

Dicofol¹



OSPAR Commission 2002

¹ Secretariat's note: A review statement on dicofol (Publication 352a/2008) was adopted in 2008, highlighting new developments since the adoption of the Background Document.

The Convention for the Protection of the Marine Environment of the North-East Atlantic (the “OSPAR Convention”) was opened for signature at the Ministerial Meeting of the former Oslo and Paris Commissions in Paris on 22 September 1992. The Convention entered into force on 25 March 1998. It has been ratified by Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, Netherlands, Norway, Portugal, Sweden, Switzerland and the United Kingdom and approved by the European Community and Spain.

La Convention pour la protection du milieu marin de l'Atlantique du Nord-Est, dite Convention OSPAR, a été ouverte à la signature à la réunion ministérielle des anciennes Commissions d'Oslo et de Paris, à Paris le 22 septembre 1992. La Convention est entrée en vigueur le 25 mars 1998. La Convention a été ratifiée par l'Allemagne, la Belgique, le Danemark, la Finlande, la France, l'Irlande, l'Islande, le Luxembourg, la Norvège, les Pays-Bas, le Portugal, le Royaume-Uni de Grande Bretagne et d'Irlande du Nord, la Suède et la Suisse et approuvée par la Communauté européenne et l'Espagne.

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EXECUTIVE SUMMARY

Dicofol belongs to a group of chlorinated hydrocarbons and is produced from DDT; its chemical structure is therefore related to DDT and it has similar properties. The main source of dicofol in the environment is its use as a plant protection product; a miticidal pesticide and acaricide used on a wide variety of fruits, vegetables, ornamentals and field crops. Dicofol is very toxic to aquatic organisms, highly bioaccumulative and degrades moderately slowly in soil and sediments. It also possibly has endocrine-disrupting properties. There is an indication that dicofol is transported through the air and may effect the North East Atlantic from sources outside the OSPAR area. Dicofol was included in the OSPAR List of Chemicals for Priority Action in 2000.

A total amount of over 2 700 tonnes of dicofol is used around the world each year. European production amounts to 1 500-1 800 tonnes per year in one factory in Spain. All dicofol is formulated in one plant in Italy. The use of dicofol is mainly registered in Southern European countries. The current use of dicofol in Western Europe is 290 tonnes per year.

Monitoring data of dicofol in Europe is rather scarce. In a Californian catchment area where dicofol is used, river water had concentrations with peaks of 2,5 ng/l; sediments contained 23,7 ng/l and benthic clam, *Corbila fluminea*, had concentrations of 97 ng/g, which was 15% of the amount of DDT accumulated in the same species. Other monitoring studies in the USA showed 0,1 mg/kg in aquatic invertebrates and 0,05-0,1 mg/kg in fish. In an important agricultural area in Spain dicofol was monitored in river water. In Greece, maximum concentrations of 2,2 µg/kg were found in sediments; however the concentration in river water was less than 0,1 µg/l.

Although dicofol is not authorised by several Contracting Parties, there is no ban or restriction at Community level. The use is only allowed in Belgium, France, Portugal and Spain. Further developments in the use will depend on whether dicofol will be included in Annex I of Council Directive 91/414/EEC concerning the placing on the market of plant protection products. No notifications have been made for inclusion of dicofol into any of the annexes of the Biocides Directive 98/8/EC and therefore biocidal products containing dicofol can no longer be authorised by EU Member States.

The action recommended is: where marketing is permitted to consider to cancel authorisations; to review the situation with respect to dicofol in 2005 when a complete dossier under Council Directive 91/414/EEC is available; to require that dicofol should be tested in accordance with agreed guidelines for detecting endocrine-disrupting potential in case a decision to include dicofol on Annex I of Council Directive 91/414/EEC were to be taken; and to ask other relevant international forums to take account of this background document and consider coordinated efforts by Contracting Parties in UNECE-LRTAP and UNEP POPs Convention.

A monitoring strategy for dicofol has been added to this background document.

RECAPITULATIF

Le dicofol appartient à un groupe d'hydrocarbures chlorés et est obtenu à partir du DDT ; sa structure chimique est donc liée à celle du DDT et il possède des propriétés analogues à celles du DDT. La principale source du dicofol présent dans l'environnement tient à son utilisation comme produit phytosanitaire, à savoir comme pesticide miticide et comme acaricide répandu sur une grande diversité de fruits, légumes, plantes ornementales et cultures de plein champ. Le dicofol est très toxique pour les organismes aquatiques, est hautement bioaccumulatif, et se dégrade assez lentement dans le sol et les sédiments. Il possède peut-être aussi des propriétés de perturbation du système endocrinien. Certains indices donnent à penser que le dicofol est transporté dans l'atmosphère et qu'il est susceptible d'avoir des effets dans l'Atlantique du nord-est, en provenant de sources extérieures à la zone OSPAR. En 2000, le dicofol a été inscrit sur la Liste OSPAR des produits chimiques devant faire l'objet de mesures prioritaires.

La consommation mondiale annuelle de dicofol est de 2700 tonnes. La production européenne annuelle représente entre 1500 et 1800 tonnes, et est assurée par une usine située en Espagne. Tout le dicofol est fabriqué dans une installation en Italie. On constate que pour l'essentiel, le dicofol est employé dans le sud de l'Europe. La consommation actuelle de dicofol en Europe occidentale est de 290 tonnes par an.

Les données issues de la surveillance du dicofol en Europe sont assez rares. Dans un bassin hydrographique californien où le dicofol est utilisé, l'eau fluviale présentait des crêtes de teneurs de 2,5 ng/l ; la teneur dans les sédiments était de 23,7 ng/l, tandis que chez la palourde benthique, *Corbila fluminea*, les teneurs étaient de 97 ng/g, soit 15% de la quantité totale de DDT accumulé par la même espèce. D'autres études de surveillance effectuées aux Etats-Unis ont mis en évidence des teneurs de 0,1 mg/kg chez des invertébrés aquatiques et entre 0,05 et 0,1 mg/kg chez le poisson. Dans une importante région agricole de l'Espagne, l'on a contrôlé le dicofol dans l'eau des cours d'eau. En Grèce, l'on a constaté que les teneurs atteignaient au maximum 2,2 µg/kg dans les sédiments ; en revanche, dans l'eau des cours d'eau, les teneurs étaient inférieures à 0,1 µg/l.

Bien que le dicofol ne soit pas autorisé par plusieurs des Parties contractantes, aucune interdiction ni restriction n'est imposée au niveau communautaire. Son emploi n'est autorisé qu'en Belgique, en France, au Portugal et en Espagne. L'évolution de la consommation dépendra du fait que le dicofol sera inscrit ou non à l'Annexe I de la Directive 91/414/CEE du Conseil, relative à la mise sur le marché des produits phytosanitaires. Aucune notification n'a été faite dans le but de faire figurer le dicofol dans l'une quelconque des annexes à la Directive 98/8/CE relative aux biocides, et de ce fait, les produits biocides contenant du dicofol ne peuvent plus être autorisés par les Etats membres de l'Union européenne.

Mesures recommandées : là où sa commercialisation est autorisée, envisager d'annuler les autorisations ; revoir la situation du dicofol en 2005, lorsqu'un dossier complet, tel que prévu par la Directive 91/414/CEE du Conseil sera disponible ; exiger que le dicofol soit testé conformément à des lignes directrices convenues, afin de déterminer son potentiel de perturbation du système endocrinien au cas où il s'agirait de prendre une décision sur l'inscription du dicofol à l'Annexe I de la Directive 91/414/CEE du Conseil ; et demander à d'autres instances internationales compétentes de tenir compte du présent document de fond, ainsi qu'envisager de coordonner les efforts accomplis par les Parties contractantes dans le contexte de la Convention UNECE-LRTAP et de la Convention du PNUE sur les POP.

