Proposed amending CHIP regulations to implement Directive 2004/73/EC adapting to technical progress for the 29th time Council Directive 67/548/EEC on the approximation of the laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances (Dangerous Substances Directive)

Regulatory Impact Assessment (Final)

PURPOSE AND INTENDED EFFECT

Objective

1. This Regulatory Impact Assessment (RIA) examines the costs and benefits of regulations to implement Commission Directive 2004/73/EC that amends Council Directive 67/548/EEC (known as the Dangerous Substances Directive) on the classification and labelling of dangerous substances.

BACKGROUND

2. A number of EC Directives provide a comprehensive system for ensuring that people at work and in the home are properly informed about the dangers of chemicals, so that they can take the right precautions to protect themselves and the environment. The principal one of these is the long-established Dangerous Substances Directive (67/548/EEC or DSD), first agreed in 1967. The Directives establish and maintain a Single Market in chemicals by applying a uniform classification and labelling system throughout the EU. Here, 'classification' means the outcome of a systematic process that identifies the hazardous properties of chemicals, eg explosive, flammable, toxic, carcinogenic, corrosive, irritant, harmful to aquatic organisms etc. The hazard classification triggers controls on the storage and use of substances and of products containing them, to address risks to people and the environment. Annex 1 of the Dangerous Substances Directive details the classifications of several thousand substances that have been identified, through scientific evidence, to be dangerous. Classification is based on the most up to date scientific information.

3. It is therefore in the interests of both health and safety and business that Annex 1 is as comprehensive and accurate as possible. In order to achieve this, it is regularly updated and expanded. The details of the changes result from discussion, between national experts from the EU Member States, in "expert" groups, and in which representatives of chemical suppliers also play a full part.

4. Annex 1 of the Dangerous Substances Directive is revised from time to time by means of European Commission Directives known as Adaptations to Technical Progress (ATPs). Directive 67/548/EEC has been amended many times (9 amendments and 29 Adaptations to Technical Progress). This RIA deals with the implications of the 29th ATP which add classifications and labelling requirements for

some 450 new chemicals, and updates the existing dataset of hazard classification for a further 450 chemicals.

5. The "classification and labelling" Directives are implemented in Great Britain by the Chemicals (Hazard Information and Packaging for Supply) Regulations 2002 (known as CHIP). The main outputs of CHIP are warning labels and safety data sheets. It is intended to implement the 29th ATP through an amendment to the CHIP regulations - the Chemicals (Hazard Information and Packaging for Supply) (Amendment) Regulations 2005.

6. The Health and Safety Executive (HSE) has lead responsibility for the negotiation of amendments to the Dangerous Substances Directive, including its technical annexes, liasing with other departments and agencies as required. CHIP is well established and is updated regularly in line with ATPs. The British chemical industry remains a significant player in Europe and benefits from the single market, recently expanded to 25 Member States.

RATIONALE FOR GOVERNMENT INTERVENTION

7. Government is required to implement the 29th ATP as it has been formally adopted as a Commission Directive (2004/73/EC). In practice, the 29th ATP represents a routine set of amendments and requires only a minor change to the CHIP regulations and an updated version of the Health and Safety Commission's Approved Supply List to achieve implementation. Failure to implement the 29th ATP would result in UK business being placed at a commercial disadvantage in the European market, and would put the UK at risk of infraction proceedings for non-compliance.

8. The 29th ATP needs to be transposed into law by 31 October 2005. There are no transitional arrangements in the Directive and therefore none can be placed in amending CHIP regulations. Previous experience (with CHIP) has shown that timing problems can be managed by regulators and duty holders working together in the context of a transparent and proportionate enforcement policy.

9. HSE will also take the opportunity of amending the CHIP regulations to make some editorial changes to the existing regulations in order to clarify or correct minor aspects, and to remove the existing provision allowing HSE to issue exemption certificates. Removal acknowledges that there is no provision in the Directive for exemption, and in practice none has been issued since CHIP 2 came into force in 1999.

10. The previous set of amendments to the CHIP regulations (CHIP 3) which resulted in the current CHIP Regulations 2002, were extensive and resulted in significant costs to industry. The amendments dealt with in this assessment are far less extensive, do not involve any regulatory change and do not result in such high costs.

CONSULTATION

11. The partial RIA was drawn up using information taken from RIAs prepared for previous amendments to the CHIP regulations. This has the advantage that the evidence and assumptions have the validity of having gained acceptance through previous consultation exercises. HSE also had informal discussions with experts in the coatings, electroplating, pesticides and cleaning products industries during the preparation of this RIA.

12. The partial RIA formed part of the HSC's formal consultation on the proposed amending CHIP regulations and the implementation of the 29th ATP. HSC's Consultation Document (CD) No: 202 was published both in hard copy and on the HSE's web site on 17 January 2005. Formal consultation ended on 8 April 2005. Consultees were asked if the partial RIA presented sufficient information for consultees to be able to understand and comment on the proposals. Consultees were also asked to provide, wherever possible, information on:

- disposal costs;
- cost implications of the classification of n-propyl bromide;
- cost implications for pesticides;
- costs arising from increased application of the Control of Major Accident Hazards Regulations 1999 (COMAH);
- costs arising from application of the Control of Substances Hazardous to Health Regulations 2002 (COSHH) to newly classified carcinogens and/or mutagens
- the overall assumptions made in the partial RIA on both costs and benefits.

13. In addition to publication on HSE's web site, HSE sent the CD, including the partial RIA, to 218 stakeholders with a specific interest in the supply of chemicals. Specific effort was made to consult with the UK's n-propyl bromide industry and the pesticides industry.

OPTIONS

14. The UK is required to implement the 29th ATP under our European Treaty obligations. Failure to implement would be a breach of those obligations and would result in infraction proceedings against the UK for non-compliance.

15. The UK has been represented (by HSE officials) at all of the specialised experts meetings at which the detail of the 29th ATP was discussed. The UK is a leading European player in ensuring the safe use of chemicals, and remains an active participant in relevant discussions and scientific deliberations. The single market requirements of the 29th ATP are prescriptive additions or changes to the EU dataset of hazardous chemicals, and allow no substantive options for implementation.

COSTS AND BENEFITS

16. CHIP is a comprehensive framework for providing information from chemical supplier to user. Its requirements are an accepted part of the cost of running a chemical business.

17. Acute exposure to, or contact with, harmful substances continues to present a significant health and safety risk in the workplace, responsible for between 5 and 10 deaths each year. In addition, around 800 major injuries to employees and the self-employed resulting from contact with harmful substances are reported to HSE each year, and there are a further 3300 incidents causing a least three days absence from work[1]. Furthermore, not all incidents involving harmful substances are reported to the HSE. In addition exposure to chemicals can produce delayed or longer-term effects resulting in severe ill heath or death. These include dermatitis, asthma and cancer.

18. We can attach a value to all the reported incidents as noted in the risk assessment, following the DETR approach to valuing the reduction in risk associated with road traffic fatalities. The value of fatal risk reduction (VFR) attached to a future fatality in year 2003 values is around £1.3 million[2]. It should be noted that this is the value attached to a small reduction in what is already a small risk, and HSE has traditionally assumed that this figure would also be applicable to risks in the workplace (or from hazardous substances more generally). We can also value injury prevention using a `weighted average' approach that has been applied in other industries and in previous HSE research on the costs of accidents. This would suggest that 1 future fatality and around 10-20 future serious injuries has a VFR equivalent to around 1.2 fatalities. However, it is well established that there is under-reporting of injuries (compared to an effective 100% reporting of fatalities) in all HSE enforced sectors. To allow for this, and also the effect of non-reportable injuries, we therefore assume that 1 future fatality prevented corresponds to 1.5 "equivalent" fatalities prevented.

19. Given the scale of the safety risk from hazardous substances described above, this leads to an annual valuation of:

8 fatalities * 1.5 * £1.36 million = £16.3 million

20. This is equivalent to a present value of around £167 million over ten years, and is the safety risk relating to all incidents whether affected by the CHIP regime or not.

21. For a large, and growing, number of chemicals the information to be placed on the label of a product containing a dangerous substance (known as the classification and labelling information) is detailed in Annex 1 of the Dangerous Substances Directive. A supplier of a chemical in Annex 1 simply has to use the information

[1] Figures given are approximations taken from HSE's Statistics 2002/03. Actual figures for injuries to employees and the self-employed from exposure to, or contact with, a harmful substance are: 8 fatalities; 802 non-fatal major injuries; 3269 over 3 day injuries.
[2] For the purpose of the calculations this value was up rated in 2004 prices. This gives a value of £1.36 million

provided. The supplier will know that its competitors are obliged to provide the same information and that there is a “level playing field” across the EU. If the chemical is not in Annex 1, the supplier is required to carry out an assessment of the properties of the chemical - potentially an expensive process. Furthermore, when this has been done there is no guarantee that a competitor will reach the same conclusion.

22. The changes set out in the 29^{th} ATP identify new risks to human health in a number of substances as well as some new environmental hazards associated with them. This will serve to prevent damage to the environment from the use/disposal of the chemical.

23. The 29^{th} ATP also makes changes to Annex 5 of the Directive that deals with approved test methods to determine the hazardous properties of chemicals. The specification of new test methods (which is mainly relevant for new substances in the future) does not in itself impose any new obligations or costs on business and no regulatory change is required to bring the updated Annex 5 into force. HSE sought advice from one of the leading contract research facilities involved in the safety evaluation of chemicals on whether there would be any cost implications as a result of the changes to Annex 5. No cost implications were identified.

24. The editorial changes to the regulations are also regarded as cost neutral (or marginally beneficial) as they do not impose any extra regulatory load.

SECTORS AND GROUPS AFFECTED

25. Given the size of the chemical industry and the many and varied processes and uses chemicals are put to, the changes in the 29^{th} ATP are limited, affecting only a relatively small number of substances and businesses, and each one in a different way. For this reason it is not possible to define a typical affected business. We explained this in the partial assessment, noting that those businesses or industries likely to be most affected are those associated with the production and use of chemicals.

26. However, we attempted to identify certain activities or processes where we anticipated the greatest costs would occur. This approach was in keeping with previous approaches to CHIP amendments. The responses to consultation appeared to support this assumption. There were no responses from business or industry representatives that reflected an area of chemical supply or usage that was unexpected.

27. This assessment has considered the principal *costs* of the actions that businesses and industry will need to take as a result of the changes in the 29^{th} ATP, especially where new or revised classifications are required. We, therefore, identified three key chemicals or chemical groups where it is considered business and industry will need to expend the greatest costs. The three chemicals were n-propyl bromide (nPB) used primarily in vapour degreasing; chromium trioxide and its use in the chrome plating industry; and the new or revised classifications of around 50 pesticides approved for use in the UK. Businesses and suppliers of these specific chemicals were targeted to seek details about the cost implications and benefits seen to result from the classification changes.

28. HSE has not identified any issues relating to differential impacts on vulnerable individuals.

ANALYSIS OF COSTS AND BENEFITS

29. Costs and benefits are calculated in 2004 prices over a ten-year period. The base year for appraisal is 2004. In arriving at 10-year cost figures one adjustment is made. Costs are discounted to present value using the Treasury-recommended 3.5% discount rate.

30. Overall, very little information was provided by consultees to allow HSE to test and refine its original assumptions on costs and benefits. Where relevant industry responses identified a cost implication, little or no specific information was submitted that could effectively challenge the assumptions being made. Where costs were identified, there was little robust evidence on how the estimates were reached.

31. The principle costs are associated with three outcomes:

1. Suppliers will have to review and possibly alter labels and safety data sheets.
2. In addition, the marketing of some products may be affected because additional precautions (at extra cost) may be necessary when they are used. In extreme cases the changes needed to protect people or the environment may be so considerable that the use of the chemical is no longer viable.
3. Finally, some revised classifications will bring chemicals within the scope of other health and safety regulations, thereby changing the rigour with which duty holders have to manage chemical hazards.

