INTERNATIONAL MARITIME ORGANIZATION

4 ALBERT EMBANKMENT
LONDON SE1 7SR

Telephone: 0171-735 7611
Fax: 0171-587 3210
Telex: 23588 IMOLDN G

IMO

E

Ref: T5/2.01

BLG/Circ.7
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HAZARD EVALUATION OF SUBSTANCES TRANSPORTED BY SHIPS

Report of the thirty-fifth session of the GESAMP Working Group on the Evaluation of the Hazards of Harmful Substances Carried by Ships

The report of the thirty-fifth session of the GESAMP Working Group on the Evaluation of the Hazards of Harmful Substances Carried by Ships (EHS 35/15) is attached for information. This report will be submitted for approval to the twenty-ninth session of GESAMP to be held at IMO Headquarters, London, from 23 to 27 August 1999.

Any comments would be welcome and should be addressed to:

IMO Technical Secretary of GESAMP
Marine Environment Division
4 Albert Embankment
London SE1 7SR
United Kingdom

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EHS 35/15
4 March 1999
ENGLISH ONLY

WORKING GROUP ON THE EVALUATION
OF THE HAZARDS OF HARMFUL
SUBSTANCES CARRIED BY SHIPS
35th session
Agenda item 15

REPORT OF THE THIRTY-FIFTH SESSION

1 INTRODUCTION

1.1 The thirty-fifth session of the GESAMP Working Group on the Evaluation of the Hazards of Harmful Substances Carried by Ships was held at IMO Headquarters, London, from 1 to 5 February 1999 under the chairmanship of Mr. C. T. Bowmer.

1.2 The IMO Technical Secretary of GESAMP, Mr. M. Nauke, welcomed the Working Group on behalf of the Secretary-General of IMO and the Director of the Marine Environment Division. He pointed out that in light of IMO's review of Annex II to MARPOL 73/78, GESAMP had been requested by the Marine Environment Protection Committee (MEPC) to re-evaluate the hazards of all products in the International Bulk Chemical (IBC) Code within the next three years, taking into account the new evaluation procedures adopted by GESAMP. This was a major and challenging undertaking which could only be carried out if the number of annual meetings of the Working Group was increased. The costs associated with the development of the new GESAMP hazard profiles should be estimated in the light of experience gained at this session.

1.3 A list of members of the Working Group is shown in annex 1. The agenda for this session, as adopted by the Working Group, is shown in annex 2.

2 GESAMP: REPORT FROM ITS 28TH SESSION

2.1 The Working Group was informed that GESAMP had approved the revised hazard evaluation procedures for publication in its Reports and Studies series as No.64.

2.2 GESAMP further urged IMO to make available the Composite List of Hazard Profiles as part of the IMO and/or GESAMP Web Sites.

2.3 The Secretariat informed the Working Group that the publication of the revised hazard evaluation procedure had been delayed because the final report on the work carried out by OECD, which acted as a clearing house to develop an agreed Harmonized Integrated Hazard Classification System for Human Health and Environmental Effects of Chemical Substances, had only very recently been made available. It was recognized that this might result in some changes to the GESAMP scheme. However, the revised procedure developed under GESAMP, including some additional elements to be developed at this session, would be published by June 1999.

3 MATTERS ARISING FROM IMO AND OTHER ORGANIZATIONS RELEVANT TO THE ACTIVITIES OF THE WORKING GROUP

Marine Environment Protection Committee (MEPC 42)

3.1 The Working Group recalled that MARPOL 73/78, Annex II, was under review and was being amended to make it simpler, whilst taking into account new technical developments in the field of efficient chemical tank stripping devices reducing chemical residues on board ships, as well as the revision of GESAMP's hazard evaluation procedure and the harmonization of chemical classification by OECD (see paragraph 3.2). The Working Group was informed that the Committee had recently extended the target for the completion of the review of Annex II to MARPOL 73/78 to 2002 in order to allow time for the 637 products identified in the IBC Code to be re-evaluated by GESAMP and new Pollution Categories assigned. This might require additional meetings of the GESAMP Working Group, including financial support for the compilation of hazard data. MEPC invited its Sub-Committee on Bulk Liquids and Gases (BLG) to provide information reflecting the budgetary implications of such work. A submission to the BLG Sub-Committee from the Secretariat on this issue would be prepared after the conclusion of this EHS meeting.

OECD's work on harmonization of classification and labelling

3.2 The Working Group recalled that subsequent to the adoption of UNCED's Agenda 21, Chapter IX the Inter-organizational Programme for the Sound Management of Chemicals (IOMC) had requested OECD to act as the Focal Point for work on the harmonization of classification systems for human health and environmental hazards.

3.3 The Chairman informed the Working Group of the completion of a harmonized classification system for hazardous chemicals which had been submitted to the Co-ordinating Group for the Harmonization of Chemical Classification System (CG-HCCS) of IOMC. With regard to the classification of mixtures, an OECD Working Group had been established recently to cover the special aspects needed for such classification and this work was still ongoing. OECD identified its harmonized classification system as "simple and transparent with a clear distinction between classes, in order to allow for 'self classification' as far as possible". It further noted that "expert judgement is required to interpret data for classification purposes".

3.4 With regard to "chemicals which are hazardous for the aquatic environment", OECD emphasized that "the harmonized scheme is considered suitable for use for packaged goods in both supply and use and multimodal transport schemes, and elements of it may be used for bulk land transport and bulk marine transport under MARPOL 73/78, Annex II, insofar as this uses aquatic toxicity".

4 REVIEW OF THE GESAMP HAZARD EVALUATION PROCEDURES: COMPLETION OF DOCUMENT FOR PUBLICATION AS GESAMP REP. STUD. (64)

The Working Group reviewed the text of the revised GESAMP hazard evaluation procedure as had been set out in document EHS 34/12 under annex 4. During its review the Group incorporated a number of editorial changes, updated references and clarified several uncertainties, taking into account the final results of OECD's harmonization process. The Chairman and Secretary undertook to prepare, as soon as possible, the final text for publication before mid-summer 1999.

5 REVIEW OF THE IBC CODE (1998) SUBSTANCES.

5.1 Subsequent to MEPC's request mentioned in paragraph 3.1 above, a list of 65 substances was circulated to members of the Working Group in November 1998 as a first set of the 637 bulk liquid substances in the IBC Code (1998). The EHS Working Group used this exercise to assess the scale of resources that would be required to complete the task.

5.2 Should sufficient support be available for members to review data filed at IMO and to attend a second full meeting of the Working Group, a further batch of ca. 150 compounds will be evaluated in 1999. Three sub groups of the Working Group will prepare the hazard profiles in regard to:

.1 environmental hazards;

.2 human health and safety; and

.3 physical and chemical properties.

The Working Group will confirm the completed profiles at its thirty-sixth session in September 1999.

5.3 The Group noted that for many of the environmental criteria, in particular aquatic toxicity, large amounts of data are available through electronic databases, compared with the last time when many of the substances had been evaluated or reviewed. However, collection of these data was time-consuming and may need assistance from supernumerary personnel.

5.4 Whilst recognizing that the majority of substances contained in the GESAMP Composite List are packaged goods (70%), IMO requested GESAMP, via the Marine Environment Protection Committee, to ask the Group to give priority to bulk liquids during the next three years. Nevertheless, as time permits, the Group will continue its efforts to provide hazard evaluations for manufacturers submitting data on substances for shipment as packaged goods.

5.5 A list of old and new hazard profiles for 63 of the substances examined is set out in annex 3. The old hazard profiles were also updated. Column B of the old hazard profiles was updated to reflect the new Column B1. Further column updating will take place at a later date.