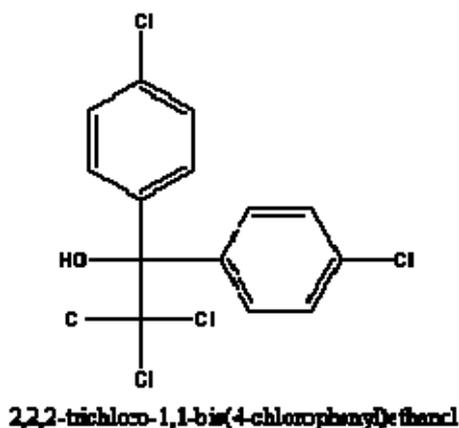
Une stratégie de surveillance sur le dicofol a été ajoutée à ce document de fond.

1 IDENTIFICATION OF ALL SOURCES OF DICOFOL AND ITS PATHWAYS TO THE MARINE ENVIRONMENT

1.1 Substance

Dicofol (CAS name: 1,1-bis(4'-chlorophenyl)2,2,2-trichloroethanol; CAS No 115-32-2) was identified as one of the chemicals for priority action at the meeting of the OSPAR Commission held in Copenhagen 26-30 June 2000 (Annex 2 of the OSPAR Strategy with regard to Hazardous Substances as updated from time to time). Dicofol is an organochlorine pesticide manufactured from DDT by hydroxylation or from cloral (trichloroacetaldehyde; CAS 75-87-6), monochlorobenzene and oleum (SO₃ + H₂SO₄). The active ingredient is an organochlorine alcohol consisting of about 80 % p,p'-dicofol and 20 % o,p'-dicofol.

Dicofol was selected on the OSPAR 1998 list of candidate substances based on the reference list of substances agreed by the Third North Sea Ministerial Conference (Annex 1D of the Hague Declaration) and based on the OSPAR List of Potential Endocrine Disruptors (see Annex 3 of the OSPAR Strategy with regard to Hazardous Substances). Dicofol is very toxic to aquatic organisms, highly bioaccumulating and primary degrades moderately slowly in soil. There is no data available on mineralisation nor properties of metabolites.



During the production of dicofol from DDT, DDT and DDT related compounds are formed as impurities. Council Directive 79/117/EEC of 21 December 1978 amended by Council Directive 90/533/EEC prohibits the use and marketing of products containing less than 78 % p,p'-dicofol or more than 0,1 % of DDT or DDT related compounds.

Based on US-EPA regulations, the marketing of dicofol with more than 0,1 % DDT was prohibited in 1.1.1989 and the use in 31.3.1989 (Clark, 1990).

DDT is one of the chemicals characterised as persistent organic pollutants (POP) and is highly restricted by the global UNEP Stockholm Convention on Persistent Organic Pollutants. However, its use as a site-limited closed-system intermediate in the dicofol production is allowed.

1.2 Identification of sources

The main source of dicofol identified in the environment is the use as a plant protection product; a miticidal pesticide and acaricide used on a wide variety of fruits, vegetables, ornamentals and field crops.

It is unknown whether dicofol is currently used as a biocidal product (indoor use) in any of the OSPAR countries. It is, however, for the implementation of the Biocide Directive 98/8/EC preliminarily identified

by the European Chemical Bureau as a biocide that has been on the European market before 14.5.2000. Based on this identification, the chemical industry has been in a position to notify before July 2002 its interest for future marketing of dicofol as a biocide.

There is an indication that dicofol may be transported from its sources through the air far. Therefore existing use of dicofol outside the OSPAR region may cause pollution of the North East Atlantic.

2 QUANTIFICATION OF SOURCES AND ASSESSMENT OF THE EXTENT OF THE PROBLEMS AND EXISTING MONITORING DATA

2.1 Production and import of dicofol

A total amount of more than 2 700 tonnes of dicofol is used around the world annually. A European manufacturer produces about 1 500-1 800 tonnes/year. A summary table of the annual consumption of dicofol is presented below (Table 1) and it includes production from all manufacturers, not only Rohm and Haas (Rohm and Haas, 2001).

Table 1 Annual consumption of dicofol in the world

Region	Active ingredient treated area (in 1000 ha)	Active ingredient volume (in 1000 kg)
Western Europe	653,23	290,00
Africa and Middle East	322,94	177,64
Asia	5 311,42	1 814,71
North America	212,50	289,95
South America	221,35	166,49
Total	6 721,44	2 738,79

1500 tonnes of dicofol are produced annually in a plant in North-East Spain. It is sent to Italy for processing. Rohm and Haas manufactures all their technical dicofol in their own plant, located at Mozzanica BG, Italy. This is the only currently known formulation plant in Europe. Dicofol is mainly registered in Southern Europe, in Portugal, Spain, France, Italy and Greece. It is also registered in Belgium (but virtually not sold) (Rohm and Haas, 2001) and in the UK and Ireland. The European manufacturer assumes that some other dicofol might also be on the European market, coming from India or China, which is not produced or registered by Rohm and Haas.

2.2 Use of dicofol

Rohm and Haas's current registrations in Europe include the following edible crops: table grapes, wine grapes, citrus fruits, cucurbits and tomatoes. In all these cases there is one application per growing season. There is also a minimal use on cotton and ornamentals, in both cases also one application per season. Based on the data given by Rohm and Haas, the average usage rate is 0,44 kg per hectare.

Finland has sent an inquiry on the use of dicofol to all OSPAR Contracting Parties and CEFIC. The information asked for was:

- the amounts used and sold of dicofol as a pesticide/biocide;
- other type of uses;
- possible restrictions on use;
- all existing monitoring data or any other relevant information.

All OSPAR countries, except Luxembourg, responded to the inquiry. The results given below are based on the information obtained from the competent authorities from each country. The results made it clear that dicofol is not used for any other purposes than as a pesticide, and France is the only country where dicofol has been monitored in surface water and groundwater.

The use of dicofol is allowed in Belgium, France, Portugal, and Spain. Dicofol is currently not registered in Denmark, Finland, Germany, Iceland, Ireland, the Netherlands, Norway, Sweden, Switzerland, and the United Kingdom.

Belgium

Dicofol is registered for fruit crops, vegetables and ornamentals. The sale was less than 200 kg in 1999 and the average application 350-440 g/ha, once per growing season.

France

Dicofol is sold in 80 registered trademark products as an acaricide in vineyards, tree nurseries, fruit tree orchards, etc. Around 14 000 kg are used annually based on the average sales volumes of the last 10 years. Dicofol has been monitored in surface water and in groundwater in 1998-1999 and it has been found in 520 surface water samples with a 90 percentile concentration of 0,01 µg/l and in 359 groundwater samples with similar results.

Portugal

The use of dicofol as a pesticide is allowed. In 1999, 4 862 kg were sold, but the amounts used will be reduced in 2001, since dicofol uses will be limited to citrus fruits, wine grapes and cucurbits with inedible peels after 1.7.2001.

Spain

The use of dicofol in Spain is around 100-150 tonnes/year. Use occurs mainly in the Mediterranean areas and in citrus culture and fruits.

Denmark

Plant protection products containing dicofol have not been approved in Denmark since 1992 (Danish EPA, 2001).

