products. It is focused on children's health and, as explained elsewhere, excludes pesticides. The consideration of "children's health" includes the life stages of pre-conception (thus including parental occupational exposures) through gestation, birth, infancy, childhood and adolescence. Health effects in young adults (age 20-44) are noted where exposure circumstances in childhood are suspected.

What is known, or scientifically proven, about health effects in children of environmental contaminants, tends to be limited to a very small number of individual substances, or to certain groups of substances. Even where the information base is exceptionally well developed, scientific uncertainty and knowledge gaps remain. For a slightly larger number of substances, the knowledge as to health effects is more tentative in the midst of much greater uncertainty and information gaps. For the vast majority of substances, the knowledge base is exceptionally poor (USEPA, 1998 and ECB, 1999). Whether or not the substances in these latter two categories are of concern to children's health is, for the most part, unknown.

A key distinction needs to be made when trying to make sense of large numbers of substances. Regulatory agencies, and the societies they serve, face an enormous backlog of unfinished work. With only a few exceptions, the toxicological evaluation and regulation of commercial substances and wastes began in earnest only in the past ten to fifteen years. However, the production of vast numbers and quantities of these, often synthetic, substances has continued, since at least the Second World War. In Canada, as in other countries, this situation has resulted in a list of 23,000 substances for which little exists in the way of regulatory limits, and often little knowledge as to potential health effects or exposure circumstances.

There are many reasons for concern about the knowledge and potential regulatory gaps. There is a large and rapidly growing body of scientific inquiry into the different exposure circumstances and particular vulnerability of children to environmental toxins. There are mistakes to point to in which lack of knowledge of these differences caused tragic results. The disastrous results of thalidomide, DES, methylmercury and lead, are a few noteworthy examples. There are also troubling trends in health and behavioural problems among large numbers of children that cannot be clearly explained, but for which toxic substances may be implicated.

## 1.2 Project Scope and Organization

This project looks at toxic substances and children's health using two closely related approaches that seek information from the published literature to derive a single list of substances of concern to children. The project also briefly considers Risk Assessment strategies being employed or developed in relation to an increased recognition of the need for improved standard-setting approaches to account for children.

The first approach was to analyze recent literature reviews by high profile and credible sources. A full literature review was beyond the scope of this project. Instead, the first step looks at existing comprehensive and general reviews and makes comparisons with the objective of demonstrating where the information converges on identifying toxic substances of concern to children. A list of substances of concern to children is drawn from this review.

The second approach is an analysis of lists of substances. When researching toxic chemicals, their health effects and the circumstances of exposure, or seeking regulatory, policy or industry responses, there are many lists to consider. Literally dozens of lists and/or databases of substances have been prepared for a wide variety of purposes. Key among these lists, for the purposes of this project, are a series of health effects-based lists generated from comprehensive reviews of the scientific literature and provided on the www.scorecard.org website of Environmental Defense (US).

A large database was created for this project using MS Access software and additional open source technology. The database was used to import information from multiple lists and databases from numerous Canadian and international agencies and other sources. The lists generated from the database were compared and contrasted to the list generated by the analysis of literature reviews described above. However, the database had considerably more depth, for example, as a tool to analyze the individual lists.

In addition to reviewing the child health and environment literature and creating the database of lists, the regulatory response to toxic substances was briefly reviewed, mainly in terms of looking at the critique of Risk Assessment and the challenges presented by the need to evaluate vast numbers of substances for their effects in children. This third area in this study is as large in scope as the literature survey and database approaches. The initial decision to include a review of Risk Assessment approaches to addressing children's health was unrealistic within the time available. The scope of such a review would be enormous. Hence, the review done for this study was primarily a non-technical summary, focusing in detail only on recent advances in developmental toxicology. The review of Risk Assessment was conducted in a way that would enable the formulation of initial policy recommendations related to tackling the lists of substances of concern to children. Recommendations are made on areas of Risk Assessment needing further investigation.

This effort started from an assumption that the many lists available could yield useful information, and in particular, could help to set child-specific priorities among the many thousands of substances in the environment. To a reasonable extent, these objectives were met within the limits of the data available. The database of lists and the data in the lists themselves, particularly exposure data, had important limitations. These limits within the database exercise are noted and the

results are qualified accordingly. Despite its limitations however, the database has considerable merit and can continue to be used and expanded upon in future work. It provides information that is chemical-specific, compared to the more general results of the literature review. The results of these two approaches, taken together, are complementary in terms of providing useful information to prepare lists of substances, and group of substances, of concern for children.

The exclusion of pesticides from this project was a challenge. The exclusion was done at the request of Environment Canada, who funded the project, and other project advisors from Health Canada. They requested that the work focus on children's exposures to chemical substances in the context of providing input to Environment Canada's risk assessment work under the *Canadian Environmental Protection Act, 1999*, which does not apply to pesticides. This scoping also derived from the fact that pesticides are within the separate purview of the Pest Management Regulatory Agency, the agency within Health Canada with jurisdiction over the evaluation and registration of pesticides in Canada.

The distinction between toxic substances and pesticides as separate categories is a uniquely Canadian approach, since the many lists of toxic substances drawn from international sources, and entered into the project database, routinely contain pesticides. The database of lists for this project includes pesticides, since they are in most of the source lists. Canadian lists of pesticides are included in the database as well to enable their exclusion when other lists in the database are queried. Hence, consideration of all substances in the database, including pesticides, will be possible at a later date. In the Risk Assessment review, the field of pesticides is one in which considerable advances have been made with respect to consideration of children's health. Hence, although the Risk Assessment review does not focus on pesticides, their exclusion is not logical.

The project focus on toxic substances, and their regulation, also resulted in a choice to exclude food-borne and water-borne microbial pathogens, both of concern in a review of environmental factors influencing children's health. Similarly, physical factors, such as injuries, are excluded, but radiation (ionizing, non-ionizing and UV) is included in the results of the literature review, though not comprehensively in the database exercise. As well, environmental tobacco smoke (ETS) is similarly noted as of concern to children's health in the context of the literature review.

Finally, the project was specifically scoped to be a Canadian exercise. The research drew upon Canadian and international information sources, particularly the US, the European Union, Australia and many international agencies, such as the United Nations Environment Program, the World Health Organization and others. The overall project puts a Canadian perspective on the available information and the resulting analysis.

# Part Two — Children's Health Literature Reviews

## 2.1 Introduction

Since the beginning of the 1990s, the scientific literature has exploded with the results of investigations trying to discern the exposure circumstances and potential health effects of toxic substances in children. In response, around the world, policy and regulatory action has either occurred or is being contemplated, as discussed in Part Four.

Despite the growth in scientific understanding, our lack of knowledge remains great. Exposure to a myriad of poorly understood substances continues. Debates drag on for years over whether and when to set, or strengthen, regulatory limits. The intensity of such debates tends to occur in direct proportion to the commercial importance of the substances in question. By extension, the greater the commercial importance, the greater the demand for scientific certainty about harmful effects. Even for substances that have been studied extensively, such as pesticides and PCBs, scientific certainty remains elusive.

Table One contains a selected list of recent, large reviews of the scientific literature on children's environmental health conducted by, or for, a range of international and national agencies, NGOs and academics; in the latter two cases, primarily by physicians. Each of these publications was reviewed during this project in order to develop a list of substances that are most commonly identified to be of greatest concern in regard to children's health.

Approaches vary in how this vast and complex topic is organized. The reviews were scanned to compare major conclusions about the state of the knowledge base. Three major topic areas can be described, corresponding to sections 2.2, 2.3 and 2.4 below. They include, first, the exploration of the greater exposure to, and vulnerability of, children, to toxic substances. Second is the exploration, via diverse scientific techniques, to understand health effects of concern in children. And third, closely related to the first two, is the investigation of the toxicity of specific substances or groups of substances.

The authors of these various reviews addressed the same body of literature. As would be expected, there is a great deal of convergence on which health effects are addressed and which substances are noted as being of known or suspected concern to children. There is convergence as well across these reviews on which substances are better understood, as well as substances for which scientific understanding is poor, but emerging. The reviews tend to deal with groups, or categories, of substances and less often with individual substances that can be uniquely identified by CAS#.[1] In contrast, the many lists used in the database exercise undertaken for this project, and described in Part Three, more often include individual, uniquely

[1] The CAS or Chemical Abstracts Service is a numbering system created by the American Chemical Society to uniquely identify chemical substances. There are 22 million organic and inorganic substances and 39 million chemical sequences, in the CAS numbering system with about 4000 new substances added daily. See www.cas.org.

identifiable substances. As noted above, with respect to project scope, this difference in the two major sources of information about chemical substances became a major issue to sort out in this project.

Recurring themes and recommendations across all of the literature reviews that were scanned for this project included the need for precaution and to learn from past mistakes. To address the problem of the "data gap", strong recommendations were made for increased research and monitoring, including the need for indicators, biomonitoring and a longitudinal study of the effects on children of large numbers of contaminants. In particular, recommendations were made for vastly enlarged epidemiologic research on child health, beginning before conception and following through adolescence supported by major initiatives

**Table One: Selected, Recent Literature Reviews on Issues Relevant to Child Health and Environment**

| Organization or Author | Date | Title |
|---|---|---|
| **National, Multilateral and International Agencies** | | |
| Commission for Environmental Cooperation of North America | (in press) | Taking Stock: A Special Report on Toxic Chemicals and Children's Health in North America |
| Environmental Protection Agency (US), Office of Children's Health Protection | 2003 | America's Children and the Environment, Measures of Contaminants, Body Burdens and Illnesses |
| Environmental Protection Agency (US) — Three Commissioned Papers | 2003 | Paper Series on Children's Health and the Environment: Overview of the Special Vulnerability and Health Problems of Children; Critical Periods in Development; and Children's Environmental Exposures |
| Environmental Protection Agency (US), National Center for Environmental Assessment | 2002 | Child-Specific Exposure Factors Handbook |
| International Program on Chemical Safety (United Nations Environment Program, International Labour Organization, World Health Organization) | 2002 | Global Assessment of the State-of-the-Science of Endocrine Disruptors |
| United Nations Environment Programme, United Nations Children's Fund and World Health Organization | 2002 | Children in the New Millenium: Environmental Impact on Health |
| World Health Organization, Europe. Joint WHO/Convention Task Force on the Health Aspects of Air Pollution | 2003 | Health Risks of Persistent Organic Pollutants From Long-Range Transboundary Air Pollution |
| World Health Organization Regional Office for Europe and European Environment Agency | 2002 | Children's Health and the Environment: A Review of Evidence |

**Table One: Selected, Recent Literature Reviews on Issues Relevant to Child Health and Environment *(continued)***

| Organization or Author | Date | Title |
|---|---|---|
| **Academics and NGOs** | | |
| American Academy of Pediatrics (note that 2nd edition was published in late 2003; not reviewed here) | 1999 | Handbook of Pediatric Environmental Health, Committee on Environmental Health, American Academy of Pediatrics |
| Canadian Environmental Law Association and Ontario College of Family Physicians (Cooper, et.al.) | 2000 | Environmental Standard Setting and Children's Health |
| Center for Children's Health and the Environment www.childenvironment.org | 2002 | On-line series of scientific background papers in support of Ad Series in New York Times |
| Children's Health Environmental Coalition www.checnet.org (Wargo and Wargo) | 2002 | The State of Children's Health and Environment 2002. |
| Greater Boston Physicians for Social Responsibility (Schettler, et.al.) | 2000 | In Harm's Way: Toxic Threats to Child Development |
| Institute of Medicine (US), Committee on the Assessment of Asthma and Indoor Air, Division of Health Promotion and Disease Prevention | 2000 | Clearing the Air: Asthma and Indoor Air Exposures |
| Lowell Center for Sustainable Production (Gouveia-Vigeant and Tickner) | 2003 | Toxic Chemicals and Childhood Cancer: A Review of the Evidence |
| National Research Council (US), Committee on Developmental Toxicology | 2000 | Scientific Frontiers in Developmental Toxicology and Risk Assessment |
| National Research Council (US), Subcommittee on Reproductive Toxicology, Committee on Toxicology, Board on Environmental Studies and Toxicology, Commission on Life Sciences | 2001 | Evaluating Chemical and Other Agent Exposures for Reproductive and Developmental Toxicity |
| Steingraber, S. | 2001 | Having Faith: An Ecologist's Journey to Motherhood |
| Wigle, D.T. | 2003 | Child Health and the Environment (and companion website) |

to monitor and track population exposures. In both cases, monitoring and longitudinal study, substantial international collaborative effort was considered valuable. Many reviews noted the shortcomings of the chemical-by-chemical evaluation approach, despite the fact of exposure to complex mixtures. As well, the literature frequently noted that childhood poverty is associated with worse conditions for exposure and health outcomes, that boys are more affected by neurodevelopmental effects than girls (for reasons unknown), and that more research must be directed towards understanding multiple effects and multiple exposures.

### 2.1.1 Children's Environmental Health in Context

It is important to discuss environmental health concerns within the broader context of all factors that influence child health before looking at trends in illnesses or diseases most relevant to children. Conditions that result in death, illness and disability in children are as different from adults as the contaminant exposure and vulnerability issues that are of primary interest here.

The health of children, as with adults, is the net result of interacting factors in society, the environment and the individual. Factors influencing a child's health begin in the womb and are directly linked to the mother's overall health, prenatal care and nutrition. Optimum child development and health occurs with good nutrition and a suite of emotional, social, psychological and physical supports and stimulations throughout childhood and adolescence.

Equally important is the recognition that most health effects, including those for which environmental contaminants are suspected, result from complex and multifactorial influences. Particularly troubling are those health effects for which incidence trends appear to rapidly increasing, such as respiratory and neurodevelopmental effects. For effects that are still quite rare, such as birth defects or cancer, effects can be severe, up to and including lifelong disability or even death.

Comprising roughly 25 per cent of the population, Canadian children live predominantly in urban environments (79 per cent). Nearly one in five Canadian children live in poverty. (UNICEF, 2000 and 2003). The leading causes of death, illness or disability in children include birth defects, low birth weight, neurodevelopmental effects, unintentional injuries, cancer and asthma (Wigle, 2003). The relative importance and/or prevalence of each of these effects varies across age groups.

For example, the leading cause of death in infants in Canada is perinatal disorders, followed by congenital malformations (see Table Two). The third leading cause of death for infants, between the age of one month and one year, is Sudden Infant Death Syndrome (SIDS). In children older than one year, after unintentional injuries, the leading cause of death is cancer and birth defects.

Looking beyond mortality statistics, injuries continue to be the leading cause of disability in older children but are joined by increasing numbers of children affected by asthma and other respiratory illness and gastrointestinal conditions, as well as various neurodevelopmental effects. Apart from injuries, the extent to which environmental contaminants contribute to these outcomes is difficult to determine and is largely unknown. One US-based study concluded that 100 per cent of lead poisoning, 30 per cent of asthma, 5 per cent of cancer, and 10 per cent of neurobehavioural disorders in US children are caused by environmental

**Table Two: Annual Mortality Rates for Specific Causes of Death for Children in Canada (rate per 100,000)***

| Cause of Death | Infant (< 1 YR) | Infants (1 month to 1 year) | Pre-School (1–4 YRS) | School Age (5–14 YRS) |
|---|---|---|---|---|
| Perinatal disorders** | 274.9 | | 0.1 | 0.1 |
| Congenital malformations*** | 162.6 | | 2.3 | 1.1 |
| Sudden Infant Death Syndrome (SIDS)**** | 6.7 | ~ 50 | 1.1 | 0.4 |
| Infectious and parasitic diseases | 16.2 | | 10.6 | 10.8 |
| Unintentional injuries | 2.2 | | 3.7 | 2.8 |
| Influenza and pneumonia | 5 | | 0.4 | 0.1 |

* Statistics Canada, 1997.
** e.g., complications of pregnancy, labour, or delivery, preterm birth, intrauterine growth retardation (IUGR), birth trauma or respiratory distress.
*** birth defects.
**** www.sidscanada.org.

contaminants, imposing an annual economic cost of about $55 billion (Landrigan, et al 2002, Massey and Ackerman, 2003).

There may be an association between neurotoxic agents in the environment and the rate of injuries among children with hyperactivity and impulsivity. Several studies have noted higher rates of incidents resulting in bodily injury among children and teens with Attention Deficit Hyuperactivity Disorder (ADHD) (as reported in EPA, 2003b, Paper No. 1). Hence, it seems plausible that injuries, the leading causing of death and disability among children, are, like other conditions under consideration here, multifactorial in origin. Neurotoxic agents may be playing an unrecognized role as partial, underlying causal factors.

Although still quite rare, incidence rates of some cancers in children and young adults exhibit disturbing trend lines. Childhood cancers in Canada increased during the period 1974 to 1984, but have not increased since that time, although the kinds of cancers seen most often in children continue to be the same as those seen in other industrialized countries (namely, leukemia, brain cancer, Hodgkin's disease and non-Hodgkin's lymphoma). In young adults, several kinds of cancers are on the rise. During the 1990s, incidence rates increased more among young women than young men, primarily in excess cancers of the reproductive system. Significant increases were found for non-Hodgkin's lymphoma and thyroid cancer in both sexes, lung and brain cancer in women, and testicular cancer in men. Causes are unknown (NCIC, 2002).

Much less rare are incidences of neurobehavioural and neurodevelopmental effects in children. According to data collected for the National Longitudinal Study on Children and Youth, 28 per cent of Canadian children (age 0–11 yrs) have at least one identifiable learning or behavioural problem. Further, 16 per cent of Canadian children (age 4–5 yrs) show delayed vocabulary skills. (Landy and Tam, 1998). The numbers are equally high in the US. Nearly 17 per cent, or 12 million,

US children have one or more learning, developmental or behavioural disability. Attention deficit hyperactivity disorder is estimated to occur in 3 to 6 per cent of all US school children. Some estimates are higher, at 17 per cent. Learning disabilities alone may affect 5 to 10 per cent of US children (Schettler et al, 2000, CDC, 2003). Although the apparent increase of these conditions may be influenced by more aggressive diagnostic practices, there can be no doubt that the burden of disabling conditions is very high. Much less certain is the potential role of environmental contaminants in these conditions (Wigle, pers. comm.).

Canadian figures tabulated in 1998 (Miller and Hill, 1998) for asthma prevalence among the young reflect a fourfold increase in the number of children under age 15 afflicted with asthma, compared to the previous 15 years. Twelve percent of Canadian children and youth under the age of 20 have asthma.[2] The Ontario Medical Association has concluded that, while recognizing the complexity and multi-factoral nature of the relationships, low levels of air pollution are responsible for increased respiratory morbidity in children (OMA, 1998).

[2] According to data from the 1996–1997 National Population Health Survey, as reported on-line by the Population and Public Health Branch of Health Canada, at www.hc-sc.gc.ca/pphb-dgspsp/publicat/meas-haut/mu_r_e.html

## 2.2 Exposure and Vulnerability to Environmental Contaminants

Across the published, peer-reviewed literature, in reviews published by government, inter-governmental and international agencies, as well as independent organizations operating in the public interest, there is overwhelming agreement about the different, and generally higher, exposure circumstances and greater vulnerability of children to environmental contaminants. Notable (and only partial) exceptions to this consensus arise in a small number of published reviews; reviews that also acknowledge research funding from umbrella organizations serving, and funded by, the pesticides and chemical industries (Scheuplein et. al., 2002 and Dourson et. al., 2002). Summaries of well-established conclusions as to the greater exposure and vulnerability of children to environmental contaminants are discussed below. The information is drawn from the non-industry-funded literature noted above and summarized in Table One.

### 2.2.1 A Note About Qualifying Language

It is important to note the use of qualifying language. This report attempts to summarize a vast body of literature. As previously noted, the "data gap" for environmental contaminants is profound. In attempting such a summary, it is necessary to carefully qualify most statements. Scientific inquiry into these complex issues rarely provides proof of causal connections between environmental contaminants and a range of health effects. In many cases, limited (and sometimes no) understanding exists about mechanisms of child-related toxicity, even when associations between contaminants and

health effects have been shown to exist. Hence, it should be taken as given that all summarizing statements are made recognizing this constant underlying scientific uncertainty.

### 2.2.2 Greater Exposure

Children's environmental exposures are unique and clearly different from those of adults. Before conception, both parents' environmental and/or occupational exposure circumstances may contribute to adverse reproductive outcomes that would not affect either parent's health. The mother's body burden of contaminants becomes part of the first exposure environment for her fetus. In the womb, indirect exposure to environmental contaminants occurs through maternal circulation to the fetus via the placenta. After birth, the infant experiences further exposure to the mother's body burden and ongoing intake of contaminants, via breastmilk. Or, if fed with infant formula, a different range of contaminants will be present, and generally at much lower levels, especially for persistent organochlorine toxicants. Throughout infancy and childhood, children tend to consume a limited range of foodstuffs and hence the proportion of intake (and any accompanying contaminants) will be higher than adults who consume a more varied diet.

Other differences from adults (that can also be relevant prenatally) include a smaller body mass and generally higher metabolic rates and activity levels. Kilogram for kilogram, children will be exposed to greater levels of contaminants than adults, particularly to vital organs like the brain. Proportional to body mass, a child's brain is larger and receives more blood flow than occurs in an adult. Children breathe more air and consume more food and water, per unit of body weight, than adults. Children also consume far greater amounts, per unit body weight, of certain foods compared to adults. For instance, childhood consumption of milk, combined with their greater thyroid uptake of iodine, caused children to accumulate far greater radiation doses from fallout of radioiodide nuclides after the Chernobyl nuclear reactor explosion. This greater thyroid uptake of radioiodide caused a major epidemic of thyroid cancer among exposed children (Wigle, pers comm.).

Exposure by young children to soil and house dusts can be different than adults for several reasons. These include shorter stature, crawling and/or toddling, with frequent falling or deliberate contact with the ground, floors and other surfaces, play patterns and hand-to-mouth behaviour.

The result overall can be greater exposure to a child than an adult for the same level of contaminants in the environment.

### 2.2.3 Greater Vulnerability

The above discussion of how children experience greater exposure to environmental contaminants is only one aspect of greater vulnerability. Another is that they simply have longer life expectancies than adults. Chemicals with latent effects are more capable of exerting such effects in older children, young adults or adults that were exposed during childhood, in the womb, or even via parental exposures affecting sperm or ova.

Once exposed, children may absorb and also retain more contaminants in their bodies than adults for a variety of reasons. Key differences exist between adults and children in terms of the greater permeability of tissues, notably the blood-brain barrier, resulting in greater delivery of contaminants to the brain of a child than to an adult. A child's skin is also more permeable than that of an adult. Once contaminants are absorbed, ingested

or inhaled, a child's metabolic pathways for transforming and eliminating them can be less developed than in an adult. Children can also more effectively absorb some ingested contaminants. For instance, a child's digestive tract will absorb about 50 per cent of ingested lead, while an adult will absorb only 10 per cent. Adults store 99 per cent of absorbed lead in bones and teeth, while children store only 70 per cent, with the balance remaining in circulation and available to soft tissues, especially the brain. Since lead stored in bone is known to go into circulation during pregnancy and lactation, total female body burden and ongoing exposure (via the placenta) in pregnant women constitutes an endogenous source of fetal lead exposure (ATSDR, 1988).

The problem of exposure is thus compounded by the fact that children's bodies tend to absorb more contaminants. Moreover, children also have immature detoxification systems. The two main filtering organs, the kidneys and especially the liver, are not fully developed at birth. The detoxification function of the liver is not fully developed until six months of age.

A wide range of additional reasons for the greater vulnerability of children to environmental contaminants relate to various aspects of the possibility of environmental contaminants interfering with the growth and development process. The developmental stages from conception through gestation, birth, infancy, childhood and adolescence involve a series of genetically controlled molecular processes that are mind-boggling in their complexity. These processes are not fully understood. Throughout each stage, with some stages more sensitive than others, there are opportunities for environmental contaminants to interfere with these natural processes and cause irreversible structural and/or functional deficits. Across the literature, including results of research funded by the pesticides and chemical industry associations, there is agreement about the particular vulnerability to environmental contaminants of the prenatal and neonatal (infants up to 6 months) periods of development. The vulnerability of older infants, children and adolescents is less understood, except for a small number of well-studied contaminants, such as lead and PCBs. Growing concern exists about the opportunity of contaminants to interfere with ongoing brain development (which continues until age 20) and the many hormonally-regulated processes of human reproductive development that continue up to the age of approximately 12 years.

## 2.3 Health Effects of Concern

Across the literature surveyed for this project, there is convergence on six health effect categories of concern with respect to known or suspected associations with environmental contaminants. The six categories are respiratory system effects, reproductive system effects, developmental effects, neurodevelopmental effects, cancer and endocrine system effects.

Endocrine system effects can be thought of as a slightly different category since they may be contributing to a wide range of effects on the structure and function of other body systems, especially the reproductive system. Other potential endocrine-mediated effects include neurodevelopmental effects, hormone-related cancers and altered immune function.

Across the literature, there is vast uncertainty and gaps in information, but these six categories are consistently discussed with respect to children's health and environmental contaminants. The categories are noted in Table Three alongside the range of specific health

## Table Three: Health Effects in Children Suspected or Associated with Environmental Contaminants

| Major Categories of Health Effects | Specific Health Endpoints of Concern |
|---|---|
| **Respiratory effects:** | |
| Evidence of associations between increased outdoor air pollution and these effects in children. Indoor air pollution also implicated as contributing factor in asthma exacerbation. | Asthma exacerbation and allergic disorders. Increased bronchitis (controlling for ETS and history of allergies). Decreased lung function (with greater chance of pulmonary inflammation). Increased susceptibility to respiratory infections. |
| **Reproductive and development effects:** | |
| Human, animal and laboratory studies and QSARs ranging from weak to robust. Extremely complex field of inquiry (requiring multi-disciplinary coordination of fields of pharmacology, toxicology, embryology, molecular and developmental biology). Fundamental gaps in information and understanding. | IUGR (intrauterine growth retardation); low birth weight; decreased birth size, weight, and head circumference; preterm delivery; birth defects (orofacial clefts, cardiac defects, aortic/pulmonary defects); reduced stature; spontaneous abortions; visual and hearing deficits; cerebral palsy (congenital); genotoxicity. |
| **Neurodevelopmental effects:** | |
| Solid laboratory, clinical and epidemiological data demonstrating these associations in a small number of substances. Suspected in many more, but data insufficient. Highly complex field of inquiry and many information gaps. | Neurotoxicity (lower school performance, IQ deficits, lower scores on aptitude tests, other cognitive and motor deficits); Autism Spectrum Disorders; Attention Deficit Hyperactivity Disorder (ADHD); Visual or hearing deficits; Learning disabilities; Learning and behavioural problems; Thyroid hormone inhibition (impacting brain development). |
| **Cancer:** | |
| With few exceptions, human evidence is limited to insufficient, demonstrating the contribution of environmental factors to cancers seen in children and young adults. Animal data are slightly better. Despite extensive knowledge base about cancer and carcinogens, understanding about cause of cancers in children and young adults is very limited. Prenatal and early life exposures suspected. | In children: Brain cancer, Wilms' tumour, thyroid tumours, leukemia, lymphomas, Non-Hodgkin's lymphoma, neuroblastoma, bone sarcomas, melanoma; Genotoxicity; In young adults: Non-Hodgkin's lymphoma, thyroid cancer, lung and brain cancer in women, testicular cancer in men. |
| **Endocrine system — mediated effects:** | |
| **NB — IN ALL CASES:** Little to no evidence as to causality. Data increasing regarding plausibility of endocrine disruptor hypothesis. Limited and weak human evidence. Growing, but still limited evidence from animal data and chemical-assays and bioassays. Most effects noted here are suspected or associated with a very small number of chemicals, mostly persistent organic pollutants, including several pesticides. Much more research is necessary. | Spontaneous abortion and stillbirth; changes in sex ratio (fewer males); cryptorchidism and hypospadias (fetal gonadal development) and subsequent adult testicular cancer; reduced sperm quality and testis function; premature menarche and precocious puberty; PCOS (assoc. w/ chronic anovulation and polycystic ovaries); shortened lactation; neurobehavioural effects (from neurotoxins exerting thyroid hormone dysfunction during exposure in utero); endocrine-mediated immunotoxicity; cancer promotion at endocrine sites (breast, endometrial, testes, prostate, and thyroid) by EDC's with estrogenic activity (prenatal/ perinatal or otherwise early life exposure). |

endpoints for each. The degree of scientific uncertainty is summarized for each health effect category. A final category, not included in Table Three, is effects on the immune system. This area was omitted in this summary because, while the reviews note some evidence of immunotoxity for a small number of substances, only Wigle (2003) in the reviews scanned for this report covered this area in detail. It appears from the reviews surveyed in this section that strong evidence of immunotoxicity is scant and exists for only a small handful of substances, often pesticides, which are not the subject of this review.

Approaches vary in terms of entry points to this information and how conclusions are summarized as to the evidence base for the six categories of health effects summarized in Table Three. Some approaches are contaminant-centred. Wigle (2003), for example, painstakingly works through the evidence related to several major contaminant groupings (metals, PCBs, dioxins, and related compounds, pesticides, hormonally active agents, and radiation). He also addresses complex mixtures of contaminants by addressing three pathways/settings of exposure (indoor air, outdoor air and water).

The WHO-EEA (2002) approach to reviewing the evidence first organizes the information by exposure settings and media. It then reviews several major health outcomes (respiratory, neurodevelopmental, cancer, birth defects and others not under consideration here, such as waterborne and foodborne diseases, and injuries. The WHO-EEA review addresses four additional exposures as those associated with multiple health effects (ETS, pesticides, and both EMF and UV radiation). Likewise, the scientific background papers prepared by a team of scientists in support of the Center for Children's Health and the Environment ad series in the New York Times (2002), address concerns about exposure to complex chemical mixtures and certain health outcomes (neurodevelopmental effects, cancer, birth defects), as well as concerns about the potential for multiple effects from endocrine disruption.

Overall, and generalizing broadly, there appears to be more detailed and robust information about respiratory effects, neurodevelopmental effects and cancer. For the latter, however, the amount of evidence is overwhelmingly focused on what is known about the carcinogenic potential of contaminants in animals or humans, regardless of age, but primarily in adults. For a limited number of substances (DES, ionizing radiation and substances used in chemotherapy), there are some well-established links between environmental exposures and childhood cancer. For others (solvents, pesticides, petrochemicals, dioxins and PAHs) there is increasing, but in some cases, still limited evidence of such links. A great deal of evidence exists in support of conclusions about numerous adverse effects in children of respiratory toxins. As well, for a small number of substances, such as lead, mercury, alcohol and PCBs, there is robust information about neurodevelopmental effects in children, alongside considerable data from animal studies demonstrating neurodevelopmental and neurobehavioural effects.

Several of the sources reviewed focus on the four areas specifically related to existing, and especially, emerging evidence of effects on various aspects of human development, (i.e., of the six health effect areas noted above: reproductive effects, developmental effects, neurodevelopmental effects and endocrine system effects). This focus occurs in the Commission for Environmental Cooperation of North America review (in press), the Greater Boston Physicians for Social Responsibility report, *In Harm's Way* (Schettler, et. al.,

2000) and in the US National Research Council reports addressing the state of the science with respect to exposure (NRC, 2001) and toxicology and risk assessment (NRC, 2000) for developmental toxins. The exclusion of respiratory effects in these particular reviews is not due to the lack of evidence or concern. Rather, entire reviews are devoted solely to the evidence of respiratory impacts related to air pollution. The researchers who prepared the CEC Taking Stock report on children's health (CEC, in press) focused on existing PRTR data about developmental toxins, neurotoxins and carcinogens, and reviewed some of the other major contaminants, such as lead, mercury and dioxin. The choice to leave aside the respiratory toxins was based on the enormity of the task of including this area and the need for a separate and thorough investigation to do the subject justice.

Reviews of respiratory toxins are included in Wigle (2003), Wargo and Wargo (2002), in the USEPA reports on body burdens (2003) and in the WHO-EEA review (2002). An older, though still relevant, review of outdoor air pollution is provided by the Ontario Medical Association (1998). A singular focus on indoor air pollution is provided in the NAS Clearing the Air (2000) report. While these reviews consider health effects from respiratory toxins in the entire population, the disproportionate adverse effects in children are reviewed in detail.

For cancer, as noted above, there is an enormous body of scientific literature reporting on investigations of chemicals and carcinogenicity in animals or humans, but these investigations are much more limited when the lens is cancer in children.

Two overall impressions about the state of scientific evidence of harm arise from these reviews. First, the information base is increasing, up to and including causal evidence, that large numbers of children are experiencing respiratory effects for which both indoor and outdoor air pollutants are implicated. The relationships between these effects and air pollutants include a suite of highly complex interacting factors, including the contribution to these health effects from factors such as individual genetic propensity for asthma and the influence of allergens unrelated to indoor or outdoor air pollution. Nevertheless, there is increasingly solid evidence that air pollution is significantly contributing to childhood morbidity from asthma and other respiratory ailments.

A second overall impression is the apparent ability (recognizing that far less evidence exists in this area) of synthetic chemicals to interfere with three integrative or internally regulating systems of the body. The fact that these are all internally regulating systems is the key observation here. Using a myriad of naturally-occurring chemicals as messengers, the nervous, endocrine and immune systems work together to maintain physiological homeostatis. These systems orchestrate normal physiological development and functioning, including reproductive outcomes, normal development of all organs and systems, including the complex human brain, cognitive functioning and behaviour, and maintenance of good health via resistance to irritants and disease, including cancer. This integrated suite of functions is, simply put, a situation of immune, nervous, endocrine (including neuroendocrine) systems using (naturally-occurring) chemicals to communicate and cooperate in order to create, develop and maintain life, and not just life, but normal development, normal functioning and overall good health.

The understanding of how these systems work is as complex a review of the interaction of (naturally-occurring) chemicals as is the attempt to understand

how a myriad of synthetic chemicals can interfere with these systems and impact on human development and health. Knowledge about the ability of chemical contaminants to cause or contribute to the health outcomes noted in Table Three is well developed for a very small number of substances. In the face of vast ignorance, concern exists for many thousands more.

Some commentators refer to "toxic trespass" or "matter out of place" as a way to capture the notion of how synthetic chemicals may be interfering with the normal, complex, and not entirely understood, chemical activity from which life and good health can arise.

## 2.4 Substances of Concern

Convergence across the literature reviewed for this project is again apparent in terms of the substances or groups of substances that are known or suspected to be associated with the health effect categories described in section 2.3 above. Care was taken during the review of each to note the degree of scientific certainty, or more often uncertainty about the effects suspected or associated with specific substances and groups of substances. Wigle (2003) has created a series of tables for a range of health effect categories, and has summarized the environmental risk factors and level of epidemiological evidence in support of these associations. On the website of the McLaughlin Centre for Population Health Risk Assessment (Wigle, 2003), this published information is augmented with expanded bibliographies for each of the book's twelve chapters, and, as a work-in-progress, will provide epidemiologic evidence summary tables for substances and groups of substances addressed in the book. The health effect tables note, for each substance or group of substances, the strength of the evidence (i.e., categorized as sufficient, limited or inadequate).

As noted above, approaches vary across the other literature reviews, but in scanning each of them, a common set of substances, mostly generalized as groups of substances, arises. Taking Wigle's summary of substances for which human health effects are known or suspected as a conservative, comparative starting point, the following observations can be made. The American Academy of Pediatrics (1999) addresses roughly the same list of substances, though with the addition of asbestos. The WHO-EEA (2002) review looks at the evidence from three perspectives — developmental, disease and environmental settings. But, the substances addressed throughout the review are, again, substantially the same list as in Wigle (2003) and in that of the AAP (1999). Likewise, the UNEP (2002) review is more limited, but again covers a similar list of substances. Wargo and Wargo (2002) also covers the same areas, but goes deeper into specific substances of concern in indoor air, particularly focusing on some well-known (as do Wigle and others), but in particular (unlike some of the other reviews), emerging information about substances in a wide range of consumer products. The Gouveia-Vigeant and Tickner (2003) review of childhood cancer confirms Wigle's conclusions about the state of the science with respect to associations between childhood cancer and certain pesticides, solvents and combustion by-products or petrochemicals. Wigle goes further, with a review of the evidence of cancer and various forms of radiation.

The same comparisons can be made across the four EPA papers, as well as the EPA Exposure Factors Handbook. Although the purposes of these documents vary, the range of substances considered in terms of known or suspected harmful effects in children is similar to the reviews noted above. The very recent WHO-Europe review of POPs (2003) addresses the well-

known substances in the Stockholm Treaty, as well as additional substances of emerging concern, some of which are addressed in the other reviews, such as PBDEs, some PAHs, SCCPs and others.

The CEC Taking Stock report (in press) addresses substances that are known or suspected carcinogens, developmental toxins and neurotoxins. To do so, the report discusses the evidence about these health effects for a range of unspecified substances. The report then uses an approach similar to what was attempted in this project. Taking three lists of substances that are known carcinogens, and known or suspected developmental toxins and neurotoxins (from the IARC carcinogens lists and the www.scorecard.org website), the CEC analysis matches these lists with PRTR data for the same substances. The results are ranked according to those for which there are the greatest volumes of releases and transfers. The "top 25" (in terms of total emissions) substances in each of the three health effect categories are noted in terms of volumes of emissions to different media, highlighting individual facilities, and so on.

A similar analysis is done in the *In Harm's Way* report (Schettler, et.al., 2000). It first addresses the evidence of a few well-known neurotoxicants, including lead, mercury, dioxins and PCBs, and it also discusses the neurotoxic effects of some pesticides. However, after addressing this small number of reasonably well-known substances, the report includes an analysis similar to that done in the CEC review noted above. Using the www.scorecard.org list of suspected neurotoxicants, Toxic Release Inventory data are matched to show which of these substances contribute to the highest volumes of environmental releases. The "Top 20" results include a list of individual substances unaccompanied by any additional information about chemical grouping(s) to which they may belong.

The CEC analysis and the *In Harm's Way* report are examples of where the kinds of information that can be obtained from the scientific literature, in particular the overviews of the broad field reviewed here, are difficult to compare directly to the data generated by tools that track and regulate toxic substances. The difficulty arises from the sheer volume of substances (tens of thousands of them) and the varied ways they are investigated, grouped and described. Regulatory tools for monitoring and regulating substances tend to pinpoint individual substances, and occasionally small groups of similar substances.

### 2.4.1 Chemical Groups

The manner in which substances are categorized into groups is of interest here in trying to extract useful information from the scientific literature. Individual scientific investigations of the toxicity of substances will, of necessity, address a specific situation, generally a single chemical. The body of knowledge about individual substances can be enormous, but it can also be limited to what is known about a single substance or a group of similar substances.

However, chemical groupings are created for a variety of different purposes. Some groupings are done for the sake of functional description — pesticides or flame retardants. Some are grouped according to basic properties, such as metals or POPs. Other groupings relate to environmental media/settings of exposure, such as air pollutants or disinfection by-products (from water chlorination). Still others relate to structural or physical properties, such as PAHs, VOCs, isomers or isotopes.

When substances are grouped in these ways, there can be many different substances (and even many different groups of

substances) in each group. For example, the category "pesticides" includes many sub-groupings (OPs, carbamates, pyrethroids, etc.) that include a wide range of substances that are different in terms of chemical structure or activity. Likewise, for substances that might be thought of as a single substance, such as lead, mercury and PCBs, the reality is much more complicated. There are hundreds of lead and mercury compounds and more than 200 different PCBs. Like isomers of chemical compounds or isotopes of specific elements, the properties of each substance, including environmental fate and health effects, are not always the same. Regulatory lists tend to identify specific compounds within such groups, while the scientific literature reviewed for this project tended not to be specific and dealt mainly with chemical groups.

A further complication is the fact of chemical mixtures within substances or emissions of concern. For example, diesel exhaust is a complex mixture that includes three known human carcinogens, benzene, 1,3-butadiene and soot, and many more chemicals considered to be toxic or hazardous air pollutants (Wargo and Wargo, 2002). Similarly, fine particles (with a diameter of 2.5 microns), also called $PM_{2.5}$, contain sulphates, nitrates, ammonium ion, elemental carbon, PAHs and other toxic organic compounds, as well as metals (Wigle, 2003). The scientific literature and regulatory lists can and do refer to these mixtures, but they also consider them in isolation, (i.e., addressing constituent chemicals separately).

Finally, there can also be a lot of overlap among groupings. For example, chemicals categorized as solvents can also be categorized as VOCs, but all solvents are not necessarily VOCs, and *vice versa*. The single substance chloroform is a disinfection by-product (DBP). It is also a trihalomethane (THM) and a volatile organic compound (VOC). In each of the groups — DBPs, THMs and VOCs — there are dozens or even hundreds of additional substances. Describing substances in groups is helpful, but can also become confusing and contradictory. On the other hand, only having information about a single unique substance (e.g., chloroform, CAS# 67-66-3) excludes useful contextual information provided by whatever reason a group is created. As is explored further in Part Four below, the grouping of substances into those with common structural and activity patterns enables new and more efficient ways to assess their toxicity and environmental fate.

Another source of confusion, not related to groupings, but relevant when trying to clearly identify chemicals, is the fact that chemicals can often have very different names. For example, the pesticide, hexachlorobenzene or HCB, can also be referred to as pentachlorophenyl chloride or perchlorobenzene, or by trade names such as Anticarie or Bunt-cure or julian's carbon chloride. All of these substances are the same substance with CAS# 118-74-1. Such diversity of names for substances that are in fact the same, and uniquely identifiable, (by CAS#), is routine.

### 2.4.2 Substances of Concern to Children's Health — The First List

The result of scanning many literature reviews is contained in Table Four. The substances of concern are often noted in the literature in either general or very specific terms. While this sounds contradictory, it derives from the highly specific nature of scientific reviews of individual substances, as noted above. At the same time, there is a tendency, in the broader reviews scanned for this report, to discuss groups of substances in general terms on the basis of evidence that has been gathered about a small number of, or only specific members of, that particular

group of substances. For example, detailed investigations have been conducted for specific chemicals, such as DEHP (a pththalate) or formaldehyde (a VOC) or pentaBDE (a brominated flame retardant). The literature reviews scanned here tend to summarize the knowledge about these specific substances and then either generalize to the broader group or, more often, highlight examples of effects in more intensively studied substances as indicative of the potential for effects from the group as a whole.

Hence, the list in Table Four, generated from the literature review, includes substances, or groups of substances, that repeatedly appear across these reviews as being of some degree of concern to children's health. Such a list does not always pinpoint specific substances in the way that they are identified in the regulatory and/or health effects-based lists gathered for the database exercise described in Part Three below. What is apparent from the literature review is that it is possible to compile a list of substance categories, noting some specific examples in each, that reflects general agreement across reviews about the substances, and groups of substances, where the evidence exists or is emerging that these substances are of concern to children's health. Since the table summarizes an enormous amount of information, and the categories used are quite simplified, care was taken to be conservative in noting only those substances that repeatedly came up across the literature reviews scanned. Table Four is a rough overview, focused on substance groupings, while the database exercise described below attempts to understand what is known about individual, uniquely identifiable substances.

## Table Four: Literature Scan Results — Substances of Concern to Children — Associated/Suspected and Emerging

| Associated/Suspected | Emerging |
|---|---|
| **Metals (often numerous compounds in each):** | |
| Lead, Mercury, MethylMercury, Cadmium, Arsenic, Chromium VI | Manganese, Thallium, Beryllium, Organotins |
| **Pesticides (numerous substances in each group):** | |
| Organophosphates, Carbamates, Pyrethroids, Organochlorines, Chlorophenoxy Herbicides, Amides, Bipyridils, Triazines, Fungicides | Similar list — broader range of health effects |
| **Persistent Organic Pollutants (POPS):** | |
| POPS TREATY substances: Hexachlorobenzene (HCB), Polychlorinated biphenyls (PCBs), Polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF) and eight pesticides (Mirex, Aldrin, DDT, Chlordane, Dieldrin, Endrin, Heptachlor, Toxaphene) | PBDEs, PBBs, SCCPs, Hexachlorocyclohexanes (Lindane and derivatives), Pentachlorophenol, some PAHs, Polychlorinated terphenyls, Ugilec |
| **Indoor and Outdoor Air Pollutants (including VOCs and PAHs):** | |
| Sulphur dioxide, Nitrogen dioxide, Ozone, PM (coarse, fine and ultrafine particles — fine and ultra fine PM contain sulfates, nitrates, ammonium ion, elemental carbon, PAHs, other toxic organic carbon compounds and metals), diesel exhaust (benzene, 1,3-butadiene and soot), carbon monoxide, hydroge sulphide | |
| Numerous VOCs (inlcuding organic solvents and disinfection by-products): benzene, chloroform, styrene, toluene, xylene, vinylidene chloride, p-dichlorobenzene, 1,1,1-trichloroethane, tetrachloroethylene, dichloroethylene, carbon tetrachloride, methylene chloride, styrene, n-decane, n-undecane, 2-methoxyethanol, trichloroethylene, formaldehyde, dichlorobromomethane, dibromochloromethane, and bromoform | Up to 600 additional VOCs |
| PAHs including Benzo[a]pyrene, bisphenol A, benzo[a]fluoranthene | Up to 100 additional PAHs (formed during incomplete combustion) |
| **Phthalates:** | |
| Di(2-ethylhexyl) phthalate (DEHP) and mono(2-ethylhexyl) phthalate (MEHP) | diethyl phthalate (DEP), dibutyl phthalate (DBP), butylbenzyl phthalate (BBzP), Dimethyl phthalate (DMP) |
| **Radiation:** | |
| Ionizing, non-ionizing, UV, radon, select radionuclides | EMF |
| **Miscellaneous Additional Substances and Groups of Substances:** | |
| Non-volatile disinfection by-products | Perfluorochemicals (PFCs) |
| Vinyl Chloride | Nonylphenol and its Ethoxylates |
| Environmental Tobacco Smoke | Non-volatile disinfection by-products |

# Part Three — Database of Lists

## 3.1 Introduction

A large database was created using MS Access software and additional open source technology. The overall objective was to bring together numerous lists of substances on the assumption that they could be mined for useful information. The central question was whether or not a database containing all of this information could assist with developing a single list of substances of concern to children. Coming from many sources and created for many purposes, the lists were often very different. In order to be able to combine them in a common database and to sort, filter and compare information, the lists were modified in ways that had to be consistent, logical and defensible.

## 3.2 Methods

### 3.2.1 The Data Sources — Source Lists

Obtaining and organizing the data in a credible and manageable form was tricky and time consuming. Lists were gathered in both exploratory and systematic fashion. Coverage included approximately 80 different lists gathered primarily from the Internet. Emphasis was placed on lists that could be obtained electronically in spreadsheet format, but some were recreated manually.

To summarize, the database includes approximately 40 Canadian lists, roughly half from the federal government level, the rest from four provinces (Ontario, British Columbia, Alberta and New Brunswick). All of these lists originate from government departments, generally as a result of environmental, health or consumer product legislation. Another eight lists are either federal-provincial, binational (Canada-US), or trinational (Canada-US-Mexico). Again, these lists derive from government policy and/or legislative activities. Seventeen legislatively-based lists originate in the United States. Another seven lists are from European legislative or policy initiatives, or result from multi-lateral action on substances of environmental or health concern. Two lists can be classified as "voluntary," or the result of industry activities, including self-monitoring. Finally, ten different health effects-based lists are used in the database to develop sub-lists of substances of concern. The health effects lists originate from comprehensive reviews of the scientific literature and are described in more detail below.

Each imported list was identified in the database with common descriptive information, including its origin, a description of its contents, when it was last updated, when it was imported, etc. The source lists are described in more detail below and in the Table in Appendix One. The database was constructed by *Catharsis Managed IT* according to the entity-relationships diagram provided in Appendix Two. Ultimately, not all lists were used in this exercise although they could be in future work.

The source data and/or databases (Source Lists), at a minimum, contained two pieces of information for each entry — a chemical name and associated CAS# (with the exception of Canada's Domestic Substances List (DSL) and the non-

Domestic Substances Lists (nDSL), lists for which the only publicly available information, is the CAS#s). Where a CAS# was not provided, a unique "unknown" CAS number was assigned upon first entering the list in the database. This procedure assisted with the subsequent process of correcting and revising lists to either assign correct CAS#s or leave them with the assigned unique, but "unknown," number. This process ensured that, after all lists were cleaned up, the CAS# field was always unique within each list, thus enabling comparisons across lists (as explained in Section 3.2.2 below).

Most of the Source Lists contained additional information, beyond chemical name and CAS#. In many cases, this additional information derived from the criteria by which the list was created; for example, media-specific contaminants, priority substances, etc. As well, some lists contained additional fields with information about each chemical including, chemical group or category, location on other regulatory lists or sub-lists, total emissions, and so on.

Many lists contained individual entries denoting groups of chemicals not sub-divided by CAS#, and these often included groups of substances of particular interest, such as dioxins, furans, PAHs, PCBs, phthalates, VOCs, PBDEs and various metal compounds. In some cases, individual members of each group were also on the list (with a CAS#), but this situation was inconsistent. On the other hand, many of the source lists contained only individual substances with unique CAS#s, many of which were substances that fall within groups of chemicals, such as those noted above. Hence, the entry of source lists was accompanied by the development of group lists to gather together information about the constituent members of chemical groups. Information about members of chemical groups was drawn from some of the source lists (where this information was included), as well as from the literature review summarized in Section Two above. The database was constructed so that this chemical group information could be drawn upon to do two things: to determine individual group members on lists and to enable comparisons among lists containing group entries with those that contained individual substances.

### 3.2.2 Consistency Across Lists (Comparing "Apples to Apples")

The process of creating a single database required that the CAS# for individual chemicals and the assigned numbers for groups of chemicals had to be consistent across all lists. Ensuring that the database would not compare "apples to oranges" required the following steps to clean up all Source Lists:

1. Where a CAS# for an individual chemical was not in the Source List, it was obtained from the www.chemfinder.com database. More than 1000 chemicals had to be searched. As well, duplicate entries occurred on many lists that were often discovered when individual CAS#s were found. Duplication was removed.

2. A numbering system was devised to address two areas where CAS#s were unavailable. Across the lists, there were both individual chemicals and groups of chemicals without CAS#s. For both situations, individual CAS#s were not available, either because of the nature of the individual substance, such as $PM_{2.5}$ and $PM_{10}$, or because the list entry was for a group. To overcome this problem, each entry was assigned an "unknown," but still unique number, when the list data were imported. All lists were manually scanned to devise an expanded version of the NA–01, NA–02, numbering

system employed on the NPRI and CCPA lists. Beginning with these existing NA allocations to denote groups of chemicals, more NA allocations were added for additional groups of substances. As well, for those individual substances without CAS#s, but which came up across many lists, NA allocations were created. During the manual scan of all lists, the allocation of NA numbers for groups, and especially individual substances, was done on the basis of substances or groups of substances that were either of known concern (drawing upon the results of literature review) or that occurred repeatedly across many lists. The NA allocations and associated chemicals or chemical groups are listed in the table in Appendix Three. For some individual chemicals for which CAS#s could not be found, or would not exist given the nature of the substance, and for which an NA allocation was not made, a decision was made to leave them in their respective lists with their "unknown," but still unique, CAS#s. Because of this unique number, such chemicals were essentially excluded from the rest of the analysis and lists comparisons since they would never appear on more than one list. The integrity of each list was not altered as a result of the changes made in assigning NA numbers, with one exception, for the grouping of dioxins and furans with the use of NA – D/F. The NPRI and CCPA lists used this combined grouping. To apply the same approach across the lists in the database, several lists had to be altered accordingly. Hence, all lists containing individual entries of "dioxins" and "furans" as group entries were combined. Where individual list entries had specific dioxin or furan species with CAS#s noted, these were left unchanged. Hence, all lists with dioxins and furans became comparable across the database, and the associated group list for NA – D/F contains the list of constituent chemicals within both of these chemical groups.

3. As noted above, to obtain further information about the constituent chemicals within groups, additional lists were created containing the constituent members of each group. These sub-group lists are not always complete. Data sources included many of the Source Lists in which additional fields contained this information. The N-CLASS database contained full group listings for several groups of metal compounds, and the literature review also provided useful information about members of chemical groups. Having these group lists associated with the NA numbers was crucial to enabling the comparison of lists. With this information about constituent members of groups, lists containing only group entries could be compared to the many other lists containing only individual CAS#s of substances.

After all these modifications across the database in all lists, and with the creation of the group lists associated with the NA numbering system, the CAS# field contains either the correct CAS# or an assigned NA number that is used consistently for that chemical or group of chemicals across all lists. For some lists that only noted isomer groups without individual CAS#s, there was not enough information to assign individual CAS#s, so these groups were excluded. It appeared that most of the health-effect lists did note individual isomers, and so caught this information, but it may not be useful when comparing to regulatory lists. Finally, the remaining substances or groups with "unknown" CAS#s are unavailable to list querying and, as such, were ignored for the purposes of this project.

### 3.2.3 Screening out the Pesticides

The database had to include lists of pesticides in order to screen them out of the many other lists being queried. Three problems arose during this screening, such that removing pesticides from the lists is not likely to have been entirely successful.

First, the list of active ingredients in pesticides in Canada obtained from the Pest Management Regulatory Agency is composed of 521 entries, 177 of which do not have associated CAS #s. Hence, for the purposes of this project only the 344 pesticide active ingredients with CAS#s were available for comparison to other lists. The list did not lend itself to being cleaned up as others did, so it was left intact with 177 assigned "unknown" CAS#s that were not of use in querying. The full list contains many substances that are not uniquely identifiable by CAS#, including some pesticides in active use. As a result, the exclusion of pesticides in active use was not entirely successful and they slipped through into the results of further list querying. Second, there are some substances on the PMRA list that, although they are active ingredients in pesticides, have other industrial or commercial applications. An attempt was made to catch these substances, but some may have been missed. Four substances were removed from the PMRA list for the purposes of this project. These were ammonia, formaldehyde, nonylphenol, polyoxyethylene ether and octylphenoxypolyethoxyethanol. The latter two are within the NPE and OPE groups of interest to this project. This modification of the PMRA list was considered essential since exclusion of pesticides was always the first step before any further analysis of lists was undertaken. Excluding these substances with non-pesticidal applications was counter-productive.

The third problem arose from the fact that the PMRA list is one of active ingredients allowed for use in Canada. There are many banned or restricted pesticides that are often not on the PMRA list. But, some of these pesticides do appear on many other lists. They also needed to be screened out.

In summary, to screen out pesticides, all lists were queried to exclude both the (modified) PMRA list of active ingredients, and, because there is no equivalent Canadian list, the US EPA List of Banned or Severely Restricted Pesticides.

### 3.2.4 The Health Effect Lists

Ten different lists were imported to provide information about health effects associated with chemical substances. The lists included the following:

- Known Carcinogens
- Recognized Developmental Toxins
- Suspected Developmental Toxins
- Recognized Reproductive Toxins
- Suspected Reproductive Toxins
- Suspected Endocrine Toxins
- Suspected Immunotoxins
- Suspected Neurotoxins
- Suspected Respiratory Toxins
- Thyroid Hormone Interference (Known and Suspected)

The first nine lists were imported from the www.scorecard.org website. These lists were compiled from numerous internationally recognized information databases and peer-reviewed references. A detailed list of the references used in support of each list is provided on the www.scorecard.org website. These lists of references are summarized and separately compiled at the end of the list of References Cited for this report. The tenth list, the list of thyroid hormone disruptors, was manually created from an article published in the journal

*Environmental Health Perspectives*. CAS#s for substances on the thyroid hormone disruptors lists were individually searched on the www.chemfinder.com site. Two observations are necessary about these health effect-based lists.

First, like most of the Source Lists, the health effect-based lists include a combination of substances that are uniquely identified by CAS#, as well as group entries. The same problems of the lack of, or the inability to identity, CAS#s arose with some substances on the health-based lists. Group allocations were made, consistent with the approach used in other lists. Some substances, for which CAS#s could not be found, were simply excluded.

Second, some of these lists were not prepared with the explicit intention of addressing health effects in children. For several lists, the health effects are directly pertinent to children, including the lists that identify Recognized Developmental Toxins, Suspected Developmental Toxins, Recognized Reproductive Toxins and Suspected Reproductive Toxins. For the other five scorecard lists, the Suspected Carcinogens, Suspected Endocrine Toxins, Suspected Immunotoxins, Suspected Neurotoxins and Suspected Respiratory Toxins, the lists were not prepared solely through the lens of whether children were particularly, or disproportionately, affected by these substances. The list of thyroid hormone disruptors was drawn from a review that explicitly focused on the role of thyroid hormone in fetal brain development. Despite these limitations for half of the health effect-based lists, these lists do provide a comprehensive set of substances that are suspected or associated with a wide range of health effects. Moreover, these are the health effects for which the extensive literature on child health and the environment provides evidence of significant and/or emerging concern.

The fact that these lists identify substances by individual CAS# allows comparison to the many regulatory lists that often provide no other information beyond a chemical name and associated CAS#.

### 3.2.5 The Canadian Lens — The DSL, nDSL and GPE Lists

Three lists were imported that enabled a uniquely Canadian look at the list of substances. The first two are the Domestic Substances List (DSL), and the non-Domestic Substances List (nDSL). The DSL was created in the late 1980s as a comprehensive list of all substances in commercial use in Canada.

Substances that are not on the DSL are considered "new" to Canada, and if used in Canada are subject to certain reporting and assessment requirements. The nDSL is a list of such chemicals that are new to Canada, but are used commercially in the United States.

These two lists provide both a comprehensive, and at the same time very limited, amount of information about chemicals in use in Canada. This contradiction exists because, between these two lists, approximately 23,000 substances on the DSL, and another 10,000 or so on the nDSL, they comprise the complete list of substances that are in commercial use in Canada, excluding pesticides. However, the publicly available information about these lists contains only a single piece of information, the CAS#, per list entry. There are no group entries on either the DSL or nDSL.

A third list of considerable value to the analysis in this project is one that is currently (early 2004) the subject of public consultation. It is a list of 849 substances on the DSL for which Health Canada analyses have determined Canadians have the Greatest Potential for

Exposure (GPE). The GPE list results from the ongoing screening and categorization exercise for the DSL.

The GPE data were compiled from a systematic consideration of information about use and emissions of DSL substances (including potential consumer exposure) using two data streams alongside expert judgement about likelihood of exposure. It is important to note that the list was compiled without the benefit of any actual data on exposure. Rather, three streams of "proxy" data or information on use of DSL substances were used to pare down the DSL to this short-list. Health Canada acknowledges that there are significant limits on the reliability of these data, but also considers the effort innovative and precedent-setting internationally, since it attempts to move beyond the typical approach of solely addressing "high production volume" (HPV) substances (Health Canada, 2003, and Bette Meek, Health Canada, pers. comm.). There are no comparable exposure data, or proxy data, for nDSL substances.

### 3.2.6 Querying the Database — Source Lists and Derived Lists

The database is made up of more than 80 "source lists," which can be matched in three ways (i.e., full matches, exclude matches and look-up matches) to other lists. During this matching, the fields within individual lists can also be filtered, refining matched results. Lists are placed in the "list builder" and are always compared to the first list chosen. Once in the "list builder," lists can be matched according to the matching choices noted above, and new lists, "derived lists," are created. Derived lists can be further queried in the list builder, but cannot be queried against the source lists from which they were derived.