6 DEVELOPMENT OF PROCEDURES FOR A REVIEW OF BULK LIQUID SUBSTANCES

6.1 The Working Group developed the following principles for the evaluation of substances under the new system.

Link to the old hazard profiles

6.2 The Working Group will prepare a new profile for each substance reviewed, following the revised hazard evaluation procedure and will also **update** the old hazard profiles until such time as this was no longer deemed necessary by IMO. An "old profile" will also be provided for new substances.

Data recording and quality control

6.3 The Group will continue to record the rationale behind its ratings in each column of the profile for each substance. This will be added to the summary of the file maintained on each substance by the Secretariat in order to ensure the ability to reconstruct each profile in the future. In principle, members will continue to search for qualifying information, with which to complement and cross-check the scientific data submitted by manufacturers.

Completeness of the hazard profiles and missing data

6.4 In order to assist IMO, the Group will strive to issue the revised hazard profiles in the most complete form possible. This would depend on the integrity and reliability of the data submitted, combined with that researched by the members themselves. Every effort will be made by the Group to fill in missing data.

6.5 Hazard profiles that are clearly missing large amounts of essential data (e.g. over several columns) would be withdrawn from the review list. The Secretariat will place these compounds on the missing profiles list under the work item "correspondence with the chemical industry". Industry would be regularly invited to co-operate in providing additional data, bearing in mind that the data required for the revised GESAMP hazard profile is closely harmonised with the OECD global classification system. Such compounds would be reviewed again when sufficient data were available.

6.6 Where no experimental data were available, then generally accepted extrapolation techniques might be applied on a case by case basis, e.g., in cases where ecotoxicity and bioconcentration were concerned, **validated** or otherwise reliable QSAR's for the chemical group in question might be used. The use of extrapolation techniques for deriving chronic aquatic toxicity data are generally considered to be inadequate. Likewise, the Group felt that where inhalation toxicity was concerned, sufficiently reliable techniques were not yet available to provide extrapolated data on the basis of oral toxicity combined with vapour pressure, etc.

6.7 Where data on a closely analogous substance are available, these may be used as a basis to provide a rating in the hazard profile. Where industry chooses to submit data referring to an analogous compound, the exact analogy and supporting data should always be submitted. Lack of well defined analogies may cause delay.

6.8 Substances carried in solvents or containing substantial quantities of potentially harmful additives may be rated on the basis of those additives on a case by case basis.

6.9 As many substances have large databases, a **weight of evidence approach** is necessary to ensure that a rating reflects the body of data rather than simply using the most conservative value. Expert judgement will continue to be used by the Working Group to issue a rating in such cases.

Rating notation

6.10 As with the old procedure, the Group may only issue a rating in three ways:

.1 a full rating will indicate that the Group reached consensus based on data specific on the product or other supporting evidence;

.2 a rating "in brackets" will indicate that the Group had sufficient confidence to provide a provisional rating but that some clarification is still required, bearing in mind that the decision could allow the product to be shipped. There is always a risk that further data may not be forthcoming; and

.3 a symbol "NI" may be placed in any column to indicate that insufficient data were available to allow even a provisional rating. In such circumstances, IMO may not be able to provide a pollution category, and shipping of the product may be hindered. The Group recognized that several of the sub-columns were not currently used by IMO for assigning pollution categories.

Specific matters relating to the columns of the hazard profiles

Bioaccumulation: A1A (log Pow) and A1B (BCF)

6.11 Where data in column A1A was missing, a calculated log Pow value should be provided by the Group. This should be possible in the majority of cases except for poorly characterized mixtures and inorganic compounds.

6.12 Where data in column A1B were missing, every effort should be made to provide a value on the basis of QSAR extrapolation, bearing in mind that measured BCF (A1B) data overrule A1A (log Pow) data in providing a rating for Column A1 as a whole. As it is more difficult to extrapolate or provide an A1B rating on the basis of QSAR for substances with log Pow values > 4, measured BCF data should be provided in order to provide a true indication of bioaccumulation for those products with log Pow >4.

Ready (bio)degradation: A2

6.13 Occasional indications of lower biodegradability under marine conditions were observed in assessing data for the first 63 substances under the revised GESAMP hazard evaluation procedure when compared with freshwater conditions. The Working Group considered that further information was required on the relationship between freshwater biodegradability tests using activated sewage sludge inocula (OECD 301 A-F) and those using only seawater as the inoculum (e.g., OECD 306).

Aquatic toxicity: Column B

6.14 The availability of environmental databases greatly assists the work of the Group. However, such databases need to be carefully screened, as the data are often of poor quality. For many compounds, a range of values covering fish, crustaceans, algae and other taxa will be available. In such cases, a weight of evidence approach for each group may be more appropriate than the use of a single lowest LC/EC_{50} value.

Skin and eye irritation and corrosion: D1 and D2

6.15 The Working Group, at its thirty-fourth meeting, developed a conversion table between the OECD and GESAMP ratings for irritation/corrosive effects on skin and eye. Since that meeting, OECD has changed its classification to such an extent that it was no longer possible to provide a simple conversion table in order to compare the categorization of these effects. The skin and eye effects have already been rated for the first 63 compounds according to the revised GESAMP system; this work is still in progress. The OECD scheme is being investigated with the same sub-set of compounds. The end result of the two rating systems will then be compared and reported on at a later date.

Specific health concerns: D3

6.16 In the case of Column D3 (specific health concerns), it was agreed to keep blank spaces indicating cases where no specific health concerns are reflected in Column F (Remarks column) rather than to use a "No" rating.

Effects on wildlife and bottom habitats: E2

6.17 Although the revised GESAMP hazard evaluation procedure uses only the rating F (floater), Fp (persistent floater) and S (sinker), the other physical behaviour classes indicated in IMO Manuals on Chemical Pollution, e.g., dissolver, evaporator, etc., will be included under the remarks column F for the benefit of other users of the GESAMP Composite List.

6.18 A "0" rating meaning none of the above, would be entered in the E2 column and relevant physical behaviour classes in the remarks column F, as appropriate, including the following:

- gas
- gas - dissolves
- evaporates
- evaporates - dissolves
- dissolves - evaporates
- dissolves

- floats - evaporates
- floats - dissolves
- floats - evaporates - dissolves
- sinks - dissolves

6.19 With regard to **solubility**, the Group agreed that for substances described as solutions and where no other data are available, e.g., ammonium sulphide soln. (45% or less) the vapour pressure of 2,000 Pa will generally be used (vapour pressure of water is 2,400 Pa). Expert judgement will have to apply.

6.20 For substances (mixtures) where a range was given for the **viscosity**, a "best estimate" would be made. For example, arylpolyolefin (C_{11}-C_{50}) LOA, has a viscosity of 1.5-200 cst at 40°C. A value of 200 cst at 20°C is taken to be representative of the product. ("best estimate" = 100 cst is representative at 40°C x2 for 20°C to give 200 cst.).

Interferences with coastal amenities: E3

6.21 The Group reiterated its view that persistent floating substances with an Fp rating in column E2 would receive a "2" rating under column E3 to indicate the likelihood of stranding and physical harm to amenities and persons coming in contact with them. Since this column incorporates various factors to evaluate interferences with coastal amenities, consideration needs to be given on how to integrate the other ratings "F" and "S" to provide a final rating in column E3.

Remarks: F

6.22 Following discussions, the Group agreed to review the contents of the remarks column to identify those remarks referring to conditions having serious health implications and which might aid IMO in using this column as part of a categorization rationale. Due to lack of time, this was deferred to the thirty-sixth session of the Working Group.

7 WORK CARRIED OUT INTERSESSIONALLY

The new hazard evaluation procedure

7.1 Several members of the Working Group have co-operated in the production of a more readable form of the hazard evaluation procedure subsequently presented at GESAMP 28. A presentation had also been made on the hazard evaluation procedures at the IAEA International Symposium on Marine Pollution, Monaco, October 1998; a paper will be published shortly.