Finland

Dicofol was not re-registered as a pesticide in Finland in 1990. The registrant withdrew dicofol containing products from the market due to negative statements of the authorities. The last sales (146 kg) were in 1991.

Germany

Dicofol is not authorised and the last sales took place at the latest in 1995.

Iceland

The authorisation for pesticides containing dicofol was withdrawn in 1999. Dicofol has not been sold since 1998.

Ireland

Approval of dicofol has been withdrawn and use has been illegal since 31 December 2001.

Netherlands

The use of dicofol as a plant protection product has expired on 1.11.1997.

Norway

Dicofol was banned as a pesticide in 1989. The marketing of dicofol was allowed until 1992 and the use until 1993. During the last years of registration, 400 kg of dicofol on average was sold per year.

Sweden

Dicofol was not re-registered as a pesticide in Sweden in 1990. The initiative came from the manufacturer. The use was not allowed after 31.12.1992 (KEMI, 2001).

Switzerland

The use of dicofol is banned in Switzerland in Article 8 of the Swiss Regulation on the Ban of Toxic Substances.

United Kingdom

The approval of the marketing of dicofol was revoked on 31 May 2000 but approval for storage and use is valid until 31 May 2002. The average annual sales volume has been 1002 kg of active substance.

The annual sales volume of dicofol in the OSPAR countries is approximately 170 000 kg. This would mean that 120 000 kg dicofol is used in at least the non-OSPAR countries Italy, Greece, and Turkey.

The plant protection product industry is still interested in the marketing of dicofol, since dicofol is notified in the European review of the pesticide active ingredients according to article 10 of Commission Regulation (EC) 451/2000. This means that the industry will support the substance for inclusion in Annex I of Council Directive 91/414/EEC concerning the placing of plant protection products on the market and a complete dossier according to Council Directive 91/414/EEC will be available in May 2005. The decision whether the substance will be accepted on Annex I is expected in 2008-2010.

2.3 Emissions

The use of dicofol is allowed in Belgium, France, Portugal, and Spain. Pesticides are intentionally sprayed on crops and therefore the use of dicofol will cause emissions to sprayed areas and dicofol used will end up straight into the environment. Emissions from sprayed areas to the atmosphere are possible and modelling results indicate that volatilised dicofol may be subject to long range transport (Bayer and Matthies, 2001). Dicofol could therefore end up in surface water by spray drift and surface run-off (dicofol bound to particles). The route of dicofol entering the marine environment is through volatilisation and transportation by rivers. As dicofol is a highly bioaccumulating substance it can also end up in the marine environment through migration of organisms and through biomagnification.

According to the present data, only one plant in OSPAR area produces dicofol and exports it to Italy for further processing. DDT is not involved in this process. Data on dicofol emissions are not available. The plant is located in the Mediterranean catchment area and direct discharges and emissions from production to the North-East Atlantic are therefore unlikely.

2.4 Fate, behaviour and ecotoxicity in the environment

Dicofol is moderately volatile with a vapour pressure of $5,20E-5$ Pa (at 25°C) and low water solubility. Its molecular weight is 370 g/M.

Dicofol is very toxic to aquatic organisms, highly bioaccumulating and degrades moderately slowly in soil. It meets the persistency criterion in acidic waters (Table 2). Detailed property information is at Annex 1 in the fact sheet.

Table 2 Key PBT-properties of dicofol

	Results	Test type
T½ in water (days)	pH 5: 85,4 pH 7: 4 pH 9: 0,02	pH5, (p,p'-dicofol) pH7, (p,p'-dicofol) pH9, (p,p'-dicofol)
T½ in soil (daus)	pH 5,6: 50 pH 7: 50-60 7,6 (25°C) 23,4 (10°C)	(p,p'-dicofol) (p,p'-dicofol) (o,p'-dicofol) (GLP)
Bioaccumulation	10 000	BCF
Aquatic toxicity (acute, mg/l)	0,012 0,32 0,015 0,075	LC ₅₀ fish (GLP) LC ₅₀ crustaceans (GLP) LC ₅₀ mollusc LC ₅₀ algae (GLP)
Aquatic toxicity (chronic, mg/l)	0,0045 0,0045	NOEC fish (99 d) (GLP) NOEC fish (300d)

Calculated half-life for volatilised dicofol in atmosphere is 3,1 days, which indicates possible long-range atmospheric transport. It meets the UN-ECE POP criterion for long-range atmospheric transport (VROM/DGM, 2001).

Model development and calculations for atmospheric transport potential of chemicals by the Osnabrück University in Germany suggested that the atmospheric travel distance of dicofol is in the order of thousands of kilometres (based on gas-particle partitioning estimated according to vapour pressure and assuming no degradation in plants) (Beyer and Matthies, 2001). However, the vapour pressure used for modelling was somewhat high (6,4E-3 Pa) compared to other available data.

Dicofol is extremely toxic to aquatic organisms in acute and chronic toxicity tests and it may cause long-term adverse effects. An acute toxicity study was carried out with 14C-p,p'-dicofol to determine a safe concentration for a 28-day exposure bio-accumulation study. LC50 found was > 1,5 mg/l. The exposure concentration was set to 6 µg/l, 1/50 of the NOEC (0,34 mg/l). The experimentally determined BCF (28-day exposure) in whole fish samples was 10 000. Edible tissues had BCF values of 6600 and 17 000, respectively. Tissue concentrations varied:

- 0,31-23 µg/g (ppm) in fillet;
- 0,41-35 µg/g (ppm) in whole fish;
- 0,62-60 µg/g (ppm) in viscera.

Elimination of 14C activity in fish was followed after dosage ceased, and the tissue concentrations decreased through the 56-day period. The decrease was 68 to 77% in 14C concentration. A steady state was not reached during the uptake. Using computer modelling (BIOFAC) the time to reach a 90% steady state concentration was estimated to be 122 days. The model estimated a whole fish BCF of 25 000 at steady-state conditions. Modelled T½ for elimination was 33±2,1 days; 95% of the extracted 14C from fillet was identified as a parent compound (study abstract taken from a secondary source (dicofol fact sheet, 2001, by Rohm and Haas) as the original reference was not available). The high bioaccumulation indicates potential biomagnification. According to the reference VROM/DGM, 2001, several studies are available on toxicity to birds. The lowest LD50 is 265 mg/kg. Long-term effects include egg-shell thinning and effects on reproduction. In a study with a captive population of American kestrels, birds were dosed with 20 mg/kg of 99%-pure o,p'-dicofol. The eggs laid had significantly thinner shells than those of the control birds. Feminisation of male embryos was confirmed by the presence of primordial

germ cells in the male gonad. Second generation breeding results indicated negative effects on reproductive behaviour.

The degradation of dicofol in soil is moderately slow (DT_{50} 30-60 days) which increases the transportation and biomagnification potential in terrestrial environments. Metabolites can be found in large mounts in laboratory studies one year after incubation (Dicofol Fact Sheet, 2001). In watercourses dicofol hydrolyses within a few days in neutral and alkaline waters, but it is quite stable (DT_{50} value of 47-85 days) in acidic waters with pH 5. The main hydrolysis products are the corresponding dichlorobenzophenons (DCBP) (VROM/DGM, 2000; Dicofol Fact Sheet, 2001). Estimated properties for solubility, vapour pressure and octanol/water partition coefficient of DCBP are approximately the same as for dicofol (VROM/DGM2001).

