EUROPEAN COMMISSION
DIRECTORATE-GENERAL
Joint Research Centre

Institute for Health and Consumer Protection
European Chemicals Bureau
I-21020 Ispra (VA) Italy

ALKANES, C_{14-17}, CHLORO (MCCP)

Part I - Environment

CAS No: 85535-85-9

EINECS No: 287-477-0

Summary Risk Assessment Report

2005 **Special Publication I.05.70**

ALKANES, C_{14-17}, CHLORO (MCCP)

Part I – Environment

CAS No: 85535-85-9

EINECS No: 287-477-0

SUMMARY RISK ASSESSMENT REPORT

Final report, 2005

The United Kingdom

Rapporteur for the risk assessment of alkanes, C_{14-17}, chloro (MCCP) is the UK on behalf of the European Union. The scientific work on the environmental part was prepared by the Building Research Establishment Ltd. (BRE), under contract to the UK rapporteur.

Contact point:

Environment: Environment Agency
Chemicals Assessment Unit
Isis House, Howbery Park
Wallingford, Oxfordshire, OX10 8BD
e-mail: ukesrenv@environment-agency.gov.uk
Fax: +44 (0)1491 828 556

Human health: Health & Safety Executive
Industrial Chemicals Unit
Magdalen House, Stanley Precinct
Bootle, Merseyside L20 3QZ
e-mail: ukesrhh@hse.gsi.gov.uk
Fax: +44 (0)151 951 3308

Date of Last Literature Search:	**2003**
Review of report by MS Technical Experts finalised:	**2004**
Final report:	**2005**

(The last full literature survey was carried out in 2003 - targeted searches were carried out subsequently.)

PREFACE

This report provides a summary, with conclusions, of the risk assessment report of the substance alkanes, C_{14-17}, chloro (MCCP) that has been prepared by The United Kingdom in the context of Council Regulation (EEC) No. 793/93 on the evaluation and control of existing substances.

For detailed information on the risk assessment principles and procedures followed, the underlying data and the literature references the reader is referred to the comprehensive Final Risk Assessment Report (Final RAR) that can be obtained from the European Chemicals Bureau[1]. The Final RAR should be used for citation purposes rather than this present Summary Report.

[1] European Chemicals Bureau – Existing Chemicals – http://ecb.jrc.it

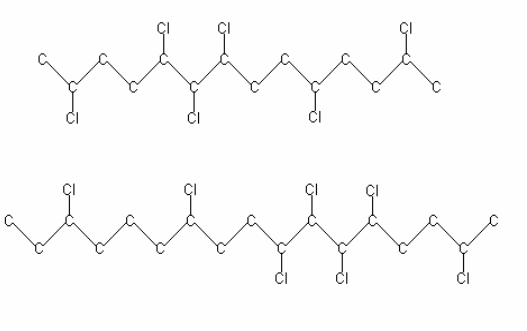
CONTENTS

TABLES

1 GENERAL SUBSTANCE INFORMATION

1.1 IDENTIFICATION OF THE SUBSTANCE

CAS Number: 85535-85-9
EINECS Number: 287-477-0
IUPAC Name: alkanes, C_{14-17}, chloro
Synonyms: chlorinated paraffin (C_{14-17}); chloroalkanes, C_{14-17}; chloroparaffin; chloroparaffine, C_{14-17}; medium-chain chlorinated paraffins; paraffine clorurate (C_{14-17}); paraffine clorurate a catena media.
Molecular weight: 233-827 g/mole
Molecular formula: $C_xH_{(2x-y+2)}Cl_y$, where x = 14-17 and y = 1-17
Structural formula:



$C_{14}H_{24}Cl_6$

$C_{17}H_{29}Cl_7$

The name medium-chain chlorinated paraffins (or MCCP) is used in this assessment.

1.2 PURITY/IMPURITIES, ADDITIVES

Commercial medium-chain chlorinated paraffin products contain a number of components with different carbon chain lengths within the C_{14} to C_{17} range and different amounts of chlorine, usually expressed as a percentage by weight (% wt. Cl). The purity of the chlorinated paraffin produced is related to the purity of the n-paraffin feedstock from which it is made. These feedstocks contain no more than 1-2% isoparaffins and <100 mg aromatics/kg. The medium-chain chlorinated paraffins may also contain <1% of chlorinated paraffins with chain lengths other than C_{14-17}.