32. Each of these outcomes is considered in this assessment.

Familiarisation costs

33. The vast majority of companies within the chemical industry are already familiar with the detail of the CHIP Regulations. Although the 29th ATP makes amendments to Annex 1 of the Dangerous Substances Directive, to which many companies will have to refer, the act of checking a classification is likely to take only a few minutes. We have therefore assumed that the costs of familiarisation are small and implicit in the costs estimated in paragraph 119.

Labels and safety data sheets

34. The main outputs of the 29^{th} ATP are amended labels, indicating the new or revised hazard information that must now appear on product packaging, and amended safety data sheets.

Labels

35. Some aspects of re-labelling can be regarded as cost neutral. In particular the listing of classifications for new substances will merely confirm the labels already agreed as part of the New Substances Notification regime[3].

36. With revised classifications, experience with previous ATPs and subsequent amendments to CHIP has shown that many chemical suppliers are aware of proposed new classifications well in advance of the implementation date in CHIP. These firms are in a position to plan in advance for the changes and to work them into their normal cycle of label printing at minimum additional cost. We know from the number of approaches to HSE from representatives of a range of industries that the proposed amendments were already widely circulated in industry both during the negotiation process and at the time of the final agreement and vote by Member States. To raise the profile of the proposed 29th ATP further, HSE alerted chemical suppliers, through ACTS' Standing Committee and Hazard Information and Packaging (SCHIP), the HSE web site and via the Chemical Hazard Communications Society, of the need to start preparing for the label and safety data sheet changes that would result from the ATP in September 2004 – over a year before the ATP was to enter into force.

Dangerous substances

37. Based on feedback from previous consultations we estimate that, for each substance, there is a cost between £80 and £500 resulting from a change to the classification of a substance in Annex 1. We do not know how many UK suppliers there are of each substance, but we assume that some substances are only supplied by one firm, while others may be supplied by several. As in the past, we assume a maximum of ten suppliers for each substance.

38. The total cost is therefore:

> 464 (the number of substances with revised/new entries) x 10 (the estimated number of suppliers) x £80 to £500 (the range of costs), i.e. a cost range between **£371,200** and **£2,320,000.**

Dangerous preparations

39. In the case of the 29th ATP we believe (on the basis of expert advice) that relatively few of the substances are used in the kinds of preparations where there are significant varieties and large consumer markets. We have therefore assumed that only 25% of the substances are used in this way and that for each of these substances there are 100 preparations that will require review. This assumption is based on soundings taken in the coatings and cleaning products industries. These have, traditionally, borne the brunt of the costs of previous rounds of changes.

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[3] The Notification of New Substances Regulations 1993 (NONS) is a European-wide system that requires chemical suppliers to get information on substances that are new to the European market. This information is used to decide whether or not the substance is dangerous. HSE together with the Environment Agency are responsible for running the scheme in GB.

40. This gives a total cost of 464/4 (the fraction of the substances used in preparations) x 100 (the number of preparations) x £80 to £500 (the range of costs), i.e.

a cost range between: **£928,000** and **£5,800,000.**

Labels for pesticides

41. Provisional costings were provided by the agricultural industry. The industry drew attention to the specialist nature of some of its products and the need for such products to carry a booklet style label designed to give detailed instructions on the safe use of the product. These specialised labels arise from the requirements of legislation on pesticides, not from CHIP per se. However, change in the CHIP label may drive reprinting earlier than would otherwise be the case. The cost of booklet labels was estimated at £5000 per label. However, no detail was provided on how many products carry such a label, or on how many of these would require reprinting because of changes in CHIP rather than changes in the specific label requirements for pesticides.

42. There are 49 approved active pesticide substances in the 29^{th} ATP, and the Pesticide Safety Directorate has estimated that these 49 substances may be marketed in up to 500 products. The Directorate has also estimated that only a few of these products, approximately 10%, would carry the detailed booklet style labels and therefore result in an amendment and a subsequent cost. While in practice, the 29^{th} ATP will only require an amendment to the front of the label (i.e. the hazard symbol or risk phrase), we recognise that this would still require additional printing arrangements. The costs of re-labelling specialised pesticide labels as a result of the 29^{th} ATP are estimated as:

50 (10% of the 500 products likely to be affected) x £5000 (the quoted cost of the specialised label) = **£250,000.**

43. The above costs are considered to be one-off costs to the labelling of such products coming onto the market after 31 October 2005.

Safety data sheets

44. With previous changes to CHIP, industry has indicated that the most significant cost is preparing or making changes to safety data sheets (SDS). Checking their own classification with that given by the Approved Supply List will be straightforward. Information previously collected from industry for the Cost Benefit Analysis of the Dangerous Preparations Directive (DPD) suggests that the cost of revising a SDS was between £100 and £230 in 1997, or about £140 to £320 in 2004 prices[4].

45. Manufacturers have also commented that they already routinely supply SDSs where these are requested. However this is not a strict requirement in all cases under the Directive.

[4] Figures have been up rated using the average earning index. Source: Office of National Statistics.

Coatings industry

46. The coatings industry has often borne the brunt of ATP amendments as many solvents and similar chemicals used in the industry become subject to revised classifications. In responding to this assessment, the industry indicated significant costs being associated with re-labelling and amendments to SDS, particularly in relation to preparations (mixtures of two or more substances) that contain dangerous substances. No specific costings were presented by industry, however, the general costings provided above for labels and safety data sheets should provide a baseline for costs.

Effects on the marketing of products

48. In order to consider the impact of the classification changes on the market, we have followed previous practice and sought to identify the substances that appear to be particularly vulnerable rather than trying to assess all of the substances. The substances identified were pesticides; n-propyl bromide; and chromium trioxide (coatings).

Pesticides

49. In the EU, pesticide supply and use is regulated by an approval-based regime in which an assessment of the risk of specific uses is carried out. The regulatory framework takes account of the hazards of the ingredient substances in formulations and changes to the classifications of the substances are reflected in the approval scheme. In the 29th ATP a number of pesticides active ingredients have been reclassified and, as a result, there may be a change in the conditions of use of a pesticide product or even withdrawal of it. However the data on which reclassification is based is already available to the operators of the approval scheme and in many cases has already been taken into account in setting the conditions of use that are set out on the label.

50. It is therefore extremely difficult to assess any additional impact on pesticides over and above the general cost of changes to labels and safety data sheets that apply to all affected chemicals. Our assessment is that the conditions of use for some professional products may need to be amended and possibly some home and garden products may need to be withdrawn.

51. Earlier regulatory impact assessments on CHIP amendments indicated that costs to the agricultural products supply industry were assumed to be relatively low. However, since July 2004, the sector has had to become fully compliant with all the requirements of the CHIP regulations. The industry has indicated administrative and logistical difficulties in implementing CHIP but these do not appear to relate to the supply of pesticides, which is largely dictated by approval for use in the UK rather than by classification.

52. The principle costs of compliance with the 29th ATP for the pesticide industry appear to be incremental costs related to re-labelling and the amendment of relevant safety data sheets (SDS). These incremental costs are estimated as being relatively low (see paragraphs 42 and 44).

N-propyl bromide (solvent)

53. Current information is that nPB is not manufactured in the UK but there are three UK suppliers that control a large proportion of the market. The revised classification of nPB (as Category 2 reproductive toxicant and Highly Flammable) will have cost implications for suppliers. Current information suggests that there will be no impact on competition.

54. The UK n-propyl bromide industry has indicated the revised classification will result in a significant financial impact on the industry and its customers. We were anxious to obtain more information on the impact of this reclassification in the UK, particularly to gain an estimate of the cost in terms of current or potential business. The partial assessment asked for more information.

55. One company estimated that the cost of reclassification could be as high as £2 billion. This is a huge estimate and far exceeds any estimates made for previous ATPs and CHIP amendments. The estimate was based on:

> 40,000 (no. of vapour degreasers in the UK) x £50,000 (the cost of a new vapour degreaser) = **£2 billion.**

56. We asked the company to justify the assumptions that appear to have been made in this estimate, i.e.:

a) there *are* 40,000 actively used vapour degreasers in the UK;
b) that all these units would have to be replaced because of the re-classification of n-propyl bromide at a cost of £50,000 each;
c) that none of the units/vapour degreasing processes could use alternative solvents;
d) that current users of n-propyl bromide would be reluctant to use an alternative solvent; and
e) that no modifications could be made to the units to accommodate an alternative solvent.

57. HSE approached UK based suppliers of vapour degreasing units. These suppliers indicated that the cost of a unit could range from £10,000 to £130,000, rising to £250,000 or £380,000 for certain 'top-of-the-range' models that were designed to provide totally enclosed units that could deal with the solvent emissions and environmental requirements (such as extraction systems), rather than health and safety. The type of unit used is determined by the boiling temperature of the solvents being used. N-propyl bromide has a low boiling temperature. Therefore a lower range unit was probably sufficient when using this solvent.

58. The suppliers also indicated that the figure of 40,000 vapour degreasers in the UK was historic, and significantly overestimated modern usage. In 2002, the regulatory impact assessment for the last amendment to the CHIP regulations, indicated that there were around 4000 degreasing plants across the UK.

59. There are alternatives to using n-propyl bromide in the vapour degreasing process, some of which involve limited or no hazardous chemicals and have potential

costs advantages. The health and safety of these alternatives to humans and the environment have not necessarily been evaluated to the same level as n-propyl bromide, so there may be health, safety and environmental costs associated with the use of these alternatives. These are unquantifiable. In some cases, the alternatives are of lower health risk. We also recognise, however, that such processes may not result in the same level of cleaning and that it is accepted that some product processes will continue to require solvent vapour degreasing.

60. The use of another solvent as an alternative to n-propyl bromide did not appear to be seen as a problem to suppliers of vapour degreasing units, who advised that no or little modification would be needed to the units. However, if the alternative solvent had a significantly higher boiling point then a new vapour degreasing unit may be needed. Suppliers of n-propyl bromide may opt for an alternative solvent or degreasing process rather than choose to replace or modify existing vapour degreasing units. Such a move would reduce potentially substantial capital costs. Therefore compliance with the 29^{th} ATP for n-propyl bromide suppliers should not lead to disproportionate compliance costs.

Solvent Emissions Directive

61. The suppliers we spoke to highlighted the possibility of additional cost implications for those using vapour degreasing units beyond 2007 when the European Directive on Solvent Emissions (1999/13/EC) (SED) comes into force. SED aims to reduce emissions from volatile organic compounds (VOCs) to the environment from specified industrial processes where certain threshold limits are set – e.g. 1 tonne and 2 tonnes. It also aims to phase out the use of more harmful solvents such as carcinogens, mutagens and those toxic to reproduction. The Directive is brought into effect in the UK by the Solvent Emissions (England and Wales) Regulations 2004. The Department for the Environment, Food and Rural Affairs (DEFRA) has the lead for the implementation of SED. DEFRA has prepared a regulatory impact assessment on the estimated costs to UK industry of implementing the Directive. This can be found at: www.defra.gov.uk/corporate/regulat/ria/2003/ria-emissions.pdf

62. DEFRA's regulatory impact assessment identified surface cleaning (the sector using vapour degreasers and solvents such as n-propyl bromide), as being within the scope of SED. DEFRA estimated the overall costs of compliance for the surface cleaning sector at £18.8 million per annum, a significant proportion of the overall costs of SED. This is to be expected as surface cleaning uses solvents.

63. As the Directive calls for a phasing out of the more harmful solvents, n-propyl bromide, now classified as a Category 2 reproductive toxicant may fall within the scope of the Directive. So, while the costs of classification may be much less than estimated by industry, the *effect* of classification may have greater costs in complying with additional European legislation. However, it should be borne in mind that n-propyl bromide is not the only solvent being used in vapour degreasers and the figure given above cannot be taken as a cost of the reclassification itself. The anticipated costs of phasing out n-propyl bromide and other solvents would be incorporated in the £18.8 million costing given above as they are not costs directly attributed to CHIP amendments or compliance.