Dicofol is degraded quite slowly in aerobic water/sediment experiments. The half-life for the whole system in the higher organic matter system was 70-84 days (Dicofol Fact Sheet, 2001). Dicofol meets the UNEP-POP criteria, except the degradation criteria for primary degradation. However, these criteria are met for p,p'-dicofol in acidic waters.

There is no information on mineralisation of dicofol or the behaviour of its degradation products, including dichlorobenzophenons (DCBPs) in watercourses. DCBPs are, however, known metabolites analysed on food produce (Commission Recommendation 1999/333/EC of 3 March 1999). Studies on the rate of degradation in soil, and in water/sediment should be available to satisfy the risk assessments carried out under Council Directive 91/414/EEC (stage 3 in May 2003). These studies also address the toxicity and the hydrolysis rate of DCBP.

Dicofol is listed as a candidate for endocrine disruptive substances in the OSPAR Strategy with regard to Hazardous Substances (OSPAR, 1998). According to the study references submitted by the manufacturer also contradicting data exists: for rats no effects on reproductive hormone function was found for dicofol (Hoberman 1997 quoted by Chen *et al.*). Bennett *et al.* (1990) showed with dicofol formulation containing less than 0,1 % DDT-r compounds that statistically significantly more cracked eggs were produced by mallards in a 100 µg/g dicofol dietary group. The adverse effect was noted already after one day of exposure. Dicofol's pattern and magnitude of effects were similar to those observed with DDE (a known chemical to affect the egg shell quality of birds). Schwarzbach *et al.* (1988) obtained the same type of results when exposing ring neck doves to dicofol (33,4 µg/g; less than 0,1 % DDT-r compounds) and DDE. They showed that dicofol was not metabolised to DDE in birds and therefore the adverse effect is based on dicofol itself, and that egg shells became progressively thinner with increasing time of exposure. American kestrels were even more sensitive to dicofol than ring neck doves (Schwarzbach *et al.*, 1991). Another study by Schwarzbach (1991) revealed that dicofol metabolites have less effects on egg shell formation than dicofol. A two generation avian study (MacLellan *et al.*, 1996) confirmed the results of egg shell thinning by o,p'-dicofol and in addition revealed feminisation of male embryos already at a level of 5 µg/g dicofol. Hatching success of the second generation females and males mating with untreated birds showed adverse effects on reproduction success. MacLellan *et al.* (1997) found out that dicofol exposure of parents had negative effects on the behaviour and mating success of the second generation kestrels.

2.5 Monitoring data

No monitoring data are available from remote areas based as shown in the background document of a dicofol risk profile from the Ministry of Environment in the Netherlands (VROM/DGM, 2000). Based on the inquiry to all OSPAR Contracting Parties, only France has monitored dicofol both in surface water and groundwater (see chapter 2.2). As the monitoring information on dicofol was so scarce, a literature search on scientific research work has been performed in order to find other information sources of the occurrence of dicofol in different compartments of the environment. The performed literature search

included searches in the Environmental Abstracts - data base (CIS 1997) and in the Cambridge Scientific Abstracts – data base (Internet Database Service, IDS; <http://www.csa1.co.uk>).

The scientific articles show that dicofol has been found in the environment in a few monitoring studies. The occurrence of dicofol in the treated areas is self-evident. The study on the occurrence and accumulation of pesticides in river sediment, water and clam tissues in the Californian San Joaquin River and its tributaries showed that dicofol was not found in water samples at concentrations higher than 1 ng/l, but was found in riverbed sediments in concentrations of 23,7 ng/l and in the most ubiquitously distributed benthic clam, *Corbicula fluminea*, at concentrations of 97 ng/g, which was 15 % of the level of DDT accumulated in the same species (Pereira et al., 1996). In another study of the San Joaquin River dicofol was found in 7 out of the 8 sampling locations in areas where there was a significant use of dicofol. Dicofol was found throughout the growing season with maximum concentrations of 2,5 ng/l (Domagalski 1996).

In a study on the occurrence of organochlorine pesticides in water supply network of a very important agricultural area, La Plana de Castellón in Spain, the pesticides most frequently found in samples analysed were aldrin and dicofol (Hernández et al 1991). A monitoring study from Greece showed that dicofol was found in river water during the growing season (not in winter time) in amounts less than 0,1 µg/l, but was found in the river sediment throughout the period with a maximum concentration of 2,2 µg/kg (Angelidis et al. 1996).

A three year monitoring study (1989-1992) of dicofol in aquatic and terrestrial environments was conducted in the USA on three locations, California, Florida and New York, under the supervision of US EPA. The amounts of dicofol used in different areas ranged from 1,3 to 2,2 kg active ingredient/ha. All sampling locations were adjacent to suitable habitats for terrestrial and aquatic wildlife. The waterbodies sampled were in almost all cases lentic, which means that no dicofol was removed from the site by water transportation. Water analysis was carried out 1, 7, 21 and 90 days after application. Residues of o,p'-isomer of dicofol were seldomly found. The major residue found was p,p'-isomer and less than 2 % of water and sediment samples (953 and 524 samples, respectively) contained residues above the reporting limit of 5 ng/l for water and 0,1 mg/kg for sediment (Bender, 2001).

Many studies have shown that dicofol is found in wildlife. In the above described US monitoring study 7,2 % of the sampled aquatic invertebrates contained residues over 0,1 mg/kg and 71 % of the sampled fish contained residues over 0,05-0,1 mg/kg (Bender, 2001). The maximum concentration of residues in fish was 0,45 mg/kg (Wilkinson, 1993). The residues declined during the three months below concentrations of 0,05-0,1 mg/kg and no bioaccumulation occurred (Bender, 2001). In the same study residues of small mammals, terrestrial invertebrates, reptiles/amphibians and earthworms were 0,8-3,9, 1,7-3,9, 0,9-3,8 and 1,1 mg/kg, respectively. The environmental half-life of most biota was between 18 and 39 days. Residues in earthworms were fairly constant throughout the year (1-2 mg/kg). Birds were also studied in the US monitoring study and samples were taken from 7 to 21 days after dicofol application. The p,p'-dicofol residues in birds in treated area ranged from 0,1 to 1,4 mg/kg. There was no clear evidence of the accumulation of dicofol in biota in the treated areas (Wilkinson, 1993). The summary report did not, however, clearly respond to the primary objective of the field study, which was establishing the risk of potential reproduction failures for birds.

Clark (1990) found dicofol residues in an Eastern screech owl egg in concentrations of 1,8 µg/g and Clark et al. (1995) found dicofol in carcasses of whiptail in concentrations of 12 µg/g, but not in any studied bird eggs in areas where dicofol was used. The concentration found in whiptail is higher than the concentration found in carcasses of screech owls (5,4-7,8 µg/g) that produced thinned eggs shells (Wiemeyer et al., 1989). The possible effects on lizard reproduction were not studied (Clark et al., 1995).

3. DESIRED REDUCTION

In 2000, dicofol was included in the OSPAR List of Chemicals Identified for Priority Action. The OSPAR objective with regard to hazardous substances is to continuously reduce discharges, emissions and losses with the ultimate aim of achieving concentrations in the marine environment near background values for naturally occurring substances and close to zero for man-made synthetic substances. Every endeavour will be made to move towards the target of cessation of discharges, emissions and losses of hazardous substances by the year 2020 (OSPAR, 1998).

