Hydrocarbon solvents commonly used in their refined forms: Human health tier II assessment

01 September 2015

Chemicals in this assessment

Chemical Name in the Inventory	CAS Number
Naphtha, petroleum, solvent refined heavy	64741-92-0
Naphtha, petroleum, hydrotreated heavy	64742-48-9
Naphtha, petroleum, hydrodesulfurized heavy	64742-82-1

Preface

This assessment was carried out by staff of the National Industrial Chemicals Notification and Assessment Scheme (NICNAS) using the Inventory Multi-tiered Assessment and Prioritisation (IMAP) framework.

The IMAP framework addresses the human health and environmental impacts of previously unassessed industrial chemicals listed on the Australian Inventory of Chemical Substances (the Inventory).

The framework was developed with significant input from stakeholders and provides a more rapid, flexible and transparent approach for the assessment of chemicals listed on the Inventory.

Stage One of the implementation of this framework, which lasted four years from 1 July 2012, examined 3000 chemicals meeting characteristics identified by stakeholders as needing priority assessment. This included chemicals for which NICNAS already held exposure information, chemicals identified as a concern or for which regulatory action had been taken overseas, and chemicals detected in international studies analysing chemicals present in babies' umbilical cord blood.

Stage Two of IMAP began in July 2016. We are continuing to assess chemicals on the Inventory, including chemicals identified as a concern for which action has been taken overseas and chemicals that can be rapidly identified and assessed by using Stage One information. We are also continuing to publish information for chemicals on the Inventory that pose a low risk to human health or the environment or both. This work provides efficiencies and enables us to identify higher risk chemicals requiring assessment.

The IMAP framework is a science and risk-based model designed to align the assessment effort with the human health and environmental impacts of chemicals. It has three tiers of assessment, with the assessment effort increasing with each tier. The Tier I assessment is a high throughput approach using tabulated electronic data. The Tier II assessment is an evaluation of risk on a substance-by-substance or chemical category-by-category basis. Tier III assessments are conducted to address specific concerns that could not be resolved during the Tier II assessment.

These assessments are carried out by staff employed by the Australian Government Department of Health and the Australian Government Department of the Environment and Energy. The human health and environment risk assessments are conducted and published separately, using information available at the time, and may be undertaken at different tiers.

This chemical or group of chemicals are being assessed at Tier II because the Tier I assessment indicated that it needed further investigation.

For more detail on this program please visit:**www.nicnas.gov.au**

Disclaimer

ACRONYMS & ABBREVIATIONS

Grouping Rationale

The chemicals in this group are substances of unknown or variable compositions, complex reaction products and biological materials (UVCBs) containing aliphatic and aromatic hydrocarbons (e.g. alkanes, cycloalkanes, aromatics, alkenes etc.).

These chemicals may be present in petroleum naphtha refinery streams used as blending constituents in final gasoline products, intermediate distillation products, or residues from distillation or extraction processes. All of the chemicals in this group are included in the low boiling point petroleum naphtha (gasoline) category as defined by the CONservation of Clean Air and Water in Europe (CONCAWE) (2001) and the gasoline blending streams category of the United States Environmental Protection Agency (US EPA) (2011) from information submitted by the American Petroleum Institute (API) Petroleum HPV Testing Group (API, 2008).

These chemicals may also be used as hydrocarbon solvents derived from petroleum naphtha refinery streams, which are highly refined to meet the requirements of specialised product specifications (e.g. low concentration of benzene (CAS No. 71-43-2)) (IPCS, 1996; CONCAWE, 2001; McKee et al., 2015). The chemical compositions of refined hydrocarbon solvents depend on both the original source of the chemical and on the refinery process applied to the petroleum streams (e.g. distillation, desulfurisation, deacidification, hydrotreatment, catalytic cracking, sweetening, etc.) used during manufacture (IPCS, 1986; McKee et al., 2015).