Additives such as long-chain epoxidised soya oil or glycidyl ether are sometimes added at concentrations of <1% by weight in order to improve the stability of the product at elevated temperatures.

1.3 PHYSICO-CHEMICAL PROPERTIES

Medium-chain chlorinated paraffins are liquids at room temperature. The physico-chemical properties are summarised in **Table 1.1**.

Table 1.1 Summary of physico-chemical properties

Property	Chlorine content (% wt)	Value	Remarks
Physical state	40-63	liquid	
Pour point		-45 °C to 25 °C	commercial mixtures – no distinct melting point
Boiling point		>200 °C	decomposition with release of HCl
Density	41	1.095 g/cm^3 at 20°C	
	56	1.315 g/cm^3 at 20°C	
	40-58	1.1-1.38 g/cm^3 at 25°C	
	56	1.28-1.31 g/cm^3 at 60°C	
Vapour pressure	45	$2.27 \cdot 10^{-3}$ Pa at 40°C	a value of $2.7 \cdot 10^{-4}$ Pa at 20°C is used in the Environmental Assessment
		0.16 Pa at 80°C	
	52	$1.3 \cdot 10^{-4}$-$2.7 \cdot 10^{-4}$ Pa at 20°C	
		$1.07 \cdot 10^{-3}$ Pa at 45°C	
		$6.0 \cdot 10^{-3}$ Pa at 60°C	
		0.051 Pa at 80°C	
Water solubility	51	0.005-0.027 mg/l	a value of 0.027 mg/l is used in the Environmental Assessment
Log octanol-water partition coefficient	45	5.52-8.21	measured by a high performance thin layer chromatography method; a value of 7 is used in the Environmental Assessment
	52	5.47-8.01	
Flash point	>40	>210°C	closed cup
Autoflammability		not stated	
Explosivity		not applicable	
Oxidising properties		none	

Ntp Normal temperature and pressure

1.4 CLASSIFICATION

The following classification is proposed for environmental effects:

N – Dangerous for the environment

R50/53 – Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

This proposal is based on the acute toxicity seen with *Daphnia magna* (48-hour EC_{50} = 0.0059 mg/l), a high fish bioconcentration factor of 1,087 and the lack of degradation expected in standard ready biodegradation tests. This proposal was agreed at the Environmental Classification and Labelling Expert Meeting in September 2004.

2 GENERAL INFORMATION ON EXPOSURE

Production

Medium-chain chlorinated paraffins are currently manufactured at five sites in the EU (although it is understood that there is now a sixth production site following the recent enlargement of the EU). The current total production capacity given in IUCLID is in the range 45,000-160,000 t/year.

Uses

The total EU consumption of medium-chain chlorinated paraffins was between 56,700 and 65,300 t/year over the period 1994-1997. The main uses are as plasticisers/flame retardants in PVC (~79-83% of use), additives in metal cutting/working fluids (5-9% of use), plasticisers/flame retardants for paints and sealants (4-5% of use), plasticisers/flame retardants for rubber and polymers other than PVC (3-4% of use), components of leather fat liquors (2-3% of use) and as a carrier solvent in carbonless copy paper (1-2% of use).

3 ENVIRONMENT

3.1 ENVIRONMENTAL EXPOSURE

Environmental Releases

The assessment considers emissions from the production of medium-chain chlorinated paraffins based on information from the producers. It also covers emissions from use of medium-chain chlorinated paraffins in production of PVC, formulation and use of metal cutting/working fluids, formulation and use of paints and sealants, production of rubber and polymers other than PVC, formulation and use in leather fat liquors and recycling of carbonless copy paper. The emissions from PVC/polymers, paints and sealants are also considered over their service life and at disposal. The total worst case EU emissions of medium-chain chlorinated paraffin from these processes are estimated to be around 171-172 t/year to air, 1,263-1,309 t/year to waste water treatment plants, 816-885 t/year direct to surface water and 826-973 t/year to urban/industrial soil.