Based on laboratory data, dicofol is a highly bioaccumulating substance which is extremely toxic to water organisms and which has shown to affect at least bird reproduction at very low concentrations. Based on the USA monitoring studies the laboratory data seem to overestimate the bioaccumulation potential of dicofol in the aquatic environment because of the fairly rapid hydrolysis of dicofol in neutral and alkaline waters and due to the metabolism in fish. However, the monitoring studies performed in the USA, Spain and Greece, in areas with a significant use of dicofol, show that dicofol is in some areas found in river water in small amounts throughout the season, and in sediments and sediment dwelling organisms.

The major problems of the use of dicofol seem to occur in the terrestrial environments due to high residues in plants and soil and slow degradation rates in soil, which result in a high bioaccumulation potential. There is no data available on the mineralisation of dicofol, or the fate of its metabolites DCBPs.

4. IDENTIFICATION OF POSSIBLE MEASURES

4.1 Review of existing national and international measures

The European Community has not banned or restricted the use of dicofol at Community level. The only restriction concerning dicofol concerns the composition of technical dicofol. During the production of dicofol from DDT, DDT and DDT-related compounds are formed as impurities. Council Directive 79/117/EEC of 21 December 1978, amended by Council Directive 90/533/EEC, prohibits the marketing and use of products containing less than 78 % p,p'-dicofol or more than 0,1 % of DDT or DDT-related compounds. However, the production process in the OSPAR area is not based on DDT.

Although there is not a Community wide ban on the use of dicofol, several OSPAR countries have not authorised the use of products containing dicofol. The use of dicofol is only allowed in Belgium, France, Portugal, and Spain. Portugal has restricted the target crops for dicofol and thereby the use of it since 1.7.2001.

In the context of the ad-hoc expert group of the regional UN-ECE POP Protocol (Århus Protocol 1998) the Netherlands is preparing a risk profile and a summary document on dicofol. The intention of the experts' work is to identify and assess possible new candidates to be included in the protocol.

4.2 Possible additional measures

It seems dicofol is produced only in Spain, in the Mediterranean catchment area, where direct discharges and emissions to the North-East Atlantic are unlikely. There is little knowledge on the formulation industry for dicofol containing plant protection or biocidal products in OSPAR region. Control measures for discharges and emissions could be introduced, if such industry should emerge.

The cessation of the use of dicofol can be obtained either by voluntary agreements with the manufacturing industry and importers or by banning its use by legislation and administrative procedures.

Use as plant protection active ingredient

Negotiations with the chemical industry for the voluntary withdrawal of dicofol from the market could be arranged.

During the transitional period of Council Directive 91/414/EEC, those EU Member States still using dicofol can decide on the cancellation of authorisations.

If, following the risk assessment procedures, dicofol is included in Annex I of Council Directive 91/414/EEC, Member States may still decide on not authorising plant protection products containing dicofol from an agricultural, environmental or plant protection point of view.

If dicofol is not included in Annex I of Council Directive 91/414/EEC, a prohibition at Community level could be introduced in order to make sure that dicofol will not appear anymore on the market as a pesticide.

Use as a biocidal active ingredient

Verification of the notifications received in the framework of the Biocides Directive 98/8/EC has shown that dicofol was not notified for inclusion in any of the Annexes of the Directive. Biocidal products containing dicofol, can hence no longer be authorised by EU Member States in the near future.

A prohibition at Community level could therefore be introduced in order to make sure that dicofol will not appear on the market as a biocide.

Work performed under the UN-ECE may lead to regional actions on dicofol. These actions could, if necessary, be expanded to a global level in the framework of the UNEP Stockholm Convention on Persistent Organic Pollutants.

5. CHOICE FOR ACTION

The results obtained so far from the use survey in OSPAR Contracting States shows that the volumes of dicofol used are quite small.

The presence of dicofol in water and sediment samples taken for monitoring from areas with a significant use of dicofol shows that dicofol may not disappear from the aquatic environment as quickly as has been supposed. However, based on its rapid hydrolysis in neutral and alkaline waters, such as seawater, dicofol is not likely to reach the North-East Atlantic. However, on the basis of criteria for toxicity and bioaccumulation, environmental risks of metabolites of dicofol cannot be excluded.

The rapid degradation in marine waters does not mean that the substance will not pose problems in other environmental compartments. There is a lot of evidence of the toxic properties of dicofol and of its effects as an endocrine disrupter. The presence of dicofol in fresh water, even in very small quantities, for most of the growing season may have implications that there will be endocrine disruption of aquatic organisms. The persistence in the terrestrial environment and bioaccumulation potential in terrestrial organisms may lead to unacceptable effects at the top level of the food web. Where the existing national authorisation procedures for plant-protection products and biocides give OSPAR countries a possibility not to approve the marketing and use in their country of products containing dicofol:

- OSPAR Contracting States, where marketing is permitted of plant-protection products containing dicofol, should consider what action they can take as a precautionary step to cancel such authorisations.

Since dicofol is notified in the third list of European review program of the pesticide active ingredients and the industry is willing to provide a complete dossier for risk evaluation, it is unlikely that the chemical industry will voluntarily withdraw dicofol. It is therefore necessary to consider how its use may be controlled under EC legislation.

Under Council Directive 91/414/EEC concerning the placing of the plant protection products on the market and Directive 98/8/EC of the European Parliament and Council concerning the placing of biocidal products on the market, EU Member States may only authorise the use of products which, when used according to the instructions, do not cause unacceptable risks to humans and to the environment. Even if an active substance has been accepted under Council Directive 91/414/EEC, a Member State may conclude that a product containing the active substance does not fulfil the conditions for approval. Even though the principle of mutual acceptance of authorisations is usually followed, a Member State may refuse to authorise a plant protection product already authorised in accordance with the Directive in another Member State where, for example, the agricultural, plant health or environmental conditions differ.

Under Council Directive 91/414/EEC, the risks of active substances are evaluated at the Community level. A complete dossier on dicofol is expected to be available in May 2005. A full risk evaluation of dicofol and its metabolites will be carried out by the Co-Rapporteur Member States. The decision on inclusion or non-inclusion in Annex I will be taken by the Commission after a vote among all Member States at the Standing Committee on the Food Chain and Animal Health. Until the Community evaluation procedure has been finalised, national legislation continues to apply (dicofol is authorised in 7 Member States). If dicofol is not included in Annex I, use of any plant protection products containing dicofol would cease in the EU countries.

- After the dossier for the plant-protection product risk-assessment is available (expected in 2005), OSPAR should review the situation. In collaboration with the Rapporteur Member State (Spain), the lead country for dicofol should review the new information on whether dicofol meets the persistency criterion.
- If the decision on the approval of dicofol under Council Directive 91/414/EEC has to be taken before the guidelines for detecting the endocrine-disrupting potential of chemicals are available and the criteria for unacceptable endocrine effects have not been agreed upon by the Member States, OSPAR Contracting States which are EU Member States should require that dicofol should be tested and treated in accordance with those guidelines and criteria once they have been established.

After the approval of the Council Directive 91/414/EEC, no new prohibitions have been issued under the earlier Council Directive 79/117/EEC. It does not therefore seem necessary to consider action under this older directive.

The Biocides Directive 98/8/EC could also be relevant. Under this, as with Council Directive 91/414/EEC, the risks of the active substances in biocides are evaluated at Community level. Dicofol is included in the provisional list of possible active substances for biocides which were on the European market before 14 May 2000 (the cut-off date for Directive 98/8/EC). None of the OSPAR Contracting Parties has reported that dicofol was in use then as a non-agricultural pesticide. Nevertheless, it is possible for the chemical industry to apply for registration (“notify”) for dicofol as a biocide. If such authorisation were sought for dicofol, the risks will be evaluated by the Rapporteur Member State and the decision on inclusion or non-inclusion to Annex I will be taken at the Community level. However, verification of the notifications received in the framework of the Biocides Directive 98/8/EC has shown that dicofol has not been notified for inclusion into any of the annexes of the Directive. Biocidal products containing dicofol can hence no longer be authorised by EU Member States.