The refined forms of these chemicals are in the C6–C13 carbon number range and boiling point ranges covering 65 to 230 °C (NCI; SciFinder; McKee et al., 2015). The refined forms of these chemicals are described below:

- naphtha, petroleum, solvent refined heavy (CAS No. 64741-92-0) is defined as 'a complex combination of hydrocarbons obtained from a catalytic hydrodesulfurization process. It consists of hydrocarbons having carbon numbers predominantly in the range of C7 through to C12 and boiling in the range of approximately 90°C to 230°C (194°F to 446°F)' (SciFinder);
- naphtha, petroleum, hydrotreated heavy (CAS No. 64742-48-9) is defined as 'a complex combination of hydrocarbons obtained by treating a petroleum fraction with hydrogen in the presence of a catalyst. It consists of hydrocarbons having carbon numbers predominantly in the range of C6 through to C13 and boiling in the range of approximately 65°C to 230°C (149°F to 446°F)' (SciFinder); and
- naphtha, petroleum, hydrodesulfurized heavy (CAS No. 64742-82-1) is defined as 'a complex combination of hydrocarbons obtained as the raffinate from a solvent extraction process. It consists predominantly of aliphatic hydrocarbons having carbon numbers predominantly in the range of C7 through to C12 and boiling in the range of approximately 90°C to 230°C (194°F to 446°F)' (SciFinder).

The similarity between the refined forms of these chemicals and other petroleum naphtha refinery stream chemicals depends on the relative percentages of the individual constituents and their respective physicochemical properties. Although the Chemical Abstracts Service (CAS) numbers of these chemicals in petroleum naphtha refinery streams and refined hydrocarbon solvent forms may be the same, there may be a significant difference in compositions and thus the hazards may differ significantly.

The aromatic content of these chemicals in their refined forms available for cosmetic and domestic uses is reported to be up to 25 % (IPCS, 1996; OECD, 2011; OECD, 2012a; OECD, 2012b; OECD, 2012c; McKee et al., 2015), with expected low concentrations of benzene of less than 0.1 % (IPCS, 1996; API, 2008; OECD, 2011; US EPA, 2011; OECD, 2012a; OECD, 2012b; OECD, 2012c). When these chemicals are used in petroleum naphtha refinery streams, the benzene content is typically 1 % (NICNASb; Government of Canada, 2011; US EPA, 2011; Government of Canada, 2013) and, as such, the hazards and risks associated with the unrefined forms of the chemicals in this group are similar to those of the low boiling point petroleum naphthas (NICNASb).

Import, Manufacture and Use

Australian

The following Australian industrial uses were reported under previous mandatory and/or voluntary calls for information.

The chemical identified by the CAS No. 64742-82-1 has reported commercial use as solvents in surface coatings and is listed on the 2006 High Volume Industrial Chemicals List (HVICL) with a total reported volume of 10000–99999 tonnes.

The chemical identified by the CAS No. 64742-48-9 is listed in the 2006 HVICL with no identified use and a total reported volume of 1000–9999 tonnes. The chemical has reported commercial use in industrial adhesives and domestic us in automotive aftercare products.

International

The following international uses have been identified through:

- the European Union (EU) Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) dossiers;
- the Organisation for Economic Co-operation and Development (OECD) Screening information data set International Assessment Report (SIAR);
- Galleria Chemica;
- the Substances and Preparations in Nordic countries (SPIN) database;
- the European Commission Cosmetic Ingredients and Substances (CosIng) database;
- the US Personal Care Products Council International Nomenclature of Cosmetic Ingredients (INCI) Dictionary;
- US Household Products Database;
- the OECD High Production Volume chemical program (OECD HPV);
- the US National Library of Medicine's Hazardous Substances Data Bank (HSDB); and
- various international assessments (REACH; IPCS, 1996; OECD, 2011; OECD, 2012a; OECD, 2012b).

The chemicals identified by the CAS Nos. 64742-48-9 and 64742-82-1 have reported cosmetic use as solvents. These chemicals are included in the CosIng database and the US Personal Care Product Council INCI dictionary with the INCI names C10-12 alkane/cycloalkane and C8-10 alkane/cycloalkane/aromatic hydrocarbons, respectively. Only CAS No. 64742-48-9 (INCI name C10-12 alkane/cycloalkane) has documented uses in cosmetic products in the United States (Personal Care Products Council, 2011).