The objective of using a database to query many lists to arrive at a single list of substances of concern to children ran into technical problems once the database was constructed. It was not possible, the way the database had been constructed, to accomplish the desired first step; that is, to use the database as a tool to compile a single list of substances of concern (excluding pesticides) so that further list querying could be done. The problem arose from the database design that required lists to be compared to an initial list.

To resolve this problem a choice was made to use the health effects-based lists, the pesticide lists and the Canadian DSL, nDSL and GPE lists to create a series of new source lists.

To create these new source lists, the first step was to combine the information from the ten health effect lists. From this combination a new source list was created, called "Combined Health Effects," which brought together all of the substances from all of the ten health effect source lists into a single list with fields indicating which health effect was associated with each substance. (This first list will be used in subsequent work with the database outside of the scope of this project.) A second source list was created in exactly the same manner, but was also matched to the two pesticide lists (the PMRA list of active ingredients and the USEPA list of banned or severely restricted pesticides). The pesticides were excluded resulting in the source list "Combined Health Effects No Pesticides." As noted above, some pesticides remained on this final list because they are either used for non-pesticidal applications or because of the limitations of the PMRA list.

These two lists then had to be further refined to reflect "Canadian content." The Combined Health Effects list contained over 2600 entries. Once the pesticides

were excluded, there were over 2300 list entries. Some of these substances did not appear on either the Domestic Substances List or the non-Domestic Substances List. Hence, the lists were filtered against the DSL and nDSL so the resulting lists would only include substances in use in Canada. A further refinement to these source lists was to filter the information against the GPE data so that a source list could be created that combined information about health effects, Canadian content and Canadian exposure data. However, the exposure (GPE) data were only available for substances on the DSL, and since the GPE data are not particularly detailed, and are still preliminary, the larger lists of substances were retained regardless of the lack of exposure data.

The details of refining these lists and results of subsequent querying of other lists in the database are explained in the results, below.

## 3.3 Results

### 3.3.1 Canadian Lists

The "Combined Health Effects No Pesticides" list contained 2450 entries comprising 29 groups, 107 unique entries with no CAS#s and 2314 individual substances. The 107 entries without CAS#s were removed resulting in a final list containing 2343 (2314 + 29 groups) entries. Within the 107 removed, these entries either duplicated existing group entries, were groups of pesticides, or were individual substances for which no CAS# could be identified. The entries removed from the combined list remain on their respective individual health effect source lists.

The 2343 entries in the "Combined Health Effects No Pesticides" list were checked against the Domestic Substances List (DSL) and the non-Domestic Substances List (nDSL). First, however, duplication between the DSL and nDSL was checked. Two substances matched. These were CAS#s 147256-34-6 and 70914-41-9, neither of which appeared on the Health Effect lists matched to the DSL or the nDSL. Hence, to obtain a uniquely Canadian list, full matches of the "Combined Health Effects No Pesticides" list to the DSL resulted in 1084 substances. Full matches to the nDSL resulted in 318 substances. Adding the 29 group entries, a total of 1431 resulted as a Canadian list of substances (and groups of substances) of concern to children. The list was called Canadian List #1 (see Appendix Four).

A second list was then created by screening the DSL substances on Canadian List #1 against the substances on the GPE list. As noted above, the GPE list included 849 substances for which Health Canada has determined there is the Greatest Potential for Exposure (GPE). The GPE list was screened against Canadian List #1 to shorten the list to those substances with the greatest potential for exposure. The result was a drop from 1084 substances to 250. Since the GPE data were only relevant for substances on the DSL, the nDSL data were retained. Hence, a second Canadian list was created that combined the 250 substances (matched to the GPE data) from the DSL, the 318 substances from the nDSL, and the 29 groups. The result was Canadian List #2 containing 597 entries — provided in Appendix Five.

In both of these lists, and in considering any of the results of list querying, it must be emphasized that where a substance or group of substances is not shown to be associated with a particular health effect, this should not be construed as evidence that such effects have not been found or suspected. Rather, the lists summarize what is known or suspected. A blank entry should not be interpreted as an indication

that particular effects have not been found for the substances in question.

Table Five summarizes some of the information in these two Canadian lists. The most striking result is the dominance of suspected neurotoxins (over 50 per cent of substances on both lists) and suspected respiratory toxins (at proportions nearly as high). Carcinogens are the next most plentiful at about one quarter of all list entries. As well, this summary reveals a large number of substances of concern on the nDSL. This finding is surprising since the nDSL is a list of substances that are supposedly subject to rigorous, modern evaluation of toxicity, unlike the comparable dearth of evaluation of most substances on the DSL.

### Table Five: Number of Substances on Canadian Lists Associated with the Health Effect Categories

| Health Effect Category | Canadian List #1 (total of 1402 individual substances) | | Canadian List #2 (total of 568 individual substances) | | # on nDSL |
|---|---|---|---|---|---|
| | Number of Substances | % of total on list | Number of Substances | % of total on list | |
| Suspected Carcinogens | 351 | 25% | 162 | 29% | 114 |
| Recognized Developmental Toxins | 126 | 9% | 49 | 9% | 30 |
| Suspected Development Toxins | 132 | 9% | 77 | 14% | 18 |
| Suspected Endocrine Toxins | 137 | 10% | 59 | 10% | 25 |
| Suspected Immunotoxins | 246 | 18% | 99 | 17% | 33 |
| Suspected Neurotoxins | 772 | 55% | 322 | 57% | 145 |
| Recognized Reproductive Toxins | 53 | 4% | 23 | 4% | 11 |
| Suspected Reproductive Toxins | 160 | 11% | 85 | 15% | 15 |
| Suspected Respiratory Toxins | 624 | 45% | 304 | 54% | 125 |
| Thyroid Hormone Disruption | 47 | 3% | 17 | 3% | 12 |

**Note:** Percentages will not round to 100 since many substances are associated with more than one health effect. Total on nDSL is the same for both lists since GPE data were only available for the DSL. To be able to calculate the number of substances on the nDSL meant group entries were excluded since only individual CAS#s appear on the nDSL. Hence, the groups were excluded from the calculation of percentages, a choice that did not substantially alter the results.

To make the calculations in Table 5, and to be able to show the nDSL component, the group entries on both Canadian Lists were excluded in calculating the percentages. This exclusion occurred because the database compared the nDSL with a full match to the Canadian Lists and then filtered on each of the health effects fields to obtain the percentages. Since the nDSL contained only individual substances, and then only with a single piece of information (the CAS#), no group entry matches resulted.

However, as previously noted, the database was constructed to include information about constituent members of the chemical groups (i.e., those assigned with the "NA" numbering system provided in Appendix Three). For any list, a report can be generated stating whether a list contains a group entry (NA-numbered item), any constituent members of that group in the list, as well as any other individual substances that are contained in NA-assigned groups. Reports were generated to obtain this group information for both Canadian Lists One and Two. These two reports, provided in Appendix Six, revealed useful information about the constituent members of chemical groups within the two lists.

The reports in Appendix Six show those list members that are either NA group entries or individual members of groups. Note that the entire list of substances or groups is not included since the full lists are provided in Appendices Four and Five. The group reports for Canadian Lists One and Two provide a means of partially organizing the lists into groups. The fact that the list includes many substances from certain groups of well-known toxicity, such as lead compounds, methylmercury compounds, phthalates, VOCs, etc., confirms what would be expected and is generally consistent with the results of the literature review in Part Two above. These reports also help to focus on specific substances within large groups, assisting with further comparisons to regulatory and other lists that often include only individual substances.

In an effort to focus on a smaller list of substances of greatest concern with respect to exposure (for DSL substances) and health effects, Table Six was created by paring down the second Canadian List to those substances, and groups of substances, associated with four or more of the health effect categories noted.

Table Six contains "Canadian List #2A" that includes 75 entries in total, including eight groups. Of the individual substances, the list contains 14 substances from the nDSL and 53 on the DSL.

Of particular note in these results is the finding of lead in every single health effect category. This list also contains substances that are pesticides or that have pesticidal applications. Some of the substances are pharmaceuticals.

As is the case with the reports for the two larger lists, a scan of Canadian List #2A reveals an even tighter match to those substances and groups of substances noted in the results of the literature review (Table Four).

While Table Six identified substances, and groups of substances, suspected or associated with four or more health effects, additional health effect combinations were also queried. Canadian List #2 was filtered to generate sub-sets of substances suspected or associated with the health effect combinations noted in Table Seven. The first two combinations were chosen to focus on those health effects most specifically related to children (developmental and reproductive toxicity). Additional queries were done to

match substances with several combinations of three health effects (and a single combination of four). Results are summarized in Table Seven and tables, noting the actual substances and groups of substances are included in Appendix Six.

### Table Six: Canadian List #2A — Substances of Concern to Children Associated with Four or More of the Health Effects Considered

| CAS# or NA group allocation | **Substance or Group of Substances** (list contains 14 substances on the nDSL, 53 from the DSL screened by GPE data, and 8 groups; 75 entries in total) | On nDSL | On DSL and GPE list | Suspected Carcinogen | Recognized Developmental Toxin | Suspected Developmental Toxin | Suspected Endocrine Toxin | Suspected Immunotoxin | Suspected Neurotoxin | Recognized Reproductive Toxin | Suspected Reproductive Toxin | Suspected Respiratory Toxin | Thyroid Hormone Interference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NA-D/F | DIOXINS AND FURANS | | | X | | X | X | | | | X | X | |
| NA-39 | GLYCOL ETHERS | | | | | X | | | X | | X | X | |
| NA-30 | POLYBROMINATED BIPHENYLS | | | X | X | | X | | X | | X | | |
| NA-29 | RADIONUCLIDES | | | X | | X | | | | | X | X | |
| NA-10 | METHYL MERCURY COMPOUNDS | | | X | X | | | X | X | | X | X | |
| NA-08A | ALKYL LEAD COMPOUNDS | | | X | X | | | | X | X | | | |
| NA-08 | LEAD COMPOUNDS | | | X | X | | | X | X | X | | | |
| NA-02 | INORGANIC ARSENIC COMPOUNDS | | | X | X | X | | | X | | | X | |
| 98-07-7 | BENZOIC TRICHLORIDE | X | | X | | X | | | X | | | X | |
| 95-47-6 | O-XYLENE | | X | | | X | | X | X | | X | X | |
| 900-95-8 | STANNANE, ACETOXYTRIPHENYL | X | | | | | X | X | X | | | | |
| 85-68-7 | BENZYL BUTYL PHTHALATE | | X | | | X | X | | X | | X | | |
| 84-74-2 | DIBUTYL PHTHALATE | | X | | | X | X | X | X | | X | | |
| 80-62-6 | METHYL METHACRYLATE | | X | | | X | | X | X | | X | X | |
| 80-05-7 | 4,4'-ISOPROPYL IDENEDIPHENOL | | X | | | | X | X | X | | X | | |
| 79-01-6 | TRICHLOROETHYLENE | | X | X | | X | | | X | | X | X | |
| 78-93-3 | METHYL ETHYL KETONE | | X | | | X | | | X | | X | X | |

## Table Six: Canadian List #2A — Substances of Concern to Children Associated with Four or More of the Health Effects Considered *(continued)*

| CAS# or NA group allocation | **Substance or Group of Substances** (list contains 14 substances on the nDSL, 53 from the DSL screened by GPE data, and 8 groups; 75 entries in total) | On nDSL | On DSL and GPE list | Suspected Carcinogen | Recognized Developmental Toxin | Suspected Developmental Toxin | Suspected Endocrine Toxin | Suspected Immunotoxin | Suspected Neurotoxin | Recognized Reproductive Toxin | Suspected Reproductive Toxin | Suspected Respiratory Toxin | Thyroid Hormone Interference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 78-00-2 | TETRAETHYLLEAD | | X | X | X | | | | X | X | | | |
| 7758-97-6 | LEAD CHROMATE | | X | X | X | | | X | X | X | | X | |
| 7664-41-7 | AMMONIA | | X | | | | | | X | | X | X | X |
| 7664-39-3 | HYDROFLUORIC ACID | | X | | | X | | | X | | X | X | |
| 759-73-9 | N-ETHYL-N-NITROSOUREA | X | | X | | X | | | X | | X | | |
| 75-56-9 | PROPYLENE OXIDE | | X | X | | X | | X | X | | X | X | |
| 75-09-2 | DICHLOROMETHANE | | X | X | | | X | | X | | X | X | |
| 75-07-0 | ACETALDEHYDE | | X | X | | X | | | X | | | X | |
| 75-05-8 | ACETONITRILE | | X | | | X | | | X | | X | X | |
| 74-87-3 | CHLOROMETHANE | | X | | X | | | | X | | X | X | |
| 7440-66-6 | ZINC | | X | | | X | | X | | | X | X | |
| 7440-48-4 | COBALT | | X | X | | X | | X | X | | X | X | |
| 7440-47-3 | CHROMIUM (CR6+) | | X | X | | | | X | | | X | X | |
| 7440-31-5 | TIN | | X | | | | | X | X | | X | X | |
| 7440-02-0 | NICKEL | | X | X | | X | | X | X | | X | X | |
| 7439-92-1 | LEAD | | X | X | X | | X | X | X | X | | X | X |
| 71-43-2 | BENZENE | | X | X | X | | X | X | X | X | | X | |
| 68-12-2 | N,N-DIMETHYLFORMAMIDE | | X | | | X | | | X | | X | X | |
| 680-31-9 | HEXAMETHYL PHOSPHORAMIDE | X | | X | | | | | X | X | | X | |
| 67-66-3 | CHLOROFORM | | X | X | | X | X | | X | | X | X | |
| 630-93-3 | DIPHENYLHYDANTOIN (PHENYTOIN), SODIUM SALT | X | | X | | | X | | X | | | X | |
| 630-08-0 | CARBON MONOXIDE | | X | | X | | | | X | | X | X | |
| 62-75-9 | METHANAMINE, N-METHYL-N-NITROSO | X | | X | | X | | X | X | | | X | |

## Table Six: Canadian List #2A — Substances of Concern to Children Associated with Four or More of the Health Effects Considered *(continued)*

| CAS# or NA group allocation | **Substance or Group of Substances** (list contains 14 substances on the nDSL, 53 from the DSL screened by GPE data, and 8 groups; 75 entries in total) | On nDSL | On DSL and GPE list | Suspected Carcinogen | Recognized Developmental Toxin | Suspected Developmental Toxin | Suspected Endocrine Toxin | Suspected Immunotoxin | Suspected Neurotoxin | Recognized Reproductive Toxin | Suspected Reproductive Toxin | Suspected Respiratory Toxin | Thyroid Hormone Interference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 62-56-6 | THIOUREA | | X | X | | X | | X | | | X | | X |
| 624-83-9 | METHYL ISOCYANATE | X | | | | X | | X | | | X | X | |
| 56-53-1 | DIETHYLSTILBESTROL | X | | X | X | | X | X | X | | X | | |
| 51-52-5 | PROPYLTHIOURACIL | X | | X | X | | X | | | | | | X |
| 505-60-2 | MUSTARD GAS | X | | X | | X | | | X | | X | X | |
| 50-00-0 | FORMALDEHYDE | | X | X | | | | X | X | | X | X | |
| 319-85-7 | BETA-LINDANE | X | | X | | | X | X | X | | X | | |
| 151-56-4 | ETHYLENEIMINE | X | | X | | | | X | X | | X | X | |
| 140-88-5 | ETHYL ACRYLATE | | X | X | | X | | X | X | | | X | |
| 139-65-1 | 4,4'-DIAMINO DIPHENYL SULFIDE | X | | X | | | X | | | | X | X | |
| 1330-20-7 | XYLENE (MIXED ISOMERS) | | X | | | X | | X | X | | X | X | |
| 127-18-4 | TETRACHLOROETHYLENE | | X | X | | X | | | X | | X | X | |
| 126-72-7 | TRIS(2,3-DIBROMO PROPYL) PHOSPHATE | X | | X | | X | | | X | | X | | |
| 123-91-1 | 1,4-DIOXANE | | X | X | | | | X | X | | | X | |
| 123-31-9 | HYDROQUINONE | | X | | | | | X | X | | X | X | |
| 117-81-7 | BIS(2-ETHYLHEXYL) PHTHALATE | | X | X | | X | X | | | | X | X | |
| 111-76-2 | ETHYLENE GLYCOL MONOBUTYL ETHER | | X | | | X | X | | X | | X | X | |
| 111-46-6 | DIETHYLENE GLYCOL ETHER | | X | | | X | | | X | | X | X | |
| 110-80-5 | ETHYLENE GLYCOL MONOETHYL ETHER | | X | | X | | X | | X | X | | X | |
| 110-54-3 | N-HEXANE | | X | | | X | | | X | | X | X | |
| 109-99-9 | TETRAHYDROFURAN | | X | | | X | X | | X | | | X | |

**Table Six: Canadian List #2A — Substances of Concern to Children Associated with Four or More of the Health Effects Considered *(continued)***

| CAS# or NA group allocation | **Substance or Group of Substances** (list contains 14 substances on the nDSL, 53 from the DSL screened by GPE data, and 8 groups; 75 entries in total) | On nDSL | On DSL and GPE list | Suspected Carcinogen | Recognized Developmental Toxin | Suspected Developmental Toxin | Suspected Endocrine Toxin | Suspected Immunotoxin | Suspected Neurotoxin | Recognized Reproductive Toxin | Suspected Reproductive Toxin | Suspected Respiratory Toxin | Thyroid Hormone Interference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 109-86-4 | ETHYLENE GLYCOL MONOMETHYL ETHER | | X | | X | | X | | X | X | | X | |
| 108-95-2 | PHENOL | | X | | | X | | | X | | X | X | X |
| 108-94-1 | CYCLOHEXANONE | | X | | | X | | X | X | | | X | |
| 108-91-8 | CYCLOHEXYLAMINE | | X | | | | | X | X | | X | X | |
| 108-88-3 | TOLUENE | | X | | X | | | X | X | | X | X | |
| 108-38-3 | M-XYLENE | | X | | | X | | X | X | | | X | |
| 108-10-1 | METHYL ISOBUTYL KETONE | | X | | | X | | | X | | | X | |
| 107-13-1 | ACRYLONITRILE | | X | X | | X | | | X | | X | X | |
| 106-99-0 | 1,3-BUTADIENE | | X | X | | X | | | X | | X | X | |
| 106-89-8 | EPICHLOROHYDRIN | | X | X | | | X | X | X | X | | X | |
| 105-60-2 | CAPROLACTAM | | X | | | X | | X | X | | X | X | |
| 100-44-7 | BENZYL CHLORIDE | | X | X | | X | | | X | | | X | |
| 100-42-5 | STYRENE | | X | | | X | X | X | X | | X | X | |
| 100-41-4 | ETHYLBENZENE | | X | | | X | X | | X | | X | X | |

**NB:** In considering any of the results of list querying, it must be emphasized that where a substance or group of substances is not shown to be associated with a particular health effect, this should not be construed as evidence that such effects have not been found or suspected. Rather, the lists summarize what is known or suspected. A blank entry should not be interpreted as an indication that particular effects have not been found for the substances in question.

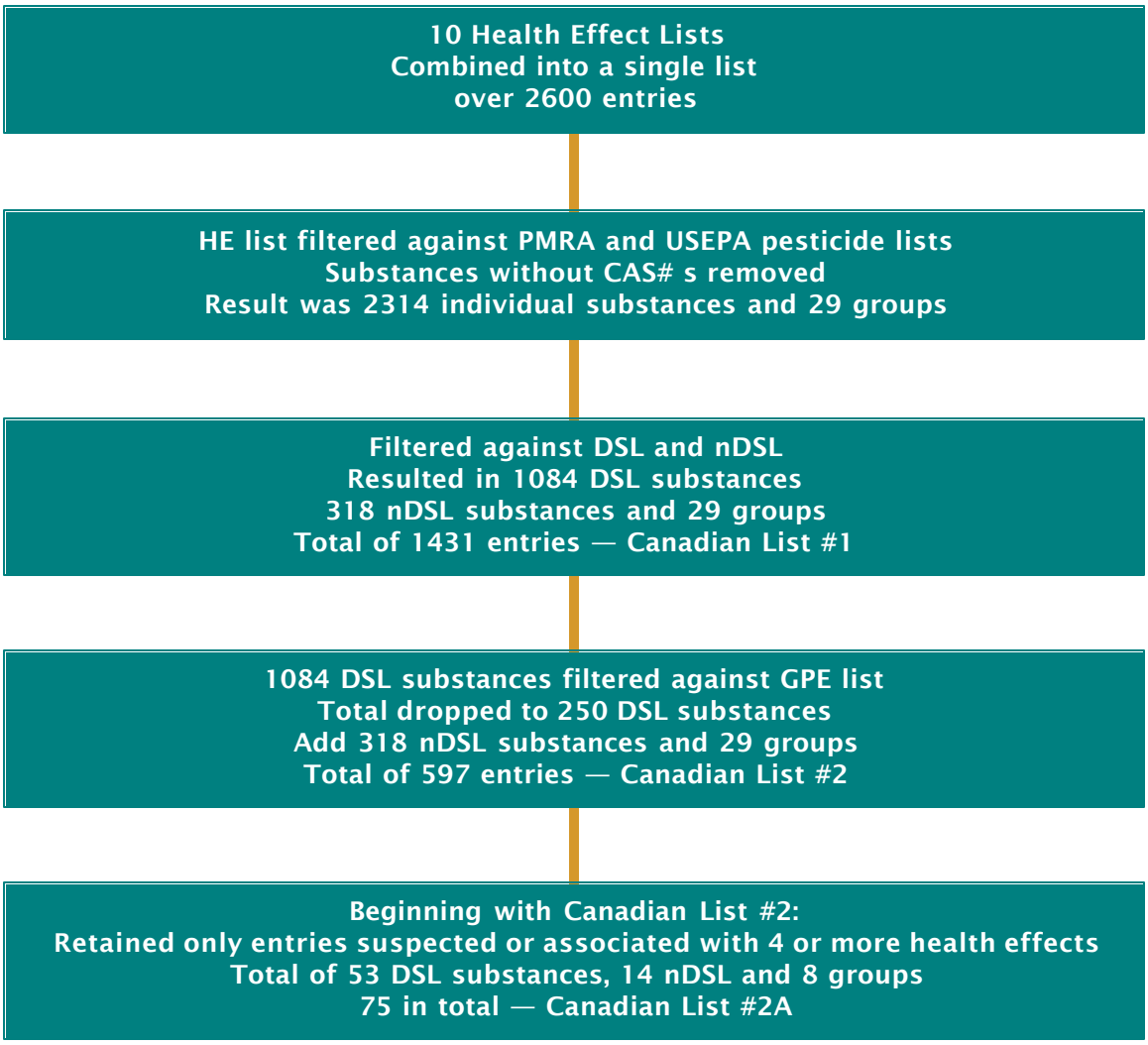
The results in Table Seven are indicative of ways in which the database can continue to be used to query on health effects and individual substances.

Finally, Figure One provides a graphical representation of the process used to generate Canadian Lists #1, #2 and #2A.

**Table Seven: Summary of Queries on Canadian List #2 to identify sub-sets of substances suspected or associated with several different health effect combinations (tables noting the actual substances and groups of substances are included in Appendix Six)**

| Health Effect Matches | Number of Substances or Groups of Substances on Canadian List #2 | Table Number in Appendix Six |
|---|---|---|
| recognized developmental toxin, recognized reproductive toxin | 15 matches including 13 individual substances and two groups | Table One |
| suspected developmental toxin and suspected reproductive toxin | 43 matches including 36 individual substances and 7 groups | Table Two |
| known carcinogens, suspected neurotoxins, suspected respiratory toxins and suspected reproductive toxins | 13 matches including 12 individual substances and one group | Table Three |
| known carcinogens, suspected neurotoxins, and suspected respiratory toxins | 37 matches including 35 individual substances and 2 groups | Table Four |
| known carcinogens, suspected immunotoxins, and suspected respiratory toxins | 26 matches including 23 individual substances and 3 groups | Table Five |
| suspected immunotoxins, suspected neurotoxins and suspected respiratory toxins | 36 matches including 35 individual substances and one group | Table Six |
| developmental toxins, suspected neurotoxins and suspected reproductive toxins | 29 matches including 28 individual substances and one group | Table Seven |
| suspected developmental toxins, suspected respiratory toxins, and suspected reproductive toxins | 33 matches including 28 individual substances and 5 groups | Table Eight |

**Figure 1: Deriving Canadian Lists #1, #2 and #2A**



### 3.3.2 Analysis of Existing Lists

The database also provided an interesting tool for analyzing existing lists. It is possible to drill into individual lists and identify substances and groups of substances suspected or associated with the various health effects, as well as identify those that are on the DSL (and the associated GPE list), the nDSL, and any other lists, for example, the US or OECD lists of high production volume substances, or lists of substances that are persistent, bioaccumulative and toxic.

Since most of the lists in the database are in place for the purposes of regulation, or otherwise tracking of high production volumes, the calculations in Table Eight were made to summarize information about the substances and groups of substances on the two Canadian lists (Canadian List #1 and Canadian List #2). Both of the Canadian Lists were matched with the many source lists in the database that originate from regulatory agencies and/or instruments.

**Table Eight: Comparison of Canadian Lists #1 and #2 — Number of Matches to Substances in Selected Source Lists**

| **Source Lists** (total number of entries on source list; total includes groups, where applicable) | **Canadian List #1** (1402 individual substances and 29 groups) | **Canadian List #2** (568 individual substances and 29 groups) |
|---|---|---|
| **Canadian — Federal Lists** | | |
| DSL Pilot (123) | 43 | 15 |
| FDA Act Ingredients (1336) | 11 | 11 |
| FDA Substances in Products (1053) | 58 | 20 |
| Fisheries Act Effluent Regulations (17) | 7 | 4 |
| Candidate Toxic Substances ARET (118) | 65 (+ 3 groups) | 34 (+ 3 groups) |
| Candidate Toxic Substances ARET 2 (329) | 195 (+ 17 groups) | 94 (+ 16 groups) |
| National Ambient Air Quality Contaminants (4) | 4 | 3 |
| National Pollutant Release Inventory (301) | 195 (+ 17 groups) | 82 (+ 7 groups) |
| National Pollutant Release Inventory 2001 (245) | 185 (+ 11 groups) | 75 (+ 11 groups) |
| Priority Substances List (72) | 39 (+ 6 groups) | 29 (+ 6 groups) |
| Prohibited Substances Canada (11) | 3 | 2 |
| Toxic Substances List (67) | 25 (+ 5 groups) | 18 (+ 5 groups) |
| TSMP Track 1 (11) | 1 (+ 1 group) | 1 group |
| Haz Prod Act CCC Reg Subst of Spec Concern (10) | 7 | 4 |
| **Air — Canadian and Provincial Lists** | | |
| Air Contaminants Alberta EPEA (35) | 22 (+ 2 groups) | 16 (+ 2 groups) |
| Air Contaminants BC Waste Management Act (41) | 19 (+ 12 groups) | 12 (+ 12 groups) |
| Air Contaminants NB Clean Air Act (4) | 4 | 2 |
| Air Contaminants Point of Impingement (78) | 66 (+ 7 groups) | 43 (+ 7 groups) |
| Air Contaminants Regulation 127 (415) | 254 (+ 18 groups) | 116 (+ 18 groups) |

**Table Eight: Comparison of Canadian Lists #1 and #2 — Number of Matches to Substances in Selected Source Lists *(continued)***

| **Source Lists** (total number of entries on source list; total includes groups, where applicable) | **Canadian List #1** (1402 individual substances and 29 groups) | **Canadian List #2** (568 individual substances and 29 groups) |
|---|---|---|
| **Water — Canadian and Provincial Lists** | | |
| Drinking Water Contaminants SDWA (157) | 30 (+ 1 group) | 12 (+ 1 group) |
| Effluent Discharge Contaminants BC (42) | 12 (+ 13 groups) | 7 (+ 13 groups) |
| Process Effluent Discharge Substances Ont EPA (78) | 33 (+ 13 groups) | 13 (+ 13 groups) |
| Water Contaminants Alberta EPEA (122) | 44 (+ 7 groups) | 22 (+ 7 groups) |
| **Haz Waste and Contam Sites — Canadian Lists** | | |
| Contaminated Sites Substances BC (186) | 73 (+ 18 groups) | 34 (+ 13 groups) |
| Haz Wastes Ontario EPA Reg347 and 558 (421) | 221 (+ 6 groups) | 103 (+ 6 groups) |
| Hazardous Waste Chemicals Alberta EPEA (242) | 113 (+ 12 groups) | 46 (+ 12 groups) |
| Special Waste Chemicals BC (75) | 28 (+ 13 groups) | 18 (+ 13 groups) |
| **Ozone Depleting Substances Lists** | | |
| Ozone Depleting Substances Montreal Protocol (94) | 12 | 5 |
| **Canada-US, Trinational and FPT Lists** | | |
| Canada Ontario Agreement (27) | 8 (+ 2 groups) | 1 (+ 2 groups) |
| Chemicals Requiring Sound Management (6) | 1 (+ 2 groups) | 2 groups |
| Great Lakes Binational Toxics Strategy (36) | 11 (+ 3 groups) | 2 (+ 3 groups) |
| Substances Requiring Canada Wide Standards (9) | 1 | 1 |
| Transboundary Air Pollutants Canada US (4) | 2 (+ 2 groups) | 2 (+ 2 groups) |
| **US Lists** | | |
| Bioaccumulative Chemicals of Concern (22) | 7 | 3 |
| CERCLA Priority List (275) | 126 | 61 |
| CERCLA Top 20 (20) | 10 | 5 |
| Criteria Air Pollutants US Clean Air Act (8) | 5 (+ 3 groups) | 4 (+ 3 groups) |
| Extremely Hazardous Substances Superfund (359) | 165 | 82 |
| Hazardous Air Pollutants US Clean Air Act (203) | 145 (+ 11 groups) | 75 (+ 11 groups) |
| Hazardous Constituents US RCRA (463) | 223 (+ 8 groups) | 98 (+ 8 groups) |
| Inhalation Hazard Chemicals US DOT (157) | 78 | 27 |
| Maximum Contaminant Levels USSDWA (110) | 53 (+ 11 groups) | 26 (+ 11 groups) |
| Persistent Bioaccumulative and Toxic Chemicals (32) | 12 (+ 1 group) | 3 (+ 1 group) |
| Priority Pollutants US Clean Water Act (130) | 78 | 37 |
| Regulated Toxic Explosive or Flammable (138) | 92 | 43 |
| Toxic Release Inventory Chemicals (671) | 366 (+ 16 groups) | 166 (+ 16 groups) |
| **Rotterdam PIC and Related Canadian Lists** | | |
| Prior Informed Consent Chemicals Rotterdam (33) | 6 (+ 1 group) | 5 (+ 1 group) |
| Restricted Substances Canada (15) | 6 | 1 |
| Substances Requiring Export Notice or Consent (28) | 2 (+ 1 group) | 1 (+ 1 group) |

**Table Eight: Comparison of Canadian Lists #1 and #2 — Number of Matches to Substances in Selected Source Lists *(continued)***

| **Source Lists** (total number of entries on source list; total includes groups, where applicable) | **Canadian List #1** (1402 individual substances and 29 groups) | **Canadian List #2** (568 individual substances and 29 groups) |
|---|---|---|
| **International and EU** | | |
| EEC List of Priority Substances (141) | 89 | 53 |
| OSPAR List of Chemicals for Priority Action (53) | 9 (+ 8 groups) | 1 (+ 8 groups) |
| OSPAR Substances of Possible Concern (382) | 64 | 24 |
| Persistent Organic Pollutants Stockholm (11) | 1 (+ 1 group) | 1 group |
| SPIN Simple List (18378) | 1002 | 349 |
| WHO Air Quality (33) | 21 | 14 |
| NClass Database EEC (2213) | 189 | 60 |
| **Industry Lists** | | |
| CCPA NERM list (315) | 186 (+ 14 groups) | 120 (+ 14 groups) |
| Voluntary Childrens Chemical Evaluation Program (23) | 16 | 10 |
| **HPV Lists** | | |
| HPV 1990 (3590) | 754 | 308 |
| HPV 1994 Additions (523) | 30 | 8 |
| HPV Additional Chemicals (257) | 33 | 21 |
| OECD List of HPV Chemicals (5234) | 772 | 300 |
| **Misc** | | |
| Candidate Substances for Ban and Phase Out — Ont. (27)Consent (28) | 7 (+ 2 groups) | 2 (+ 2 groups) |

Several observations can be made about the two Canadian Lists from the information summarized in Table Eight. Of interest here are the total number of matches between substances (or groups of substances) that appear on the two Canadian Lists and the source lists, as well as where matching occurs most often. It should be remembered that the Canadian Lists have excluded pesticides. Since the lists to which the Canadian Lists are being compared often contain pesticides, the number of matched substances is, overall, an underestimate in terms of comparing lists of substances of concern to children. If pesticides were included in the Canadian lists, the number of matches would increase. Recognizing that the source lists have all been prepared at different times and for different purposes, nevertheless, it is possible to note several consistent observations.

First, it can be accepted that most of the regulatory lists contain substances or groups of substances that are hazardous, and in some cases extremely hazardous. Otherwise, they would not have been placed on these lists for regulation. Across the board, on both Canadian lists, there are many individual substances and groups of substances matching this diverse range of regulatory lists. When the number of matches is compared to the total number of entries on each source list (provided in parentheses beside each list name) it is clear that both Canadian lists contain many substances and groups of substances

that are the subject of a wide range of regulatory instruments. A very large proportion are included in both ARET lists, both NPRI lists, the Priority Substances List, the DSL Pilot, and both the US and OECD HPV lists. This finding indicates that the substances of concern on the two Canadian lists have already been considered worthy of focused attention. They should be evaluated to determine if these various regulatory instruments have accomplished significant reductions in exposure.

A second observation can be made about the preponderance of matches between the two Canadian lists and those source lists that include substances or groups of substances that are, without doubt, extremely hazardous. Consistently across all such lists, (e.g., the Canadian Prohibited Substances List, the five lists noted as "Canada-US, trinational and FPT Lists," several of the US-based lists of hazardous substances, the EEC and OSPAR lists and Ontario's Candidate Substances for Ban or Phase-Out) both Canadian lists include many of these extremely hazardous substances and groups of substances.

A third observation can be made about the large proportion of matches between lists of substances that are air pollutants, constituents of hazardous waste or contaminated sites, and to a slightly lesser extent, water contaminants. This finding is true across all of the Canadian federal and provincial lists, and the US and international lists. Another observation is that, once again, very little information is discernable about hazardous substances in consumer products.

Overall, Table Eight yields information that flows in two useful directions. First, the two Canadian lists provide an interesting perspective on the large preponderance of these contaminants on certain lists, such as the NPRI lists, the two ARET lists, the CCPA list, the VCCEP list, the DSL Pilot, etc. As well, the regulatory lists provide interesting information about the nature of substances on the two Canadian lists. For example, large numbers of substances on the two Canadian lists appear on the OECD high production volume list of chemicals, many are hazardous air pollutants and many appear on lists of hazardous waste. Very large numbers of substances on the two Canadian lists are in the Nordic Countries database of substances in products and on EEC lists of hazardous substances.

### 3.3.3 Substances of Concern to Children's Health — Choosing a Final List

Two very large, and in many ways closely related, streams of information have been used to decide whether or not it is possible to choose a final list of substances of concern to children. First, as summarized in Part Two above, a scan was undertaken of a broad range of recent, comprehensive literature reviews by credible sources. The "First List" (Table Four above) combines the results of that scan. It includes those substances, and groups of substances, for which the literature repeatedly reported on health effects of concern to children. The substances and groups are organized into two columns to indicate those where the information base is fairly solid versus where evidence is emerging as to associations between the substances and health effects of concern. The literature reviews often summarized information about groups of substances without necessarily noting individual substances. Or, information about specific substances, (rarely, if ever, uniquely identified by CAS#), was often presented as a means of indicating concerns about an entire class of similar substances. In all cases, the authors emphasized the fact that a great deal of uncertainty exists about the effects of the thousands of substances to which children are exposed. Hence, the "First

List" summarizes into the two categories of associated/suspected and emerging, includes those substances and groups of substances that came up repeatedly across the literature reviews as being of concern to children's health.

The second information stream is the database of over 80 lists of substances. There were generally two types of lists imported into the database. First, there were the many lists of substances generated mainly by government agencies for policy and/or regulatory purposes, including emission monitoring. Second, there were the ten health effect-based lists generated from reviews of the scientific literature. Nine of these health effect lists were prepared by a group of scientists working for Environmental Defense, a public interest, environmental organization in the United States. Specifically, the lists were prepared for the www.scorecard.org website. The tenth list, of thyroid hormone disruptors, was obtained from an *Environmental Health Perspectives* journal article.

The information base for the literature reviews, the regulatory lists and the health effect-based lists is, of course, the same. It is the body of scientific literature that is continuously generated, peer-reviewed and published all over the world. A key difference between the literature reviews scanned for Part Two above, and the health effect lists, is the latter's specificity as to individual substances. The health effect lists imported to the database result from the same kind of rigorous and credible literature review undertaken by the studies listed in Table One. However, by noting individual substances using their unique CAS#, the health effect-based lists of substances can be directly compared to the many regulatory lists that are often equally specific as to individual substances, uniquely identified by CAS#. The ability to know what health effects are suspected or associated with individual, uniquely identifiable substances, is crucial when other sources of information were extremely limited. For example, publicly accessible information about Canada's DSL and nDSL, comprising about 33,000 substances, and the sum total of substances in commercial use in Canada, provide only the single piece of information for each substance on the list: the unique CAS#.

The nine health effect lists obtained from the Scorecard website had the added benefit of including group entries. Although the DSL and nDSL only include individual CAS#s, this is rarely the case across the rest of the lists. By applying the "NA" numbering system consistently across the lists, group entries could be caught in the results of database queries. Capturing this information was valuable since the groups include many substances of significant concern, such as dioxins and furans or phthalates. As well, for individual substances that do not have unique CAS#s, such as $PM_{2.5}$ and $PM_{10}$, the NA numbering system also ensured that these important list entries could be caught in list queries and maintained in the results, despite the fact that they do not appear on the DSL or nDSL.

Both of the two large information streams used in this project have additional strengths and limitations. As noted, the literature reviews are rarely specific as to individual chemical substances. They do offer valuable contextual information about groups of substances and the tendency of similar substances to have common mechanisms of toxicity. In the lists used to generate Canadian List #1 and #2, several limitations exist with respect to the underlying health effect lists and the data used to generate Health Canada's GPE list.

First, five of the nine Scorecard health effect lists were not prepared with children's health specifically in mind. Hence, as

noted in Section 3.2.4 above, the lists that are specifically relevant to children are the four lists of suspected and recognized developmental toxins and reproductive toxins. The other five lists, (known carcinogens, suspected neurotoxins, suspected immunotoxins, suspected endocrine toxins and suspected respiratory toxins) contain substances suspected or associated with these health effects in humans, without necessarily being specific to children. The implication here is that the list of suspected neurotoxins, for example, could be different from a list of suspected developmental neurotoxins. The list of thyroid hormone disruptors was prepared with children specifically in mind, as part of a review of substances capable of thyroid hormone disruption interfering with brain development, *in utero*.

In addition, as noted in Section 3.2.5 above, the GPE list provides a useful starting point in paring down the DSL to a list of substances for which there may be the greatest potential for exposure. But, as Health Canada notes, the GPE data have important limitations. They should not be considered a final choice for which substances should be on such a list. Another key limitation is that the GPE data only exist for substances on the DSL. There are no comparable exposure data available for nDSL substances.

To accomplish the project objective of paring down the roughly 33,000 substances in commercial use in Canada to a list of substances of concern to children, several "short-lists" have resulted that are, in many ways, very similar. The literature review results (Table Four) contain many of the same individual, and in particular, groups of substances, as are in Canadian Lists #1 and #2. These latter two lists provide very specific information as to which of these individual substances are on either the DSL or the nDSL. Likewise, Canadian List #2A, prepared by focusing in even more closely on substances associated with four or more of the health effects, closely mirrors the results of the literature review scan. Canadian List #2A includes about six dozen substances and groups of substances and could be considered a "dirty six dozen" of some of the most seriously detrimental substances of concern to children.

It is also possible to consider choosing a final list by focusing on particular health effects. As noted in Table Five, it seems clear that suspected neurotoxins, and suspected respiratory toxins, dominate the two Canadian Lists. For Canadian List #2A, only eight out of 73 list entries are not suspected neurotoxins. Likewise, only eleven out of 73 are not suspected respiratory toxins. About half of the list entries on Canadian List #2A are known carcinogens. These observations should be qualified by the fact, noted above, that the determination about these three health effects was not made only with children in mind.

Further aggregation of these "short-lists" into a single list could be done to choose a final list. However, given the many qualifications noted above with respect to the data sources, it seems counter-productive to do so. Information would be lost that instead should prompt further investigation. The results of each exercise provide interesting and varied information that raise many questions.

For example, the list in Table Four resulting from the scan of literature reviews, provides broad coverage of existing information and emerging issues. But, it lacks specificity about individual chemicals. The database exercise provides much the same information and fills in some useful details about specific substances that can be keyed directly into lists generated by regulatory agencies. But, when it is pared down with the use of the GPE data, it

appears that important data are lost. For example, the GPE data do not include some important emerging areas where exposure is known to be high and increasing, such as PDBEs. Also, many questions arise with respect to the substances on the nDSL for which there are no exposure data. A wide range of recommendations are made in Section 5 below for further investigation of the results of the literature review and the database exercise.

The "final list" is therefore a series of lists: Table Four, Canadian List #1 (Appendix Four), Canadian List #2 (Appendix Five) and Canadian List #2A (Table Six). Thus, the results retain the contextual information provided by describing substances as members of groups. Such groups often have common mechanisms of toxicity and there is value in addressing the group as a whole, both in a regulatory sense, as well as in choosing individual substances to either focus further attention, or illustrate problems with the group as a whole. The database results that include specific substances are also retained in the context of the list querying that created them. For example, in Canadian List #1, the results include matches to the DSL and nDSL, without further screening against the (preliminary, and perhaps not entirely reliable) GPE data. Further investigation of these results is warranted and can be informed by the group information contained in Appendix Seven. Where the information was available, group information was entered into the database and the "Substance Reports" from which Appendix Seven was created, can be used to determine the chemical groups to which individual substances belong. This information can then be cross-referenced to the group information that resulted from the literature review (summarized in Table Four).

In sum, the results of the literature review lack specificity with respect to individual chemicals (via the unique CAS# identifier) but the review is entirely child-specific with respect to noting concerns about health effects and the substances, and groups of substances, noted. The database exercise is almost entirely CAS#-specific, with additional and useful information about groups of substances, but it relies heavily upon lists of health effects, half of which were not developed solely with children in mind. The results also rely upon a foundation of exposure data (Health Canada's GPE list) that is still a very preliminary work in progress, and a complete lack of exposure data for the nDSL substances. It is therefore appropriate to retain separated results from both exercises, use the information together where it is complementary, and seek the lessons that can be learned from this work and tease out the many research questions that it presents. The following discussion of Risk Assessment issues with respect to children's health reinforces this choice.

# Part Four — Risk Assessment and Children's Health

## 4.1 Introduction

An original objective of this project was to survey current national and international literature for Risk Assessment approaches that take children's health into consideration in the regulatory Risk Assessment of chemical substances. Due to the already unwieldy size and scope of this project and the similarly enormous scope of the topic of Risk Assessment and children's health, this objective was pared down.[3] Instead, this section attempts to provide, in overview format, information that is useful and complementary to what already exists within Environment Canada, and, in particular, within Health Canada, and is focused on providing sufficient information to support detailed recommendations for further investigation. In reviewing the literature on Risk Assessment and children's health, including the application of modern techniques within Health Canada, it seemed unproductive to simply report on, and duplicate information about, the ongoing efforts to incorporate children's health into Risk Assessment. Rather, it seemed more useful to prepare a summary overview of the topic, to focus in detail in a single area to illustrate current challenges, and to note commentators views on its adequacy and future directions.

Hence, a brief overview is provided to first place Risk Assessment in its broader context of Risk Assessment and Risk Management. The well-developed critique of Risk Assessment is summarized as well since it relates directly to the scientific "data gap" that exists with respect to toxic substances, particularly knowledge of effects in children, noted throughout this report.

As well, an overview is provided noting how a variety of national and multi-lateral agencies are converging in their application of Risk Assessment techniques, as well as the place of relative leadership currently occupied by Canada in the enormous challenge of trying to deal with the backlog of substances that have not been assessed or regulated. Finally, this convergence in Risk Assessment approaches is contrasted with the observation that there is an overall lack of integration across regulatory approaches. Instead, regulatory approaches are largely one-sided, focusing on individual chemical releases and emissions and largely ignoring the full life-cycle and environmental fate of harmful substances, a point also illustrated by the regulatory lists gathered for the database exercise described in Part Three above.

[3] As an indication of the scope of such a review, Health Canada's Applied Research and Analysis Directorate recently (late 2003) posted a Request for Proposals for a two-year, $600,000 research program to analyze domestic and international governance tools that address the protection of children's health from exposure to environmental contaminants. Such a review will need to include a comprehensive review of risk assessment approaches as they address the vulnerability of children.

## 4.2 Risk Assessment and Risk Management

Risk Assessment fits within the broader package of Risk Assessment and Risk Management, which comprises complex suite of tools applied by regulatory agencies and others to diverse situations. These situations can include the setting of environmental standards, environmental assessment and planning decisions, remediation of contaminated lands or hazardous waste sites, as well as many non-environmental settings. Risk Assessment is considered a science-based exercise (though this is debatable, as summarized below) while Risk Management is considered the broader policy-making step in which additional social, economic, ethical, etc., issues are taken into account in various ways.

Although terms and definitions vary, it is generally accepted that the four steps of Risk Assessment include hazard identification, dose-response assessment (also called hazard characterization), exposure assessment and risk characterization. It is a structured approach that looks at the consequences of an event (e.g., health effects arising from chemical exposure) and the probability of it occurring. These calculations inform decisions (during the Risk Management stage) about whether and how the consequences of the event should be managed.

Although international trade agreements, including NAFTA, require Risk Assessment, they do not specify the methodologies to be applied. Approaches vary in different countries stemming from variations in underlying legislative frameworks and requirements. However, for Risk Assessment, convergence in techniques is increasingly apparent, a trend that is being facilitated by the Organization for Economic Cooperation and Development (OECD) and the World Health Organization International Program on Chemical Safety (IPCS).

Risk Assessment and Risk Management are relatively recent and evolving tools. Risk Assessment can be useful and reliable when the scientific information base is strong. However, there is a well-developed critique of, and debate on, its limitations and children's environmental health issues, where the information base is so poor, have often fuelled this debate.

## 4.3 The Critique of Risk Assessment

The critique of Risk Assessment and Risk Management (RA-RM) has accompanied the approach since its beginnings in the 1970s. In the early 1980s, the US government reviewed RA-RM approaches and found them to be in need of refinement (through the development of detailed technical guidance), but fundamentally sound (NAS, 1983). Nevertheless, critics (beginning within environmental NGOs and then expanding to include physicians and additional mainstream commentators) have expressed serious concerns about the ability of RA-RM to set fair, scientifically valid and health-protective environmental standards in a timely manner, if at all. While this paper has been scoped to focus only on the Risk Assessment side of the RA-RM continuum, it is difficult, some would say impossible, to separate Risk Assessment from Risk Management. In order to summarize the critique, the concerns about the combined package of RA-RM are described in order to then focus on the key scientific issues that arise on the Risk Assessment side, and which are the focus of subsequent sections.

One of the most recent, and fairly blistering, critiques of RA-RM is a detailed review by the UK Royal Commission on

Environmental Pollution (2003) in its 24th Report: *Chemicals in Products — Safeguarding the Environment and Human Health*. After a thorough review of the four-step process noted above, the report concludes:

> Current approaches to risk assessment are inadequate, cumbersome and slow. Insufficient use is made of environmental monitoring, A new paradigm is needed. (p.46)

The Royal Commission report summarizes many of the same concerns about Risk Assessment as have been identified by numerous others (McClenaghan et.al,, 2003, Cooper, et.al., 2000, etc).

The main concern stems from the quality of the information base upon which this "scientific" exercise is conducted. Although routinely described by its proponents, particularly within industry and frequently within government, as a strictly scientific exercise, Risk Assessment is a combination of science and guesswork, and probably always will be. There is simply too much we do not know or that we even have the capacity to understand. As described elsewhere in this report, there is a great deal of uncertainty about the health effects of exposure to small amounts of toxic substances, and near total ignorance about the effects of these substances in combination. Compounding this problem is the reality of so many thousands of substances for which little to no data exist and the enormous complexity of understanding their interaction with physiological processes and responses throughout human growth and development.

These issues can be illustrated by noting some historical origins of how they have been handled in the US with respect to concern about pesticides and children. A landmark report published in 1993 by the National Research Council (NRC), *Pesticides in the Diets of Infants and Children* was the first of many detailed investigations into the unique exposure circumstances and greater vulnerability of children to pesticides. The report set the stage in the US for a debate over whether and how pesticides and other contaminants could be regulated to protect children's health. Similar debates were occurring internationally within the OECD and member states of the EU and contributed as well to similar policy and legal changes — described in detail in the UK Royal Commission review.

Policy conclusions drawn in the NRC report influenced changes in policy and several pieces of legislation in the US, and indirectly in Canada. To confront the child health issues raised by the NRC report, the notion of ever more detailed refinement of Risk Assessment practices was embraced. The NRC reviewed in detail the many shortcomings of exposure assessment and toxicity testing for pesticides. Key gaps were identified in terms of both data and methodologies for assessing exposure to, and metabolism and toxicity of, pesticides during children's developmental stages. Ten years later, the UK Royal Commission report notes, alongside other commentators, that many of the same gaps and shortcomings in Risk Assessment approaches continue to exist.

The NRC made three recommendations attempting to address the dual gaps in data and methodologies. First, to compensate for the lack of information about toxicity, specifically with respect to children, the NRC recommended that Risk Assessment calculations incorporate an additional 10-fold margin of safety. This extra safety factor would be additional to the existing practice of assigning two separate 10-fold safety factors (i.e., up to a 100-fold) to account for uncertainty in the calculations already. The second and third

recommendations had to do with attempting to address (in a limited way) real-world combinations of chemicals. The NRC recommended that exposure assessments and dose-response assessments should not be restricted to the impact of a single pesticide, but should be required to assess aggregated exposures to pesticides with common toxic effects.

The development of guidance documents to be able to refine Risk Assessment methods according to these NRC recommendations continue to this day. Many additional advances in Risk Assessment techniques continue to develop, and many of these are summarized in the next section. However, in looking back ten years to the NRC report, and contrasting it with both the recent UK Royal Commission report, and what is increasingly known about the vulnerability of children to environmental contaminants, the following observations about Risk Assessment and Risk Management remain valid:

- The notion that Risk Assessment is an objective, scientific phase that precedes the broader policy-making step of Risk Management is an artificial and misleading distinction. There are too many uncertainties, assumptions and judgements made during Risk Assessment to deny the reality of subjective interpretation within the Risk Assessment exercise.

- The denial by Risk Assessment practitioners of the subjective nature of Risk Assessment remains a problem. As the UK Royal Commission notes, the problem is not one of subjectivity *per se*, but unacknowledged subjectivity that can accompany a rigid insistence that Risk Assessment is a purely objective scientific exercise.

- The quality of the scientific information base upon which Risk Assessment depends remains woefully inadequate to be able to assess the many thousands of substances in the "backlog." However, whether the information base is poor or even reasonably high, the "analysis paralysis" of Risk Assessment routinely results in single evaluations taking several years to complete before the additional time necessary for (and further delays and political machinations of) the Risk Management phase to begin.

- Risk Assessment must continue to make generalizations and extrapolations about health effects from small populations and from animal studies, perpetuating uncertainty and allowing for objections to be raised related to insistence on a high degree of scientific proof of harm before setting regulatory limits. Such objections tend to be raised more vehemently about substances for which contemplated controls could have major commercial implications.

- Even with improved screening and evaluative techniques (discussed below), establishing cause and effect relationships between toxic substances and health effects in children is extremely difficult. As the reviews canvassed in Part Two above illustrate, despite voluminous and ever-growing scientific literature, discussions of effects in children are about uncertainty and the relative strength of incomplete evidence. It is possible in only a relatively few cases to show causal relationships between specific exposures and health effects in children. Such causal relationships have been demonstrated in substances that have been studied in great detail. More important, effects have been

demonstrated in children who have experienced extended, measurable exposure. Such was the case with the evaluation of low level lead exposure resulting in the eventual regulation of lead out of gasoline, but only after millions of children were exposed and poisoned. A comparable information base exists for PCBs due to various studies, including those of pregnant women consuming contaminated Great Lakes fish. For the vast majority of other contaminants, findings are far more limited, they can be inconsistent or contradictory, exposure data are often lacking, all of which allows for continued exposure and, if the Risk Assessment stage is even reached, Risk Assessment conclusions that are equivocal as to whether control measures should be applied during Risk Management.

- Practical pressures of lack of data and methods continue to allow for oversimplifications, such as ignoring background sources of hazardous substances, overlooking multiple exposures, failing to detect very long-term effects, and limiting the coverage of toxicity assessments to those endpoints where data exist vs. other endpoints, particularly those of concern in children, where data are lacking and evaluation methods are lacking, still under development, or controversial.

- As noted by the NRC in 1993, "in the absence of data to the contrary, there should be a presumption of greater toxicity in infants and children" (p. 9).

In sum, the ever-increasing complexity of Risk Assessment methods continues to be overmatched by the greater complexity of the problems confronted — including accounting for the special exposure circumstances and vulnerabilities of children. An overarching criticism about the manner in which science is used in the RA-RM exercise is the tension between the demand for scientific certainty and the desire to set health-protective standards or prohibit suspicious substances. The result is too often a situation of wait-and-see as exposure continues. Further scientific inquiry may confirm, and often does confirm, that exposure should have been avoided. The increasing application of efficiency measures that would screen and categorize substances for prioritized assessment are a partial and necessary response. Whether the application of additional advanced methods can overcome the fundamental limitations of Risk Assessment summarized here remains to be seen.

## 4.4 International Convergence in Approaches

Regulatory agencies around the world are converging in their acceptance, and increasingly integrated use, of Risk Assessment. There is convergence in both the application of Risk Assessment generally, as well as the sharing of data and the use of emerging techniques. For the purposes of summarizing a very large topic, it is useful to think in terms of these new techniques as serving two purposes: first, to more comprehensively evaluate substances during the dose-response and exposure assessment stages of Risk Assessment (including, for example, accounting for children's uniqueness) and second, related techniques for screening and categorizing substances to assist with the understanding of mechanisms of toxicity, but especially to enable "short-listing" of large numbers of substances for prioritized evaluation.

In the first area, given the increased understanding about opportunities for greater childhood exposure, as well as

greater physiological vulnerability, the evaluation of contaminants by regulatory agencies has been gradually modified to take such differences into account. Some discussion is provided above with respect to the ongoing development of techniques within the USEPA to improve the dose-response and exposure assessment of pesticides. These techniques are being gradually adopted in Canada through the harmonization of standards and standard-setting that flows from the trinational integration of pesticide regulation required under NAFTA. For toxic substances in general, techniques continue to be developed and refined to estimate the aggregate exposure in people, including children, to individual contaminants from multiple exposure pathways, as well as techniques to account for age-dependent variation. However, across the board it remains the case that methods are still poorly developed that can account for, and accurately measure, chronic, low-level exposures to complex mixtures of environmental contaminants. Moreover, alongside this gap in methodologies, the gap in actual data on exposure and scientific evaluations of dose-response relationship remains enormous, most particularly with respect to exposure data.

The following section focuses on one area of Risk Assessment, developmental toxicology, to illustrate new developments and ongoing challenges in this field.

### 4.4.1 "Scientific Frontiers"

In its review of the "scientific frontiers in developmental toxicology and risk assessment" the US National Research Council (NRC, 2000) provides a useful overview and discussion of current practices for assessing risk from developmental effects. A review of this report is provided here as a means of discussing key issues within this broad topic from the angle of developmental toxicity.

In discussing methods and tools for approaching toxicity assessment, dose-response assessment and exposure assessment, the overall impression is one of significant advances in techniques that offer highly specific pieces of information surrounded by a sea of uncertainty.

For toxicity assessment, four methods are reviewed including Structure-Activity Relationships, (also called QSARs — Quantitative Structure-Activity Relationships), *in vitro* (literally, "in glass" and also called *ex vivo* for "outside the organism") laboratory experiments, *in vivo* or animal bioassay experiments, and epidemiology. The review notes the advances occurring in each area, as well as the relative strength and intrinsic limitations of the information that each type of study can provide. Each is briefly discussed in turn below.

As the UK Royal Commission report also notes in detail, SARs or QSARs provide a very useful tool for screening large amounts of substances since it can allow for a reference compound with known toxicity to be used to generally predict toxicity in other compounds of similar structure. For developmental toxicity, the NRC notes that complexity arises when different toxicity endpoints[4] have different SARs. They conclude that, to be useful for developmental toxicity Risk Assessments, SARs must be evaluated for each of the endpoints of developmental toxicity.

*In vitro* assessments can detect potential effects of chemicals and offer means of analyzing mechanisms of effects.

[4] The logic here is obvious since the effects are so varied (e.g., heart defects, respiratory defects, nervous systems defects, muskuloskeletal anomalies, etc.) and would be related to very different properties of toxic substances.

However, the techniques have intrinsic limitations undermining their ability to predict developmental toxicity. These limitations stem largely from the fact that developmental processes are so complex and *in vitro* assessments are very simple tests. Such tests can help to predict effects or potential mechanisms of toxicity and may develop as useful screening tools. Reporting in 2000, and noting the swiftly evolving nature of the field, the NRC states that no consensus exists as to how to categorize, stratify or quantify the developmental toxicity of chemicals, but notes that such screening methods are applied to detect and assess the activity of endocrine disrupting substances, noting that similar approaches could be devised for other signaling pathway receptors involved in developmental toxicity.

Animal bioassays are the most highly developed aspects of chemical Risk Assessment, mainly in the assessment of toxicity and dose-response, and the area in which many detailed guidance documents have been developed. Such guidance documents are noted above with respect to the USEPA and pesticides. As well, there are similar guidance documents and protocols flowing from domestic legislation in other OECD countries, as well as documents produced by the OECD itself (many of which are listed in the next section).

The NRC review (NRC, 2000) notes the difficulty of finding associations between chemicals and effects in the area of developmental toxicity unless the outcome is very striking, such as occurred with thalidomide. Significant limitations arise within these techniques when trying to discern effects that manifest as functional impairments later in life (such as various forms of neurotoxicity). Most studies involve a maternally toxic dose administered throughout the entire period of organogenesis, with the result that the dose is too high and for too long and results do not represent risks of ambient exposure concentrations of varied exposures.

