Emissions Estimation Technique Manual

for

Aggregated Emissions from Domestic/Commercial Solvent and Aerosol Use

November 1999

**EMISSIONS ESTIMATION TECHNIQUE MANUAL:
AGGREGATED EMISSIONS FROM DOMESTIC/COMMERCIAL SOLVENT
AND AEROSOL USE**

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1.0   Introduction

1.1   *The National Pollutant Inventory*

The National Pollutant Inventory (NPI) was established under a National Environment Protection Measure (NEPM) made by the National Environment Protection Council (NEPC) under Commonwealth, State and Territory legislation on 27 February 1998.   This Measure is to be implemented progressively through the laws and administrative arrangements of each of these participating jurisdictions (i.e. State and Territory Governments).

The NEPM and an associated Memorandum of Understanding for the NPI, which have been published as a single document by the NEPC, provide more details on the purpose and structure of the NPI, and the arrangements for implementation of the NEPM that have been agreed by the jurisdictions. Users of this Manual should read this publication if they are unfamiliar with the NEPM or the NPI.

1.2   *Purpose and Scope of the Manuals*

The NPI will be developed as an internet database designed to provide information on the types and amounts of certain chemical substances being emitted to the air, land and water environments. If the NPI is to achieve its aim of communicating useful and reliable information to the community, industry and governments on pollutants present in our environment, the emissions estimation techniques (EETs) used to generate inputs to the NPI need to be consistent, and the process for developing these techniques needs to be transparent. This Manual has been developed, reviewed and finalised in this context.

The NEPM contains a list of substances for which emissions will be reported on an annual basis to the Commonwealth Government, which will then compile and publish the NPI. The aggregated emissions manuals, of which this is one, have been prepared to assist State and Territory Governments in preparing these submissions, and to facilitate consistent reporting between these jurisdictions.

State and Territory Governments will also be compiling and submitting emissions data based on annual inputs from reporting facilities.   These facilities are primarily industrial enterprises which use (or handle, manufacture or process) more than specified amounts of certain polluting substances, burn more than specified amounts of fuel, or consume more than certain amounts of energy. These amounts or "thresholds" (which are clearly defined in the NEPM) govern whether an industrial facility is required to report and what substances it is required to report on, and industry handbooks are being developed to help industries to prepare the information for these reports.

The aggregated emissions manuals complement these handbooks, and are intended to enable Governments to estimate emissions from non-industrial activities (e.g. transportation, domestic and commercial activities) and

emissions from industry which are not reported because the relevant thresholds are not exceeded or are exempt from reporting.

Annual submissions are also to be prepared and submitted in conformance with the NPI Data Model and Data Transfer Protocol. For emissions to the air environment, this Protocol only requires jurisdictions to submit data on emissions into the particular airsheds that are listed in the Protocol, and not to the rest of each jurisdictional area. For example, under the 1998 to 2000 Memorandum of Understanding, in Victoria, emissions data are only required for the Port Phillip and Latrobe Valley Regions. In addition, emissions data are required to be submitted on a gridded basis, with each jurisdiction determining a grid domain and grid cell size necessary to meet its obligations under Section 7 of the NEPM.

Therefore, in addition to recommending and providing details and examples of appropriate emissions estimation techniques (EETs) for the relevant NPI substances, this Manual provides guidance on the spatial allocation of emissions and the use of area-based surrogates for accurately distributing the activities or sources in question.

1.3   Application of the Manuals

Each of the AE manuals provides details of:

- the NPI substances that are expected to be emitted from the relevant aggregated source type;
- the origins or sources of the emissions, and the processes that may generate them;
- the impacts of any control equipment or procedures on those emissions;
- the broad approaches that may be employed in the estimation and spatial allocation of emissions;
- details of emission factors to be used in the estimation of emissions; and
- a series of illustrative sample calculations for each estimation technique.

Each of the manuals also contains a section on "Uncertainty Analysis", which provides information and guidance to users on the reliability of the various estimation techniques, problems and issues associated with their development and application, and recommendations for their improvement.

In preparing the AE manuals it has been recognised that some jurisdictions already undertake detailed emissions inventories on a regular basis, based on relatively sophisticated methodologies. For these jurisdictions the manuals offer techniques which represent commonly available best practice for emissions estimation in Australia (i.e. techniques of high quality which can be employed by larger or more experienced jurisdictions with an acceptable expenditure of time and effort). The most recent developments in inventory methodology in Australia and overseas have been considered in selecting and documenting these techniques.