The chemicals have reported dosmestic uses, including as:

- cleaning/washing agents;
- solvents;
- paints;
- lacquers;
- varnishes;
- degreasers;
- corrosion inhibitors; and
- adhesives/binding agents.

The chemicals have reported uses as fuels, that can either be site-limited or can be transferred to other petroleum processing facilities such as a fractionation plant.

Restrictions

Australian

The chemicals in this group fall under the scope of the group entry for liquid hydrocarbons which are listed in the *Poisons Standard—the Standard for the Uniform Scheduling of Medicines and Poisons* (SUSMP) in Schedule 5 (SUSMP, 2015).

Schedule 5:

'HYDROCARBONS, LIQUID, including kerosene, diesel (distillate), mineral turpentine, white petroleum spirit, toluene, xylene and light mineral and paraffin oils (but excluding their derivatives), except:

(a) toluene and xylene when included in Schedule 6;

(b) benzene and liquid aromatic hydrocarbons when included in Schedule 7;

(c) food grade and pharmaceutical grade white mineral oils;

(d) in solid or semi-solid preparations;

(e) in preparations containing 25 per cent or less of designated solvents;

(f) in preparations packed in pressurised spray packs;

(g) in adhesives packed in containers each containing 50 grams or less of adhesive;

(h) in writing correction fluids and thinners for writing correction fluids packed in containers having a capacity of 20 mL or less; or

(i) in other preparations when packed in containers with a capacity of 2 mL or less.'

Schedule 5 chemicals are described as 'Substances with a low potential for causing harm, the extent of which can be reduced through the use of appropriate packaging with simple warnings and safety directions on the label.' Schedule 5 chemicals are labelled with 'Caution' (SUSMP, 2015).

International

Benzene is listed on the EU Cosmetics Regulation 1223/2009 Annex II—List of substances prohibited in cosmetic products, and all of the chemicals may be subject to the same restriction if the level of benzene is > 0.1 % w/w (CosIng).

Existing Worker Health and Safety Controls

Hazard Classification

All of the chemicals are classified as hazardous, with the following risk phrases for human health in the Hazardous Substances Information System (HSIS) (Safe Work Australia):

- R45 Carc. Cat. 1 (carcinogenicity);
- R46 Muta. Cat. 2 (mutagenicity);
- Xn; R65 (aspiration hazard).

These classifications are subject to notes H and P.

'**Note H:** The classification and label shown for this substance applies to the dangerous property(ies) indicated by the Risk Phrase(s) in combination with the category(ies) of danger shown. The manufacturers, distributors and importers of this substance shall be obliged to carry out an investigation to make themselves aware of the relevant and accessible data which exists for all other properties to classify and label the substance.'

'**Note P:** The classification as a carcinogen or mutagen need not apply if it can be shown that the substance contains less than 0.1% w/w benzene (EINECS no. 200-753-7). When the substance is classified as a carcinogen or mutagen, Note E shall also apply. When the substance is not classified as a carcinogen or mutagen, at least the Safety Phrases (2-)23-24-62 shall apply. This note applies only to certain complex oil-derived substances in Annex I.'

'**Note E:** For substances ascribed Note E, the Risk Phrases R20, R21, R22, R23, R24, R25, R26, R27, R28, R39, R68 (harmful), R48 and R65 and all combinations of these Risk Phrases should be preceded by the word 'also'.'

Exposure Standards

Australian

No specific exposure standards are available for the chemicals.

International

No specific exposure standards are available for the chemicals.