For the fourth area of scientific inquiry contributing to toxicity assessments, epidemiology, the NRC report emphasizes the limitations of techniques (case series, randomized control trials, cohort studies and case-control studies) and does not review the relative strength of longitudinal studies or meta-analysis. This treatment is surprising, given the constant discussion throughout the NRC review of the limitations and gaps in knowledge that exist across the spectrum of scientific tools at the disposal of Risk Assessment practitioners. It is also inconsistent with the rest of a report that often emphasizes the importance of epidemiological evidence. Epidemiological studies cannot directly demonstrate causal relationships. However, they have played a crucial role in identifying substances of concern and drawing attention to areas in need of further investigation.

Moving on to the use of all of these scientific advances within the two key areas of Risk Assessment — dose-response assessment and exposure assessment — some indication is given of the influence of industry participation in the NRC review. In a discussion of the quantitative evaluation that is customary during dose-response assessment, the report describes the approaches used to account for uncertainty using the two 10-fold uncertainty factors and the addition of a third, 10-fold factor for the sake of accounting for uncertainty with respect to effects in children. The report then notes that the need for uncertainty factors could be reduced with better data on comparative toxicokinetics, susceptible populations and mechanisms of toxic action. It is troubling that the authors of the work cited in support of the notion of superceding

default uncertainty factors are affiliated with the chemical industry. While it is certainly more accurate to apply good exposure data during Risk Assessment calculations, such proposals come from industry representatives and reflect a desire to replace default uncertainty factors with information that can be used to justify greater exposures and smaller margins of safety. Such proposals are disingenuous when made in the context of huge areas of ongoing uncertainty and no real consideration for cumulative effects of chemical combinations.

While the NRC review does go on to describe worthy advances in understanding derived from adding to Risk Assessments the results of studies of the toxicokinetics and toxicodynamics of chemicals, the qualifying language continues as to the overall limits of knowledge that must continue to be recognized. The report later concludes a review of the mechanisms of developmental toxicity by noting that:

> In no case is the mechanism of cellular and developmental toxicity fully known, both toxicokinetically and toxicodynamically. However, it should be recognized how broad and deep the scientific understanding has to be in order to have all the facets of a hypothesized mechanism distinguished and substantiated. The variety of mechanisms by which environmental toxicants probably work should be noted: mechanisms for toxicity are cellular, developmental, or physiological. Some involve two or more of these three. Some mechanisms occur at embryonic stages, fetal stages, or both, and some affect the conceptus, the mother, or both. Recent advances in the understanding of normal development (e.g., the cell cycle and checkpoint pathways) have identified critical processes, which, if investigated for their alteration by developmental toxicants, can provide exciting new advances in mechanistic investigations. (p. 87)

*This work will go on for decades, if not centuries*. Meanwhile, exposure continues. During comparatively much shorter periods of time, children are conceived, born and grow up in an environment contaminated with hundreds(?), thousands(?), tens of thousands(?), of chemicals that are or might be developmental toxicants, neurotoxicants, immunotoxicants, etc.

The NRC report concludes with a discussion of a comprehensive multi-level approach to improving Risk Assessment. It captures much of what has increasingly been incorporated into the most advanced Risk Assessment practices, or for which detailed guidance is being developed. Elsewhere in the NRC Report, and also examined in the UK Royal Commission report, is the promise held in the new field of genomics. Although still very new, advanced techniques within genomics (including toxicogenomics, DNA micro-arrays, proteomics, and bio-informatics) appear to offer additional means of, mostly *in vitro*, screening of substances in ways that may speed up the screening and assessment of large numbers of substances (see, e.g., Chapter 5 in NRC, 2000, Appendix H of UK Royal Commission, 2003, and the May and November, 2003 issues of *Environmental Health Perspectives*).

### 4.4.2 Risk Assessment Guidance

Where guidance on available techniques has been developed, it is being assembled and coordinated, at the international level, within the EU and by the OECD and the UN IPCS. Whether or not such practices are being implemented within specific national government agencies is another matter, and beyond the scope of this report.

In the international review conducted within the UK Royal Commission and in looking at additional countries, including in more detail at Canada, the US and Australia, it is the case that Risk Assessment techniques and guidance now exist for the following health endpoints, including those of concern in children:

- acute toxicity (oral, inhalation and dermal);
- irritation (skin and eye);
- corrosivity (skin);
- skin and respiratory sensitization;
- repeated dose toxicity (oral, inhalation and dermal);
- sub-chronic and/or chronic toxicity (90-day repeat oral, or inhalation or dermal, dosing in rodents and non-rodents);
- mutagenicity and genotoxicity (numerous techniques for assessment, *in vitro* or *in vivo*, of chromosome aberrations, mutations, DNA damage, cell transformation, and heritable translocation);
- Developmental toxicity (teratogenicity tests in rodents and non-rodents, assessments of peri-natal and post-natal effects);
- Fertility tests (one- two- and three-generation reproductive toxicity tests);
- Carcinogenicity (*in vitro* mammalian cell transformation; combined chronic toxicity and carcinogenicity test);
- Toxicokinetic and pharmacokinetic tests;
- Organ and system toxicity tests (including neurotoxicity and immunotoxicity, delayed neurotoxicity of organophosphorous substances following acute exposure and in 28-day repeated doses); and,
- Developmental neurotoxicity.

With the exception of the final test for developmental neurotoxicity, recently proposed by the OECD (OECD, 2003), the above list is a summary adapted from Appendix D in the UK Royal Commission report that, in turn, was obtained from the Regulatory Impact Assessment of the EU White Paper about the proposed REACH program. REACH (an acronym for Registration, Evaluation, and Authorization of Chemicals) is a European Union proposal for the phased assessment of high production volume chemicals.

Clearly there is no shortage of techniques available to assess health endpoints, and many of these are focused on addressing effects of concern in children. It is important to note that the latter are affected by the many challenges and limitations in scientific understanding and methodologies described in Sections 4.3 and 4.4.1 above. Some techniques are less developed than others (particularly the assessment of developmental neurotoxicity) and not all Risk Assessment procedures that are required or followed by individual regulatory agencies will include all tests as "core" requirements for the assessment of chemical substances. A discussion of the relative strength of each approach, and whether and under what circumstances it is applied in Canada or elsewhere, is beyond the scope of this review. What can be observed is that with the convergence occurring at the international level in both advanced Risk Assessment techniques and practices and the sharing of data, this should provide all agencies with the best available information for each substance evaluated. In theory, this situation ought to speed up Risk Assessments.

### 4.4.3 Screening, Sorting and Setting Priorities

It seems from the international review provided in the UK Royal Commission report that Canada, and to a lesser extent, the US, are ahead of countries in Europe, or at least the UK, in the use of advanced computational screening methods. This conclusion should be investigated in depth within the Health Canada ARAD research program. The UK report notes the value of using QSARs and recommends that the UK follow the North American lead in this area. The use of QSARs is described in the UK Royal Commission report as innovative and an improvement over the REACH proposals[5] in terms of the ability of such methods to quickly screen large numbers of substances and to avoid excessive use of animal testing and the consequent death of hundreds of thousands, if not millions, of vertebrate test animals.

The use of QSARs and other methods in Canada is assisting with the requirement to screen the DSL for substances that are persistent, bioaccumulative and inherently toxic. Also required in Canada, under the *Canadian Environmental Protection Act*, is an assessment of whether exposure to such substances is occurring.[6] The GPE data are also part of this screening and categorizing effort. By applying several streams of information (noted in Section 3.2.5 above), the DSL is being essentially short-listed to the GPE list, comprising a best guess estimate of DSL substances for which there is the greatest potential for exposure. The list of substances of concern to children generated by the database exercise undertaken here comprises another screen on the DSL (Canadian List #1), and when screened on the GPE data (Canadian List #2). However, the two lists generated by the database for this project also include nDSL substances and groups of substances.

### 4.4.4 End-of-Pipe and Rarely Integrated Approaches

Finally, in the context of ongoing integration of Risk Assessment approaches to the regulation of chemicals, it is worth noting an opposite observation made by the UK Royal Commission in its review of a wide variety of regulatory approaches to chemicals. Outside of the narrower scope of how chemicals are evaluated using increasingly integrated Risk Assessment approaches, they found an overall approach that is one-sided and with a distinct lack of integration. In looking at the dizzying and complex array of chemical substances, there are, around the world, correspondingly complex regulatory responses. However, the one-sidedness of this approach is apparent in terms of what aspects of chemicals are regulated. The majority of regulations concern chemical releases as emissions from manufacturing, while very little regulation exists for chemicals in products or directed at their environmental behaviour and effects.

In the first case, the regulation of chemical releases, there are well-developed, though rarely integrated, regulatory approaches. This observation is also evident in the lists gathered to create the database for this project. Regulatory approaches, established for controlling harmful chemicals, include the many statutes and regulations from which most of the lists

[5] The REACH proposals would require the full assessment of each HPV substance.

[6] As the writing for this report is concluding, Environment Canada is about to release for public consultation the results of initial screening of organic substances on the DSL (comprising roughly half of the list) using QSAR methods to predict persistence, inherent toxicity and the ability of substances to bioaccumulate.

originated that were imported to the database created for this project. In the second case, for the regulation of products containing chemicals, including their environmental behaviour and effects, regulation is poorly developed and is not coordinated with other regulatory regimes. The UK report (p. 6) makes this observation as a result of an international scan of regulatory approaches to chemicals management. The report also notes that the OECD identified this lack of integration across regulatory approaches over ten years ago in a 1991 OECD monograph entitled *Integrated Pollution Prevention and Control*. A broader approach to pollution control and prevention is recommended within the OECD in that report, which would take a life-cycle perspective assessing the effects of activities and substances throughout the entire chain of commercial activity and environmental fate. As NGOs and other commentators in Canada and elsewhere have noted, progress towards the kind of pollution prevention approach recommended in the OECD report of over ten years ago, has not been effectively, some would say even marginally, implemented.

The lack of integration across chemical regulatory approaches on both the chemical release and product and environmental fate sides of this spectrum is an observation that rings true in terms of the database constructed for this project. Among the many lists found, there is a preponderance of emission-focused, regulatory lists that are rarely integrated. The observation about the regulatory approach being one-sided also rings true, particularly in Canada. In the area of regulating products or ensuring regulation and monitoring of environmental behaviour and effects of chemicals, there are huge gaps, beginning with the difficulty of obtaining reliable exposure data. For the regulation of products, the *Hazardous Products Act* is an antiquated piece of legislation, the shortcomings of which are only partially compensated for by the inclusion of substances in products within the assessment processes flowing from the *Canadian Environmental Protection Act.*

# Part Five — Conclusions

This report summarizes more than a year of research that attempted to tap into two very large streams of information about children's health and environmental contaminants. The first information stream (recent, comprehensive literature reviews from credible sources) provided a snapshot of where consensus exists about children's health and contaminants of concern. Similar results were obtained from the second information stream, (the dozens of lists of substances imported to the project database), but with more specific results about individual chemicals. Many research questions arose from both information streams, and these inform the recommendations below. The third area of research, the evaluation of how Risk Assessment takes children's health into account in the regulation of toxic substances, was far too large an objective to fit within the project scope. A comprehensive review was not possible. Instead, the review of Risk Assessment was done in a summary way, focusing on areas that would inform the balance of this project and that would also usefully inform recommendations for future work.

In retrospect, it is clear that the initial project design and scope was far too large. The database exercise was successful in terms of serving as a useful scoping exercise that provided many interesting and provocative results. But, the effort was constrained by the shortcomings of the data sources and the complexity of the effort. Accordingly, the Risk Assessment review had to be scaled back and replaced by a brief critique. Nevertheless, the database created for this project is a powerful tool that can continue to be queried for a variety of purposes. It can also be expanded to include more lists, and existing lists can be updated, as needed. It can also be queried again without excluding pesticides from the results.

The project overall raises many questions with respect to the substances on the resulting short-lists and the corresponding Risk Assessment, and especially Risk Management, decisions that have been made or still need to be made about them.

## 5.1 The Literature Reviews

The following observations and conclusions can be drawn from the literature reviews canvassed in Part Two. The broad definition of "children" noted at the outset applies to these general statements.

Environmental contaminants are suspected in (and, more rarely, directly associated with) a broad range of health effects in children, or health effects for which childhood exposures are a concern. These effects are, in all cases, complex conditions with multiple causes, and the relative contribution of environmental factors is poorly understood and very difficult to isolate.

Many "dread" factors arise when noting the kinds of health effects listed in Table Two. From a communications perspective, these factors include the fact that the risks, or perceived risks, are often involuntary and inescapable; they are man-made rather than natural; they can cause hidden and irreversible damage; they cause danger to children and future generations; the form of harm arouses dread (e.g., birth defects, developmental concerns,

cancer, etc.); and the risks appear to be poorly understood by science (Bennett, et. al., 1999). Given these "dread factors," it is important to place the issues in the broader context of child health and in terms of the numbers of children potentially affected. It is possible to very generally divide the health concerns into those in which incidence rates of rare events may be increasing due to environmental contaminants, and those in which large numbers of children appear to be affected.

Health effects in the first category would include those for which the incidence of rare events (cancer, birth defects and other complications of pregnancy, immune system problems, etc.) is, in some cases, increasing in ways that are still rare, but seem beyond the realm of chance.

For the second category, large numbers of children are affected by respiratory and neurodevelopmental or neurobehavioural effects. Cancer might reasonably be included in both categories. Fortunately, small numbers of children are affected, but there are unexplained increases of certain cancers among young adults, and there are high rates of cancer in the adult population generally, raising the concern that exposures to substances with latent effects could have occurred during childhood, particularly during sensitive life stages.

It must be emphasized that drawing direct relationships among any of these effects in children and environmental or chemical contaminants is exceptionally difficult. Tragically, the only way that clear associations have been drawn has been where effects are obvious or dramatic (e.g., thalidomide) or where large numbers of children have been exposed for extended periods of time and scientific evidence has been collected to demonstrate the causal relationship. For example, this causal relationship was drawn with the evidence of harm from lead in gasoline. Similarly, strong evidence is emerging about the contribution of air pollution to childhood asthma. This "wait and see" approach is what has prompted lead expert Herbert Needleman to conclude, "we are conducting a vast toxicological experiment in which our children and our children's children are the experimental subjects."

Scanning the various literature reviews listed in Table One, it was possible to come up with a rough list of substances of concern, often needing to be grouped as general categories of substances. The literature reviews were often concerned with exploring the degree of certainty in the scientific evidence. Hence, the list of substances resulting from this review could be so divided, noting areas of emerging concern.

While a detailed review was not included here about exposure sources and pathways, this is an obvious next step. Air pollution appears to be the most significant source of environmental contamination, outweighing water emissions by a considerable margin. It also seems generally true from this review that areas or substances of emerging concern are often substances in consumer products, and others for which exposure is occurring via food, or exposures indoors, in house dust, air or dermal exposure. This general conclusion requires further investigation to be verified. Examples here include flame retardants, perfluorochemicals (PFCs) used in non-stick and non-stain surfaces on products, phthalates, etc.

Another impression from the literature review is, as already noted, the strength of the evidence for air pollution links to respiratory effects. But, it also seems clear that exposures from indoor air (and therefore including consumer products) appear to be strongly implicated.

However, the relative importance of biological factors (pet dander, moulds, dust mites) versus other indoor exposures (ETS, consumer products, etc.) must be carefully examined.

Recurring themes and recommendations across all of these reviews included the need for precaution and the need to learn from past mistakes. Recommendations were made for increased research and monitoring, including the need for indicators, biomonitoring and longitudinal study of the effects of large numbers of contaminants. In particular, recommendations were made for vastly enlarged epidemiologic research on child health beginning before conception and following through adolescence, supported by major initiatives to monitor and track population exposures. Both could benefit from substantial international collaborative effort. All reviews noted that childhood poverty worsens conditions for exposure and health outcomes, boys are more affected by neurodevelopmental effects than girls (for reasons unknown), and that research must be concerned with understanding multiple effects and multiple exposures.

## 5.2 The Database of Lists

The database was created on the expectation that combining information from all over the world, created for many of the same purposes, could yield unique, useful and interesting information. A great deal of care was taken to avoid comparing "apples to oranges" by ensuring that lists were cleaned up to remove, or correct, inconsistent or incomplete identifying information about individual substances or groups of substances, while maintaining the integrity of the data in the source list. Care was also taken to avoid making unreasonable comparisons across lists prepared for a variety of purposes.

The availability of a credible source of lists assigning known or suspected health effects to substances and groups of substances (on www.scorecard.org) was enormously valuable. Screening out the pesticides (a requirement of the project funder) was not entirely successful for reasons that are explained, and in the final result, in terms of helping to provide a picture of chemicals of concern to children, was an unfortunate omission.

The need to further screen the health effect lists against the DSL and the nDSL to obtain Canadian-content lists resulted in a surprisingly large number of substances from the nDSL. An early assumption was made during the research that the nDSL would not likely contain any of the substances of concern to children, given the greater degree of toxicological evaluation, particularly during the 1990s, that supposedly occurs for nDSL substances. However, observations about the nDSL substances on the final lists are highly speculative. The publicly available information about the nDSL contains nothing but CAS#s, it is not clear whether, or how much, the substances in the results are used in Canada, nor are these results informed by any exposure data. The list does warrant further detailed scrutiny and, at 318 substances, this becomes a reasonably manageable task.

The tallying in Table Five of substances in the two Canadian lists associated with the health effect categories confirms that substances of concern are overwhelmingly in the two categories of suspected neurotoxins and suspected respiratory toxins (each at approximately 50 per cent). Carcinogens follow at third place in frequency on both lists (at about 25 per cent). While a direct association cannot be drawn, it is provocative and disturbing to see that the largest number of substances of concern correspond to the two health effects in which large numbers

of children are affected in the general population. This finding should inform research priorities.

The results in Table Six of those substances suspected of, or associated with, four or more of the health effects considered comprises a "dirty six dozen" list that deserves detailed scrutiny. Table Seven, and the associated tables in Appendix Six, illustrate a range of lists of substances associated with a variety of health effect combinations and an indication of the flexibility of the database in teasing out varied results.

Table Eight yields information that flows in two useful directions. First, the two Canadian lists provide an interesting perspective on the large preponderance of these contaminants on certain lists, such as the NPRI lists, the two ARET lists, the CCPA list, the VCCEP list, the DSL Pilot, etc. As well, the regulatory lists provide interesting information about the nature of substances on the two Canadian lists. For example, large numbers of substances on the two Canadian lists appear on the OECD high production volume list of chemicals. Many are hazardous air pollutants and many appear on lists of hazardous waste. Very large numbers of substances on the two Canadian lists are in the Nordic Countries database of substances in products, and on EEC lists of hazardous substances.

To accomplish the project objective of paring down the roughly 33,000 substances in commercial use in Canada to a list of substances of concern to children, several "short-lists" have resulted that are, in many ways, very similar. The literature review results (Table Four) contain many of the same individual, and in particular, groups of substances as are in Canadian Lists #1 and #2. These latter two lists provide specific information as to which of these individual substances are on either the DSL or the nDSL. Likewise, Canadian List #2A, prepared by focusing in even more closely on substances associated with four or more of the health effects, closely mirrors the results of the literature review scan.

It was assumed during the research and database querying that further aggregation of these "short-lists" into a single list could be done to choose a final list. However, given the many qualifications that exist with respect to the data sources, it seems counter-productive to do so. Information would be lost that instead should prompt further investigation. The results of each exercise provide interesting and varied information that raise many questions.

For example, the list in Table Four resulting from the scan of literature reviews provides broad coverage of existing information and emerging issues. But, it lacks specificity about individual chemicals. The database exercise provides much the same information and fills in some useful details about specific substances that can be keyed directly into lists generated by regulatory agencies. But, when the first Canadian list is pared down with the use of the GPE data, it appears that important data are lost. For example, the GPE data do not include some important emerging areas where exposure is known to be high and increasing, such as the flame retardants, specifically the PDBEs. Also, many questions arise with respect to the substances on the nDSL for which there are no exposure data.

The "final list" is therefore a series of lists: Table Four, Canadian List #1 (Appendix Four), Canadian List #2 (Appendix Five) and Canadian List #2A (Table Six). These results retain the contextual information provided by describing substances as members of groups. Such groups often have common mechanisms of toxicity, and there is value in addressing the group

as a whole, both in a regulatory sense, as well as in choosing individual substances, on which to either focus further attention, or to illustrate problems with the group as a whole.

In summary, the results of the literature review lack specificity with respect to individual chemicals (via the unique CAS# identifier), but the review is entirely child-specific with respect to noting concerns about health effects and the substances and groups of substances surveyed. The literature review results also include pesticides, an extremely important issue with respect to children's health and environmental contaminants. The database exercise is almost entirely CAS#-specific, with additional and useful information about groups of substances, but it relies upon lists of health effects, half of which were not developed solely with children in mind. The results also rely upon a foundation of exposure data (Health Canada's GPE list) that is still a very preliminary work in progress, and a complete lack of exposure data for the nDSL substances. It is therefore appropriate to retain separated results from both exercises, use the information together where it is complementary, seek the lessons that can be learned from this work and tease out the many research questions that it presents. Finally, the database contains the pesticide information that was excluded from Canadian Lists #1 and #2. Such lists can be re-created again during subsequent work, without excluding pesticides. As such, these lists could then be queried against the regulatory lists and in other ways to continue to yield interesting and useful results. The next steps for the results provided in this report are proposed in detailed recommendations, contained later in this report.

## 5.3 Risk Assessment

This report provides a brief review of Risk Assessment, first in its broader context of Risk Assessment and Risk Management, and then in terms of a longstanding and well-developed critique. The critique of Risk Assessment relates directly to the scientific "data gap" that exists with respect to toxic substances, particularly knowledge of effects in children, noted throughout this report. To illustrate some of the scientific frontiers and challenges in Risk Assessment, a summary is provided of a recent report on developmental toxicology and Risk Assessment, alongside related commentary from a recent and comprehensive international review of Risk Assessment of chemicals in products, prepared by a UK Royal Commission.

The scientific frontiers in developmental toxicology and Risk Assessment provide a window into the complexity of both sides of this issue. It is equally as complex to understand the details of human development as it is to evaluate the effects of chemicals on development. This research field is an exciting and fast moving one, but very large gaps in understanding remain and the research agenda to close these gaps is massive. Meanwhile, exposure to thousands of toxic substances of unknown or uncertain toxicity continues.

In an effort to continue to scope a very large topic, a brief overview is provided noting how a variety of national and multi-lateral agencies are converging in their application of Risk Assessment techniques, including the increasing ways in which children are explicitly taken into account. This convergence in Risk Assessment techniques is contrasted with the observation that there is an overall lack of integration across regulatory approaches. Instead, regulatory approaches are largely one-sided, focusing on individual chemical releases and emissions

and largely ignoring the full life-cycle and environmental fate of harmful substances, a point also illustrated by the regulatory lists gathered for the database exercise described in Part Three of this report.

The brief survey done for this report points to several areas for further study with respect to Risk Assessment and children's health. The comprehensive review of Risk Assessment and children's health envisioned for this project should still occur. It should build upon the review by the UK Royal Commission, frequently referenced here, and can be part of the study for which Health Canada's ARAD request for proposals was issued in late 2003. That work is budgeted to a maximum of $600,000 and will likely comprise three sub-projects. It would be valuable for these three projects to be closely coordinated so that the entire package of research can be an integrated whole. Even at this scale, the topic remains enormous, and to be of the greatest value it should include focused reviews of the results of the combined package of Risk Assessment and Risk Management such that an evaluation is conducted of the actual results of this regulatory tool. Criteria to measure success should include an evaluation of whether or not the regulatory responses accomplish measurable reductions in exposure and prevention of harm.

Beyond this broad review within ARAD, which will be a lengthy exercise, many questions can be asked about the individual assessment (and especially the related Risk Management decisions) of the contaminants identified in the results of this research. For example, for substances in the lists generated in this project, many are already the subject of regulatory attention. Each can be further explored to determine the kind of child-specific data and methodologies that have been, or are being, employed in the setting of regulatory limits and the actual results in terms of final Risk Management decisions. Have final decisions been made? If not, why not, and how long have these investigations been running? What has been the "standard of proof"? Has precaution been incorporated? If so, how and if not, why not? Whether regulatory limits have been set, or revised, or not, is exposure continuing and, if so, why, where and how much? Can specific sources be pinpointed?

The brief review of Risk Assessment provided in this report, and the more detailed sections about environmental contaminants and children's health concerns, lead to common conclusions and recommendations about closing the data gap. There is an urgent need for more research and better monitoring, including biomonitoring, of chemical exposures. A child health focus is essential in this work. The overwhelming lack of monitoring that occurs following what is widely considered, by many NGOs and health professionals, to be the highly inexact "science" of Risk Assessment, is a major omission. It is also a serious flaw in the argument of Risk Assessment proponents, within government and industry, who insist that Risk Assessment is a "science-based" exercise. It is an understatement to say that Risk Assessment lacks accuracy. The corresponding lack of basic data collection, and indeed the lack of insistence by many Risk Assessment proponents that it be gathered, is a serious problem.

Many calls have been made for a paradigm shift towards precaution and away from the "analysis paralysis" of Risk Assessment; that is, towards pollution prevention, chemical and product substitution, finding safer alternatives, removing entire classes of substances on the basis of their inherent toxicity, etc. However, it is recognized that these issues are difficult to separate from a review of Risk Assessment, but that they are also beyond the scope of this review.

What can be noted from the results of this review of Risk Assessment, alongside the rest of the project results, is the recurring challenge of dealing with individual substances vs. groups of substances. Part of the criticism of Risk Assessment is the ponderously slow evaluation of one chemical at a time. In fact, this slow evaluation process goes to even greater extremes since government or industry, or both, can often insist, or be required by legislation or policy, on the conduct of a separate, detailed Risk Assessment each time a substance is used or released (for example, in a new emission, a new product, etc.). The history of lead in gasoline, paint, lead-soldered cans, drinking water, food, soil, consumer products, etc., is a case in point.

The brief survey of Risk Assessment done for this project highlights a clear role for government in information generation and collection. Within the constraints of limited government resources, priorities and clear roles should be set. There is a logical, if not ethical, imperative that those wanting to use (and profit from) chemicals should be responsible for demonstrating their safety. While the chemical industry may not agree with such an imperative, it is increasingly accepted, and it is impossible for government to muster the resources to conduct the required evaluations. What government can and should do is monitor results, demand, via legislative tools if necessary, the data demonstrating chemical safety, assist with the coordination and some of the funding of research, and facilitate pollution prevention and chemical and product substitution.

## 5.4 Recommendations

The following recommendations are organized within eight categories of activity and are briefly discussed.

### Monitoring, Longitudinal Study and International Coordination

1. The federal government should be directly involved in research into monitoring (including exposure and body burdens) of chemical substances and longitudinal study of child health. This work should be coordinated with international efforts already under development.

There is an urgent need for systematic data collection to provide a better understanding of body burdens of chemical substances, as well as information on the nature and circumstances of exposure (indoors and out). The proposed (by Statistics Canada) Canadian Health Measures Survey is a step in the right direction. It should be given high priority, should expand the range of substances to be monitored, and needs to be coordinated with vastly enlarged epidemiological research on child health beginning before conception and following through all sensitive life stages to the end of adolescence. Particular attention should be paid in this research to respiratory toxicity and developmental neurotoxicity, as well as on the application of emerging techniques to evaluate multiple exposures and multiple effects. Both of these initiatives would benefit from substantial international collaboration to both build on, and not duplicate, existing efforts, as well as to strengthen the information base for all. Accordingly, efforts in Canada should be immediately coordinated with efforts already underway in the United States and Europe to conduct biomonitoring and longitudinal studies.

### *Further Database Queries — Including Pesticides and Further DSL Categorization Results*

2. The database constructed for this project and the short-listing exercise should be expanded to include pesticides and further results of DSL categorization.

3. The ongoing results of efforts by Health Canada and Environment Canada to categorize the DSL should be compared to the results of this project. How are the results comparable? What is different and why?

Since the effort to exclude pesticides was not entirely successful and, more important, many pesticides are of concern to child health, it would be valuable to run a variety of list queries without the initial, and incomplete, exclusion of pesticides. Likewise, the database would benefit from inclusion of further lists that are being generated during 2004 by Environment Canada and Health Canada as the effort to categorize DSL substances continues. These lists include Environment Canada's first list of DSL substances that are persistent and bioaccumulative, and Health Canada's forthcoming list of DSL substances with inherent toxicity.

### *Drilling into Canadian Lists #1, #2 and #2A*

4. The lists of substances of concern generated from the database exercise in this project should be scanned to determine whether list entries are inappropriately or needlessly on the list.

5. The 834 substances in Canadian List #1 that were not included in Health Canada's Greatest Potential for Exposure (GPE) list should be investigated to determine whether emissions or exposure warrant further concern. This review should inform an assessment of the reliability of the GPE data.

A decision could be made to remove substances, such as pharmaceuticals, for which exposure is either unlikely or otherwise controlled. Drilling down into information about individual substances will need to be informed by various information sources, including much of the information reviewed for this report, and emerging information about pharmaceuticals in drinking water sources. In doing so, the degree of gaps in this information should be assessed.

6. Particular emphasis in further research should be placed on the "dirty six dozen" results (Canadian List #2A, Table Six) of substances suspected or associated with four or more of the health effects noted.

Are the substances in Canadian List #2A already the subject of regulatory attention? Which ones, and has regulatory action been effective? Recognizing that some have been the subject of Priority Substances List evaluations, and that the assessment reports generated from that work include detailed recommendations for risk management, research should be conducted to assess progress on accomplishing those recommendations and their effectiveness in reducing exposure.

7. For the fourteen substances from the nDSL in Canadian List #2A, further research should include detailed review of these individual substances for data on the amount and circumstances of emissions, exposure and biomonitoring data (if any), and a determination of why and how substances suspected or associated with so many health effects have been approved for use in Canada during the time that (supposedly) stringent evaluation criteria have been in place.

8. For the 318 substances on the nDSL in Canadian Lists #1 and #2, similar questions should be asked about emissions, exposure, monitoring and the child health aspects of the evaluation procedure that approved the use of these substances in Canada.

9. Research questions for subsequent evaluation of the substances of concern identified from this research should include: where are these substances used; how are emissions and/or exposures occurring; can specific facilities and/or consumer products be identified; are some exposures of greater significance to children than others; and for the latter, which ones and why? What kind of child-specific data and methodologies have been, or are being, employed in the setting of regulatory limits? Have precautionary measures to prevent exposure or harm, or both, have been incorporated in the setting of regulatory limits. If so, how, and if not, why not?

Gaps in the information base available to answer these kinds of questions should be identified and the means of providing such information explored. Across all these reviews, the issue of whether or not regulatory action has been consistently slow and/or delayed should be evaluated.

### *Respiratory Toxins and Neurotoxins*

10. Priority should be placed on respiratory toxins and developmental neurotoxins, including ensuring that substances suspected or associated with developmental neurotoxicity are caught during DSL categorization for inherent toxicity and evaluation of nDSL substances.

11. The findings of high levels of respiratory effects and neurodevelopmental effects in the child population and the parallel findings, in this research, of very large numbers of substances of concern associated with or suspected of contributing to respiratory and neurotoxic effects, should prompt routine evaluation of these effects during Risk Assessments of toxic substances.

Given the results of this study, emphasis is warranted for further research in the areas of respiratory toxins and neurotoxins. An attempt should be made to develop lists of child-specific respiratory toxins and developmental neurotoxins. Such lists should be assessed to determine whether they are significantly different than the respiratory toxins and suspected neurotoxins lists used in this research, and they should be compared to the DSL and nDSL. The results of Health Canada's and Environment Canada's categorization efforts for the DSL should be evaluated to determine whether or not substances suspected or associated with developmental neurotoxicity are caught during categorization for inherent toxicity.

### Seeking Efficiencies — Dealing with Groups of Substances

12. Evaluations of substances contained in consumer products and in environmental emissions must include the efficiency of making decisions about entire groups of substances, particularly when entire groups of substances are suspected or associated with health effects of concern.

13. Given that the results of this exercise include many groups of substances of concern, as well as substances on the non-Domestic Substances List, it should be investigated whether and how the evidence of harm about entire groups of substances is being incorporated into the DSL categorization efforts? Alongside the DSL work, how are Health Canada and Environment Canada addressing substances of concern on the non-Domestic Substances List?

Groups of substances that are, by their inherent qualities, suspected or associated with serious health effects, including developmental neurotoxicity, should be regulated as a group, phased down, as a group, and ultimately phased out. The evaluation of safer alternatives should be part of these evaluations. This approach encompasses a paradigm shift towards integrated regulation that addresses entire life-cycles of toxic substances and embraces efficiency measures to eliminate entire baskets of problems while facilitating the switch to safer alternatives. It is also a practical and necessary response to the backlog of tens of thousands of unregulated substances in commercial use.

### Informing the CEPA Review and the Proposed Canada Health Protection Act

14. The many research questions raised in this report and its recommendations should be focused on various ways to assist with an evaluation of the effectiveness of the *Canadian Environmental Protection Act* (CEPA) and to formulate recommendations for the proposed Canada Health Protection Act (CHPA).

15. Given the recent changes to the *Pest Control Products Act*, (to be proclaimed during 2004), with respect to ensuring the evaluation of exposure and toxicity to children, as well as reversing the onus of proof about pesticide safety, an evaluation should include whether and how these measures could or should be incorporated into CEPA and the proposed CHPA.

Research questions for individual substances should address and evaluate whether and how various tools within CEPA have been used, including various powers to require data, to use the results of international reviews of toxic substances, and to categorize substances for persistence, bioaccumulation, inherent toxicity and exposure potential.

### Comparing Substances of Concern with Exposure Data

16. A longer-term research goal should include aggregating information about substances of concern to be able to compare exposure data (from environmental levels, biomonitoring, etc.) with health-based reference levels.

Lessons from lead in gasoline and other well-studied contaminants can assist with this work, and especially can assist with achieving the objective of preventing the increase of exposure levels to points at which health-based reference levels are exceeded in the child population. Differences across populations can also be examined with this kind of research to assist in focusing efforts where they are most required and to avoid subjecting vulnerable populations to undue harm.

### Health Canada ARAD's Child Health Policy Review — Risk Assessment Research Priorities

17. The research scheduled to begin in the fall of 2004 for Health Canada's Applied Research and Analysis Directorate to analyze domestic and international governance tools that address the protection of children's health from exposure to environmental contaminants should include a comprehensive review of Risk Assessment approaches as they address the vulnerability of children.

In particular this work should include focused reviews of the results of the combined package of Risk Assessment and Risk Management so that an evaluation is conducted of the actual results of this regulatory tool. Criteria to measure success should include an evaluation of whether or not the regulatory responses accomplish measurable reductions in exposure and prevention of harm. More specifically, the research should evaluate the availability and effectiveness of tools to assess aggregated exposures of the same substance from multiple sources, multiple exposures to multiple substances, the assessment of substances with multiple effects, and the assessment of groups of substances with common mechanisms of toxicity. To be useful, this review should not only explore whether and how such methods exist, or are being developed, but also should drill down into a few examples of individual or group assessments to assess their effectiveness. Criteria for evaluating effectiveness should include whether actual reductions in exposure and health effects are evident or can be measured. If not, why not? To get at the key issues within the debate about the effectiveness of Risk Assessment, this research should also assess, or at least make recommendations for companion research to assess, the comparative and/or complementary effectiveness of banning substances that are inherently toxic, persistent and bioaccumulative, the impact and effectiveness of data call-ins, producer liability and reversing the onus of proof to require industry to demonstrate chemical safety.

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# Summary of References for Health Effects Source Lists in Database

### Neurotoxins — Suspected

Environmental Defense Fund "Scorecard" (www.scorecard.org) health effects of chemicals — suspected neurotoxins — compiled from 21 databases or references including EPA, National Institute for Occupational Safety and Health's Registry of Toxic Effects of Chemical Substances, NJ Dept of Health Services TRI Fact Sheets and Casarett and Doull's Toxicology, the Basic Science of Poisons, edited by C. Klaasen, M. Amdur J. Doull, 5th Ed. Pergamon Press, NY 1996. Complete list of references on-line at: www.scorecard.org/health-effects.

### Carcinogens — Suspected

Environmental Defense Fund "Scorecard" (www.scorecard.org) health effects of chemicals — suspected carcinogens — compiled from California Proposition 65 ("chemicals known to the State of California to cause cancer" and broadened to include suspected carcinogens from 15 databases or references including USEPA, National Toxicology Program, International Agency for Research on Cancer, William, G. and J. Weisburger, Chemical Carcinogens. Chapter 5 in Casarett and Doull's Toxicology, the Basic Science of Poisons, edited by C. Klaasen, M. Amdur J. Doull, 5th Ed. Pergamon Press, NY 1996. Complete list of references on-line at: www.scorecard.org/health-effects.

### Developmental Toxins — Recognized and Suspected

Environmental Defense Fund "Scorecard" (www.scorecard.org) health effects of chemicals — recognized and suspected developmental toxins — compiled from California Proposition 65 ("chemicals known to the State of California to cause reproductive toxicity" and 11 databases or references including USEPA, US National Research Council, Subcommittee on Reproductive and Developmental Toxicity, US National Toxicology Program, and Manson, J. Teratogens. Chapter 7 in Casarett and Doull's Toxicology, the Basic Science of Poisons, edited by C. Klaasen, M. Amdur J. Doull, 5th Ed. Pergamon Press, NY 1996. Complete list of references on-line at: www.scorecard.org/health-effects.

### Endocrine Toxins — Suspected

Environmental Defense Fund "Scorecard" (www.scorecard.org) health effects of chemicals — suspected endocrine toxins — compiled from 23 databases or references including USEPA, US National Research Council, US Agency for Toxic Substances and Disease Registry, European Commission, International Program on Chemical Safety, National Institute for Occupational Safety and Health. Complete list of references on-line at: www.scorecard.org/health-effects.

### Immunotoxins — Suspected

Environmental Defense Fund "Scorecard" (www.scorecard.org) health effects of chemicals — suspected immunotoxins — compiled from 21 databases or references including USEPA, US Agency for Toxic Substances and Disease Registry, International Programme on Chemical Safety, US National Institute for Occupational Safety and Health's Registry of Toxic Effects of Chemical Substances, and Dean, J., M. Murray, and E. Ward. Toxic Responses of the Immune System. Chapter 9 in Casarett and Doull's Toxicology, the Basic Science of Poisons, edited by C. Klaasen, M. Amdur J. Doull, 5th Ed. Pergamon Press, NY 1996. Complete list of references on-line at: www.scorecard.org/health-effects.

### Reproductive Toxins — Recognized and Suspected

Environmental Defense Fund "Scorecard" (www.scorecard.org) health effects of chemicals — recognized and suspected reproductive toxins — compiled from California Proposition 65 ("chemicals known to the State of California to cause reproductive toxicity") and 17 additional databases or references including USEPA, US National Research Council, US National Toxicology Program Center for the Evaluation of Risks to Human Reproduction, US Agency for Toxic Substances and Disease Registry, and Dixon, R. Toxic Responses of the Reproductive System. Chapter 16 in Casarett and Doull's Toxicology, the Basic Science of Poisons, edited by C. Klaasen, M. Amdur J. Doull, 5th Ed. Pergamon Press, NY 1996. Complete list of references on-line at: www.scorecard.org/health-effects.

### Respiratory Toxins — Suspected

Environmental Defense Fund "Scorecard" (www.scorecard.org) health effects of chemicals — suspected respiratory toxins — compiled from 21 databases or references including USEPA, US Agency for Toxic Substances and Disease Registry, National Institute for Occupational Safety and Health's Registry of Toxic Effects of Chemical Substances, US National Toxicology Program and Menzel, D.B. and M. Amdur, Toxic Responses of the Respiratory System. Chapter 15 in Casarett and Doull's Toxicology, the Basic Science of Poisons, edited by C. Klaasen, M. Amdur J. Doull, 5th Ed. Pergamon Press, NY 1996. Complete list of references on-line at: www.scorecard.org/health-effects.

### Thyroid Hormone Interference — Recognized

List of synthetic chemicals that interfere with the production, transport, and metabolism of thyroid hormone obtained from Howdeshell, K.L., A Model of the Development of the Brain as a Construct of the Thyroid System, in *Environmental Health Perspectives*, Vol. 110, Suppl 3, June, 2002, pp. 337–348. List contains synthetic chemicals list in Table One of this article wherein each chemical is noted according to the thyroid mechanism with which it interferes. Eleven chemicals were excluded due to inability to locate CAS numbers.

# Appendices

# Appendix One: Source Lists Gathered for Database

The following lists or databases were imported to the database constructed for this project. They are organized into general categories of either list types or jurisdictional origin. Following this list is a table noting descriptive details for those lists (a sub-set of the total listed below) used to generate the results in this report.

## Pesticide Lists

Active Ingredients of Pesticides Used in Canada
Banned or Severely Restricted Pesticides

## Health Lists

California Proposition 65
Health Cancer
Health Recognized Developmental Toxins
Health Recognized Reproductive Toxins
Health Suspected Developmental Toxins
Health Suspected Endocrine Toxins
Health Suspected Immunotoxins
Health Suspected Neurotoxins
Health Suspected Reproductive Toxins
Health Suspected Respiratory Toxins
Thyroid Hormone Interference
IARC Classifications

## Canadian — Federal Lists

Domestic Substances List
Non Domestic Substances List
DSL Pilot
FDA Act Ingredients
FDA Substances in Products
Fisheries Act Effluent Regulations
GPE scan of DSL
Candidate Toxic Substances ARET
Candidate Toxic Substances ARET 2
National Ambient Air Quality Contaminants
National Pollutant Release Inventory
National Pollutant Release Inventory 2001
Priority Substances List
Prohibited Substances Canada
Toxic Substances List
TSMP Track 1
Haz Prod Act CCC Reg Subst of Spec Concern

## Air — Canadian and Provincial Lists

Air Contaminants Alberta EPEA
Air Contaminants BC Waste Management Act
Air Contaminants NB Clean Air Act
Air Contaminants Point of Impingement
Air Contaminants Regulation 127

## Water — Canadian and Provincial Lists

Drinking Water Contaminants SDWA
Effluent Discharge Contaminants BC
Process Effluent Discharge Substances Ont EPA
Water Contaminants Alberta EPEA

## Hazardous Waste and Contaminated Sites — Canadian Lists

Contaminated Sites Substances BC
Haz Wastes Ontario EPA Reg347 and 558
Hazardous Waste Chemicals Alberta EPEA
Special Waste Chemicals BC

## Ozone Depleting Substances Lists

Ozone Depleting Substances Alberta EPEA
Ozone Depleting Substances BC
Ozone Depleting Substances CEPA
Ozone Depleting Substances EPA
Ozone Depleting Substances Montreal Protocol
Ozone Depleting Substances NB Clean Air Act

### Canada-US, Trinational and FPT Lists

Canada Ontario Agreement
Chemicals Requiring Sound Management
Great Lakes Binational Toxics Strategy
Substances Requiring Canada Wide Standards
Transboundary Air Pollutants Canada US

### US Lists

Bioaccumulative Chemicals of Concern
CERCLA Priority List
CERCLA Top 20
Criteria Air Pollutants US Clean Air Act
Extremely Hazardous Substances Superfund
Hazardous Air Pollutants US Clean Air Act
Hazardous Constituents US RCRA
Inhalation Hazard Chemicals US DOT
Maximum Contaminant Levels USSDWA
Persistent Bioaccumulative and Toxic Chemicals
Priority Pollutants US Clean Water Act
Regulated Toxic Explosive or Flammable
Toxic Release Inventory Chemicals

### Rotterdam PIC and Related Canadian Lists

Hazardous Waste Export Import
Prior Informed Consent Chemicals Rotterdam
Restricted Substances Canada
Substances Requiring Export Notice or Consent

### International and EU

EEC List of Priority Substances
OSPAR List of Chemicals for Priority Action
OSPAR Substances of Possible Concern
Persistent Organic Pollutants Stockholm
SPIN Simple List
WHO Air Quality
NClass Arsenic and its compounds
NClass Cadmium and its compounds
NClass Database EEC
NClass Lead and its compounds
NClass Manganese and its compounds
NClass Mercury and its compounds
NClass Nickel and its compounds
NClass Substances derived from coal
NClass Substances derived from petroleum

### Industry Lists

CCPA NERM list
Voluntary Childrens Chemical Evaluation Program

### HPV Lists

HPV 1990
HPV 1994 Additions
HPV Additional Chemicals
OECD List of HPV Chemicals

### Misc

Candidate Substances for Ban and Phase Out — Ontario

**Table One (Appendix 1) — Table of Lists Imported to Database** including brief description, originating organization, law, policy or guideline, and country of origin. Most lists were obtained in April of 2003, Scorecard Health Effect lists were updated in October of 2003, and a few lists were obtained in late 2003 including the GPE scan of the DSL).

| List Name | Description | Organization | Act | Country |
|---|---|---|---|---|
| Active Ingredients of Pesticides Used in Canada | Under the Pest Control Products Act, the federal government registers both the active ingredient and the pest control product. The list of active ingredients varies from year to year but normally falls in the range of hundreds of substances. The number of control products registered in Canada is in the thousands. The list used here is currently registered active ingredients in Canada and contains some duplication since some pesticides may be registered for use for more than one purpose. (Note deletions: 50-00-0 formaldehyde, 7664-41-7 ammonia, 9016-45-9 NPE and 9002-93-1 OPE) (517 list entries) | Pest Management Regulatory Agency | Pest Control Products Act | Canada |
| Air Contaminants Alberta EPEA | Alberta's Environmental Protection and Enhancement Act (EPEA) prohibits the release of air contaminants unless there is an express approval, or the release is permitted by regulations or codes of practice adopted by regulation. Four types of substances are included: visible emissions from stationary sources, particulate emissions from industrial and combustion activities, emissions from secondary lead smelter and releases from vinyl chloride and polyvinyl chloride plants. Additionally, Alberta's unenforceable ambient air quality guidelines may be made enforceable by incorporation into a specific approval or order. After removing duplication across the list of ambient air quality guidelines and the four types of substances covered by regulation, there are 35 substances included. Fields 3-5 correspond to: Common Air Pollutants, Air Toxic Substances, and Other Air Quality Parameters. | Alberta Environment | Environmental Protection and Enhancement Act | Canada |
| Air Contaminants BC Waste Management Act | British Columbia's Waste Management Act establishes three types of regulations governing air contaminants including industry-sector specific regulations controlling stationary sources, motor vehicle or mobile sources, and general waste management identifying contaminants subject to certain annual permit fees per tonne of air contaminant emitted. | British Columbia Ministry of Water, Land and Air Protection | Waste Management Act | Canada |
| Air Contaminants NB Clean Air Act | Under the New Brunswick Clean Air Act emission standards are set for specific industries, for parts of the province, or for province-wide application. Air quality regulations group all sources of air pollution into four categories according to their amount and type of air emissions. | New Brunswick Department of the Environment and Local Government | Clean Air Act | Canada |
| Air Contaminants Point of Impingement | Point of Impingement (point of environmental contact for air contaminants) standards under the Environmental Protection Act (EPA) are province-wide limits on contaminants regardless of the industrial source of emission. Additionally, Ministry of Environment sets 300 ambient air quality criteria (AAQC), including the 94 legally enforceable POI limits. The remaining AAQC are unenforceable unless incorporated specifically into a certificate of approval (licence or permit) issued under the Act for a particular industrial or municipal air emission source. | Ontario Ministry of Environment | Environmental Protection Act | Canada |

| List Name | Description | Organization | Act | Country |
|---|---|---|---|---|
| Air Contaminants Regulation 127 | Ontario's Airborne Contaminant Discharge — Monitoring and Reporting regulation requires estimating and reporting of emissions for over 350 air contaminants identified from various domestic and international environmental programs including the National Pollutant Release Inventory. Annual reporting is required if facilities meet specific reporting criteria, such as emissions that exceed specific contaminant thresholds. For some chemicals, such as criteria air contaminants (e.g., SO2, VOC, NOx, CO, PM, PM10 and PM2.5), additional reporting is also required. Fields 3-11 correspond to: Ministry of the Environment Release Based Thresholds, Ministry of the Environment Graded MPO (manufactured, processed or otherwise used) Thresholds, National Pollutant Release Iventory— 2002, Part 2, Part 3, Part 4 — Criteria Air Contaminants, Part 5 — Selected Vocs With Additional Reporting Requirements, Isomer Groups, Other Groups And Mixtures | Ontario Ministry of Environment | Airborne Contaminant Discharge Monitoring and Reporting Regulation | Canada |
| Banned or Severely Restricted Pesticides | List maintained by USEPA of banned or severely restricted pesticides. "Banned" pesticides are those for which all registered uses have been prohibited or all requests for any registered use have been refused for health or environmental reasons. "Sseverely restricted" pesticides are those for which virtually all registered uses have been prohibited, but certain specific registered use or uses remain authorized. The list is maintained as part of US participation in the Prior Informed Consent (PIC) procedure, a voluntary international program. (64 list entries) | US Environmental Protection Agency | Prior Informed Consent — voluntary international agreement | USA |
| Bioaccumu-lative Chemicals of Concern | Under the US EPA's Final Water Quality Guidance for the Great Lakes System, specific chemicals are identified as bioaccumulative chemicals of concern (BCCs) that will be subject to stringent regulatory controls. BCCs include any chemical with the potential to cause adverse effects after release to surface waters due to bioaccumulation in aquatic organisms where the bioaccumulation factor is greater than 1 ,000, after considering metabolism and other physicochemical properties. | US Environmental Protection Agency | Water Quality Guidance for the Great Lakes System | USA |
| California Proposition 65 | List of 689 substances (as of Oct. 24, 2003) compiled under California's Proposition 65, the Safe Drinking Water and Toxic Enforcement Act of 1986. This law, enacted by public referendum, requires the state to publish, at least annually, a list of chemicals known to the state to cause cancer or reproductive toxicity, including birth defects or other reproductive harm. | California Office of Environmental Health Hazard Assessment | Proposition 65 | USA |
| Canada Ontario Agreement | The Canada-Ontario Agreement of 2002 commits Canada and Ontario, among other things, to establish schedules and to achieve significant reductions in the releases of persistent, bioaccumulative, and toxic substances. Two Tiers of substances are included. Tier I substances are targeted for virtual elimination. They are of immediate concern due to their persistence, toxicity and ability to bioaccumulate. Tier II substances have demonstrated potential to cause harm and are subject to research and voluntary reductions at source. Periodic updates of Tier II substances are required. Those found to be persistent, bioaccumulative or toxic, via weight-of-evidence evaluation and stakeholder consultation, may be elevated to Tier I. Fields 3-5 correspond to: Tier I, Tier II, PAHs, (17 PAHs, 5 indiv named) | Environment Canada and Ontario Ministry of Environment | Canada-Ontario Agreement | Canada |

| List Name | Description | Organization | Act | Country |
|---|---|---|---|---|
| Candidate Substances for Ban and Phase Out | The Ontario Ministry of the Environment, in 1992, published a Candidate Substances List for Bans and Phase-Outs, Criteria for choosing substances included toxicity, persistence and bioaccumulation. About 800 substances were assessed. The final list of 28 substances included several pesticides, most of which have since been banned in Ontario. | Ontario Ministry of Environment | Proposal | Canada |
| Candidate Toxic Substances ARET | The Candidate Toxic Substances list was developed within the industry-lead voluntary challenge program also known as Accelerated Reduction and Elimination of Toxics (ARET) that ran from 1994 to 2000. At its height ARET attracted the participation of 318 facilities from 171 companies representing 8 major industrial sectors in Canada. Collectively, the participants achieved a total reduction in releases to the environment of almost 28,000 tonnes of toxic substances. In 1993, ARET proposed a list of 117 candidate substances for action divided into five categories based on toxicity, bioaccumulation and persistence of substances. | Accelerated Reduction and Elimination of Toxics | Voluntary Program | Canada |
| Candidate Toxic Substances ARET 2 | Following the conclusion, in 2000, of the original ARET program, Environment Canada has worked with stakeholders on ARET 2 which will be another voluntary program to challenge participants to reduce or eliminate releases of toxic substances related to their operations and likely the reduction and elimination of the use of such substances as well. A larger list of substances is targeted than in the first program. | Accelerated Reduction and Elimination of Toxics | Voluntary Program | Canada |
| CCPA NERM list | The Canadian Chemical Producers Association reports annually on total emissions of substances from its members. The list used here includes CCPA member emission reporting for 2001 with each substance further identified for its appearance on most federal regulatory lists, the ARET list and several substance-specific pieces of information such as appearance on, and classification within, the list of substances evaluated for carcinogeneity by the International Agency for Research on Cancer (IARC). | Canadian Chemical Producers Association | Voluntary Program | Canada |
| CERCLA Priority List | EPA's National Priorities List for Uncontrolled Hazardous Waste Sites (NPL) is a published list of hazardous waste sites that are being addressed through the Superfund program. These Superfund sites are found throughout the United States and in several US territories. For a state-by-state listing of NPL sites. | US EPA and US ATSDR | Comprehensive Response, Compensation, and Liability Act (CERCLA) | USA |
| CERCLA Top 20 | List created by the US Environmental Protection Agency and the Agency for Toxic Substances and Disease Registry to denote the top 20 hazardous substances on the CERCLA Priority List of Hazardous Substances for 2001. Prioritization for the entire Priority List of Substances takes account of frequency of occurrence at NPL sites, toxicity, and potential for human exposure. This list contains the first twenty substances on the ranked list. | US EPA and US ATSDR | Comprehensive Response, Compensation, and Liability Act (CERCLA) | USA |

| List Name | Description | Organization | Act | Country |
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| Chemicals Requiring Sound Management | Under the North American Agreement on Environmental Cooperation (NAAEC), Canada, Mexico, and the United States have a tri-lateral framework for the sound management of chemicals that pose mutual concern and that are persistent and toxic. Operating through the Commission for Environmental Cooperation (CEC), a tri-lateral working group on the sound management of chemicals is mandated to develop North American regional action plans for the management and control of substances nominated by the CEC Council. | North American Commission for Environmental Cooperation | North American Agreement on Environmental Cooperation | Canada-Mexico-USA |
| Contaminated Sites Substances BC | British Columbia's Waste Management Act and regulations set out a regime for the identification, determination, and remediation of contaminated sites, including the assessment and allocation of liability for contamination. Contaminated sites include land, groundwater, surface water, or sediment containing hazardous waste (as identified in special waste regulations) or substances at concentrations that exceed soil or water standards. Substances are subject to general or specific soil and water standards. With duplication removed across these lists, there are standards for 184 substances. Fields 3-14 correspond to: Substances Subject to Soil Standards, Substances Subject to Water Standards, Inorganic Substances, Chlorinated Hydrocarbons, Miscellaneous Organic Substances, Monocyclic Aromatic Hydrocarbons, Phenolic Substances, Phthalic Acid Esters, Polycyclic Aromatic Hydrocarbons, Glycols, Halogenated Methanes, Organotins, Pesticides, Radioactive | British Columbia Ministry of Water, Land and Air Protection | Waste Management Act | Canada |
| Criteria Air Pollutants US Clean Air Act | Under Section 108 of the US Clean Air Act, the US EPA is authorized to establish National Ambient Air Quality Standards (NAAQS) for criteria air pollutants to protect public health and the environment. Criteria air pollutants must cause or contribute to air pollution that may reasonably be anticipated to endanger public health or welfare and must be present in ambient air results from numerous or diverse mobile or stationary sources. | US Environmental Protection Agency | Clean Air Act | USA |
| Domestic Substances List | Domestic Substances List (DSL), contains over 23,000 industrial chemicals in commercial use and is used to determine whether a substance is classified as new to Canada or whether it is an existing substance. The federal government is categorizing substances on the DSL for their persistence, bioaccumulation and inherent toxicity. Use and environmental fate data are also being collected. | Health Canada and Environment Canada | Canadian Environmental Protection Act | Canada |
| Drinking Water Contaminants SDWA | Drinking water protection regulations under the Safe Drinking Water Act (SDWA) set as enforceable standards the pre-existing Drinking Water Objectives. The chemical, physical, and radiological drinking water contaminant standards apply to both municipal and non-municipal drinking water systems. Fields 3-5 correspond to: Chemical/Physical Parameters, Radiological Parameters, Natural Radionucleides, Artificial Radionucleides | Ontario Ministry of Environment | Safe Drinking Water Act | Canada |

| List Name | Description | Organization | Act | Country |
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| DSL Pilot | List of 123 substances contained in the November 17, 2001 Canada Gazette, Part One. Most of the substances (93) were proposed by a technical advisory group. An additional 30 substances were proposed by Health Canada. The list includes a range of classes and types of uses for the substances present on the Domestic Substances List. The notice is essentially a data call-in requiring the submission of information about the substances including about their manufacture, use, movement, import/export, including quantities in each area, as well as trade names, Material Safety Data Sheets, use patterns and any studies related to persistence, bioaccumulation or toxicity of the substances. Information in this list is limited to chemical name, CAS number, chemical synonyms and trade names. | Canada Federal Government | Canadian Environmental Protection Act | Canada |
| EEC List of Priority Substances | Under the Treaty establishing the European Community, Council Regulations in 1994, 1995, 1997 and 2000, established four lists of substances (Priority Substances Lists 1, 2, 3, and 4) to be evaluated for the sake of controlling risks. The tasks of risk evaluation are spread across all member states with the regulation noting which state is responsible for evaluating each substance. | European Economic Community (EEC) | Commission Regulation (EC) No 2364 and Council Regulation (EEC) 793/93 | European Union |
| Effluent Discharge Contaminants BC | British Columbia's Waste Management Act and regulations provide for a permitting and approval process for contaminants in effluent discharges to water. Regulations are industry-sector specific, identifying contaminants subject to controls, or general waste management permits that identify those contaminants subject to annual permit fees per tonne of contaminant discharged. | British Columbia Ministry of Water, Land and Air Protection | Waste Management Act | Canada |
| Extremely Hazardous Substances Superfund | Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Superfund Program was created to clean up uncontrolled or abandoned hazardous-waste sites and to respond to contaminant accidents and emergencies. CERCLA defines a list of hazardous chemicals for which the US EPA must establish regulations. Hazardous substances identified in CERCLA include all chemicals on four other regulatory lists: Clean Air Act list of hazardous air pollutants (HAPs); Clean Water Act list of hazardous substances and priority pollutants; Solid Waste Disposal Act list of hazardous wastes; and Toxic Substances Control Act list of imminent hazards. | US Environmental Protection Agency | Superfund Amendments and Reauthorization Act | USA |
| FDA Act Ingredients | List of those substances found in cosmetics and personal care products that have been identified, through a database search, by Health Canada officials as having been on the Canadian market between January 1, 1987, and September 13, 2001. | Health Canada | Food and Drug Act | Canada |
| FDA Substances in Products | Substances in Products Regulated Under the Food and Drugs Act (F&DA) That Were In Commerce between January 1, 1987 and September 13, 2001. | Health Canada | Food and Drug Act | Canada |
| Fisheries Act Effluent Regulations | The Fisheries Act prohibits pollution of fish consumed by humans or of fish habitat unless authorized by regulations specifying allowable emissions of specified deleterious substances. Several industrial sector-specific effluent regulations designate substances subject to general prohibitions of the Act and effluent control limits specified in regulations. Fields 3-6 correspond to: Chlor-Alkali Mercury Effluents, Metal Mining Effluents, Petroleum Refinery Effluents, Pulp and Paper Effluents | Environment Canada | Fisheries Act | Canada |