Where a more simplified methodology for emissions estimation of acceptable quality is available, it is recommended in the manual for the use of those jurisdictions which may, for the time being at least, lack the data, resources or expertise to employ a more sophisticated approach, or not see the need for highly reliable estimates in that particular part of the inventory.

Emissions Covered by the Manual

Products containing solvents are used in a variety of domestic and commercial applications. Solvents within these products contain volatile organic compounds (VOCs) which are emitted to the atmosphere when these products are used. The followings groups of domestic/commercial solvent and aerosol products are covered by this handbook:

- personal care products;

- household cleaning products;

- motor vehicle aftermarket products;

- adhesive and sealant products;

- pesticide and herbicide products;

- coatings and related products; and

- miscellaneous products.

The product groupings listed above can be broken down into sub-categories as listed in Appendix A.

Emissions from the use of architectural surface coatings and coatings used in motor vehicle refinishing work are addressed in other NPI AE manuals. In particular, motor vehicle touch-up paints, sanding primers, engine enamels and other aerosol coatings used on motor vehicles are addressed in the EET Manual for Aggregated Emissions from Motor Vehicle Refinishing.

Similarly, an NPI AE manual has been prepared for estimating emissions from the industrial use of solvents by those facilities that are not required to report to jurisdictions under the NEPM (i.e. "sub-threshold" industrial activities).

Estimating emissions from broad-acre and horticultural application of pesticides is not addressed in this manual. The EETs and emission factors presented in this manual relate only to solvents in domestic and commercial application of pesticides.

1.4   NPI Substances

Products containing solvents are used in a variety of domestic and commercial applications. Solvents within these products contain volatile organic compounds (VOCs) that act either as active ingredients themselves or carriers for the active ingredients. VOCs is a general term, which refers to a large and diverse group of chemicals including hydrocarbons, oxygenates and halocarbons. A number of these VOCs are listed as NPI substances in Table 2 to Annex A of the NEPM, and these substances are listed in Table 1.

Table 1: NPI Substances Typically Emitted by Domestic/Commercial Solvent and Aerosol Use

Acrylic acid [d]	Hydrochloric acid [b]
Benzene [c]	Methanol [a-g]
Chloroform [c,f]	Methyl ethyl ketone [a-g]
1,2-Dichloroethane [a,b]	Methyl isobutyl ketone [b-f]
Dichloromethane [b-g]	n-Hexane [b-d,f]
Ethylbenzene [b–f]	Tetrachloroethylene [b-g]
Ethylene glycol [a-g]	Toluene [a-d,f,g]
Ethylene oxide [e]	Total volatile organic compounds (VOCs) [a-g]
Fluoride compounds [b,c]	Trichloroethylene [b-d,f]
Formaldehyde [b,d-f]	Xylenes [b–g]

[a] Personal care products.
[b] Household cleaning products.
[c] Motor vehicle aftermarket products.
[d] Adhesive and sealant products.
[e] Pesticide and herbicide products.
[f] Coatings and related products.
[g] Miscellaneous products.

1.5   Emission Sources and Related Processes

VOCs contained in domestic and commercial products are either active ingredients (such as cleaning, adhesive or pest control agents) or function as propellants, solvents or co-solvents for the active agents. The VOCs are primarily released during product use by means of immediate evaporation (aerosol spray), evaporation after application (product drying), and direct release in the gaseous phase (USEPA, 1995). Emissions from the use of motor vehicle aftermarket products may occur during the replacement of radiators, fuel systems or engines, and from loss or leakage during use.

VOC sources arising from the use of domestic and commercial products are obviously large in number and highly dispersed, and emit relatively small amounts of the NPI substances on an individual basis.

Products in solid form (e.g. baits, powders and granules) typically have lower VOC contents (and hence emissions) than aerosol and liquid sprays, because propellants and drying agents are not required.

Residual amounts of solvents may remain in discarded product containers and enter the municipal solid waste stream through disposal at landfill. Solvents from these products may also enter the wastewater treatment system through use and disposal.

1.6   Emission Controls

Potential control strategies for VOC emissions from domestic/commercial solvent and aerosol use typically involve:

• a change in consumer purchasing practices;

- a change in application method (repackaging);

- product substitution;

- product reformulation; and

- providing guidance on the use, storage, disposal, and recycling of spent containers.