Physical properties

7.2 Several members of the Working Group also co-operated in the production of tabulated physical properties relating to substances which pose a potential persistent floating hazard.

Search for additional information

7.3 Arising from the Working Group's considerations at its thirty-fourth session, the Secretariat corresponded widely with the chemical industry requesting further information on individual chemical substances.

8 CORRESPONDENCE WITH THE CHEMICAL INDUSTRY

Carriage of animal and vegetable oils and their oleo-chemical derivatives

8.1 The Working Group recalled that, at its last meeting, very few data were available in the GESAMP files on the many hundreds of vegetable and animal oils and derivative products and considered that the best approach was to group the products on the basis of their chemical composition and physical properties for an initial review.

8.2 In response to enquiries made by the Secretariat during the intersessional period, experts representing the European Oleochemicals & Allied Products Group[1], the Federation of Oils, Seeds and Fats Associations Ltd[2], and the Palm Oil Research Institute of Malaysia[3] attended this session and introduced their "Draft Inventory of Vegetable, Animal and Marine Oils and Fats Carried in Bulk by Sea" and a "Draft Inventory of Derivatives of Oils and Fats Obtained by Chemical/Physical Processes and Carried in Bulk by Sea", as set out in annexes 4 and 5 to this report.

8.3 The bases for the categories of vegetable oil, animal fat, marine oil products, acid oils and fatty acid distillates contained in these documents were explained, the latter two categories being refined products produced by alkali treatment and steam distillation respectively.

8.4 It was emphasized that it was important for the Group to receive information on the composition of representative members of these product categories, in addition to their free fatty acid content. It was noted that palm kernel oil and coconut oil in particular contain significant proportions of shorter chain length fatty acids which in certain products could cause aquatic toxicity.

8.5 Aspects such as the presence of impurities, as well as regional and batch variability in product composition were discussed. The Working Group members emphasized that it was of great importance to remove any products with clearly different environmental or human safety properties from representative groups of compounds being presented for hazard evaluation. Substances with unique properties would have to be evaluated separately. It was also stressed that in connection with the protection of marine benthic (sea bottom) communities and wildlife, in particular seabirds, information on the viscosity of products would be of great importance and might influence the grouping of products.

8.6 It was agreed that data on the composition of the groups of vegetable and animal oils and oleochemical derivatives would be presented to the Working Group by industry for consideration within the coming months. Following this, the Working Group would decide on meaningful (sub)groupings of products and maintain a dialogue with the industry representatives. The Chairman of the Working Group thanked the industry representatives for their presentation and a very useful exchange of views.

Issues raised by the industry

8.7 A number of queries concerning the profile ratings of existing substances in the Composite List were raised by the following chemical companies, chemical associations, Port Authorities etc.

Aristech Chemical Corporation
Arizona Chemicals / HARRPA (Hydrocarbon and Rosin Resin Producers Association)

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1 Mr R. Pearson

2 Mr A.T. Fenlon

3 Mr M. Jaafar

Director of Ports and Coasts, Rio de Janeiro
Japan Chemical Industry Association
Kureha Chemical Industry Co. Ltd.
Mobil Chemical Company.

8.8 These questions were addressed by the Working Group in evaluating the following substances:

***N*,*N*-Dimethyldodecylamine**
2,6-Diisopropylnaphthalene
Ethoxylated tallowamine
Tall oil fatty acid (resin acids less than 10%)
Diphenylamine (molten)
Copper beryllium alloy in massive form
Mobilad G210
Mobilad G201
Mobilad G221
Mobilad G521

8.9 Resulting changes are set out in annex 6.

9 EVALUATION OF NEW SUBSTANCES FOR BULK CARRIAGE BY SHIPS

9.1 The following new substances were proposed for marine transport in bulk.

Alcoholic silicasol
Dialkyl(C_6-C_8) phthalates
L-Lysine solution (50% or less)
2-Methyl-1,3-propanediol
Polyalkyl(C_{10}-C_{18}) methacrylate/ethylene-propylene copolymer mixture

9.2 In carrying out assessments of these substances the Working Group found additional information which warranted a change of the current hazard profile for ethanol. This change is recorded together with the hazard profile ratings assigned by the Working Group to the above substances as set out in annex 6.

10 REVIEW OF PESTICIDES

10.1 A preliminary comparison has been carried out between the pesticide entries on the EHS Composite List and all of those listed in the Inventory of IPCS of WHO; this publication is now being used by the United Nations in its Orange Book, and in the IMDG Code for packaged goods. It was noted that the IPCS evaluations, as presented, refer mainly to Acceptable Daily Intake (ADI) values for human beings, whereas the EHS Hazard Profile ratings are assessed on the basis of aquatic toxicity and mammalian considerations.

10.2 The IPCS Inventory stresses that great importance was placed on the assessment based on the widespread use of pesticides, both in agriculture and public health and on the high level of concern in both developed and developing countries because of the intrinsic toxicity of and potential exposure to these chemicals. The basic IPCS approach to grading its pesticides was concluded to have a greater bias towards human health.

10.3 A comprehensive table had been prepared by the Secretariat listing those pesticides of the EHS Composite List and of the IPCS Inventory, indicating which were present in both, and identifying each substance with an ISO-approved common name as well as an IUPAC systematic chemical name. A summary of the composition of this table is as follows :

Numbers of pesticides in the two lists under comparison

EHS List only	**IPCS List only**	**Both Lists**	**Total**
104	172	117	392

of which

37	18	17	72

are believed to be no longer manufactured.

10.4 Further work on this comparative exercise has been suspended by the Group in favour of the priority review of the hazard profiles of the 637 bulk cargoes undertaken at the request of MEPC. The Working Group agreed to continue the review and to assess the results at the earliest opportunity, the timetable for the review of IBC code bulk liquid substance permitting.

11 FLOATING/SINKING SUBSTANCES

Procedures for assigning "effects on benthic communities and wildlife" as well as on "interferences with coastal amenities" (columns E2 and E3) through the use of physical parameters were discussed under item 6 of the agenda (see section 6 above).

12 CHEMICALS OF PARTICULAR INTEREST OR CONCERN

The Working Group had intended to consider under this item "animal and vegetable oils and fat" and exchanged preliminary views on these substances with representatives from manufacturers' associations, as reflected in section 8 above. Those associations will submit data and information in the near future to the Working Group for its review.

13 FUTURE WORK PROGRAMME AND DATE OF NEXT SESSION

Programme

13.1 In the light of IMO's request regarding the re-evaluation within three years of all products carried in bulk, the Working Group, recognizing that this was a matter of highest priority, amended its long-term work programme.

13.2 The Working Group identified tasks to be carried out during the intersessional period and at its next meeting. These included:

.1 the re-evaluation of IBC Code products;

.2 the evaluation of animal and vegetable oils and their derivatives;

.3 the implications of physical properties of substances for their classification; and

.4 the specific health concerns listed in column F and their use by IMO.

Resources

13.3 Towards the end of its meeting the Working Group, in light of experience gained during this session, considered the kind of support that would have to be provided for the re-evaluation of the 637 bulk liquid substances listed in the IBC Code (1998).

13.4 The Working Group agreed that during the period 1999 to 1001 five more meetings of the Working Group should be convened. The three sub-groups of the Working Group should each meet during intersessional periods, i.e., five times before completion of the work.

13.5 The services provided by the IMO Consultant need to be extended; 120 days per year were necessary for him to collect data, review available material and prepare summaries of all information stored in IMO's GESAMP files. Representatives from each of the sub-groups should come to London during the intersessional period and review files. Their results would be distributed to the other members of their sub-groups for further discussion at meetings during intersessional periods as outlined in paragraph 13.4 above.