| List Name | Description | Organization | Act | Country |
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| GPE scan of DSL | The GPE data were compiled from a systematic consideration of information about exposure to DSL substances (including potential consumer exposure) using three data streams encompassing data on chemical volume, use, and expert prediction of high, medium or low potential for exposure. | Health Canada | Canadian Environmental Protection Act | Canada |
| Great Lakes Binational Toxics Strategy | Under the Great Lakes Binational Toxics Strategy, Great Lakes regional and federal governments and other organizations seek the virtual elimination of persistent toxic substances in the Great Lakes that result from human activity. Two categories of substances are established under the strategy. Level I include substances with well-known harmful or toxic effects and environmental persistence and which have previously been nominated to other lists of concern to the Great Lakes basin ecosystem. The Strategy focuses efforts on substances that are persistent, toxic, and/or bioaccumulative. Level II substances, identified by one or both countries, have the potential to cause significant impacts and both countries agree to share information as to the ability of these substances to be persistent, toxic or bioaccumulative. Fields 3-4 correspond to: Level I, Level II | Great Lakes Binational Toxics Strategy | Voluntary Program | Canada-USA |
| Haz Prod Act CCC Reg Subst of Spec Concern | The Consumer Chemicals and Containers Regulation, 2001 under Canada's Hazardous Products Act sets out substances of special concern in Section 34 of the Regulation as those where standard animal tests may not reflect the actual hazard posed by these substances to humans. Section 34 notes the substances of special concern, the concentrations of concern and a related categorization of harmful, toxic, or very toxic. | Health Canada | Hazardous Products Act Consumer Chemicals and Containers Regulation | Canada |
| Haz Wastes Ontario EPA Reg347 and 558 | The Environmental Protection Act (EPA) establishes the regulatory framework for managing and tracking the movement of hazardous wastes in Ontario. Through regulations under the Act, the province defines hazardous wastes to be a mixture of eleven different categories of waste. Numerous chemicals are listed in each category. The list of hazardous wastes compiled for this project cover acute hazardous waste chemicals, hazardous waste chemicals, severely toxic contaminants, and leachate toxic waste contaminants. Duplication of substances appears in some of the lists. Consequently, the total number of substances listed here, without duplication is 384 substances. Fields 3-6 correspond to: Schedule 2(A) - Acute Hazardous Waste Chemicals, Part B- Hazardous Waste Chemicals, Severely Toxic Contaminants, Leachate Contaminants | Ontario Ministry of Environment | Environmental Protection Act | Canada |
| Hazardous Air Pollutants US Clean Air Act | List of Hazardous Air Pollutants (HAP) identified under the US Clean Air Act that are known to cause or may reasonably be anticipated to cause adverse effects to human health or adverse environmental effects. "National emissions standards for hazardous air pollutants" (NESHAPs) are issued to limit the release of specified HAPs from specific industrial sectors. Standards are "technology-based," not based on health risk considerations: allowable releases and resulting concentrations have not been determined to be safe for the general public. The Clean Air Act does not establish air quality standards for HAPs that define legally acceptable concentrations of these pollutants in ambient air. | US Environmental Protection Agency | Clean Air Act | USA |

| List Name | Description | Organization | Act | Country |
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| Hazardous Constituents US RCRA | List contained in Appendix VIII of the US Resource Conservation and Recovery Act (RCRA) and used to identify the universe of chemicals of concern under RCRA, the main federal law governing disposal of hazardous wastes. Substances on the Hazardous Constituents list meet the following criteria: Inclusion in the Clean Water Act list of priority pollutants; chemicals considered hazardous to transport by the Department of Transportation; chemicals identified as carcinogens by the US EPA's Carcinogen Assessment Group; and chemicals with high acute toxicity, as identified by the National Institute for Occupational Safety and Health's Registry of Toxic Effects of Chemical Substances list. | US Environmental Protection Agency | Resource Conservation and Recovery Act | USA |
| Hazardous Waste Chemicals Alberta EPEA | Alberta's Environmental Protection and Enhancement Act (EPEA) provides a regulatory framework for managing and tracking the movement of hazardous wastes which are defined by reference to schedules in the regulations and related criteria and provincial guidance. The schedules identify as hazardous waste both toxic leachates and hazardous wastes in four categories. The regulations also exempt certain types of waste from the definition of hazardous waste. The substances included her are landfill and leachate hazardous waste chemicals as well as discarded commercial chemical hazardous wastes. Not included are over 3,000 commercial or off-specification products or an additional table containing over 100 waste types that include multiple chemicals per waste type. All or most of the chemicals identified in the waste types are included in the substances included here. With duplication across lists removed, there are 247 substances. Fields 3-5 correspond to Class I Landfill Hazardous Waste Chemicals, Toxic Leachate Chemicals, Hazardous Waste (Discarded Commercial) Chemicals | Alberta Environment | Environmental Protection and Enhancement Act | Canada |
| Hazardous Waste Export Import | List of hazardous wastes subject to provisions of CEPA, 1999 and associated regulations that prohibit the import, export, or conveying in transit a hazardous waste, hazardous recyclable material, or a prescribed non-hazardous waste for final disposal, without first notifying the Minister of Environment and obtaining an import, export, or transit permit from the Minister. | Environment Canada | Canadian Environmental Protection Act | Canada |
| Health Cancer | List of known carcinogens from www.scorecard.org website. | www.scorecard.org | | USA |
| Health Recognized Developmental Toxins | List of recognized developmental toxins as identified on the www.scorecard.org website. | www.scorecard.org | | USA |
| Health Recognized Reproductive Toxins | List of recognized reproductive toxins from the www.scorecard.org website. | www.scorecard.org | | USA |
| Health Suspected Developmental Toxins | List of Suspected Developmental Toxins from the www.scorecard.org website. | www.scorecard.org | | USA |

| List Name | Description | Organization | Act | Country |
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| Health Suspected Endocrine Toxins | List of suspected endocrine toxins from the www.scorecard.org website. | www.scorecard.org | | USA |
| Health Suspected Immunotoxins | List of suspected immunotoxins from the www.scorecard.org website. | www.scorecard.org | | USA |
| Health Suspected Neurotoxins | List of suspected neurotoxins from the www.scorecard.org website. | www.scorecard.org | | USA |
| Health Suspected Reproductive Toxins | List of suspected reproductive toxins from the www.scorecard.org website. | www.scorecard.org | | USA |
| Health Suspected Respiratory Toxins | List of suspected respiratory toxins from the www.scorecard.org website. | www.scorecard.org | | USA |
| Thyroid Hormone Interference | List of synthetic chemicals that interfere with the production, transport, and metabolism of thyroid hormone. List obtained from Howdeshell, K.L., A Model of the Development of the Brain as a Construct of the Thyroid System, in Environmental Health Perspectives, Vol. 110, Suppl 3, June, 2002, pp. 337-348. List contains synthetic chemicals list in Table One of this article wherein each chemical is noted according to the thyroid mechanism with which it interferes. Duplication across the list occurred (and was removed here) due to some chemicals affecting more than one mechanism. Eleven chemicals are excluded due to inability to locate CAS numbers. | Environmental Health Perspectives Journal | scientific literature | USA |
| HPV 1990 | United States list of high production volume (HPV) chemicals with annual production and/or importation volumes above 1 million pounds. In the US, 2,979 chemicals (excluding polymers) out of approximately 70,000 chemicals in commerce are used in such substantial quantities. The US HPV chemicals were identified through information collected under the Toxic Substances Control Act (TSCA) Inventory Update Rule (IUR) from company reports of chemical use in 1990. Organic chemicals that are manufactured in, or imported into, the United States in amounts equal to or exceeding 10,000 pounds per year are subject to reporting under the TSCA IUR. Inorganic chemicals and polymers, except in special circumstances, were not subject to the IUR reporting requirements. Companies are only required to report their chemical production/imports as a range. Reporting is required every four years. | US Environmental Protection Agency | Toxic Substances Control Act | USA |
| HPV 1994 Additions | Chemicals added, in 1994, to the United States list of high production volume (HPV) chemicals with annual production and/or importation volumes above 1 million pounds. | US Environmental Protection Agency | Toxic Substances Control Act | USA |
| HPV Additional Chemicals | List of chemicals, current to January 2003, added to the United States list of high production volume (HPV) chemicals with annual production and/or importation volumes above 1 million pounds. | US Environmental Protection Agency | Toxic Substances Control Act | USA |

| List Name | Description | Organization | Act | Country |
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| IARC Classifications | Lists developed by the International Agency for Research on Cancer that classifies agents, mixtures or exposures as to their carcinogenic risk to humans. IARC classifications fall into four groups: Group 1: The agent (mixture) is carcinogenic to humans. The exposure circumstance entails exposures that are carcinogenic to humans. Group 2 (two classifications): Group 2A: The agent (mixture) is probably carcinogenic to humans. The exposure circumstance entails exposures that are probably carcinogenic to humans. Group 2B: The agent (mixture) is possibly carcinogenic to humans. The exposure circumstance entails exposures that are possibly carcinogenic to humans. Group 3: The agent (mixture, or exposure circumstance) is not classifiable as to carcinogenicity in humans. Group 4: The agent (mixture, exposure circumstance) is probably not carcinogenic to humans. | International Agency for Research on Cancer | research institution | World Health Organi zation |
| Inhalation Hazard Chemicals US DOT | List of inhalation hazards maintained by the US Department of Transportation for regulatory purposes. Chemicals must be either gases or volatile liquids and must meet certain toxicity thresholds. | US Department of Transportation | list maintained for regulatory purposes | USA |
| Maximum Contaminant Levels USSDWA | US Safe Drinking Water Act (SDWA) requires the US EPA to establish primary drinking-water regulations for contaminants in public water systems that may have adverse effects on people's health. Maximum Contaminant Levels (MCLs) define legally allowable concentrations of toxic chemicals that are established at or near levels without known or anticipated adverse health effects, within technical or economic feasibility. All contaminants occurring in public water systems with potential adverse health effects are covered by SDWA but MCLs are established for prioritized candidates on a fixed time schedule. | US Environmental Protection Agency | Safe Drinking Water Act | USA |
| National Ambient Air Quality Contaminants | Under CEPA, 1999, Minister of the Environment can formulate environmental quality objectives specifying goals or purposes of environmental control at three levels of air quality: desirable, acceptable and tolerable. Provinces have jurisdiction over air pollution control making these federal objectives advisory and unenforceable national ambient air quality objectives for certain contaminants. | Environment Canada | Canadian Environmental Protection Act | Canada |
| National Pollutant Release Inventory | National database of pollutant releases to land, water, or air by industrial and transportation sources. Facilities required to report on substances are those with ³ 10 employees, those manufacturing, processing or using ³ 10 tonnes of a designated substance, and those manufacturing, processing, or using a substance where the concentration of the substance is equal to or greater than one per cent by weight, unless the substance is a by-product. A lower reporting threshold applies to facilities using mercury (threshold of 5 kg) and any incinerators handling ³ 100 tonnes of waste must report dioxin emissions. Fields 4- 10 correspond to: Part , Part 2, Part 3, Part 4 - Criteria Air Contaminants, Part 5 - Selected VOCs with Additional Reporting Requirements, Isomer Groups, Other Groups and Mixtures | Environment Canada | Canadian Environmental Protection Act | Canada |

| List Name | Description | Organization | Act | Country |
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| National Pollutant Release Inventory 2001 | National database (for 2001 reporting year) of pollutant releases to land, water, or air by industrial and transportation sources. Facilities required to report on substances are those with ³ 10 employees, those manufacturing, processing or using ³ 10 tonnes of a designated substance, and those manufacturing, processing, or using a substance where the concentration of the substance is equal to or greater than one per cent by weight, unless the substance is a by-product. A lower reporting threshold applies to facilities using mercury (threshold of 5 kg) and any incinerators handling ³ 100 tonnes of waste must report dioxin emissions. | Environment Canada | Canadian Environmental Protection Act | Canada |
| NClass Arsenic and its compounds | Pre-selected (on-line) advanced search of the N-Class database to spell out full set of chemicals within category of arsenic and its compounds. | Nordic Council of Ministers | Commission Working Group on the Classification and Labelling of Dangerous Substances (CWGCLDS) | European Union |
| NClass Cadmium and its compounds | Pre-selected (on-line) advanced search of the N-Class database to spell out full set of chemicals within category of cadmium and its compounds. | Nordic Council of Ministers | CWGCLDS | European Union |
| NClass Database EEC | The N-Class Database, developed by the Nordic council of Ministers in collaboration with European Chemicals Bureau contains substances that have been or are being discussed by the Commission Working Group (CWG) on the Classification and Labelling of dangerous substances. Listed here are 2,213 substances assessed as dangerous to the environment according to a combination of data on aquatic toxicity and environmental persistence. | Nordic Council of Ministers | CWGCLDS | European Union |
| NClass Lead and its compounds | Pre-selected (on-line) advanced search of the N-Class database to spell out full set of chemicals within category of lead and its compounds. | Nordic Council of Ministers | CWGCLDS | European Union |
| NClass Manganese & its compounds | Pre-selected (on-line) advanced search of the N-Class database to spell out full set of chemicals within category of manganese and its compounds. | Nordic Council of Ministers | CWGCLDS | European Union |
| NClass Mercury and its compounds | Pre-selected (on-line) advanced search of the N-Class database to spell out full set of chemicals within category of mercury and its compounds. | Nordic Council of Ministers | CWGCLDS | European Union |
| NClass Nickel and its compounds | Pre-selected (on-line) advanced search of the N-Class database to spell out full set of chemicals within category of nickel and its compounds. | Nordic Council of Ministers | CWGCLDS | European Union |
| NClass Substances derived from coal | Pre-selected (on-line) advanced search of the N-Class database to spell out full set of chemicals derived from coal. | Nordic Council of Ministers | CWGCLDS | European Union |
| NClass Substances derived from petroleum | Pre-selected (on-line) advanced search of the N-Class database to spell out full set of chemicals derived from petroleum. | Nordic Council of Ministers | CWGCLDS | European Union |

| List Name | Description | Organization | Act | Country |
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| Non Domestic Substances List | The nDSL contains substances that are considered new to Canada (since the DSL was prepared in the mid 1980s) but are used commercially in the United States. Chemicals listed on the nDSL for which uses in Canada are sought, require notification, but have reduced information requirements. About 800 or more substances a year are added to the nDSL. It was first developed in the early 1990s and contains approximately 10,000 entries. Publicly available version of the nDSL contain a single piece of information: the CAS#. | Health Canada and Environment Canada | Canadian Environmental Protection Act | Canada |
| OECD List of HPV Chemicals | List compiled by the Organization for Economic Co-operation and Development (OECD) of over 5,000 high production volume (HPV) chemicals, compiled in 2000 from nine national inventories and the European Union. The OECD list includes chemicals that have annual production volumes greater than 1 thousand metric tonnes (2.2 million pounds) in more than one economically developed country. | Organization for Economic Cooperation and Development | nine national inventories | OECD members |
| OSPAR List of Chemicals for Priority Action | List drawn from the larger OSPAR List of Substances of Possible Concern and including those substances which the OSPAR Commission has to date determined require priority action, based primarily on recommendations from the Dynamic Selection and Prioritisation Mechanism for Hazardous Substances (DYNAMEC) ranking process and expert judgement as to which substances represent the highest concern due to the amount produced, the degree of hazardous properties and/or the actual occurrence in the marine environment. Like the larger list, the List of Chemicals for Priority Action is expected to be updated with more substances from the List of Possible Concern as the objectives of the Strategy on Hazardous Substances are progressively met. | Oslo Paris (OSPAR) Commission | Convention for the Protection of the Marine Environment of the North-East Atlantic | Parties to the OSPAR Convention |
| OSPAR Substances of Possible Concern | The Oslo-Paris (OSPAR) Commission for the Protection of the Marine Environment of the North-east Atlantic prepares a List of Substances of Possible Concern as a dynamic working list that is regularly revised, as new information becomes available. Substances are selected on the basis of their intrinsic hazardous properties. Revisions may lead to exclusion of substances present on the version of the OSPAR List used here, and to future inclusion of other substances on the list if data on persistence, toxicity and liability to bioaccumulate (or evidence that they give rise to an equivalent level of concern) show that substances should be added. This version of the OSPAR List of Substances of Possible Concern was last revised on 13 May 2003. | Oslo Paris (OSPAR) Commission | Convention for the Protection of the Marine Environment of the North-East Atlantic | Parties to the OSPAR Convention |
| Ozone Depleting Substances Montreal Protocol | Within the United Nations, the control of ozone-depleting substances has been the subject of several international protocols that have, over time, increased the range and number of substances and practices subject to control or phase-out measures. The current control schedule applicable to developed countries includes timetables for the reduction and ultimate phase-out of most ozone-depleting substances. A more gradual phase-out period applies to developing countries recognizing that most emissions arise from developed countries that also have greater resources to adopt replacements. | United Nations | Montreal Protocol | International Treaty |

| List Name | Description | Organization | Act | Country |
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| Persistent Bioaccumulative and Toxic Chemicals | List maintained by the US EPA of persistent, bioaccumulative, and toxic (PBT) chemicals that is used to identify chemicals and chemical categories which may be found in hazardous wastes regulated under the Resource Conservation and Recovery Act (RCRA). List assists with implementation of RCRA waste minimization policy and is used to promote voluntary waste minimization efforts to reduce the generation of PBT chemicals found in RCRA hazardous waste by at least half by the year 2005. | US Environmental Protection Agency | Resource Conservation and Recovery Act | USA |
| Persistent Organic Pollutants Stockholm | In May 2001 the Stockholm Convention on Persistent Organic Pollutants (POPs) was signed. This global treaty, not yet in force, is intended to protect human and environmental health from these substances which are persistent, bioaccumulative, highly toxic and global in scope and impact, both by means of their ability to travel long distances and their contribution to growing unwanted stockpiles or presence in leaking, or likely to leak, disposal sites. The 12 POPs identified under the Stockholm Convention are the same substances as those identified as Track 1 Criteria Substances in Canada's Toxic Substances Management Policy and slated potentially for virtual elimination from the Canadian environment under CEPA 1999. Canada signed and ratified the Stockholm Convention in May 2001. Fields 1-3 correspond to: Annex A, Annex B - Restricted, Annex C - Unintentional Production | United Nations | Stockholm Convention on Persistent Organic Pollutants | International Treaty |
| Prior Informed Consent Chemicals Rotterdam | The Rotterdam Convention, not yet in force, enables international monitoring and control of trade in very dangerous substances. Under the Convention, export of a chemical can only occur with the prior informed consent (PIC) of the importing country. The PIC procedure allows for information exchange about individual decisions by countries as to whether they wish to receive future shipments of PIC chemicals and ensuring compliance with these decisions by exporting countries. The idea is to promote shared responsibility between exporting and importing countries in protecting human and environmental health. The Convention includes banned or severely restricted pesticides and industrial chemicals. | United Nations | Rotterdam Convention | International Treaty |
| Priority Pollutants US Clean Water Act | List of priority pollutants, required by the Clean Water Act (CWA), for which the US EPA must establish ambient water-quality criteria (the basis of state water-quality standards) and effluent limitations (rules controlling environmental releases from specific industrial categories based on the "best available technology economically achievable"). Decisions to expand the list must take into account the toxicity, persistence, and degradability of the pollutant; the potential presence and the importance of affected organisms in any waters; and the nature and extent of the effect of the toxic pollutant on such organisms. | US Environmental Protection Agency | Clean Water Act | USA |

| List Name | Description | Organization | Act | Country |
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| Priority Substances List | Ministers of Health and Environment are required by CEPA, 1999, to compile a list of priority substances for assessment as to whether they are toxic or capable of becoming toxic. (CEPA-toxic) is defined as chemicals that have the actual or potential ability to pose: an immediate or long-term harmful effect on the environment or biological diversity; a danger to the environment on which human life depends; or a danger in Canada to human life or health. First PSL, established in 1989, included 44 substances. Second PSL, created in 1995, contained 25 substances. Fields 3-6 correspond to: PSL 1 substances considered toxic under Section 64, CEPA 1999, PSL 1 substances not considered "toxic" under Section 64, CEPA 1999, PSL 1 Substances for which data considered insufficient to conclude whether "toxic" under section 11 CEPA (equivalent to section 64 CEPA 1999), Priority Substance List 2 ("PSL 2") | Environment Canada | Canadian Environmental Protection Act | Canada |
| Process Effluent Discharge Substances EPA | Under Ontario's Environmental Protection Act, water effluent discharge standards are applied to nine industrial sectors. Effluent limit regulations specify allowable concentrations and amounts of each toxic substance that may be discharged by each industrial sector discharger. In particular, these regulations set sector specific effluent limits, a timetable for elimination, a requirement that all effluents be non-acutely lethal, and a list of water-based persistent toxic substances that must be eliminated from discharges. The list of chemicals regulated under the nine industrial sector regulations is identified here on a sector by sector basis. Because the same chemicals may be discharged by more than one sector, the total number of substances contains duplication. The actual number of chemicals - both conventional and toxic - without duplication is 75 substances. Fields 3-11 correspond to: Electric Power Generation, Industrial Minerals, Inorganic Chemical, Iron and Steel Manufacturing, Metal Casting, Metal Mining, Organic Chemical, Petroleum Refinery, Pulp and Paper | Ontario Ministry of Environment | Environmental Protection Act | Canada |
| Prohibited Substances Canada | List derived from Schedule 3, Part 1 of CEPA, 1999. Canadian exporters must notify the Minister of Environment of proposed exports of substances listed in Schedule 3, Part 1. Exports of listed substances are prohibited unless (1) prior notice of the proposed export is given to the Minister of Environment, (2) the export is for the purpose of destroying the substance, and (3) the export is done in accordance with regulations under the Act. Since the Act prohibits the export of any substance listed in Schedule 3, Part 1, this list covers substances that are both prohibited from use and that may be prohibited in whole or in part from export. | Environment Canada | Canadian Environmental Protection Act | Canada |
| Regulated Toxic Explosive or Flammable | Under the US Clean Air Act (CAA), a list is established of substances which, if present in a process in a quantity in excess of a threshold, require that the facility establish a Risk Management Program to prevent chemical accidents and to prepare a risk management plan and submit the plan to the state and to the local emergency planning organization. | US Environmental Protection Agency | Clean Air Act | USA |

| List Name | Description | Organization | Act | Country |
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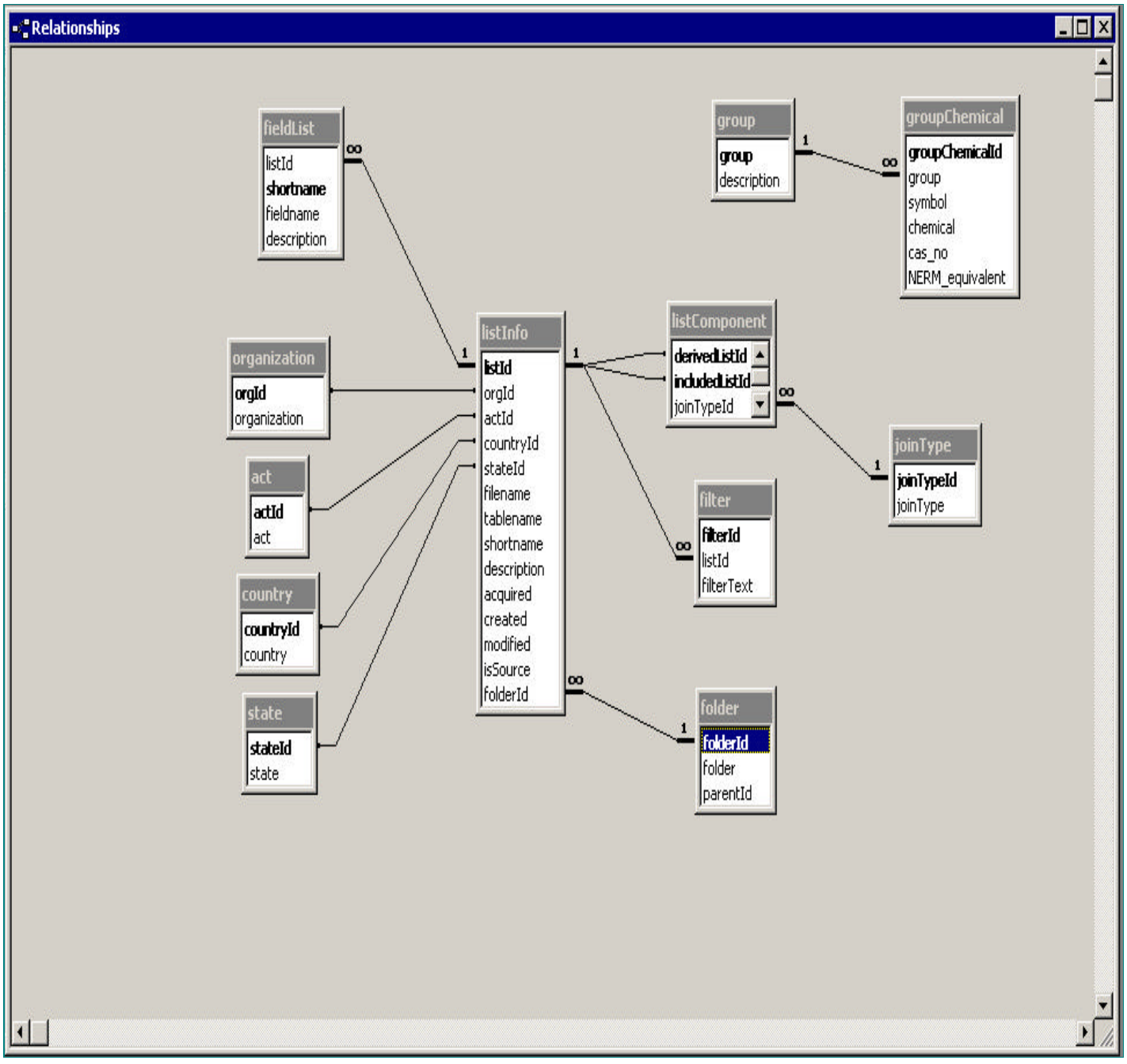
| Restricted Substances Canada | List derived from Schedule 3, Part 3 of CEPA, 1999. Canadian exporters must notify the Minister of Environment of proposed exports of substances listed in Part 3, Schedule 3. Listed substances are those that are otherwise restricted in Canada. The Act prohibits any person from exporting such substances unless (1) prior notice of the proposed export is given to the Minister of Environment, and (2) the export is done in accordance with regulations under the Act. The Act also completely prohibits the export of any substance listed in Schedule 3 that is identified by regulation as prohibited from export. Consequently, Schedule 3, Part 3 identifies substances that are restricted from use in Canada as well as substances that may be prohibited in whole or in part from export. | Environment Canada | Canadian Environmental Protection Act | Canada |
| Special Waste Chemicals BC | British Columbia's Waste Management Act provides a regulatory framework for managing and tracking the movement of "special wastes" which are defined by regulation according to nine categories of highly dangerous and/or hazardous substances. Eight additional waste categories are exempted from the definition of special wastes. When duplication of substances across the nine categories is removed, special wastes include 78 substances. Fields 3-12 correspond to: Waste Oil Chemicals, Hydrocarbon Contaminated Soil Chemicals, Waste Paint Chemicals, Dioxin Waste Chemicals, Polycyclic Aromatic Hydrocarbon Chemicals, Effluent Standard Chemicals (Inorganic), Effluent Standard Chemicals (Organic), Emission Standard Chemicals, Leachate Toxic Chemicals, Other Chemicals | British Columbia Ministry of Water, Land and Air Protection | Waste Management Act | Canada |
| SPIN Simple List | List of 18,379 substances in chemical products on the Nordic market. The SPIN (Substances in Products in the Nordic Countries) database provides non-confidential information on chemical substances on the Nordic market, including volume data and in which types of products and branches the chemicals are used. It does not include information on trade names or companies. The purpose of SPIN is to aggregate data on substances from the national product registers of the Nordic countries. These registers provide among the most complete information on chemical substances in products worldwide. The Nordic Group of Product Registers is responsible for the practical creation of the data base and updates the data annually. | Nordic Council of Ministers | Substances in Products in the Nordic Countries (SPIN) database | European Union |
| Substances Requiring Canada Wide Standards | Canada-Wide Standards are developed by the Canadian Council of Ministers of the Environment (an intergovernmental council of federal, provincial, and territorial environment ministers) under a sub-agreement to Canada-Wide Accord on Environmental Harmonization. The sub-agreement is called the Canada-Wide Environmental Standards Sub-Agreement which encourages governments to work together on key issues requiring standards Canada-wide. The sub-agreement focuses on ambient environmental standards for the quality of air, water, soil, biota, and other media. Measures undertaken by governments for implementing agreed-upon standards may include regulatory standards, codes of practice, guidelines, memoranda of understanding, voluntary initiatives, economic instruments, and pollution prevention planning. Standards generally contain a numeric limit, a timetable for attainment and a framework for monitoring progress and public reporting. | Canadian Council of Ministers of the Environment | Canada-Wide Accord on Environmental Harmonization | Canada and Provinces |

| List Name | Description | Organization | Act | Country |
|---|---|---|---|---|
| Substances Requiring Export Notice or Consent | List derived from Schedule 3, Part 2 of CEPA, 1999. Canadian exporters must notify the Minister of Environment of proposed exports of substances listed in Schedule 3, Part 2. Listed substances include those subject to an international agreement that requires notification or the consent of the country of destination before the substance can be exported from Canada. The Act also prohibits any person from exporting such substances unless (1) prior notice of the proposed export is given to the Minister of Environment, and (2) the export is done in accordance with regulations under the Act. The Act also completely prohibits the export of any substance listed in Schedule 3 that is identified by regulation as prohibited from export. | Environment Canada | Canadian Environmental Protection Act | Canada |
| Toxic Release Inventory Chemicals | Inventory established under the US Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986 requiring a range of industrial sectors to publicly report environmental releases and transfers of chemicals. Included are chemicals known or suspected to cause significant adverse acute effects on health at concentrations likely beyond facility boundaries such as cancer, teratogenic effects, reproductive effects, neurological effects, heritable genetic mutations, or other chronic effects on health or significant damage to the environment. | US Environmental Protection Agency | Emergency Planning and Community Right-to-Know Act | USA |
| Toxic Substances List | Substances deemed to be "CEPA Toxic""(according to evaluations of substances on the Priority Substances List) are placed on a list of toxic substances in Schedule One to the Act. Thereafter, regulatory requirements can be set concerning environmental releases or pollution prevention plans can be required.List information updated Oct, 2003 according to revisions dated July 4, 2003 on CEPA Registry. | Environment Canada | Canadian Environmental Protection Act | Canada |
| Transboundary Air Pollutants Canada US | The 1991 Canada-US Air Quality Agreement is intended to require both countries to address and control shared transboundary air pollution concerns by establishing specific objectives and related programs and measures to limit or reduce transboundary air pollution. | Canada and US | Canada-US Air Quality Agreement | Canada-USA |
| TSMP Track 1 | The federal government-wide Toxic Substances Management Policy establishes a list of substances in Track 1 of the policy slated for virtual elimination from the environment. Thirteen substances (those in the POPs treaty plus the group of chemicals called short-chain chlorinated paraffins) meet the criteria to qualify for virtual elimination, that is, persistence, bioaccumulative, toxic, and primarily resulting from human activity. Eight of the substances are pesticides no longer registered for use in Canada. Four others are subject to management controls and Short-chain Chlorinated Paraffins remain under consideration by the federal government. | Canada Federal Government | Toxic Substances Management Policy | Canada |
| Voluntary Childrens Chemical Evaluation Program | Commonly-used industrial/commercial chemicals for which chemical manufacturers are voluntarily providing data to the US Environmental Protection Agency (EPA) about exposure and health effects and integrating the information in a risk assessment. Chemicals were selected if monitoring data indicated the likelihood of human exposure (from biomonitoring data) and environmental presence (from monitoring data for indoor air and drinking water as an unregulated contaminant). This is a pilot program. | US Environmental Protection Agency | Voluntary Program | USA |

| List Name | Description | Organization | Act | Country |
|---|---|---|---|---|
| Water Contaminants Alberta EPEA | Alberta's Environmental Protection and Enhancement Act prohibits the environmental release of substances that may cause "significant adverse effects" unless by express approval, or as permitted by regulations. Alongside regulations for wastewater discharges, Alberta has developed unenforceable surface water quality guidelines to evaluate the acceptability of, and the limits for, wastewater discharges in advance of issuing approvals under the Act. Contaminants included here are the province's water quality guidelines for the protection of freshwater aquatic life. | Alberta Environment | Environmental Protection and Enhancement Act | Canada |
| WHO Air Quality | Air quality guidelines for Europe established by the World Health Organization. | World Health Organization | Guideline | World Health Organi zation |

# Appendix Two: Database Entity-Relationships Diagram



# Appendix Three: Allocations of NA Symbols to Chemical Groups

| NA Code | Chemical Group or Name |
|---|---|
| NA - 01 | Antimony (and compounds) |
| NA - 02 | Arsenic (and compounds) |
| NA - 02A | Arsenic (inorganic oxides) |
| NA - 03 | Cadmium (and compounds) |
| NA - 04 | Chromium (and compounds) |
| NA - 04A | Chromium 6+ compounds |
| NA - 05 | Cobalt (and compounds) |
| NA - 06 | Copper (and compounds) |
| NA - 06A | Copper (inorganic salts) |
| NA - 07 | Cyanides (ionic) |
| NA - 08 | Lead (and compounds) |
| NA - 08A | Alkyl lead compounds |
| NA - 09 | Manganese (and compounds) |
| NA - 10 | Mercury (and compounds) |
| NA - 10A | Mercury (elemental, inorganic |
| NA - 11 | Nickel (and compounds) |
| NA - 11A | Nickel (inorganic/respirable/soluble) |
| NA - 12 | Selenium (and compounds) |
| NA - 13 | Silver (and compounds) |
| NA - 14 | Zinc (and compounds) |
| NA - 14A | Zinc (inorganic/respirable/soluble) |
| NA - 15 | Barium (and compounds) |
| NA - 16 | Ammonia (total) |
| NA - 17 | Nitrate ion (in solution at pH >=6.0) |
| NA - 18 | Aluminum (and compounds) |
| NA - 19 | Beryllium (and compounds) |
| NA - 20 | Organotin compounds |
| NA - 21 | Total Particulate Matter |
| NA - 22 | PM 2.5 |
| NA - 23 | PM 10 |
| NA - 24 | Ground level ozone |
| NA - 25 | Haze (coefficient) |
| NA - 26 | Dustfall |
| NA - 27 | Halocarbons |
| NA - 28 | Phosphorous |
| NA - 29 | Radionuclides |
| NA - 30 | Polybrominated Biphenyls (PBBs) |
| NA - 31 | Coke Oven Emissions |
| NA - 32 | Hexachlorocyclohexane |

| NA Code | Chemical Group or Name |
|---|---|
| NA - 33 | Dinitropyrene |
| NA - 34 | 3,3'-dichlorobenzene |
| NA - 35 | Uranium (inorganic, respirable, soluble) |
| NA - 36 | sulphide |
| NA - 37 | chloride |
| NA - 38 | Trihalomethanes |
| NA - 39 | Glycol Ethers |
| NA - 40 | Nitrate an Nitrite (as Nitrogen) |
| NA - 41 | Thallium compounds |
| NA - 42 | Nitrosamines |
| NA - 43 | Tetrachloroethanes |
| NA - D/F | Dibenzo-p-dioxins and dibenzofurans, polychlorinated |
| NA - NITR | nitrogen oxides |
| NA - NPE | Nonylphenol and its ethoxylates |
| NA - OPE | Octylphenol and its ethoxylates |
| NA - P/H | PAHs |
| NA - PBDE | PBDEs |
| NA - PCB | Polychlorinated biphenyls |
| NA - PFAS | Perfluoroalkylsulfonyl Containing Chemicals |
| NA - PFOA | Perfluorooctanoic acid and derivatives |
| NA - PHEN | Phenols |
| NA - PHENA | chlorophenol isomers |
| NA - PHENB | nonchlorinated phenols |
| NA - PHTH | Phthalates |
| NA - SCCP | Short-chain chlorinated paraffins |
| NA - SULP | Sulphates |
| NA - VOC | Volatile Organic Compounds |

# Appendix Four — Canadian List #1

**Canadian List #1 — List of Substances of Concern to Children.** These substances are suspected of, or associated with, the health effects noted, they appear on either the nDSL or the DSL or are group entries. (Note that where a substance or group of substances is not shown to be associated with a particular health effect, this should not be construed as evidence that such effects have not been found or suspected. Rather, the lists summarize what is known or suspected. A blank entry should not be interpreted as an indication that particular effects have not been found for the substances in question.)

| CAS# or NA group allocation | **Substance or Group of Substances** (list contains 1431 entries: 1084 from DSL, 318 from nDSL and 29 groups) | On nDSL | On DSL | Suspected Carcinogen | Recognized Developmental Toxin | Suspected Developmental Toxin | Suspected Endocrine Toxin | Suspected Immunotoxin | Suspected Neurotoxin | Recognized Reproductive Toxin | Suspected Reproductive Toxin | Suspected Respiratory Toxin | Thyroid Hormone Interference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NA - VOC | VOLATILE ORGANIC COMPOUNDS | | | | | X | | | | | X | | |
| NA - SULP | SULFATES (1) | | | | | | | | | | | X | |
| NA - PHTH | PHTHALATES | | | | | | X | | | | X | | |
| NA - PFOA | Perfluorooctane sulfonate (PFOS) | | | | | | X | | | | | | |
| NA - PCB | Coplanar Polychlorinated Biphenyls | | | X | X | | | | | | | | |
| NA - NPE | ALKYLPHENOLS | | | | | | X | | | | | | |
| NA - NITR | OXIDES OF NITROGEN | | | | | | | | | | | X | |
| NA - D/F | Dioxins and Furans | | | X | | X | X | | | | X | X | |
| NA - 39 | GLYCOL ETHERS | | | | | X | | | X | | X | X | |
| NA - 31 | COKE OVEN EMISSIONS | | | X | | | | | | | | X | |
| NA - 30 | POLYBROMINATED BIPHENYLS | | | X | X | | X | | X | | X | | |
| NA - 29 | RADIONUCLIDES | | | X | | X | | | | | X | X | |
| NA - 23 | PM 10 | | | | | X | | | | | X | X | |
| NA - 22 | PM 2.5 | | | | | X | | | | | X | X | |
| NA - 19 | BERYLLIUM COMPOUNDS | | | X | | | | X | | | | X | |
| NA - 18 | ALUMINUM COMPOUNDS | | | | | | | | | | | X | |
| NA - 14 | ZINC CHROMATES | | | X | | | | X | | | | X | |
| NA - 12 | SELENIUM COMPOUNDS | | | | | | | | X | | X | X | |
| NA - 11 | NICKEL COMPOUNDS | | | | | X | | X | | | X | | |

| CAS# or NA group allocation | **Substance or Group of Substances** (list contains 1431 entries: 1084 from DSL, 318 from nDSL and 29 groups) | On nDSL | On DSL | Suspected Carcinogen | Recognized Developmental Toxin | Suspected Developmental Toxin | Suspected Endocrine Toxin | Suspected Immunotoxin | Suspected Neurotoxin | Recognized Reproductive Toxin | Suspected Reproductive Toxin | Suspected Respiratory Toxin | Thyroid Hormone Interference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NA - 10 | METHYL MERCURY COMPOUNDS | | | X | X | | | X | X | X | X | X | |
| NA - 09 | MANGANESE COMPOUNDS | | | | | | | | X | | | | |
| NA - 08A | ALKYL LEAD COMPOUNDS | | | X | X | | | | X | X | | | |
| NA - 08 | LEAD COMPOUNDS | | | X | X | | | X | X | | | | |
| NA - 07 | CYANIDE COMPOUNDS | | | | | | | | X | | | X | |
| NA - 06 | COPPER COMPOUNDS | | | | | | | | | | | X | |
| NA - 05 | COBALT COMPOUNDS | | | | | | | X | | | | X | |
| NA - 04 | CHROMIUM COMPOUNDS | | | | | | | X | | X | | X | |
| NA - 02 | INORGANIC ARSENIC COMPOUNDS | | | X | X | X | | | X | X | | X | |
| NA - 01 | ANTIMONY COMPOUNDS | | | | | | | | | | | X | |
| 999-97-3 | 1,1,1,3,3,3-HEXAMETHYLDISILAZANE | | X | | | | | | X | X | | X | |
| 99-99-0 | 1-METHYL-4-NITROBENZENE | | X | | | | X | | X | X | | | |
| 99-98-9 | DIMETHYL-P-PHENYLENEDIAMINE | | X | | | | | | X | X | | X | |
| 999-61-1 | 2-HYDROXYPROPYL ACRYLATE | | X | | | | | X | | X | | X | |
| 998-30-1 | TRIETHOXYSILANE | X | | | | | | | X | | | X | |
| 99-71-8 | 1-HYDROXY-4-SEC-BUTYLBENZENE | | X | | | | X | | | | | | |
| 99-65-0 | M-DINITROBENZENE | | X | | | | | | X | | | X | |
| 99-63-8 | 1,3-BENZENEDICARBONYL CHLORIDE | | X | | | | | | X | X | | | |
| 99-62-7 | 1,3-BIS(1-METHYLETHYL)BENZENE | | X | | | | | | X | X | | | |
| 99-59-2 | 5-NITRO-O-ANISIDINE | X | | X | | | | | | | | | |
| 99-35-4 | 1,3,5-TRINITROBENZENE | X | | | | | | | X | | | X | |
| 99-08-1 | 1-METHYL-3-NITROBENZENE | | X | | | | | | X | | | | |
| 99-04-7 | 3-METHYLBENZOIC ACID | | X | | | | | | X | | | | |
| 98-95-3 | NITROBENZENE | | X | X | | | | | X | | X | X | |
| 98-94-2 | (DIMETHYLAMINO)CYCLOHEXANE | | X | | | | | | X | | | | |
| 98-88-4 | BENZOYL CHLORIDE | | X | | | X | | | | | | X | |
| 98-87-3 | BENZAL CHLORIDE | X | | | | | | | X | | | X | |
| 98-83-9 | ALPHA-METHYLSTYRENE | | X | | | | | | X | | | | |
| 98-82-8 | CUMENE | | X | | | | | | X | | | | |
| 98-57-7 | 1-CHLORO-4-(METHYLSULFONYL)BENZENE | X | | | | | | | X | | | X | |
| 98-54-4 | 1-HYDROXY-4-TERT-BUTYLBENZENE | | X | | | | X | | X | | | | |

| CAS# or NA group allocation | **Substance or Group of Substances** (list contains 1431 entries: 1084 from DSL, 318 from nDSL and 29 groups) | On nDSL | On DSL | Suspected Carcinogen | Recognized Developmental Toxin | Suspected Developmental Toxin | Suspected Endocrine Toxin | Suspected Immunotoxin | Suspected Neurotoxin | Recognized Reproductive Toxin | Suspected Reproductive Toxin | Suspected Respiratory Toxin | Thyroid Hormone Interference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 98-51-1 | P-TERT-BUTYLTOLUENE | | X | | | | | | X | | | X | |
| 98-16-8 | BENZENAMINE, 3-(TRIFLUOROMETHYL)- | X | | | | | | | X | | | X | |
| 98-08-8 | TRIFLUOROMETHYLBENZENE | X | | | | | | | X | | | | |
| 98-07-7 | BENZOIC TRICHLORIDE | X | | X | | X | | | X | | | X | |
| 98-01-1 | FURFURAL | | X | | | | | | X | | | X | |
| 98-00-0 | FURFURYL ALCOHOL | | X | | | | | | X | | | X | |
| 97-90-5 | 1,2-BIS(METHACRYLOYLOXY)ETHANE | | X | | | | | X | | | | | |
| 97-88-1 | 2-METHYL-BUTYLACRYLAAT | | X | | | | | X | | | | | |
| 97-86-9 | 2-METHYLPROPYL 2-METHYL-2-PROPENOATE | | X | | | | | X | | | | | |
| 97-77-8 | DISULFIRAM | | X | | | X | | X | X | | | | |
| 97-74-5 | ACETO TMTM | | X | | | | | X | | | | | |
| 97-63-2 | 2-METHYL-2-PROPENOIC ACID, ETHYL ESTER | | X | | | | | X | X | | | X | |
| 97-56-3 | C.I. SOLVENT YELLOW 3 | | X | X | | | | X | | | | | |
| 97-53-0 | EUGENOL | | X | | | | | X | X | | | | |
| 97-51-8 | BENZALDEHYDE, 2-HYDROXY-5-NITRO- | X | | | | | | | X | | | | |
| 97-23-4 | DICHLOROPHENE | | X | | X | | | X | | | | | |
| 97-18-7 | 2,2'-THIOBIS(4,6-DICHLORO)PHENOL | X | | | | | | X | | | | | |
| 97-00-7 | 1,3-DINITRO-4-CHLOROBENZENE | | X | | | | | X | | | | | |
| 96-69-5 | 1,1'-THIOBIS(2-METHYL-4-HYDROXY-5-TERT-BUTYLBENZENE) | | X | | | | | X | | | | | |
| 96-48-0 | 1,2-BUTANOLIDE | | X | | | | | | X | | | X | |
| 96-45-7 | ETHYLENE THIOUREA | | X | X | X | | X | X | | | X | | X |
| 96-33-3 | METHYL ACRYLATE | | X | | | | | X | X | | | X | |
| 96-31-1 | 1,3-DIMETHYLUREA | | X | | | X | | | | | | | |
| 96-29-7 | 2-BUTANONE OXIME | | X | | | | | X | | | | | |
| 96-22-0 | DIETHYL KETONE | | X | | | | | | X | | | | |
| 96-18-4 | 1,2,3-TRICHLOROPROPANE | | X | X | | | | | X | | X | X | |
| 96-13-9 | 2,3-DIBROMO-1-PROPANOL | X | | X | | | | | | | | | |
| 961-11-5 | TETRACHLORVINPHOS | | X | | | | | | X | | | | |
| 96-09-3 | STYRENE OXIDE | | X | X | | X | | | X | | X | X | |
| 95-94-3 | 1,2,4,5-TETRACHLORBENZOL | | X | | | | | | X | | | | |

| CAS# or NA group allocation | **Substance or Group of Substances** (list contains 1431 entries: 1084 from DSL, 318 from nDSL and 29 groups) | On nDSL | On DSL | Suspected Carcinogen | Recognized Developmental Toxin | Suspected Developmental Toxin | Suspected Endocrine Toxin | Suspected Immunotoxin | Suspected Neurotoxin | Recognized Reproductive Toxin | Suspected Reproductive Toxin | Suspected Respiratory Toxin | Thyroid Hormone Interference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95-88-5 | 4-Chlororesorcinol | | X | | | | | | | | | | X |
| 95-87-4 | 1,2,5-XYLENOL | | X | | | | | | X | | | X | |
| 95-83-0 | 4-CHLORO-ORTHO-PHENYLENEDIAMINE | X | | X | | | | | | | | | |
| 95-82-9 | 2,5-DICHLOROBENZENAMINE | X | | | | | | | X | | | X | |
| 95-80-7 | 2,4-DIAMINOTOLUENE | | X | X | | X | | X | | | X | | |
| 95-76-1 | 1-AMINO-3,4-DICHLOROBENZENE | | X | | | | X | | X | | | X | |
| 95-70-5 | 2,5-DIAMINOTOLUENE | X | | X | | | | X | | | | | |
| 95-69-2 | P-CHLORO-O-TOLUIDINE | X | | X | | | | | | | | | |
| 95-65-8 | 1,3,4-XYLENOL | | X | | | | | | X | | | X | |
| 95-63-6 | 1,2,4-TRIMETHYLBENZENE | | X | | | | | | X | | | X | |
| 95-57-8 | 2-CHLOROPHENOL | | X | | | | | | X | | | | |
| 95-55-6 | 1-AMINO-2-HYDROXYBENZENE | | X | | | | | X | | | | X | |
| 95-54-5 | O-PHENYLENEDIAMINE | | X | X | | | | X | | | | | |
| 95-53-4 | O-TOLUIDINE | | X | X | | | | | X | | | X | |
| 95-51-2 | 1-AMINO-2-CHLOROBENZENE | | X | | | | X | | | | | | |
| 95-50-1 | 1,2-DICHLOROBENZENE | | X | | | | X | X | X | | | | |
| 95-49-8 | 2-CHLOROTOLUENE | | X | | | | | | X | | | X | |
| 95-48-7 | O-CRESOL | | X | | | | X | | X | | | X | X |
| 95-47-6 | O-XYLENE | | X | | | X | | X | X | | X | X | |
| 95-14-7 | 1,2,-AMINOZOPHENYLENE | | X | | | | | | X | | | X | |
| 95-01-2 | 2,4-Dihydroxybenzaldehyde | X | | | | | | | | | | | X |
| 94-74-6 | METHOXONE | X | | | | | | | X | | | | X |
| 94-58-6 | DIHYDROSAFROLE | | X | X | | | | | | | | | |
| 94-36-0 | BENZOYL PEROXIDE | | X | | | | X | X | | | | | |
| 94-28-0 | 2,2'-ETHYLENEDIOXYDIETHYL BIS(2-ETHYLHEXANOATE) | | X | | | | | | X | | | | |
| 93-89-0 | ETHYL BENZOATE | | X | | | | | | X | | X | | |
| 93-58-3 | METHYL BENZOATE | | X | | | | | | X | | | | |
| 934-73-6 | 1-CHLORO-4-(METHYLSULFINYL)BENZENE | X | | | | | | | X | | | X | |
| 93-15-2 | Methyleugenol | | X | X | | | | | | | | | |
| 930-55-2 | N-NITROSOPYRROLIDINE | X | | X | | | | | | | | | |

| CAS# or NA group allocation | **Substance or Group of Substances** (list contains 1431 entries: 1084 from DSL, 318 from nDSL and 29 groups) | On nDSL | On DSL | Suspected Carcinogen | Recognized Developmental Toxin | Suspected Developmental Toxin | Suspected Endocrine Toxin | Suspected Immunotoxin | Suspected Neurotoxin | Recognized Reproductive Toxin | Suspected Reproductive Toxin | Suspected Respiratory Toxin | Thyroid Hormone Interference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 93-05-0 | DIETHYL-P-PHENYLENEDIAMINE | | | | | | | | X | | | X | |
| 92-93-3 | 4-NITROBIPHENYL | X | | X | | | | | X | | | X | |
| 929-06-6 | (AMINO-2-ETHOXY)-2 ETHANOL | | | | | | | | X | | | | |
| 92-87-5 | BENZIDINE | X | | X | | | | X | X | | | | |
| 92-84-2 | DIBENZOTHIAZINE | | | | | | | X | X | | | | |
| 92-69-3 | 4-Hydroxybiphenyl | | X | | | | | | | | | | X |
| 92-67-1 | 4-AMINOBIPHENYL | | | X | | | | | X | | | X | |
| 92-52-4 | BIPHENYL | | X | | | X | | | X | | | X | |
| 92-44-4 | 2,3-Dihydroxynaphthalene | | | | | | | | | | | | X |
| 924-42-5 | N-METHYLOLACRYLAMIDE | | X | X | | | | | X | | X | | |
| 92-43-3 | 1-PHENYL-3-PYRAZOLIDONE | | | | | | | X | | | | | |
| 924-16-3 | N-NITROSODI-N-BUTYLAMINE | X | | X | | | | | | | | X | |
| 923-26-2 | HYDROXYPROPYLMETHACRYLAT | | | | | | | X | | | | | |
| 91-97-4 | 1,1'-BIPHENYL, 4,4'-DIISOCYANATO-3,3'-DIMETHYL- (9CI) | | X | | | | | | | | | X | |
| 91-94-1 | 3,3'-DICHLOROBENZIDINE | | | X | | | | X | | | | | |
| 919-16-4 | LITHIUM CITRATE | X | | | X | | | | | | | | |
| 91-59-8 | 2-AMINONAPHTHALENE | | | X | | | | | | | | | |
| 91-57-6 | 2-METHYLNAPHTHALENE | | X | | | | | | | | | X | |
| 91-23-6 | 2-NITROANISOLE | | | X | | | | | | | | X | |
| 91-22-5 | QUINOLINE | | X | | | | | | X | | | X | |
| 91-17-8 | DECAHYDRONAPTHALENE | | | | | | | | | | | X | |
| 91-08-7 | TOLUENE-2,6-DIISOCYANATE | | X | X | | | | X | | | | X | |
| 90-94-8 | MICHLER'S KETONE | | | X | | | | | | | | | |
| 90-72-2 | 2,4,6-TRI (DIMETHYLAMINOMETHYL)PHENOL | | X | | | | | X | | | | | |
| 90-41-5 | [1,1'-Biphenyl]-2-amine | | | | | | | | X | | | X | |
| 9036-19-5 | OCTYLPHENOXY POLYETHOXYETHANOL | | X | | | | X | | | | | | |
| 9016-87-9 | POLYMERIC MDI | | | | | | | | | | | X | |
| 9016-45-9 | 2-(2-(2-(2-(NONYLPHENOXY) ETHOXY)ETHOXY)ETHOXY)ETHANOL | | X | | | | X | | | | | | |
| 90-12-0 | 1-METHYLNAPHTHALENE | | | | | | | | | | | X | |