Consumer purchasing practices directly influence VOC emissions by controlling total product consumption on a long-term basis.

Changing the application method generally means that liquid and aerosol products are replaced with solid products which, as discussed above, have lower VOC emissions.

Product substitution is a control measure that consists of replacing an existing product with a different product that achieves the same or similar results for the consumer, but with reduced VOC emissions.

Product reformulation as a control strategy can be implemented in two ways. Firstly, it may involve the use of improved products containing higher levels of VOCs but that result in reduced VOC emissions over time. For example, the new product may result in less frequent reapplications, or use of lesser volumes of the product, and an overall reduction in emissions.

Product reformulation, however, can also involve the development of low-VOC products by modifying the chemical composition. Reformulation may also involve the substitution of VOCs with less photochemically reactive or environmentally disadvantageous compounds, while still maintaining the product's effectiveness or integrity. An example of a compound used to replace VOCs in domestic and commercial products is the use of carbon dioxide as a propellant.

Providing consumers with directions for the proper use, storage, and disposal of products can also result in reduced VOC emissions. Product labelling and consumer education are two methods available to convey such information. The method used to dispose of unused products also affects the overall VOC emissions from domestic and commercial products.

Assessing the adoption of control techniques, like those listed above, at an NPI region (airshed) level is important if the efficacy of emission control strategies and consumer practices is to be reflected in the NPI database.

Emissions Estimation Techniques

1.7 Approach Employed

There are considerable variations in the VOC content of the relevant products, not only between different product types (as might be expected), but also between individual products of the same type, and even between and within jurisdictions. The wide range of product formulation and distribution data required for accurate emissions estimation are not easily obtainable from the relevant industries or their associations, and appropriate questionnaires or surveys would require a major effort. For example, within personal care products alone there are over twenty sub-categories of product types, and a wide range of low to high VOC-content products (QDEH 1998).

Consequently, the recommended techniques for estimating emissions employ emission factors (EFs) based on per capita usage for the various product groupings. The factors recommended in this manual have been derived in the USA, but are considered to give estimates of reasonable and acceptable accuracy for the Australian situation. When combined with population data the techniques estimate VOC emissions from domestic/commercial solvent and aerosol use in a region or airshed, which can be adjusted to reflect controls applicable in the region (see Section 2.3).

The techniques include the following steps:

• obtaining population data for the airshed of interest;

• identifying the relevant EFs (and adjusting them, where appropriate, for any emission control strategies operating in the airshed);

• multiplying the US per capita EFs for total and speciated VOCs by the airshed population; and

• apportioning emissions to grid cells based on the population distribution.

1.7.1 Estimating Emissions of NPI Substances

Emissions of total or speciated VOCs can be calculated by multiplying the EF (adjusted where appropriate) by the number of residents within an airshed.

Equation 1: Estimating total airshed emissions

$$E_i = TEF_i * P$$

where

E_i = Total airshed emissions of VOC species i, kg yr^{-1}
TEF_i = Total emission factor for VOC species i, kg yr^{-1} person^{-1}
P = Population of the airshed

1.7.2   Adjusting Emission Factors to Account for Control Strategies

If there are applicable State or Territory control strategies, emission factors should be adjusted to account for reductions in emissions of total and speciated VOCs.

It is important to note that programs targeted at reducing the VOC content of products (e.g. for control of photochemical pollution) may not have evenly distributed impacts, either between or within product types, or between or within jurisdictions (or even airsheds). For example, a regulation may have varying levels of impact on the formulations of different products within a product type or grouping, and the sales and usage of these same products may themselves vary geographically (e.g. with socio-economic factors) across a region. However, in the absence of detailed survey data, the best available approach is to update the US emission factor by taking into account the best estimate of product formulation reduction (PFR), in terms of percentage VOC reduction, across a relevant product type.

Equation 2: Accounting for the impacts of control strategies

The updated or adjusted emission factor is calculated as

$$AEF_i \quad = \quad EF_i - [(EF_i * PFR) / 100]$$

where

AEF_i =   Adjusted emission factor for species i, kg yr^{-1} person^{-1}
EF_i =   US emission factor for species i, kg yr^{-1} person^{-1}
PFR   =   Product Formulation Reduction, % mass

The above equation is applicable only when known control strategies are in place for a particular airshed. If there are no control strategies for the airshed, the basic US EFs should be used.