13.6 Several experts need assistance for gathering data and information at their home institutions. Financial support for such assistance needs to be made available.

Date of next meeting

13.7 It was agreed that the thirty-sixth session of the Group should be convened from 13 to 17 September 1999.

14 ANY OTHER BUSINESS

No matters were raised under this item by members of the Working Group. The Chairman expressed his sincere thanks to the members of the Working Group for the hard work carried out in re-evaluating all the products he had selected from the list of the IBC Code.

15 CONSIDERATION AND ADOPTION OF THE REPORT

The Chairman closed the meeting on Friday, 5 February 1999 at 17.00.

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ANNEX 1

LIST OF MEMBERS ATTENDING THE THIRTY-FIFTH SESSION OF THE WORKING GROUP

Dr. C. T. Bowmer (Chairman)
Department of Environmental Toxicology
Toxicology Division
TNO Nutrition and Food Research Institute
P.O. Box 6011
2600 JA Delft
The Netherlands
E-mail: bowmer@voeding.tno.nl
Tel: +31 15 2 696252
Fax: +31 15 2 572649

Dr. B. Ballantyne
Applied Toxicology Group
Union Carbide Corporation (K-3)
39 Old Ridgebury Road
Danbury, Connecticut 06817-0001
U.S.A.
E-mail: ballanb@ucarb.com
Tel: +1 203 794 5220
Fax: +1 203 794 5275

Dr. T. Höfer
BGVV
Ref.823
Thielallee 88-92
D-14195 Berlin
Germany
E-mail: thomas.hoefer@bgvv.de
Tel: +49 30 8412 3267
Fax: +49 30 8412 3685

Dr. M. Marchand
CEDRE
Technopôle Brest-Iroise
Boite Postale 72
29280 Plouzane
France
E-mail: Michel.Marchand@ifremer.fr
Tel: +33 02 98 49 12 66
Fax: +33 02 98 49 64 46

Dr. S. Micallef
IMO/UNEP Regional Marine Pollution
Emergency Response Centre for the
Mediterranean Sea (REMPEC)
Manoel Island
Malta
E-mail: chemexp@waldonet.net.mt
Tel: +356 337297
Fax: +356 339951

Mr. M. Morrissette
Director of Technical Support
Hazardous Materials Advisory Council
Suite 301
1101 Vermont Avenue, NW
Washington, D.C. 20005-3521
U.S.A.
E-mail: mmorrissette@hmac.org
Tel: +1 202 289 4550
Fax: +1 202 289 4074

Dr. T. Syversen
Norwegian University of Science and Technology
Faculty of Medicine
Department of Pharmacology and Toxicology
Medisinsk Teknisk Senter
N-7005 Trondheim
Norway
E-mail: tore.syversen@medisin.ntnu.no
Tel: +47 73 59 88 48
Fax: +47 73 59 86 55

Dr. M. Wakabayashi
Tokyo Metropolitan Research Institute
for Environmental Protection
7-5 Shinsuna 1-Chome Koto-ku
Tokyo 136
Japan
E-mail: w_meiko@tokyo-eiken.go.jp
Tel: +81 3 3699 1331 (ext. 350)
Fax: +81 3 3699 1345

Dr. P.G. Wells
Environment Canada
Environmental Conservation Branch
45 Alderney Drive
Dartmouth, Nova Scotia
Canada B2Y 2N6
E-mail: peter.wells@ec.gc.ca
Tel: +1 902 426 1426
Fax: +1 902 426 4457
Cell: +1 902-483-3724

SECRETARIAT

Dr. M. Nauke
IMO Technical Secretary of GESAMP
International Maritime Organization
Marine Environment Division
4 Albert Embankment
London SE1 7SR
United Kingdom
E-mail: mnauke@imo.org
Tel: +44 (0)171 735 7611
Fax: +44 (0)171 587 3210

Mr. N. M. Soutar
IMO Consultant
International Maritime Organization
Marine Environment Division
4 Albert Embankment
London SE1 7SR
United Kingdom
Tel: +44 (0)171 735 7611
Fax: +44 (0)171 587 3210

Mr. J.V. Crayford
IMO Secretariat
Senior Technical Officer
International Maritime Organization
Marine Environment Division
4 Albert Embankment
London SE1 7SR
United Kingdom
E-mail: jcrayford@imo.org
Tel: +44 (0)171 735 7611
Fax: +44 (0)171 587 3210

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ANNEX 2

AGENDA FOR THE THIRTY-FIFTH SESSION OF THE WORKING GROUP

1 Adoption of the agenda

2 GESAMP: report of its 28th session

3 Matters arising from IMO and other organizations relevant to the activities of the Working Group

4 Review of the GESAMP hazard evaluation procedures: completion of document for publication as GESAMP Rep. Stud. (64)

5 Review of 65 selected substances currently carried in bulk

6 Development of procedures for the review in 1999 to 2001 of the "650 substances"

7 Work carried out intersessionally

8 Correspondence with the chemical industry
- Carriage of animal and vegetable oils (data permitting)

9 Evaluation of new substances proposed for bulk carriage by ships

10 Review of pesticides

11 Floating/sinking substances

12 Chemicals of particular interest or concern

13 Future work programme and date of next session

14 Any other business

15 Consideration and adoption of the report

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ANNEX 3

PRODUCTS RE-EVALUATED UNDER THE REVISED HAZARD EVALUATION SYSTEM

	--- Existing GHP -----					---------- Revised GESAMP Hazard Profile (GHP) system ----------													
EHS Name/IBC Code Name	**EHS**	**A**	**B**	**C**	**D**	**E**	**A1**	**A2**	**B1**	**B2**	**C1**	**C2**	**C3**	**D1**	**D2**	**D3**	**E1**	**E2**	**E3**	**F**	**Last Update**
Acetic acid Acetic acid	13	0	1	1	II	XX	0	R	1	NI	1	1	1				NT	0	3		01/02/99
Acetic anhydride Acetic anhydride	12	0	1	1	II	XXX	0	R	1	NI	1	0	2			Yes	NI	0	2	Lachrymator; Aspiration hazard	01/02/99
Acetone Acetone	15	0	0	1	I	X	0	R	0	0	0	0	0				NI	0	1		01/02/99
Acetone cyanohydrin Acetone cyanohydrin	14	0	4	3	II	XX	0	R	4	NI	3	4	3				NI	0	(2)		01/02/99
Acetonitrile Acetonitrile	16	0	1	2	I	X	0	R	1	NI	2	2	2				NI	0	1		01/02/99
Acrylamide Acrylamide solution (50% or less)	23	0	2	2	II	XX	0	R	2	0	2	2	NI			Yes	NI	0	3	Delayed neurotoxicity; Animal carcinogen	01/02/99
Acrylic acid Acrylic acid	24	0	4	2	II	XX	0	R	4	NI	2	2	2				NI	0	3		01/02/99
Acrylonitrile Acrylonitrile	25	0	3	3	II	XXX	2	R	3	0	2	2	2			Yes	NI	0	3	Human carcinogen;Teratogen;Reproductive toxicity	01/02/99
Acrylonitrile-styrene copolymer dispersion in polyether polyol (LOA) Acrylonitrile-Styrene copolymer dispersion in polyether polyol	1432	0	1	0	0	X	0	NI	1	NI	1	NI	(0)				NI	S	(3)		01/02/99
Adiponitrile Adiponitrile	26	0	1	3	I	XX	0	R	1	NI	3	(3)	3				NI	0	(2)		01/02/99