| CAS# or NA group allocation | **Substance or Group of Substances** (list contains 1431 entries: 1084 from DSL, 318 from nDSL and 29 groups) | On nDSL | On DSL | Suspected Carcinogen | Recognized Developmental Toxin | Suspected Developmental Toxin | Suspected Endocrine Toxin | Suspected Immunotoxin | Suspected Neurotoxin | Recognized Reproductive Toxin | Suspected Reproductive Toxin | Suspected Respiratory Toxin | Thyroid Hormone Interference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9011-05-6 | ACRISIN FS 017 | | X | | | | | X | | | | X | |
| 900-95-8 | STANNANE, ACETOXYTRIPHENYL | X | | | | | X | X | X | | | | |
| 9005-90-7 | TURPENTINE GUM | | X | | | | | | X | | | | |
| 90-05-1 | METHYL CATECHOL, O- | | X | | | | | | X | | | | |
| 9004-66-4 | IRON DEXTRAN | | X | X | | | | | | | | | |
| 90-04-0 | O-ANISIDINE | | X | X | | | | | X | | | | |
| 9003-53-6 | 168N15 | | X | | | | | X | | | | X | |
| 9003-35-4 | FORMALDEHYDE, PHENOL POLYMER | | X | | | | | X | | | | | |
| 9003-11-6 | POLOXANLENE | | X | | | | | | X | | | | |
| 9003-07-0 | POLYPROPYLENE | | X | | | | | | | | | X | |
| 9003-05-8 | POLYACRYLAMIDE | | X | | | | | | X | | | X | |
| 9002-93-1 | OCTYLPHENOXYPOLYETHOXYETHANOL | | X | | | | X | | | | | | |
| 9002-89-5 | ALCOTEX 17F-H | | X | | | | | | X | | | | |
| 9002-86-2 | POLYVINYL CHLORIDE | | X | | | | | | | | | X | |
| 90-01-7 | o-Hydroxybenzyl alcohol (saligenin) | X | | | | | | | | | | | X |
| 9000-71-9 | CASEIN | | X | | | | | | | | | X | |
| 9000-65-1 | Tragacanth | | X | | | | | | | | | X | |
| 89-98-5 | BENZALDEHYDE, O-CHLORO- | | X | | | | | | X | | | | |
| 89-86-1 | 2,4-Dihydroxybenzoic acid | X | | | | | | | | | | | X |
| 89-83-8 | THYMOL | | X | | | | | | X | | | | |
| 89-72-5 | O-SEC-BUTYLPHENOL | | X | | | | | | X | | | | |
| 89-32-7 | 1,2,4,5 BENZENETETRACARBOXYLIC 1,2:4,5 DIANHYDRIDE | | X | | | | | | X | | | X | |
| 88-89-1 | 2,4,6-TRINITROPHENOL | | X | | | | | X | X | | | | |
| 88-75-5 | 2-NITROPHENOL | | X | | | | | | X | | | | |
| 88-74-4 | O-NITROANILINE | | X | | | | | | X | | | | |
| 88-73-3 | 1-CHLORO-2-NITROBENZENE | X | | | | | X | | | | | | |
| 88-72-2 | 1-METHYL-2-NITROBENZENE | | X | X | | | | | X | | | | |
| 88-19-7 | TOLUENESULFONAMIDE, O- | | X | | | X | | | | | | | |
| 88-06-2 | 2,4,6-TRICHLOROPHENOL | X | | X | | | | | | | | X | X |
| 88-05-1 | ANILINE, 2,4,6-TRIMETHYL- | X | | | | | | | X | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 88-04-0 | 4-CHLORO-3,5-XYLENOL | | X | | | | | X | | | | | |
| 87-68-3 | HEXACHLORO-1,3-BUTADIENE | | X | | | X | X | | X | | X | | |
| 87-66-1 | Pyrogallol | | X | | | | | X | X | | | X | X |
| 87-65-0 | 2,6-Dichlorophenol | X | | | | | | | | | | | X |
| 87-62-7 | 2,6-XYLIDINE | | X | X | | | | | | | | | |
| 87-51-4 | ACETIC ACID, INDOLYL- | | X | | | X | | | | | | | |
| 87-29-6 | CINNAMYL ANTHRANILATE | | X | X | | | | | | | | | |
| 872-50-4 | N-METHYL-2-PYRROLIDONE | | X | | X | | | | X | | X | | |
| 87-10-5 | 3,4,5-TRIBRMOSALICYLANILIDE | | X | | | | | X | | | | | |
| 868-85-9 | BIS(HYDROXYMETHYL)PHOSPHINE OXIDE | X | | | | | | | X | | | X | |
| 86-88-4 | ANTU | X | | | | | | | | | | X | |
| 868-77-9 | 2-(METHACRYLOYLOXY)ETHANOL | | X | | | | | X | X | | | | |
| 86-74-8 | CARBAZOLE | | X | | | | | | | | | | |
| 86-30-6 | N-NITROSODIPHENYLAMINE | | X | X | | | | | | | | X | |
| 86290-81-5 | ANTIKNOCK GASOLINE | | X | X | | | | | X | | | | |
| 85-68-7 | BENZYL BUTYL PHTHALATE | | X | | | X | X | | X | | X | | |
| 85-44-9 | PHTHALIC ANHYDRIDE | | X | | | | | X | X | | | X | |
| 85-42-7 | 1,2-CYCLOHEXANEDICARBOXYLIC ACID ANHYDRIDE | | X | | | | | | | | | X | |
| 85-01-8 | PHENANTHRENE | | X | | | | | | | | | X | |
| 85-00-7 | 1,1'-AETHYLEN-2,2'-BIPYRIDINIUM-DIBROMID | | X | | | | | | X | | | | |
| 84852-15-3 | 4-NONYLPHENOL BRANCHED | | X | | | | X | | | | | | |
| 84-76-4 | 1,2-BENZENEDICARBOXYLIC ACID, DINONYL ESTER | | X | | | | | | X | | | | |
| 84-75-3 | DI-N-HEXYLPHTHALATE | | X | | | | X | | | | X | | |
| 84-74-2 | DIBUTYL PHTHALATE | | X | | | X | X | X | X | | X | | |
| 84-66-2 | DIETHYL PHTHALATE | | X | | | | X | X | X | | X | X | |
| 84-61-7 | 1,2-BENZENEDICARBOXYLIC ACID, DICYCLOHEXYL ESTER | | X | | | | X | | | | | | |
| 842-07-9 | C.I. SOLVENT YELLOW 14 | | X | X | | | | | | | | | |
| 838-88-0 | 2,2-DIMETHYL-4,4-METHYLENEDIANILINE | X | | X | | | | X | | | | X | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 83-67-0 | THEOBROMINE | | X | | | | X | | X | | X | | |
| 836-30-6 | 4-NDPA | | X | | | | | | X | | | | |
| 83-56-7 | 1,5-Dihydroxynaphthalene | | X | | | | | | | | | | X |
| 83-34-1 | 3-METHYLINDOLE | | X | | | | | | | | | X | |
| 826-62-0 | Himic anhydride | | X | | | | | | | | | X | |
| 824-11-3 | TRIMETHYLOLPROPANE PHOSPHITE | X | | | | | | | X | | | | |
| 823-40-5 | 2,6-DIAMINOTOLUENE | | X | X | | | | | | | | | |
| 82-28-0 | 1-AMINO-2-METHYLANTHRAQUINONE | X | | X | | | | | | | | | |
| 822-06-0 | HEXAMETHYLENE-1,6-DIISOCYANATE | | X | | | | | X | | | | X | |
| 81-88-9 | C.I. FOOD RED 15 | | X | X | | | | | | | | | |
| 818-61-1 | 2-(ACRYLOYLOXY)ETHANOL | | X | | | | | X | | | | | |
| 81-81-2 | WARFARIN AND SALTS | | X | | X | | | | X | | | | |
| 81-49-2 | 1-AMINO-2,4-DIBROMOANTHRAQUINONE | X | | X | | | | | | | | | |
| 81-07-2 | SACCHARIN | | X | | | X | | | | | X | | |
| 80-63-7 | METHYL 2-CHLOROACRYLATE | X | | | | | | | | | | X | |
| 80-62-6 | METHYL METHACRYLATE | | X | | | X | | X | X | | X | X | |
| 80-56-8 | 2,6,6-TRIMETHYLBICYCLO(3.1.1)-2-HEPT-2-ENE | | X | | | | | | X | | | X | |
| 8052-41-3 | STODDARD SOLVENT | | X | | | | | | X | | | | |
| 8050-09-7 | BALS 3A | X | X | | | | | X | X | | | X | |
| 8032-32-4 | BENZINE | | X | | | | | | X | | | | |
| 8030-30-6 | VM & P (VARISH MAKERS & PAINTERS) NAPHTHA | | X | | | | X | | X | | | | |
| 80-15-9 | CUMENE HYDROPEROXIDE | | X | | | | | | | | | X | |
| 8008-20-6 | KEROSENE | | X | | | | X | | X | | | X | |
| 80-08-0 | DAPSONE | | X | | | | | | X | | | X | |
| 80-07-9 | 1,1'-SULFONYLBIS(4-CHLOROBENZENE) | | X | | | | | | X | | | | |
| 8007-45-2 | COAL TARS | | X | X | | | | | | | | X | |
| 8006-64-2 | TURPENTINE | | X | | | | | X | X | | | X | |
| 8006-61-9 | GASOLINE | | X | | | | | | X | | | X | |
| 8006-54-0 | ADEPS LANE | | X | | | | | X | | | | | |
| 80-05-7 | 4,4'-ISOPROPYLIDENEDIPHENOL | | X | | | | X | X | X | | X | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8002-05-9 | PETROLEUM DISTILLATES | | X | | | | | | X | | | X | |
| 8000-48-4 | Oils, eucalyptus | | X | | | | | | X | | | X | |
| 79-95-8 | PHENOL, 4,4'-ISOPROPYL IDENEBIS(2,6-DICHLORO- | X | | | | | | | X | | | X | |
| 79-94-7 | 2,2',6,6'-TETRABROMO-4,4'-ISOPROPYLIDENEDIPHENOL | | X | | | | X | | | | | | |
| 79-57-2 | OXYTETRACYCLINE | | X | | X | | | | | | | | |
| 79-46-9 | 2-NITROPROPANE | | X | X | | X | | | X | | X | X | |
| 79-44-7 | DIMETHYLCARBAMOYL CHLORIDE | X | | X | | | | | | | | X | |
| 79-43-6 | 2,2-DICHLOROACETIC ACID | | X | X | | | | | | | | | |
| 79-41-4 | METHACRYLIC ACID | | X | | | | | | X | | | X | |
| 79-39-0 | 2-Propenamide, 2-methyl- | | X | | | | | | X | | | | |
| 79-34-5 | 1,1,2,2-TETRACHLOROETHANE | | X | X | | X | | | X | | | X | |
| 793-24-8 | 1,3-DIMETHYLBUTYL-N-PHENYLPHENYLENEDIAMINE | | X | | | | | | X | | | | |
| 79-27-6 | 1,1,2,2-TETRABROMOETHANE | | X | | | | | | X | | | | |
| 79-24-3 | NITROETHANE | | X | | | | | | X | | | X | |
| 79-22-1 | METHYL CHLOROCARBONATE | | X | | | | | | | | | X | |
| 79-20-9 | METHYL ACETATE | | X | | | | | | X | | | X | |
| 79-14-1 | GLYCOLIC ACID | | X | | | | | | X | | | | |
| 79-11-8 | CHLOROACETIC ACID | | X | | | | | | | | | X | |
| 79-10-7 | ACRYLIC ACID | | X | | | | | X | | | | X | |
| 79-08-3 | Acetic acid, bromo- | X | | | | | | | X | | | | |
| 79-06-1 | ACRYLAMIDE | | X | X | | | | | X | | X | | |
| 79-04-9 | CHLOROACETYL CHLORIDE | | X | | | | | | | | | X | |
| 79-01-6 | TRICHLOROETHYLENE | | X | X | | X | | | X | | X | X | |
| 79-00-5 | 1,1,2-TRICHLOROETHANE | | X | X | | | | | X | | | | |
| 78-95-5 | MONOCHLOROACETONE, STABILIZED | | X | | | | | | X | | | | |
| 78-94-4 | METHYL VINYL KETONE | | X | | | | | | | | | X | |
| 78-93-3 | METHYL ETHYL KETONE | | X | | | X | | | X | | X | X | |
| 78-92-2 | SEC-BUTYL ALCOHOL | | X | | | | | | X | | | X | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 78-87-5 | 1,2-DICHLOROPROPANE | | X | X | | | X | | X | | X | X | |
| 78-84-2 | ISOBUTYRALDEHYDE | | X | | | | | | | | | X | |
| 78-83-1 | 2-METHYL-1-PROPANOL | | X | | | | | | X | | | X | |
| 78-82-0 | ISOBUTYRONITRILE | | X | | | | | | X | | | | |
| 78-79-5 | 2-METHYL-1,3-BUTADIENE | | X | X | | | | | X | | | X | |
| 78-71-7 | OXETANE, 3,3-BIS(CHLOROMETHYL)- | X | | | | | | | X | | | X | |
| 78-59-1 | ISOPHORONE | | X | | | X | | | X | | | X | |
| 78491-02-8 | Urea, N-[1,3-bis(hydroxymethyl)-2,5-dioxo-4-imidazolidinyl]-N,N'-bis(hydroxymethyl)- | | X | | | | | | X | | | X | |
| 78-48-8 | S,S,S-TRIBUTYLTRITHIOPHOSPHATE | X | X | | | | | | X | | | | |
| 78-40-0 | ETHYL PHOSPHATE | | X | | | | | | X | | | | |
| 78-30-8 | TRIORTHOCRESYL PHOSPATE | | X | | | | | | X | | X | | |
| 78-10-4 | ETHYL SILICATE | | X | | | | | | X | | | X | |
| 7803-51-2 | PHOSPHINE | | X | | | | | | X | | | X | |
| 7803-49-8 | Hydroxylamine | X | | | | | | X | | | | | |
| 78-00-2 | TETRAETHYLLEAD | | X | X | X | | | | X | X | | | |
| 77-99-6 | 1,1,1-TRI(HYDROXYMETHYL)PROPANE | | X | | | | | | X | | | X | |
| 7791-23-3 | SELENIUM OXYCHLORIDE | | X | | | | | | X | | | | |
| 7790-91-2 | CHLORINE TRIFLUORIDE | X | | | | | | | X | | | X | |
| 7790-79-6 | CADMIUM FLUORIDE | X | | X | | | | | | | | | |
| 7790-30-9 | Thallium iodide | X | | | | | | | X | | | | |
| 7789-47-1 | MERCURIC BROMIDE | | X | | X | | | | | | | | |
| 7789-42-6 | CADMIUM BROMIDE | | X | X | | | | | | | | | |
| 7789-09-5 | AMMONIUM BICHROMATE | | X | X | | | | X | | | | | |
| 7789-06-2 | STRONTIUM CHROMATE | | X | X | | | | X | | | | X | |
| 7789-00-6 | POTASSIUM CHROMATE | | X | X | | | | X | | | | X | |
| 7788-98-9 | AMMONIUM CHROMATE | X | | X | | | | | | | | | |
| 7787-49-7 | BERYLLIUM FLUORIDE | X | | X | | | | | | | | X | |
| 7787-47-5 | BERYLLIUM CHLORIDE | | X | X | | | | | | | | | |
| 7786-81-4 | NICKEL SULFATE | | X | | | | X | X | | | | X | |
| 7785-87-7 | MANGANESE SULFATE | | X | | | | | | X | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7784-42-1 | ARSINE | | X | X | X | | X | | X | | X | | |
| 7784-41-0 | POTASSIUM ARSENATE | X | | X | X | | | | X | | | | |
| 7784-34-1 | ARSENOUS TRICHLORIDE | | X | X | X | | | | | | | | |
| 7783-80-4 | TELLURIUM HEXAFLUORIDE | X | | | | | | | | | | X | |
| 77-83-8 | HYDROCINNAMIC ACID, ALPHA,BETA-EPOXY-BETA-METHYL-, ETHYL ESTER | | X | | | | | | X | | | | |
| 7783-60-0 | SULFUR FLUORIDE (SF4), (T-4)- | | X | | | | | | | | | X | |
| 7783-54-2 | NITROGEN TRIFLUORIDE | | X | | | | | | | | | X | |
| 7783-46-2 | LEAD FLUORIDE | | X | X | X | | | | X | X | | X | |
| 7783-35-9 | MERCURIC SULFATE | | X | | X | | | | | | | | |
| 7783-07-5 | HYDROGEN SELENIDE | | X | | | | | | X | | | X | |
| 7783-06-4 | HYDROGEN SULFIDE | | X | | | | | | X | | X | X | |
| 7783-00-8 | SELENIOUS ACID | | X | | | | | | X | | | | |
| 7782-50-5 | CHLORINE | | X | | | | | | X | | | X | |
| 7782-49-2 | SELENIUM | | X | | | X | | | X | | X | X | X |
| 7782-44-7 | OXYGEN | | X | | | X | | | | | | X | |
| 7782-42-5 | GRAPHITE | | X | | | | | | | | | X | |
| 7782-41-4 | FLUORINE | | X | | | | | | | | | X | |
| 77-81-6 | TABUN | | X | | | | | | X | | | X | |
| 7778-43-0 | DISODIUM HYDROGEN ARSENATE | X | | | | X | | | X | | | | |
| 7778-39-4 | ARSENIC ACID | | X | X | X | | | | | | | | |
| 77-78-1 | DIMETHYL SULFATE | | X | X | | | | | X | | | X | |
| 7775-11-3 | SODIUM CHROMATE | | X | X | | | | | | | | X | |
| 7774-29-0 | MERCURIC IODIDE | | X | | | | | | | | | X | |
| 77-73-6 | DICYCLOPENTADIENE | | X | | | | | | X | | | | |
| 77-71-4 | 2,4-IMIDAZOLIDINEDIONE, 5,5-DIMETHYL- | | X | | | | | | X | | | X | |
| 7761-88-8 | SILVER NITRATE | | X | | | | | | X | | | X | |
| 7758-98-7 | CUPRIC SULFATE | | X | | | | | | X | | | X | |
| 7758-97-6 | LEAD CHROMATE | | X | X | X | | | X | X | | | X | |
| 7758-95-4 | LEAD CHLORIDE | | X | X | X | | | | | X | | | |
| 7758-29-4 | Sodium Tripolyphosphate | | X | | | | | | X | X | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7758-19-2 | SODIUM CHLORITE | | X | | | X | | | | | | | |
| 7758-02-3 | POTASSIUM BROMIDE | | X | | | | | | X | | | | |
| 7758-01-2 | POTASSIUM BROMATE | | X | X | | | | | | | | | |
| 77-47-4 | HEXACHLOROCYCLOPENTADIENE | | X | | | X | | | X | | X | X | |
| 7733-02-0 | ZINC SULFATE | | X | | | X | | | | | | X | |
| 7732-18-5 | DEIONIZED WATER | | X | | | | | | X | | | | |
| 7727-54-0 | AMMONIUM PERSULFATE | | X | | | | | X | | | | X | |
| 7727-37-9 | NITROGEN | | X | | | | | | | | | X | |
| 7726-95-6 | BROMINE | | X | | | | X | | X | | | X | |
| 7723-14-0 | PHOSPHORUS (YELLOW OR WHITE) | | X | | | | | | X | | X | X | |
| 7722-64-7 | POTASSIUM PERMANGANATE | | X | | | | | | X | | | X | |
| 7719-12-2 | PHOSPHORUS TRICHLORIDE | | X | | | | | | X | | | X | |
| 7719-09-7 | THIONYL CHLORIDE | | X | | | | | | | | | X | |
| 77-09-8 | PHENOLPHTHALEIN | | X | X | | | | | | | | | |
| 7697-37-2 | NITRIC ACID | | X | | | | | | | | X | X | |
| 76-87-9 | TRIPHENYLTIN HYDROXIDE | X | | X | X | | | | | | | | |
| 7681-82-5 | SODIUM IODIDE | | X | | | X | | | | | | | |
| 7681-57-4 | SODIUM METABISULFITE | | X | | | | | X | | | | X | |
| 7681-11-0 | POTASSIUM IODIDE | | X | | | X | | | | | | | |
| 7664-93-9 | STRONG INORGANIC ACID MISTS CONTAINING SULFURIC ACID | | X | X | | | | | | | | X | |
| 7664-41-7 | AMMONIA | | X | | | | | | X | | X | X | X |
| 7664-39-3 | HYDROFLUORIC ACID | | X | | | X | | | X | | X | X | |
| 7664-38-2 | PHOSPHORIC ACID | | X | | | | | | X | | | X | |
| 7647-18-9 | ANTIMONY PENTACHLORIDE | | X | | | | | | X | | | | |
| 7647-01-0 | HYDROCHLORIC ACID | | X | | | | | | | | | X | |
| 7646-85-7 | ZINC CHLORIDE FUME | | X | | | | | | | | X | X | |
| 7646-79-9 | COBALT CHLORIDE | | X | | | | X | | X | | | | |
| 764-41-0 | 1,4-DICHLORO-2-BUTENE | X | | X | | | | | X | | | X | |
| 7637-07-2 | BORON TRIFLUORIDE | | X | | | | | | X | | | X | |
| 763-29-1 | 2-METHYL-1-PENTENE | X | | | | | | | X | | | X | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7632-00-0 | SODIUM NITRITE | | X | | | X | | | X | | | X | |
| 7631-99-4 | SODIUM NITRATE | | X | | | | | | | | | X | |
| 7631-90-5 | SODIUM BISULFITE | | X | | | | | | | | | X | |
| 7631-89-2 | SODIUM ARSENATE (ASH3O4.XNA) | | X | X | X | | | | | | | | |
| 76-22-2 | CAMPHOR | | X | | | | | | X | | | X | |
| 7616-94-6 | PERCHLORYL FLUORIDE | X | | | | | | | | | | X | |
| 76-15-3 | MONOCHLOROPENTAFLUOROETHANE | | X | | | | | | X | | | | |
| 76-14-2 | DICHLOROTETRAFLUOROETHANE (CFC-114) | | X | | | | | | X | | | | |
| 76-13-1 | FREON 113 | | X | | | | | | X | | | X | |
| 76-12-0 | 1,1,2,2-TETRACHLORO-1,2-DIFUOROETHANE (FC 112) | X | | | | | | | X | | | X | |
| 76-11-9 | 1,1,1,2-TETRACHLOR-2,2-DIFLUOROETHANE | X | | | | | | | X | | | | |
| 76-05-1 | Acetic acid, trifluoro- | | X | | | | | | X | | | X | |
| 76-03-9 | TRICHLOROACETIC ACID | | X | | | | | | | | | X | X |
| 760-23-6 | 1,2-DICHLORO-3-BUTENE | X | | | | | | | X | | | X | |
| 76-01-7 | PENTACHLOROETHANE | | X | | | | | | X | | | | |
| 759-73-9 | N-ETHYL-N-NITROSOUREA | X | | X | | X | | | X | | X | | |
| 75-91-2 | 1,1-DIMETHYLETHYL HYDROPEROXIDE | | X | | | | | | X | | | X | |
| 75-87-6 | 2,2,2-TRICHLOROACETALDEHYDE | X | | | | | | | X | | | | |
| 75-86-5 | 2-METHYLLACTONITRILE | | X | | | | | | X | | | X | |
| 7580-67-8 | LITHIUM HYDRIDE | X | | | | | | | | | | X | |
| 75790-87-3 | 2,4'-DIISOCYANATODIPHENYL SULFIDE | X | | | | | | | | | | X | |
| 75790-84-0 | 4-METHYLDIPHENYLMETHANE-3,4-DIISOCYANATE | X | | | | | | | | | | X | |
| 75-77-4 | TRIMETHYLCHLOROSILANE | | X | | | | | | X | | | | |
| 75-74-1 | TETRAMETHYL LEAD | | X | X | X | | | | X | X | | | |
| 75-71-8 | DICHLORODIFLUOROMETHANE | | X | | | | | | X | | | X | |
| 75-69-4 | TRICHLOROFLUOROMETHANE | | X | | | | | | X | | | X | |
| 75-66-1 | 1,1-DIMETHYLETHANETHIOL | | X | | | | | | X | | | X | |
| 75-65-0 | TERT-BUTYL ALCOHOL | | X | | | X | | | X | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 75-64-9 | 1,1-DIMETHYLETHYLAMINE | | X | | | | | | X | | | | |
| 75-63-8 | BROMOTRIFLUOROMETHANE | | X | | | | | | X | | | | |
| 75-61-6 | DIBROMODIFLUOROMETHANE | X | | | | | | | X | | | | |
| 75-60-5 | CACODYLIC ACID | X | | X | | X | | | | | | | |
| 75-56-9 | PROPYLENE OXIDE | | X | X | | X | | X | X | | X | X | |
| 75-55-8 | PROPYLENEIMINE | X | | X | | | | | | | | X | |
| 75-52-5 | NITROMETHANE | | X | X | | | | | X | | | | |
| 7550-45-0 | TITANIUM TETRACHLORIDE | | X | | | | | | | | | X | |
| 75-50-3 | TRIMETHYLAMINE | | X | | | | | X | X | | | X | |
| 75-47-8 | IODOFORM | | X | | | | | | X | | | X | |
| 7546-30-7 | MERCUROUS CHLORIDE | | X | | X | | | | | | | | |
| 75-45-6 | CHLORODIFLUOROMETHANE | | X | | | X | X | | X | | | X | |
| 75-44-5 | PHOSGENE | | X | | | | | | | | | X | |
| 75-43-4 | DICHLOROFLUOROMETHANE | | X | | | | | | X | | X | | |
| 75-38-7 | 1,1-DIFLUORETILENO | | X | | | | | | X | | | | |
| 75-36-5 | ACETIC ACID, CHLORIDE | | X | | | | | | | | | X | |
| 75-35-4 | 1,1-DICHLOROETHYLENE | | X | | | X | | | X | | X | X | |
| 75-34-3 | 1,1-DICHLOROETHANE | | X | X | | | | | X | | | | |
| 75-31-0 | ISOPROPYLAMINE | | X | | | | | X | | | | X | |
| 75-29-6 | 2-CHLOROPROPANE | | X | | | | | | X | | | X | |
| 75-28-5 | 1,1-DIMETHYLETHANE | | X | | | | | | X | | | | |
| 75-27-4 | DICHLOROBROMOMETHANE | X | | X | | | | | X | | | | |
| 75-26-3 | 2-BROMOPROPANE | | X | | | | X | | | | X | | |
| 75-25-2 | TRIBROMOMETHANE | | X | X | | | | | X | | | X | |
| 75-18-3 | 2-THIAPROPANE | | X | | | | | | X | | | | |
| 75-15-0 | CARBON DISULFIDE | | X | | X | | X | | X | X | | | |
| 75-12-7 | FORMAMIDE | | X | | | | | | | | X | | |
| 75-11-6 | DIIODOMETHANE | | X | | | | | | X | | | X | |
| 75-09-2 | DICHLOROMETHANE | | X | X | | | X | | X | | X | X | |
| 75-08-1 | ETHYL MERCAPTAN | | X | | | | | | X | | | X | |
| 75-07-0 | ACETALDEHYDE | | X | X | | X | | | X | | | X | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 75-05-8 | ACETONITRILE | | X | | | X | | | X | | X | X | |
| 75-04-7 | AMINOETHANE | | X | | | | | | X | | | | |
| 75-02-5 | ETHENE, FLUORO- | X | | X | | | | | | | | | |
| 75-00-3 | CHLOROETHANE | | X | X | | X | | | X | | | X | |
| 74-99-7 | METHYL ACETYLENE; PROPYNE | | X | | | | | | X | | | | |
| 74-98-6 | PROPANE | | X | | | | | | X | | | X | |
| 74-97-5 | CHLOROBROMOMETHANE | | X | | | | | | X | | | X | |
| 74-96-4 | ETHYL BROMIDE | | X | X | | | | | X | | | | |
| 74-95-3 | METHYLENE BROMIDE | | X | | | | | | X | | | | |
| 74-93-1 | METHANETHIOL | | X | | | | | | | | | X | |
| 74-90-8 | HYDROGEN CYANIDE | | X | | | | X | | X | | X | X | |
| 74-89-5 | METHYLAMINE | | X | | | | | X | | | | | |
| 74-88-4 | METHYL IODIDE | | X | X | | | | | X | | | X | |
| 7487-94-7 | MERCURY CHLORIDE (2) | | X | | X | | X | | | | | X | |
| 7487-88-9 | MAGNESIUM SULFATE | | X | | | | | | X | | | X | |
| 74-87-3 | CHLOROMETHANE | | X | | X | | | | X | | X | X | |
| 74-86-2 | ACETYLENE | | X | | | | | | X | | | X | |
| 74-84-0 | ETHANE | | X | | | | | | | | | X | |
| 74-82-8 | METHANE | | X | | | | | | | | | X | |
| 7447-41-8 | LITHIUM CHLORIDE | | X | | | | | | X | | | | |
| 7447-40-7 | POTASSIUM CHLORIDE | | X | | | | | | | | | X | |
| 7447-39-4 | CUPRIC CHLORIDE | | X | | | | | | X | | | | |
| 7446-70-0 | ALUMINUM CHLORIDE | | X | | | | | | X | | X | | |
| 7446-27-7 | LEAD PHOSPHATE | X | | X | X | | | | | X | | | |
| 7446-14-2 | LEAD SULFATE | | X | X | X | | | | | X | | | |
| 7446-11-9 | SULFUR TRIOXIDE | | X | | | | | | | | | X | |
| 7446-09-5 | SULFUR DIOXIDE | | X | | | X | | | X | | | X | |
| 7446-08-4 | SELENIUM OXIDE | | X | | | | | | X | | | | |
| 7440-74-6 | INDIUM | | X | | | | | | X | | X | | |
| 7440-67-7 | ZIRCONIUM | | X | | | | | | | | | X | |
| 7440-66-6 | ZINC | | X | | | X | | X | | | X | X | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7440-62-2 | VANADIUM | | X | | | | | X | | | | X | |
| 7440-61-1 | URANIUM | | X | X | | | | | X | | X | X | |
| 7440-59-7 | HELIUM | | X | | | | | | | | | X | |
| 7440-57-5 | GOLD | | X | | | | | | X | | | X | |
| 7440-50-8 | COPPER | | X | | | X | | | | | X | X | |
| 7440-48-4 | COBALT | | X | X | | X | | X | X | | X | X | |
| 7440-47-3 | CHROMIUM (CR6+) | | X | X | | | | X | | | X | X | |
| 7440-46-2 | CESIUM | X | | | | X | | | | | | | |
| 7440-45-1 | CERIUM | | X | | | | | | | | | X | |
| 7440-43-9 | CADMIUM | | X | X | X | | X | X | X | X | | X | |
| 7440-42-8 | BORON | | X | | | X | | | X | | | X | |
| 7440-41-7 | BERYLLIUM | | X | X | | | | X | | | X | X | |
| 7440-39-3 | BARIUM | | X | | | X | | | X | | X | X | |
| 7440-38-2 | ARSENIC | | X | X | X | | X | | X | | X | X | |
| 7440-37-1 | ARGON | | X | | | | | | | | | X | |
| 7440-36-0 | ANTIMONY | | X | | | | | | X | | X | X | |
| 7440-33-7 | TUNGSTEN METAL | | X | | | | | | | | X | | |
| 7440-32-6 | TITANIUM METAL POWDER | | X | | | | | | | | | X | |
| 7440-31-5 | TIN | | X | | | | | X | X | | X | X | |
| 7440-29-1 | THORIUM | | X | X | | | | | | | | | |
| 7440-28-0 | THALLIUM | | X | | | | | | X | | X | | |
| 7440-16-6 | RH-103M | | X | X | | | | | | | | | |
| 7440-06-4 | PLATINUM METAL | | X | | | | | X | X | | | X | |
| 7440-05-3 | PALLADIUM | | X | | | | | X | | | | | |
| 7440-04-2 | METALLIC OSMIUM | | X | | | | | | | | | X | |
| 7440-03-1 | NB-93M | | X | X | | | | | | | | | |
| 7440-02-0 | NICKEL | | X | X | | X | | X | X | | X | X | |
| 7440-01-9 | NEON | | X | | | | | | | | | X | |
| 7439-98-7 | MOLYBDENUM | | X | | | | | | X | | X | | |
| 7439-96-5 | MANGANESE | | X | | | | | | X | | X | X | |
| 7439-95-4 | MAGNESIUM | | X | | | | | | | | | X | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7439-93-2 | LITHIUM | | X | | | X | | | X | | | | |
| 7439-92-1 | LEAD | | X | X | | | X | X | X | X | | X | |
| 7439-89-6 | IRON | | | | | | | | X | | X | X | |
| 74-31-7 | DIPHENYL-P-PHENYLENEDIAMINE | | X | | X | X | | | | | | | |
| 7429-90-5 | ALUMINUM | | X | | | | | | X | | X | X | |
| 7428-48-0 | LEAD STEARATE | | X | X | | | | | | X | | | |
| 72-57-1 | TRYPAN BLUE | | X | X | | | | | | | | | |
| 723-46-6 | SULFAMETHOXAZOLE | | X | | | | X | | | | | | |
| 71-63-6 | DIGITOXIN | X | | | | | | | X | | | | |
| 71-58-9 | MEDROXYPROGESTERONE ACETATE | | X | X | | | | | | | | | |
| 71-55-6 | 1,1,1-TRICHLOROETHANE | | X | | X | | | | X | | X | | |
| 71-43-2 | BENZENE | | X | X | | | X | X | X | X | | X | |
| 71-41-0 | 1-PENTANOL | | X | | | | | | X | | | X | |
| 71-36-3 | N-BUTYL ALCOHOL | | X | | | | | | X | | | X | |
| 71-23-8 | N-PROPYL ALCOHOL | | X | | | | | | X | | | X | |
| 7085-85-0 | 2-PROPENOIC ACID, 2-CYANO-, ETHYL ESTER (9CI) | | X | | | | | X | | | | X | |
| 70657-70-4 | 2-METHOXYPROPYL-1-ACETATE | | X | | X | | | | | | | | |
| 70321-80-1 | CREOSOTE OIL, LOW-BOILING DISTILLATE | X | | X | | | | | | | | | |
| 70321-79-8 | CREOSOTE OIL (DERIVED FROM ANY SOURCE) | X | | X | | | | | | | | | |
| 70-30-4 | HEXACHLOROPHENE (HCP) | | X | | X | | | X | X | | | X | X |
| 70-25-7 | 1-METHYL-1-NITROSO-3-NITROGUANIDINE | X | | X | | | | | | | | X | |
| 693-21-0 | 2,2'-OXYBISETHANOL DINITRATE | X | | | | | | | X | | | X | |
| 69011-06-9<br>688-73-3 | (1,2-BENZENEDICARBOXYLATO(2-))<br>DIOXOTRILEAD | X | | X | | | | | | X | | | |
| | TRIBUTYLTIN | | X | | | | X | | | | | | |
| 6864-37-5 | 4,4'DIAMINO-3,3'DIMETHYL... | | X | | | X | | X | | | | | |
| 68515-49-1 | 1,2-BENZENEDICARBOXYLIC ACID, DI-C9-11-BRANCHED ALKYL ESTERS, C10-RICH | | X | | X | | | | | | | | |
| 68515-48-0 | 1,2-BENZENEDICARBOXYLIC ACID, DI-C8-10-BRANCHED ALKYL ESTERS, C9-RICH | | X | | X | X | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 684-93-5 | N-NITROSO-N-METHYLUREA | X | | X | | X | | | | | | | |
| 68476-48-2 | CHLORINATED HYDROCARBON DISTILLATE | X | | | | | | | X | | | | |
| 68476-30-2 | #2 HOME HEATING OILS | | X | | | | | | X | | | | |
| 684-16-2 | HEXAFLUOROACETONE | X | | | | | | | | | X | | |
| 68411-44-9 | BENZENE, BUTYL-, BRANCHED AND LINEAR | X | | | | | X | | | | | | |
| 68411-30-3 | sodium alkyl aryl sulfonate | | X | | | | | | X | | | | |
| 683-18-1 | DI-N-BUTYLTIN DICHLORIDE | | X | | | | | X | | | | | |
| 68308-34-9 | SHALE-OILS | X | | X | | | | | | | | X | |
| 68-26-8 | RETINOL/RETINYL ESTERS, WHEN IN DAILY DOSAGE IN EXCESS OF 10,000 IU,OR 3,000 RETINOL EQUIVALENTS | | X | | X | | | | | | | | |
| 681-84-5 | METHYL SILICATE | | X | | | | | | | | | X | |
| 68131-74-8 | ASH | | X | | | | | | | | | X | |
| 68-12-2 | N,N-DIMETHYLFORMAMIDE | | X | | | X | | | X | | X | X | |
| 680-31-9 | HEXAMETHYLPHOSPHORAMIDE | X | | X | | | | | X | X | | X | |
| 67-72-1 | HEXACHLOROETHANE | | X | X | | X | | | X | | X | X | |
| 67-66-3 | CHLOROFORM | | X | X | | X | X | | X | | X | X | |
| 67-64-1 | ACETONE | | X | | | | | | X | | | X | |
| 67-56-1 | METHANOL | | X | | | X | | | X | | | X | |
| 675-14-9 | CYANURIC FLUORIDE | X | | | | | | | | | | X | |
| 67-48-1 | (2-HYDROXYETHYL) TRIMETHYLAMMONIUM CHLORIDE | | X | | | | | | X | | | X | |
| 67-45-8 | FURAZOLIDONE | | X | X | | | | | | | | X | |
| 67-20-9 | NITROFURANTOIN | X | | | | X | | | X | X | | X | |
| 66-76-2 | DICUMAROL | X | | | X | | | | | | | X | |
| 665-66-7 | AMANTADINE HYDROCHLORIDE | X | | | X | | | | X | | | | |
| 66-27-3 | METHYL METHANESULFONATE | | X | X | | | | | | | X | | |
| 65997-15-1 | CEMENT KILN DUST | | X | | | | | X | | | | X | |
| 65996-93-2 | POLYCYCLIC AROMATIC COMPOUNDS | | X | | | | | | | | X | | |
| 65-45-2 | Benzamide, 2-hydroxy- | | X | | | | | | X | | | | |
| 65-30-5 | NICOTINE SULFATE | | X | | | | | | X | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 650-51-1 | ACETIC ACID, TRICHLORO-, SODIUM SALT | X | | | | | | | X | | | | |
| 64-86-8 | COLCHICINE | | X | | X | | | | X | X | | X | |
| 64-77-7 | TOLBUTAMIDE | | X | | | | X | | | | | | |
| 64-75-5 | TETRACYCLINE HYDROCHLORIDE | | X | | X | | | | | | | | |
| 64742-95-6 | AROMATIC NAPHTHA, TYPE I | | X | | | X | | | | | | | |
| 64742-05-8 | EXTRACTS, PETROLEUM, LIGHT | | X | | | | | | X | | | | |
| | PARAFFINIC DISTILLATE SOLVENT | | X | | | | | | | | | | |
| 64-67-5 | DIETHYL SULFATE | | X | X | | | | | | | | | |
| 6459-94-5 | C.I. ACID RED 114 | | X | X | | | | | | | | | |
| 645-56-7 | 4-N-PROPYLPHENOL | | X | | | | X | | | | | | |
| 644-97-3 | BENZENE PHOSPHORUS DICHLORIDE | X | | | | | | | X | | | | |
| 6423-43-4 | PROPTLENE GLYCOL DINITRATE | X | | | | | | | X | | | | |
| 64-18-6 | FORMIC ACID | | X | | | | | | X | | | X | |
| 639-58-7 | TRIPHENYLTIN CHLORIDE | X | | | | | | | | | X | | |
| 636-23-7 | 2,4-DIAMINOTOLUENE.2HCL | X | | X | | | | | | | | | |
| 636-21-5 | O-TOLUIDINE HYDROCHLORIDE | X | | X | | | | | | | | | |
| 6358-53-8 | CITRUS RED NO.2 | X | | X | | | | | | | | | |
| 635-22-3 | ANILINE, 4-CHLORO-3-NITRO- | X | | | | | | | X | | | X | |
| 634-93-5 | 1-AMINO-2,4,6-TRICHLOROBENZENE | X | | | | | | | X | | | | |
| 631-64-1 | Dibromoacetic acid | X | | | | | X | | | | | | |
| 630-93-3 | DIPHENYLHYDANTOIN (PHENYTOIN), SODIUM SALT | X | | X | | | X | | X | | | X | |
| 630-20-6 | 1,1,1,2-TETRACHLOROETHANE | | X | | | | | | X | | | | |
| 630-08-0 | CARBON MONOXIDE | | X | | X | | | | X | | X | X | |
| 629-14-1 | ETHYLENE GLYCOL DIETHYL ETHER | X | | | | X | | | X | | | | |
| 628-86-4 | FULMINATE DE MERCURE | X | | | X | | | | | | | | |
| 628-63-7 | AMYL ACETATE | | X | | | | | | X | | | X | |
| 62-75-9 | METHANAMINE, N-METHYL-N-NITROSO | X | | X | | X | | X | X | | | X | |
| 627-44-1 | DIETHYL MERCURY | X | | | X | | | | X | | | X | |
| 62-73-7 | DICHLORVOS | | X | X | | X | | | X | | X | | |
| 627-13-4 | N-PROPYL NITRATE | X | | | | | | | X | | | X | |