Environmental fate

The main characteristics of medium-chain chlorinated paraffins relevant for the exposure assessment are that the substance is not expected to hydrolyse in water, is not readily or inherently biodegradable, has a high log Kow value (~5.5-8.2), and has an estimated atmospheric half-life of 2 days. The high log Kow indicates that medium-chain chlorinated paraffins will adsorb strongly onto sludge and sediments and are not expected to be mobile in soil. Bioconcentration factors up to 1,087 l/kg have been determined in rainbow trout. Uptake from food into fish and from soil into earthworms and plants has also been demonstrated. A bioconcentration factor of up to 5.6 has been determined for accumulation in worms from soil.

The predicted fate of medium-chain chlorinated paraffins in waste water treatment plants is 93% adsorbed onto sludge and 7% released in water. Thus, when emitted to a water treatment plant the emissions from the plant will occur to water or to land via sewage sludge application.

Environmental concentrations

The methods in the Technical Guidance document were used to estimate concentrations in water, sediment, air, soil and biota (fish and earthworms). **Table 3.1** shows the PECs calculated for the various stages of the lifecycle of medium-chain chlorinated paraffins. For production, the PECs are based on site specific information. For the other lifecycle steps, the PECs are estimated using a combination of some industry-specific information, supplemented with default values from the Technical Guidance Document. The calculated levels in air were very low for all lifecycle states and are not presented here. The regional concentrations for surface water, sediment and agricultural soil are based on the available environmental monitoring data for the EU.

There are measurements of the levels of medium-chain chlorinated paraffins in surface waters, sediment and soil related to industrial activity. The local levels predicted for the sediment compartment are in good agreement with the measured levels.

3.2 EFFECTS ASSESSMENT

There is a complete 'base set' of acute toxicity data for medium-chain chlorinated paraffins; there are short term $L(E)C_{50}$ studies from each of three trophic levels (fish, *Daphnia* and algae) and also reliable long-term no observed effect concentrations for *Daphnia* and algae. The most sensitive NOEC was 0.010 mg/l from a 21-day multigenerational study on *Daphnia magna*. In addition, a comparison of the data set for medium-chain chlorinated paraffins with that for a similar substance (short-chain chlorinated paraffins) indicated that that the NOEC for medium-chain chlorinated paraffin from a standard fish early lifestage study is unlikely to be lower than the NOEC obtained in the 21-day *Daphnia* study. Therefore, applying an assessment factor of 10 to the *Daphnia* NOEC gives a $PNEC_{water}$ of 1 µg/l for surface water.

Medium-chain chlorinated paraffins appear to be of low toxicity to microorganisms. The lowest concentration reported to be toxic over a 24 hour period was 800 mg/l. Applying an assessment factor of 10 to this gives a $PNEC_{micro\text{-}organisms}$ of 80 mg/l.

Sediment toxicity data are also available for medium-chain chlorinated paraffins. The lowest NOEC from three prolonged toxicity studies was 50 mg/kg wet wt. obtained both in a study with *Lumbriculus variegatus* and a study with *Hyalella azteca*. Applying an assessment factor of 10 to this value gives a $PNEC_{sediment}$ of 5 mg/kg wet wt.

PNEC for the terrestrial compartment

Terrestrial toxicity data are available for plants, earthworms and soil microorganisms. The lowest NOEC from prolonged studies was 248 mg/kg wet wt. for the earthworm *Eisenia fetida*. The Technical Guidance indicates that, for soil organisms, the NOEC should be normalised to the organic carbon content used in the Technical Guidance (2%), leading to a normalised NOEC of 106 mg/kg wet wt. Applying an assessment factor of 10 to this value gives a $PNEC_{soil(standard)}$ of 10.6 mg/kg wet wt.

Atmospheric compartment

The predicted levels of medium-chain chlorinated paraffins are very low, and reflect the low, but measurable, volatility of the substance. Therefore, neither biotic nor abiotic effects are likely. Some components of the commercial medium-chain chlorinated paraffin products may have properties that mean that long-range transport via the atmosphere is a possibility. This issue should be considered further in the appropriate international fora.