Finally, Council Directive 76/769/EEC of 27 July 1976 on the approximation of the laws, regulations and administrative provisions of the Member States relating to restrictions on the marketing and use of certain dangerous substances and preparations may in principle also be used to restrict or ban dangerous biocides.

- If other means of control are not sufficient to control the marketing and use of dicofol, OSPAR should consider inviting the European Commission to develop proposals under this directive.

Dicofol may not be a critical substance in the North-East Atlantic, but may cause risk to the other regions. Thus, the Contracting Parties should act in other international contexts, as within the European Union and global forums.

- OSPAR should send this Background Document to the European Commission.
- OSPAR Contracting Parties should follow closely the work undertaken under the UN-ECE Convention on the Long-Range Transport of Airborne Pollution and, in addition, participate actively in the work and deliver all the contributions possible to the work of this organisation.
- OSPAR should consider whether there is scope for taking initiatives in relation to dicofol under the Stockholm Convention on Persistent Organic Pollutants.
- OSPAR should send copies of this background document to the appropriate bodies dealing with those agreements and invite Contracting Parties who are common parties to OSPAR and those other agreements to promote action to take account of this background document by those other international bodies in a consistent manner.

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ANNEX 1 - DICOFOL FACT SHEET

Index	Parameter	Original Value	Converted value	Source	Reference	Scaled value	Remarks
0	VERSION:		30.1.2002				
1	IDENTIFICATION						
1.1	Cas No		115322				
1.2	EINECS/ELINCS		204-082-0				
1.3	Name		Benzenemethanol, 4-chloro-.alpha.-(4-chlorophenyl)-.alpha.-(trichloromethyl)-				
1.4	Synonym		Dicofol				
1.5	Group/Function		Pesticide				
2	PHYSICAL/CHEMICAL PROPERTIES						
2.1	Molecular weight, g/mole		370.49	QSAR-DK			
2.1			3.70E+02	envichem			
2.1		370,5	3.71E+02	A1c	KemI Report 9/88. Solna, Sweden, Nationals Chemicals Inspectorate, 1988 (In Swedish)		
2.2	Water solubility, mg/l		7.77E-01	QSAR-DK			EPIWIN 3.02
2.2		1.2 24°C	1.20E+00	envichem			
2.2		0,016	1.60E-02	A1c	KemI Report 9/88. Solna, Sweden, Nationals Chemicals Inspectorate, 1988 (In Swedish)		
2.2			0.14 mg/l (o,p'-dicofol) at 20°C, pH 4 and 7	Rohm& Haas	J. Betteley: "Kelthane® Insecticide Water Solubility", APR-00-137, 19.7.2000, (ER Ref. 70.10)		
2.2			0.45 mg/l (p,p'-dicofol) at 20°C, pH 4 and 7				
2.2			2.24E-03	ECB			IGE fact sheet
2.3	Vapour pressure, Pa		1.61E-06	QSAR-DK			EPIWIN 3.02
2.3			1.00E-30	Default			IGE fact sheet
2.3		0,000052	0.000052	A1c	KemI Report 9/88. Solna, Sweden, Nationals Chemicals Inspectorate, 1988 (In Swedish)		

Index	Parameter	Original Value	Converted value	Source	Reference	Scaled value	Remarks
2.3		5.33 x 10 ⁻⁵ Pa at 25°C	0.000053	ROHM & HAAS	Rothman, A.M.: "Vapor Pressures of Kelthane and p,p'-Dichlorobenzophenone", AR13 TR No. 7097, 16.5.1980, (ER Ref. 34.1)		
3	ABIOTIC/BIOTIC DEGRADATION PROPERTIES						
3.1	Abiotic OH-oxidation t _{1/2} d		3.117	QSAR-DK			EPIWIN 3.02
3.2	Photolysis t _{1/2} d						
3.3	Ready Biodegradability	4	19.9	A1c	KemI Report 9/88. Solna, Sweden, Nationals Chemicals Inspectorate, 1988 (In Swedish)	9	
3.3		0	0	E1A	Biodegradation and bioaccumulation data of existing chemicals based on the CSCL Japan. Ed. by Chemicals Inspection & Testing Institute Japan, Tokyo, Japan Chemical Industry Ecology-Toxicology & Information Center (JETOC), 1992.	9	
3.4	Half-life DT50 Hydrolysis	o,p'-dicofol 47d (pH 5) 8h (pH 7) 9min (pH 9)		8h ROHM & HAAS	Tillman, A.M., Warren, J.: "Hydrolysis of 14C-o,p'-Dicofol (Kelthane)", 310-86-58, 16.11.1986 (ER Ref. 25.1)		
3.4		p,p'-dicofol 85d (pH 5) 64h (pH 7) 26min (pH 9)		64h ROHM & HAAS	Warren, J.: "Hydrolysis of 14C-p,p'-Dicofol (Kelthane)", 310-86-59, 17.10.1986 (ER Ref. 26.1)		
3.4	DT50 in soil	o,p'-dicofol aerobic lab:	25°C: 7.6 d 10°C: 23.4 d	ROHM & HAAS	Daly, D, Tillman A.M.: "Addendum to The Aerobic Soil Metabolism of 14C-o,p'-Dicofol on Silt Loam Soil", 34C-88-28, 25.5.1988 (ER Ref. 35.1)		
3.4		p,p'-dicofol aerobic lab: 25°C: 60.8d 10°C: 187d		187 ROHM & HAAS	Daly D: "Aerobic Soil Metabolism of 14C-p,p'-Dicofol", 34-89-13, 7.2.1989 (ER Ref.37.1)		
3.4		o,p'-dicofol anaer. lab: 25°C: 5.5 d		5.5 ROHM & HAAS	Hoffman, S.L.: "Anaerobic Soil Metabolism of 14C-o,p'-Dicofol Study", 34-95-198, 15.1.1986 (ER Ref. 61.4)		
3.4		p,p'-dicofol anaer. lab:		15.9 ROHM & HAAS	Tillman, A.M.: "Anaerobic Metabolism of 14C-p,p'-Dicofol on Silt Loam Soil", 310-86-41, 2.9.1986 (ER Ref. 37.1)		