| CAS# or NA group allocation | **Substance or Group of Substances** (list contains 1431 entries: 1084 from DSL, 318 from nDSL and 29 groups) | On nDSL | On DSL | Suspected Carcinogen | Recognized Developmental Toxin | Suspected Developmental Toxin | Suspected Endocrine Toxin | Suspected Immunotoxin | Suspected Neurotoxin | Recognized Reproductive Toxin | Suspected Reproductive Toxin | Suspected Respiratory Toxin | Thyroid Hormone Interference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 627-03-2 | ETHOXYACETIC ACID | | X | | | | | | | | X | | |
| 626-38-0 | 1-METHYLBUTYL ACETATE | | X | | | | | | X | | | X | |
| 62571-86-2 | captopril | | X | | | | | | X | | | X | |
| 62-56-6 | THIOUREA | | X | X | | X | | X | | | X | | X |
| 62-55-5 | THIOACETAMIDE | | X | X | | | | | | | | | |
| 625-45-6 | METHYOXYACETIC ACID | | X | | | | | | | | X | | |
| 62-53-3 | ANILINE | | X | X | | X | | | X | | | X | |
| 62-50-0 | ETHYL METHANESULFONATE | | X | X | | | | | | | X | | |
| 624-83-9 | METHYL ISOCYANATE | X | | | | X | | X | | | X | X | |
| 62476-59-9 | ACIFLUORFEN, SODIUM SALT | X | | X | | | | | | | | | |
| 62-44-2 | PHENACETIN | | X | X | | | | | X | | | | |
| 62-38-4 | PHENYLMERCURIC ACETATE | | X | | X | | | | | | | | |
| 622-97-9 | 1-ETHENYL-4-METHYLBENZENE | X | | | | | | | X | | | X | |
| 622-45-7 | CYCLOHEXYL ACETATE | | X | | | | | | | | | X | |
| 62-23-7 | 1-CARBOXY-4-NITROBENZENE | | X | | | | | | | | X | | |
| 621-64-7 | DI-N-PROPYLNITROSAMINE | X | | X | | | | | | | | X | |
| 619-15-8 | 2,5-DINITROTOLUENE | X | | | | | | | X | X | | | |
| 61790-53-2 | SILICA, AMORPHOUS | X | | | | | | | | | | X | |
| 61788-76-9 | ALKANES, CHLORO | | X | | | X | | | | | | | |
| 61788-33-8 | POLYCHLORINATED TERPHENYLS | X | | | | X | | | | | | | |
| 615-53-2 | N-NITROSO-N-METHYLURETHANE | X | | X | | | | | | | | | |
| 615-05-4 | 2,4-DIAMINOANISOLE | | X | X | | | | | | | | | |
| 6145-73-9 | 1-PROPANOL, 2-CHLORO-, PHOSPHATE (3:1) (8CI)(9CI) | | X | | | | | | X | | | | |
| 614-45-9 | BENZENECARBOPEROXOIC ACID, 1,1-DIMETHYLETHYL ESTER | | X | | | | X | | | | | | |
| 613-35-4 | 4',4'''-BIACETANILIDE | X | X | X | | | | | | | | | |
| 612-83-9 | 3,3'-DICHLOROBENZIDINE DIHYDROCHLORIDE | | X | X | | | | | | | | | |
| 612-82-8 | (1,1'-BIPHENYL)-4,4'-DIAMINE, 3,3'-DIMETHYL-, DIHYDROCHLORIDE (9CI) | | X | X | | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6108-10-7 | EPSILON-LINDANE | X | | X | | | | | | | | | |
| 610-39-9 | 3,4-DINITROTOLUENE | X | | | | | | | | X | | | |
| 608-93-5 | PENTACHLOROBENZENE | | X | | | | | | X | | | | |
| 608-25-3 | 2-Methylresorcinol | | X | | | | | | | | | | X |
| 607-57-8 | 2-NITROFLOURENE | X | | X | | | | | | | | | |
| 606-20-2 | 2,6-DINITROTOLUENE | | X | X | | | | | X | X | | | |
| 60-56-0 | METHIMAZOLE | | X | | X | | X | | | | | X | |
| 604-75-1 | OXAZEPAM | | X | X | X | | X | | X | | | | |
| 60-35-5 | ACETAMIDE | | X | X | | | | | | | | | |
| 60-34-4 | METHYL HYDRAZINE | X | | X | | | | | X | | | X | |
| 603-35-0 | NSC 10 | | X | | | | | | X | | | X | |
| 60-29-7 | DIETHYL ETHER | | X | | | | | | X | | | | |
| 602-87-9 | 5-NITROACENAPHTHANE | X | | X | | | | | | | | X | |
| 60-24-2 | 1-ETHANOL-2-THIOL | | X | | | | | | X | | | X | |
| 602-01-7 | 2,3-DINITROTOLUENE | X | | | | | X | | | X | | | |
| 60168-88-9 | FENARIMOL | X | | | | | | | | | | | |
| 60-11-7 | 4-DIMETHYLAMINOAZOBENZENE | | X | X | | | | | | | | | |
| 60-09-3 | 4-AMINOAZOBENZENE | | X | X | | | | | | | | | |
| 599-79-1 | SALICYLAZOSULFAPYRIDINE | | X | X | | | | | X | X | | X | |
| 59-92-7 | Levodopa | X | | | X | | | | | | | | |
| 5989-27-5 | (+)-4-ISOPROPENYL-1-METHYLCYCLOHEXENE | | X | | | | | X | X | | | X | |
| 59-88-1 | PHENYLHYDRAZINE HYDROCHLORIDE | | X | | | | | | | | | X | |
| 598-78-7 | 2-CHLOROPROPIONIC | | X | | | | | | X | | | | |
| 59-87-0 | NITROFURAZONE | | X | X | | | | | | | X | | |
| 598-63-0 | Carbonic acid, lead(2+) salt (1:1) | | X | | | | | | X | | | | |
| 598-55-0 | METHYL CARBAMATE | | X | X | | | | | | | | | |
| 597-64-8 | TETRAETHYLTIN | X | | | | | | | X | | | | |
| 597-31-9 | 2,2-DIMETHYL-3-HYDROXYPROPANAL | X | | | | | | | X | | | | |
| 59-66-5 | ACETAZOLAMIDE | | X | | X | | | | | | | X | |
| 594-42-3 | PERCHLOROMETHYL MERCAPTAN | X | | | | | | | | | | X | |
| 593-74-8 | DIMETHYL MERCURY | X | | | | | | X | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 593-60-2 | VINYL BROMIDE | | X | X | | | | | X | | | | |
| 592-87-0 | LEAD THIOCYANATE | X | | X | X | | | | | X | | | |
| 592-85-8 | MERCURIC THIOCYANATE | | X | | X | | | | | | | | |
| 592-84-7 | BUTYL FORMATE | | X | | | | | | X | | | X | |
| 592-04-1 | MERCURIC CYANIDE | X | | | X | | | | X | | | | |
| 591-78-6 | METHYL N-BUTYL KETONE | | X | | | | | | X | | | | |
| 591-27-5 | 1-AMINO-3-HYDROXYBENZENE | | X | | | | | | X | | | X | |
| 590-86-3 | BUTYRALDEHYDE, 3-METHYL- | | X | | | | | | X | | | X | |
| 59-05-2 | METHOTREXATE | X | | | X | | | | X | | | X | |
| 5873-54-1 | BENZENE, 1-ISOCYANATO-2-((4-ISOCYANATOPHENYL)METHYL)- (9CI) | | X | | | | | X | | | | | |
| 58-55-9 | THEOPHYLLINE | | X | | | | X | | X | | X | X | |
| 585-34-2 | 3-TERT-BUTYLPHENOL | | X | | | | X | | | | | | |
| 584-84-9 | TOLUENE-2,4-DIISOCYANATE | | X | X | | | | X | X | | | X | |
| 583-60-8 | O-METHYLCYOHEXANONE | | X | | | | | | X | | | | |
| 58-25-3 | CHLORDIAZEPOXIDE | | X | | X | | | | X | | | | |
| 58-22-0 | TESTOSTERONE AND ITS ESTERS | | X | X | | | | | | | | | |
| 582-17-2 | 2,7-Dihydroxynaphthalene | | X | | | | | | | | | | X |
| 58-18-4 | METHYLTESTOSTERONE | X | | | X | | | | | | | | |
| 58-15-1 | AMIDOPYRINE | X | | | | | | | X | | | | |
| 58-08-2 | CAFFEINE | | X | | | | | | X | | | X | |
| 57-97-6 | 7,12-DIMETHYLBENZ(A)ANTHRACENE | | X | X | | | | X | | | X | X | |
| 57-83-0 | PROGESTERONE | X | | X | | | | | | | | | |
| 577-11-7 | 1,4-BIS(2-ETHYLHEXYL) SODIUM SULFOSUCCINATE | | X | | | | | | X | | | | |
| 57693-14-8 | CHROMATE(3-), BIS(3-HYDROXY-4-((2-HYDROXY-1-NAPHTHALENEYL) AZO)-7-NITRO-1-NAPHTH-ALENESULFONATO(3-))-, TRISODIUM | | X | X | | | | | | | | | |
| 57-68-1 | SULFAMETHAZINE | | X | | | | X | | | | X | | |
| 57-63-6 | ETHINYLESTRADIOL | X | | X | | | | | | | | X | |
| 576-26-1 | 2,6-DIMETHYLPHENOL | | X | | | | | | X | | | X | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 576-24-9 | 2,3-Dichlorophenol | X | | | | | | | | | | | X |
| 57-57-8 | BETA-PROPIOLACTONE | X | | X | | | | | | | | X | |
| 57-53-4 | MEPROBAMATE | | X | | X | | | | X | | | X | |
| 57-50-1 | SUCROSE | | X | | | | | | X | | | X | |
| 57-47-6 | PHYSOSTIGMINE | X | | | | | | | X | | | X | |
| 57-33-0 | PENTOBARBITAL SODIUM | | X | | X | | | | X | | X | | |
| 57-24-9 | STRYCHNINE | | X | | | | | | X | | | | |
| 57-14-7 | 1,1-DIMETHYL HYDRAZINE | X | | X | | | | | X | | | X | |
| 57-13-6 | UREA | | X | | | | | | X | | | | |
| 57-12-5 | CYANIDE | | X | | | X | | | X | | | X | |
| 569-61-9 | C.I. BASIC RED 9 MONOHYDROCHLORIDE | | X | X | | | X | | | | | | |
| 56-81-5 | GLYCERIN MIST | | X | | | | | | X | | | | |
| 56-75-7 | CHLORAMPHENICOL | | X | X | | X | | | X | | | X | |
| 56-55-3 | BENZ(A)ANTHRACENE | X | | X | | | | | | | | | |
| 56-53-1 | DIETHYLSTILBESTROL | X | | X | X | | X | X | X | | X | | |
| 56-49-5 | 3-METHYLCHLORANTHRENE | | X | X | | | X | | | | | | X |
| 563-80-4 | METHYL ISOPROPYL KETONE | | X | | | | | | X | | | | |
| 563-47-3 | 3-CHLORO-2-METHYL-1-PROPENE | | X | X | | | | | | | | | |
| 56-18-8 | DIPROPYLENETRIAMINE | | X | | | | | | | | | | |
| 56-04-2 | METHYLTHIOURACIL | X | | X | | | X | X | | | | | |
| 55-91-4 | DIISOPROPYLFLUOROPHOSPHATE | | X | | | | | | X | | | | |
| 558-13-4 | CARBON TETRABROMIDE | | X | | | | | | X | | | | |
| 55-80-1 | 3'-methyl-4-dimethylaminoazobenzene | X | | | | | X | | | | | | |
| 557-98-2 | 2-CHLOROPROPYLENE | X | | | | | | | | | | X | |
| 556-88-7 | 1-NITROGUANIDINE | | X | | | | | | | | | X | |
| 556-64-9 | METHYL THIOCYANATE | X | | | | | | | X | | | | |
| 556-52-5 | 2,3-EPOXY 1-PROPANOL | | X | X | | | | X | X | | X | X | |
| 55-63-0 | NITROGLYCERIN | | X | | | | | | X | | | X | |
| 55-55-0 | 4(METHYLAMINO)PHENOLSULFAT | | X | | | | | X | | | | | |
| 554-13-2 | LITHIUM CARBONATE | | X | | X | | X | | X | | | | |
| 55406-53-6 | 3-IODO-2-PROPYNYL BUTYLCARBAMATE | | X | | | | | | X | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 554-00-7 | DICHLOROANILINE, 2,4- | | X | | | | | | X | | | X | |
| 552-30-7 | TRIMELLITIC ANHYDRIDE | | X | | | | | X | | | | X | |
| 5522-43-0 | 1-NITROPYRENE | X | | X | | | | | | | | | |
| 55-18-5 | N-NITROSODIETHYLAMINE | | X | X | | X | | | | | X | X | |
| 548-62-9 | BASIC VIOLET 3 | | X | | | | | | X | | | | |
| 54-85-3 | ISONICOTINIC ACID HYDRAZIDE | | X | | | | | | X | | | X | |
| 546-88-3 | ACETOHYDROXAMIC ACID | | X | | X | | | | | | | | |
| 54-64-8 | THIMEROSAL | | X | | X | | | X | | | | | |
| 54-62-6 | AMINOPTERIN | X | | | X | | | | X | X | | | |
| 545-06-2 | TRICHLOROACETONITRILE | | X | | | | | | X | | | X | |
| 544-16-1 | butyl nitrite | | X | | | | | | X | | | X | |
| 543-90-8 | CADMIUM ACETATE | | X | X | | | | | | | | | |
| 54-31-9 | FUROSEMIDE | | X | | | | | | X | | | | |
| 542-92-7 | CYCLOPENTADIENE | | X | | | | | | X | | | | |
| 542-90-5 | ETHYL THIOCYANATE | X | | | | | | | X | | | X | |
| 542-88-1 | BIS(CHLOROMETHYL) ETHER | | X | X | | | | | | | | X | |
| 542-76-7 | 3-CHLOROPROPIONITRILE | | X | | | | | | X | | | | |
| 542-56-3 | ISOBUTYL NITRITE | X | | X | | | | | X | | | X | |
| 54-21-7 | 2-HYDROXYBENZOIC ACID MONOSODIUM SALT | | X | | | | | | X | | | X | |
| 5421-46-5 | ACETIC ACID, MERCAPTO-, MONOAMMONIUM SALT | | X | | | | | X | | | | | |
| 541-85-5 | ETHYL SEC-AMYL KETONE | | X | | | | | | X | | | | |
| 541-73-1 | 1,3-DICHLOROBENZENE | | X | | | | | | | | | X | |
| 541-53-7 | DITHIOBIURET | X | | | | | | | X | | | | |
| 541-41-3 | ETHYL CHLOROFORMATE | | X | | | | | | | | | X | |
| 541-25-3 | LEWISITE (ARSENIC COMPOUND) | X | | | | X | | | | | | | |
| 54-11-5 | NICOTINE AND SALTS | | X | | X | | | | X | | | X | |
| 540-88-5 | TERT-BUTYL ACETATE | | X | | | | | | X | | | | |
| 540-84-1 | 2,2,4-TRIMETHYLPENTANE | | X | | | | | | | | | X | |
| 540-59-0 | 1,2-DICHLOROETHYLENE | X | | | | | | | X | | | X | |
| 53-96-3 | 2-ACETYLAMINOFLUORENE | X | | X | | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 53-86-1 | INDOMETHACIN | | X | | | | | | | | | X | |
| 53-70-3 | DIBENZ(A,H)ANTHRACENE | X | | X | | | | | | | | | |
| 535-77-3 | 1-ISOPROPYL-3-METHYLBENZENE | X | | | | | | | X | | | | |
| 534-07-6 | BIS(CHLOROMETHYL) KETONE | | X | | | | | | X | | | | |
| 53404-19-6 | BROMACIL LITHIUM SALT (2,4(H,3H)-PYRIMIDINEDIONE, ETHYL-3 (1-METHYLPROPYL), LITHIUM SALT) | X | | | X | | X | | | X | | | |
| 533-73-3 | 1,2,4-Trihydroxybenzene (hydroxyquinol) | X | | | | | | | | | | | X |
| 5329-14-6 | SULFAMIC ACID | | X | | | | | | X | | | | |
| 532-32-1 | SODIUM BENZOATE | | X | | | | | | X | | | | |
| 532-27-4 | 2-CHLOROACETOPHENONE | X | | | | | | X | X | | | X | |
| 53-16-7 | ESTRONE | X | | X | | | | | | | | | |
| 52-85-7 | FAMPHUR | X | | | | | | | X | | | | |
| 527-84-4 | O-CYMENE | X | | | | | | | | | | X | |
| 52-28-8 | CODEINE PHOSPHATE | | X | | X | | | | X | | | | |
| 5216-25-1 | P-A,A,A-TETRACHLOROTOLUENE | X | | X | | | | | X | | | X | |
| 52-01-7 | SPIRONOLACTONE | X | | X | | | | | | | | X | |
| 51-79-6 | URETHANE | | X | X | X | | | | | | | X | |
| 51-75-2 | MECHLORETHAMINE | X | | X | X | | | | | | X | | |
| 5160-02-1 | D & C RED NO. 9 | | X | X | | | | | | | | | |
| 51-52-5 | PROPYLTHIOURACIL | X | | X | X | | X | | | | | | X |
| 51-43-4 | EPINEPHRINE | | X | | | | | | X | | | | |
| 513-78-0 | CADMIUM CARBONATE | | X | X | | | | | | | | | |
| 513-77-9 | BARIUM CARBONATE | | X | | | | | | X | | | X | |
| 5131-66-8 | 1,2-PROPYLENE GLYCOL 1-MONOBUTYL ETHER | | X | | | | | | X | | | | |
| 51-28-5 | 2,4-DINITROPHENOL | | X | | | X | | | X | | X | | X |
| 512-56-1 | TRIMETHYL PHOSPHATE | | X | X | | | | | X | | X | | |
| 5124-30-1 | 1,1'-METHYLENEBIS(4-ISOCYANATOCYCLOHEXANE) | | X | | | | | X | | | | X | |
| 51-21-8 | FLUOROURACIL | X | | | X | | | | X | | | | |
| 5104-49-4 | flurbiprofen | | X | | X | | | | X | X | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 51-03-6 | PIPERONYL BUTOXIDE | | X | | | | | | X | | X | | |
| 509-14-8 | TETRANITROMETHANE | X | | X | | | | | X | | | X | |
| 50782-69-9 | PHOSPHONOTHIOIC ACID, METHYL-, S-(2-(BIS(1-METHYLETHYL) AMINO)ETHYL)O-ETHYL ESTER | | | | | | | | X | | | X | |
| 50-78-2 | ACETYLSALICYLIC ACID | | X | | X | | | | X | X | | X | |
| 506-93-4 | GUANIDINE MONONITRATE | | X | | | | | | X | | | | |
| 506-77-4 | CYANOGEN CHLORIDE | X | | | | | | | X | | | X | |
| 505-60-2 | MUSTARD GAS | | | X | | X | | | X | | X | X | |
| 50-55-5 | RESERPINE | X | | X | | | | | X | | | | |
| 504-63-2 | 1,3-Propanediol | | X | | | | | | X | | | | |
| 504-29-0 | 2-AMINOPYRIDINE | | X | | | | | | X | | | | |
| 504-15-4 | 5-Methylresorcinol (orcinol) | | X | | | | | | | | | | X |
| 50-34-0 | PROPANTHELINE BROMIDE | X | | | | | | | | | X | | |
| 50-33-9 | PHENYLBUTAZONE | | X | | | | | | X | | | X | |
| 50-32-8 | BENZO(A)PYRENE | | X | X | | X | X | X | | | | X | X |
| 50-07-7 | MITOMYCIN C | | | X | | | | | X | | | | |
| 50-06-6 | PHENOBARBITAL | | X | X | | | | | X | | | X | X |
| 50-00-0 | FORMALDEHYDE | | X | X | | | | X | X | | X | X | |
| 4986-89-4 | PENTAERYTHRITOL TETRAACRYLATE | | X | | | | | X | | | | | |
| 496-72-0 | 3,4-DIAMINOTOLUENE | | | X | | | | | | | | | |
| 492-80-8 | AURAMINE | | X | X | | | | | | | | | |
| 479-45-8 | TETRYL | | | | | | | X | X | | | X | |
| 4759-48-2 | ISOTRETINOIN | | X | | X | | | X | | | | | |
| 474-25-9 | CHENODIOL | | X | | X | | | | X | | | X | |
| 463-58-1 | CARBONYL SULFIDE | | X | | | | | | X | | | | |
| 463-56-9 | Thiocyanate | | | | | | | | | | | | X |
| 463-51-4 | KETENE; ETHENONE | X | | | | | | | | | | X | |
| 460-35-5 | 3-CHLORO-1,1,1-TRIFLUOROPROPANE | | | | | | | | X | | | | |
| 4602-84-0 | 2,6,10-DODECATRIEN-1-OL, 3,7,11-TRIMETHYL- | | X | | | | | | X | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 460-19-5 | CYANOGEN | | X | | | | | | X | | | X | |
| 4454-05-1 | 2,3-DIHYDRO-2-METHOXY(4H)PYRAN | | X | | | | | | | | | X | |
| 4418-26-2 | SODIUM DEHYDROACETATE | | X | | | | | | X | | | | |
| 439-14-5 | DIAZEPAM | | X | | X | | | | X | | | | |
| 4342-36-3 | TRIBUTYLTIN BENZOATE | X | | | | | X | | | | | | |
| 4342-30-7 | Phenol, 2-[[(tributylstannyl)oxy]carbony | | X | | | | X | | | | | | |
| 420-12-2 | ETHYLENE SULPHIDE | X | | | | | | | X | | | | |
| 420-04-2 | CYANAMIDE | | X | | | | | X | | | | | |
| 4180-23-8 | (E)-1-METHOXY-4-(1-PROPENYL)BENZENE | | X | | | | | | X | | | | |
| 4170-30-3 | CROTONALDEHYDE | | X | | | | | | | | | X | |
| 41340-25-4 | etodolac | | X | | X | | | | | X | | X | |
| 4128-73-8 | 1,1'-OXYBIS(4-ISOCYANATOBENZENE) | X | | | | | | | | | | X | |
| 4098-71-9 | ISOPHORONE DIISOCYANATE | | X | | | | | X | | | | X | |
| 4097-22-7 | 2,'3'-DIDEOXYADENOSINE (DDA) | | X | | | | | X | | | | | |
| 4083-64-1 | 4-METHYLBENZENESULFONYL ISOCYANATE | | X | | | | | X | | | | X | |
| 4080-31-3 | 1-(3-CHLOROALLYL)-3,5,7-TRIAZA-1-AZONIAADAMANTANE CHLORIDE | | X | | | | | X | | | | | |
| 4074-88-8 | DIETHYLENE GLYCOL DIACRYLATE | | X | | | | | X | | | | | |
| 4067-16-7 | PENTAETHYLENEHEXAMINE | | X | | | | | X | | | | | |
| 4044-65-9 | BITOSCANATE | X | | | | | | | X | | | | |
| 4016-14-2 | ISOPROPYL GLYCIDYL ETHER | X | | | | | | X | X | | | X | |
| 39515-51-0 | 3-PHENOXYBENZALDEHYDE | X | | | | | | | X | | | | |
| 392-56-3 | HEXAFLUOROBENZENE | X | | | | | | | X | | | X | |
| 39156-41-7 | 2,4-DIAMINOANISOLE SULFATE | | X | X | | | X | | | | | | |
| 38661-72-2 | 1,3-BIS(METHYLISOCYANATE) CYCLOHEXANE | X | | | | | | | | | | X | |
| 3825-26-1 | AMMONIUM PERFLUOROOCTANOATE | | X | | | | | | X | | | X | |
| 3810-74-0 | STREPTOMYCIN SULFATE | | X | | X | | | | X | | | | |
| 379-79-3 | ERGOTAMINE TARTRATE | X | | | X | | | | X | | | | |
| 3775-90-4 | 2-TERT-BUTYLAMINOETYLMETAKRYLAT | | X | | | | | X | | | | | |
| 3761-53-3 | C.I. FOOD RED 5 | | X | X | | | | | | | | | |
| 373-02-4 | NICKEL ACETATE | | X | X | | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 37300-23-5 | ZINC CHROMATE WITH ZINC HYDROXIDE AND CHROMIUM OXIDE (9:1) | | X | X | | | | | | | | | |
| 371-62-0 | ETHYLENE FLUOROHYDRIN | X | | | | | | | X | | | X | |
| 3653-48-3 | METHOXONE SODIUM SALT ((4-CHLORO-2-METHYLPGENOXY) ACETATE SODIUM SALT) | X | | | | | | | X | | | | |
| 36355-01-8 | BIPHENYL, HEXABROMO- | X | | X | X | | | | | | | | |
| 3622-84-2 | BENZENESULFONAMIDE, N-BUTYL- (8CI)(9CI) | | X | | | | | | X | | | | |
| 353-59-3 | BROMOCHLORODIFLUOROMETHANE | | X | | | | | | X | | | | |
| 353-50-4 | CARBONYL FLUOIRDE | X | | | | | | | | | | X | |
| 3524-68-3 | PENTAERYTHRITOL TRIACRYLATE | | X | | | | | X | | | | | |
| 3468-63-1 | D & C ORANGE NO. 17 | | X | X | | | | | | | | | |
| 34590-94-8 | DIPROPYLENE GLYCOL MONOMETHYL ETHER | | X | | | | | | X | | X | | |
| 3425-61-4 | T-AMYL HYDROPEROXIDE | X | | | | | | | | | | X | |
| 3383-96-8 | TEMEPHOS | X | | | | | | | X | | | | |
| 3380-34-5 | TRICLOSAN | | X | | | | | X | | | | | |
| 3333-67-3 | NICKEL CARBONATE | | X | X | | | | X | | | | | |
| 3333-52-6 | TETRAMETHYL SUCCINONITRILE | | X | | | | | | X | | | X | |
| 333-20-0 | POTASSIUM THIOCYANATE | | X | | | | | | X | | | X | |
| 331-39-5 | CAFFEIC ACID | | X | X | | | | | | | | | |
| 3296-90-0 | 1,3-DIBROMO-2,2-DIMETHYLOLPROPANE | | X | X | | | | | | | | | |
| 329-01-1 | (ALPHA,ALPHA,ALPHA-TRIFLUORO-M-TOLYL) ISOCYANATE | X | | | | | | | X | | | X | |
| 32568-89-1 | 2,4-IMIDAZOLIDINEDIONE, 5,5-DIMETHYL-3-(2-(OXIRANYLMETHOXY)PROPYL)-1-(OXIRANYLMETHYL)- | X | | | | | | | X | | | | |
| 32534-81-9 | 1,1'-OXYBISBENZENE PENTABROMO DERIV. | | X | | | | X | | | | | | |
| 3252-43-5 | DIBROMOACETONITRILE | X | | | | | | | X | | | X | |
| 3251-23-8 | CUPRIC NITRATE | | X | | | | | | X | | | | |
| 3236-54-2 | 2,4,4-TRIMETYLHEXAMETYLEN-1,6-DIAMIN | | X | | | | | X | | | | | |
| 3236-53-1 | 2,2,4-TRIMETYLHEXAMETYLEN-1,6-DIAMIN | | X | | | | | X | | | | | |
| 319-86-8 | DELTA-LINDANE | X | | X | | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 319-85-7 | BETA-LINDANE | X | | X | | | X | X | X | | X | | |
| 319-84-6 | ALPHA-LINDANE | X | | X | | | | | | | | | |
| 3173-72-6 | 1,5-NAPHTHALENE DIISOCYANATE | X | | | | | | X | | | | X | |
| 314-40-9 | BROMACIL | | X | | | | X | | | | | | |
| 309-43-3 | SECOBARBITAL SODIUM | | X | | X | | | | X | | | | |
| 3081-01-4 | 1,4-BENZENEDIAMINE, N-(1,4-DIMETHYLPENTYL)-N'-PHENYL- (9CI) | | X | | | | | | X | | | | |
| 3068-88-0 | BETA-BUTYROLACTONE | X | | X | | | | | | | | | |
| 3066-71-5 | CYCLOHEXYLACRYLAT | X | | | | | | X | | | | | |
| 30618-84-9 | ACETIC ACID, MERCAPTO-, MONOESTER WITH 1,2,3-PROPANETRIOL | | X | | | | | X | | | | | |
| 30516-87-1 | AZT | | X | | | | | | X | | | | |
| 302-79-4 | ALL-TRANS RETINOIC ACID | | X | | X | | | | | | | | |
| 302-17-0 | 1,1,1-TRICHLORO-2,2-DIHYDROXYETHANE | | X | | | | | | X | | | X | |
| 302-01-2 | HYDRAZINE | | X | X | | X | X | X | X | | X | X | |
| 301-04-2 | LEAD ACETATE | | X | X | X | | | | X | X | | | |
| 29911-28-2 | 1-(2-BUTOXY-1-METHYLETHOXY)-2-PROPANOL | | X | | | | | | X | | | | |
| 29911-27-1 | dipropylene glycol n-propyl ether | | X | | | | | | X | | | | |
| 298-81-7 | 8-METHOXYPSORALEN WITH ULTRAVIOLET A THERAPY | | X | X | | | | | X | | | | |
| 2917-26-2 | 1-Hexadecanethiol | X | | | | | | | | | | X | |
| 29122-68-7 | ATENOLOL | | X | | X | | | | X | | | X | |
| 2909-38-8 | ISOCYANIC ACID, M-CHLOROPHENYL ESTER | X | | | | | | | X | | | X | |
| 29091-21-2 | PRODIAMINE (RYDEX) | | X | | | | X | | | | | | |
| 2893-78-9 | SODIUM DICHLORO-S-TRIAZINETRIONE | | X | | | | | | X | | | | |
| 288-88-0 | 1,2,4-TRIAZOLE | | X | | | | | | X | | | X | |
| 2885-00-9 | 1-Octadecanethiol | X | | | | | | | | | | X | |
| 287-92-3 | CYCLOPENTANE | | X | | | | | | X | | | | |
| 2867-47-2 | 2-(DIMETHYLAMINO)ETHYL 2-METHYL-2-PROPENOATE | | X | | | | | X | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28553-12-0 | 1,2-BENZENEDICARBOXYLIC ACID, DIISONONYL ESTER | | X | | | X | X | | | | | | |
| 2855-13-2 | 3-AMINOMETHYL-3,5,5-TRIMETHYLCYCLOHEXYLAMINE | | X | | | | | X | | | | X | |
| 28407-37-6 | C.I. DIRECT BLUE 218 | | X | X | | | X | | | | | | |
| 28347-13-9 | XYLYLENE DICHLORIDE | X | | | | | | | X | | | X | |
| 28178-42-9 | BENZENE, 1,3-BIS(1-METHYLETHYL)-2-ISOCYANATO- | | X | | | | | | | | | X | |
| 2807-30-9 | ETHYLENE GLYCOL MONOPROPYL ETHER | | X | | | X | | | X | | | X | |
| 280-57-9 | 1,4-DIAZA(2.2.2)BICYCLOOCTANE | | X | | | | | | X | | | | |
| 27858-07-7 | OCTABROMOBIPHENYL | X | | X | X | | | | | | | | |
| 2784-94-3 | HC BLUE 1 | X | | X | | | X | | | | | | |
| 2778-42-9 | 1,3-BIS(1-ISOCYANATO-1-METHYLETHYL)BENZENE | | X | | | | | | X | | | X | |
| 2767-54-6 | Stannane, bromotriethyl- | X | | | | | | | X | | | | |
| 27193-28-8 | (1,1,3,3-TETRAMETHYLBUTYL)PHENOL | | X | | | | X | | | | | | |
| 271-89-6 | BENZOFURAN | | X | X | | | | | | | | | |
| 27137-85-5 | TRICHLORO(DICHLOROPHENYL)SILANE | X | | | | | | | | | | X | |
| 2702-72-9 | 2,4-D SODIUM SALT | X | | | | | | | X | | | | |
| 2699-79-8 | SULFURYL FLUORIDE | X | | | | | | | X | | | X | |
| 2698-41-1 | O-CHLOROBENZYLIDENE MALONONITRILE | X | | | | | | X | X | | | X | |
| 26952-21-6 | ISOOCTYL ALCOHOL | | X | | | | | | X | | | | |
| 2691-41-0 | 1,3,5,7-TETRANITRO-1,3,5,7-TETRAAZACYCLOOCTANE | | X | | | | | | X | | | | |
| 2687-25-4 | 2,3-DIAMINOTOLUENE | X | | X | | | | | | | | | |
| 26761-40-0 | 1,2-BENZENEDICARBOXYLIC ACID, DIISODECYL ESTER | | X | | | X | X | | | | | | |
| 26636-32-8 | Tributyltinnaphthalate | | X | | | | X | | | | | | |
| 26628-22-8 | SODIUM AZIDE | | X | | | | | | X | | X | X | |
| 26590-20-5 | Methyltetrahydrophthalic anhydride | | X | | | | | X | | | | X | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 26472-00-4 | 3A,4,7,7A-TETRAHYDRODIMETHYL-4,7-METHANO-1H-INDENE | | X | | | | | | X | | | | |
| 26471-62-5 | TOLUENE DIISOCYANATE (MIXED ISOMERS) | | X | X | | | | | X | | | X | |
| 2646-17-5 | OIL ORANGE SS | | X | X | | | | | X | | | | |
| 26447-14-3 | PROPANE, 1,2-EPOXY-3-(TOLYLOXY)- | | X | | | | | X | X | | | | |
| 2644-70-4 | Hydrazine, monohydrochloride | X | | | | | | | X | | | | |
| 26354-18-7 | 2-propenoic acid, 2-methyl-, methyl ester = Stannane, tributylmeacrylate | | X | | | | X | | | | | | |
| 26266-68-2 | 2-ETHYLHEXENAL | | X | | | | | | X | | | | |
| 260-94-6 | ACRIDINE | X | | | | | | | X | | | | |
| 26062-79-3 | POLY(DIMETHYLDIALLYLAMMINIUM CHLORIDE) | | X | | | | | | X | | | X | |
| 2602-46-2 | DIRECT BLUE 6 | X | | X | | X | | | | | | | |
| 2570-26-5 | PENTADECYLAMINE | X | | | | | | | X | | | X | |
| 25646-77-9 | CD-4 | | X | | | | | X | | | | | |
| 25646-71-3 | CD 003 | | X | | | | | X | | | | | |
| 25640-78-2 | (1-METHYLETHYL)-1,1'-BIPHENYL | | X | | | | | | X | | | | |
| 25620-58-0 | TRIMETHYL-1,6-HEXANDIAMIN | | X | | | | | X | | | | | |
| 25586-43-0 | NAPHTHALENE, CHLORO- | | X | | | | | | X | | | | |
| 2556-36-7 | 1,4-CYCLOHEXANE DIISOCYANATE | X | | | | | | | | | | X | |
| 25551-13-7 | TRIMETHYLBENZENE | | X | | | | | | X | | | | |
| 25550-51-0 | METYLHEXAHYDROFTALSYRAANHYDRID | | X | | | | | X | | | | | |
| 2551-62-4 | SULFUR HEXAFLUORIDE | | X | | | | | | X | | | X | |
| 25376-45-8 | DIAMINOTOLUENE (MIXED ISOMERS) | | X | X | | X | | | | | | | |
| 2536-05-2 | DIFENYLMETAN-2,2'-DIISOCYANAT | | X | | | | | X | | | | | |
| 25340-17-4 | BENZENE, DIETHYL- (8Cl)(9Cl) | | X | | | | | | X | | | | |
| 25321-14-6 | DINITROTOLUENE (MIXED ISOMERS) | | X | | | | | | X | X | | X | |
| 2524-03-0 | DIMETHYL CHLOROTHIOPHOSPHATE | | X | | | X | | | | | | | |
| 25167-83-3 | 1,4-Tetrachlorophenol | | X | | | | | | | | | | X |
| 25167-80-0 | CHLOROPHENOLS | | X | | | | | X | | | | | X |
| 25155-30-0 | SODIUM DODECYLBENZENE SULFONATE | | X | | | | | | X | | | | |
| 25154-52-3 | 2,6-DIMETHYL-4-HEPTYLPHENOL, (O AND P) | | X | | | | X | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25134-21-8 | 1,2,3,6-TETRAHYDROMETHYL-3,6-METHANOPHTHALIC ANHYDRIDE | | X | | | | | X | | | | | |
| 25068-38-6 | (CHLOROMETHYL)OXIRANE, 4,4'-(1-METHYLETHYLIDENE)BISPHENOL COPOLYMER | | X | | | | | X | X | | | X | |
| 25035-71-6 | Toluenesulfonamide formaldehyde resin | | X | | | | | X | | | | | |
| 25013-16-5 | BUTYLATED HYDROXYANISOLE (BHA) | | X | X | | | X | | X | | | X | |
| 25013-15-4 | VINYLTOLUENE | | X | | | | | | X | | | X | |
| 2499-58-3 | 2-Propenoic acid, heptyl ester | X | | | | | | | X | | | | |
| 2475-45-8 | DISPERSE BLUE 1 | | X | X | | | | | | | | | |
| 2467-02-9 | Bisphenol F | X | | | | | X | | | | | | |
| 24613-89-6 | CHROMIUM (III) CHROMATE | | X | X | | | | X | | | | | |
| 24549-06-2 | 2-ETHYL-6-METHYLANILINE | | X | | | | | | X | | | | |
| 2451-62-9 | 1,3,5-TRIAZINE-2,4,6(1H,3H,5H)-TRIONE, 1,3,5-TRIS(OXIRANYLMETHYL)- (9CI) | | X | | | | | X | | | | X | |
| 2429-74-5 | AIREDALE BLUE D | | X | X | | | | | | | | | |
| 2426-08-6 | 1-BUTOXY-2,3-EPOXYPROPANE | | X | | | | | X | X | | | X | |
| 2425-79-8 | BUTANEDIOLDIGLYCIDYL ETHER | | X | | | | | X | | | | | |
| 2420-98-6 | CADMIUM 2-ETHYLHEXANOATE | | X | X | | | | | | | | | |
| 2409-55-4 | 1-HYDROXY-2-TERT-BUTYL-4-METHYLBENZENE | | X | | | | | | X | | | X | |
| 23386-52-9 | 1,4-DICYCLOHEXYL SULFOBUTANE DIOATE SODIUM SALT | | X | | | | | | X | | | | |
| 23214-92-8 | ADRIAMYCIN | | X | X | X | | | | | X | | | |
| 22591-21-5 | 1,1-DICHLORO-3,3-DIMETHYL-2-BUTANONE | X | | | | | | | X | | | | |
| 22494-42-4 | Diflunisal | | X | | X | | | | X | X | | X | |
| 2244-21-5 | POTASSIUM DICHLORO ISOCYANURATE | | X | | | | | | X | | | | |
| 22398-80-7 | INDIUM PHOSPHIDE | X | | X | | | | | | | | | |
| 2238-07-5 | BIS(2,3-EPOXYPROPYL)ETHER | | X | | | | | X | X | | | | |
| 2234-13-1 | OCTACHLORONAPHTHALENE | X | | | | | | | | | X | | |
| 2223-93-0 | CADMIUM STEARATE | | X | X | | | | | X | | | | |
| 2223-82-7 | NEOPENTYL GLYCOL DIACRYLATE | X | | | | | | X | | | | | |
| 2191-10-8 | Octanoic acid, cadmium salt | | X | | | | | | X | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21908-53-2 | MERCURIC OXIDE | | X | | X | | | | | | | | |
| 21829-25-4 | Nifedipine | | X | | X | | | | | X | | | |
| 218-01-9 | CHRYSENE | | X | X | | | | | | | | | |
| 2155-70-6 | TRIBUTYLTIN METHACRYLATE | | X | | X | | X | | X | | | | |
| 21351-79-1 | CESIUM HYDROXIDE | | X | | | | | | X | | | | |
| 2092-56-0 | D & C RED NO. 8 | X | | X | | | | | | | | | |
| 208-96-8 | ACENAPHTHYLENE | X | | | | | | | | | | X | |
| 20830-75-5 | DIGOXIN | | X | | | | | | X | | | | |
| 20816-12-0 | OSMIUM OXIDE OSO4 (T-4) | | X | | | | | | | | | X | |
| 2079-89-2 | BAPN FUMARATE | X | | | | X | | | | | | | |
| 2058-46-0 | OXYTETRACYCLINE HYDROCHLORIDE (INTERNAL USE) | | X | | X | | | | | | | | |
| 2051-79-8 | CD-2 | | X | | | | | X | | | | | |
| 20325-40-0 | 3,3'-DIMETHOXYBENZIDINE DIHYDROCHLORIDE | | X | X | | | | | | | | | |
| 20265-96-7 | P-CHLOROANILINE.HCL | X | | X | | | X | | | | | | |
| 2001-95-8 | VALINOMYCIN | X | | | | | | | X | | | | |
| 1982-69-0 | SODIUM DICAMBA | X | | | | X | | | | | | | |
| 19624-22-7 | PENTABORANE | X | | | | | | | X | | | | |
| 19485-03-1 | 1-METHYLTRIMETHYLENE DIACRYLATE | X | | | | | | X | | | | | |
| 1937-37-7 | DIRECT BLACK 38 | | X | X | | | | | | | | | |
| 1934-21-0 | 1-(4-SULFOPHENYL)-4-((4-SULFOPHENYL) AZO)-1H-PYRAZOLE-3-CARBOXYLIC | | X | | | | | | X | | | | |
| 193-39-5 | INDENO(1,2,3-CD)PYRENE | X | | X | | | | | | | | | |
| 1929-82-4 | NITRAPYRIN | | X | | X | | | | | | | | |
| 19287-45-7 | DIBORANE | | X | | | | | | X | | | X | |
| 1918-02-1 | PICLORAM | X | | | | | X | | | | | | |
| 1912-24-9 | ATRAZINE | | X | | | | X | X | X | | X | | |
| 1888-71-7 | 1,1,2,3,3,3-HEXACHLORO-1-PROPENE | X | | | | | | | X | | | X | |
| 1879-09-0 | Phenol, 2-(1,1-dimethylethyl)-4,6-dimethyl- | | X | | | | | | X | | | X | |
| 1863-63-4 | ammonium benzoate | | X | | | | | | X | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18454-12-1 | LEAD CHROMATE OXIDE | | X | X | X | | | | | X | | | |
| 1806-26-4 | 1-(P-HYDROXYPHENYL)OCTANE | | X | | | | X | | | | | | |
| 17976-43-1 | CYCLO-DI-:-OXO(:-PHTHALATO)TRILEAD | | X | X | X | | | | | X | | | |
| 17924-92-4 | ZEARALENONE | X | | | | X | | | | | X | | |
| 17796-82-6 | 1H-ISOINDOLE-1,3(2H)-DIONE, 2-(CYCLOHEXYLTHIO)- | | X | | | | | | X | | | | |
| 17754-90-4 | BENZALDEHYDE, 4-(DIETHYLAMINO)-2-HYDROXY- | X | | | | | | | X | | | | |
| 17702-41-9 | DECABORANE(14) | X | | | | | | | X | | | X | |
| 1762-95-4 | AMMONIUM THIOCYANATE | | X | | | | | | X | | | | |
| 1738-25-6 | 3-(DIMETHYLAMINO)-PROPANENITRILE | X | | | | | | | X | | | | |
| 1717-00-6 | 1,1-DICHLORO-1-FLUOROETHANE | | X | | | | | | X | | | | |
| 1694-09-3 | BENZYL VIOLET 4B | | X | X | | | | | | | | | |
| 16938-22-0 | 2,2,4-TRIMETHYLHEXAMETHYLENE DIISOCYANATE | | X | | | | | X | | | | X | |
| 1689-99-2 | BROMOXYNIL OCTANOATE | X | | | X | | | | | | | | |
| 1680-21-3 | TRIETHYLENE GLYCOL DIACRYLATE | | X | | | | | X | | | | | |
| 1675-54-3 | 2,2'-((1-METHYLETHYLIDENE)BIS(4,1-PHENYLENEOXYMETHYLENE))BISOXIRA- N | | X | | | | | X | X | | | | |
| 1639-09-4 | 1-Heptanethiol | X | | | | | | | | | | X | |
| 1634-04-4 | METHYL TERT-BUTYL ETHER | | X | | | X | | | X | | | | |
| 16219-75-3 | ETHYLIDENE NORBORNENE | | X | | | | | | X | | | | |
| 16071-86-6 | C.I. DIRECT BROWN 95 | | X | X | | | | | | | | | |
| 1600-27-7 | MERCURIC ACETATE | | X | | X | | | | | | | | |
| 15968-05-5 | 2,2',6,6'-TETRACHLOROBIPHENYL (PCB-54) | X | | X | X | | | | | | | | |
| 1569-69-3 | CICLOHEXILMERCAPTANO | | X | | | | | | | | | X | |
| 15663-27-1 | CISPLATIN | X | | X | | | | | | | | | |
| 156-62-7 | CALCIUM CYANAMIDE | | X | | | | | X | | | | X | |
| 156-60-5 | 1,2-TRANS-DICHLOROETHYLENE | | X | | | | | | X | | | X | |
| 156-59-2 | CIS-1,2-DICHLOROETHYLENE | X | | | | | | | X | | | | |
| 15647-08-2 | Phosphorous acid, 2-ethylhexyl diphenyl ester | | X | | | | | | X | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15646-96-5 | 2,4,4-TRIMETHYLHEXAMETHYLENE DIISOCYANATE | | X | | | | | X | | | | X | |
| 15630-89-4 | sodium percarbonate | | X | | | | | | X | | | X | |
| 15625-89-5 | 1,3-PROPANEDIOL, 2-ETHYL-2-(HYDROXYMETHYL)-, TRIACRYLATE | | X | | | | | X | | | | | |
| 156-10-5 | P-NITROSODIPHENYLAMINE | X | | X | | | | | | | | | |
| 1559-35-9 | ethylene glycol 2-ethylhexyl ether | | X | | | | | | X | | | | |
| 1558-25-4 | TRICHLORO(CHLOROMETHYL)SILANE | X | | | | | | | X | | | X | |
| 151-56-4 | ETHYLENEIMINE | X | | X | | | | X | X | | X | X | |
| 151-50-8 | POTASSIUM CYANIDE | | X | | | | | | X | | | X | |
| 151-18-8 | BAPN | | X | | | X | | | | | | | |
| 150-76-5 | 4-METHOXYPHENOL | | X | | | | | | X | | | | |
| 150-68-5 | MONURON | | X | | | | | | | | | X | |
| 150-50-5 | MERPHOS | X | | | | | | | X | | | | |
| 150-19-6 | 3-METHYOXYPHENOL | X | | | | | | | X | | | | |
| 14977-61-8 | CHROMYL CHLORIDE | X | | X | | | | X | | | | X | |
| 149-74-6 | DICHLOROMETHYLPHENYLSILANE | X | | | | | | | | | | X | |
| 149-30-4 | 2-MERCAPTOBENZOTHIAZOLE | | X | | | | | X | X | | | | |
| 14808-60-7 | QUARTZ | | X | | | | X | X | | | | X | |
| 14807-96-6 | TALC | | X | | | | | | | | | X | |
| 147-47-7 | 1,2-DIHYDRO-2,2,4-TRIMETHYLQUINOLINE | X | | | | | | | X | | | | |
| 1464-53-5 | 1,1'-BI(ETHYLENE OXIDE) | X | | X | | | | X | | | | X | |
| 1455-21-6 | 1-Nonanethiol | X | | | | | | | | | | X | |
| 14486-19-2 | CADMIUM FLUOBORATE | | X | X | | | | | | | | | |
| 144-80-9 | SULFACETAMIDE | | X | | | | | | X | | | | |
| 14464-46-1 | CRISTOBALITE | | X | | | | | | | | | X | |
| 144-62-7 | OXALIC ACID | | X | | | | | | X | | X | | |
| 144-55-8 | SODIUM BICARBONATE | | X | | | | | | | | | X | |
| 143-10-2 | 1-Decanethiol | X | | | | | | | | | | X | |
| 14307-35-8 | LITHIUM CHROMATE | | X | X | | | | | | | | X | |
| 142-82-5 | N-HEPTANE | | X | | | | | | X | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 142-71-2 | CUPRIC ACETATE | | X | | | | | | X | | | | |
| 142-64-3 | PIPERAZINE DIHYDROCHLORIDE | X | | | | | | X | | | | X | |
| 142-47-2 | Glutamic acid, monosodium salt, L- | | X | | | | | | X | | | X | |
| 142-04-1 | ANILINE HYDROCHLORIDE | | X | X | | | | | | | | | |
| 14187-32-7 | DIBENZO[18]CROWN-6 | X | | | | | | | X | | | | |
| 141-85-5 | ANILINE, M-CHLORO-, HYDROCHLORIDE | X | | | | | X | | | | | | |
| 141-79-7 | MESITYL OXIDE | | X | | | | | | X | | | | |
| 141-78-6 | ETHYL ACETATE | | X | | | | | | X | | | X | |
| 141-43-5 | 2-AMINOETHANOL | | X | | | | | | X | | | X | |
| 141-32-2 | BUTYL ACRYLATE | | X | | | | | X | | | | X | |
| 141-01-5 | 2-Butenedioic acid (2E)-, iron(2+) salt (1:1) | | X | | | | | | X | | | X | |
| 140-88-5 | ETHYL ACRYLATE | | X | X | | X | | X | X | | | X | |
| 140-67-0 | 1-ALLYL-4-METHOXYBENZENE | | X | X | | | | | | | | | |
| 140-66-9 | 4-(1,1,3,3-TETRAMETHYLBUTYL)PHENOL | | X | | | | X | | | | | | |
| 140-64-7 | pentamidine | | X | | | | X | | | | X | | |
| 1405-10-3 | NEOMYCIN SULFATE | | X | | X | | | | X | | | | |
| 140-31-8 | 1-(2-AMINOETHYL)PIPERAZINE | | X | | | | | | | | | X | |
| 140-29-4 | BENZYL CYANIDE | | X | | | | | | X | | | X | |
| 1401-55-4 | ACACIA MOLLISSIMA TANNIN | | X | | | | | | | | | X | |
| 140-11-4 | BENZYL ACETATE | | X | | | | | | X | | | X | |
| 139-65-1 | 4,4'-DIAMINODIPHENYL SULFIDE | X | | X | | | X | | | | X | X | |
| 139-25-3 | 1,1'-METHYLENEBIS(4-ISOCYANATO-3-METHYLBENZENE) | X | | | | | | | | | | X | |
| 139-13-9 | NITRILOTRIACETIC ACID | | X | X | | | | | | | | | |
| 139-07-1 | Lauryl dimethyl benzyl ammonium chloride | | X | | | | | X | | | | | |
| 13826-35-2 | (3-PHENOXYPHENYL)METHANOL | X | | | | | | | X | | | | |
| 138-22-7 | N-BUTYL LACTATE | | X | | | | | | X | | | | |
| 13814-96-5 | LEAD FLUOBORATE | | X | X | X | | | | | X | | | |
| 13768-11-1 | Perrhenate | X | | | | | | | | | | | X |
| 13765-19-0 | CALCIUM CHROMATE | | X | X | | | | | | | | | |
| 137-58-6 | lidocaine | | X | | | | | | X | | | X | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 137-42-8 | METHAM SODIUM | | X | X | X | | X | | | | | | |
| 13718-26-8 | SODIUM VANADIUM OXIDE | | X | | | | | | X | | | X | |
| 137-05-3 | METHYL 2-CYANONACRYLATE | | X | | | | | X | | | | X | |
| 136-77-6 | 4-Hexylresorcinol | | X | | | | | | | | | | X |
| 13674-87-8 | 1,3-DICHLORO-2-PROPANOL PHOSPHATE (3:1) | | X | | | | | | X | | | | |
| 13654-09-6 | DECABROMOBIPHENYL | | X | X | X | | | | | | | | |
| 136-40-3 | PHENAZOPYRIDINE HYDROCHLORIDE | | X | X | | | | | X | | | X | |
| 13597-99-4 | BERYLLIUM NITRATE | X | | X | | | | | | | | | |
| 135-88-6 | N-PHENYL-BETA-NAPHTHYLAMINE | | X | | | | | | X | | | | |
| 13552-44-8 | 4,4'-METHYLENEBIS-DIHYDROCHLORIDE BENZENEMINE | X | | X | | | X | | | | | | |
| 13530-65-9 | ZINC CHROMATE | | X | X | | | | X | | | | X | |
| 135-20-6 | CUPFERRON | | X | X | | | | | | | | | |
| 13510-49-1 | BERYLLIUM SULFATE | X | | X | | | | X | | | | X | |
| 13494-80-9 | TELLURIUM | | X | | | | | | X | | X | | |
| 13463-67-7 | TITANIUM DIOXIDE | | X | | | | | | | | X | | |
| 13463-41-7 | ZINC, BIS(1-HYDROXY-2(1H)-PYRIDINETHIONATO-O,S)-, (T-4)- | | X | | | | | | X | | | | |
| 13463-40-6 | IRON PENTACARBONYL | | X | | | | | | X | | | X | |
| 13463-39-3 | NICKEL CARBONYL | | X | X | X | | | | X | | X | X | |
| 1344-48-5 | MERCURIC SULFIDE | | X | | X | | | | | | | | |
| 1344-28-1 | ALUMINUM OXIDE (FIBROUS FORMS) | | X | | | | | | X | | | | |
| 134-32-7 | ALPHA-NAPHTHYLAMINE | | X | X | | | | | | | | | |
| 13410-01-0 | SODIUM SELENATE (H2O4SE.2NA) | | X | | | | | | X | | | X | |
| 13397-24-5 | GYPSUM; CALCIUM SULFATE DIHYDRATE | | X | | | | | | | | | X | |
| 1338-23-4 | METHYL ETHYL KETONE PEROXIDE | | X | | | | | | | | | X | |
| 1336-36-3 | POLYCHLORINATED BIPHENYLS | | X | X | X | | X | X | X | | X | X | X |
| 1336-21-6 | AMMONIUM HYDROXIDE | | X | | | | | | | | | X | |
| 1335-32-6 | LEAD SUBACETATE | | X | X | X | | | | | X | | | |
| 1333-86-4 | CARBON BLACK | | X | X | | | | | | | | | |
| 1333-82-0 | CHROMIUM TRIOXIDE | | X | X | | | | X | | | | X | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1333-74-0 | HYDROGEN | | X | | | | | | | | | X | |
| 13327-32-7 | BERYLLIUM HYDROXIDE | X | | X | | | | X | | | | X | |
| 1332-58-7 | KAOLIN | | X | | | | | | | | | X | |
| 1331-28-8 | CHLOROETHENYLBENZENE | X | | | | | | | X | | | | |
| 1330-78-5 | TRICRESYL PHOSPHATE | | X | | | | | | X | | X | | |
| 1330-43-4 | NATRIUMTETRABORAT ANHYDRID | | X | | | | | | X | | | | |
| 1330-20-7 | XYLENE (MIXED ISOMERS) | | X | | | X | | X | X | | X | X | |
| 132-86-5 | 1,3-Dihydroxynaphthalene | | X | | | | | | | | | | X |
| 1321-74-0 | DIVINYL BENZENE | | X | | | | | | X | | | | |
| 1317-42-6 | COBALT SULPHIDE | | X | | | | | X | | | | | |
| 1317-36-8 | LEAD(II) OXIDE | | X | X | X | | | | | X | | | |
| 1317-35-7 | MANGANESE TETROXIDE | | X | | | | | | X | | X | X | |
| 1314-87-0 | LEAD SULFIDE | | X | X | X | | | | | X | | | |
| 1314-80-3 | PHOSPHORUS PENTASULFIDE | | X | | | | | | | | | X | |
| 1314-62-1 | VANADIUM OXIDE (5) | | X | | | | | | X | | X | X | |
| 1314-56-3 | PHOSPHORUS PENTOXIDE | | X | | | | | | | | | X | |
| 1314-20-1 | THORIUM DIOXIDE | | X | X | | | | | | | | | |
| 1314-12-1 | Thallium oxide (Tl2O) | X | | | | | | | X | | | | |
| 1314-06-3 | NICKEL TRIOXIDE | | X | | | | | X | | | | | |
| 1313-99-1 | NICKEL OXIDE | | X | X | | | | X | | | | X | |
| 1313-27-5 | MOLYBDENUM TRIOXIDE | | X | | | | | | X | | | X | |
| 131-18-0 | DI-N-PENTYL PHTHALATE | | X | | | | X | | | | X | | |
| 131-16-8 | DIPROPYL PHTHALATE | | X | | | | X | | | | X | | |
| 131-11-3 | DIMETHYL PHTHALATE | | X | | | | | X | X | | | X | |
| 13108-52-6 | METHYL-2,3,5,6-TETRACHLORO-4-PYRIDYLSULPHON E | X | | | | | | X | | | | | |
| 1310-73-2 | CAUSTIC SODA | | X | | | | | | | | | X | |
| 1310-61-8 | Potassium bisulfite | X | | | | | | | | | | X | |
| 1309-64-4 | ANTIMONY TRIOXIDE | | X | X | | | | | | | | X | |
| 1309-60-0 | LEAD DIOXIDE | | X | X | X | | | | | X | | | |
| 1309-48-4 | MAGNESIUM OXIDE | | X | | | | | | X | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1309-37-1 | IRON OXIDE FUME | | X | | | | | | | | | X | |
| 1307-96-6 | COBALT [II] OXIDE | | X | X | | | | X | | | | X | |
| 1306-23-6 | CADMIUM SULFIDE | | X | X | | | | | | | | | |
| 1306-19-0 | CADMIUM OXIDE | | X | X | | | | | | | | X | |
| 13048-33-4 | 1,6-HEXAMETHYLENE DIACRYLATE | | X | | | | | X | | | | | |
| 1304-56-9 | BERYLLIUM OXIDE | X | | X | | | | X | | | | X | |
| 1303-96-4 | BORATES,TETRA,SODIUM SALTS | | X | | | | X | | X | | | | |
| 1303-33-9 | ARSENIC TRISULFIDE | | X | X | X | | | | X | | | X | |
| 1303-00-0 | GALLIUM ARSENIDE | | X | X | X | | | X | X | | | | |
| 130-26-7 | CLIOQUINOL | X | | | | | | | X | | | | |
| 130-15-4 | 1,4-DIHYDRO-1,4-DIKETONAPHTHALENE | | X | | | | | | X | | | | |
| 129-06-6 | WARFARIN SODIUM | X | | | X | | | | X | | | | |
| 129-00-0 | PYRENE | | X | | | | | | X | | | | |
| 128-37-0 | 2,6-DI-TERT-BUTYL-P-CRESOL | | X | | | | | X | X | | | X | |
| 127-65-1 | SODIUM-P-TOLUENESULPHONCHLORAMIDE | | X | | | | | X | | | | X | |
| 127-19-5 | DIMETHYLACETAMIDE | | X | | | | | | X | | | | |
| 127-18-4 | TETRACHLOROETHYLENE | | X | X | | X | | | X | | X | X | |
| 1271-28-9 | NICKELOCENE | X | | X | | | | | | | | | |
| 126-99-8 | 2-CHLOR-1,3-BUTADIENE | | X | X | | X | X | X | X | | X | X | |
| 126-98-7 | METHACRYLONITRILE | X | | | | | | X | X | | | X | |
| 126-73-8 | TRIBUTYL PHOSPHATE | | X | | | | | | X | | | | |
| 126-72-7 | TRIS(2,3-DIBROMOPROPYL) PHOSPHATE | X | | X | | X | | | X | | X | | |
| 126-13-6 | 6-O-ACETYL-1,3,4-TRIS-O-(2-METHYL-1-OXOPROPYL)-BETA-D-FRUCTOFURAN- OSYL ALPHA-D-GLUCOPYRANOSIDE 6-ACETATE 2,3,4-TRIS(2-METHYLPROPANOATE) | | X | | | | | | X | | | | |
| 125-33-7 | primidone | | X | X | | | | | X | | | | |
| 125-02-0 | prednisolone sodium phosphate | X | | | X | | | | | | | | |
| 124-68-5 | 1,1-DIMETHYL-2-HYDROXYETHYLAMINE | | X | | | | | | X | | | X | |
| 124-48-1 | CHLORODIBROMOMETHANE | X | | | | | | | X | | | | |
| 124-30-1 | 1-AMINOOCTADECANE | | X | | | | | | X | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 124-17-4 | 2-(2-BUTOXYETHOXY)ETHANOL ACETATE | | X | | | | | | X | | | | |
| 124-02-7 | Diallylamine | | X | | | | | | | | | X | |
| 123-92-2 | ISOAMYL ACETATE | | X | | | | | | X | | | | |
| 123-91-1 | 1,4-DIOXANE | | X | X | | | | X | X | | | X | |
| 123-86-4 | N-BUTYL ACETATE | | X | | | | | | X | | | X | |
| 123-77-3 | 1,1'-AZOBIS(FORMAMIDE) | | X | | | | | X | | | | X | |
| 123-75-1 | PYRROLIDINE | | X | | | | | | X | | | | |
| 123-73-9 | CROTONALDEHYDE, (E)- | | X | | | | | | X | | | X | |
| 123-72-8 | BUTYRALDEHYDE | | X | | | | | | | | | X | |
| 123-63-7 | PARALDEHYDE | | X | | | | | | X | | | | |
| 123-61-5 | BENZENE-1,3-DIISOCYANATE | X | | | | | | | | | | X | |
| 123-51-3 | 3-METHYLBUTANOL | | X | | | | | | X | | | X | |
| 123-42-2 | DIACETONE ALCOHOL | | X | | | | | | X | | | X | |
| 123-39-7 | EK 7011 | | X | | | X | | | | | | | |
| 123-38-6 | PROPIONALDEHYDE | | X | | | | | | X | | | | |
| 123-31-9 | HYDROQUINONE | | X | | | | | X | X | | X | X | |
| 123-30-8 | 1-AMINO-4-HYDROXYBENZENE | | X | | | | | X | | | | X | |
| 123-19-3 | DIPROPYL KETONE | | X | | | | | | X | | | | |
| 123-11-5 | 4-ANISALDEHYDE | | X | | | | | | X | | | | |
| 123-09-1 | 1-CHLORO-4-(METHYLTHIO)BENZENE | X | | | | | | | X | | | X | |
| 123-07-9 | 1-ETHYL-4-HYDROXYBENZENE | | X | | | | X | | | | | | |
| 122-99-6 | 1-HYDROXY-2-PHENOXYETHANE | | X | | | X | | | | | X | | |
| 122-66-7 | 1,2-DIPHENYLHYDRAZINE | X | | X | | | | | | | | | |
| 122-60-1 | PHENYL GLYCIDYL ETHER | | X | X | | | | X | X | | | X | |
| 122-52-1 | ETHYL PHOSPHITE, (ETO)3P | | X | | | | | | X | | | X | |
| 122-34-9 | SIMAZINE | X | | | | | X | | X | | | | |
| 122-20-3 | 1,1',1''-NITRILOTRI-2-PROPANOL | | X | | | | | | X | | | | |
| 122-19-0 | 2B | | X | | | | | | X | | | | |
| 122-09-8 | 1,1-DIMETHYL-2-PHENYLETHYLAMINE | X | | | | | | | X | | | | |
| 121-92-6 | M-NITROBENZOIC ACID | | X | | | | | | | | X | | |
| 121-82-4 | CYCLONITE | | X | | | | | | X | | X | | |

| CAS# or NA group allocation | **Substance or Group of Substances** (list contains 1431 entries: 1084 from DSL, 318 from nDSL and 29 groups) | On nDSL | On DSL | Suspected Carcinogen | Recognized Developmental Toxin | Suspected Developmental Toxin | Suspected Endocrine Toxin | Suspected Immunotoxin | Suspected Neurotoxin | Recognized Reproductive Toxin | Suspected Reproductive Toxin | Suspected Respiratory Toxin | Thyroid Hormone Interference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 121-69-7 | N,N-DIMETHYLANILINE | | X | | | | X | | X | | | | |
| 121-60-8 | 4'-(CHLOROSULFONYL)ACETANILIDE | | X | | | | | | X | | | | |
| 121-45-9 | TRIMETHYL PHOSPHITE | | X | | | | | | | | | X | |
| 121-44-8 | TRIETHYLAMINE | | X | | | | | X | X | | | X | |
| 121-33-5 | 2-METHOXY-4-FORMYLPHENOL | | X | | | | | | X | | | | |
| 121-17-5 | 4-chloro-3-nitrobenzotrifluoride | X | | | | | | | X | | | | |
| 121-14-2 | 2,4-DINITROTOLUENE | | X | X | | | | | X | X | | | |
| 12108-13-3 | MANGANESE, TRICARBONYL METHYLCYCLOPENTADIENYL | | X | | | | | | X | | | X | |
| 120-83-2 | 2,4-DICHLOROPHENOL | | X | | | | X | X | | | | | X |
| 120-82-1 | 1,2,4-TRICHLOROBENZENE | | X | | | X | X | | X | | | X | |
| 120-80-9 | CATECHOL | | X | X | | | | X | X | | | | X |
| 12079-65-1 | MANGANESE, CYCLOPENTADIENYL-TRICARBONYL | X | | | | | | | X | | | | |
| 120-71-8 | P-CRESIDINE | X | | X | | | | | | | | | |
| 12070-12-1 | TUNGSTEN CARBIDE | | X | | | | | X | | | | X | |
| 12070-08-5 | TITANIUM CARBIDE | | X | | | | | | | | | X | |
| 120-58-1 | ISOSAFROLE | | X | X | | | | | | | | | |
| 12054-48-7 | NICKEL (II) HYDROXIDE | | X | X | | | | X | | | | | |
| 120-36-5 | 2,4-DP | X | | | | X | | | X | | | | X |
| 12035-72-2 | NICKEL SUBSULFIDE | | X | X | | | | X | | | | X | |
| 12035-36-8 | NICKEL DIOXIDE | X | | | | | | X | | | | | |
| 120-12-7 | ANTHRACENE | | X | | | | X | | | | | | |
| 12002-48-1 | Trichlorobenzene | | X | | | | | | | | | | X |
| 12001-26-2 | MICA | | X | | | | | | | | | X | |
| 119-93-7 | (1,1'-BIPHENYL)-4,4'-DIAMINE, 3,3'-DIMETHYL- | | X | X | | | | | | | | | |
| 119-90-4 | 3,3'-DIMETHOXYBENZIDINE | | X | X | | | | | | | | | |
| 119-84-6 | 3,4-DIHYDROCOUMARIN | | X | | | | | | X | | | | |
| 119-64-2 | 1,2,3,4-TETRAHYDRONAPHTHALENE | | X | | | | | | X | | | | |
| 119-61-9 | ALPHA-OXODIPHENYLMETHANE | | X | | | | X | | | | | | |
| 119-36-8 | WINTERGREEN OIL | | X | | | | | | X | | X | X | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 119-34-6 | 4-Amino-2-nitrophenol | X | | X | | | | | | | | | |
| 119-06-2 | 1,2-BENZENEDICARBOXYLIC ACID, DITRIDECYL ESTER | | X<br>X | | | | X | | | | | | |
| 118-96-7 | 2,4,6-TRINITROTOLUENE | | X | | | | | | X | | | X | |
| 117-84-0 | DI-N-OCTYL PHTHALATE | | X | | | | X | | | | | | |
| 117-81-7 | BIS(2-ETHYLHEXYL)PHTHALATE | | X | X | | X | X | | | | X | X | |
| 117-79-3 | 2-AMINOANTHRAQUINONE | X | | X | | | | | | | | | |
| 117-10-2 | DANTRON (CHRYSAZIN; 1,8-DIHYDROXYANTHRAQUINONE) | X | | X | | | | | | | | | |
| 117-08-8 | 1,3-DIOXY-4,5,6,7-TETRACHLOROISOBENZOFURAN | | X | | | | | | | | | X | |
| 1163-19-5 | DECABROMODIPHENYL OXIDE | | X | | | X | | | | | | | |
| 116-14-3 | 1,1,2,2-TETRAFLUOROETHYLENE | | X | X | | | | | X | | | | |
| 116-06-3 | ALDICARB | X | | | | | X | | X | | X | | |
| 115-96-8 | TRIS(2-CHLOROETHYL) PHOSPHATE | | | X | | | | | | | X | | |
| 115-95-7 | 1,6-OCTADIEN-3-OL, 3,7-DIMETHYL-, ACETATE | | X | | | | | | X | | | | |
| 115-86-6 | TRIPHENYL PHOSPHATE | | X | | | | | X | X | | | | |
| 115-77-5 | 1,3-PROPANEDIOL, 2,2-BIS(HYDROXYMETHYL)- | | X | | | | | | X | | | | |
| 1154-59-2 | Tetrachlorosalicylanilide | | X | | | | | X | | | | | |
| 115-28-6 | CHLORENDIC ACID | | X | X | | | | | | | | | |
| 115-07-1 | PROPYLENE | | X | | | | | | | | | X | |
| 1134-04-9 | PYRIDINE, 2,3,4,5-TETRACHLORO-6-(TRICHLOROMETHYL)- | X | | | | | | | X | | | | |
| 1131-18-6 | 1H-Pyrazol-5-amine, 3-methyl-1-phenyl- | X | | | | | | | X | | | | |
| 112-57-2 | 1,11-DIAMINO-3,6,9-TRIAZAUNDECANE | | X | | | | | X | | | | | |
| 112-55-0 | 1-DODECANETHIOL | | X | | | | | X | | | | X | |
| 112-49-2 | TRIETHYLENE GLYCOL DIMETHYL ETHER | | X | | | X | | | | | X | | |
| 112-34-5 | DIETHYLENE GLYCOL MONOBUTYL ETHER | | X | | | | | | X | | | | |
| 1122-60-7 | NITROCYCLOHEXANE | X | | | | | | | X | | | | |
| 112-25-4 | 2-(HEXYLOXY)ETHANOL | | X | | | | | | | | | X | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 112-24-3 | 1,2-ETHANEDIAMINE, N,N'-BIS(2-AMINOETHYL)- | | X | | | X | | X | | | | X | |
| 112-07-2 | 2-BUTOXYETHANOL ACETATE | | X | | | | | | X | | X | | |
| 1120-71-4 | PROPANE SULTONE | | X | X | | | | | X | | | X | |
| 111-96-6 | DIETHYLENE GLYCOL DIMETHYL ETHER | | X | | | X | | | | | | | |
| 111-94-4 | 3,3'-IMINODIPROPIONITRILE | | X | | | | | | X | | | | |
| 111-92-2 | 1-BUTANAMINE, N-BUTYL- | | X | | | | | X | | | | | |
| 111-90-0 | DIETHYLENE GLYCOL MONOETHYL ETHER | | X | | | | | | X | | | | |
| 111-88-6 | 1-MERCAPTOOCTANE | | X | | | | | | | | | X | |
| 111-84-2 | NONANE | | X | | | | | | X | | | | |
| 111-77-3 | DIETHYLENE GLYCOL MONOMETHYL ETHER | | X | | | X | X | | X | | | | |
| 111-76-2 | ETHYLENE GLYCOL MONOBUTYL ETHER | | X | | | X | X | | X | | X | X | |
| 111-71-7 | ALDEHYDE C-7 | | X | | | | | | X | | | | |
| 111-70-6 | 1-HEPTANOL | | X | | | | | | | | | X | |
| 111-69-3 | ADIPONITRILE | | X | | | | | | X | | | X | |
| 111-65-9 | OCTANE | | X | | | | | | X | | | X | |
| 1116-54-7 | N-NITROSODIETHANOLAMINE | X | | X | | | | | | | | X | |
| 111-46-6 | DIETHYLENE GLYCOL ETHER | | X | | | X | | | X | | X | X | |
| 111-44-4 | BIS(2-CHLOROETHYL) ETHER | X | | X | | | | | X | | | X | |
| 111-42-2 | DIETHANOLAMINE | | X | | | | | | X | | | X | |
| 111-41-1 | (2-AMINOETHYL)ETHANOLAMINE | | X | | | | | X | | | | X | |
| 111-40-0 | DIETHYLENETRIAMINE | | X | | | | | X | | | | X | |
| 111-36-4 | N-BUTYL ISOCYANATE | | X | | | | | | X | | | X | |
| 111-31-9 | 1-Hexanethiol | | X | | | | | | X | | | X | |
| 111-29-5 | 1,5-Pentanediol | | X | | | | | | X | | | | |
| 111-20-6 | 1,10-DECANEDIOIC ACID | | X | | | | | | X | | | | |
| 11120-22-2 | LEAD SILICATE | | X | X | X | | | | | X | | | |
| 111-15-9 | ETHYLENE GLYCOL MONOETHYL ETHER ACETATE | | X | | X | | | | X | X | | | |
| 11113-70-5 | CHROMIUM LEAD SILICATE | | X | X | X | | | | | X | | | |
| 11103-86-9 | POTASSIUM ZINC CHROMATE HYDROXIDE | | X | X | | | | | | | | | |
| 110-91-8 | MORPHOLINE | | X | | | | | | X | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 110-86-1 | PYRIDINE | | X | X | | | | | X | | | X | |
| 110-85-0 | 1,4-DIAZACYCLOHEXANE | | X | | | | | | X | | | | |
| 110-83-8 | CYCLOHEXENE | | X | | | | | | X | | | | |
| 110-82-7 | CYCLOHEXANE | | X | | | | | | X | | | | |
| 110-80-5 | ETHYLENE GLYCOL MONOETHYL ETHER | | X | | X | | X | | X | X | | X | |
| 110-74-7 | PROPYL FORMATE | | X | | | | | | X | | | | |
| 110-71-4 | ETHYLENE GLYCOL DIMETHYL ETHER | | X | | | X | | | | | | | |
| 11070-44-3 | 1,3-ISOBENZOFURANDIONE, TETRAHYDROMETHYL- | | X | | | | | X | | | | | |
| 110-66-7 | 1-Pentanethiol | | X | | | | | | | | | X | |
| 110-65-6 | 1,4-BUTINODIOL | | X | | | | | | X | | | X | |
| 110-63-4 | 1,4-BD | | X | | | | | | X | | | | |
| 110-61-2 | 1,2-DICYANOETHANE | | X | | | | | | X | | | X | |
| 110-54-3 | N-HEXANE | | X | | | X | | | X | | X | X | |
| 110-49-6 | ETHYLENE GLYCOL MONOMETHYL ETHER ACETATE | | X | | X | | | | X | X | | X | |
| 110-43-0 | METHYL N-AMYL KETONE | | X | | | | | | X | | | | |
| 110-26-9 | N,N'-METHYLENEBISACRYLAMIDE | | X | | | | | | | | X | X | |
| 110-19-0 | ISOBUTYL ACETATE | | X | | | | | | X | | | | |
| 110-16-7 | MALEIC ACID | | X | | | | | | X | | | | |
| 110-12-3 | METHYL ISOAMYL KETONE | | X | | | | | | X | | | | |
| 110-02-1 | THIOPHENE | | X | | | | X | | | | | | |
| 110-00-9 | FURAN | | X | X | | | | | | | | X | |
| 109-99-9 | TETRAHYDROFURAN | | X | | | X | X | | X | | | X | |
| 109-94-4 | ETHYL FORMATE | | X | | | | | | X | | | | |
| 109-89-7 | DIETHYLAMINE | | X | | | | | X | X | | | X | |
| 109-87-5 | DIMETHOXYMETHANE | | X | | | | | | X | | | | |
| 109-86-4 | ETHYLENE GLYCOL MONOMETHYL ETHER | | X | | X | | X | | X | X | | X | |
| 109-79-5 | 1-BUTANETHIOL | | X | | | | | | X | | | X | |
| 109-77-3 | MALONONITRILE | | X | | | | | | X | | | X | |
| 109-74-0 | 1-CYANOPROPANE | | X | | | | | | X | | | X | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 109-73-9 | BUTYLAMINE | | X | | | | | | | | | X | |
| 109-66-0 | PENTANE | | X | | | | | | X | | | | |
| 109-60-4 | N-PROPYL ACETATE | | X | | | | | | X | | | X | |
| 109-59-1 | ISOPROPOXYETHANOL | | X | | | | | | X | | X | | |
| 109-55-7 | 1,3-PROPANEDIAMINE, N,N-DIMETHYL- | | X | | | | | X | | | | X | |
| 109-16-0 | METHACRYLIC ACID, DIESTER WITH TRIETHYLENE GLYCOL | | X | | | | | | X | | | X | |
| 109-09-1 | 2-CHLOROPYRIDINE | X | | | | | | | X | | | | |
| 109-06-8 | 2-METHYLPYRIDINE | | X | | | | | | X | | | | |
| 109-02-4 | 4-Methylmorpholine | | X | | | | | | | | | X | |
| 108-98-5 | BENZENETHIOL | | X | | | | | | X | | | X | |
| 108-95-2 | PHENOL | | X | | | X | | | X | | X | X | X |
| 108-94-1 | CYCLOHEXANONE | | X | | | X | | X | X | | | X | |
| 108-93-0 | CYCLOHEXANOL | | X | | | | | | X | | X | X | |
| 108-91-8 | CYCLOHEXYLAMINE | | X | | | | | X | X | | X | X | |
| 108-90-7 | CHLOROBENZENE | | X | | | X | | | X | | X | | |
| 108-88-3 | TOLUENE | | X | | X | | | X | X | | X | X | |
| 108-87-2 | METHYLCYCLOHEXANE | | X | | | | | | X | | | | |
| 108-84-9 | 1,3-DIMETHYLBUTYL ACETATE | | X | | | | | | X | | | X | |
| 108-83-8 | DIISOBUTYL KETONE;2,6-DIMETHYL-4-HEPTONE | | X | | | | | | X | | | | |
| 108-78-1 | 1,3,5-TRIAZINE-2,4,6(1H,3H,5H)-TRIIMINE | | X | | | | | | | | X | | |
| 108-77-0 | 1,3,5-TRIAZINE, 2,4,6-TRICHLORO- | | X | | | | | | X | | | | |
| 108-73-6 | 1,3,5-Trihydroxybenzene (phloroglucinol) | | X | | | | | | | | | | X |
| 108-68-9 | 1,3,5-XYLENOL | | X | | | | | | X | | | X | |
| 108-67-8 | MESITYLENE | | X | | | | | | X | | | X | |
| 108-60-1 | BIS(2-CHLORO-1-METHYLETHYL) ETHER | X | | X | | | | | X | | | | |
| 1085-98-9 | DICHLOFLUANID | | X | | | | | X | | | | | |
| 108-46-3 | RESORCINOL | | X | | | | X | | X | | | | X |
| 108-45-2 | M-PHENYLENEDIAMINE | | X | | | | | X | | | | | |
| 108-39-4 | M-CRESOL | | X | | | | | | X | | | X | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 108-38-3 | M-XYLENE | | X | | | X | | X | X | | | X | |
| 108-31-6 | MALEIC ANHYDRIDE | | X | | | | | X | | | | X | |
| 108-24-7 | ACETIC ANHYDRIDE | | X | | | | | | | | | X | |
| 108-21-4 | ISOPROPYL ACETATE | | X | | | | | | X | | | X | |
| 108-20-3 | DIISOPROPYL ETHER | | X | | | | | | X | | | | |
| 108-18-9 | DIISOPROPYLAMINE | | X | | | | | X | X | | | X | |
| 108-11-2 | METHYL ISOBUTYL CARBINOL | | X | | | | | | X | | | | |
| 108-10-1 | METHYL ISOBUTYL KETONE | | X | | | X | | | X | | | X | |
| 108-05-4 | VINYL ACETATE | | X | | | | | | X | | | X | |
| 108-03-2 | 1-NITROPROPANE | | X | | | | | | X | | | | |
| 108-01-0 | (2-HYDROXYETHYL)DIMETHYLAMINE | | X | | | | | | X | | | X | |
| 107-98-2 | PROPYLENE GLYCOL MONOMETHYL ETHER | | X | | | | | | X | | X | | |
| 107-87-9 | METHYL PROPYL KETONE | | X | | | | | | X | | | | |
| 107-66-4 | DIBUTYL PHOSPHATE | | X | | | | | | X | | | | |
| 107-46-0 | BIS(TRIMETHYLSILYL) OXIDE | | X | | | | | | X | | | | |
| 107-44-8 | SARIN | X | | | | | | | X | | | X | |
| 107-41-5 | HEXYLENE GLYCOL | | X | | | | | X | X | | | X | |
| 107-31-3 | METHYL FORMATE | | X | | | | | | X | | | X | |
| 107-30-2 | CHLOROMETHYL METHYL ETHER | X | | X | | | | | | | | X | |
| 107-22-2 | 1,2-ETHANEDIAL | | X | | | | | X | X | | | | |
| 107-20-0 | CHLOROACETALDEHYDE | | X | | | | | | | | | X | |
| 107-19-7 | PROPARGYL ALCOHOL | | X | | | | | | X | | | | |
| 107-18-6 | ALLYL ALCOHOL | | X | | | | | | X | | | X | |
| 1071-83-6 | GLYPHOSATE | | X | | | | | | X | | X | X | |
| 107-16-4 | FORMALDEHYDE CYANOHYDRIN | X | | | | | | | X | | | X | |
| 107-15-3 | ETHYLENEDIAMINE | | X | | | | | X | X | | | X | |
| 107-13-1 | ACRYLONITRILE | | X | X | | X | | | X | | X | X | |
| 107-12-0 | ETHYL CYANIDE | | X | | | | | | X | | | X | |
| 107-11-9 | ALLYL AMINE | | X | | | | | | | | | X | |
| 107-07-3 | CHLOROETHANOL | | X | | | | | | X | | | X | |
| 1070-70-8 | TETRAMETHYLENE DIACRYLATE | X | | | | | | X | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 107-05-1 | ALLYL CHLORIDE | | X | | | X | | | X | | | X | |
| 107-03-9 | 1-MERCAPTOPROPANE | | X | | | | | | X | | | X | |
| 106-99-0 | 1,3-BUTADIENE | | X | X | | X | | | X | | X | X | |
| 106-97-8 | BUTANE | | X | | | | | | X | | | | |
| 106-94-5 | 1-BROMOPROPANE | | X | | | | | | | | X | | |
| 106-92-3 | ALLYL GLYCIDYL ETHER;AGE | | X | | | | | X | X | | | X | |
| 106-91-2 | GLYCIDYL METHACRYLATE | | X | | | | | X | X | | | | |
| 106-90-1 | GLYCIDYL ACRYLATE | | X | | | | | X | | | | | |
| 106-89-8 | EPICHLOROHYDRIN | | X | X | | | X | X | X | X | | X | |
| 106-88-7 | 1,2-BUTYLENE OXIDE | | X | | | | | | | | | X | |
| 106-87-6 | 1-EPOXYETHYL-3,4-EPIXYCYCLOHEXANE | | X | X | | | X | X | X | | | | |
| 1066-45-1 | TRIMETHYLTIN CHLORIDE | X | | | | | | | X | | | | |
| 106-63-8 | 2-METHYLPROPYL 2-PROPENOATE | X | | | | | | X | | | | | |
| 106-51-4 | QUINONE | | X | | | | | | X | | | | |
| 106-50-3 | P-PHENYLENEDIAMINE | | X | | | | | X | X | | | X | |
| 106-48-9 | 4-CHLOROPHENOL | | X | | | | | | X | | | | |
| 106-47-8 | P-CHLOROANILINE | | X | X | | | | | | | | | |
| 106-44-5 | P-CRESOL | | X | | | | | | X | | | X | X |
| 106-35-4 | ETHYL BUTYL KETONE | | X | | | | | | X | | | | |
| 10599-90-3 | CHLORAMINE | X | | | | | | | | | | X | |
| 10588-01-9 | SODIUM BICHROMATE | | X | X | | | | X | | | | X | |
| 105-67-9 | 2,4-DIMETHYLPHENOL | | X | | | | | | | | | X | |
| 105-60-2 | CAPROLACTAM | | X | | | X | | X | X | | X | X | |
| 105-46-4 | SEC-BUTYL ACETATE | | X | | | | | | X | | | | |
| 105-37-3 | ETHYL ESTER PROPANOIC ACID | | X | | | | | | | | | X | |
| 104-88-1 | BENZALDEHYDE, P-CHLORO- | X | | | | | | | X | | | | |
| 104-78-9 | 3-AMINOPROPYLDIETHYLAMINE | | X | | | | | X | | | | | |
| 10476-85-4 | STRONTIUM (STABLE STRONTIUM CHLORIDE) | | X | | | | X | | X | | | | |
| 104-76-7 | 1-HEXANOL, 2-ETHYL- | | X | | | X | | | | | | | |
| 104-55-2 | 2-PROPENAL, 3-PHENYL- | | X | | | | | X | X | | | | |
| 104-49-4 | 1,4-PHENYLENE DIISOCYANATE | X | | | | | | | | | | X | |