64. The reclassification of n-propyl bromide to Highly Flammable may also see a cost implication. Additional control equipment may be needed to adequately control the hazard.

Alternatives to n-propyl bromide

65. The control measures used by the engineering industry in degreasing activities have already be subject to change during the implementation of the previous ATP (28th) and the last amendment to the CHIP regulations. The 28th ATP classified a well-known and extensively used solvent, trichloroethylene as a category 2 carcinogen. This had significant cost implications for the industry. The regulatory impact assessment estimated the cost to industry of the classification of trichloroethylene as £105.5 million to £117 million (one-off costs) and £136.5 million to £148 million (10 year costs).

66. These costs included the costs of alternative substances; the costs of upgrading degreasing equipment; training costs; and compliance costs for SED. However, as a category 2 carcinogen, the impact was expected to be far greater than when responding to a reproductive toxicant and any immediate comparison between the classification of trichloroethylene and that of n-propyl bromide would need to be treated with caution.

Chromium trioxide – Coatings industry

67. The industry drew attention to two specific substances naphthalene (re-classified as R40 – limited evidence of a carcinogenic effect) and butyl benzyl naphthalate (classified as a Category 2 reproductive toxicant (among others)).

68. Some parts of the industry have a voluntary policy of not using any materials classified R40. Therefore, industry has stated that, when the re-classification comes into effect this, will disqualify many products from the market. The deliberate withdrawal of a product because of a substance classification is not unknown and industry usually seeks an appropriate alternative or substitute before such a decision is made. Such action is likely to be expected in this case as industry also stated the need to reformulate, trial and prove any alternatives commercially, although this was unlikely to be completed by 31 October 2005.

69. The process of finding a viable alternative to naphthalene will have a cost implication for those in industry who will not wish to use it after October 2005. However, no details were provided to indicate how many products are likely to be affected or what the cost implications would be or the effect on the market/s.

70. The reclassification of benzyl butyl phthalate (used as a constituent of some printing inks) as a Category 2 reprotoxicant has also been identified as a problem for the industry. Again, some companies choose not to sell products classified and labelled as 'Toxic', and would wish to find suitable and viable alternatives.

71. As napthalene and butyl benzyl phthalate are used in particular processes it is not possible for us to estimate potential costs without details from the industries

concerned. Furthermore, cost implications for one company in terms of reduced sales are likely to be broadly balanced by increased alternatives by other companies.

Effects of classification changes on the scope of other health and safety legislation

72. In order to estimate these, we have again used a selective approach to identify the major costs. There are two main areas of extra regulation that may be triggered by the changes in the 29th ATP; the COMAH regime and the application of the COSHH Carcinogens Approved Code of Practice.

COMAH regulations

73. The COMAH regulations implement the SEVESO II Directive on preventing and mitigating the effects of major accidents in the chemicals industry. COMAH applies where threshold quantities of dangerous chemicals identified in the regulations are kept or used. As well as listing specific dangerous substances that will cause COMAH to be applied (if the threshold quantities are reached) it also lists certain CHIP classification categories of substances and preparations that will also cause COMAH to be applied where thresholds are reached. Toxic and Very Toxic classifications appear in COMAH as 'trigger' classifications. Chromium trioxide has been re-classified as Very Toxic. Both Airbus and the British Coatings Federation have expressed concern that this reclassification may trigger the extension of COMAH to sites undertaking chrome plating where quantities of chromium trioxide exceed the threshold tonnages.

74. COMAH operates a two-tier system depending on the hazards present and the tonnage of substances on the site. Where a site falls into the 'upper tier' a full safety report on the site is needs to be prepared, requiring the involvement of HSE and local fire and other emergency authorities. HSE can charge for assisting in this process.

75. In our initial assessment we set out the results of our informal discussions with the chrome plating industry that suggested that the inclusion of chrome plating within COMAH may involve a maximum of 100 firms who will have to comply with the lower tier requirements of the COMAH regime at a typical cost of £5000 per site.

76. Informal discussions also indicated that it is possible that some larger plating firms may be subject to the upper tier provisions of COMAH. We assumed the number affected to be less than 10. For these the cost is more difficult to estimate and we assumed £15,000 / site giving a total of £150,000.

77. These costs were challenged by industry during formal consultation. Industry has identified apparent inconsistencies between the HSC's Consultative Document on the recent changes to the COMAH regulations (CD No: 193) and the initial assessment we prepared for consultation on the 29th ATP. CD No: 193 estimated the average cost of becoming an upper tier COMAH site as £511,000. This far exceeds the £15,000 per upper tier site we estimated in our earlier assessment. HSE had also estimated that the 29th ATP changes (mainly to chromium trioxide) would bring a further 10 sites into the scope of the upper tier arrangement. However,

industry identified only 1 site that it knew would become subject to upper tier COMAH arrangements at an estimated cost of up to **£511,000.**

78. Industry also estimated compliance costs for the lower tier sites arrangements at £177,000, rather than the £5000 we originally assumed. However, industry has identified only 2 sites that may fall within scope of the lower tier COMAH arrangements at an estimated cost of **£354,000.**

79. Industry qualifies both these costings, however. The companies which either supply, store or use sufficient quantities of substances that have the potential to fall within the scope of COMAH are only now addressing the possible implications of revised or new classifications brought in by the 29th ATP, and may not yet have considered all the possible affects of the COMAH thresholds and the subsequent application of those regulations. The COMAH thresholds themselves are also subject to change in July 2005 which industry claimed, has added to the uncertainty in provided more accurate costing details.

80. The table below provides an estimate on the costs of COMAH compliance for individual new and upgraded sites, present value (£'000)[5]:

Risk category:	**Effect on site (£'000):**		
	Enters COMAH as lower tier	Enters COMAH as upper tier	Moves from lower to upper tier
Analysis	£9	£66	£57
Writing	£8	£74	£65
Notification	£2	£2	£0
Information	£0	£18	£18
Emergency planning and testing	£0	£37	£37
Competent authority charges	£24	£56	£32
Costs recovered by other authorities[6]	£0	£25	£25
Total excluding control costs	**£44**	**£278**	**£234**
Control costs	£160	£376	£216
Total including control costs	**£204**	**£654**	**£450**

81. Therefore, taking these estimates, costs of applying the COMAH regulations to chrome plating processes and sites are estimated in present value terms as[7]:

1 x £654,000 (upper tier) + 2 x £204,000 (lower tier) = **£1,061,000**

82. As industry's assumption of the number of sites potentially affected is considerably less than the number originally assumed, we have made the following adjustment to the estimates given. This also reflects the adjustments to the COMAH tonnage thresholds, resulting in the potential for more chrome plating sites to fall

[5] Regulatory Impact Assessment: Health and Safety Commission paper HSC/05/26. Costs were initially expressed in 2003 prices. They have been adjusted to 2004 prices using the average earnings index.
[6] Cost initially borne by local authorities and emergency services. See also Costs to competent authorities and others.
[7] Figures have been rounded.

within the scope of COMAH. We have, therefore, estimated the costs in present value terms to the coatings industry as being:

5 x £654,000 + 25 x £204,000 = **£8,360,000**

Pesticides

83. The UK pesticide industry also raised concerns about the potential for those holding sufficient qualifying tonnages of pesticides to fall within scope of COMAH. Unlike the threshold tonnages for the classifications described above, the qualifying tonnages required to trigger COMAH for those substances classified as harmful to the environment (specifically Very Toxic and Toxic to aquatic organisms) are much higher (100 – 200 tonnes for a lower tier site, and 200 – 500 tonnes for an upper tier site). It is unlikely that any farmer or pesticide retailer would use or store such high volumes of any of the 49 approved active pesticides that appear in the 29th ATP, and therefore fall within the scope of COMAH. Therefore, we do not anticipate any costs attributed to COMAH for the UK pesticide industry as a direct result of the 29th ATP.

Control of Substances Hazardous to Health regulations (COSHH)

84. The impact of the COSHH regime, and particularly the special provisions relating to carcinogens, is more difficult to assess.

85. Annex 1 to this RIA lists those substances newly classified as Category 1 or 2 carcinogens and/or mutagens. We know that many of these substances are already subject to close control or are used in closed systems, either as a result of the processes or because of other properties (for example the petroleum products newly listed as mutagens). Where these substances are already classified as carcinogens and, as such, are subject to the special requirements of COSHH, there would be no or relatively little additional cost. We also know that the effect of classification as carcinogens will result in the substitution of some substances with less dangerous alternatives.

86. However other carcinogens will have to continue in use with extra controls. We have no reliable information on the numbers of these or the cost of extra controls. We suspect the impact will be small and confined to minor, highly specialised activities.

Costs to competent authority and others

87. We anticipate only minor costs to HSE and Local Authorities (LAs) as a result of the need to update copies of regulations, guidance and other supporting documentation.

88. However, the potential increase in the number of sites covered by the COMAH regulations may have cost implications for the emergency services. The competent authority (HSE) is required by Government to recover from industry the costs of its regulatory activities under COMAH. This includes work associated with the examination of safety reports, inspection to assess compliance, and the investigation of complaints and incidents. These costs can range between £23,000 and £54,000

per site. However, there are costs that the competent authority cannot recover, such as work relating to legal proceedings, industrial tribunals, the assessment of off-site emergency plans, or the provision of advice.

Costs to local authorities (LAs)

89. LAs are required to prepare off-site plans for upper tier sites. COMAH provides for LAs to charge the operator for any reasonably incurred costs associated with the preparation, review and testing of these plans. Information provided by the Emergency Planning Society suggests that the cost to a LA of preparing an off-site emergency plan lies between £6000 and £10,000. The cost of reviewing and revising a plan as necessary at least every three years is £500 - £1,000. This yields a cost per site of £7,300 to £12,500 in present value terms. LAs are assumed to recover 80% of these costs from site operators[8].

90. It is possible to derive the total cost to local authorities of the implementation of the 29th ATP. However this is an underestimate, as much uncertainty remains on the exact number of sites that have to comply with the COMAH regulations. This is especially the case within the pesticide industry[9]. Overall, local authorities are faced with a first year cost of between £198,000 and £330,000. Over ten years, estimated costs amount between £240,000 and £412,000 in present value terms.

Costs to the emergency services

91. COMAH provides for the emergency services to recover any reasonably incurred costs associated with their participation in testing off-site plans, albeit indirectly via the LA. However, it does not allow the Fire Service to recover costs for their contribution towards the preparation, review and revision of off-site emergency plans unless those fire authorities are emergency planning authorities in their own right. The Chief Fire Officers Association expressed its concern at this situation in their response to consultation.

92. Information from the Fire Service suggests the following cost estimates: £6000 - £10,000 for plan preparation; £500 - £2000 for review/revision; £1000 - £4000 for testing. It is assumed that the review and the testing of emergency plans takes place every three years[10]. This gives a ten-year present value cost per site to emergency services of between £9,800 and £25,200.

93. It is therefore possible to derive the total cost to emergency services of the implementation of the 29th ATP. However, as with the local authorities, costs are likely to be underestimated because of lack of information on the total number of sites that have to comply with the COMAH regulations in the pesticide industry[11]. First year costs are estimated between £198,000 and £330,000. In ten-year present value, costs amount between £323,000 and £832,000.

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[8] There is a transfer between local authorities and industries. However, society bears the full cost.
[9] The estimated cost figure presented in this section excludes costs to local authorities of complying with the COMAH requirements in the pesticide industry.
[10] Source: Regulatory Impact Assessment: Health and Safety Commission paper HSC/05/26.
[11] This cost estimate exludes pesticide sites.

Disposal costs

94. Experience with previous Adaptations suggests that the disposal costs incurred as a result of these latest changes will be negligible. Suppliers and retailers have, in the past, found various ways to deal with stocks of products with outdated labels and have not resorted to disposal as waste.