Secondary poisoning

The lowest NOAEL from mammalian studies was 5 mg/kg food from a 90-day feeding study with rats. Using this value and an assessment factor of 30 gives a $PNEC_{oral}$ of 0.17 mg/kg food. It should be noted that the dose-response curve for this study was shallow, and the effects seen at the next highest concentration tested (50 mg/kg food) were slight (based on this concentration a $PNEC_{oral}$ of 1.7 mg/kg food could be derived). However, similar conclusions are reached for secondary poisoning even if a $PNEC_{oral}$ of 1.7 mg/kg food is used.

Table 3.1 Summary of PECs and PEC/PNEC ratios estimated for medium-chain chlorinated paraffins

Media	Release source	PEC	PEC/PNEC ratio
Surface water	Production sites	0.10-0.27 μg/l	0.10-0.27
	Use in PVC – plastisol coating	0.15-0.49 μg/l	0.15-0.49
	Use in PVC – extrusion/other	0.18-1.59 μg/l	0.18-1.6
	Use in rubber/plastics other than PVC	0.19-0.48 μg/l	0.19-0.48
	Formulation of sealants	negligible	<1
	Formulation of paints	0.38 μg/l	0.38
	Industrial application of paints	0.21 μg/l	0.21
	Domestic application of paints	0.10 μg/l	0.10
	Formulation of metal cutting/working fluids	1.64 μg/l	1.6
	Use of oil-based metal working fluids	0.66-0.71 μg/l	0.66-0.71
	Use of emulsifiable fluids	0.15 μg/l 46.6 μg/l[a]	0.15 47[a]
	Formulation of leather fat liquors	0.29 μg/l	0.29
	Use of leather fat liquors	1.77-6.79 μg/l	1.8-6.8
	Recycling of carbonless copy paper	0.43	0.43
	Regional sources	0.1 μg/l	0.10
Sediment	Production sites	1.28-3.46 mg/kg wet wt.	0.26-0.69
	Use in PVC - plastisol coating	1.88-6.27 mg/kg wet wt.	0.38-1.3
	Use in PVC - extrusion/other	2.3-20.4 mg/kg wet. wt.	0.46-4.1
	Use in rubber/plastics other than PVC	2.38-6.14 mg/kg wet wt.	0.48-1.2
	Formulation of sealants	negligible	<1
	Formulation of paints	4.86 mg/kg wet wt.	0.97
	Industrial application of paints	2.69 mg/kg wet wt.	0.54
	Domestic application of paints	1.28 mg/kg wet wt.	0.26
	Formulation of metal cutting/working fluids	21.0 mg/kg wet wt.	4.2
	Use of oil-based metal working fluids	8.45-9.09 mg/kg wet wt.	1.7-1.8
	Use of emulsifiable fluids	1.92 mg/kg wet wt. 11.7 or 597[a] mg/kg wet wt.	0.38 2.3 or 119[a]
	Formulation of leather fat liquors	3.71 mg/kg wet wt.	0.74
	Use of leather fat liquors	22.7-86.9 mg/kg wet wt.	4.5-17.4
	Recycling of carbonless copy paper	5.50 mg/kg wet wt.	1.1
	Regional sources	0.7 mg/kg wet wt.	0.14
Agricultural soil	Production sites	negligible	<1
	Use in PVC - plastisol coating	0.51-3.64 mg/kg wet wt.	0.05-0.34
	Use in PVC - extrusion/other	0.81-13.6 mg/kg wet wt.	0.08-1.3

Table 3.1 continued overleaf

Table 3.1 continued Summary of PECs and PEC/PNEC ratios estimated for medium-chain chlorinated paraffins