| CAS# or NA group allocation | **Substance or Group of Substances** (list contains 1431 entries: 1084 from DSL, 318 from nDSL and 29 groups) | On nDSL | On DSL | Suspected Carcinogen | Recognized Developmental Toxin | Suspected Developmental Toxin | Suspected Endocrine Toxin | Suspected Immunotoxin | Suspected Neurotoxin | Recognized Reproductive Toxin | Suspected Reproductive Toxin | Suspected Respiratory Toxin | Thyroid Hormone Interference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 104-46-1 | 1-METHOXY-4-(1-PROPENYL)BENZENE | | X | | | | | | X | | | | |
| 104-43-8 | 4-DODECYLPHENOL | | X | | | | X | | | | | | |
| 104-40-5 | 4-NONYLPHENOL | | X | | | | X | | | | | | |
| 10415-75-5 | MERCUROUS NITRATE | | X | | X | | | | | | | | |
| 104-12-1 | P-CHLOROPHENYL ISOCYANATE | X | | | | | X | | | | | X | |
| 103-90-2 | ACETAMINOPHEN | | X | | | | | | X | | | X | |
| 103-84-4 | ACETANILIDE | | X | | | | | | X | | | X | |
| 103-83-3 | DIMETHYLBENZYLAMINE | | X | | | | | X | X | | | X | |
| 103-76-4 | (BETA-HYDROXYETHYL)PIPERAZINE | | X | | | | | | X | | | | |
| 103-71-9 | PHENYL ISOCYANATE | | X | | | | | X | | | | | |
| 103-65-1 | N-PROPYLBENZENE | | X | | | | | | X | | | | |
| 10361-37-2 | BARIUM CHLORIDE | | X | | | | | | X | | | | |
| 10347-54-3 | 1,4-BIS(METHYLISOCYANATE) CYCLOHEXANE | X | | | | | | | | | | X | |
| 103-41-3 | 2-Propenoic acid, 3-phenyl-, phenylmethyl ester | | X | | | | | | X | | | | |
| 103-33-3 | AZOBENZENE | | X | X | | | | | | | | | |
| 103-27-5 | PHENYL MERCURIC PROPIONATE | | X | | X | | | | | | | | |
| 10325-94-7 | CADMIUM NITRATE | | X | X | | | | | | | | | |
| 103-23-1 | BIS(2-ETHYLHEXYL) ADIPATE | | X | | | | X | | | | | | |
| 103-11-7 | 1-HEXANOL, 2-ETHYL-, ACRYLATE | | X | | | | | X | X | | | | |
| 10294-40-3 | BARIUM CHROMATE | | X | X | | | | | | | | | |
| 10294-33-4 | BORON TRIBROMIDE | | X | | | | | | | | | X | |
| 102-71-6 | TRIETHANOLAMINE | | X | | | | | X | | | | X | |
| 102-54-5 | DICYCLOPENTADIENYL IRON | | X | | | | X | | | | | | |
| 10210-68-1 | COBALT CARBONYL | | X | | | | | | X | | | X | |
| 102-06-7 | 1,3-DIFENYLGUANID | | X | | | | | | X | | | | |
| 101-90-6 | DIGLYCIDYL RESORCINOL ETHER (DGRE) | | X | X | | | | X | X | | | | |
| 101-84-8 | PHENYL ETHER, VAPOR | | X | | | | | | X | | | | |
| 101-80-4 | 4,4'-DIAMINODIPHENYL ETHER | X | | X | | | X | | | | | | |
| 101-77-9 | 4,4'-METHYLENEDIANILINE | | X | X | | | | X | X | | | | X |
| 101-72-4 | 1,4-BENZENEDIAMINE, N-(1-METHYLETHYL)-N'-PHENYL- | | X | | | | | X | | | | | |

| CAS# or NA group allocation | **Substance or Group of Substances** (list contains 1431 entries: 1084 from DSL, 318 from nDSL and 29 groups) | On nDSL | On DSL | Suspected Carcinogen | Recognized Developmental Toxin | Suspected Developmental Toxin | Suspected Endocrine Toxin | Suspected Immunotoxin | Suspected Neurotoxin | Recognized Reproductive Toxin | Suspected Reproductive Toxin | Suspected Respiratory Toxin | Thyroid Hormone Interference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 101-68-8 | 1,1'-METHYLENEBIS(4-ISOCYANATOBENZENE) | | X | | | | | X | | | | X | |
| 101-61-1 | 4,4'-METHYLENEBIS(N,N-DIMETHYL)BENZENAMINE | | X | X | | | | | | | | | |
| 101-37-1 | 1,3,5-Triazine, 2,4,6-tris(2-propenyloxy)- | | X | | | | | | X | | | | |
| 10124-43-3 | COBALT(II) SULFATE (1:1) | | X | | | | | | X | | | | |
| 10124-36-4 | CADMIUM SULFATE | | X | X | | | | | | | | | |
| 101-14-4 | 4,4'-METHYLENEBIS(2-CHLOROANILINE) | | X | X | | | | | X | | | X | |
| 10112-91-1 | Mercury chloride | | X | | | | | | | | | | X |
| 10108-64-2 | CADMIUM CHLORIDE | | X | X | | X | X | | | | | X | X |
| 10103-50-1 | MAGNESIUM ARSENATE | X | | X | X | | | | | | | | |
| 10102-44-0 | NITROGEN DIOXIDE | | X | | | X | X | X | X | | X | X | |
| 10102-43-9 | NITRIC OXIDE | | X | | | | | | X | | | X | |
| 10102-20-2 | SODIUM TELLURITE | X | | | | | | | X | | | X | |
| 10102-18-8 | SODIUM SELENITE (H2O3SE.2NA) | | X | | | | | | X | | | X | |
| 10101-63-0 | LEAD IODIDE | X | | X | X | | | | | X | | | |
| 10101-53-8 | CHROMIC SULFATE | | X | X | | | | | | | | | |
| 10099-76-0 | Silicic acid, lead(2+) salt (1:1) | | X | | | | | X | | | | | |
| 10099-74-8 | LEAD NITRATE | | X | X | X | | | | | X | | | |
| 100-97-0 | 1,3,5,7-TETRAAZAADAMANTANE | | X | | | | | X | | | | X | |
| 100-75-4 | N-NITROSOPIPERIDINE | | X | X | | | | | | | | X | |
| 100-63-0 | PHENYLHYDRAZINE | X | | X | | | | X | X | | | | |
| 100-61-8 | METHYLANILINE | | X | | | | | | X | | | X | |
| 10061-02-6 | TRANS-1,3-DICHLOROPROPENE | X | | X | | | | | | | | | |
| 100-53-8 | (MERCAPTOMETHYL)BENZENE | | X | | | | | | X | | | X | |
| 100-52-7 | ALMOND ARTIFICIAL ESSENTIAL OIL | | X | | | | | | X | | | X | |
| 100-51-6 | BENZYL ALCOHOL | | X | | | | | | X | | | | |
| 10049-04-4 | CHLORINE DIOXIDE | | X | | | X | | | | | X | X | |
| 100-47-0 | BENZONITRILE | | X | | | | | | X | | | | |
| 10045-94-0 | MERCURIC NITRATE | | X | | X | | | | | | | | |
| 100-44-7 | BENZYL CHLORIDE | | X | X | | X | | | X | | | X | |
| 100-43-6 | Pyridine, 4-ethenyl- | | X | | | | | | X | | | X | |

| CAS# or NA group allocation | **Substance or Group of Substances** (list contains 1431 entries: 1084 from DSL, 318 from nDSL and 29 groups) | On nDSL | On DSL | Suspected Carcinogen | Recognized Developmental Toxin | Suspected Developmental Toxin | Suspected Endocrine Toxin | Suspected Immunotoxin | Suspected Neurotoxin | Recognized Reproductive Toxin | Suspected Reproductive Toxin | Suspected Respiratory Toxin | Thyroid Hormone Interference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 100-42-5 | STYRENE | | X | | | X | X | X | X | | X | X | |
| 100-41-4 | ETHYLBENZENE | | X | | | X | X | | X | | X | X | |
| 100-40-3 | 4-VINYLCYCLOHEXENE | | X | X | | | | | | | X | | |
| 10039-54-0 | HYDROXYLAMINE, SULFATE (2:1) | | X | | | | | | X | | | X | |
| 100-37-8 | 2-(DIETHYLAMINO)ETHANOL | | X | | | | | | X | | | X | |
| 10035-10-6 | HYDROBROMIDE ACID | | X | | | | | | | | | X | |
| 10034-93-2 | HYDRAZINE SULFATE | | X | X | | | | | X | | | X | |
| 10028-17-8 | TRITIUM | | X | X | | | | | | | | | |
| 10028-15-6 | OZONE | X | | | | | | X | X | | | X | |
| 10026-13-8 | PHOSPHORUS PENTACHLORIDE | | X | | | | | | | | | X | |
| 10025-91-9 | ANTIMONY TRICHLORIDE | | X | | | | | | X | | | X | |
| 10025-87-3 | PHOSPHORUS OXYCHLORIDE | | X | | | | | | X | | | X | |
| 10025-67-9 | SULFUR CHLORIDE (MONO) | | X | | | | | | | | | X | |
| 100-25-4 | P-DINITROBENZENE | | X | | | | | | X | X | | | |
| 10024-97-2 | NITROUS OXIDE | | X | | | X | | | X | | X | X | |
| 100-21-0 | TEREPHTHALIC ACID | | X | | | | | | X | | | | |
| 100-20-9 | 1,4-BENZENEDICARBONYL CHLORIDE | | X | | | | | | X | | | X | |
| 100-02-7 | 4-NITROPHENOL | | X | | | | | | X | | | | |
| 100-01-6 | P-NITROANILINE | | X | | | | | | X | | | | |
| 100-00-5 | P-NITROCHLOROBENZENE | | X | X | | | | | | | | | |

# Appendix Five — Canadian List #2

**Canadian List #2 — List of Substances of Concern to Children.** These substances are suspected of, or associated with, the health effects noted, they appear on either the nDSL or the DSL or are group entries. DSL substances correspond to those on Health Canada's preliminary list of those substances for which there is the greatest potential for exposure. (Note that where a substance or group of substances is not shown to be associated with a particular health effect, this should not be construed as evidence that such effects have not been found or suspected. Rather, the lists summarize what is known or suspected. A blank entry should not be interpreted as an indication that particular effects have not been found for the substances in question.)

| CAS# or NA group allocation | **Substance or Group of Substances** (list contains 597 entries: 250 from DSL, 318 from nDSL and 29 groups) | On nDSL | On DSL and GPE list | Suspected Carcinogen | Recognized Developmental Toxin | Suspected Developmental Toxin | Suspected Endocrine Toxin | Suspected Immunotoxin | Suspected Neurotoxin | Recognized Reproductive Toxin | Suspected Reproductive Toxin | Suspected Respiratory Toxin | Thyroid Hormone Interference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NA - VOC | VOLATILE ORGANIC COMPOUNDS | | | | | X | | | | | X | | |
| NA - SULP | SULFATES (1) | | | | | | | | | | | X | |
| NA - PHTH | PHTHALATES | | | | | | X | | | | X | | |
| NA - PFOA | Perfluorooctane sulfonate (PFOS) | | | | | | X | | | | | | |
| NA - PCB | Coplanar Polychlorinated Biphenyls | | | X | X | | | | | | | | |
| NA - NPE | ALKYLPHENOLS | | | | | | X | | | | | | |
| NA - NITR | OXIDES OF NITROGEN | | | | | | | | | | | X | |
| NA - D/F | Dioxins and Furans | | | X | | X | X | | | | X | X | |
| NA - 39 | GLYCOL ETHERS | | | | | X | | | X | | X | X | |
| NA - 31 | COKE OVEN EMISSIONS | | | X | | | | | | | | X | |
| NA - 30 | POLYBROMINATED BIPHENYLS | | | X | X | | X | | X | | X | | |
| NA - 29 | RADIONUCLIDES | | | X | | X | | | | | X | X | |
| NA - 23 | PM 10 | | | | | X | | | | | X | X | |
| NA - 22 | PM 2.5 | | | | | X | | | | | X | X | |
| NA - 19 | BERYLLIUM COMPOUNDS | | | X | | | | X | | | | X | |
| NA - 18 | ALUMINUM COMPOUNDS | | | | | | | | | | | X | |
| NA - 14 | ZINC CHROMATES | | | X | | | | X | | | | X | |
| NA - 12 | SELENIUM COMPOUNDS | | | | | | | | X | | X | X | |
| NA - 11 | NICKEL COMPOUNDS | | | | | X | | X | | | X | | |

| CAS# or NA group allocation | **Substance or Group of Substances** (list contains 1431 entries: 1084 from DSL, 318 from nDSL and 29 groups) | On nDSL | On DSL and GPE list | Suspected Carcinogen | Recognized Developmental Toxin | Suspected Developmental Toxin | Suspected Endocrine Toxin | Suspected Immunotoxin | Suspected Neurotoxin | Recognized Reproductive Toxin | Suspected Reproductive Toxin | Suspected Respiratory Toxin | Thyroid Hormone Interference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NA - 10 | METHYL MERCURY COMPOUNDS | | | X | X | | | X | X | | X | X | |
| NA - 09 | MANGANESE COMPOUNDS | | | | | | | | X | | | | |
| NA - 08A | ALKYL LEAD COMPOUNDS | | | X | X | | | | X | X | | | |
| NA - 08 | LEAD COMPOUNDS | | | X | X | | | X | X | X | | | |
| NA - 07 | CYANIDE COMPOUNDS | | | | | | | | X | | | X | |
| NA - 06 | COPPER COMPOUNDS | | | | | | | | | | | X | |
| NA - 05 | COBALT COMPOUNDS | | | | | | | X | | | | X | |
| NA - 04 | CHROMIUM COMPOUNDS | | | | | | | X | | | | X | |
| NA - 02 | INORGANIC ARSENIC COMPOUNDS | | | X | X | X | | | X | | | X | |
| NA - 01 | ANTIMONY COMPOUNDS | | | | | | | | | | | X | |
| 998-30-1 | TRIETHOXYSILANE | X | | | | | | | X | | | X | |
| 99-59-2 | 5-NITRO-O-ANISIDINE | X | | X | | | | | | | | | |
| 99-35-4 | 1,3,5-TRINITROBENZENE | X | | | | | | | X | | | X | |
| 98-87-3 | BENZAL CHLORIDE | X | | | | | | | X | | | X | |
| 98-82-8 | CUMENE | | X | | | | | | X | | | | |
| 98-57-7 | 1-CHLORO-4-(METHYLSULFONYL)BENZENE | X | | | | | | | X | | | X | |
| 98-16-8 | BENZENAMINE, 3-(TRIFLUOROMETHYL)- | X | | | | | | | X | | | X | |
| 98-08-8 | TRIFLUOROMETHYLBENZENE | X | | | | | | | X | | | | |
| 98-07-7 | BENZOIC TRICHLORIDE | X | | X | | X | | | X | | | X | |
| 98-01-1 | FURFURAL | | X | | | | | | X | | | X | |
| 98-00-0 | FURFURYL ALCOHOL | | X | | | | | | | | | X | |
| 97-88-1 | 2-METHYL-BUTYLACRYLAAT | | X | | | | | X | X | | | | |
| 97-53-0 | EUGENOL | | X | | | | | X | X | | | | |
| 97-51-8 | BENZALDEHYDE, 2-HYDROXY-5-NITRO- | X | | | | | | | | | | | |
| 97-18-7 | 2,2'-THIOBIS(4,6-DICHLORO)PHENOL | X | | | | | | X | | | | | |
| 96-29-7 | 2-BUTANONE OXIME | | X | | | | | X | | | | | |
| 96-13-9 | 2,3-DIBROMO-1-PROPANOL | X | | X | | | | | | | | | |
| 95-83-0 | 4-CHLORO-ORTHO-PHENYLENEDIAMINE | X | | X | | | | | | | | | |
| 95-82-9 | 2,5-DICHLOROBENZENAMINE | X | | | | | | | X | | | X | |
| 95-70-5 | 2,5-DIAMINOTOLUENE | X | | X | | | | X | | | | | |

| CAS# or NA group allocation | **Substance or Group of Substances** (list contains 1431 entries: 1084 from DSL, 318 from nDSL and 29 groups) | On nDSL | On DSL and GPE list | Suspected Carcinogen | Recognized Developmental Toxin | Suspected Developmental Toxin | Suspected Endocrine Toxin | Suspected Immunotoxin | Suspected Neurotoxin | Recognized Reproductive Toxin | Suspected Reproductive Toxin | Suspected Respiratory Toxin | Thyroid Hormone Interference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95-69-2 | P-CHLORO-O-TOLUIDINE | X | | X | | | | | | | | | |
| 95-47-6 | O-XYLENE | | X | | | X | | X | X | | X | X | |
| 95-01-2 | 2,4-Dihydroxybenzaldehyde | X | | | | | | | | | | | X |
| 94-74-6 | METHOXONE | X | | | | | | | X | | | | X |
| 93-58-3 | METHYL BENZOATE | | X | | | | | | X | | | | |
| 934-73-6 | 1-CHLORO-4-(METHYLSULFINYL)BENZENE | | X | | | | | | X | | | X | |
| 930-55-2 | N-NITROSOPYRROLIDINE | X | | X | | | | | | | | | |
| 92-93-3 | 4-NITROBIPHENYL | X | | X | | | | | X | | | X | |
| 92-87-5 | BENZIDINE | X | | X | | | | X | X | | | | |
| 92-67-1 | 4-AMINOBIPHENYL | X | | X | | | | | X | | | X | |
| 924-16-3 | N-NITROSODI-N-BUTYLAMINE | X | | X | | | | | | | | X | |
| 91-94-1 | 3,3'-DICHLOROBENZIDINE | X | | X | | | | X | | | | | |
| 919-16-4 | LITHIUM CITRATE | X | | | X | | | | | | | | |
| 91-23-6 | 2-NITROANISOLE | X | | X | | | | | | | | X | |
| 90-41-5 | [1,1'-Biphenyl]-2-amine | | X | | | | | | X | | | X | |
| 9036-19-5 | OCTYLPHENOXY POLYETHOXYETHANOL | | X | | | | X | | | | | | |
| 9016-87-9 | POLYMERIC MDI | | X | | | | | | | | | X | |
| 9016-45-9 | 2-(2-(2-(2-(NONYLPHENOXY) ETHOXY) ETHOXY)ETHOXY)ETHANOL | | X | | | | X | | | | | | |
| 9011-05-6 | ACRISIN FS 017 | | X | | | | | X | | | | X | |
| 900-95-8 | STANNANE, ACETOXYTRIPHENYL | X | | | | | X | X | X | | | | |
| 9003-53-6 | 168N15 | | X | | | | | X | | | | X | |
| 9003-35-4 | FORMALDEHYDE, PHENOL POLYMER | | X | | | | | X | | | | | |
| 9003-11-6 | POLOXANLENE | | X | | | | | | X | | | | |
| 9003-07-0 | POLYPROPYLENE | | X | | | | | | | | | X | |
| 9003-05-8 | POLYACRYLAMIDE | | X | | | | | | X | | | X | |
| 9002-93-1 | OCTYLPHENOXYPOLYETHOXYETHANOL | | X | | | | X | | | | | | |
| 9002-89-5 | ALCOTEX 17F-H | | X | | | | | | X | | | | |
| 9002-86-2 | POLYVINYL CHLORIDE | | X | | | | | | | | | X | |
| 90-01-7 | o-Hydroxybenzyl alcohol (saligenin) | X | | | | | | | | | | | X |
| 9000-71-9 | CASEIN | | X | | | | | | | | | X | |

| CAS# or NA group allocation | **Substance or Group of Substances** (list contains 1431 entries: 1084 from DSL, 318 from nDSL and 29 groups) | On nDSL | On DSL and GPE list | Suspected Carcinogen | Recognized Developmental Toxin | Suspected Developmental Toxin | Suspected Endocrine Toxin | Suspected Immunotoxin | Suspected Neurotoxin | Recognized Reproductive Toxin | Suspected Reproductive Toxin | Suspected Respiratory Toxin | Thyroid Hormone Interference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 89-86-1 | 2,4-Dihydroxybenzoic acid | X | | | | | | | | | | | X |
| 88-73-3 | 1-CHLORO-2-NITROBENZENE | X | | | | | X | | | | | | |
| 88-06-2 | 2,4,6-TRICHLOROPHENOL | X | | X | | | | | | | | X | X |
| 88-05-1 | ANILINE, 2,4,6-TRIMETHYL- | X | | | | | | | X | | | | |
| 87-65-0 | 2,6-Dichlorophenol | X | | | | | | | | | | | X |
| 872-50-4 | N-METHYL-2-PYRROLIDONE | | X | | X | | | | X | | X | | |
| 868-85-9 | BIS(HYDROXYMETHYL)PHOSPHINE OXIDE | X | | | | | | | X | | | X | |
| 86-88-4 | ANTU | X | | | | | | | | | | X | |
| 85-68-7 | BENZYL BUTYL PHTHALATE | | X | | | X | X | | X | | X | | |
| 85-44-9 | PHTHALIC ANHYDRIDE | | X | | | | | X | X | | | X | |
| 84-74-2 | DIBUTYL PHTHALATE | | X | | | X | X | X | X | | X | | |
| 838-88-0 | 2,2-DIMETHYL-4,4-METHYLENEDIANILINE | X | | X | | | | X | | | | X | |
| 824-11-3 | TRIMETHYLOLPROPANE PHOSPHITE | X | | | | | | | X | | | | |
| 82-28-0 | 1-AMINO-2-METHYLANTHRAQUINONE | X | | X | | | | | | | | | |
| 81-49-2 | 1-AMINO-2,4-DIBROMOANTHRAQUINONE | X | | X | | | | | | | | | |
| 80-63-7 | METHYL 2-CHLOROACRYLATE | X | | | | | | | | | | X | |
| 80-62-6 | METHYL METHACRYLATE | | X | | | X | | X | X | | X | X | |
| 8052-41-3 | STODDARD SOLVENT | | X | | | | | | X | | | | |
| 8050-09-7 | BALS 3A | | X | | | | | X | | | | X | |
| 8032-32-4 | BENZINE | | X | | | | | | X | | | | |
| 8030-30-6 | VM & P (VARISH MAKERS & PAINTERS) NAPHTHA | | X | | | | X | | X | | | | |
| 80-15-9 | CUMENE HYDROPEROXIDE | | X | | | | | | | | | X | |
| 8008-20-6 | KEROSENE | | X | | | | X | | X | | | X | |
| 8007-45-2 | COAL TARS | | X | X | | | | | | | | X | |
| 8006-64-2 | TURPENTINE | | X | | | | | X | X | | | X | |
| 80-05-7 | 4,4'-ISOPROPYLIDENEDIPHENOL | | X | | | | X | X | X | | X | | |
| 8002-05-9 | PETROLEUM DISTILLATES | | X | | | | | | X | | | X | |
| 79-95-8 | PHENOL, 4,4'-ISOPROPYL IDENEBIS(2,6-DICHLORO- | X | | | | | | | X | | | X | |
| 79-44-7 | DIMETHYLCARBAMOYL CHLORIDE | X | | | | | | | | | | X | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 79-41-4 | METHACRYLIC ACID | | X | | | | | | X | | | X | |
| 79-14-1 | GLYCOLIC ACID | | X | | | | | | X | | | | |
| 79-10-7 | ACRYLIC ACID | | X | | | | | X | | | | X | |
| 79-08-3 | Acetic acid, bromo- | X | | | | | | | X | | | | |
| 79-06-1 | ACRYLAMIDE | | X | X | | | | | X | | X | | |
| 79-01-6 | TRICHLOROETHYLENE | | X | X | | X | | | X | | X | X | |
| 78-93-3 | METHYL ETHYL KETONE | | X | | | X | | | X | | X | X | |
| 78-83-1 | 2-METHYL-1-PROPANOL | | X | | | | | | X | | | | |
| 78-79-5 | 2-METHYL-1,3-BUTADIENE | | X | X | | | | | X | | | X | |
| 78-71-7 | OXETANE, 3,3-BIS(CHLOROMETHYL)- | X | | | | | | | X | | | X | |
| 78-59-1 | ISOPHORONE | | X | | | X | | | X | | | X | |
| 78-48-8 | S,S,S-TRIBUTYLTRITHIOPHOSPHATE | X | | | | | | | X | | | | |
| 7803-49-8 | Hydroxylamine | | | | | | | X | | | | | |
| 78-00-2 | TETRAETHYLLEAD | | X | X | X | | | | X | X | | | |
| 77-99-6 | 1,1,1-TRI(HYDROXYMETHYL)PROPANE | | X | | | | | | X | | | X | |
| 7790-91-2 | CHLORINE TRIFLUORIDE | X | | | | | | | X | | | X | |
| 7790-79-6 | CADMIUM FLUORIDE | | X | X | | | | | | | | | |
| 7790-30-9 | Thallium iodide | X | | | | | | | X | | | | |
| 7788-98-9 | AMMONIUM CHROMATE | | X | X | | | | | | | | | |
| 7787-49-7 | BERYLLIUM FLUORIDE | X | | X | | | | | | | | X | |
| 7786-81-4 | NICKEL SULFATE | | X | | | | X | X | | | | X | |
| 7784-41-0 | POTASSIUM ARSENATE | X | | X | X | | | | | | | | |
| 7783-80-4 | TELLURIUM HEXAFLUORIDE | X | | | | | | | | | | X | |
| 7782-50-5 | CHLORINE | | X | | | | | | X | | | X | |
| 7782-42-5 | GRAPHITE | | X | | | | | | | | | X | |
| 77-81-6 | TABUN | X | | | | | | | X | | | X | |
| 77-73-6 | DICYCLOPENTADIENE | | X | | | | | | X | | | | |
| 7758-98-7 | CUPRIC SULFATE | | X | | | | | | X | | | X | |
| 7758-97-6 | LEAD CHROMATE | | X | X | X | | | X | X | X | | X | |
| 7758-29-4 | Sodium Tripolyphosphate | | X | | | | | | X | | | | |
| 7733-02-0 | ZINC SULFATE | | X | | | X | | | | | | X | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7732-18-5 | DEIONIZED WATER | | X | | | | | | X | | | | |
| 7727-37-9 | NITROGEN | | X | | | | | | | | | X | |
| 7697-37-2 | NITRIC ACID | | X | | | | | | | | | X | |
| 76-87-9 | TRIPHENYLTIN HYDROXIDE | X | | X | X | | | | | | | | |
| 7681-57-4 | SODIUM METABISULFITE | | X | | | | | X | | | | X | |
| 7681-11-0 | POTASSIUM IODIDE | | X | | | X | | | | | | | |
| 7664-93-9 | STRONG INORGANIC ACID MISTS CONTAINING SULFURIC ACID | | X | X | | | | | | | | X | |
| 7664-41-7 | AMMONIA | | X | | | | | | X | | X | X | X |
| 7664-39-3 | HYDROFLUORIC ACID | | X | | | X | | | X | | X | X | |
| 7664-38-2 | PHOSPHORIC ACID | | X | | | | | | X | | | X | |
| 7647-01-0 | HYDROCHLORIC ACID | | X | | | | | | | | | X | |
| 7646-85-7 | ZINC CHLORIDE FUME | | X | | | | | | | | X | X | |
| 764-41-0 | 1,4-DICHLORO-2-BUTENE | X | | X | | | | | X | | | X | |
| 763-29-1 | 2-METHYL-1-PENTENE | X | | | | | | | X | | | X | |
| 7632-00-0 | SODIUM NITRITE | | X | | | | | | X | | | X | |
| 7631-99-4 | SODIUM NITRATE | | X | | | X | | | | | | X | |
| 7631-90-5 | SODIUM BISULFITE | | X | | | | | | | | | X | |
| 7616-94-6 | PERCHLORYL FLUORIDE | X | | | | | | | | | | X | |
| 76-13-1 | FREON 113 | | X | | | | | | X | | | X | |
| 76-12-0 | 1,1,2,2-TETRACHLORO-1,2-DIFUOROETHANE (FC 112) | X | | | | | | | X | | | X | |
| 76-11-9 | 1,1,1,2-TETRACHLOR-2,2-DIFLUOROETHANE | X | | | | | | | X | | | | |
| 760-23-6 | 1,2-DICHLORO-3-BUTENE | X | | | | | | | X | | | X | |
| 759-73-9 | N-ETHYL-N-NITROSOUREA | X | | X | | X | | | X | | X | | |
| 75-87-6 | 2,2,2-TRICHLOROACETALDEHYDE | X | | | | | | | X | | | | |
| 7580-67-8 | LITHIUM HYDRIDE | X | | | | | | | | | | X | |
| 75790-87-3 | 2,4'-DIISOCYANATODIPHENYL SULFIDE | X | | | | | | | | | | X | |
| 75790-84-0 | 4-METHYLDIPHENYLMETHANE-3,4-DIISOCYANATE | X | | | | | | | | | | X | |
| 75-71-8 | DICHLORODIFLUOROMETHANE | | X | | | | | | X | | | X | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 75-69-4 | TRICHLOROFLUOROMETHANE | | X | | | | | | | | | X | |
| 75-66-1 | 1,1-DIMETHYLETHANETHIOL | | X | | | | | | X | | | X | |
| 75-61-6 | DIBROMODIFLUOROMETHANE | X | | | | | | | X | | | | |
| 75-60-5 | CACODYLIC ACID | X | | X | | X | | | | | | | |
| 75-56-9 | PROPYLENE OXIDE | | X | X | | X | | X | | | X | X | |
| 75-55-8 | PROPYLENEIMINE | X | | X | | | | | | | | X | |
| 75-28-5 | 1,1-DIMETHYLETHANE | | X | | | | | | | | | | |
| 75-27-4 | DICHLOROBROMOMETHANE | X | | X | | | | | X | | | | |
| 75-09-2 | DICHLOROMETHANE | | X | X | | | X | | | | X | X | |
| 75-08-1 | ETHYL MERCAPTAN | | X | | | | | | X | | | X | |
| 75-07-0 | ACETALDEHYDE | | X | X | | X | | | | | | X | |
| 75-05-8 | ACETONITRILE | | X | | | X | | | X | | X | X | |
| 75-02-5 | ETHENE, FLUORO- | X | | X | | | | | | | | | |
| 74-98-6 | PROPANE | | X | | | | | | | | | X | |
| 7487-88-9 | MAGNESIUM SULFATE | | X | | | | | | X | | | X | |
| 74-87-3 | CHLOROMETHANE | | X | | X | | | | X | | X | X | |
| 74-84-0 | ETHANE | | X | | | | | | X | | | X | |
| 74-82-8 | METHANE | | X | | | | | | | | | X | |
| 7447-40-7 | POTASSIUM CHLORIDE | | X | | | | | | | | | X | |
| 7446-70-0 | ALUMINUM CHLORIDE | | X | | | | | | X | | X | | |
| 7446-27-7 | LEAD PHOSPHATE | X | | X | X | | | | | X | | | |
| 7446-09-5 | SULFUR DIOXIDE | | X | | | X | | | X | | | X | |
| 7440-66-6 | ZINC | | X | | | X | | X | | | X | X | |
| 7440-50-8 | COPPER | | X | | | X | | | | | X | X | |
| 7440-48-4 | COBALT | | X | X | | X | | X | X | | X | X | |
| 7440-47-3 | CHROMIUM (CR6+) | | X | X | | | | X | | | X | X | |
| 7440-46-2 | CESIUM | X | | | | X | | | | | | | |
| 7440-31-5 | TIN | | X | | | | | | X | | X | X | |
| 7440-02-0 | NICKEL | | X | X | | X | | | X | | X | X | |
| 7439-96-5 | MANGANESE | | X | | | | | | | | X | X | |
| 7439-92-1 | LEAD | | X | X | X | | X | X | X | X | | X | X |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7439-89-6 | IRON | | X | | | | | | X | | X | X | |
| 7429-90-5 | ALUMINUM | | X | | | | | | X | | X | X | |
| 71-63-6 | DIGITOXIN | X | | | | | | | X | | | | |
| 71-55-6 | 1,1,1-TRICHLOROETHANE | | X | | | X | | | X | | X | | |
| 71-43-2 | BENZENE | | X | X | X | | X | X | X | X | | X | |
| 71-41-0 | 1-PENTANOL | | X | | | | | | X | | | X | |
| 71-36-3 | N-BUTYL ALCOHOL | | X | | | | | | X | | | X | |
| 71-23-8 | N-PROPYL ALCOHOL | | X | | | | | | X | | | X | |
| 70321-80-1 | CREOSOTE OIL, LOW-BOILING DISTILLATE | X | | X | | | | | | | | | |
| 70321-79-8 | CREOSOTE OIL (DERIVED FROM ANY SOURCE) | X | | X | | | | | | | | | |
| 70-25-7 | 1-METHYL-1-NITROSO-3-NITROGUANIDINE | X | | X | | | | | | | | X | |
| 693-21-0 | 2,2'-OXYBISETHANOL DINITRATE | X | | | | | | | X | | | X | |
| 69011-06-9 | (1,2-BENZENEDICARBOXYLATO(2-)) DIOXOTRILEAD | X | | X | X | | | | | X | | | |
| 684-93-5 | N-NITROSO-N-METHYLUREA | X | | X | | X | | | | | | | |
| 68476-48-2 | CHLORINATED HYDROCARBON DISTILLATE | X | | | | | | | X | | | | |
| 68476-30-2 | #2 HOME HEATING OILS | | X | | | | | | X | | | | |
| 684-16-2 | HEXAFLUOROACETONE | X | | | | | | | | | X | | |
| 68411-44-9 | BENZENE, BUTYL-, BRANCHED AND LINEAR | X | | | | | X | | | | | | |
| 68411-30-3 | sodium alkyl aryl sulfonate | | X | | | | | | X | | | | |
| 68308-34-9 | SHALE-OILS | X | | X | | | | | | | | X | |
| 68-12-2 | N,N-DIMETHYLFORMAMIDE | | X | | | X | | | X | | X | X | |
| 680-31-9 | HEXAMETHYLPHOSPHORAMIDE | X | | X | | | | | X | X | | X | |
| 67-66-3 | CHLOROFORM | | X | X | | X | X | | X | | X | X | |
| 67-64-1 | ACETONE | | X | | | | | | X | | | X | |
| 67-56-1 | METHANOL | | X | | | X | | | X | | | X | |
| 675-14-9 | CYANURIC FLUORIDE | X | | | | | | | | | | X | |
| 67-20-9 | NITROFURANTOIN | X | | | | X | | | X | X | | | |
| 66-76-2 | DICUMAROL | X | | | X | | | | | | | X | |
| 665-66-7 | AMANTADINE HYDROCHLORIDE | X | | | X | | | | X | | | X | |
| 65997-15-1 | CEMENT KILN DUST | | X | | | | | X | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 65996-93-2 | POLYCYCLIC AROMATIC COMPOUNDS | | X | | | | | | | | X | X | |
| 650-51-1 | ACETIC ACID, TRICHLORO-, SODIUM SALT | X | | | | | | | X | | | | |
| 64742-95-6 | AROMATIC NAPHTHA, TYPE I | | X | | | X | | | | | | | |
| 644-97-3 | BENZENE PHOSPHORUS DICHLORIDE | X | | | | | | | X | | | | |
| 6423-43-4 | PROPTLENE GLYCOL DINITRATE | X | | | | | | | X | | | | |
| 64-18-6 | FORMIC ACID | | X | | | | | | X | | | X | |
| 639-58-7 | TRIPHENYLTIN CHLORIDE | X | | | | | | | | | X | | |
| 636-23-7 | 2,4-DIAMINOTOLUENE.2HCL | X | | X | | | | | | | | | |
| 636-21-5 | O-TOLUIDINE HYDROCHLORIDE | X | | X | | | | | | | | | |
| 6358-53-8 | CITRUS RED NO.2 | X | | X | | | | | | | | | |
| 635-22-3 | ANILINE, 4-CHLORO-3-NITRO- | X | | | | | | | X | | | X | |
| 634-93-5 | 1-AMINO-2,4,6-TRICHLOROBENZENE | X | | | | | | | X | | | | |
| 631-64-1 | Dibromoacetic acid | X | | | | | X | | | | | | |
| 630-93-3 | DIPHENYLHYDANTOIN (PHENYTOIN), SODIUM SALT | X | | X | | | X | | X | | | X | |
| 630-08-0 | CARBON MONOXIDE | X | | | X | | | | X | | X | X | |
| 629-14-1 | ETHYLENE GLYCOL DIETHYL ETHER | X | | | | X | | | X | | | | |
| 628-86-4 | FULMINATE DE MERCURE | | X | | X | | | | | | | | |
| 628-63-7 | AMYL ACETATE | | X | | | | | | X | | | X | |
| 62-75-9 | METHANAMINE, N-METHYL-N-NITROSO | X | | X | | X | | X | X | | | X | |
| 627-44-1 | DIETHYL MERCURY | X | | | X | | | | X | | | X | |
| 627-13-4 | N-PROPYL NITRATE | X | | | | | | | X | | | X | |
| 62-56-6 | THIOUREA | | X | X | | X | | X | | | X | | |
| 624-83-9 | METHYL ISOCYANATE | X | | | | X | | X | | | X | X | |
| 62476-59-9 | ACIFLUORFEN, SODIUM SALT | X | | X | | | | | | | | | |
| 622-97-9 | 1-ETHENYL-4-METHYLBENZENE | X | | | | | | | X | | | X | |
| 621-64-7 | DI-N-PROPYLNITROSAMINE | X | | X | | | | | | | | X | |
| 619-15-8 | 2,5-DINITROTOLUENE | X | | | | | | | X | X | | | |
| 61790-53-2 | SILICA, AMORPHOUS | X | | | | | | | | | | X | |
| 61788-76-9 | ALKANES, CHLORO | | X | | | X | | | | | | | |
| 61788-33-8 | POLYCHLORINATED TERPHENYLS | X | | | | X | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 615-53-2 | N-NITROSO-N-METHYLURETHANE | X | | X | | | | | | | | | |
| 613-35-4 | 4',4"'-BIACETANILIDE | X | | X | | | | | | | | | |
| 6108-10-7 | EPSILON-LINDANE | X | | X | | | | | | | | | |
| 610-39-9 | 3,4-DINITROTOLUENE | X | | | | | | | | X | | | |
| 607-57-8 | 2-NITROFLOURENE | X | | X | | | | | | | | | |
| 60-34-4 | METHYL HYDRAZINE | X | | X | | | | | X | | | X | |
| 60-29-7 | DIETHYL ETHER | | X | | | | | | X | | | | |
| 602-87-9 | 5-NITROACENAPHTHANE | X | | X | | | | | | | | X | |
| 60-24-2 | 1-ETHANOL-2-THIOL | | X | | | | | | X | | | X | |
| 602-01-7 | 2,3-DINITROTOLUENE | X | | | | | | | | X | | | |
| 60168-88-9 | FENARIMOL | X | | | | | X | | | | | | |
| 59-92-7 | Levodopa | X | | | X | | | | | | | | |
| 597-64-8 | TETRAETHYLTIN | X | | | | | | | X | | | | |
| 597-31-9 | 2,2-DIMETHYL-3-HYDROXYPROPANAL | X | | | | | | | X | | | | |
| 594-42-3 | PERCHLOROMETHYL MERCAPTAN | X | | | | | | | | | | X | |
| 593-74-8 | DIMETHYL MERCURY | X | | X | X | | | X | | | | | |
| 592-87-0 | LEAD THIOCYANATE | X | | X | X | | | | | X | | | |
| 592-04-1 | MERCURIC CYANIDE | X | | | X | | | | X | | | | |
| 59-05-2 | METHOTREXATE | X | | | X | | | | X | | | X | |
| 58-18-4 | METHYLTESTOSTERONE | X | | | X | | | | | | | | |
| 58-15-1 | AMIDOPYRINE | X | | | | | | | X | | | X | |
| 57-83-0 | PROGESTERONE | X | | X | | | | | | | | | |
| 577-11-7 | 1,4-BIS(2-ETHYLHEXYL) SODIUM SULFOSUCCINATE | | X | | | | | | X | | | | |
| 57-63-6 | ETHINYLESTRADIOL | X | | X | | | | | | | | X | |
| 576-24-9 | 2,3-Dichlorophenol | X | | | | | | | | | | | X |
| 57-57-8 | BETA-PROPIOLACTONE | X | | X | | | | | | | | X | |
| 57-50-1 | SUCROSE | | X | | | | | | X | | | X | |
| 57-47-6 | PHYSOSTIGMINE | X | | | | | | | X | | | X | |
| 57-14-7 | 1,1-DIMETHYL HYDRAZINE | X | | X | | | | | X | | | X | |
| 57-13-6 | UREA | | X | | | | | | X | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 56-81-5 | GLYCERIN MIST | | X | | | | | | X | | | | |
| 56-55-3 | BENZ(A)ANTHRACENE | X | | X | | | | | | | | | |
| 56-53-1 | DIETHYLSTILBESTROL | X | | X | X | | X | X | X | | X | | |
| 56-04-2 | METHYLTHIOURACIL | X | | X | | | X | | | | | | |
| 55-80-1 | 3'-methyl-4-dimethylaminoazobenzene | X | | | | | X | | | | | | |
| 557-98-2 | 2-CHLOROPROPYLENE | X | | | | | | | | | | X | |
| 556-64-9 | METHYL THIOCYANATE | X | | | | | | | X | | | | |
| 552-30-7 | TRIMELLITIC ANHYDRIDE | | X | | | | | X | | | | X | |
| 5522-43-0 | 1-NITROPYRENE | X | | X | | | | | | | | | |
| 54-62-6 | AMINOPTERIN | X | | | X | | | | X | X | | | |
| 542-90-5 | ETHYL THIOCYANATE | X | | | | | | | X | | | X | |
| 542-56-3 | ISOBUTYL NITRITE | X | | X | | | | | X | | | X | |
| 541-53-7 | DITHIOBIURET | X | | | | | | | X | | | | |
| 541-25-3 | LEWISITE (ARSENIC COMPOUND) | X | | | | X | | | | | | | |
| 540-84-1 | 2,2,4-TRIMETHYLPENTANE | | X | | | | | | | | | X | |
| 540-59-0 | 1,2-DICHLOROETHYLENE | X | | | | | | | X | | | X | |
| 53-96-3 | 2-ACETYLAMINOFLUORENE | X | | X | | | | | | | | | |
| 53-70-3 | DIBENZ(A,H)ANTHRACENE | X | | X | | | | | | | | | |
| 535-77-3 | 1-ISOPROPYL-3-METHYLBENZENE | X | | | | | | | X | | | | |
| 53404-19-6 | BROMACIL LITHIUM SALT (2,4(H,3H)-PYRIMIDINEDIONE, ETHYL-3 (1-METHYLPROPYL), LITHIUM SALT) | X | | | X | | X | | | X | | | |
| 533-73-3 | 1,2,4-Trihydroxybenzene (hydroxyquinol) | X | | | | | | | | | | | X |
| 5329-14-6 | SULFAMIC ACID | | X | | | | | | X | | | | |
| 532-32-1 | SODIUM BENZOATE | | X | | | | | | X | | | | |
| 532-27-4 | 2-CHLOROACETOPHENONE | X | | | | | | X | X | | | X | |
| 53-16-7 | ESTRONE | X | | X | | | | | | | | | |
| 52-85-7 | FAMPHUR | X | | | | | | | X | | | | |
| 527-84-4 | O-CYMENE | X | | | | | | | | | | X | |
| 5216-25-1 | P-A,A,A-TETRACHLOROTOLUENE | X | | X | | | | | X | | | X | |
| 52-01-7 | SPIRONOLACTONE | X | | X | | | | | | | | X | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 51-75-2 | MECHLORETHAMINE | X | | X | X | | | | | | X | | |
| 5160-02-1 | D & C RED NO. 9 | | X | X | | | | | | | | | |
| 51-52-5 | PROPYLTHIOURACIL | X | | X | X | | X | | | | | | X |
| 513-77-9 | BARIUM CARBONATE | | X | | | | | | X | | | X | |
| 51-21-8 | FLUOROURACIL | X | | | X | | | | X | | | | |
| 509-14-8 | TETRANITROMETHANE | X | | X | | | | | X | | | X | |
| 50782-69-9 | PHOSPHONOTHIOIC ACID, METHYL-, S-(2-(BIS(1-METHYLETHYL)AMINO)ETHYL)O-ETHYL ESTER | X | | | | | | | X | | | X | |
| 506-77-4 | CYANOGEN CHLORIDE | X | | | | | | | X | | | X | |
| 505-60-2 | MUSTARD GAS | X | | X | | X | | | X | | X | X | |
| 50-55-5 | RESERPINE | X | | X | | | | | X | | | X | |
| 50-34-0 | PROPANTHELINE BROMIDE | X | | | | | | | | | X | | |
| 50-07-7 | MITOMYCIN C | X | | X | | | | | X | | | | |
| 50-00-0 | FORMALDEHYDE | | X | X | | | | X | X | | X | X | |
| 496-72-0 | 3,4-DIAMINOTOLUENE | X | | X | | | | | | | | | |
| 479-45-8 | TETRYL | X | | | | | | X | X | | | X | |
| 463-56-9 | Thiocyanate | X | | | | | | | | | | | X |
| 463-51-4 | KETENE; ETHENONE | X | | | | | | | | | | X | |
| 460-35-5 | 3-CHLORO-1,1,1-TRIFLUOROPROPANE | X | | | | | | | X | | | | |
| 4342-36-3 | TRIBUTYLTIN BENZOATE | X | | | | | X | | | | | | |
| 420-12-2 | ETHYLENE SULPHIDE | X | | | | | | | X | | | | |
| 4128-73-8 | 1,1'-OXYBIS(4-ISOCYANATOBENZENE) | X | | | | | | | | | | X | |
| 4080-31-3 | 1-(3-CHLOROALLYL)-3,5,7-TRIAZA-1-AZONIAADAMANTANE CHLORIDE | | X | | | | | X | | | | | |
| 4044-65-9 | BITOSCANATE | X | | | | | | | X | | | | |
| 4016-14-2 | ISOPROPYL GLYCIDYL ETHER | X | | | | | | X | X | | | X | |
| 39515-51-0 | 3-PHENOXYBENZALDEHYDE | X | | | | | | | X | | | | |
| 392-56-3 | HEXAFLUOROBENZENE | X | | | | | | | X | | | X | |
| 38661-72-2 | 1,3-BIS(METHYLISOCYANATE) CYCLOHEXANE | X | | | | | | | | | | X | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 379-79-3 | ERGOTAMINE TARTRATE | X | | | X | | | | X | | | | |
| 37300-23-5 | ZINC CHROMATE WITH ZINC HYDROXIDE AND CHROMIUM OXIDE (9:1) | | X | X | | | | | | | | | |
| 371-62-0 | ETHYLENE FLUOROHYDRIN | X | | | | | | | X | | | X | |
| 3653-48-3 | METHOXONE SODIUM SALT ((4-CHLORO-2-METHYLPGENOXY) ACETATE SODIUM SALT) | X | | | | | | | X | | | | |
| 36355-01-8 | BIPHENYL, HEXABROMO- | X | | X | X | | | | | | | | |
| 353-50-4 | CARBONYL FLUOIRDE | X | | | | | | | | | | X | |
| 34590-94-8 | DIPROPYLENE GLYCOL MONOMETHYL ETHER | | X | | | | | | X | | X | | |
| 3425-61-4 | T-AMYL HYDROPEROXIDE | X | | | | | | | | | | X | |
| 3383-96-8 | TEMEPHOS | X | | | | | | | X | | | | |
| 329-01-1 | (ALPHA,ALPHA,ALPHA-TRIFLUORO-M-TOLYL) ISOCYANATE | X | | | | | | | X | | | X | |
| 32568-89-1 | 2,4-IMIDAZOLIDINEDIONE, 5,5-DIMETHYL-3-(2-(OXIRANYLMETHOXY)PROPYL)-1-(OXIRANYLMETHYL)- | X | | | | | | | X | | | | |
| 3252-43-5 | DIBROMOACETONITRILE | X | | | | | | | X | | | X | |
| 319-86-8 | DELTA-LINDANE | X | | X | | | | | | | | | |
| 319-85-7 | BETA-LINDANE | X | | X | | | X | X | X | | X | | |
| 319-84-6 | ALPHA-LINDANE | X | | X | | | | | | | | | |
| 3173-72-6 | 1,5-NAPHTHALENE DIISOCYANATE | X | | | | | | X | | | | X | |
| 3068-88-0 | BETA-BUTYROLACTONE | X | | X | | | | | | | | | |
| 3066-71-5 | CYCLOHEXYLACRYLAT | X | | | | | | X | | | | | |
| 2917-26-2 | 1-Hexadecanethiol | X | | | | | | | | | | X | |
| 2909-38-8 | ISOCYANIC ACID, M-CHLOROPHENYL ESTER | X | | | | | | | X | | | X | |
| 29091-21-2 | PRODIAMINE (RYDEX) | X | | | | | | | | | | | |
| 2893-78-9 | SODIUM DICHLORO-S-TRIAZINETRIONE | | X | | | | | | X | | | | |
| 2885-00-9 | 1-Octadecanethiol | X | | | | | | | | | | X | |
| 28553-12-0 | 1,2-BENZENEDICARBOXYLIC ACID, DIISONONYL ESTER | | X | | | X | X | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28347-13-9 | XYLYLENE DICHLORIDE | X | | | | | | | X | | | X | |
| 2807-30-9 | ETHYLENE GLYCOL MONOPROPYL ETHER | | X | | | X | | | X | | | X | |
| 27858-07-7 | OCTABROMOBIPHENYL | X | | X | X | | | | | | | | |
| 2784-94-3 | HC BLUE 1 | X | | X | | | X | | | | | | |
| 2767-54-6 | Stannane, bromotriethyl- | X | | | | | | | X | | | | |
| 27137-85-5 | TRICHLORO(DICHLOROPHENYL)SILANE | X | | | | | | | | | | X | |
| 2702-72-9 | 2,4-D SODIUM SALT | X | | | | | | | X | | | | |
| 2699-79-8 | SULFURYL FLUORIDE | X | | | | | | | X | | | X | |
| 2698-41-1 | O-CHLOROBENZYLIDENE MALONONITRILE | X | | | | | | X | X | | | X | |
| 2687-25-4 | 2,3-DIAMINOTOLUENE | X | | X | | | | | | | | | |
| 26761-40-0 | 1,2-BENZENEDICARBOXYLIC ACID, DIISODECYL ESTER | | X | | | X | X | | | | | | |
| 26471-62-5 | TOLUENE DIISOCYANATE (MIXED ISOMERS) | | X | X | | | | | X | | | X | |
| 2644-70-4 | Hydrazine, monohydrochloride | X | | | | | | | X | | | | |
| 260-94-6 | ACRIDINE | X | | | | | | | X | | | | |
| 26062-79-3 | POLY(DIMETHYLDIALLYLAMMINIUM CHLORIDE) | | | | | | | | X | | | X | |
| 2602-46-2 | DIRECT BLUE 6 | X | | X | | X | | | | | | | |
| 2570-26-5 | PENTADECYLAMINE | X | | | | | | | X | | | X | |
| 2556-36-7 | 1,4-CYCLOHEXANE DIISOCYANATE | X | | | | | | | | | | X | |
| 25155-30-0 | SODIUM DODECYLBENZENE SULFONATE | | X | | | | | | X | | | | |
| 25154-52-3 | 2,6-DIMETHYL-4-HEPTYLPHENOL, (O AND P) | | X | | | | X | | | | | | |
| 25068-38-6 | (CHLOROMETHYL)OXIRANE, 4,4'-(1-METHYLETHYLIDENE)BISPHENOL COPOLYMER | | X | | | | | X | X | | | X | |
| 2499-58-3 | 2-Propenoic acid, heptyl ester | X | | | | | | | X | | | | |
| 2467-02-9 | Bisphenol F | X | | | | | X | | | | | | |
| 22591-21-5 | 1,1-DICHLORO-3,3-DIMETHYL-2-BUTANONE | X | | | | | | | X | | | | |
| 22398-80-7 | INDIUM PHOSPHIDE | X | | X | | | | | | | | | |
| 2234-13-1 | OCTACHLORONAPHTHALENE | X | | | | | | | | | X | | |
| 2223-82-7 | NEOPENTYL GLYCOL DIACRYLATE | X | | | | | | X | | | | | |
| 2092-56-0 | D & C RED NO. 8 | X | | X | | | | | | | | | |
| 208-96-8 | ACENAPHTHYLENE | X | | | | | | | | | | X | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2079-89-2 | BAPN FUMARATE | X | | | | X | | | | | | | |
| 20265-96-7 | P-CHLOROANILINE.HCL | X | | X | | | X | | | | | | |
| 2001-95-8 | VALINOMYCIN | X | | | | | | | X | | | | |
| 1982-69-0 | SODIUM DICAMBA | X | | | | X | | | | | | | |
| 19624-22-7 | PENTABORANE | X | | | | | | | X | | | | |
| 19485-03-1 | 1-METHYLTRIMETHYLENE DIACRYLATE | X | | | | | | X | | | | | |
| 193-39-5 | INDENO(1,2,3-CD)PYRENE | X | | X | | | | | | | | | |
| 1918-02-1 | PICLORAM | X | | | | | X | | | | | | |
| 1888-71-7 | 1,1,2,3,3,3-HEXACHLORO-1-PROPENE | X | | | | | | | X | | | X | |
| 17924-92-4 | ZEARALENONE | X | | | | X | | | | | X | | |
| 17754-90-4 | BENZALDEHYDE, 4-(DIETHYLAMINO)-2-HYDROXY- | X | | | | | | | X | | | | |
| 17702-41-9 | DECABORANE(14) | X | | | | | | | X | | | X | |
| 1738-25-6 | 3-(DIMETHYLAMINO)-PROPANENITRILE | X | | | | | | | X | | | | |
| 1689-99-2 | BROMOXYNIL OCTANOATE | X | | | X | | | | | | | | |
| 1639-09-4 | 1-Heptanethiol | X | | | | | | | | | | X | |
| 15968-05-5 | 2,2',6,6'-TETRACHLOROBIPHENYL (PCB-54) | X | | X | X | | | | | | | | |
| 15663-27-1 | CISPLATIN | X | | X | | | | | | | | | |
| 156-59-2 | CIS-1,2-DICHLOROETHYLENE | X | | | | | | | X | | | | |
| 156-10-5 | P-NITROSODIPHENYLAMINE | X | | X | | | | | | | | | |
| 1558-25-4 | TRICHLORO(CHLOROMETHYL)SILANE | X | | | | | | | X | | | X | |
| 151-56-4 | ETHYLENEIMINE | X | | X | | | | X | X | | X | X | |
| 150-50-5 | MERPHOS | X | | | | | | | X | | | | |
| 150-19-6 | 3-METHYOXYPHENOL | X | | | | | | | X | | | | |
| 14977-61-8 | CHROMYL CHLORIDE | X | | X | | | | X | | | | X | |
| 149-74-6 | DICHLOROMETHYLPHENYLSILANE | X | | | | | | | | | | X | |
| 149-30-4 | 2-MERCAPTOBENZOTHIAZOLE | | X | | | | | X | X | | | | |
| 14808-60-7 | QUARTZ | | X | | | | X | X | | | | X | |
| 14807-96-6 | TALC | | X | | | | | | | | | X | |
| 147-47-7 | 1,2-DIHYDRO-2,2,4-TRIMETHYLQUINOLINE | X | | | | | | | X | | | | |
| 1464-53-5 | 1,1'-BI(ETHYLENE OXIDE) | X | | X | | | | X | | | | X | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1455-21-6 | 1-Nonanethiol | X | | | | | | | | | | X | |
| 14464-46-1 | CRISTOBALITE | | X | | | | | | | | | X | |
| 144-62-7 | OXALIC ACID | | X | | | | | | X | | X | | |
| 144-55-8 | SODIUM BICARBONATE | | X | | | | | | | | | X | |
| 143-10-2 | 1-Decanethiol | X | | | | | | | | | | X | |
| 142-82-5 | N-HEPTANE | | X | | | | | | X | | | | |
| 142-64-3 | PIPERAZINE DIHYDROCHLORIDE | X | | | | | | X | | | | X | |
| 142-47-2 | Glutamic acid, monosodium salt, L- | | X | | | | | | X | | | X | |
| 14187-32-7 | DIBENZO[18]CROWN-6 | X | | | | | | | X | | | | |
| 141-85-5 | ANILINE, M-CHLORO-, HYDROCHLORIDE | X | | | | | X | | | | | | |
| 141-79-7 | MESITYL OXIDE | | X | | | | | | X | | | | |
| 141-78-6 | ETHYL ACETATE | | X | | | | | | X | | | X | |
| 141-43-5 | 2-AMINOETHANOL | | X | | | | | | X | | | X | |
| 141-32-2 | BUTYL ACRYLATE | | X | | | | | X | | | | X | |
| 140-88-5 | ETHYL ACRYLATE | | X | X | | X | | X | X | | | X | |
| 139-65-1 | 4,4'-DIAMINODIPHENYL SULFIDE | X | | X | | | X | | | | X | X | |
| 139-25-3 | 1,1'-METHYLENEBIS(4-ISOCYANATO-3-METHYLBENZENE) | X | | | | | | | | | | X | |
| 13826-35-2 | (3-PHENOXYPHENYL)METHANOL | X | | | | | | | X | | | | |
| 13768-11-1 | Perrhenate | X | | | | | | | | | | | X |
| 13597-99-4 | BERYLLIUM NITRATE | X | | X | | | | | | | | | |
| 13552-44-8 | 4,4'-METHYLENEBIS-DIHYDROCHLORIDE BENZENEMINE | X | | X | | | X | | | | | | |
| 13530-65-9 | ZINC CHROMATE | | X | X | | | | X | | | | X | |
| 13510-49-1 | BERYLLIUM SULFATE | X | | X | | | | X | | | | X | |
| 13463-67-7 | TITANIUM DIOXIDE | | X | | | | | | | | X | | |
| 1344-28-1 | ALUMINUM OXIDE (FIBROUS FORMS) | | X | | | | | | X | | | | |
| 1336-21-6 | AMMONIUM HYDROXIDE | | X | | | | | | | | | X | |
| 1333-86-4 | CARBON BLACK | | X | X | | | | | | | | | |
| 1333-82-0 | CHROMIUM TRIOXIDE | | X | X | | | | X | | | | X | |
| 1333-74-0 | HYDROGEN | | X | | | | | | | | | X | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13327-32-7 | BERYLLIUM HYDROXIDE | X | | X | | | | X | | | | X | |
| 1332-58-7 | KAOLIN | | X | | | | | | | | | X | |
| 1331-28-8 | CHLOROETHENYLBENZENE | X | | | | | | | X | | | | |
| 1330-78-5 | TRICRESYL PHOSPHATE | | X | | | | | | X | | X | | |
| 1330-43-4 | NATRIUMTETRABORAT ANHYDRID | | X | | | | | | X | | | | |
| 1330-20-7 | XYLENE (MIXED ISOMERS) | | X | | | X | | X | X | | X | X | |
| 1317-36-8 | LEAD(II) OXIDE | | X | X | X | | | | | X | | | |
| 1314-62-1 | VANADIUM OXIDE (5) | | X | | | | | | X | | X | X | |
| 1314-56-3 | PHOSPHORUS PENTOXIDE | | X | | | | | | | | | X | |
| 1314-12-1 | Thallium oxide (Tl2O) | X | | | | | | | X | | | | |
| 1313-99-1 | NICKEL OXIDE | | X | X | | | | X | | | | X | |
| 13108-52-6 | METHYL-2,3,5,6-TETRACHLORO-4-PYRIDYLSULPHON E | X | | | | | | X | | | | | |
| 1310-73-2 | CAUSTIC SODA | | X | | | | | | | | | X | |
| 1310-61-8 | Potassium bisulfite | X | | | | | | | | | | X | |
| 1309-64-4 | ANTIMONY TRIOXIDE | | X | X | | | | | | | | X | |
| 1309-60-0 | LEAD DIOXIDE | | X | X | X | | | | | X | | | |
| 1309-48-4 | MAGNESIUM OXIDE | | X | | | | | | X | | | | |
| 1309-37-1 | IRON OXIDE FUME | | X | | | | | | | | | X | |
| 1304-56-9 | BERYLLIUM OXIDE | X | | X | | | | X | | | | X | |
| 1303-96-4 | BORATES,TETRA,SODIUM SALTS | | X | | | | X | | X | | | | |
| 130-26-7 | CLIOQUINOL | X | | | | | | | X | | | | |
| 129-06-6 | WARFARIN SODIUM | X | | | X | | | | X | | | | |
| 128-37-0 | 2,6-DI-TERT-BUTYL-P-CRESOL | | X | | | | | X | X | | | X | |
| 127-18-4 | TETRACHLOROETHYLENE | | X | X | | X | | | X | | X | X | |
| 1271-28-9 | NICKELOCENE | X | | X | | | | | | | | | |
| 126-98-7 | METHACRYLONITRILE | X | | | | | | X | X | | | X | |
| 126-72-7 | TRIS(2,3-DIBROMOPROPYL) PHOSPHATE | X | | X | | X | | | X | | X | | |
| 125-02-0 | prednisolone sodium phosphate | X | | | X | | | | | | | | |
| 124-68-5 | 1,1-DIMETHYL-2-HYDROXYETHYLAMINE | | X | | | | | | X | | | X | |
| 124-48-1 | CHLORODIBROMOMETHANE | X | | | | | | | X | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 124-30-1 | 1-AMINOOCTADECANE | | X | | | | | | X | | | | |
| 123-91-1 | 1,4-DIOXANE | | X | X | | | | X | X | | | X | |
| 123-86-4 | N-BUTYL ACETATE | | X | | | | | | X | | | X | |
| 123-77-3 | 1,1'-AZOBIS(FORMAMIDE) | | X | | | | | X | | | | X | |
| 123-61-5 | BENZENE-1,3-DIISOCYANATE | X | | | | | | | | | | X | |
| 123-42-2 | DIACETONE ALCOHOL | | X | | | | | | X | | | X | |
| 123-31-9 | HYDROQUINONE | | X | | | | | X | X | | X | X | |
| 123-09-1 | 1-CHLORO-4-(METHYLTHIO)BENZENE | X | | | | | | | X | | | X | |
| 122-99-6 | 1-HYDROXY-2-PHENOXYETHANE | | X | | | X | | | | | X | | |
| 122-66-7 | 1,2-DIPHENYLHYDRAZINE | X | | X | | | | | | | | | |
| 122-34-9 | SIMAZINE | X | | | | | X | | X | | | | |
| 122-09-8 | 1,1-DIMETHYL-2-PHENYLETHYLAMINE | X | | | | | | | X | | | | |
| 121-17-5 | 4-chloro-3-nitrobenzotrifluoride | X | | | | | | | X | | | | |
| 12079-65-1 | MANGANESE, CYCLOPENT ADIENYL-TRICARBONYL | X | | | | | | | X | | | | |
| 120-71-8 | P-CRESIDINE | X | | X | | | | | | | | | |
| 120-36-5 | 2,4-DP | X | | | | X | | | X | | | | X |
| 12035-36-8 | NICKEL DIOXIDE | X | | | | | | X | | | | | |
| 12001-26-2 | MICA | | X | | | | | | | | | X | |
| 119-34-6 | 4-Amino-2-nitrophenol | X | | X | | | | | | | | | |
| 117-81-7 | BIS(2-ETHYLHEXYL)PHTHALATE | | X | X | | X | X | | | | X | X | |
| 117-79-3 | 2-AMINOANTHRAQUINONE | X | | X | | | | | | | | | |
| 117-10-2 | DANTRON (CHRYSAZIN; 1,8-DIHYDROXYANTHRAQUINONE) | X | | X | | | | | | | | | |
| 116-06-3 | ALDICARB | X | | | | | X | | X | | X | | |
| 115-77-5 | 1,3-PROPANEDIOL, 2,2-BIS(HYDROXYMETHYL)- | | X | | | | | | X | | | | |
| 115-07-1 | PROPYLENE | | X | | | | | | | | | X | |
| 1134-04-9 | PYRIDINE, 2,3,4,5-TETRACHLORO-6-(TRICHLOROMETHYL)- | X | | | | | | | X | | | | |
| 1131-18-6 | 1H-Pyrazol-5-amine, 3-methyl-1-phenyl- | X | | | | | | | X | | | | |
| 112-34-5 | DIETHYLENE GLYCOL MONOBUTYL ETHER | | X | | | | | | X | | | | |