Health Hazard Information

The chemicals in this group, identified by the CAS Nos. 64742-82-1, 64741-92-0, and 64742-48-9 are also referred to as white spirit type 1, white spirit type 2 and white spirit type 3, respectively (CEFIC, 1989, as cited in IPCS, 1996). The white spirit types are differentiated by the production processes applied to the petroleum streams. The crude oil naphtha and kerosine petroleum fractions are first hydrodesulfurised to remove sulfur (type 1), then polycyclic aromatic hydrocarbons are removed by solvent extraction (type 2). Both types are fractionally distilled to

achieve the desired boiling point range. The hydrodesulfurised white spirit is treated with hydrogen using a catalyst to reduce the levels of other undesirable constituents (type 3) (IPCS, 1996). The aromatic content and benzene concentrations decrease as the petroleum streams are subjected to higher refinements (IPCS, 1996; McKee et al., 2015).

Stoddard solvent (CAS No. 8052-41-3) is a white spirit or mineral spirit which is a 'colourless, refined petroleum distillate that is free from rancid or objectionable odours and that boils in the range of approximately 149°C to 204.5°C (300°F to 400°F)' (SciFinder) and was one of the earliest commercial hydrocarbon solvents produced (McKee et al., 2015). The chemicals in this group have similar uses to Stoddard solvent, and also have similar carbon number ranges, similar boiling point ranges, and similar aromatic hydrocarbon content (up to 25%) as used in products. Where information is insufficient for the chemicals in this group, data for Stoddard solvent (NICNASb; McKee et al., 2015) are used as surrogate for the refined form of the chemicals in this group. Additionally, data from other hydrocarbon solvents and petroleum naphtha refinery streams (NICNASa; McKee et al., 2015) are used in this assessment to represent the unrefined forms of these chemicals (refer to **Grouping Rationale**).

Toxicokinetics

The chemicals in this category are UVCBs and, as a result, definitive ADME (absorption, distribution, metabolism and excretion) toxicokinetic data are difficult to ascertain.

Based on information for hydrocarbon solvents with similar carbon ranges (OECD, 2011; OECD 2012a; OECD 2012b; OECD, 2012c), the chemicals in this group are expected to be readily absorbed following inhalation and oral exposure and, to a lesser extent, following dermal exposure. Following absorption, the chemicals are expected to be excreted rapidly (within 24 hours of exposure), primarily in urine. Metabolism of the aliphatic hydrocarbons typically involves side chain oxidation to alcohol and carboxylic acid derivatives (OECD, 2011).

Acute Toxicity

Oral

The chemicals are expected to have low acute oral toxicity. Refined hydrocarbon solvents and the unrefined forms of these chemicals both have low acute toxicity based on results from animal tests following oral exposure, with the mean median lethal dose (LD50) in rats reported to be > 2000 mg/kg bw (NICNASa; NICNASb; IPCS, 1996; API, 2008; McKee et al., 2015).

However, the chemicals may present an aspiration hazard based on their viscosities. The chemicals are classified as hazardous with the risk phrase 'Harmful: may cause lung damage if swallowed' (Xn; R65) in the HSIS (Safe Work Australia).

Dermal

The chemicals are expected to have low acute dermal toxicity. Refined hydrocarbon solvents and the unrefined forms of these chemicals both have low acute toxicity based on results from animal tests following oral exposure, with LD50 in rats and rabbits reported to be > 2000 mg/kg bw (NICNASa; NICNASb; IPCS, 1996; API, 2008; McKee et al., 2015).

Inhalation

The chemicals are expected to have low acute inhalation toxicity. Refined hydrocarbon solvents and the unrefined forms of these chemicals both have low acute toxicity based on results from animal tests following oral exposure, with mean median lethal concentration (LC50) in rats reported to be >5 mg/L (> 5000 mg/m^3) (NICNASa; NICNASb; IPCS, 1996; API, 2008; McKee et al., 2015).

Corrosion / Irritation

Skin Irritation

The chemicals are not expected to be irritating to the skin. Refined hydrocarbon solvents and the unrefined forms of these chemicals both have low to moderate skin irritation potential based on results from rabbit studies (NICNASa; NICNASb; IPCS, 1996; API, 2008; McKee et al., 2015). The effects reported in these studies are not sufficient to warrant hazard classification.