Media	Release source	PEC	PEC/PNEC ratio
Agricultural soil	Use in rubber/plastics other than PVC	0.87-3.5 mg/kg wet wt.	0.08-0.33
	Formulation of sealants	negligible	<1
	Formulation of paints	2.62 mg/kg wet wt.	0.25
	Industrial application of paints	1.08 mg/kg wet wt.	0.10
	Domestic application of paints	negligible	<1
	Formulation of metal cutting/working fluids	14.1 mg/kg wet wt.	1.3
	Use of oil-based metal working fluids	5.15-5.66 mg/kg wet wt.	0.48-0.53
	Use of emulsifiable fluids	0.51 mg/kg wet wt. 46[a] mg/kg wet wt.	0.05 4.3[a]
	Formulation of leather fat liquors	1.78 mg/kg wet wt.	0.17
	Use of leather fat liquors	15.3-60.8 mg/kg wet wt.	1.4-5.7
	Recycling of carbonless copy paper	3.02 mg/kg wet wt.	0.28
	Regional sources	0.088mg/lg wet wt.	0.008
Secondary poisoning - fish	Production sites	0.11-0.76 mg/kg	0.64-4.5
	Use in PVC - plastisol coating	0.13-1.12 mg/kg	0.76-6.6
	Use in PVC - extrusion/other	0.14-3.08 mg/kg	0.82-18
	Use in rubber/plastics other than PVC	0.15-1.12 mg/kg	0.88-6.6
	Formulation of sealants	negligible	<1
	Formulation of paints	0.23-0.92 mg/kg	1.4-5.4
	Industrial application of paints	0.16-0.64 mg/kg	0.94-3.8
	Domestic application of paints	negligible	<1
	Formulation of metal cutting/working fluids	0.80-3.20 mg/kg	4.7-19
	Use of oil-based metal working fluids	0.36-1.52 mg/kg	2.1-8.9
	Use of emulsifiable fluids	0.13-0.52 mg/kg 0.52-2.08 mg/kg[a]	0.76-3.1 3.1-12[a]
	Formulation of leather fat liquors	0.19-0.76 mg/kg	1.1-4.5
	Use of leather fat liquors	0.86-12.4 mg/kg	5.1-73
	Recycling of carbonless copy paper	0.23-0.92 mg/kg	1.4-5.4
Secondary poisoning - earthworm	Production sites	negligible	<1
	Use in PVC - plastisol coating	1.7-10.4 mg/kg	10.0-61.2
	Use in PVC - extrusion/other	2.5-38.3 mg/kg	14.7-225

Table 3.1 continued overleaf

Table 3.1 continued Summary of PECs and PEC/PNEC ratios estimated for medium-chain chlorinated paraffins

Media	Release source	PEC	PEC/PNEC ratio
Secondary poisoning - earthworm	Use in rubber/plastics other than PVC	2.7-10.0 mg/kg	15.9-58.8
	Formulation of sealants	negligible	<1
	Formulation of paints	7.6 mg/kg	44.7
	Industrial application of paints	3.3 mg/kg	19.4
	Domestic application of paints	negligible	<1
	Formulation of metal cutting/working fluids	39.7 mg/kg	234
	Use of oil-based metal working fluids	14.7-16.1 mg/kg	86.4-94.7
	Use of emulsifiable fluids	1.7 mg/kg 129 mg/kg[a]	10.0 759[a]
	Formulation of leather fat liquors	5.2 mg/kg	30.6
	Use of leather fat liquors	43.0-171 mg/kg	253-1,006
	Recycling of carbonless copy paper	8.8 mg/kg	51.6

a) Intermittent release scenario. Assumes disposal to sewer of cutting fluid at end of useful life.

3.3 RISK CHARACTERISATION

Aquatic compartment (incl. sediment)

The worst case PEC/PNEC ratios are summarised in **Table 3.1**. For surface water, the PEC/PNEC ratios indicate a significant risk to freshwater organisms from some local sources. Risk reduction measures are required with respect to surface water for the following areas:

- Use in the production of PVC in some processes (particularly where compounding or compounding and conversion is carried out in partially open systems).
- Formulation of metal cutting fluids, and use in emulsifiable metal cutting/working fluids where the spent fluid is discharged to waste water.
- Use in leather fat liquors.

The PEC/PNEC ratios for waste water treatment are <1 for all scenarios considered, indicating no concern for the functioning of waste water treatment plants.

For the sediment compartment, the PEC/PNEC ratios are >1 for several scenarios. These indicate that risk reduction measures are needed with respect to sediment for the following areas:

- Use in PVC: plastisol coating - sites carrying out conversion or both compounding and conversion.
- Use in PVC: extrusion/other - sites carrying out compounding in partially open processes or sites carrying out both compounding and conversion in open, partially open or closed processes.
- Use in PVC: extrusion/other - sites carrying conversion in open, partially open or closed processes.
- Use in rubber/other plastics - sites carrying out conversion or both compounding and conversion.
- Use in metal cutting/working fluids: formulation sites.
- Use in metal cutting/working fluids: use in oil-based fluids at large and small sites.