Total costs to society

95. The implementation of the 29th ATP is expected to generate an initial one–off cost of between £1.9 million and £9 million. In present value, cost to society is expected to be between £11.4 million and £18.5 million over ten years.

BENEFITS

96. The principal *benefits* of the changes will be a reduction in ill heath, injury and environmental damage as a result of adapting appropriate protective measures that take into account the dangers of the chemicals.

Health benefits

97. There is no direct or immediate connection between the implementation of the 29th ATP and the resulting health benefits. As such, it is very difficult to quantify those benefits. Nevertheless, we would expect some benefits to the health of users to accrue. The principal health benefit of the 29th ATP is in ensuring that newly recognised dangers to human health are transparently declared to users (employers, workers and consumers) of chemicals. As a result, targeted precautions can be taken or the product removed from use. The dangers include recognition of the ability of a chemical to cause cancer, to cause asthma or to severely damage the skin.

Environmental benefits

98. The proposals will inform duty holders and others of the environmental risks associated with hazardous substances. This will have three positive effects. Firstly, it will reduce the risk of misuse or disposal of the substance that might cause environmental damage. Secondly, it will ensure that where substances that have the potential to harm the environment are stored or used in high quantities, they will be more tightly regulated (i.e. through the COMAH regulations). Thirdly, it will enable duty holders to make an informed choice between a product containing substances damaging to the environment and a less environmentally harmful alternative. This may cause consumers to move towards the use of products less likely to damage the environment and place economic pressure on firms to reformulate their products to reduce or remove substances that cause the environmental damage.

Safety benefits

99. It is difficult to assess the safety benefit that will be gained from these amendments alone, rather than from the existence of the CHIP regulatory framework

as a whole. Indeed, with regard to actual incidents, it is generally difficult to disentangle the role played by CHIP in mitigating or preventing incidents from other factors (including other regulations) that would have also played a part.

100. As stated in paragraph 20, the safety risk relating to all incidents, whether affected by the CHIP regime or not, is estimated at £167 million over ten years in present value terms. However, it is expected that the CHIP regime as a whole is able to have only a marginal future impact on this total risk, ands the actual change brought about by the 29th ATP only relate to a small proportion of the risk that CHIP could mitigate in the future.

Other benefits

101. The main additional benefit to the UK implementation of the 29th ATP is the continued improvement to the Single Market by requiring all suppliers of dangerous chemicals to provide the same standard of information to their customers. This improvement will be beneficial to UK industry both domestically and in trade with other EU Member States.

102. Changes to the Approved Supply List should result in more and better information to users of dangerous substances. Hazards and risks can be more easily identified and appropriate actions taken. This should lead to improvements in health and safety, and perhaps greater protection of the environment. Amending the CHIP Regulations presents an opportunity for suppliers to review and improve safety data sheets. We might expect a tangible benefit if this is the case, given the scale of the risks already noted. However, these effects cannot be quantified, and one industry association has noted that it is seen as confusing users, and that the numerous changes can sometimes result in confusion to many `downstream' users (despite the best efforts by suppliers to explain the changes).

103. Ultimately, hazards and risks can be more easily identified and appropriate actions taken. This should lead to improvements in health and safety, and perhaps greater protection of the environment.

104. A key financial benefit relates to those substances that are newly added to the Annex. For these substances there will no longer be a need for costly self-classification by manufacturers and suppliers, and the uncertainty in the market place which results from that will disappear. On the occasions where self-classification is carried out, it is estimated that the process would involve the cost of expert scientific advice assumed to be, on current costs, £1000 per day, and to take typically, two days.

Total benefits

105. We estimate the total cost of accidents involving harmful substances are in the order of £167 million in present terms over ten years. However, the amendments following the 29th ATP would only impact on a very small, and unknown, proportion of this risk, and we cannot separately estimate the contribution that these current amendments will make in reducing these costs. We would also expect further health benefits from reductions in other illnesses. However, benefits cannot be quantified.

COMPETITION ASSESSMENT

106. The 29th ATP amends Annex 1 and Annex 5 of the Dangerous Substances Directive – 67/548/EEC (DSD). The DSD was drafted, primarily, to establish a single and common market in the field of dangerous chemicals, while ensuring a high level of protection for human health. The standardisation of classification and labelling is a key tool in providing a level playing field for those in the business of supplying dangerous chemicals. Amendments to the DSD are based on up-to-date scientific information on the known hazards of a dangerous substance. Member States do not consider the economic impact of amendments, as all suppliers of dangerous chemicals have to comply, in full, with all the new or revised classifications. The 29th ATP sets out the most recent amendments to the DSD. UK industry has dealt successfully with many previous amendments and no significant evidence indicating a negative impact on competition has been presented.

107. However, the new and revised classifications set out in the 29th ATP have the potential to affect a large variety of businesses and therefore may have an impact on competition in numerous markets, primarily for those that either manufacture or supply the chemicals and for those markets which use them. Two of the most identifiable markets that may experience an impact on competition are associated with the use of chromium trioxide (metal plating) and n-propyl bromide.

Chromium trioxide

108. Chromium trioxide is used widely in the metal plating industry. Already classified as a Category 1 carcinogen and subject to tight protection and use controls, chromium trioxide will have Category 2 mutagen and Very Toxic added to its classification. The revised Category 2 mutagen classification is not expected to impose any increase in costs to either the manufacturers or the downstream users. However, the inclusion of Very Toxic is likely to bring certain user sites into the scope of the Control of Major Accident Hazards Regulations 1999 (COMAH) (see paragraphs 73 to 82). Falling within the scope of COMAH (either as a lower-tier or an upper-tier site) will have cost implications. However, these costs are not expected to have a significant impact on competition, as the vast majority of businesses will be affected in the same way. Market structure is likely to remain unaffected.

109. Industry expressed concerns during the consultation process that the reclassification of chromium trioxide could have some competition impact on the aeronautic market. The aeronautic market is concentrated in Great Britain. Few large companies share large portions of the market and is opened to worldwide competitors. The main impact of the market depends on the number of sites that fall into the scope of the COMAH regulations. This number is estimated to be however low[12]. These costs may affect come firms more than others, but these remain relatively low compared to companies' turnover on the market. It is unlikely to change the market structure. Furthermore, the implementation of the 29th ATP directive is not expected to have any particular impact on entry on the market, as this will not lead to higher set up or ongoing costs for potential firms that existing firms do not

[12] For further details, please see Para xx.

have to meet. Chrome-plating processes are not characterised by rapid technological change. Moreover, it is unlikely that the directive will affect firms' ability to make choices on the market.

110. Overall, it is not expected that the reclassification of chromium trioxide will have any adverse impact on competition on the aeronautic market.

n-Propyl Bromide

111. Current information on n-Propyl Bromide suggests that there are three suppliers in the UK, which control a large proportion of the market. The revised classification of n-propyl bromide (it is now classified as Category 2 reproductive toxicant) will have cost implications for suppliers. Current information suggests that there will be no impact on competition.

Competition and small firms

112. It is possible that some small firms in some sectors may face disproportionately high compliance costs if they had a significant number of products requiring either new labels and/or safety data sheets, or major changes in control. Whether this would have implications for competition would depend on the scale of compliance costs and the existing level of concentration in the affected markets. The costs associated with labelling, amending safety data sheets and disposal arrangements vary across small firms but should not have a significant impact on competition.

Overall impact on UK competition

113. Overall, therefore, we have concluded that although the 29th ATP will result in costs to certain businesses, the nature of the changes and the markets affected will not result in any significant impact on competition for UK business, either domestically or across the European Union.

SMALL FIRMS IMPACT TEST

114. In March 2003, the HSC's Advisory Committee on Toxic Substances' Standing Committee for Hazard Information and Packaging (SCHIP) was consulted on the provisional list of substances in the 29th ATP. Members, associate members (representatives of trade associations) and observers were asked to provide HSE with a list of small firms (of less than 50 employees) that could be contacted for a preliminary regulatory impact assessment. The initial responses from those small businesses contacted were broadly similar.

115. The responses indicated two main areas where costs were anticipated – printing of new warning labels and the revision and/or production of new safety data sheets. Some qualification is needed, however, to show that these should not be read as generic costs. The length of time available to implement the changes, and local facilities available to small firms will play a part in the calculating the extent of the costs and where those costs will be most keenly felt.

116. There are some direct costs associated with re-labelling, although these are relatively small. Respondents have linked the costs of re-labelling to the length of time that is available to make the change after it has been announced. A period of up to a year is generally seen as sufficient to use existing stocks and to avoid unnecessary wastage. The implementation period for the 29th ATP was 18 months.

117. Amending the wording on safety data sheets is an area that suggests a wide range of costs. For some small firms it is this area that could present a significant cost. Respondents indicated those who have access to an automated system do not anticipate much in the way of cost. However, those respondents who do not have an automated system have cited significant costs, including temporary loss of employee expertise in order for this work to be carried out, and it is seen as a major undertaking.

118. We, therefore, assume that there will not be a significant impact on small firms as a result of the 29th ATP given the period of implementation available.

SUMMARY OF COSTS AND BENEFITS

119. The table below provides a summary of the total costs to society of the 29th ATP. It has not been possible to quantify any benefits. Over ten years, costs to society are estimated between £11.4 million and £18.5 million in present value terms. All quantified costs relate to implementation costs of the 29th ATP directive. Administrative costs from the 29th ATP are expected to be insignificant. Administrative costs mainly arise from familiarising with the directive and are likely to have only a small impact on costs.

	COSTS		BENEFITS	
	One-off[13]	**Ten year present value**	**One-off**	**Ten year NPV**
Low	£1,900,000	£11,400,000	Not quantified	
High	£9,000,000	£18,500,000		

UNCERTAINTIES

120. There are substantial uncertainties involved in the cost estimates. However, to some extent these have already been indicated through the use of wide estimated cost ranges. The greatest uncertainties lie in the number of preparations that will require relabelling, and the impact that reclassification may have on some products (particularly n propyl bromide and the reclassified pesticides) within the marketplace. The latter would tend to increase the estimated benefits presented in this assessment.

[13] It must be noted that this estimate does not include one-off costs for complying with the COMAH regulations triggered by the implementation of the 29th ATP. It was not possible to provide this information, as available sources express these costs only in present value terms over ten years.

121. A further uncertainty lies with the implementation of the Solvent Emissions Directive in 2007 and the costs of compliance for those who either supply or use solvents that will fall within scope of the Directive. The Directive has a qualifying threshold of 1 tonne. It is unclear how many degreasing plants in the UK currently use or store a sufficient quantity of a qualifying solvent that would result in the application of the Directive's stringent provisions. It is also not known how many such plants continue to use traditional open bath degreasers. Where such equipment is in use, it is likely that it will need to be replaced or modified to accommodate the enclosed equipment the Directive requires.

122. However, compliance costs with this Directive cannot be directly attributable to the 29th ATP or CHIP more generally.

ENFORCEMENT AND SANCTIONS

123. Experience with previous ATPs shows that the chemicals industry implements changes to the CHIP regulations without any need for enforcement from HSE. There is every reason to believe that compliance with the latest amendments will be close to 100%.

Ministerial Declaration

I have read the Regulatory Impact Assessment and I am satisfied that the benefits justify the costs.