		--- Existing GHP -----					---------- Revised GESAMP Hazard Profile (GHP) system ----------													
EHS Name/IBC Code Name	**EHS**	**A**	**B**	**C**	**D**	**E**	**A1**	**A2**	**B1**	**B2**	**C1**	**C2**	**C3**	**D1**	**D2**	**D3**	**E1**	**E2**	**E3**	**F**	**Last Update**
Alachlor (ISO) Alachlor technical (90% or more)	1488	0	4	1	I	XX	3	NI	4	1	1	0	(1)			Yes	NI	S	3	Animal carcinogen; Sensitizer	01/02/99
Alcoholic beverages Alcoholic beverages, n.o.s.	293	0	0	0	0	0	0	R	0	0	0	0	0				0	0	0		01/02/99
Alcohol(C6-C17)(secondary) poly(3-6)ethoxylate Alcohol (C6-C17) (secondary) poly(3-6)ethoxylates	722	0	4	1	0	0	3	R	4	2	0	NI	NI				NI	NI	1		01/02/99
Alcohol(C6-C17)(secondary) poly(7-12)ethoxylate Alcohol (C6-C17) (secondary) poly(7-12)ethoxylates	295	0	4	1	0	0	3	R	4	1	1	NI	NI				NI	0	1		01/02/99
Alcohol(C12-C16) poly(1-6)ethoxylates Alcohol (C12-C16) poly(1-6)ethoxylates	294	0	4	1	I	X	3	R	4	1	0	0	NI				0	0	1		01/02/99
Alcohol(C12-C16) poly(20 and above)ethoxylates Alcohol (C12-C16) poly(20+)ethoxylates	1482	0	2	1	I	X	(3)	R	2	0	(0)	NI	NI				NI	0	1		01/02/99
Alcohol(C12-C16) poly(7-19)ethoxylates Alcohol (C12-C16) poly(7-19)ethoxylates	1481	0	4	1	I	X	3	R	4	1	0	NI	NI				NI	0	1		01/02/99
Alcohols, C13 and above as individuals and mixtures Alcohols (C13+)	2039	0	1	0	0	X	2	R	1	1	0	0	0				NI	F	1		01/02/99
Alkanes (C6-C9) Alkanes (C6-C9)	2202						4	NI	3	NI	0	0	1				NI	0	1		01/02/99
Iso- and cyclo-alkanes (C10-C11) Iso- and cyclo-alkanes (C10-C11)	2203						(3)	NI	0	0	0	0	0				NI	NI	1		01/02/99

		--- Existing GHP -----					---------- Revised GESAMP Hazard Profile (GHP) system ----------													
EHS Name/IBC Code Name	**EHS**	**A**	**B**	**C**	**D**	**E**	**A1**	**A2**	**B1**	**B2**	**C1**	**C2**	**C3**	**D1**	**D2**	**D3**	**E1**	**E2**	**E3**	**F**	**Last Update**
Iso-and cyclo-alkanes (C12+) Iso- and cyclo-alkanes (C12+)	2204						(3)	NR	0	NI	0	0	(1)				NI	NI	(1)		01/02/99
n-Alkanes (C10-C20) n-Alkanes (C10+)	296	0	0	(1)	0	0	(3)	NR	0	0	0	0	0				NI	F	2		01/02/99
Alkaryl polyether (C9-C20) (LOA) Alkaryl polyethers (C9-C20)	1974	0	3	1	II	XX	4	NR	3	NI	NI	NI	NI				NI	S	1		01/02/99
Alkenylamide, long chain, more than C10 Alkenyl (C11+) amide	1858	0	4	0	0	XX	(3)	NI	4	NI	0	NI	NI				NI	F	1		01/02/99
Alkyl acrylate/Vinyl pyridine copolymer in toluene Alkyl acrylate-vinylpyridine copolymer in toluene	299	0	2	1	II	XX	2	R	2	0	0	0	NI			Yes	NI	(NI)	2	Neurotoxic	01/02/99
Alkyl amine, alkenyl acid ester, mixture Alkyl(C8+)amine, Alkenyl (C12+) acid ester mixture	1433	0	1	1	I	XX	NI	NI	1	NI	(0)	(0)	NI				NI	Fp	2		01/02/99
Alkyl (C12-C15) benzene/indane/indene mixture Alkylbenzene, alkylindane, alkylindene mixture (each C12-C17)	1872	0	5	0	0	X	4	NR	5	NI	0	0	NI				NI	0	1		01/02/99
Alkyl (C3-C4) benzenes Alkyl (C3-C4) benzenes	2206						3	NR	3	NI	0	NI	NI				(T)	0	1		01/02/99
Alkyl (C5-C8) benzenes Alkyl (C5-C8) benzenes	2207						4	NI	4	NI	0	0	(1)				NI	F	1		01/02/99
Alkyl benzenes, C9-C17 (straight or branched) Alkyl(C9+)benzenes	1783	0	1	-	-	-	4	NR	1	NI	0	(0)	NI				NI	F	NI		01/02/99

	--- Existing GHP -----						---------- Revised GESAMP Hazard Profile (GHP) system ----------													
EHS Name/IBC Code Name	**EHS**	**A**	**B**	**C**	**D**	**E**	**A1**	**A2**	**B1**	**B2**	**C1**	**C2**	**C3**	**D1**	**D2**	**D3**	**E1**	**E2**	**E3**	**F**	**Last Update**
Dodecyl benzene sulphonic acid (contains 1.5% Sulphuric acid) Alkyl (C11-C17) benzene sulphonic acid	1739	0	3	1	I	X	3	R	3	1	1	NI	NI				NI	0	1		01/02/99
Alkyl(C11-C13)benzenesulphonates, straight chain Alkylbenzene sulphonic acid, sodium salt solution	301	0	3	1	0	0	3	R	3	1	1	(1)	NI				NI	0	1		01/02/99
Alkyl dithio thiadiazole (C6-C24) (LOA) Alkyldithiothiadiazole (C6-C24)	1981	0	1	0	0	X	5	NR	1	NI	0	0	(0)				NI	NI	0		01/02/99
Alkyl (C7-C9) nitrates Alkyl (C7-C9) nitrates	8	Z	3	0	II	XX	3	NR	3	NI	0	0	NI			Yes	NI	F	2	Potent skin sensitizer	01/02/99
Allyl alcohol Allyl alcohol	28	0	4	2	II	XXX	0	R	4	NI	2	3	4			Yes	NI	0	2	Potent lachrymator;latent skin vesication; Aspiration hazard	01/02/99
3-Chloropropylene Allyl chloride	478	0	3	2	II	XX	1	R	3	NI	1	0	2				NI	0	2		01/02/99
Aluminium chloride/hydrogen chloride solution Aluminium chloride (30% or less)/Hydrochloric acid (20% or less) solution	336						2	Inorg	3	1	1	NI	3				NI	0	(1)		01/02/99
Aluminium sulphate solution Aluminium sulphate solution	2205						2	Inorg	3	1	0	NI	NI				NI	0	1		01/02/99
2-(2-Aminoethoxy) ethanol 2-(2-Aminoethoxy) ethanol	75	0	1	0	II	X	0	NR	1	0	0	1	NI				NI	0	2		01/02/99
Aminoethylethanolamine/Aminoethyl diethanolamine solution Aminoethyldiethanolamine/Aminoethylethanolamine solution	74	0	1	1	I	0	0	NR	1	0	1	NI	NI				NI	0	NI		01/02/99