1.8   *Spatial Surrogates and Spatial Allocation*

Spatial allocation is required to apportion total emissions within the airshed of interest to each grid cell. The recommended technique uses population data as the basis for spatial distribution of total airshed emissions. The ABS can provide population data by Collection District, which can be converted to population per grid cells using a specific program or GIS. If population data are not available for the relevant reporting year, data from the most recent census may need to be adjusted by applying appropriate population projections.

Further refinement of the spatial allocation of emissions is possible. For example, if the number of commercial premises in each grid cell is known, some adjustment of the emissions in each cell is feasible. However, this is

not considered a high priority, given the relatively small size of the total emissions inventory from domestic commercial solvent and aerosol use and the potential errors already inherent in using the broad-based US EFs.

Equation 3: Allocating emissions to a grid cell

Emissions may be allocated to grid cells as follows

$$E_{ij} \quad = \quad E_i * P_j/P$$

where

E_{ij}	=	Emissions of species i in grid cell j, kg yr^{-1}
E_i	=	Total airshed emissions of species i, kg yr^{-1}
P_j	=	Population of grid cell j
P	=	Population of the airshed

1.9   Emission Factors

Table 2 provides the EFs recommended for estimating emissions of the relevant NPI substances from domestic/commercial solvent and aerosol use. These factors were developed by the USEPA in conjunction with product manufacturers and industry associations in the USA (QDEH 1998), and their use in Australia obviously assumes that product compositions and usage patterns are similar to those in the USA.   It is considered that this is a reasonable assumption which should produce acceptable estimates for Australian conditions (QDEH 1998) and hence for the purposes of the NPI.

The EFs in Table 2 are also considered to represent a reasonable estimate of per capita emissions in Australia in 1998, including the impacts of any environmental measures introduced up to that date.   Thus, they will only require adjustment for significant changes in product formulation or usage patterns in Australia which occur after that date.

The EFs in Table 2 are sourced from the Eastern Research Group (1996), which includes only reactive VOCs. Since 31% of the total VOCs is non-reactive (USEPA 1995), total VOCs are obtained by multiplying reactive VOCs by a factor of 1.45 (or 1/{1-0.31}).

The emission factors contained in Table 2 have also been adjusted to account for biodegradation of VOCs that enter the wastewater stream and therefore relate entirely to atmospheric emissions.

Table 2: Emission Factors for NPI Substances from Domestic/Commercial Solvent and Aerosol Use

NPI Listed Pollutant	Personal Care (EF$_a$)	House-hold (EF$_b$)	MV After-Market (EF$_c$)	Adhesives and Sealants (EF$_d$)	Pesticides and Herbicide (EF$_e$)	Coatings and Related (EF$_f$)	Miscellan-eous (EF$_g$)	Total Emission Factor (TEF) (kg yr^{-1} person^{-1})
Acrylic acid				1.79×10^{-9}				1.79×10^{-9}
Benzene			2.14×10^{-6}					2.14×10^{-6}
Chloroform			1.63×10^{-5}			4.33×10^{-4}		4.49×10^{-4}
1,2-Dichloroethane	2.10×10^{-6}	1.60×10^{-8}						2.12×10^{-6}
Dichloromethane		1.08×10^{-3}	2.19×10^{-3}	3.98×10^{-3}	3.09×10^{-4}	8.93×10^{-3}	1.08×10^{-5}	1.65×10^{-2}
Ethylbenzene		1.16×10^{-6}	3.41×10^{-5}	6.17×10^{-6}	5.89×10^{-4}	3.11×10^{-4}		9.42×10^{-4}
Ethylene oxide					6.85×10^{-3}			6.85×10^{-3}
Formaldehyde		3.06×10^{-6}		1.14×10^{-5}	1.73×10^{-4}	3.88×10^{-4}		5.75×10^{-4}
Ethylene glycol	6.89×10^{-6}	2.41×10^{-3}	1.22×10^{-2}	5.80×10^{-5}	2.56×10^{-2}	1.02×10^{-3}	1.10×10^{-4}	$4.14 * 10^{-2}$
Fluoride compounds		3.97×10^{-8}	6.39×10^{-6}					6.44×10^{-6}
n-Hexane		9.48×10^{-4}	1.60×10^{-3}	3.55×10^{-2}		1.08×10^{-3}		3.91×10^{-2}
Hydrochloric acid		7.94×10^{-7}						7.94×10^{-7}
Methanol	2.57×10^{-7}	3.02×10^{-4}	3.00×10^{-1}	3.09×10^{-3}	4.30×10^{-4}	7.26×10^{-3}	8.34×10^{-3}	3.19×10^{-1}
Methyl ethyl ketone	7.94×10^{-6}	2.04×10^{-4}	1.38×10^{-3}	1.77×10^{-2}	9.12×10^{-6}	3.60×10^{-3}	4.58×10^{-6}	2.29×10^{-2}
Methyl isobutyl ketone		4.90×10^{-5}	3.96×10^{-4}	5.62×10^{-4}	4.09×10^{-5}	2.39×10^{-3}		3.44×10^{-3}
Tetrachloroethylene		1.34×10^{-3}	1.07×10^{-2}	3.06×10^{-4}	8.71×10^{-5}	6.71×10^{-5}	3.42×10^{-4}	1.28×10^{-2}
Toluene	1.55×10^{-3}	2.64×10^{-4}	1.13×10^{-2}	3.82×10^{-2}		1.43×10^{-1}	1.12×10^{-6}	1.94×10^{-1}
Trichloroethylene		1.97×10^{-5}	1.21×10^{-4}	1.76×10^{-5}		6.23×10^{-5}		2.20×10^{-4}
Xylenes		1.49×10^{-3}	5.44×10^{-3}	4.43×10^{-3}	6.23×10^{-2}	1.84×10^{-2}	1.96×10^{-4}	9.21×10^{-2}
Total VOCs	1.52	0.52	0.90	0.38	1.17	0.62	0.04	5.15