Signed:

LORD PHILIP HUNT OF KING'S HEATH OBE

Date:

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Health and Safety Executive
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Annex 1

FINAL REGULATORY IMPACT ASSESSMENT (POST-CONSULTATION)

LIST OF SUBSTANCES CATEGORISED AS CATEGORY 1 OR 2, CARCINOGENS, MUTAGENS AND REPRODUCTIVE TOXINS OR AS VERY TOXIC IN THE 29TH ADAPTATION TO TECHNICAL PROGRESS TO THE DANGEROUS SUBSTANCES DIRECTIVE

Carc	= carcinogenic
Muta	= mutagen
Repro	= reproductive toxin
T+	= very toxic
R	= risk phrase. A complete list of risk phrases appear in the Approved Supply List

DANGEROUS SUBSTANCES DIRECTIVE: NEW AND REVISED CLASSIFICATIONS: Annex 1B

Substance:	New classification:
ziram (ISO)	T+
linuron	Repr cat 2 R61
isobutyl nitrite	Carc cat 2 R45
parathion (ISO)	T+ R26/28 (previously T+ R27/28)
parathion-methyl (ISO)	T+ R26/28 (previously T+ R28)
methamidophos	T+ R26/28
ethoprophos	T+ R26/27
chromium trioxide	Carc cat 1 R45, Muta cat 2 R46, T+ R26
potassium dichromate	Carc cat 2 R45, Muta cat 2 R46, T+ R26
ammonium dichromate	Carc cat 2 R45, Muta cat2 R46, Repr cat 2 R60-61, T+ R26
sodium dichromate anhydrate	Carc cat 2 R45, Muta cat 2 R46, Repr cat 2 R60-61, T+ R26

sodium dichromate dihydrate	Carc cat 2 R45, Muta cat 2 R46, Repr cat 2 R60-61, T+ R26
sodium chromate	Carc cat 2 R45, Muta cat 2 R46, Repr cat 2 R60-61, T+ R26
cadmium sulphate	Carc cat 2 R45, Muta cat 2 R46, Repr cat 2 R60-61, T+ R26
cadmium sulphide	Carc cat 2 R45 (previously Carc cat 3)
isoprene (stabilized)	Carc cat 2 R45
benzene	Carc cat 1 R45
1-bromopropane	Repr cat 2 R60
chloroprene (stabilized)	Carc cat 2 R45
1,2,3 trichloropropane	Carc cat 2 R45, Repr cat 2 R60
1,2-dimethoxyethane EGDME	Repr cat 2 R60 R61
methyl chloroformate	T+ R26
bromoxynil (ISO)	T+ R26
chlorothalonil (ISO)	T+ R26
dinocap (ISO)	Repr cat 2 R61
guazatine	T+ R26
2,4,6-trichloro-1,3,5-triazine cyanuric chloride	T+ R26
carbendazim	Muta cat 2 R46, Repr Cat 2 R60-61 (previously muta cat 3)
benomyl (ISO)	Muta cat 2 R46, Repr cat 2 R60-61 (previously muta cat 3)
methyl isocyanate	T+ R26

The following group of petroleum gases are now classified as Carc Cat 1 R45 and Muta Cat 2 R46. Previous classifications were Carc Cat 2 only.

Gases (petroleum), catalytic cracked naphtha depropanizer overhead, C_3-rich acid-free
Petroleum gas
[A complex combination of hydrocarbons obtained from fractionation of catalytic cracked hydrocarbons and treated to remove acidic impurities. It consists of hydrocarbons having carbon numbers in the range of C_2 through C_4, predominantly C_3.]

Gases (petroleum), catalytic cracker
Petroleum gas
[A complex combination of hydrocarbons produced by the distillation of the products from a catalytic cracking process. It consists predominantly of aliphatic hydrocarbons having carbon numbers predominantly in the range of C_1 through C_6.]

Gases (petroleum), catalytic cracker, C_{1-5}-rich
Petroleum gas
[A complex combination of hydrocarbons produced by the distillation of products from a catalytic cracking process. It consists of aliphatic hydrocarbons having carbon numbers in the range of C_1 through C_6, predominantly C_1 through C_5.]

Gases (petroleum), catalytic polymd. naphtha stabilizer overhead, C_{2-4}-rich
Petroleum gas
[A complex combination of hydrocarbons obtained from the fractionation stabilization of catalytic polymerized naphtha. It consists of aliphatic hydrocarbons having carbon numbers in the range of C_2 through C_6, predominantly C_2 through C_4.]

Gases (petroleum), catalytic reformer, C_{1-4}-rich
Petroleum gas
[A complex combination of hydrocarbons produced by distillation of products from a catalytic reforming process. It consists of hydrocarbons having carbon numbers in the range of C_1 through C_6, predominantly C_1 through C_4.]

Gases (petroleum), C_{3-5} olefinic-paraffinic alkylation feed
Petroleum gas
[A complex combination of olefinic and paraffinic hydrocarbons having carbon numbers in the range of C_3 through C_5 which are used as alkylation feed. Ambient temperatures normally exceed the critical temperature of these combinations.]

Gases (petroleum), C_4-rich
Petroleum gas
[A complex combination of hydrocarbons produced by distillation of products from a catalytic fractionation process. It consists of aliphatic hydrocarbons having carbon numbers in the range of C_3 through C_5, predominantly C_4.]

Gases (petroleum), deethanizer overheads
Petroleum gas

[A complex combination of hydrocarbons produced from distillation of the gas and gasoline fractions from the catalytic cracking process. It contains predominantly ethane and ethylene.]

Gases (petroleum), deisobutanizer tower overheads
Petroleum gas
[A complex combination of hydrocarbons produced by the atmospheric distillation of a butane-butylene stream. It consists of aliphatic hydrocarbons having carbon numbers predominantly in the range of C_3 through C_4.]

Gases (petroleum), depropanizer dry, propene-rich
Petroleum gas
[A complex combination of hydrocarbons produced by the distillation of products from the gas and gasoline fractions of a catalytic cracking process. It consists predominantly of propylene with some ethane and propane.]

Gases (petroleum), depropanizer overheads
Petroleum gas
[A complex combination of hydrocarbons produced by distillation of products from the gas and gasoline fractions of a catalytic cracking process. It consists of aliphatic hydrocarbons having carbon numbers predominantly in the range of C_2 through C_4.]

Gases (petroleum), gas recovery plant depropanizer overheads
Petroleum gas
[A complex combination of hydrocarbons obtained by fractionation of miscellaneous hydrocarbon streams. It consists predominantly of hydrocarbons having carbon numbers in the range of C_1 through C_4, predominantly propane.]

Gases (petroleum), Girbatol unit feed
Petroleum gas
[A complex combination of hydrocarbons that is used as the feed into the Girbatol unit to remove hydrogen sulfide. It consists of aliphatic hydrocarbons having carbon numbers predominantly in the range of C_2 through C_4.]

Gases (petroleum), isomerized naphtha fractionator, C_4-rich, hydrogen sulfide-free
Petroleum gas

Tail gas (petroleum), catalytic cracked clarified oil and thermal cracked vacuum residue fractionation reflux drum Petroleum gas
[A complex combination of hydrocarbons obtained from fractionation of catalytic cracked clarified oil and thermal cracked vacuum residue. It consists predominantly of hydrocarbons having carbon numbers predominantly in the range of C_1 through C_6.]

Tail gas (petroleum), catalytic cracked naphtha stabilization absorber
Petroleum gas
[A complex combination of hydrocarbons obtained from the stabilization of catalytic cracked naphtha. It consists predominantly of hydrocarbons having carbon numbers predominantly in the range of C_1 through C_6.]

Tail gas (petroleum), catalytic cracker, catalytic reformer and hydrodesulfurizer combined fractionater
Petroleum gas
[A complex combination of hydrocarbons obtained from the fractionation of products from catalytic cracking, catalytic reforming and hydrodesulfurizing processes treated to remove acidic impurities. It consists predominantly of hydrocarbons having cabon numbers predominantly in the range of C_1 through C_5.]

Tail gas (petroleum), catalytic reformed naphtha fractionation stabilizer
Petroleum gas
[A complex combination of hydrocarbons obtained from the fractionation stabilization of catalytic reformed naphtha. It consists predominantly of hydrocarbons having carbon numbers predominantly in the range of C_1 through C_4.]

Tail gas (petroleum), saturate gas plant mixed stream, C_4-rich
Petroleum gas
[A complex combination of hydrocarbons obtained from the fractionation stabilization of straight-run naphtha, distillation tail gas and catalytic reformed naphtha stabilizer tail gas. It consists of hydrocarbons having carbon numbers in the range of C_3 through C_6, predominantly butane and isobutane.]

Tail gas (petroleum), saturate gas recovery plant, C_{1-2}-rich
Petroleum gas
[A complex combination of hydrocarbons obtained from fractionation of distillate tail gas, straight-run naphtha, catalytic reformed naphtha stabilizer tail gas. It consists predominantly of hydrocarbons having carbon numbers in the range of C_1through C_5, predominantly methane and ethane.]

Tail gas (petroleum), vacuum residues thermal cracker
Petroleum gas
[A complex combination of hydrocarbons obtained from the thermal cracking of vacuum residues. It consists of hydrocarbons having carbon numbers predominantly in the range of C_1 through C_5.]

Hydrocarbons, C_{3-4}-rich, petroleum distillate
Petroleum gas
[A complex combination of hydrocarbons produced by distillation and condensation of crude oil. It consists of hydrocarbons having carbon numbers in the range of C_3 through C_5, predominantly C_3 through C_4.]

Gases (petroleum), full-range straight-run naphtha dehexanizer off
petroleum gas
[A complex combination of hydrocarbons obtained by the fractionation of the full-range straight-run naphtha. It consists of hydrocarbons having carbon numbers predominantly in the range of C_2 through C_6.]

Gases (petroleum), hydrocracking depropanizer off, hydrocarbon-rich
Petroleum gas

[A complex combination of hydrocarbon produced by the distillation of products from a hydrocracking process. It consists predominantly of hydrocarbons having carbon numbers predominantly in the range of C_1 through C_4. It may also contain small amounts of hydrogen and hydrogen sulfide.]

Gases (petroleum), light straight-run naphtha stabilizer off
Petroleum gas
[A complex combination of hydrocarbons obtained by the stabilization of light straight-run naphtha. It consists of saturated aliphatic hydrocarbons having carbon numbers predominantly in the range of C_2 through C_6.]

Residues (petroleum), alkylation splitter, C_4-rich
Petroleum gas
[A complex residuum from the distillation of streams various refinery operations. It consists of hydrocarbons having carbon numbers in the range of C_4 through C_5, predominantly butane and boiling in the range of approximately P11.7°C to 27.8°C (11°F to 82°F).]

Hydrocarbons, C_{1-4}
Petroleum gas
[A complex combination of hydrocarbons provided by thermal cracking and absorber operations and by distillation of crude oil. It consists of hydrocarbons having carbon numbers predominantly in the range of C_1 through C_4 and boiling in the range of approximately164°C to0.5°C (P263°F to 31°F).]

Hydrocarbons, C_{1-4}, sweetened
Petroleum gas
[A complex combination of hydrocarbons obtained by subjecting hydrocarbon gases to a sweetening process to convert mercaptans or to remove acidic impurities. It consists of hydrocarbons having carbon numbers predominantly in the range of C_1 through C_4 and boiling in the range of approximately164°C to0.5°C (-263°F to 31°F).]

Hydrocarbons, C_{1-3}
Petroleum gas
[A complex combination of hydrocarbons having carbon numbers predominantly in the range of C_1 through C_3 and boiling in the range of approximately164°C to42°C (-263°F to P44°F).]

Hydrocarbons, C_{1-4}, debutanizer fraction
Petroleum gas

Gases (petroleum), C_{1-5}, wet
Petroleum gas
[A complex combination of hydrocarbons produced by the distillation of crude oil and/or the cracking of tower gas oil. It consists of hydrocarbons having carbon numbers predominantly in the range of C_1 through C_5.]

Hydrocarbons, C_{2-4}
Petroleum gas

Hydrocarbons, C_3
Petroleum gas

Gases (petroleum), alkylation feed
Petroleum gas
[A complex combination of hydrocarbons produced by the catalytic cracking of gas oil. It consists of hydrocarbons having carbon numbers predominantly in the range of C_3 through C_4.]

Gases (petroleum), depropanizer bottoms fractionation off
Petroleum gas
[A complex combination of hydrocarbons obtained from the fractionation of depropanizer bottoms. It consists predominantly of butane, isobutane and butadiene.]