- Use in metal cutting/working fluids: use in emulsifiable fluids at sites with intermittent release (disposal) to sewer/drain.
- Use in leather fat liquors: use at sites carrying out processing of hides/leather.
- Use in carbonless copy paper: sites carrying out paper recycling.

Terrestrial compartment

The PEC/PNEC ratio for several local scenarios is >1, indicating that risk reduction measures are required with respect to the terrestrial compartment for the following local sources:

- Use in PVC: extrusion/other - sites carrying our both compounding and conversion using partially open systems.
- Use in metal cutting/working fluids: formulation sites.
- Use in metal cutting/working fluids: use in emulsifiable fluids at sites with intermittent release (disposal) to sewer/drain.
- Use in leather fat liquors: use at sites carrying out processing of hides/leather.

In these cases, the major source of release to soil is predicted to come from the spreading of sewage sludge onto agricultural land.

The regional assessment of "waste remaining in the environment" also indicates a possible risk to industrial soil. The major source of release to soil in this scenario is direct particulate release to industrial soil. There are, however, many uncertainties inherent in this scenario.

Atmosphere

Neither biotic nor abiotic effects are likely because of the low volatility and low atmospheric concentrations of medium-chain chlorinated paraffins. One possible area of concern is with regard to their possible long-range transport. This issue should be considered further in the appropriate international fora.

Secondary poisoning

For the aquatic (fish) food chain, most of the scenarios considered give a PEC/PNEC ratio >1, indicating that risk reduction measures are needed for the following sources:

- Production sites.
- Use in the production of PVC – plastisol coating.
- Use in the production of PVC – extrusion/other.
- Use in the production of plastic/rubber.
- Formulation of paints and industrial application of paints.
- Formulation and use of metal cutting/working fluids (all types).
- Formulation and use in leather fat liquors.
- Recycling of carbonless copy paper.

For the terrestrial (earthworm) food chain, the PEC/PNEC ratios are >1 for all of the scenarios with the exception of production sites (where no sewage sludge is applied to land), formulation and use of sealants and domestic application of paints. Risk reduction measures are needed for all other applications.

4 HUMAN HEALTH

(To be added later)

5 RESULTS

5.1 INTRODUCTION

Medium-chain chlorinated paraffins are produced at five sites in the EU. The main area of use is as a secondary plasticiser in PVC, but substantial amounts are also used in other plastics/rubber products, sealants, paints, metal cutting/working fluids, leather fat liquors and carbonless copy paper. They are viscous liquids of very low volatility.

5.2 ENVIRONMENT

Medium-chain chlorinated paraffins have a high acute toxicity towards aquatic organisms, a high fish bioconcentration factor and are poorly degradable. For surface water, the estimated PEC/PNEC ratios are >1 for several of the life-stages of medium-chain chlorinated paraffins, and so a risk to surface water exists from some uses of medium-chain chlorinated paraffins. The risk to surface water from regional sources is low.

The PEC/PNEC ratios obtained for sediment also indicate a risk to the environment from several of the local scenarios considered. The regional PEC/PNEC ratio is currently <1, indicating a low risk to the environment from regional sources.

No risk to the environment is identified from the assessment of waste water treatment plants or the atmosphere.

For the soil compartment the PEC/PNEC ratios are >1 for four of the local scenarios. When the emissions of "waste remaining in the environment" to urban/industrial soil are considered, the predicted regional PEC/PNEC ratio would be >1 for that type of soil.

For secondary poisoning, almost all uses of medium chain chlorinated paraffins lead to a possible risk of secondary poisoning via the earthworm food chain and many of these uses also indicate a risk via the fish food chain. No risk of secondary poisoning was identified from formulation and use in sealants and domestic application of paints.

Conclusion (ii) There is at present no need for further information and/or testing and no need for risk reduction measures beyond those which are being applied already.