Source: Eastern Research Group (1996), but total VOCs are adjusted to include non-reactive VOCs (USEPA 1995).

1.10 Sample Calculation

The sample calculations in this section relate to a single NPI substance. The calculations will therefore need to be repeated for each substance to derive the total inventory.

Example 1: Adjusting emission factors to account for control strategies

Adjustment is only necessary for control strategies implemented after 1998 (see Section 3.3). This example assumes that motor vehicle aftermarket products have been reformulated within a jurisdiction. This has led to an overall PFR of 15% for tetrachloroethylene.

Using Equation 2 and Table 2

$$
\begin{aligned}
AEF_c &= EF_c - [(EF_c * PFR) / 100] \\
&= 1.07 * 10^{-2} - [(1.07 * 10^{-2} * 15) / 100] \\
&= 1.07 * 10^{-2} - (1.61 * 10^{-3}) \\
&= 9.09 * 10^{-3} \text{ kg yr}^{-1} \text{ person}^{-1}
\end{aligned}
$$

This AEF would then replace the emission factor (EF_c) listed in Table 2. The TEF for tetrachloroethylene would then become

$$
\begin{aligned}
TEF_i &= \sum EF_i \\
&= (EF_a) + (EF_b) + (EF_c) + (EF_d) + (EF_e) + (EF_f) + (EF_g) \\
&= (0) + (1.34 * 10^{-3}) + (9.09 * 10^{-3}) + (3.06 * 10^{-4}) + (0.87 * 10^{-4}) + (0.67 * 10^{-4}) + (3.42 * 10^{-4}) \\
&= 1.12 * 10^{-2} \text{ kg yr}^{-1} \text{ person}^{-1}
\end{aligned}
$$

Example 2: Estimating emissions of NPI substances

Using Equation 1 and the above TEF for tetrachloroethylene (after adjustment), and assuming an airshed population of 3,400,000

$$
\begin{aligned}
E_i &= TEF_i * P \\
&= 1.12 * 10^{-2} * 3.4 * 10^{6} \\
&= 3.81 * 10^{4} \text{ kg yr}^{-1}
\end{aligned}
$$

Example 3: Spatially allocating emissions

Building on Example 2, the emissions of tetrachloroethylene from a grid cell containing 495 people are

$$
\begin{aligned}
E_{ij} &= E_i * P_j/P \\
&= 3.81*10^{4} * 495 / 3.4*10^{6} \\
&= 5.54 \text{ kg yr}^{-1}
\end{aligned}
$$

Uncertainty Analysis

1.11 Data Reliability

Population data is fundamental to the EET described in this manual. While ABS data are considered to be highly reliable, some uncertainty will be introduced if census data need to be adjusted for the relevant NPI reporting year. Accurate projections of population are very important to the technique.