Index	Parameter	Original Value	Converted value	Source	Reference	Scaled value	Remarks
3.4		25°C:15.9d p,p'-dicofol pH 5.6	50 d		Ref.18.1) IUCLID		UNECE Risk profile VROM/DGM2001
3.4		p,p'-dicofol pH 7	50-60 d		IUCLID		UNECE Risk profile VROM/DGM2001
3.4		o,p'-dicofol pH 7	30-35 d		IUCLID		UNECE Risk profile VROM/DGM2001
3.5	Inherent Biodegradability	0% by BOD period: 14D substance	0	envichem	MITI 1992. Biodegradation and bioaccumulation data of existing chemicals based on the CSCL Japan. Compiled under the Safety Division Basic Industries Bureau Ministry of International Trade & Industry, Japan. Edited by Chemicals Inspection & Testing Institute,	9	
3.6	Biodeg-QSAR						
3.6			1.02	QSAR-NL			Ult Biodeg
3.6			-0.5	QSAR-NL			Lin Biodeg
3.6			-0.4957	QSAR-DK			BIOWIN1
3.6			1.0235	QSAR-DK			BIOWIN3
3.6			Not inherent	QSAR-DK			Interpretation of BIOWIN1 and BIOWIN3
3.6			-0.1735	QSAR-DK	Environ.Tox.Chem. 18(8): 1763-1768. Environ.Tox.Chem. 19(10): 2478-2485.		Syracuse version of H. Loonen's Simca Fragment linear MITI model.
3.6			0.0002	QSAR-DK	Environ.Tox.Chem. 18(8): 1763-1768. Environ.Tox.Chem. 19(10): 2478-2485.		Syracuse version of H. Loonen's Simca Fragment non-linear MITI model.
3.6			Not Ready	QSAR-DK	Draft Advisory list for self-classification of dangerous substances 2001. Danish EPA p. 39. http://www.mst.dk/activi/01050000.htm .		Danish EPA Multicase biodeg model on MITI substances
4	BIOACCUMULATION/BIOCONCENTRATION						
4.1	logKow		6	QSAR-DK			EPIWIN 3.02
4.1			5	QSAR-NL			
4.1		4,48	4	IuclidBioac c	European Commission, ECB, Existing chemicals, TP 280, I-21020 ISPRA	5.00	

Index	Parameter	Original Value	Converted value	Source	Reference	Scaled value	Remarks
4.1			3	qsar	KemI Report 9/88. Solna, Sweden, Nationals Chemicals Inspectorate, 1988 (In Swedish)	3.00	
4.2	Bcf		1479	QSAR-DK			EPIWIN 3.02
4.2		10000	10000	IuclidBioac	European Commission, ECB, Existing chemicals, TP 280, I-21020 ISPRA	8.75	
4.2		1100 1100 - 10000, 8w, Cyprinus carpio, conc	5100	envichem	MITI 1992. Biodegradation and bioaccumulation data of existing chemicals based on the CSCL Japan. Compiled under the Safety Division Basic Industries Bureau Ministry of International Trade & Industry, Japan. Edited by Chemicals Inspection & Testing Institute.	6.88	
4.2		10000	10000	E1A	Biodegradation and bioaccumulation data of existing chemicals based on the CSCL Japan. Ed. by Chemicals Inspection & Testing Institute Japan, Tokyo, Japan Chemical Industry Ecology-Toxicology & Information Center (JETOC), 1992.	8.75	
4.2		10000 in whole fish (28d)	10000	ROHM & HAAS	Tillman, A.M: " The Bioconcentration, Elimination, and Metabolism of 14C-p-p'Dicofol by Bluegill Sunfish (<i>Lepomis macrochirus</i>)", TR310-86-17, 22.8.1986 (ER Ref. 46.1)		
4.2		8050- 13500 (28d)	13500		Eaton G.J., Mattson V.R. et al 1982. Effects of suspended clay on bioconcentration of Kelthane in Fathead Minnows. Arch. Environ. Contam. Toxicol. 12, 439-445.		UNECE Risk profile VROM/DGM2001
5	AQUATIC TOXIC PROPERTIES						
5.1	Acute toxicity algae, mg/l	500	0.5	aquire3	Krishnakumari, M.K.(1977) Sensitivity of the Alga Scenedesmus acutus to Some Pesticides. Life Sci. 20:1525-1532	7.5	
5.1		0,073	0.073	IuclidAqua tox	European Commission, ECB, Existing chemicals, TP 280, I-21020 ISPRA	9.17	
5.1		0.075	0.075	DOW Agro- Sciences	RCC: Determination of the toxicity of Kelthane to the green Alga Scenedesmus subspicatus Chodat: Evaluation of EC 10 and EC 50.		GLP

Index	Parameter	Original Value	Converted value	Source	Reference	Scaled value	Remarks
5.2	Acute toxicity daphnia, mg/l	80	0.08	acquire1_2	Rawash,I.A., I.A.Gaaboub, F.M.El-Gayar, and A.Y.El-Shazli(1975) Standard Curves for Nuvacron, Malathion, Sevin, DDT and Kelthane Tested Against the Mosquito Culex pipiens L. and the Microcrustacean Daphnia magna...Toxicology 4(2):133-144 (Author Communicat	9.17	
5.2		0,14	0.14	IuclidAqua tox	European Commission, ECB, Existing chemicals, TP 280, I-21020 ISPRA	7.5	
5.2		0.32 (48h)	0.32	ROHM & HAAS	Forbis,A.D., Georgie,L., Burgess,D.: "Acute toxicity of Kelthane Technical to <i>Daphnia magna</i> ", 85RC-014, 17.10.1985 (ER Ref. 29.6)		GLP
5.2		3.8 srv,act, Daphnia pulex, Nishiuchi &	0.59	envichem	Nishiuchi, Y. & Hashimoto, Y. 1967. Nishiuchi & Hashimoto 1976 Toxicity of pesticide ingredients to some fresh water organisms. Botyu-Kagaku 32:5-11.	7.5	
5.2		3800	3.8	acquire4_5	Nishiuchi,Y. and Y.Hashimoto(1967)Toxicity of Pesticide Ingredients to Some Fresh Water Organisms. Sci. Pest Control /Botyu-Kagaku 32(1):5-11 (JPN) (ENG ABS) (Author Communication Used)	5.83	
5.3	Acute toxicity fish, mg/l	3,34	0.071	A1c	KemI Report 9/88. Solna, Sweden, Nationals Chemicals Inspectorate, 1988 (In Swedish)	9.17	
5.3		0,1	0.1	IuclidAqua tox	European Commission, ECB, Existing chemicals, TP 280, I-21020 ISPRA	9.17	
5.3		0.21 srv,act, 96 hr, Salmo gairdneri,	0.21	envichem	Holcombe, G.W., Phipps, G.L. & Fiandt, J.T. 1982. Effects of phenol, 2,4-dimethylphenol, 2,4-dichlorophenol and pentachlorophenol on embryo, larval and early-juvenile fathead minnows. Arch. Environ. Contam. Toxicol. 11: 73 - 78.	7.5	
5.3		0,21	0.21	ecotoc	Holcombe ea 82a	7.5	

Index	Parameter	Original Value	Converted value	Source	Reference	Scaled value	Remarks
5.3		1,14	1.14	E1A	Biodegradation and bioaccumulation data of existing chemicals based on the CSCL Japan. Ed. by Chemicals Inspection & Testing Institute Japan, Tokyo, Japan Chemical Industry Ecology-Toxicology & Information Center (JETOC), 1992.	5.83	
5.3		360	0.36	acquire4_5	Nishiuchi,Y. and Y.Hashimoto(1967) Toxicity of Pesticide Ingredients to Some Fresh Water Organisms. Sci. Pest Control /Botyu-Kagaku 32(1):5-11 (JPN) (ENG ABS) (Author Communication Used)	7.5	
5.3		53	0.053	acquire1_2	Johnson,W.W. and M.T. Finley (1980) Handbook of Acute Toxicity of Chemicals to Fish and Aquatic Invertebrates. Resour. Publ. 137, Fish Wildl. Serv., U.S.D.I., Washington, D.C.:98 p.	9.17	
5.4	Chronic toxicity daphnia, mg/l	0,125	0.125	IuclidAqua tox	European Commission, ECB, Existing chemicals, TP 280, I-21020 ISPRA	5.83	
5.5	Chronic toxicity fish, mg/l	0.019 srv,schr, Pimephales promelas, Spehar et	0.019	envichem	Spehar, R.L., Tanner, D.K. & Gibson, J.H. 1982. Effects of kelthane and pydrin on early life stages of fathead minnows and amphipods (Hyaella azteca). In: Aquatic toxicology and hazard assessment; 5th conference, ASTM STP 766. Pearson, J.G., Fost	7.5	
5.5		0,019	0.019	IuclidAqua tox	European Commission, ECB, Existing chemicals, TP 280, I-21020 ISPRA	7.5	
		19 µg/l 96 hr	0.019	ROHM & HAAS	Bowman, J.: "Acute Flow-Through Toxicity of Dicofol to Rainbow Trout (Salmo gairdneri). Analytical Biochemistry Laboratories, Inc. 1990		GLP
5.5		4.5 (300d)	0.0045	ROHM & HAAS	Ritchie,P. Stuerman,L. Rhodes,J.E. McAllister,W.A. Leak,T.: "Full Life-Cycle Toxicity Study of Dicofol (Kelthane Technical Miticide) to Fathead Minnows (<i>Pimephales promelas</i>) in a Flow-Through System", 91RC-1006, 9.12.1992 (ER Ref. 67.1)		GLP
5.5			0.0091		Rohm&Haas (lowest NOECfish, mg/l)		IGE fact sheet