A low risk to waste water treatment plants and the atmospheric compartment[2] have been identified from both the production and use of medium-chain chlorinated paraffins.

For surface water, this conclusion currently applies to the assessment of local releases from production sites, some PVC compounding and/or conversion sites, plastics/rubber compounding sites, formulation and use of sealants, formulation and use in paints, use in metal cutting/working fluids (except where spent emulsifiable fluid is discharged to waste water), formulation of leather fat liquors, recycling of carbonless copy paper and from regional sources.

For sediment, this conclusion currently applies to the assessment of local release from production sites, some use in PVC (compounding in open and closed systems), some uses in plastics/rubber (compounding), formulation and use of sealants, formulation and use in paints,

[2] Some components of the commercial products might have properties that may mean that long-range transport via the atmosphere is a possibility. This issue should be considered further in the appropriate international fora.

use in emulsifiable metal cutting/working fluids (except where intermittent disposal to drain occurs), formulation of leather fat liquors and from regional sources.

For soil, this conclusion applies to the assessment of local releases from production sites, PVC plastisol coatings compounding, conversion or combined compounding/conversion sites, PVC extrusion/other compounding sites, PVC extrusion/other conversion sites and PVC extrusion/other combined compounding/conversion sites using open or closed processes, plastics/rubber compounding, conversion and combined compounding/conversion sites, formulation and use of sealants, formulation and use of paints, use in oil-based metal cutting/working fluids, use in emulsifiable metal cutting/working fluids (not intermittent release scenario), formulation of leather fat liquors,, recycling of carbonless copy paper and from regional sources on agricultural land.

For secondary poisoning via the fish food chain, a low risk was identified from formulation and use of sealants, domestic application of paints. A low risk of secondary poisoning via the earthworm food chain is also indicated for production (sites where no application of sewage sludge onto land occurs), formulation and use in sealants, and domestic application of paints.

Conclusion (iii) There is a need for limiting the risks; risk reduction measures which are already being applied shall be taken into account.

For surface water, a risk is identified from the following applications:

- Use in the production of PVC in some processes (particularly where compounding or compounding and conversion is carried out in partially open systems).
- Formulation of metal cutting fluids, and use in emulsifiable metal cutting/working fluids where the spent fluid is discharged to waste water.
- Use in leather fat liquors.

For sediment, a risk is identified from the following applications:

- Use in PVC: plastisol coating – conversion sites or sites carrying out both compounding and conversion.
- Use in PVC: extrusion/other – compounding sites using partially open processes or sites carrying out both compounding and conversion using open, partially open or closed processes.
- Use in PVC: extrusion/other – conversion sites using open, partially open or closed processes.
- Use in plastics/rubber: sites carrying out conversion or both compounding and conversion.
- Use in metal cutting/working fluids: formulation sites.
- Use in metal cutting/working fluids: use in oil-based fluids at large and small sites.
- Use in metal cutting/working fluids: use in emulsifiable fluids at sites with intermittent release (disposal) to sewer/drain.
- Use in leather fat liquors: use at sites carrying out processing of hides/leather.
- Use in carbonless copy paper: sites carrying out paper recycling.

For the terrestrial compartment, a risk is identified from:

- Use in PVC: extrusion/other - sites carrying out both compounding and conversion using partially open systems.
- Use in metal cutting/working fluids: formulation sites.

- Use in metal cutting/working fluids: use in emulsifiable fluids at sites with intermittent release (disposal) to sewer/drain.
- Use in leather fat liquors: use at sites carrying out processing of hides/leather.
- Regional assessment of "waste remaining in the environment".

For secondary poisoning, a risk is identified from all uses of medium-chain chlorinated paraffins for the earthworm food chain (other than for production (sites where there is no spreading of sewage sludge to land), formulation and use of sealants, and domestic application of paints). The following scenarios also indicate a concern for the fish food chain:

- Production sites.
- Use in the production of PVC - plastisol coating.
- Use in the production of PVC – extrusion/other.
- Use in the production of plastic/rubber.
- Formulation of paints and industrial application of paints.
- Formulation and use in metal cutting/working fluids (all types).
- Formulation and use in leather fat liquors.
- Recycling of carbonless copy paper.