Eye Irritation

The chemicals are not expected to be irritating to the eyes. Refined hydrocarbon solvents and the unrefined forms of these chemicals both have low to moderate eye irritation potential based on results from rabbit studies (NICNASa; NICNASb; IPCS, 1996; API, 2008; McKee et al., 2015). The effects reported in these studies are not sufficient to warrant hazard classification.

Sensitisation

Skin Sensitisation

The chemicals are not expected to be skin sensitisers. Refined hydrocarbon solvents and the unrefined forms of these chemicals are both negative for skin sensitisation in several studies in guinea pigs and humans (NICNASa; NICNASb; API, 2008; McKee et al., 2015).

Repeated Dose Toxicity

Oral

The chemicals are not expected to cause systemic effects from repeated oral exposure. Adverse effects observed on animal studies orally administered refined hydrocarbon solvents and the unrefined forms of these chemicals included changes in the liver and kidneys at non-classifiable levels and some are considered not relevant to humans (NICNASa; NICNASb; McKee et al., 2015).

Dermal

Repeated dermal exposure to the chemicals is unlikely to cause serious damage to health.

In a 28-day study, the chemical identified by the CAS No. 64742-48-9 (composition not specified) was exposed to Fischer 344 (F344) rats. Lowest observed adverse effect levels (LOAELs) of 500 mg/kg bw/day (haematological effects) and 1500 mg/kg bw/day (biochemical changes) were reported (Government of Canada, 2011).

Repeat dermal toxicity studies of refined hydrocarbon solvents reported no systemic effects and the only observed effects were local irritation at the test substance application site (NICNASa). Occluded applications of the unrefined forms of these chemicals resulted in no treatment-related systemic effects in 28–90-day repeat dose toxicity studies in Sprague Dawley (SD) rats at doses up to 797 mg/kg bw/day, while 28-day studies in rabbits reported LOAELs of 200 mg/kg bw/day (decreased growth rate) and 1000 mg/kg bw/day (increased mortality) (NICNASa; API, 2008).

Inhalation

Repeated inhalation exposure to the chemicals is unlikely to cause serious damage to health.

Minimal systemic effects have been observed in rodents following 28–90-day whole body inhalation exposures to the chemical identified by CAS No. 64742-48-9 (composition not specified), refined hydrocarbon solvents, and the unrefined forms of these chemicals (NICNASa; NICNASb; API, 2008; McKee et al., 2015). The range of no observed adverse effect concentrations (NOAECs) reported in some of these studies was 2.3–13.4 mg/L based on renal effects (increased kidney weight, alpha-2μ-globulin induced nephropathy, and renal lesions such as tubule dilation), liver effects (increased liver weight), and haematological changes.

Genotoxicity

The chemicals are classified as hazardous—Category 2 mutagenic substance—with the risk phrase ‘May cause heritable genetic damage’ (T; R46) in the HSIS (Safe Work Australia). This classification need not apply if it can be shown that the chemicals contain less than 0.1 % w/w benzene.

The chemical identified by the CAS No. 64742-48-9 (composition not specified) was negative in vitro for cell transformation in mouse embryo cells without metabolic activation at doses up to 200 μg/mL, and negative in vivo for micronuclei induction in polychromatic erythrocytes (PCE) of Swiss mice via oral gavage administration. No information is available for the other two chemicals.

Benzene is classified as hazardous—Category 2 mutagenic substance—with the risk phrase ‘May cause heritable genetic damage’ (T; R46) in the HSIS (Safe Work Australia). Reported concentrations of benzene are less than 0.1 % in the refined hydrocarbon solvent forms of these chemicals (IPCS, 1996; API, 2008; OECD, 2011; US EPA, 2011; OECD, 2012a; OECD, 2012b; OECD, 2012c) and typically 1 % when these chemicals are used in petroleum naphtha refinery streams (NICNASb; Government of Canada, 2011; US EPA, 2011; Government of Canada, 2013).