Gases (petroleum), refinery blend
Petroleum gas
[A complex combination obtained from various processes. It consists of hydrogen, hydrogen sulfide and hydrocarbons having carbon numbers predominantly in the range of C_1 through C_5.]

Gases (petroleum), catalytic cracking
Petroleum gas
[A complex combination of hydrocarbons produced by the distillation of the products from a catalytic cracking process. It consists predominantly of hydrocarbons having carbon numbers predominantly in the range of C_3 through C_5.]

Gases (petroleum), C_{2-4}, sweetened
Petroleum gas
[A complex combination of hydrocarbons obtained by subjecting a petroleum distillate to a sweetening process to convert mercaptans or to remove acidic impurities. It consists predominantly of saturated and unsaturated hydrocarbons having carbon numbers predominantly in the range of C_2 through C_4 and boiling in the range of approximately51°C to34°C (-60°F to30°F).]

Gases (petroleum), crude oil fractionation off
Petroleum gas
[A complex combination of hydrocarbons produced by the fractionation of crude oil. It consists of saturated aliphatic hydrocarbons having carbon numbers predominantly in the range of C_1 through C_5.]

Gases (petroleum), dehexanizer off
Petroleum gas
[A complex combination of hydrocarbons obtained by the fractionation of combined naphtha streams. It consists of saturated aliphatic hydrocarbons having carbon numbers predominantly in the range of C_1 through C_5.]

Gases (petroleum), light straight run gasoline fractionation stabilizer off
Petroleum gas

[A complex combination of hydrocarbons obtained by the fractionation of light straight-run gasoline. It consists of saturated aliphatic hydrocarbons having carbon numbers predominantly in the range of C_1 through C_5.]

Gases (petroleum), naphtha unifiner desulfurization stripper off
Petroleum gas
[A complex combination of hydrocarbons produced by a naphtha unifiner desulfurization process and stripped from the naphtha product. It consists of saturated aliphatic hydrocarbons having carbon numbers predominantly in the range of C_1 through C_4.]

Gases (petroleum), straight-run naphtha catalytic reforming off
Petroleum gas
[A complex combination of hydrocarbons obtained by the catalytic reforming of straight-run naphtha and fractionation of the total effluent. It consists of methane, ethane, and propane.]

Gases (petroleum), fluidized catalytic cracker splitter overheads
Petroleum gas
[A complex combination of hydrocarbons produced by the fractionation of the charge to the C_3C_4 splitter. It consists predominantly of C_3 hydrocarbons.]

Gases (petroleum), straight-run stabilizer off
Petroleum gas
[A complex combination of hydrocarbons obtained from the fractionation of the liquid from the first tower used in the distillation of crude oil. It consists of saturated aliphatic hydrocarbons having carbon numbers predominantly in the range of C_1 through C_4.]

Gases (petroleum), catalytic cracked naphtha debutanizer
Petroleum gas
[A complex combination of hydrocarbons obtained from fractionation of catalytic cracked naphtha. It consists of hydrocarbons having carbon numbers predominantly in the range of C_1 through C_4.]

Tail gas (petroleum), catalytic cracked distillate and naphtha stabilizer
Petroleum gas
[A complex combination of hydrocarbons obtained by the fractionation of catalytic cracked naphtha and distillate. It consists predominantly of hydrocarbons having carbon numbers predominantly in the range of C_1 through C_4.]

Tail gas (petroleum), thermal-cracked distillate, gas oil and naphtha absorber
petroleum gas
[A complex combination of hydrocarbons obtained from the separation of thermal-cracked distillates, naphtha and gas oil. It consists pedrominantly of hydrocarbons having carbon numbers predominantly in the range of C_1 through C_6.]

Tail gas (petroleum), thermal cracked hydrocarbon fractionation stabilizer, petroleum coking

Petroleum gas [A complex combination of hydrocarbons obtained from the fractionation stabilization of thermal cracked hydrocarbons from petroleum coking process. It consists of hydrocarbons having carbon numbers predominantly in the range of C_1 through C_6.]

Gases (petroleum, light steam-cracked, butadiene conc.
Petroleum gas
[A complex combination of hydrocarbons produced by the distillation of products from a thermal cracking process, It consists of hydrocarbons having a carbon number predominantly of C_4.]

Gases (petroleum), straight-run naphtha catalytic reformer stabilizer overhead
Petroleum gas
[A complex combination of hydrocarbons obtained by the catalytic reforming of straight-run naphtha and the fractionation of the total effluent. It consists of saturated aliphatic hydrocarbons having carbon numbers predominantly in the range of C_2 through C_4.]

Hydrocarbons, C_4
Petroleum gas

Alkanes, C_{1-4}, C_3-rich
Petroleum gas

Gases (petroleum), steam-cracker C_3-rich
Petroleum gas
[A complex combination of hydrocarbons produced by the distillation of products from a steam cracking process. It consists predominantly of propylene with some propane and boils in the range of approximately70°C to 0°C (-94°F to 32°F).]

Hydrocarbons, C_4, steam-cracker distillate
Petroleum gas
[A complex combination of hydrocarbons produced by the distillation of the products of a steam cracking process. It consists predominantly of hydrocarbons having a carbon number of C_4, predominantly 1-butene and 2-butene, containing also butane and isobutene and boiling in the range of approximately12°C to 5°C (10.4°F to 41°F).]

Petroleum gases, liquefied, sweetened, C_4 fraction
Petroleum gas
[A complex combination of hydrocarbons obtained by subjecting a liquified petroleum gas mix to a sweetening process to oxidize mercaptans or to remove acidic impurities. It consists predominantly of C_4 saturated and unsaturated hydrocarbons.]

Raffinates (petroleum), steam-cracked C_4 fraction cuprous ammonium acetate extn., C_{3-5} and C_{3-5} unsatd., butadiene-free
Petroleum gas

Gases (petroleum), amine system feed
Refinery gas

[The feed gas to the amine system for removal of hydrogen sulfide. It consists of hydrogen. Carbon monoxide, carbon dioxide, hydrogen sulfide and aliphatic hydrocarbons having carbon numbers predominantly in the range of C_1 through C_5 may also be present.]

Gases (petroleum), benzene unit hydrodesulfurizer off
Refinery gas
[Off gases produced by the benzene unit. It consists primarily of hydrogen. Carbon monoxide and hydrocarbons having carbon numbers predominantly in the range of C_1 through C_6, including benzene, may also be present.]

Gases (petroleum), benzene unit recycle, hydrogen-rich
Refinery gas
[A complex combination of hydrocarbons obtained by recycling the gases of the benzene unit. It consists primarily of hydrogen with various small amounts of carbon monoxide and hydrocarbons having carbon numbers in the range of C_1 through C_6.]

Gases (petroleum), blend oil, hydrogen-nitrogen-rich
Refinery gas
[A complex combination of hydrocarbons obtained by distillation of a blend oil. It consists primarily of hydrogen and nitrogen with various small amounts of carbon monoxide, carbon dioxide, and aliphatic hydrocarbons having carbon numbers predominantly in the range of C_1 through C_5.]

Gases (petroleum), catalytic reformed naphtha stripper overheads
Refinery gas
[A complex combination of hydrocarbons obtained from stabilization of catalytic reformed naphtha. Its consists of hydrogen and saturated hydrocarbons having carbon numbers predominantly in the range of C_1 through C_4.]

Gases (petroleum), C_{6-8} catalytic reformer recycle
Refinery gas
[A complex combination of hydrocarbons produced by distillation of products from catalytic reforming of C_6-C_8 feed and recycled to conserve hydrogen. It consists primarily of hydrogen. It may also contain various small amounts of carbon monoxide, carbon dioxide, nitrogen, and hydrocarbons having carbon numbers predominantly in the range of C_1 through C_6.]

Gases (petroleum), C_{6-8} catalytic reformer
Refinery gas
[A complex combination of hydrocarbons produced by distillation of products from catalytic reforming of C_6-C_8feed. It consists of hydrocarbons having carbon numbers in the range of C_1 through C_5 and hydrogen.]

Gases (petroleum), C_{6-8} catalytic reformer recycle, hydrogen-rich
Refinery gas

Gases (petroleum), C_2-return stream
Refinery gas

[A complex combination of hydrocarbons obtained by the extraction of hydrogen from a gas stream which consists primarily of hydrogen with small amounts of nitrogen, carbon monoxide, methane, ethane, and ethylene. It contains predominantly hydrocarbons such as methane, ethane, and ethylene with small amounts of hydrogen, nitrogen and carbon monoxide.]

Gases (petroleum), dry sour, gas-concn.-unit-off
Refinery gas
[The complex combination of dry gases from a gas concentration unit. It consists of hydrogen, hydrogen sulfide and hydrocarbons having carbon numbers predominantly in the range of C_1 through C_3.]

Gases (petroleum), gas concn. reabsorber distn.
Refinery gas
[A complex combination of hydrocarbons produced by distillation of products from combined gas streams in a gas concentration reabsorber. It consists predominantly of hydrogen, carbon monoxide, carbon dioxide, nitrogen, hydrogen sulfide and hydrocarbons having carbon numbers in the range of C_1 through C_3.]

Gases (petroleum), hydrogen absorber off
Refinery gas
[A complex combination obtained by absorbing hydrogen from a hydrogen rich stream. It consists of hydrogen, carbon monoxide, nitrogen, and methane with small amounts of C_2 hydrocarbons.]

Gases (petroleum), hydrogen-rich
Refinery gas
[A complex combination separated as a gas from hydrocarbon gases by chilling. It consists primarily of hydrogen with various small amounts of carbon monoxide, nitrogen, methane, and C_2 hydrocarbons.]

Gases (petroleum), hydrotreater blend oil recycle, hydrogen-nitrogen-rich
Refinery gas
[A complex combination obtained from recycled hydrotreated blend oil. It consists primarily of hydrogen and nitrogen with various small amounts of carbon monoxide, carbon dioxide and hydrocarbons having carbon numbers predominantly in the range of C_1 through C_5.]

Gases (petroleum), recycle, hydrogen-rich
Refinery gas
[A complex combination obtained from recycled reactor gases. It consists primarily of hydrogen with various small amounts of carbon monoxide, carbon dioxide, nitrogen, hydrogen sulfide, and saturated aliphatic hydrocarbons having carbon numbers in the range of C_1 through C_5.]

Gases (petroleum), reformer make-up, hydrogen-rich
Refinery gas
[A complex combination obtained from the reformers. It consists primarily of hydrogen with various small amounts of carbon monoxide and aliphatic hydrocarbons having carbon numbers predominantly in the range of C_1 through C_5.]

Gases (petroleum), reforming hydrotreater
Refinery gas
[A complex combination obtained from the reforming hydrotreating process. It consists primarily of hydrogen, methane, and ethane with various small amounts of hydrogen sulfide and aliphatic hydrocarbons having carbon numbers predominantly in the range of C_3 thorugh C_5.]

Gases (petroleum), reforming hydrotreater, hydrogen-methane-rich
Refinery gas
[A complex combination obtained from the reforming hydrotreating process. It consists primarily of hydrogen and methane with various small amounts of carbon monoxide, carbon dioxide, nitrogen and saturated aliphatic hydrocarbons having carbon numbers predominantly in the range of C_2 through C_5.]

Gases (petroleum), reforming hydrotreater make-up, hydrogen-rich
Refinery gas
[A complex combination obtained from the reforming hydrotreating process. It consists primarily of hydrogen with various small amounts of carbon monoxide and aliphatic hydrocarbons having carbon numbers predominantly in the range of C_1 through C_5.]

Gases (petroleum), thermal cracking distn.
Refinery gas
[A complex combination produced by distillation of products from a thermal cracking process. It consists of hydrogen, hydrogen sulfide, carbon monoxide, carbon dioxide and hydrocarbons having carbon numbers predominantly in the range of C_1 through C_6.]