	--- Existing GHP -----					---------- Revised GESAMP Hazard Profile (GHP) system ----------													
EHS Name/IBC Code Name	**EHS**	**A**	**B**	**C**	**D**	**E**	**A1**	**A2**	**B1**	**B2**	**C1**	**C2**	**C3**	**D1**	**D2**	**D3**	**E1**	**E2**	**E3**	**F**	**Last Update**
Aminoethylethanolamine Aminoethyl ethanolamine	68	0	1	1	I	0	0	NR	1	0	0	0	0				NI	0	1		01/02/99
N-Aminoethylpiperazine N-Aminoethylpiperazine	88	0	1	1	II	XX	0	NR	1	NI	0	2	NI			Yes	NI	0	(2)	Sensitizer	01/02/99
2-Amino-2-methyl-1-propanol 2-Amino-2-methyl-1-propanol (95% or less)	90	0	1	1	II	X	0	NR	1	NI	0	0	(0)				NI	0	1		01/02/99
Ammonia (anhydrous and aqueous, 28% or less) Ammonia aqueous (28% or less)	91	0	3	1	I	X	0	R	3	2	1	(1)	3				NI	0	(1)		01/02/99
Diammonium hydrogen phosphate Ammonium hydrogen phosphate solution	98	0	2	0	0	0	0	Inor	1	NI	0	0	0				NI	0	(0)		01/02/99
Ammonium nitrate solutions Ammonium nitrate solution (93% or less)	1912	0	1	1	0	0	0	Inor	1	NI	0	NI	NI				NI	0	0		01/02/99
Ammonium polyphosphate solution Ammonium polyphosphate solution	1764	0	1	0	0	0	0	Inor	1	NI	0	(0)	0				0	0	0		01/02/99
Ammonium sulphate Ammonium sulphate solution	99	0	1	1	0	0	0	Inor	1	(0)	1	(0)	(0)				0	0	(0)		01/02/99
Ammonium sulphide soln.(45% or less) Ammonium sulphide solution (45% or less)	310	0	3	2	II	XX	0	Inor	3	NI	0	0	0				NI	0	2		01/02/99
Ammonium thiocyanate/ Ammonium thiosulphate solution Ammonium thiocyanate (25% or less)/Ammonium thiosulphate (20% or less) solution	1732	0	1	1	0	0	0	Inorg	1	NI	1	NI	NI				NI	0	NI		01/02/99

		--- Existing GHP -----					---------- Revised GESAMP Hazard Profile (GHP) system ----------													
EHS Name/IBC Code Name	**EHS**	**A**	**B**	**C**	**D**	**E**	**A1**	**A2**	**B1**	**B2**	**C1**	**C2**	**C3**	**D1**	**D2**	**D3**	**E1**	**E2**	**E3**	**F**	**Last Update**
Ammonium thiosulphate solution (60% or less) Ammonium thiosulphate solution (60% or less)	312	0	1	1	0	0	0	Inor	1	NI	0	NI	NI				NI	0	0		01/02/99
Amyl acetate Amyl acetate (all isomers)	255	0	2	0	0	X	2	NR	2	NI	0	NI	NI				NI	0	1		01/02/99
1-Pentanol n-Amyl alcohol	1110	0	1/BOD	2	II	X	1	R	1	0	0	0	(0)				NI	0	1		01/02/99
3-Methyl-1-butanol Amyl alcohol, primary	965	0	1	1	0	0	1	R	1	0	1	0	NI				NI	0	1		01/02/99
2-Pentanol sec-Amyl alcohol	1111	0	1	1	0	0	1	R	1	0	0	(0)	(0)				NI	0	1		01/02/99
2-Methyl-2-butanol tert-Amyl alcohol	964	0	0	1	0	0	1	R	1	0	1	NI	NI				0	0	(0)		01/02/99
Aniline Aniline	261	0	3	2	II	XX	0	R	3	2	2	2	3				NT	0	3		01/02/99
Animal oil Animal and fish acid oils and distillates, n.o.s., including:	263	0	0	0	I	XX			0							Yes	0		2	Skin sensitizer	01/05/86
Animal oil Animal and fish oils, n.o.s., including:	263	0	0	0	I	XX			0							Yes	0		2	Skin sensitizer	01/05/86
Apple juice Apple juice	275	0	0	0	0	0			0		0	0	0				NI	0	0		01/02/99
Aryl polyolefin (C11-C50) (LOA) Aryl polyolefins (C11-C50)	1979	0	0	-	0	XX	0	NR	0	NI	0	0	0				0	Fp	2		01/02/99

		--- Existing GHP -----					---------- Revised GESAMP Hazard Profile (GHP) system ----------													
EHS Name/IBC Code Name	**EHS**	**A**	**B**	**C**	**D**	**E**	**A1**	**A2**	**B1**	**B2**	**C1**	**C2**	**C3**	**D1**	**D2**	**D3**	**E1**	**E2**	**E3**	**F**	**Last Update**
Aviation alkylates (C8 paraffins and iso-paraffins BPt 95-120 Celcius) Aviation alkylates (C8 paraffins and iso-paraffins BPT 95 - 120°C) (bb)	286	0	3	(1)	0	0	4	R	3	NI	0	0	0				0	0	1		01/02/99
Benzene Benzene and mixtures having 10% benzene or more*	324	0	2	1	II	XXX	1	R	2	NI	1	0	0			Yes	NT	0	3	Human carcinogen;Haemotoxic	01/02/99
Benzene sulphonyl chloride Benzene sulphonyl chloride	320	0	(1)	1	II	XX	1	R	(1)	NI	1	NI	NI				NI	0	(1)		01/02/99
1,2,4-Benzene tricarboxylic acid, trioctyl ester Benzenetricarboxylic acid, trioctyl ester	1733	0	0	1	I	X	0	NR	0	NI	0	NI	NI				NI	Fp	2		01/02/99

APPENDIX

ABBREVIATED LEGEND TO THE EXISTING HAZARD PROFILES

Column A - Bioaccumulation and Tainting

+	Bioaccumulated to significant extent and known to produce a hazard to aquatic life or human health
Z	Bioaccumulated with attendant risk to aquatic organisms or human health, however with short retention of the order of one week or less
T	Liable to produce tainting of seafood
O	No evidence to support one of the above ratings (+, Z, T)

Column B - Damage to living resources

Ratings		**96 hr LC50**
5	Extremely toxic	less than 0.01 mg/l
4	Highly toxic	less than 1 mg/l
3	Moderately toxic	1-10 mg/l
2	Slightly toxic	10-100 mg/l
1	Practically non-toxic	100-1000 mg/l
0	Non-hazardous	greater than 1000 mg/l
D	Substance likely to blanket the sea-bed	
BOD	Substance with oxygen demand	

Column C - Hazard to human health by oral intake

Ratings		**LD50** (laboratory mammal)
4	Highly hazardous	less than 5 mg/kg
3	Moderately hazardous	5-50 mg/kg
2	Slightly hazardous	50-500 mg/kg
1	Practically non-hazardous	500-5000 mg/kg
0	Non-hazardous	greater than 5000 mg/kg

Column D - Hazard to human health by skin and eye contact or inhalation

II Hazardous (severe irritation, strong sensitizer, lung injury, percutaneous toxicity, carcinogenic, or other specific long-term adverse health effect)

I Slightly hazardous (mild irritation, weak sensitizer)

0 Non-hazardous (non-irritant, not a sensitizer)

Column E - Reduction of amenities

XXX Highly objectionable because of persistency, smell or poisonous or irritant characteristics; as a result contaminated beaches liable to be closed; also used when there is clear evidence that the substance is a human carcinogen or that the substance has the potential to produce other serious specific long-term adverse health effects in humans.

XX Moderately objectionable because of the above characteristics, but short-term effects leading only to temporary interference with use of beaches; also used when there is credible scientific evidence that the substance is an animal carcinogen but where there is no clear evidence to indicate that the material has caused cancer in humans, or when there is evidence from laboratory studies that the substance could have the potential to produce other serious specific long-term adverse health effects.

X Slightly objectionable, non-interference with use of beaches

0 No problem

Ratings in brackets, ( ), indicate insufficient data available to the GESAMP experts on specific substances, hence extrapolation was required.