The benzene content of the refined forms of these chemicals is below the cut-off concentrations for mutagenicity classification, while the benzene content in the unrefined forms of these chemicals is above the cut-off concentrations (Safe Work Australia, 2004; GHS, 2009). Therefore, classification for genotoxicity could be warranted for the chemicals in this group when used in their unrefined forms (refer to **Recommendation** section).

Carcinogenicity

The chemicals are classified as hazardous—Category 1 carcinogenic substance—with the risk phrase ‘May cause cancer’ (T; R45) in the HSIS (Safe Work Australia). This classification need not apply if it can be shown that the chemical contains less than 0.1 % w/w benzene. No data are available for the chemicals in this group.

Stoddard solvent is classified in the HSIS (Safe Work Australia) similarly to the chemicals in this group, with carcinogenicity classification dependent on the benzene level. This chemical showed carcinogenic activity in male F344/N rats based on increased incidences of renal tubule adenoma in a 2-year inhalation study (NICNASa).

Benzene is classified as hazardous—Category 1 carcinogenic substance—with the risk phrase ‘May cause cancer’ (T; R45) in the HSIS (Safe Work Australia). Reported concentrations of benzene are less than 0.1 % in the refined hydrocarbon solvent forms of these chemicals (IPCS, 1996; API, 2008; OECD, 2011; US EPA, 2011; OECD, 2012a; OECD, 2012b; OECD, 2012c) and typically 1 % when these chemicals are used in petroleum naphtha refinery streams (NICNASb; Government of Canada, 2011; US EPA, 2011; Government of Canada, 2013).

The benzene content of the refined forms of these chemicals are below the cut-off concentrations for carcinogenicity classification, while the benzene content in the unrefined forms of these chemicals are above the cut-off concentrations (Safe Work Australia, 2004; GHS, 2009). Therefore, classification for carcinogenicity could be warranted for the chemicals in this group when used in their unrefined forms (refer to **Recommendation** section).

Reproductive and Developmental Toxicity

The chemicals are not expected to be reproductive or developmental toxins. For petroleum naphtha refinery stream chemicals, no adverse effects on reproductive and developmental toxicity parameters were observed in rats following inhalation exposure at concentrations up to 25 mg/L or dermal exposure at doses up to 1000 mg/kg bw/day (NICNASb; API, 2008). Similarly, several studies in rats exposed to refined hydrocarbon solvents reported no adverse effects on reproductive and developmental toxicity parameters (NICNASa; API, 2008; McKee et al., 2015).

Risk Characterisation

Critical Health Effects

The critical health effects of the chemicals are dependent on the content of benzene, which is less than 0.1 % in the refined hydrocarbon solvent forms and 1 % in the petroleum naphtha refinery streams. For the petroleum naphtha refinery streams, critical effects may include systemic long-term effects (carcinogenicity and mutagenicity).

Public Risk Characterisation

Given the uses identified for the chemicals, limited exposure to the public is anticipated, especially for the use of the chemicals as solvents. The risks from exposure to the chemicals are dependent on their benzene content, which is generally low for the refined forms of the chemicals. The *Poisons Standard* includes hydrocarbon solvents containing benzene at 15 mL/L or greater in Schedule 7, which should not be available to the public. Therefore, the public risk from exposure to these chemicals is not considered to be unreasonable.

Occupational Risk Characterisation

Given the critical systemic long-term health effects, the chemicals could pose an unreasonable risk to workers unless adequate control measures to minimise dermal, ocular and inhalation exposure are implemented. The chemicals should be appropriately classified and labelled to ensure that a person conducting a business or undertaking (PCBU) at a workplace (such as an employer) has adequate information to determine the appropriate controls.

NICNAS Recommendation

Current risk management measures are considered adequate to protect public and workers' health and safety, provided that all requirements are met under workplace health and safety, and poisons legislation as adopted by the relevant state or territory. No further assessment is required.

Regulatory Control

Public Health

Products containing the chemicals should be labelled in accordance with state and territory legislation (SUSMP, 2015).

Work Health and Safety

The chemicals are recommended for classification and labelling under the current approved criteria and adopted GHS as below. This assessment does not consider classification of physical and environmental hazards.