Tail gas (petroleum), catalytic cracker refractionation absorber
Refinery gas
[A complex combination of hydrocarbons obtained from refractionation of products from a catalytic cracking process. It consists of hydrogen and hydrocarbons having carbon numbers predominantly in the range of C_1 through C_3.]

Tail gas (petroleum), catalytic reformed naphtha separator
Refinery gas
[A complex combination of hydrocarbons obtained from the catalytic reforming of straight run naphtha. It consists of hydrogen and hydrocarbons having carbon numbers predominantly in the range of C_1 through C_6.]

Tail gas (petroleum), catalytic reformed naphtha stabilizer
Refinery gas
[A complex combination of hydrocarbons obtained from the stabilization of catalytic reformed naphtha. It consists of hydrogen and hydrocarbons having carbon numbers predominantly in the range of C_1 through C_6.]

Tail gas (petroleum), cracked distillate hydrotreater separator
Refinery gas

[A complex combination of hydrocarbons obtained by treating cracked distillates with hydrogen in the presence of a catalyst. It consists of hydrogen and saturated aliphatic hydrocarbons having carbon numbers predominantly in the range of C_1 through C_5.]

Tail gas (petroleum), hydrodesulfurized straight-run naphtha separator
Refinery gas
[A complex combination of hydrocarbons obtained from hydrodesulfurization of straight-run naphtha. It consists of hydrogen and saturated aliphatic hydrocarbons having carbon numbers predominantly in the range of C_1 through C_6.]

Gases (petroleum), catalytic reformed straight-run naphtha stabilizer overheads
Refinery gas
[A complex combination of hydrocarbons obtained from the catalytic reforming of straight-run naphtha followed by fractionation of the total effluent. It consists of hydrogen, methane, ethane and propane.]

Gases (petroleum), reformer effluent high-pressure flash drum off
Refinery gas
[A complex combination produced by the high-pressure flashing of the effluent from the reforming reactor. It consists primarily of hydrogen with various small amounts of methane, ethane, and propane.]

Gases (petroleum), reformer effluent low-pressure flash drum off
Refinery gas
[A complex combination produced by low-pressure flashing of the effluent from the reforming reactor. It consists primarily of hydrogen with various small amounts of methane, ethane, and propane.]

Gases (petroleum), oil refinery gas distn. off
Refinery gas
[A complex combination separated by distillation of a gas stream containing hydrogen, carbon monoxide, carbon dioxide and hydrocarbons having carbon numbers in the range of C_1 through C_6 or obtained by cracking ethane and propane. It consists of hydrocarbons having carbon numbers predominantly in the range of C_1 through C_2, hydrogen, nitrogen, and carbon monoxide.]

Gases (petroleum), benzene unit hydrotreater depentanizer overheads
Refinery gas
[A complex combination produced by treating the feed from the benzene unit with hydrogen in the presence of a catalyst followed by depentanizing. It consists primarily of hydrogen, ethane and propane with various small amounts of nitrogen, carbon monoxide, carbon dioxide and hydrocarbons having carbon numbers predominantly in the range of C_1 through C_6. It may contain trace amounts of benzene.]

Gases (petroleum), secondary absorber off, fluidized catalytic cracker overheads fractionator
Refinery gas
[A complex combination produced by the fractionation of the overhead products from the catalytic cracking process in the fluidized catalytic cracker. It consists of

hydrogen, nitrogen, and hydrocarbons having carbon numbers predominantly in the range of C_1 through C_3.]

Petroleum products, refinery gases
Refinery gas
[A complex combination which consists primarily of hydrogen with various small amounts of methane, ethane, and propane.]

Gases (petroleum), hydrocracking low-pressure separator Refinery gas
[A complex combination obtained by the liquid-vapor separation of the hydrocracking process reactor effluent. It consists predominantly of hydrogen and saturated hydrocarbons having carbon numbers predominantly in the range of C_1 through C_3.]

Gases (petroleum), refinery
Refinery gas
[A complex combination obtained from various petroleum refining operations. It consists of hydrogen and hydrocarbons having carbon numbers predominantly in the range of C_1 through C_3.]

Gases (petroleum), platformer products separator off
Refinery gas
[A complex combination obtained from the chemical reforming of naphthenes to aromatics. It consists of hydrogen and saturated aliphatic hydrocarbons having carbon numbers predominantly in the range of C_2 through C_4.]

Gases (petroleum), hydrotreated sour kerosine depentanizer stabilizer off
Refinery gas
[The complex combination obtained from the depentanizer stabilization of hydrotreated kerosine. It consists primarily of hydrogen, methane, ethane, and propane with various small amounts of nitrogen, hydrogen sulfide, carbon monoxide and hydrocarbons having carbon numbers predominantly in the range of C_4 through C_5.]

Gases (petroleum), hydrotreated sour kerosine flash drum Refinery gas
[A complex combination obtained from the flash drum of the unit treating sour kerosine with hydrogen in the presence of a catalyst. It consists primarily of hydrogen and methane with various small amounts of nitrogen, carbon monoxide, and hydrocarbons having carbon numbers predominantly in the range of C_2 through C_5.]

Gases (petroleum), distillate unifiner desulfurization stripper off
Refinery gas
[A complex combination stripped from the liquid product of the unifiner desulfurization process. It consists of hydrogen sulfide, methane, ethane, and propane.]

Gases (petroleum), fluidized catalytic cracker fractionation off
Refinery gas
[A complex combination produced by the fractionation of the overhead product of the fluidized catalytic cracking process. It consists of hydrogen, hydrogen sulfide, nitrogen, and hydrocarbons having carbon numbers predominantly in the range of C_1 through C_5.]

Gases (petroleum), fluidized catalytic cracker scrubbing secondary absorber off
Refinery gas
[A complex combination produced by scrubbing the overhead gas from the fluidized catalytic cracker. It consists of hydrogen, nitrogen, methane, ethane and propane.]

Gases (petroleum), fluidized catalytic cracker scrubbing secondary absorber off
Refinery gas
[A complex combination produced by scrubbing the overhead gas from the fluidized catalytic cracker. It consists of hydrogen, nitrogen, methane, ethane and propane.]
Refinery gas
[A complex combination stripped from the liquid product of the heavy distillate hydrotreater desulfurization process. It consists of hydrogen, hydrogen sulfide, and saturated aliphatic hydrocarbons having carbon numbers predominantly in the range of C_1 through C_5.]

Gases (petroleum), platformer stabilizer off, light ends fractionation
Refinery gas
[A complex combination obtained by the fractionation of the light ends of the platinum reactors of the plattformer unit. It consists of hydrogen, methane, ethane and propane.]

Gases (petroleum), preflash tower off, crude distn.
Refinery gas
[A complex combination produced from the first tower used in the distillation of crude oil. It consists of nitrogen and saturated aliphatic hydrocarbons having carbon numbers predominantly in the range of C_1 through C_5.]

Gases (petroleum), tar stripper off
Refinery gas
[A complex combination obtained by the fractionation of reduced crude oil. It consists of hydrogen and hydrocarbons having carbon numbers predominantly in the range of C_1 through C_4.]

Gases (petroleum), unifiner stripper off
Refinery gas
[A combination of hydrogen and methane obtained by fractionation of the products from the unifiner unit.]

Tail gas (petroleum), catalytic hydrodesulfurized naphtha separator
Refinery gas
[A complex combination of hydrocarbons obtained from the hydrodesulfurization of naphtha. It consists of hydrogen, methane, ethane, and propane.]

Tail gas (petroleum), straight-run naphtha hydrodesulfurizer
Refinery gas
[A complex combination obtained from the hydrodesulfurization of straight-run naphtha. It consists of hydrogen and hydrocarbons having carbon numbers predominantly in the range of C_1 through C_5.]

Gases (petroleum), sponge absorber off, fluidized catalytic cracker and gas oil desulfurizer overhead fractionation
Refinery gas
[A complex combination obtained by the fractionation of products from the fluidized catalytic cracker and gas oil desulfurizer. It consists of hydrogen and hydrocarbons having carbon numbers predominantly in the range of C_1 through C_4.]

Gases (petroleum), crude distn. and catalytic cracking
Refinery gas
[A complex combination produced by crude distillation and catalytic cracking processes. It consists of hydrogen, hydrogen sulfide, nitrogen, carbon monoxide and paraffinic and olefinic hydrocarbons having carbon numbers predominantly in the range of C_1 through C_6.]

Gases (petroleum), gas oil diethanolamine scrubber off
Refinery gas
[A complex combination produced by desulfurization of gas oils with diethanolamine. It consists predominantly of hydrogen sulfide, hydrogen and aliphatic hydrocarbons having carbon numbers in the range of C_1 through C_5.]

Gases (petroleum), gas oil hydrodesulfurization effluent
Refinery gas
[A complex combination obtained by separation of the liquid phase from the effluent from the hydrogenation reaction. It consists predominantly of hydrogen, hydrogen sulfide and aliphatic hydrocarbons having carbon numbers predominantly in the range of C_1 through C_3.]

Gases (petroleum), gas oil hydrodesulfurization purge
Refinery gas
[A complex combination of gases obtained from the reformer and from the purges from the hydrogenation reactor. It consists predominantly of hydrogen and aliphatic hydrocarbons having carbon numbers predominantly in the range of C_1 through C_4.]

Gases (petroleum), hydrogenator effluent flash drum off
Refinery gas
[A complex combination of gases obtained from flash of the effluents after the hydrogenation reaction. It consists predominantly of hydrogen and aliphatic hydrocarbons having carbon numbers predominantly in the range of C_1 through C_6.]

Gases (petroleum), naphtha steam cracking high-pressure residual
Refinery gas
[A complex combination obtained as a mixture of the non-condensable portions from the product of a naphtha steam cracking process as well as residual gases obtained during the preparation of subsequent products. It consists predominantly of hydrogen and paraffinic and olefinic hydrocarbons having carbon numbers predominantly in the range of C_1 through C_5 with which natural gas may also be mixed.]

Gases (petroleum), residue visbaking off
Refinery gas

[A complex combination obtained from viscosity reduction of residues in a furnace. It consists predominantly of hydrogen sulfide and paraffinic and olefinic hydrocarbons having carbon numbers predominantly in the range of C_1 through C_5.]

Gases (petroleum), C_{3-4}
Petroleum gas
[A complex combination of hydrocarbons produced by distillation of products from the cracking of crude oil. It consists of hydrocarbons having carbon numbers in the range of C_3 through C_4, predominantly of propane and propylene, and boiling in the range of approximately51°C to1°C (-60°F to 30°F.)]

Tail gas (petroleum), catalytic cracked distillate and catalytic cracked naphtha fractionation absorber
Petroleum gas
[The complex combination of hydrocarbons from the distillation of the products from catalytic cracked distillates and catalytic cracked naphtha. It consists predominantly of hydrocarbons having carbon numbers in the range of C_1 through C_4.]

Tail gas (petroleum), catalytic polymn. naphtha fractionation stabilizer
Petroleum gas
[A complex combination of hydrocarbons from the fractionation stabilization products from polymerization of naphtha. It consists predominantly of hydrocarbons having carbon numbers in the range of C_1 through C_4.]

Tail gas (petroleum), catalytic reformed naphtha fractionation stabilizer, hydrogen sulfide-free
Petroleum gas
[A complex combination of hydrocarbons obtained from fractionation stabilization of catalytic reformed naphtha and from which hydrogen sulfide has been removed by amine treatment. It consists predominantly of hydrocarbons having carbon numbers predominantly in the range of C_1 through C_4.]

Tail gas (petroleum), cracked distillate hydrotreater stripper
Petroleum gas
[A complex combination of hydrocarbons obtained by treating thermal cracked distillates with hydrogen in the presence of a catalyst. It consists predominantly of saturated hydrocarbons having carbon numbers predominantly in the range of C_1 through C_6.]