N Not applicable (e.g. if gases)

- Indicate data were not available to the GESAMP Working Group

Note: The descriptive terms such as highly toxic, non-hazardous, etc., were used by the original panel for the purposes of the 1973 International Conference on Marine Pollution. They have no particular significance in terms of hazard posed outside the particular circumstances addressed by that Conference and IMO, i.e. marine pollution as a consequence of discharges or spillages from ships.

ABBREVIATED LEGEND TO THE REVISED HAZARD PROFILE SYSTEM

Column A1 - Bioaccumulation

0 - No potential to bioaccumulate
(*log Pow <1 or >ca7, or molecular weight >700; no measurable BCF*)

1 - Very low potential to bioaccumulate
(*log Pow 1 - <2; BCF 1 - <10*)

2 - Low potential to bioaccumulate
(*log Pow 2 - <3; BCF 10 - <100*)

3 - Moderate potential to bioaccumulate
(*log Pow 3 - <4; BCF 100 - <500*)

4 - High potential to bioaccumulate
(*log Pow 4 - <5; BCF 500 - <4, 000*)

5 - Very high potential to bioaccumulate
(*log Pow >5; BCF >4, 000*)

Column A2 - Biodegradation

R - Readily Biodegradable

NR - Not Readily Biodegradable

Column B1 - Acute Aquatic Toxicity (LC_{50}, EC_{50} or IC_{50})

0 - Non-toxic
(*> 1000 mg/l*)

1 - Practically non-toxic
(*100 - 1000 mg/l*)

2 - Slightly toxic
(*10 - 100 mg/l*)

3 - Moderately toxic
(*1 - 10 mg/l*)

4 - Highly toxic
(*0.1 - 1 mg/l*)

5 - Very highly toxic
(*0.01 - 0.1 mg/l*)

6 - Extremely toxic
(*< 0.01 mg/l*)

Column B2 - Chronic Aquatic Toxicity, No Effect Concentration (NOEC)

0	-	Low chronic toxicity (*NOEC > 1 mg/l*)
1	-	Moderate chronic toxicity (*NOEC 0.1 - 1 mg/l*)
2	-	High chronic toxicity (*NOEC 0.01 - 0.1 mg/l*)
3	-	Very high chronic toxicity (*NOEC 0.001 - 0.01 mg/l*)
4	-	Extremely high chronic toxicity (*NOEC < 0.001 mg/l*)

Column C1 - Acute mammalian oral toxicity (LD_{50} mg/kg)

0	-	> 2000
1	-	> 300 to $\leq$ 2000
2	-	>50 to $\leq$ 300
3	-	>5 to $\leq$ 50
4	-	$\leq$ 5

Column C2 - Acute mammalian dermal toxicity (LD_{50} mg/kg)

0	-	> 2000
1	-	> 1000 to $\leq$ 2000
2	-	>200 to $\leq$ 1000
3	-	>50 to $\leq$ 200
4	-	$\leq$ 50

Column C1 - Acute mammalian inhalation toxicity (LC_{50} mg/l/4h)

0	-	> 20
1	-	> 10 to $\leq$ 20
2	-	>2 to $\leq$ 10
3	-	>0.5 to $\leq$ 2
4	-	$\leq$ 0.5

Column D1 Skin Irritation

Under development

Column D2 - Eye Irritation

Under development

Column D3 - Specific Health Concerns

Yes - Specific health concerns identified in column F

blank - No specific health concerns have been identified BUT this does not mean that there are not any.

Column E1 - Tainting of seafood

T - The substance has been tested for tainting of seafood and found to taint at concentrations at or below 1 mg/l.

(T) - Evidence exists that tainting may occur (e.g. due to chemical analogy with known tainting substances, organoleptic properties, data from spillages resulting in tainting of seafood).

NT - The substance has been tested for tainting and found not to taint below 1 mg/l..

Column E2 - Effects on marine wildlife and on benthic habitats

F - Floating substance, not likely to evaporate or to dissolve quickly.

Fp - Persistent slick forming substance.

S - Sinking substance that would deposit on the seabed, not likely to dissolve quickly.

Column E3 - Interferences with coastal amenities

0	-	None	No action required.
1	-	Slightly objectionable	A warning may be issued but no interference with amenities expected and hence no closure required.
2	-	Moderately objectionable	A warning should be issued and possible partial closure of amenities due to short-term physical hazards or minor health effects.
3	-	Highly objectionable	A warning should be issued leading to closure of amenities because of physical hazards or serious potential adverse health effects.

Column F - Remarks

This column includes specific remarks related to the chemical that are not reflected in the other columns.

General

In cases where sufficient data are not available, or where the information submitted for evaluation is of poor or suspect quality, the note "NI" (No Information available) is included in the respective column of the hazard profile.

ANNEX 4

DRAFT INVENTORY OF VEGETABLE, ANIMAL AND MARINE OILS AND FATS CARRIED IN BULK BY SEA

INTRODUCTION

Natural oils and fats are triglycerides or esters of glycerine and a mixture of fatty acids formed by the reaction between glycerine and three molecules of fatty acids. The fatty acid part represents about 90% by weight, the glycerine part around 10% of the fat molecule. Both components are easily prepared from fats by a splitting or hydrolysing process usually carried out with water at high temperatures under pressure.

Natural oils and fats are of plant (vegetable), animal or marine (fish) origin. Chemically they differ only in the chain length and distribution of chain lengths in the attached fatty molecules and also in the degree of unsaturation in the attached fatty molecules.

A crude oil is an extract which has had little further processing except possibly degumming, filtering, settling or both to reduce some of the impurities present. These impurities consist essentially of low levels of free fatty acids, gums, trace metals, odiferous material and water. A refined oil has undergone further processing to remove most of these impurities. By-products of the refining process are "Acid Oils" and "fatty Acid Distillates".

VEGETABLE OILS

Description: Vegetable oils are of plant origin and are usually identified by the name of the plant yielding them.

Typical (but not exclusive) examples of Vegetable Oils are: Babassu Oil, Canola Oil, Castor Oil, Cocoa butter, Coconut Oil, Corn Oil, Cottonseed Oil, Crambe Oil, Groundnut (Peanut) Oil, Hemp Oil, Linola Oil, Linseed Oil, Olive Oil, Palm kernel Oil, Palm Kernel Olein, Palm Kernel Stearine, Palm Oil, Palm Oil Mid Fractions, Palm Olein, Palm Stearine, Rapeseed Oil, Rice Bran Oil, Safflower Oil, Sal Fat, Sesame Oil, Shea Butter, Soybean Oil, Sunflower Oil, Tucum Oil, Tung Oil, Vegetable Ghee, and include hydrogenated versions of all the above.

Included, but segregated is Epoxidised Soyabean Oil, a chemically modified oil.

ANIMAL FATS

Description: Fats are one of the rendered by-products of animals and birds, for example, cattle, sheep, pigs and poultry.

Typical (but not exclusive) examples of Animal Fats are: Tallow, Lard, and include hydrogenated versions of the above.

MARINE OILS

Description: Oils derived from fish and are usually identified by the name of the fish yielding them.

Typical (but not exclusive) examples of marine oils are: Anchovy Oil, Cod Liver Oil, Cod Oil, Fish Liver Oil, Fish Oil, Herring Oil, Menhaden Oil, Menhaden Stearine, Sardine Oil, Shark Oil, and include hydrogenated versions of the above.

ACID OILS

Description: Acid oil is a general term for a by-product obtained from the alkali (chemical) refining of oils and fats. During alkali refining the free fatty acids in the oil or fat are neutralised with alkali and the soapstock produced, containing some emulsified neutral oil, is separated. Acidification of the soapstock releases the fatty acid and produces an "acid oil". the main components of acid oils are fatty acids, neutral oil and moisture. An acid oil can be derived from any of the above oils or mixtures of the above oils.