The hazard classification criteria for mixtures (Safe Work Australia, 2004; GHS, 2009) should be applied to these UVCB substances based on their benzene concentration. For the highly refined forms of the chemicals in this group, the benzene content is not expected to be in the range requiring hazard classification. For these hydrocarbon solvents, only the aspiration hazard classification will apply. The existing hazard classifications for genotoxicity and carcinogenicity only apply to the unrefined forms of these chemicals, and are taken to represent the highest possible classifications.

Hazard	Approved Criteria (HSIS)[a]	GHS Classification (HCIS)[b]
Acute Toxicity	Harmful: may cause lung damage if swallowed (Xn; R65)*	May be fatal if swallowed and enters airways - Aspi. Cat. 1 (H304)
Genotoxicity	Muta. Cat 2 - May cause heritable genetic damage (T; R46)*	May cause genetic defects - Cat. 1B (H340)
Carcinogenicity	Carc. Cat 2 - May cause cancer (T; R45)*	May cause cancer - Cat. 1B (H350)

[a] Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(2004)].

[b] Globally Harmonized System of Classification and Labelling of Chemicals (GHS) United Nations, 2009. Third Edition.

[*] Existing Hazard Classification. No change recommended to this classification

Advice for consumers

Products containing the chemical should be used according to the instructions on the label.

Advice for industry

Control measures

Control measures to minimise the risk from dermal, ocular, and inhalation exposure to the chemical should be implemented in accordance with the hierarchy of controls. Approaches to minimise risk include substitution, isolation and engineering controls. Measures required to eliminate, or minimise risk arising from storing, handling and using a hazardous chemical depend on the physical form and the manner in which the chemical is used. Examples of control measures which could minimise the risk include, but are not limited to:

- using closed systems or isolating operations;
- using local exhaust ventilation to prevent the chemical from entering the breathing zone of any worker;
- health monitoring for any worker who is at risk of exposure to the chemical[s], if valid techniques are available to monitor the effect on the worker's health;
- air monitoring to ensure control measures in place are working effectively and continue to do so;
- minimising manual processes and work tasks through automating processes;
- work procedures that minimise splashes and spills;
- regularly cleaning equipment and work areas; and
- using protective equipment that is designed, constructed, and operated to ensure that the worker does not come into contact with the chemical.

Guidance on managing risks from hazardous chemicals are provided in the *Managing risks of hazardous chemicals in the workplace—Code of practice* available on the Safe Work Australia website.

Personal protective equipment should not solely be relied upon to control risk and should only be used when all other reasonably practicable control measures do not eliminate or sufficiently minimise risk. Guidance in selecting personal protective equipment can be obtained from Australian, Australian/New Zealand or other approved standards.

Obligations under workplace health and safety legislation

Information in this report should be taken into account to help meet obligations under workplace health and safety legislation as adopted by the relevant state or territory. This includes, but is not limited to:

- ensuring that hazardous chemicals are correctly classified and labelled;
- ensuring that (material) safety data sheets ((M)SDS) containing accurate information about the hazards (relating to both health hazards and physicochemical (physical) hazards) of the chemical are prepared; and
- managing risks arising from storing, handling and using a hazardous chemical.

Your work health and safety regulator should be contacted for information on the work health and safety laws in your jurisdiction.

Information on how to prepare an (M)SDS and how to label containers of hazardous chemicals are provided in relevant codes of practice such as the *Preparation of safety data sheets for hazardous chemicals—Code of practice* and *Labelling of workplace hazardous chemicals—Code of practice*, respectively. These codes of practice are available from the Safe Work Australia website.

A review of the physical hazards of the chemical has not been undertaken as part of this assessment.