Tail gas (petroleum), straight-run distillate hydrodesulfurizer, hydrogen sulfide-free
Petroleum gas
[A complex combination of hydrocarbons obtained from catalytic hydrodesulfurization of straight run distillates and from which hydrogen sulfide has been removed by amine treatment. It consists predominantly of hydrocarbons having carbon numbers predominantly in the range of C_1 through C_4.]

Tail gas (petroleum), gas oil catalytic cracking absorber
Petroleum gas

[A complex combination of hydrocarbons obtained from the distillation of products from the catalytic cracking of gas oil. It consists predominantly of hydrocarbons having carbon numbers predominantly in the range of C_1 through C_5.]

Tail gas (petroleum), gas recovery plant
Petroleum gas
[A complex combination of hydrocarbons from the distillation of products from miscellaneous hydrocarbon streams. It consists predominantly of hydrocarbons having carbon numbers predominantly in the range of C_1 through C_5.]

Tail gas (petroleum), gas recovery plant deethanizer
Petroleum gas
[A complex combination of hydrocarbons from the distillation of products from miscellaneous hydrocarbon streams. It consists of hydrocarbon having carbon numbers predominantly in the range of C_1 through C_4.]

Tail gas (petroleum), hydrodesulfurized distillate and hydrodesulfurized naphtha fractionator, acid-free
Petroleum gas
[A complex combination of hydrocarbons obtained from fractionation of hydrodesulfurized naphtha and distillate hydrocarbon streams and treated to remove acidic impurities. It consists predominantly of hydrocarbons having carbon numbers predominantly in the range of C_1 through C_5.]

Tail gas (petroleum), hydrodesulfurized vacuum gas oil stripper, hydrogen sulfide-free
Petroleum gas
[A complex combination of hydrocarbons obtained from stripping stabilization of catalytic hydrodesulfurized vacuum gas oil and from which hydrogen sulfide has been removed by amine treatment. It consists predominantly of hydrocarbons having carbon numbers predominantly in the range of C_1 through C_6.]

Tail gas (petroleum), light straight-run naphtha stabilizer, hydrogen sulfide-free petroleum gas
[A complex combination of hydrocarbons obtained from fractionation stabilization of light straight run naphtha and from which hydrogen sulfide has been removed by amine treatment. It consists predominantly of hydrocarbons having carbon numbers predominantly in the range of C_1 through C_5.]

Tail gas (petroleum), propane-propylene alkylation feed prep deethanizer
Petroleum gas
[A complex combination of hydrocarbons obtained from the distillation of the reaction products of propane with propylene. It consists of hydrocarbons having carbon numbers predominantly in the range of C_1 through C_4.]

Tail gas (petroleum), vacuum gas oil hydrodesulfurizer, hydrogen sulfide-free
Petroleum gas
[A complex combination of hydrocarbons obtained from catalytic hydrodesulfurization of vacuum gas oil and from which hydrogen sulfide has been removed by amine

treatment. It consists predominantly of hydrocarbons having carbon numbers predominantly in the range of C_1 through C_6.]

Gases (petroleum), catalytic cracked overheads
Petroleum gas
[A complex combination of hydrocarbons produced by the distillation of products from the catalytic cracking process. It consists of hydrocarbons having carbon numbers predominantly in the range of C_3 through C_5 and boiling in the range of approximately48°C to 32°C (-54°F to 90°F).]

Alkanes, C_{1-2}
Petroleum gas

Alkanes, C_{2-3}
Petroleum gas

Alkanes, C_{3-4}
petroleum gas

Alkanes, C_{4-5}
Petroleum gas

Fuel gases
Petroleum gas
[A combination of light gases. It consists predominantly of hydrogen and/or low molecular weight hydrocarbons.]

Fuel gases, crude oil of distillates
Petroleum gas
[A complex combination of light gases produced by distillation of crude oil and by catalytic reforming of naphtha. It consists of hydrogen and hydrocarbons having carbon numbers predominantly in the range of C_1 through C_4 and boiling in the range of approximately P217°C to P12°C (P423°F to 10°F).]

Hydrocarbons, C_{3-4}
Petroleum gas

Hydrocarbons, C_{4-5}
Petroleum gas

Hydrocarbons, C_{2-4}, C_3-rich
Petroleum gas

Petroleum gases, liquefied
Petroleum gas
[A complex combination of hydrocarbons produced by the distillation of crude oil. It consists of hydrocarbons having carbon numbers predominantly in the range of C_3 through C_7 and boiling in the range of approximately40 °C to 80 °C -(40 °F to 176 °F).]

Petroleum gases, liquefied, sweetened
Petroleum gas
[A complex combination of hydrocarbons obtained by subjecting liquefied petroleum gas mix to a sweetening process to convert mercaptans or to remove acidic impurities. It consists of hydrocarbons having carbon numbers predominantly in the range of C_3 through C_7 and boiling in the range of approximately40 °C to 80 °C (-40 °F to 176 °F).]

gases (petroleum), C_{3-4}, isobutane-rich
Petroleum gas
[A complex combination of hydrocarbons from the distillation of saturated and unsaturated hydrocarbons usually ranging in carbon numbers from C_3 through C_6, predominantly butane and isobutane. It consists of saturated and unsaturated hydrocarbons having carbon numbers in the range of C_3 through C_4, predominantly isobutane.]

Distillates (petroleum), C_{3-6}, piperylene-rich
Petroleum gas
[A complex combination of hydrocarbons from the distillation of saturated and unsaturated aliphatic hydrocarbons usually ranging in the carbon numbers C_3 through C_6. It consists of saturated and unsaturated hydrocarbons having carbon numbers in the range of C_3 through C_6, predominantly piperylenes.]

Gases (petroleum), butane splitter overheads
Petroleum gas
[A complex combination of hydrocarbons obtained from the distillation of the butane stream. It consists of aliphatic hydrocarbons having carbon numbers predominantly in the range of C_3 through C_4.]

Gases (petroleum), C_{2-}
Petroleum gas
[A complex combination of hydrocarbons produced by the distillation of products from a catalytic fractionation process. It contains predominantly ethane, ethylene, propane, and propylene.]

Gases (petroleum), catalytic-cracked gas oil depropanizer bottoms, C_4-rich acid-free
Petroleum gas
[A complex combination of hydrocarbons obtained from fractionation of catalytic cracked gas oil hydrocarbon stream and treated to remove hydrogen sulfide and other acidic components. It consists of hydrocarbons having carbon numbers in the range of C_3 through C_5, predominantly C_4.]

Gases (petroleum), catalytic-cracked naphtha debutanizer bottoms, C_{3-5}-rich
Petroleum gas
[A complex combination of hydrocarbons obtained from the stabilization of catalytic cracked naphtha. It consists of aliphatic hydrocarbons having carbon numbers predominantly in the range of C_3 through C_5.]

Tail gas (petroleum), isomerized naphtha fractionation stabilizer
Petroleum gas
[A complex combination of hydrocarbons obtained from the fractionation stabilization products from isomerized naphtha. It consists predominantly of hydrocarbons having carbon numbers predominantly in the range of C_1 through C_4.]

DANGEROUS SUBSTANCES DIRECTIVE: NEW AND REVISED CLASSIFICATIONS: Annex 1C

Substance:	New classification:
[(dimethylsilylene) bis	T+ R28
phosphine	T+ R26
sodium selenite	T+ R28
triethyly arsenate	Carc cat 1 R45
a,a,a 4-tetrachlorotoluene	Carc cat 2 R45
diphenylether; octabromo derivative	Repr cat 2 R61
1,2-bis(2-methoxyethoxy) ethane TEGDME	Repr cat 2 R61
ergocalciferol	T+ R26
colecalciferol vitamin D3	T+ R26
tetrahydrothiopyran-3-carboxaldehyde	Repr cat 2 R61
4,4-bis(dimethylamino) benzophenone	Carc cat 2 R45
oxiranemethanol,4-methylybenzene-sulfonate	Carc cat 2 R45
1,2-benzenedicarboxylic acid	Repr cat 2 R60-61
BBP benzyl butyl phtalate	Repr cat 2 R61

1,2-benzenedicarboxylic acid di-C7-11-branched and linear alkylesters	Repr cat 2 R61
mixture of: disodium 4-(3-ethoxycarbonyl -4-(5-(3-ethoxycarbonyl-5-hydroxy -1-(4-sulfonatophenyl)pyrazol-4-yl) penta-2,4-dienylidene)-4,5-dihydro -5-oxopyrazol-1-yl)benzenesulfonate trisodium 4-(3-ethoxycarbonyl-4-(5-(3-ethoxycarbonyl-5-oxido-1-(4-sulfonatophenyl)pyrazol-4-yl) penta-2,4-dienylidene)-4,5-dihydro-5-oxopyrazol-1-yl) benzenesulfonate	Repr cat 2 R61
(methylenebis(4,1-phenylenazo (1-(3-(dimethylamino)propyl) -1,2-dihydro-6-hydroxy-4-methyl -2-oxopyridine-5,3-diyl)))-1,1'-dipyridinium dichloride dihydrochloride	Carc cat 2 R45
2-[2-hydroxy-3-(2-chlorophenyl) carbamoyl-1-naphthylazo]-7-[2-hydroxy-3-(3-methylphenyl) carbamoyl-1-naphthylazo] fluoren-9-one	Repr cat 2 R61
azafenidin	Repr cat 2 R61
4-chloro-0-toluidine [1] 4-chloro-0-toluidine hydrochloride [2]	Carc cat 2 R45
2,4,5-trimethylaniline [1] 2,4,5-trimethylaniline hydrochloride [2]	Carc cat 2 R45
4,4-thiodianiline & its salts	Carc cat 2 R45
4,4-oxydianiline & its salts p-aminophenyl ether	Carc cat 2 R45
2,4-diaminoanisole 4-methoxy-m-phenylenediamine [1] 2,4-diaminoanisole sulphate [2]	Carc cat 2 R45

N,N,N,N-tetramethyl-4-4 methylendianiline	Carc cat 2 R45
C.I. Basic Violet 3 with >0.1% of Michler's ketone(EC no. 202-027-5)	Carc cat 2 R45
6-methoxy-m-toluidine p-cresidine	Carc cat 2 R45
3-ethyly-2-methyl-2-(3-methylbutyl)-1,3-oxazolidine	Repr cat 2 R60
A mixture of: 1,3,5-tris(3-aminomethylphenyl)-1,3,5-(1H,3H,5H)-triazine-2,4,6-trione a mixture of obligomers of 3,5-bis(3-aminomethylphenyl) -1-poly[3,5-bis (3-aminomethylphenyl) -2,4,6-trioxo-1,3,5-(1H,3H,5H)-triazinl-yl]-1,3,5-(1H,3H,5H) -triazine-2,4,6-trone	Carc cat 2 R45, Repr cat 2 R61

Annex 2

Final Regulatory Impact Assessment: Health and Safety Executive's Implementation Plan for the proposed CHEMICALS (HAZARD INFORMATION AND PACKAGING FOR SUPPLY) (AMENDMENT) REGULATIONS 2005, amended to implement the 29th Adaptation to Technical Progress (ATP) to the European Council's Dangerous Substances Directive

1. CHIP is well established in GB. GB chemical suppliers are familiar with CHIP, its requirements and the amendments, as a result of ATPs, that are routinely made every two to three years. Proposed regulatory changes, including those routine alterations required to implement ATPs, are subject to public consultation. The proposed amendments to CHIP and the full detail of the 29th ATP were the subject of public consultation between 17 January and 8 April 2005.

2. GB chemical suppliers and industry are engaged in the European classification process, and suppliers are usually well aware of classification and labelling changes before publication of Health and Safety Commission's (HSC) formal Consultative Document.

3. Given the well-established framework that is in place through CHIP, it is usual for routine amendments such as this one to be implemented through a minor amendment to the CHIP regulations and the approval of the HSC of a revised edition Approved Supply List (ASL).

4. In keeping with previous CHIP amendments, an announcement on the HSE web site will alert industry to both the regulations and the new ASL.