| CAS# or NA group allocation | **Substance or Group of Substances** (list contains 1431 entries: 1084 from DSL, 318 from nDSL and 29 groups) | On nDSL | On DSL and GPE list | Suspected Carcinogen | Recognized Developmental Toxin | Suspected Developmental Toxin | Suspected Endocrine Toxin | Suspected Immunotoxin | Suspected Neurotoxin | Recognized Reproductive Toxin | Suspected Reproductive Toxin | Suspected Respiratory Toxin | Thyroid Hormone Interference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1122-60-7 | NITROCYCLOHEXANE | X | | | | | | | X | | | | |
| 112-07-2 | 2-BUTOXYETHANOL ACETATE | | X | | | | | | X | | X | | |
| 111-90-0 | DIETHYLENE GLYCOL MONOETHYL ETHER | | X | | | | | | X | | | | |
| 111-77-3 | DIETHYLENE GLYCOL MONOMETHYL ETHER | | X | | | X | X | | X | | | | |
| 111-76-2 | ETHYLENE GLYCOL MONOBUTYL ETHER | | X | | | X | X | | X | | X | X | |
| 1116-54-7 | N-NITROSODIETHANOLAMINE | X | | X | | | | | | | | X | |
| 111-46-6 | DIETHYLENE GLYCOL ETHER | | X | | | X | | | X | | X | X | |
| 111-44-4 | BIS(2-CHLOROETHYL) ETHER | X | | X | | | | | X | | | X | |
| 111-42-2 | DIETHANOLAMINE | | X | | | | | | X | | | X | |
| 111-40-0 | DIETHYLENETRIAMINE | | X | | | | | X | | | | X | |
| 111-15-9 | ETHYLENE GLYCOL MONOETHYL ETHER ACETATE | | X | | X | | | | X | X | | | |
| 110-91-8 | MORPHOLINE | | X | | | | | | X | | | X | |
| 110-82-7 | CYCLOHEXANE | | X | | | | | | X | | | | |
| 110-80-5 | ETHYLENE GLYCOL MONOETHYL ETHER | | X | | X | | X | | X | X | | X | |
| 110-54-3 | N-HEXANE | | X | | | X | | | X | | X | X | |
| 110-43-0 | METHYL N-AMYL KETONE | | X | | | | | | X | | | | |
| 110-19-0 | ISOBUTYL ACETATE | | X | | | | | | X | | | | |
| 110-12-3 | METHYL ISOAMYL KETONE | | X | | | | | | X | | | | |
| 109-99-9 | TETRAHYDROFURAN | | X | | | X | X | | X | | | X | |
| 109-94-4 | ETHYL FORMATE | | X | | | | | | X | | | | |
| 109-86-4 | ETHYLENE GLYCOL MONOMETHYL ETHER | | X | | X | | X | | X | X | | X | |
| 109-66-0 | PENTANE | | X | | | | | | X | | | | |
| 109-60-4 | N-PROPYL ACETATE | | X | | | | | | X | | | X | |
| 109-09-1 | 2-CHLOROPYRIDINE | X | | | | | | | X | | | | |
| 108-95-2 | PHENOL | | X | | | X | | | X | | X | X | X |
| 108-94-1 | CYCLOHEXANONE | | X | | | X | | X | X | | | X | |
| 108-93-0 | CYCLOHEXANOL | | X | | | | | | X | | X | X | |
| 108-91-8 | CYCLOHEXYLAMINE | | X | | | | | X | X | | X | X | |
| 108-88-3 | TOLUENE | | X | | X | | | X | X | | X | X | |

| CAS# or NA group allocation | **Substance or Group of Substances** (list contains 1431 entries: 1084 from DSL, 318 from nDSL and 29 groups) | On nDSL | On DSL and GPE list | Suspected Carcinogen | Recognized Developmental Toxin | Suspected Developmental Toxin | Suspected Endocrine Toxin | Suspected Immunotoxin | Suspected Neurotoxin | Recognized Reproductive Toxin | Suspected Reproductive Toxin | Suspected Respiratory Toxin | Thyroid Hormone Interference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 108-83-8 | DIISOBUTYL KETONE;2,6-DIMETHYL-4-HEPTONE | | X | | | | | | X | | | | |
| 108-78-1 | 1,3,5-TRIAZINE-2,4,6(1H,3H,5H)-TRIIMINE | | X | | | | | | X | | X | | |
| 108-60-1 | BIS(2-CHLORO-1-METHYLETHYL) ETHER | X | | X | | | | | X | | | | |
| 108-46-3 | RESORCINOL | | X | | | | X | | X | | | | X |
| 108-38-3 | M-XYLENE | | X | | | X | | X | | | | X | |
| 108-31-6 | MALEIC ANHYDRIDE | | X | | | | | X | | | | X | |
| 108-24-7 | ACETIC ANHYDRIDE | | X | | | | | | X | | | X | |
| 108-21-4 | ISOPROPYL ACETATE | | X | | | | | | X | | | X | |
| 108-11-2 | METHYL ISOBUTYL CARBINOL | | X | | | | | | X | | | | |
| 108-10-1 | METHYL ISOBUTYL KETONE | | X | | | X | | | X | | | X | |
| 108-05-4 | VINYL ACETATE | | X | | | | | | X | | | X | |
| 107-98-2 | PROPYLENE GLYCOL MONOMETHYL ETHER | | X | | | | | | X | | X | | |
| 107-87-9 | METHYL PROPYL KETONE | | X | | | | | | X | | | | |
| 107-44-8 | SARIN | X | | | | | | | X | | | X | |
| 107-41-5 | HEXYLENE GLYCOL | | X | | | | | X | X | | | X | |
| 107-30-2 | CHLOROMETHYL METHYL ETHER | X | | X | | | | | | | | X | |
| 107-16-4 | FORMALDEHYDE CYANOHYDRIN | X | | | | | | | X | | | X | |
| 107-15-3 | ETHYLENEDIAMINE | | X | | | | | X | X | | | X | |
| 107-13-1 | ACRYLONITRILE | | X | X | | X | | | X | | X | X | |
| 1070-70-8 | TETRAMETHYLENE DIACRYLATE | X | | | | | | X | | | | | |
| 106-99-0 | 1,3-BUTADIENE | | X | X | | X | | | X | | X | X | |
| 106-97-8 | BUTANE | | X | | | | | | X | | | | |
| 106-89-8 | EPICHLOROHYDRIN | | X | X | | | X | X | X | X | | X | |
| 1066-45-1 | TRIMETHYLTIN CHLORIDE | X | | | | | | | X | | | | |
| 106-63-8 | 2-METHYLPROPYL 2-PROPENOATE | X | | | | | | X | | | | | |
| 10599-90-3 | CHLORAMINE | X | | | | | | | | | | X | |
| 10588-01-9 | SODIUM BICHROMATE | | X | X | | | | X | | | | X | |
| 105-60-2 | CAPROLACTAM | | X | | | X | | X | X | | X | X | |
| 104-88-1 | BENZALDEHYDE, P-CHLORO- | X | | | | | | | X | | | | |
| 104-76-7 | 1-HEXANOL, 2-ETHYL- | | X | | | X | | | | | | | |

| CAS# or NA group allocation | **Substance or Group of Substances** (list contains 1431 entries: 1084 from DSL, 318 from nDSL and 29 groups) | On nDSL | On DSL and GPE list | Suspected Carcinogen | Recognized Developmental Toxin | Suspected Developmental Toxin | Suspected Endocrine Toxin | Suspected Immunotoxin | Suspected Neurotoxin | Recognized Reproductive Toxin | Suspected Reproductive Toxin | Suspected Respiratory Toxin | Thyroid Hormone Interference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 104-49-4 | 1,4-PHENYLENE DIISOCYANATE | X | | | | | | | | | | X | |
| 104-12-1 | P-CHLOROPHENYL ISOCYANATE | X | | | | | X | | | | | X | |
| 10361-37-2 | BARIUM CHLORIDE | | X | | | | | | X | | | | |
| 10347-54-3 | 1,4-BIS(METHYLISOCYANATE) CYCLOHEXANE | X | | | | | | | | | | X | |
| 103-23-1 | BIS(2-ETHYLHEXYL) ADIPATE | | X | | | | X | | | | | | |
| 103-11-7 | 1-HEXANOL, 2-ETHYL-, ACRYLATE | | X | | | | | X | X | | | | |
| 102-71-6 | TRIETHANOLAMINE | | X | | | | | X | | | | X | |
| 101-80-4 | 4,4'-DIAMINODIPHENYL ETHER | X | | X | | | X | | | | | | |
| 101-68-8 | 1,1'-METHYLENEBIS(4-ISOCYANATOBENZENE) | | X | | | | | X | | | | X | |
| 10124-43-3 | COBALT(II) SULFATE (1:1) | | X | | | | | | X | | | | |
| 10103-50-1 | MAGNESIUM ARSENATE | X | | X | X | | | | | | | | |
| 10102-20-2 | SODIUM TELLURITE | X | | | | | | | X | | | X | |
| 10101-63-0 | LEAD IODIDE | X | | X | X | | | | | X | | | |
| 100-97-0 | 1,3,5,7-TETRAAZAADAMANTANE | | X | | | | | X | | | | X | |
| 100-75-4 | N-NITROSOPIPERIDINE | X | | X | | | | | | | | X | |
| 10061-02-6 | TRANS-1,3-DICHLOROPROPENE | X | | X | | | | | | | | | |
| 100-52-7 | ALMOND ARTIFICIAL ESSENTIAL OIL | | X | | | | | | X | | | X | |
| 100-51-6 | BENZYL ALCOHOL | | X | | | | | | X | | | | |
| 10049-04-4 | CHLORINE DIOXIDE | | X | | | X | | | | | X | X | |
| 100-44-7 | BENZYL CHLORIDE | | X | X | | X | | | X | | | X | |
| 100-42-5 | STYRENE | | X | | | X | X | X | X | | X | X | |
| 100-41-4 | ETHYLBENZENE | | X | | | X | X | | X | | X | X | |
| 100-37-8 | 2-(DIETHYLAMINO)ETHANOL | | X | | | | | | X | | | X | |
| 10028-15-6 | OZONE | X | | | | | | X | X | | | X | |

# Appendix Six: Tables of Substances from Canadian List #2 Matching on Eight Different Health Effect Combinations

### Table One (Appendix Six) — Substances matching on recognized developmental toxins and recognized reproductive toxins (17 in total — sub-set of Canadian List #2)

| cas_no | Chemical name | Chemical Group (from GPE list) |
|---|---|---|
| NA - 08A | ALKYL LEAD COMPOUNDS | |
| NA - 08 | LEAD COMPOUNDS | |
| 78-00-2 | TETRAETHYLLEAD | Lead |
| 7758-97-6 | LEAD CHROMATE | Chromium(VI) |
| 7446-27-7 | LEAD PHOSPHATE | |
| 7439-92-1 | LEAD | Lead |
| 71-43-2 | BENZENE | Hydrocarbons, Aromatic |
| 69011-06-9 | (1,2-BENZENEDICARBOXYLATO(2-))DIOXOTRILEAD | |
| 592-87-0 | LEAD THIOCYANATE | |
| 54-62-6 | AMINOPTERIN | |
| 53404-19-6 | BROMACIL LITHIUM SALT (2,4(H,3H)-PYRIMIDINEDIONE, ETHYL-3 (1-METHYLPROPYL), LITHIUM SALT) | |
| 1317-36-8 | LEAD(II) OXIDE | Lead |
| 1309-60-0 | LEAD DIOXIDE | Lead |
| 111-15-9 | ETHYLENE GLYCOL MONOETHYL ETHER ACETATE | Glycol Ethers |
| 110-80-5 | ETHYLENE GLYCOL MONOETHYL ETHER | Glycol Ethers |
| 109-86-4 | ETHYLENE GLYCOL MONOMETHYL ETHER | Glycol Ethers |
| 10101-63-0 | LEAD IODIDE | |

## Table Two (Appendix Six) — Substances matching on suspected reproductive toxins and suspected developmental toxins (43 in total — sub-set of Canadian List #2)

| cas_no | Chemical name | Chemical Group (from GPE list) |
|---|---|---|
| NA - VOC | VOLATILE ORGANIC COMPOUNDS | |
| NA - D/F | Dioxins and Furans | |
| NA - 39 | GLYCOL ETHERS | |
| NA - 29 | RADIONUCLIDES | |
| NA - 23 | PM 10 | |
| NA - 22 | PM 2.5 | |
| NA - 11 | NICKEL COMPOUNDS | |
| 95-47-6 | O-XYLENE | Hydrocarbons, Aromatic |
| 85-68-7 | BENZYL BUTYL PHTHALATE | Phthalates |
| 84-74-2 | DIBUTYL PHTHALATE | Phthalates |
| 80-62-6 | METHYL METHACRYLATE | Methacrylates |
| 79-01-6 | TRICHLOROETHYLENE | Halogenated, Aliphatic |
| 78-93-3 | METHYL ETHYL KETONE | Ketones |
| 7664-39-3 | HYDROFLUORIC ACID | Fluoro Compounds |
| 759-73-9 | N-ETHYL-N-NITROSOUREA | |
| 75-56-9 | PROPYLENE OXIDE | Epoxides |
| 75-05-8 | ACETONITRILE | Nitriles |
| 7440-66-6 | ZINC | Zinc |
| 7440-50-8 | COPPER | Copper |
| 7440-48-4 | COBALT | Cobalt |
| 7440-02-0 | NICKEL | Nickel |
| 71-55-6 | 1,1,1-TRICHLOROETHANE | Halogenated, Aliphatic |
| 68-12-2 | N,N-DIMETHYLFORMAMIDE | Amides |
| 67-66-3 | CHLOROFORM | Halogenated, Aliphatic |
| 62-56-6 | THIOUREA | Ureas |
| 624-83-9 | METHYL ISOCYANATE | |
| 505-60-2 | MUSTARD GAS | |
| 17924-92-4 | ZEARALENONE | |
| 1330-20-7 | XYLENE (MIXED ISOMERS) | Hydrocarbons, Aromatic |
| 127-18-4 | TETRACHLOROETHYLENE | Halogenated, Aliphatic |
| 126-72-7 | TRIS(2,3-DIBROMOPROPYL) PHOSPHATE | |
| 122-99-6 | 1-HYDROXY-2-PHENOXYETHANE | Alcohols |
| 117-81-7 | BIS(2-ETHYLHEXYL)PHTHALATE | Phthalates |
| 111-76-2 | ETHYLENE GLYCOL MONOBUTYL ETHER | Glycol Ethers |
| 111-46-6 | DIETHYLENE GLYCOL ETHER | Glycol Ethers |
| 110-54-3 | N-HEXANE | Hydrocarbons, Aliphatic |
| 108-95-2 | PHENOL | Phenols |
| 107-13-1 | ACRYLONITRILE | Nitriles |
| 106-99-0 | 1,3-BUTADIENE | Hydrocarbons, Aliphatic |
| 105-60-2 | CAPROLACTAM | N-Heterocycles |
| 10049-04-4 | CHLORINE DIOXIDE | Chlorine Compounds |
| 100-42-5 | STYRENE | Hydrocarbons, Aromatic |
| 100-41-4 | ETHYLBENZENE | Hydrocarbons, Aromatic |

## Table Three (Appendix Six) — Substances matching on all four of carcinogens, supsected neurotoxins, suspected respiratory toxins and suspected reproductive toxins (13 in total — sub-set of Canadian list #2)

| cas_no | Chemical name | Chemical Group (from GPE list) |
|---|---|---|
| NA - 10 | METHYL MERCURY COMPOUNDS | |
| 79-01-6 | TRICHLOROETHYLENE | Halogenated, Aliphatic |
| 75-56-9 | PROPYLENE OXIDE | Epoxides |
| 75-09-2 | DICHLOROMETHANE | Halogenated, Aliphatic |
| 7440-48-4 | COBALT | Cobalt |
| 7440-02-0 | NICKEL | Nickel |
| 67-66-3 | CHLOROFORM | Halogenated, Aliphatic |
| 505-60-2 | MUSTARD GAS | |
| 50-00-0 | FORMALDEHYDE | Aldehydes |
| 151-56-4 | ETHYLENEIMINE | |
| 127-18-4 | TETRACHLOROETHYLENE | Halogenated, Aliphatic |
| 107-13-1 | ACRYLONITRILE | Nitriles |
| 106-99-0 | 1,3-BUTADIENE | Hydrocarbons, Aliphatic |

## Table Four (Appendix Six) — Substances matching on carcinogens, suspected neurotoxins and suspected respiratory toxins (37 in total — subset of Canadian List #2)

| cas_no | Chemical name | Chemical group (from GPE list) |
|---|---|---|
| NA - 10 | METHYL MERCURY COMPOUNDS | |
| NA - 02 | INORGANIC ARSENIC COMPOUNDS | |
| 98-07-7 | BENZOIC TRICHLORIDE | |
| 92-93-3 | 4-NITROBIPHENYL | |
| 92-67-1 | 4-AMINOBIPHENYL | |
| 79-01-6 | TRICHLOROETHYLENE | Halogenated, Aliphatic |
| 78-79-5 | 2-METHYL-1,3-BUTADIENE | Hydrocarbons, Aliphatic |
| 7758-97-6 | LEAD CHROMATE | Chromium(VI) |
| 764-41-0 | 1,4-DICHLORO-2-BUTENE | |
| 75-56-9 | PROPYLENE OXIDE | Epoxides |
| 75-09-2 | DICHLOROMETHANE | Halogenated, Aliphatic |
| 75-07-0 | ACETALDEHYDE | Aldehydes |
| 7440-48-4 | COBALT | Cobalt |
| 7440-02-0 | NICKEL | Nickel |
| 7439-92-1 | LEAD | Lead |
| 71-43-2 | BENZENE | Hydrocarbons, Aromatic |
| 680-31-9 | HEXAMETHYLPHOSPHORAMIDE | |
| 67-66-3 | CHLOROFORM | Halogenated, Aliphatic |
| 630-93-3 | DIPHENYLHYDANTOIN (PHENYTOIN), SODIUM SALT | |
| 62-75-9 | METHANAMINE, N-METHYL-N-NITROSO | |
| 60-34-4 | METHYL HYDRAZINE | |
| 57-14-7 | 1,1-DIMETHYL HYDRAZINE | |
| 542-56-3 | ISOBUTYL NITRITE | |
| 5216-25-1 | P-A,A,A-TETRACHLOROTOLUENE | |
| 509-14-8 | TETRANITROMETHANE | |
| 505-60-2 | MUSTARD GAS | |
| 50-00-0 | FORMALDEHYDE | Aldehydes |
| 26471-62-5 | TOLUENE DIISOCYANATE (MIXED ISOMERS) | Isocyanates |
| 151-56-4 | ETHYLENEIMINE | |
| 140-88-5 | ETHYL ACRYLATE | Acrylates |
| 127-18-4 | TETRACHLOROETHYLENE | Halogenated, Aliphatic |
| 123-91-1 | 1,4-DIOXANE | Ethers |
| 111-44-4 | BIS(2-CHLOROETHYL) ETHER | |
| 107-13-1 | ACRYLONITRILE | Nitriles |
| 106-99-0 | 1,3-BUTADIENE | Hydrocarbons, Aliphatic |
| 106-89-8 | EPICHLOROHYDRIN | Epoxides |
| 100-44-7 | BENZYL CHLORIDE | Halogenated, Aliphatic |

## Table Five (Appendix Six) — Substances matching on carcinogens, suspected immunotoxins, and suspected respiratory toxins (26 in total — subset of Canadian List #2)

| cas_no | Chemical name | Chemical group (from GPE list) |
|---|---|---|
| NA - 19 | BERYLLIUM COMPOUNDS | |
| NA - 14 | ZINC CHROMATES | |
| NA - 10 | METHYL MERCURY COMPOUNDS | |
| 838-88-0 | 2,2-DIMETHYL-4,4-METHYLENEDIANILINE | |
| 7758-97-6 | LEAD CHROMATE | Chromium(VI) |
| 75-56-9 | PROPYLENE OXIDE | Epoxides |
| 7440-48-4 | COBALT | Cobalt |
| 7440-47-3 | CHROMIUM (CR6+) | Chromium |
| 7440-02-0 | NICKEL | Nickel |
| 7439-92-1 | LEAD | Lead |
| 71-43-2 | BENZENE | Hydrocarbons, Aromatic |
| 62-75-9 | METHANAMINE, N-METHYL-N-NITROSO | |
| 50-00-0 | FORMALDEHYDE | Aldehydes |
| 151-56-4 | ETHYLENEIMINE | |
| 14977-61-8 | CHROMYL CHLORIDE | |
| 1464-53-5 | 1,1'-BI(ETHYLENE OXIDE) | |
| 140-88-5 | ETHYL ACRYLATE | Acrylates |
| 13530-65-9 | ZINC CHROMATE | Chromium(VI) |
| 13510-49-1 | BERYLLIUM SULFATE | |
| 1333-82-0 | CHROMIUM TRIOXIDE | Chromium |
| 13327-32-7 | BERYLLIUM HYDROXIDE | |
| 1313-99-1 | NICKEL OXIDE | Nickel |
| 1304-56-9 | BERYLLIUM OXIDE | |
| 123-91-1 | 1,4-DIOXANE | Ethers |
| 106-89-8 | EPICHLOROHYDRIN | Epoxides |
| 10588-01-9 | SODIUM BICHROMATE | Chromium(VI) |

## Table Six (Appendix Six) — Substances matching on suspected immunotoxins, suspected neurotoxins and suspected respiratory toxins (36 in total — sub-set of Canadian List #2)

| cas_no | Chemical name | Chemical Group (from GPE list) |
|---|---|---|
| NA - 10 | METHYL MERCURY COMPOUNDS | |
| 95-47-6 | O-XYLENE | Hydrocarbons, Aromatic |
| 85-44-9 | PHTHALIC ANHYDRIDE | Phthalates |
| 80-62-6 | METHYL METHACRYLATE | Methacrylates |
| 8006-64-2 | TURPENTINE | Biologicals |
| 7758-97-6 | LEAD CHROMATE | Chromium(VI) |
| 75-56-9 | PROPYLENE OXIDE | Epoxides |
| 7440-48-4 | COBALT | Cobalt |
| 7440-31-5 | TIN | Tin |
| 7440-02-0 | NICKEL | Nickel |
| 7439-92-1 | LEAD | Lead |
| 71-43-2 | BENZENE | Hydrocarbons, Aromatic |
| 62-75-9 | METHANAMINE, N-METHYL-N-NITROSO | |
| 532-27-4 | 2-CHLOROACETOPHENONE | |
| 50-00-0 | FORMALDEHYDE | Aldehydes |
| 479-45-8 | TETRYL | |
| 4016-14-2 | ISOPROPYL GLYCIDYL ETHER | |
| 2698-41-1 | O-CHLOROBENZYLIDENE MALONONITRILE | |
| 25068-38-6 | (CHLOROMETHYL)OXIRANE, 4,4'-(1-METHYLETHYLIDENE)BISPHENOL COPOLYMER | Polyethers |
| 151-56-4 | ETHYLENEIMINE | |
| 140-88-5 | ETHYL ACRYLATE | Acrylates |
| 1330-20-7 | XYLENE (MIXED ISOMERS) | Hydrocarbons, Aromatic |
| 128-37-0 | 2,6-DI-TERT-BUTYL-P-CRESOL | Phenols |
| 126-98-7 | METHACRYLONITRILE | |
| 123-91-1 | 1,4-DIOXANE | Ethers |
| 123-31-9 | HYDROQUINONE | Phenols |
| 108-94-1 | CYCLOHEXANONE | Ketones |
| 108-91-8 | CYCLOHEXYLAMINE | Amines, Aliphatic |
| 108-88-3 | TOLUENE | Hydrocarbons, Aromatic |
| 108-38-3 | M-XYLENE | Hydrocarbons, Aromatic |
| 107-41-5 | HEXYLENE GLYCOL | Alcohols |
| 107-15-3 | ETHYLENEDIAMINE | Amines, Aliphatic |
| 106-89-8 | EPICHLOROHYDRIN | Epoxides |
| 105-60-2 | CAPROLACTAM | N-Heterocycles |
| 100-42-5 | STYRENE | Hydrocarbons, Aromatic |
| 10028-15-6 | OZONE | |

## Table Seven (Appendix Six) — Substances matching on suspected developmental toxicity, suspected neurotoxicity and suspected reproductive toxicity (29 in totoal — sub-set of Canadian List #2)

| cas_no | Chemical name | Chemical Group (from GPE list) |
|---|---|---|
| NA - 39 | GLYCOL ETHERS | |
| 95-47-6 | O-XYLENE | Hydrocarbons, Aromatic |
| 85-68-7 | BENZYL BUTYL PHTHALATE | Phthalates |
| 84-74-2 | DIBUTYL PHTHALATE | Phthalates |
| 80-62-6 | METHYL METHACRYLATE | Methacrylates |
| 79-01-6 | TRICHLOROETHYLENE | Halogenated, Aliphatic |
| 78-93-3 | METHYL ETHYL KETONE | Ketones |
| 7664-39-3 | HYDROFLUORIC ACID | Fluoro Compounds |
| 759-73-9 | N-ETHYL-N-NITROSOUREA | |
| 75-56-9 | PROPYLENE OXIDE | Epoxides |
| 75-05-8 | ACETONITRILE | Nitriles |
| 7440-48-4 | COBALT | Cobalt |
| 7440-02-0 | NICKEL | Nickel |
| 71-55-6 | 1,1,1-TRICHLOROETHANE | Halogenated, Aliphatic |
| 68-12-2 | N,N-DIMETHYLFORMAMIDE | Amides |
| 67-66-3 | CHLOROFORM | Halogenated, Aliphatic |
| 505-60-2 | MUSTARD GAS | |
| 1330-20-7 | XYLENE (MIXED ISOMERS) | Hydrocarbons, Aromatic |
| 127-18-4 | TETRACHLOROETHYLENE | Halogenated, Aliphatic |
| 126-72-7 | TRIS(2,3-DIBROMOPROPYL) PHOSPHATE | |
| 111-76-2 | ETHYLENE GLYCOL MONOBUTYL ETHER | Glycol Ethers |
| 111-46-6 | DIETHYLENE GLYCOL ETHER | Glycol Ethers |
| 110-54-3 | N-HEXANE | Hydrocarbons, Aliphatic |
| 108-95-2 | PHENOL | Phenols |
| 107-13-1 | ACRYLONITRILE | Nitriles |
| 106-99-0 | 1,3-BUTADIENE | Hydrocarbons, Aliphatic |
| 105-60-2 | CAPROLACTAM | N-Heterocycles |
| 100-42-5 | STYRENE | Hydrocarbons, Aromatic |
| 100-41-4 | ETHYLBENZENE | Hydrocarbons, Aromatic |

## Table Eight (Appendix Six) — Substances matching on suspected developmental toxins, suspected respiratory toxins and suspected reproductive toxins (33 in total — sub-set of Canadian List #2)

| cas_no | Chemical name | Chemical group (from GPE list) |
|---|---|---|
| NA - D/F | DIBENZOFURANS (CHLORINATED) and Dioxin and Dioxin-like Compounds | |
| NA - 39 | GLYCOL ETHERS | |
| NA - 29 | RADIONUCLIDES | |
| NA - 23 | PM 10 | |
| NA - 22 | PM 2.5 | |
| 95-47-6 | O-XYLENE | Hydrocarbons, Aromatic |
| 80-62-6 | METHYL METHACRYLATE | Methacrylates |
| 79-01-6 | TRICHLOROETHYLENE | Halogenated, Aliphatic |
| 78-93-3 | METHYL ETHYL KETONE | Ketones |
| 7664-39-3 | HYDROFLUORIC ACID | Fluoro Compounds |
| 75-56-9 | PROPYLENE OXIDE | Epoxides |
| 75-05-8 | ACETONITRILE | Nitriles |
| 7440-66-6 | ZINC | Zinc |
| 7440-50-8 | COPPER | Copper |
| 7440-48-4 | COBALT | Cobalt |
| 7440-02-0 | NICKEL | Nickel |
| 68-12-2 | N,N-DIMETHYLFORMAMIDE | Amides |
| 67-66-3 | CHLOROFORM | Halogenated, Aliphatic |
| 624-83-9 | METHYL ISOCYANATE | |
| 505-60-2 | MUSTARD GAS | |
| 1330-20-7 | XYLENE (MIXED ISOMERS) | Hydrocarbons, Aromatic |
| 127-18-4 | TETRACHLOROETHYLENE | Halogenated, Aliphatic |
| 117-81-7 | BIS(2-ETHYLHEXYL)PHTHALATE | Phthalates |
| 111-76-2 | ETHYLENE GLYCOL MONOBUTYL ETHER | Glycol Ethers |
| 111-46-6 | DIETHYLENE GLYCOL ETHER | Glycol Ethers |
| 110-54-3 | N-HEXANE | Hydrocarbons, Aliphatic |
| 108-95-2 | PHENOL | Phenols |
| 107-13-1 | ACRYLONITRILE | Nitriles |
| 106-99-0 | 1,3-BUTADIENE | Hydrocarbons, Aliphatic |
| 105-60-2 | CAPROLACTAM | N-Heterocycles |
| 10049-04-4 | CHLORINE DIOXIDE | Chlorine Compounds |
| 100-42-5 | STYRENE | Hydrocarbons, Aromatic |
| 100-41-4 | ETHYLBENZENE | Hydrocarbons, Aromatic |

# Appendix Seven: Constituent Group Members of Substances on Canadian Lists #1 and #2

**Canadian List #1 — For any substance on the list that also appears in the database group lists, they are listed under each NA Group noted. Where the list also contained the group entry, the NA allocation for the group is also included.**

**CHEMICAL GROUP INFORMATION:**

GROUP: Antimony (and compounds) (NA - 01)
- 7440-36-0 (Antimony)
- NA - 01 (Antimony and its compounds)

GROUP: Arsenic (and compounds) (NA - 02)
- 7784-41-0 (Arsenic acid, monopotassium salt)
- 7784-42-1 (Arsine)
- 7778-43-0 (Arsenic acid, disodium salt)
- 7778-39-4 (Arsenic acid)
- 7631-89-2 (Arsenic acid, sodium salt)
- 10103-50-1 (Arsenic acid, magnesium salt)
- NA - 02 (Arsenic and its compounds)
- 7784-34-1 (Arsenous trichloride)

GROUP: Cadmium (and compounds) (NA - 03)
- 513-78-0 (Carbonic acid, cadmium salt (1:1))
- 2420-98-6 (Hexanoic acid, 2-ethyl-, cadmium salt)
- 7440-43-9 (Cadmium)
- 10325-94-7 (Nitric acid, cadmium salt)
- 14486-19-2 (Borate(1-), tetrafluoro-, cadmium (2:1))
- 10124-36-4 (Sulfuric acid, cadmium salt (1:1))
- 10108-64-2 (Cadmium chloride)
- 543-90-8 (Acetic acid, cadmium salt)
- 7789-42-6 (Cadmium bromide)
- 1306-23-6 (Cadmium sulfide)
- 1306-19-0 (Cadmium oxide)
- 7790-79-6 (Cadmium fluoride)
- 2223-93-0 (Octadecanoic acid, cadmium salt)

GROUP: Chromium (and compounds) (NA - 04)
- NA - 04 (Chromium (and compounds))
- 7440-47-3 (Chromium)

GROUP: Cobalt (and compounds) (NA - 05)
- 7440-48-4 (Cobalt)
- NA - 05 (Cobalt (and compounds))

GROUP: Copper (and compounds) (NA - 06)
NA - 06 (Copper (and compounds))
7440-50-8 (Copper)

GROUP: Cyanides (ionic) (NA - 07)
57-12-5 (cyanide ion)
NA - 07 (Cyanides (ionic))

GROUP: Lead (and compounds) (NA - 08)
11120-22-2 (Silicic acid, lead salt)
592-87-0 (Thiocyanic acid, lead(2+) salt)
1335-32-6 (Lead, bis(acetato-O)tetrahydroxytri-)
7446-27-7 (Phosphoric acid, lead(2+) salt (2:3))
301-04-2 (Acetic acid, lead(2+) salt)
7758-97-6 (Chromic acid, lead(2+) salt (1:1))
7783-46-2 (Lead fluoride)
7758-95-4 (Lead chloride)
7446-14-2 (Sulfuric acid, lead(2+) salt (1:1))
7439-92-1 (Lead)
7428-48-0 (Octadecanoic acid, lead salt)
10101-63-0 (Lead iodide)
598-63-0 (Carbonic acid, lead(2+) salt (1:1))
NA - 08 (Lead and its compounds)
18454-12-1 (Chromic acid, lead(2+) salt (1:2))
17976-43-1 (Lead, di-.mu.-oxo(.mu.-phthalato)tri-, cyclo-)
13814-96-5 (Borate(1-), tetrafluoro-, lead(2+) (2:1))
1317-36-8 (Lead oxide)
1309-60-0 (Lead oxide)
1314-87-0 (Lead sulfide)
11113-70-5 (Silicic acid, chromium lead salt)
10099-76-0 (Silicic acid, lead(2+) salt (1:1))
10099-74-8 (Nitric acid, lead(2+) salt)
69011-06-9 (Lead, [1,2-benzenedicarboxylato(2-)]dioxotri-)

GROUP: Alkyl lead compounds (NA - 08A)
75-74-1 (Plumbane, tetramethyl-)
78-00-2 (Plumbane, tetraethyl-)
NA - 08A (Alkyl Lead Compounds)

GROUP: Manganese (and compounds) (NA - 09)
NA - 09 (Manganese and its compounds)
7439-96-5 (Manganese)
7722-64-7 (Permanganic acid, potassium salt)
7785-87-7 (Sulfuric acid, manganese(2+) salt (1:1))

GROUP: Mercury (and compounds) (NA - 10)
7783-35-9 (Sulfuric acid, mercury(2+) salt (1:1))
NA - 10 (Mercury and its compounds)
10045-94-0 (Nitric acid, mercury(2+) salt)
21908-53-2 (Mercury oxide)
592-85-8 (Thiocyanic acid, mercury(2+) salt)
7774-29-0 (Mercury iodide)
10415-75-5 (Nitric acid, mercury(1+) salt)
7789-47-1 (Mercury bromide)

10112-91-1 (Mercury chloride)
103-27-5 (Mercury, phenyl(propanoato-O)-)
1600-27-7 (Acetic acid, mercury(2+) salt)
54-64-8 (Mercurate(1-), ethyl(2-mercaptobenzoato(2-)-O,S)-,sodium)
628-86-4 (Fulminic acid, mercury(2+) salt)
593-74-8 (Mercury, dimethyl-)
627-44-1 (Mercury, diethyl-)
7487-94-7 (Mercury chloride)
62-38-4 (Mercury, (acetato-O)phenyl-)
7546-30-7 (Mercury chloride)
592-04-1 (Mercury cyanide)

GROUP: Nickel (and compounds) (NA - 11)
3333-67-3 (Carbonic acid, nickel(2+) salt (1:1))
12054-48-7 (Nickel hydroxide)
12035-72-2 (Nickel sulfide)
1314-06-3 (Nickel oxide)
12035-36-8 (Nickel oxide)
1313-99-1 (Nickel oxide)
13463-39-3 (Nickel carbonyl, (T-4)-)
7440-02-0 (Nickel)
NA - 11 (Nickel and its compounds)
7786-81-4 (Sulfuric acid, nickel(2+) salt (1:1))

GROUP: Selenium (and compounds) (NA - 12)
NA - 12 (Selenium (and compounds))
7782-49-2 (Selenium)

GROUP: Zinc (and compounds) (NA - 14)
7440-66-6 (Zinc)
NA - 14 (Zinc (and compounds))

GROUP: Barium (and compounds) (NA - 15)
7440-39-3 (Barium)

GROUP: Aluminum (and compounds) (NA - 18)
NA - 18 (Aluminum (and compounds))
7429-90-5 (Aluminum)

GROUP: Beryllium (and compounds) (NA - 19)
13510-49-1 (BERYLLIUM SULFATE)
NA - 19 (Beryllium (and compounds))
7440-41-7 (Beryllium)

GROUP: Organotin compounds (NA - 20)
688-73-3 (tributyltin)

GROUP: PM 2.5 (NA - 22)
NA - 22 (PM 2.5)

GROUP: PM 10 (NA - 23)
NA - 23 (PM 10)

GROUP: Radionuclides (NA - 29)
NA - 29 (Radionuclides)

GROUP: Polybrominated Biphenyls (PBBs) (NA - 30)
NA - 30 (Polybrominated Biphenyls)

GROUP: Coke Oven Emissions (NA - 31)
NA - 31 (Coke Oven Emissions)

GROUP: Uranium (inorganic, respirable, soluble) (NA - 35)
7440-61-1 (Uranium)

GROUP: Trihalomethanes (NA - 38)
75-25-2 (Bromoform)
67-66-3 (trichloromethane)
75-27-4 (Dichlorobromomethane)
124-48-1 (Chlorodibromomethane)

GROUP: Glycol Ethers (NA - 39)
NA - 39 (Glycol Ethers)

GROUP: Thallium compounds (NA - 41)
7440-28-0 (Thallium)

GROUP: Tetrachloroethanes (NA - 43)
79-34-5 (1,1,2,2-Tetrachloroethane)

GROUP: Dibenzo-p-dioxins and dibenzofurans, polychlorinated (NA – D/F)
NA - D/F (Dioxins and Furans)

GROUP: nitrogen oxides (NA - NITR)
NA - NITR (Nitrogen oxides)

GROUP: Nonylphenol and its ethoxylates (NA - NPE)
25154-52-3 (n-Nonylphenol (mixed isomers))
104-40-5 (Nonylphenol)
84852-15-3 (4-nonylphenol (branched))
9016-45-9 (Nonylphenol polyethylene glycol ether)
NA - NPE (Nonylphenol and its ethoxylates)

GROUP: Octylphenol and its ethoxylates (NA - OPE)
9036-19-5 (Scintillation surfactant (Triton X 114))
9002-93-1 (Triton(R) X-100)
27193-28-8 (octyl phenol)
1806-26-4 (4-Octylphenol)
140-66-9 (4-tert-Octylphenol)

GROUP: PAHs (NA - P/H)
91-57-6 (naphthalene, 2-methyl-)
57-97-6 (benz[a]anthracene, 7,12-dimethyl-)
260-94-6 (acridine)
208-96-8 (Acenapthylene)
5522-43-0 (pyrene, 1-nitro-)
193-39-5 (indeno(1,2,3-cd)pyrene)

53-70-3 (dibenz(a,h)anthracene)
91-22-5 (quinoline)
120-12-7 (anthracene)
85-01-8 (phenanthrene)
218-01-9 (chrysene)
50-32-8 (benzo(a)pyrene)
56-55-3 (benz(a)anthracene)
129-00-0 (pyrene)
56-49-5 (benz[j]aceanthrylene, 1,2-dihydro-3-methyl-)

GROUP: PBDEs (NA - PBDE)
1163-19-5 (Decabromodiphenyl ether (DBDPE))
32534-81-9 (Pentabromodiphenyl ether (PBDPE))
79-94-7 (Tetrabromobisphenol A (TBBPA))

GROUP: Polychlorinated biphenyls (NA - PCB)
NA - PCB (Polychlorinated biphenyls)
15968-05-5 (2,2',6,6'-TETRACHLOROBIPHENYL (PCB-54))
1336-36-3 (PCBs)

GROUP: Perfluoroalkylsulfonyl Containing Chemicals (NA - PFAS)
3825-26-1 (AMMONIUM PERFLUOROOCTANOATE)

GROUP: Perfluorooctanoic acid and derivatives (NA - PFOA)
NA - PFOA (PFOAs)
3825-26-1 (Ammonium perfluorooctanoate)

GROUP: Phenols (NA - PHEN)
108-95-2 (phenol)
25167-83-3 (tetrachlorophenol)
120-83-2 (2,4-dichlorophenol)
51-28-5 (2,4-dinitrophenol)
98-54-4 (butylphenol)
87-65-0 (2,6-dichlorophenol)
25013-16-5 (butylhydroxyanisol)
105-67-9 (2,4-dimethylphenol)
100-02-7 (4-nitrophenol)
576-24-9 (2,3-dichlorophenol)
80-05-7 (4,4'-methylethylidenebisphenol)
88-75-5 (2-nitrophenol)

GROUP: Phthalates (NA - PHTH)
131-11-3 (Dimethyl phthalate)
NA - PHTH (phthalates)
117-81-7 (Bis(2-Ethylhexyl)Phthalate (DEHP))
28553-12-0 (Di-isononyl phthalate)
85-68-7 (1,2-benzenedicarboxylic acid, butyl phenylmethyl ester)
68515-48-0 (1,2-benzenedicarboxylic acid, di-C8-10-alkyl esters, branched)
84-74-2 (1,2-benzenedicarboxylic acid, dibutyl ester)
84-66-2 (Diethyl phthalate (DEP))
84-61-7 (Dicyclohexyl phthalate)
85-68-7 (Butyl benzyl phthalate)
117-84-0 (Di-n-octyl phthalate)
84-74-2 (Dibutyl phthalate)

GROUP: Short-chain chlorinated paraffins (NA - SCCP)
61788-76-9 (Alkanes, chloro; chloroparaffins)

GROUP: Sulphates (NA - SULP)
NA - SULP (Sulphates)

GROUP: Volatile Organic Compounds (NA - VOC)
78-93-3 (methyl ethyl ketone)
127-18-4 (perchloroethylene)
67-64-1 (acetone)
95-47-6 (o-Xylene)
108-38-3 (m-Xylene)
100-41-4 (ethylbenzene)
67-66-3 (chloroform)
71-55-6 (1,1,1-Trichloroethane)
79-01-6 (trichloroethylene)
74-98-6 (propane)
NA - VOC (Volatile Organic Compounds)
115-07-1 (propylene)
108-05-4 (vinyl acetate)
108-10-1 (methyl isobutyl ketone)
108-88-3 (toluene)
108-90-7 (chlorobenzene)
71-43-2 (benzene)
110-54-3 (n-hexane)
50-00-0 (formaldehyde)
74-86-2 (acetylene)
67-56-1 (methyl alcohol)
123-86-4 (n-butyl acetate)
80-56-8 (alpha-pinene)
141-78-6 (ethyl acetate)
106-99-0 (1,3-butadiene)
103-71-9 (phenyl isocyanate)
100-42-5 (styrene)
5989-27-5 (d-limonene)
62-53-3 (aniline)
111-76-2 (2-butoxyethanol)

**Canadian List #2 — For any substance on the list that also appears in the database group lists, they are listed under each NA Group noted. Where the list also contained the group entry, the NA allocation for the group is also included.**

**CHEMICAL GROUP INFORMATION:**

GROUP: Antimony (and compounds) (NA - 01)
NA - 02 (Antimony and its compounds)

GROUP: Arsenic (and compounds) (NA - 02)
7784-41-0 (Arsenic acid, monopotassium salt)
NA - 02 (Arsenic and its compounds)
10103-50-1 (Arsenic acid, magnesium salt)

GROUP: Cadmium (and compounds) (NA - 03)
7790-79-6 (Cadmium fluoride)

GROUP: Chromium (and compounds) (NA - 04)
7440-47-3 (Chromium)
NA - 04 (Chromium (and compounds))

GROUP: Cobalt (and compounds) (NA - 05)
7440-48-4 (Cobalt)
NA - 05 (Cobalt (and compounds))

GROUP: Copper (and compounds) (NA - 06)
NA - 06 (Copper (and compounds))
7440-50-8 (Copper)

GROUP: Cyanides (ionic) (NA - 07)
NA - 07 (Cyanides (ionic))

GROUP: Lead (and compounds) (NA - 08)
1317-36-8 (Lead oxide)
NA - 08 (Lead and its compounds)
1309-60-0 (Lead oxide)
10101-63-0 (Lead iodide)
592-87-0 (Thiocyanic acid, lead(2+) salt)
7446-27-7 (Phosphoric acid, lead(2+) salt (2:3))
7439-92-1 (Lead)
69011-06-9 (Lead, [1,2-benzenedicarboxylato(2-)]dioxotri-)
7758-97-6 (Chromic acid, lead(2+) salt (1:1))

GROUP: Alkyl lead compounds (NA - 08A)
78-00-2 (Plumbane, tetraethyl-)
NA - 08A (Alkyl Lead Compounds)

GROUP: Manganese (and compounds) (NA - 09)
NA - 09 (Manganese and its compounds)
7439-96-5 (Manganese)

GROUP: Mercury (and compounds) (NA - 10)
- 627-44-1 (Mercury, diethyl-)
- 592-04-1 (Mercury cyanide)
- 628-86-4 (Fulminic acid, mercury(2+) salt)
- 593-74-8 (Mercury, dimethyl-)
- NA - 10 (Mercury and its compounds)

GROUP: Nickel (and compounds) (NA - 11)
- NA - 11 (Nickel and its compounds)
- 7440-02-0 (Nickel)
- 1313-99-1 (Nickel oxide)
- 7786-81-4 (Sulfuric acid, nickel(2+) salt (1:1))
- 12035-36-8 (Nickel oxide)

GROUP: Selenium (and compounds) (NA - 12)
- NA - 12 (Selenium (and compounds))

GROUP: Zinc (and compounds) (NA - 14)
- 7440-66-6 (Zinc)
- NA - 14 (Zinc (and compounds))

GROUP: Aluminum (and compounds) (NA - 18)
- NA - 18 (Aluminum (and compounds))
- 7429-90-5 (Aluminum)

GROUP: Beryllium (and compounds) (NA - 19)
- 13510-49-1 (BERYLLIUM SULFATE)
- NA - 19 (Beryllium (and compounds))

GROUP: PM 2.5 (NA - 22)
- NA - 22 (PM 2.5)

GROUP: PM 10 (NA - 23)
- NA - 23 (PM 10)

GROUP: Radionuclides (NA - 29)
- NA - 29 (Radionuclides)

GROUP: Polybrominated Biphenyls (PBBs) (NA - 30)
- NA - 30 (Polybrominated Biphenyls)

GROUP: Coke Oven Emissions (NA - 31)
- NA - 31 (Coke Oven Emissions)

GROUP: Trihalomethanes (NA - 38)
- 75-27-4 (Dichlorobromomethane)
- 124-48-1 (Chlorodibromomethane)
- 67-66-3 (trichloromethane)

GROUP: Glycol Ethers (NA - 39)
- NA - 39 (Glycol Ethers)

GROUP: Dibenzo-p-dioxins and dibenzofurans, polychlorinated (NA – D/F)
- NA - D/F (Dioxins and Furans)

GROUP: nitrogen oxides (NA - NITR)
NA - NITR (Nitrogen oxides)

GROUP: Nonylphenol and its ethoxylates (NA - NPE)
NA - NPE (Nonylphenol and its ethoxylates)
25154-52-3 (n-Nonylphenol (mixed isomers))
9016-45-9 (Nonylphenol polyethylene glycol ether)

GROUP: Octylphenol and its ethoxylates (NA - OPE)
9036-19-5 (Scintillation surfactant (Triton X 114))
9002-93-1 (Triton(R) X-100)

GROUP: PAHs (NA - P/H)
208-96-8 (Acenapthylene)
260-94-6 (acridine)
193-39-5 (indeno(1,2,3-cd)pyrene)
56-55-3 (benz(a)anthracene)
5522-43-0 (pyrene, 1-nitro-)
53-70-3 (dibenz(a,h)anthracene)

GROUP: Polychlorinated biphenyls (NA - PCB)
15968-05-5 (2,2',6,6'-TETRACHLOROBIPHENYL (PCB-54))
NA - PCB (Polychlorinated biphenyls)

GROUP: Perfluorooctanoic acid and derivatives (NA - PFOA)
NA - PFOA (PFOAs)

GROUP: Phenols (NA - PHEN)
80-05-7 (4,4'-methylethylidenebisphenol)
87-65-0 (2,6-dichlorophenol)
108-95-2 (phenol)
576-24-9 (2,3-dichlorophenol)

GROUP: Phthalates (NA - PHTH)
85-68-7 (Butyl benzyl phthalate)
NA - PHTH (phthalates)
85-68-7 (1,2-benzenedicarboxylic acid, butyl phenylmethyl ester)
84-74-2 (1,2-benzenedicarboxylic acid, dibutyl ester)
117-81-7 (Bis(2-Ethylhexyl)Phthalate (DEHP))
28553-12-0 (Di-isononyl phthalate)
84-74-2 (Dibutyl phthalate)

GROUP: Short-chain chlorinated paraffins (NA - SCCP)
61788-76-9 (Alkanes, chloro; chloroparaffins)

GROUP: Sulphates (NA - SULP)
NA - SULP (Sulphates)

GROUP: Volatile Organic Compounds (NA - VOC)
- 141-78-6 (ethyl acetate)
- 50-00-0 (formaldehyde)
- 108-10-1 (methyl isobutyl ketone)
- 95-47-6 (o-Xylene)
- 79-01-6 (trichloroethylene)
- 78-93-3 (methyl ethyl ketone)
- 127-18-4 (perchloroethylene)
- 123-86-4 (n-butyl acetate)
- NA - VOC (Volatile Organic Compounds)
- 115-07-1 (propylene)
- 110-54-3 (n-hexane)
- 111-76-2 (2-butoxyethanol)
- 108-38-3 (m-Xylene)
- 67-56-1 (methyl alcohol)
- 108-05-4 (vinyl acetate)
- 106-99-0 (1,3-butadiene)
- 100-42-5 (styrene)
- 100-41-4 (ethylbenzene)
- 74-98-6 (propane)
- 71-55-6 (1,1,1-Trichloroethane)
- 71-43-2 (benzene)
- 67-66-3 (chloroform)
- 67-64-1 (acetone)
- 108-88-3 (toluene)

# Appendix Eight: List of Acronyms

| | |
|---|---|
| ARAD | Applied Research and Analysis Directorate (Health Canada) |
| ARET | Accelerated Reduction and Elimination of Toxics |
| ATSDR | Agency for Toxic Substances and Disease Registry |
| CAS# | Chemical Abstract Service number |
| CCPA | Canadian Chemical Producers Association |
| CDC | Centers for Disease Control and Prevention (United States) |
| CEC | Commission for Environmental Cooperation of North America |
| CELA | Canadian Environmental Law Association |
| CEPA | Canadian Environmental Protection Act |
| DBPs | Disinfection by-products |
| DSL | Domestic Substances List |
| EEA | European Environment Agency |
| EEC | European Economic Community |
| ETS | Environmental Tobacco Smok |
| EU | European Union |
| GBPSR | Greater Boston Physicians for Social Responsibility |
| GPE | Greatest Potential for Exposure |
| HPV | High Production Volume |
| IARC | International Agency for Research on Cancer |
| IPCS | International Program on Chemical Safety |
| IUGR | Intrauterine Growth Retardation |
| NA | Not Available (numbering system for groups of substances, or individual substances with CAS#s) |
| NAFTA | North American Free Trade Agreement |
| NAS | National Academy of Sciences (United States) |
| nDSL | Non-Domestic Substances List |
| NGOs | Non-governmental organizations |
| NPRI | National Pollutant Release Inventory |

| | |
|---|---|
| NRC | National Research Council (United States) |
| OECD | Organization for Economic Cooperation and Development |
| OMA | Ontario Medical Association |
| PAHs | Polycyclic Aromatic Hydrocarbons |
| PBBs | Polybrominated biphenyls |
| PCBs | Polychlorinated biphenyls |
| PBDEs | Polybrominated diphenyl ethers |
| PCOS | Polycystic ovary syndrome |
| POPs | Persistent Organic Pollutants |
| $PM_{2.5}$ and $PM_{10}$ | Particulate Matter (subscript = diameter in microns) |
| PMRA | Pest Management Regulatory Agency |
| PRTR | Pollutant Release and Transfer Inventory |
| QSARs | Quantitative Structure-Activity Relationships |
| SCCPs | Short Chained Chlorinated Paraffins |
| SIDS | Sudden Infant Death Syndrome |
| THMs | Trihalomethanes |
| TRI | Toxic Release Inventory (United States) |
| UK | United Kingdom |
| UN | United Nations |
| UNEP | United Nations Environment Program |
| USEPA | United States Environmental Protection Agency |
| UVCBs | Unknown or Variable Composition Complex Reaction Products and Biological Materials |
| VCCEP | Voluntary Children's Chemical Evaluation Program |
| VOCs | Volatile Organic Compounds |
| WHO | World Health Organization |