1.12 Reliability of Emission Factors

The use of US per capita emission factors should produce emissions estimates of medium reliability for Australian conditions. However, because of the wide range of products (even in a particular product grouping) and the different solvents used in these products, the detailed speciation provided by these factors should be treated with some caution.

1.13 Problems and Issues Encountered

Aerosol data can be obtained from the Aerosol Association of Australia Inc. (AAAI), which would allow emissions to be estimated basing on consumption data. However, there are no equivalent data on solvent use in Australia, so overall US emission factors have to be used in the absence of more detailed information. In addition, the seven product categories listed in this manual cover a combination of both aerosol and solvent products and there is no easy way to account for the solvent use not covered by aerosol.

1.14 Recommendations for Further Work

The best method for determining emissions from domestic/commercial solvent and aerosol use would be to obtain detailed data on product sales, distribution and VOC content. While it would be possible to gather data on annual sales and composition for aerosol products, the time and effort required to extend this database to the solvents area would be significant, due to the wide range of products. Information would need to be collated from a number of sources including associations, suppliers and manufacturers.

Where the time, resources and expertise are available, it is recommended that some effort be spent on determining local sales and product composition data, at least for some of the main products addressed in this manual, and that attempts be made to verify some of the key US factors.

Also, there is limited data on the fate of VOCs in consumer products entering landfills. Appropriate adjustments to the recommended emission factors are therefore not possible at this time, but these factors should be adjusted if such data become available.

Glossary of Terms and Abbreviations

AAAI	Aerosol Association of Australia Inc.
ABS	Australian Bureau of Statistics
AE	Aggregated emissions
AEF	Adjusted emission factor
EET	Emissions estimation technique
EF	Emission factor
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NPI	National Pollutant Inventory
PFR	Product formulation reduction
QDEH	Queensland Department of Environment and Heritage
SEQT	South East Queensland Trial
TEF	Total emission factor
USEPA	United States Environmental Protection Agency
VOC	Volatile organic compound

References

Eastern Research Group (1996). "Consumer and Commercial Solvent Use", chapter in EIIP Document Series, vol III, United States Environment Protection Agency, Research Triangle Park, North Carolina, USA.

QDEH (1998). *Area-Based Emissions Estimation Workbook: Consumer and Commercial Solvent Use,* Queensland Department of Environment and Heritage.

USEPA (1995). *Compilation of Air Pollutant Emission Factors, vol I, Stationary Point and Area Sources*, AP-42, 5th edn, Research Triangle Park, North Carolina, USA.

Appendices

APPENDIX A: DOMESTIC AND COMMERCIAL PRODUCT GROUPS AND SUB-CATEGORIES

APPENDIX A
DOMESTIC AND COMMERCIAL PRODUCT GROUPS AND
SUB-CATEGORIES

Personal Care Products	**Household Products**
- Cosmetics and Hair Care Products - Deodorants and Antiperspirants - Fragrance Products - Powders - Nail Care Products - Facial and Body Treatments - Oral Care Products - Health Use Products	- Hard Surface Cleaners - Laundry Products - Fabric and Carpet Care Products - Dishwashing Products - Waxes and Polishes - Air Fresheners - Shoe and Leather Care Products - Miscellaneous Household Products
Motor Vehicle Aftermarket Products : Detailing - Car Washing Products and Waxes - Cleaners (glass, plexiglass, chrome, vinyl and upholstery) - Polishes (metal and fibreglass) - Protectants (rubber, vinyl and leather) - Rustproofing Compounds - Tyre Coatings and Paints - Insect and Tar Removers	**Motor Vehicle Aftermarket Products: Maintenance and Repair** - Radiator and Fuel Systems (coolants and antifreeze - Engine Cleaners, Degreasers and Starting Fluids - Motor Flush and Crankcase Cleaners - Transmission Sealers, Additives, Conditioners and Leak Stoppers - Lubricants - Windshield Washer Fluids
Adhesives and Sealants - Consumer Adhesives (cements, glues and pastes) - Sealants	**Coatings and Related Products** - Aerosol Spray Paints - Coating Related Products (e.g. paint removers)
Pesticides and Herbicides - Insecticides - Fungicides and Nematicides - Herbicides - Antimicrobial Agents - Other National Registration Authority (NRA) Regulated Products	**Miscellaneous Products** - Arts and Crafts Supplies - Non-pesticidal Veterinary and Pet Products - Pressurised Food Products

Source: QDEH (1998)