Typical (but not exclusive) examples of Acid Oils are: Coconut Acid Oil, Cottonseed Acid Oil, Palm Acid Oil, Palm Kernel Acid Oil, Soyabean Acid Oil, Rapeseed Acid Oil, Soft Mixed Acid Oil.

FATTY ACID DISTILLATES

Description: Fatty Acid Distillate is a general term for a by-product of the physical refining of an oil or fat in which the free fatty acid is removed by steam distillation of the crude oil or fat. The fatty acid removed by this process is called a Fatty Acid Distillate. The main components of Fatty acid distillates are fatty acids and moisture, with a low level of neutral oil. A Fatty Acid distillate can be derived from any of the above oils or mixtures of the above oils.

Typical (but not exclusive) examples of Fatty Acid Distillates are: Palm Fatty Acid Distillate, Palm Kernel Fatty Acid Distillate and include distillates of other oils and fats.

NOTES

1. the words "oil" and "fat" are synonymous. An oil may be liquid or solid, depending on its chemical make up (fatty acid chain length and degree of unsaturation) and its temperature. There is a tendency to refer to an "oil" if it is liquid at ambient temperature and a "fat" if it has a high melting point.

2. The melting point and the stability of the oil can be increased by "Hydrogenation". each double bond in an unsaturated fatty acid chain can react with hydrogen to become saturated. Hydrogenation is achieved by reacting the oil with gaseous hydrogen at elevated temperature and pressure in the presence of a catalyst.

CAVEAT

1. This inventory identifies various groupings of vegetable, animal and marine substances with examples (lists not exclusive) which are carried by sea in bulk, either in chemical parcel tanks, deep tanks or ISO tank containers.

2. The above oils and fats can be further processed to produce a wide range of "oleochemicals". These include such materials as Fatty Acids, Fatty Alcohols, Methyl Esters, Metallic Soaps and Fatty Nitriles and their derivatives. Data relating to these products is best ascertained from the Chemical Industry, who are better placed to provide data related to health, safety and the environmental impact of their products.

Prepared by FOSFA International - January 1999

Version 99/1

ANNEX 5

DRAFT INVENTORY OF DERIVATIVES OF OILS AND FATS OBTAINED BY CHEMICAL/PHYSICAL PROCESSES AND CARRIED IN BULK BY SEA

INTRODUCTION

Natural Oils and Fats provide the platform for a wide variety of higher sophisticated derivatives. This inventory deals only with those produced from oils and fats by hydrolysis (fatty acids and glycerine) or by transesterification (methyl esters and glycerine) and their further processing to produce Fatty Alcohols. Others to be considered are: Other fatty esters, metallic soaps, fatty nitriles and their derivatives (eg amines).

FATTY ACIDS

Description: Fatty acids and glycerine are produced by cleaving the triglyceride (oil or fat) molecule with water at high temperatures and pressure. Natural fatty acids are straight hydrocarbon chains with an acidic Carboxylate group at one end. They typically have an even number of carbon atoms in the chain but it is possible to produce C7, C9 and C11 fatty acids by cleaving a C18 fatty acid. The individual fatty acids are characterised by the number of carbon atoms in the carbon chain, ranging generally from caproic acid with 6 C atoms to behenic with 22 C atoms and in addition by the number of the double bonds in the chain. The composition and distribution of the fatty acids is characteristic for every fat or oil. The fatty acid mixture obtained by splitting a particular fat or fat blend can be separated into fractions by distillation and according to their melting point into solid and liquid components by crystallisation methods.

Typical (but not exclusive) examples of Fatty Acids are: Canola Oil Fatty Acid, Coconut Oil Fatty Acid, Cottonseed Oil Fatty Acid, Palm Kernel Fatty Acid, Palm Oil Fatty Acid, Rapeseed Fatty Acids, Soybean Oil Fatty Acids, Tallow Fatty Acids. Also pure cuts or blends obtained by fractionation and/or separation and hydrogenation: Caprylic, Capric, Caproic, Lauric, Myristic, Palmitic, Stearic, Arachidic, Behenic, Oleic, Linoleic, Linolenic and Erucic Acids, C6-C10 Fatty Acid Blend, C12-C14 and C12-C18 Fatty Acid Blends, C16-C18 Fatty Acid Blend.

METHYL ESTERS

Description: Methyl Esters are produced by the simple esterification of fatty acids with methanol, or directly from fats by transesterification bypassing the splitting process. They can be produced from broad cut or fractioned fatty acids. Broad cut methyl esters are easily fractionated to produce pure chain length or narrow cut esters.

Typical (but not exclusive) examples of Methyl Esters are: Methyl Esters of Coconut Fatty Acid, Palm Kernel Fatty Acid, Palm Oil Fatty Acid, Rapeseed, Soybean and Sunflower Fatty Acids. Fractionated Methyl Esters such as C6-C10, C12-C14, C12-C18, C16-C18 Methyl Esters and Methyl Caprylate, Methyl Laurate, Methyl Myristate, Methyl Oleate, Methyl Palmitate, Methyl Stearate.

FATTY ALCOHOLS

Description: Natural fatty Alcohols produced from oils and fats are monobasic, straight-chain saturated or unsaturated alcohols with chain lengths between C8 and C22. They are produced from the high pressure hydrogenation of fatty acids or fatty esters.

Typical (but not exclusive) examples of Fatty Alcohols are: Coconut Oil Fatty Alcohol, Palm Kernel Fatty Alcohol, Palm Kernel Alcohol, Tallow Fatty Alcohol. also n-Butanol, n-Hexanol, n-Octanol, n-Decanol, n-Dodecanol, n-Tetradecanol, n-Hexadecanol, n-Octadecanol, n-Eicosanol, n-Docosanol. all blends of the above including C8-C10 Fatty Alcohol, C12-C14 Fatty Alcohol, C12-C18 Fatty Alcohol, C16-C18 Fatty Alcohol.

GLYCERINE

Description: Glycerol is a tribasic alcohol, formally 1,2,3, propanetriol. Cleavage of all triglycerides (natural oils and fats) produce a crude glycerine which can be refined to the chemically pure material for food and pharmaceutical use. The impurities in crude glycerine are dependent on the original production process but can include neutral fat, electrolyes (eg sodium chloride), trace quantities of methanol (from the methyl ester process), water and proteins.

Glycerine will be shipped in both the crude and the refined form.

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ANNEX 6

Name		Hazard Profile					Remarks	Status
		A	**B**	**C**	**D**	**E**		
2198	Alcoholic silicasol	0	0	0	I	0	Narcotic	NN
22??	Copper beryllium alloy in massive form	0	0	0	0	0		NN
2197	Dialkyl(C_6-C_8) phthalates	0	0	0	I	XX	Developmental toxicity	NN
2126	***N***,***N***-Dimethyldodecylamine	+	4	2	II	XXX		NC
2186	Diphenylamine (molten)	0	3	1	I	XX	Methaemaglobin generator	R
0732	Ethanol	0	0	0	I	0	Narcotic	R
2182	Ethoxylated tallowamine	0	3	1	-	-		NC
2199	L-Lysine solution (50% or less)	0	1	0	0	0		NN
2200	2-Methyl-1,3-propanediol	0	0	0	0	0		NN
1996	Mobilad G201	0	3	0	I	XX		R
1997	Mobilad G210	0	2	1	0	X		R
2033	Mobilad G221	0	3	0	I	XXX		R
2034	Mobilad G521	0	-	-	-	-		R
2201	Polyalkyl(C_{10}-C_{18}) methacrylate/ ethylene-propylene coploymer mixture	0	0	-	-	XX	Aspiration hazard	NN
1287	Tall oil fatty acid (resin acids less than 10%)	0	(2)	0	II	XX		NC