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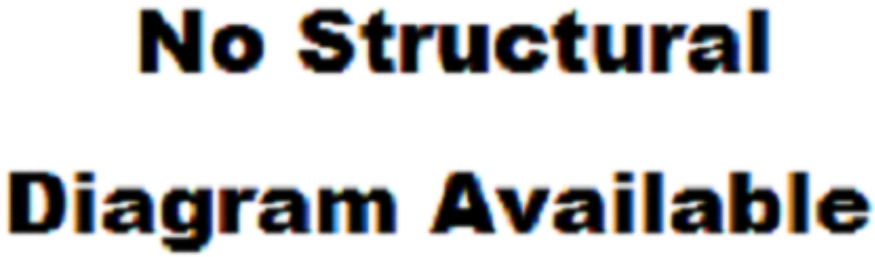
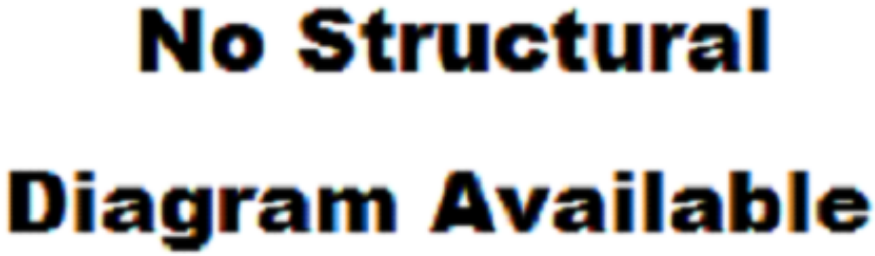
Last Update 01 September 2015

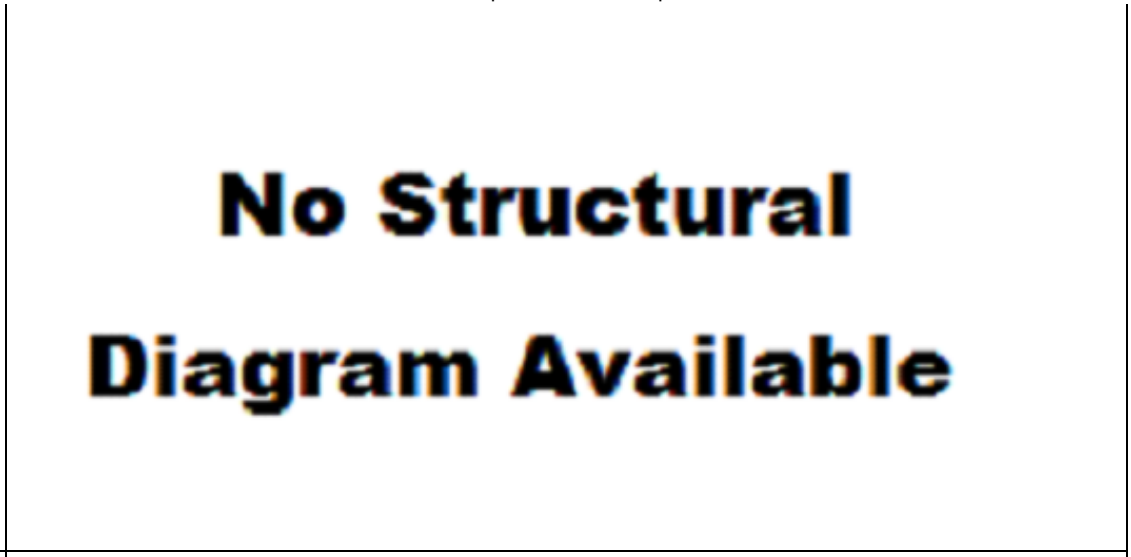
Chemical Identities

Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, solvent refined heavy** naphtha (petroleum), solvent-refined heavy white spirit type 2
CAS Number	64741-92-0

Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, hydrotreated heavy** hydrotreated light, steam cracked naphtha residuum, petroleum Exxsol D60 white spirit type 3 C10-12 alkane/cycloalkane
CAS Number	64742-48-9
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, hydrodesulfurized heavy** naphtha (petroleum), hydrodesulfurized heavy hydrodesulfurized heavy naphtha (petroleum) white spirit type 1 C8-10 alkane/cycloalkane/aromatic hydrocarbons
CAS Number	64742-82-1
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

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