Index	Parameter	Original Value	Converted value	Source	Reference	Scaled value	Remarks
5.6	Aquatox-QSAR			qsar			
5.6		-1.79	0.016218101	QSAR-NL			the logarithm of the LC50 value
5.6			0.34	QSAR-DK	Draft Advisory list for self-classification of dangerous substances 2001. Danish EPA p. 39. http://www.mst.dk/activi/01050000.htm .		Acute fish, Danish EPA Multicase Acute LC50 Fathead Minnow model.
5.6			0.14	QSAR-DK			Acute Daphnia, Danish EPA Multicase Acute EC50 Daphnia model.
5.6			0.2041	QSAR-DK			Fish NOEC, Lethal Body Burden NOEC mg/l (A:C ratio 10:1) for fish based on EPIWIN 3.02 BCF
5.7	Aquatic toxicity - other species	14 NOEC30d	0.014	ROHM & HAAS	Spehar,R.L. Tanner,D.K. Gibson,J.H.: "Effects of Kelthane and Pydrin on Early Life Stages of Fathead Minnows (<i>Pimephales promelas</i>) and Amphipods (<i>Hyalella azteca</i>) Aquatic Toxicity and Hazard Assessment": Fifth Conference, ASTM STP 766, American Society for Testing and Materials, pp. 234-244, 82RN-1050, 1982 (ER Ref. 38.7		
		0.015	0.015		Extoxnet, Pesticide information profiles 2000 (Shell oyster)		UNECE Risk profile VROM/DGM2001
6	HUMAN TOXIC PROPERTIES	21/22-38-43					
6.1	Acute toxicity		T	QSAR-NL			
6.2	Carcinogenicity	3	3	B2B	International Agency for Research on Cancer, Homepage www.iarc.fr	2.00	
6.3	Chronic toxicity	1,25	1,25	A1c	KemI Report 9/88. Solna, Sweden, Nationals Chemicals Inspectorate, 1988 (In Swedish)	7	
6.4	Mutagenicity						
6.5	Reprotoxicity						
7	EXPOSURE						
7.1	Production Volume	tonnes/year		LPVC	IUCLID		

Index	Parameter	Original Value	Converted value	Source	Reference	Scaled value	Remarks
7.1			Confidential				IGE fact sheet
7.2	Use/Industry Category		AGRICULTURAL INDUSTRY, PESTICIDES	IUCLID			
7.3	Use in articles						
7.4	Environm.Occur. Measured						(Compartment)
7.5	Environm.Occur. Modelled						(Compartment)
8	DYNAMEC-PROFILE						
8.1	Ranking calc. Water		38		Ranking according to the Fraunhofer report Jan 2000		
8.1			33				IGE fact sheet
8.2	Ranking calc. Sediment		32		Ranking according to the Fraunhofer report Jan 2000		
8.2			27				IGE fact sheet
8.3	Ranking meas. Water						
8.4	Ranking meas. Sediment						
8.5	Selection in DYNAMEC		NSDB(I), QSAR-NL(I), ED(y),			Group A	IGE fact sheet
9	EU-LEGISLATION						
9.1	Dir 67/548/EEC (Classification)		21/22-38-43-50/53	28ATP	Annex 1, Dir 67/548/EEC		
9.1	Dir 67/548/EEC (Classification)		7,20,21/22-38-43-50/53	28ATP	Annex 1, Dir 67/548/EEC		IGE fact sheet
9.2	Reg 793/93/EEC (Existing substances)						
9.3	Dir 2000/60/EEC (WFD)						
9.4	Dir 76/769/EEC (M&U)						
9.5	Dir 76/464/EEC (water)						
9.6	Dir 91/414/EEC (ppp)		RA				Not on a priority list
9.7	Dir 98/8/EEC (biocid)						
10	ADDITIONAL INFORMATION						
10.1	Hazard assessment-OECD						
10.2	Other risk assessments						

MONITORING STRATEGY FOR DIFOCOL

As part of the Joint Assessment and Monitoring Programme (reference number 2003-22), OSPAR 2004 adopted an Agreement on monitoring strategies for OSPAR Chemicals for Priority Chemicals (reference number 2004-15) to implement the following monitoring for tracking progress towards the objectives of the OSPAR Hazardous Substances Strategy (reference number 2003-21) with regard to dicofol. The Monitoring Strategy for dicofol will be updated as and when necessary, and redirected in the light of subsequent experience.

The sources of dicofol are currently well characterised, and the volumes are expected to decrease as the substance has been withdrawn from the market in several European countries due to environmental concerns. The Background Document proposes that Contracting Parties should withdraw products containing dicofol from the market. Therefore, rather than carry out limited monitoring programmes in water and air, it is considered that the most effective way of demonstrating progress on moving towards the 2020 cessation target in the medium term is:

- a. to continue to examine progress in the implementation of programmes and measures restricting the marketing and use of dicofol;
- b. to seek the assistance of the relevant industry trade associations to collect data on production and sales in the four Contracting Parties where dicofol is currently used; and
- c. to investigate the possibilities for estimating quantities of dicofol imported to, and exported from, the OSPAR Convention area.

Environmental monitoring data from the Convention Area are scarce, but a survey of the literature shows that dicofol has been found in some studies, particularly in sediment and in biota and wildlife. Dicofol is not listed under the EC Water Framework Directive. There are, however, indications that dicofol may be transported in the air far from its sources, therefore all Contracting Parties are advised to consider including dicofol and its degradation products in their national environmental screening projects in particular in air, acidic environments, and biota and report any results of such monitoring.

DICOFOL MONITORING STRATEGY

Implementation of actions and measures • Examination of progress in the implementation of regulations on marketing and/or use or emission and/or discharge which have been agreed, or are endorsed, by the Background Document

Production/use/sales/figures • Collect, with assistance from industry, data on quantities produced and sold in the countries of the OSPAR Convention Area
• Estimate quantities imported to, and exported from, the OSPAR Convention Area

Atmospheric inputs *Additional voluntary activity*
• *In organising national screening projects, Contracting Parties should bear in mind that there are indications that dicofol is transported in air far from its sources and that dicofol or its degradation products may occur in air*

Maritime area

Concentrations in biota • In organising national screening projects, Contracting Parties should bear in mind that there are indications that dicofol is transported in air far from its sources and that dicofol or its degradation products may occur in biota