



White Spirit

Incident Management

Key Points

Fire

- flammable
- reacts with strong oxidants, causing a fire and explosion hazard; attacks some forms of plastics, rubber and coatings
- emits acrid fumes and may explode when heated to decomposition
- in the event of a fire involving white spirit, use normal foam and normal fire kit with breathing apparatus

Health

- ingestion causes nausea, vomiting and abdominal pain
- systemic symptoms include drowsiness, lethargy, ataxia, convulsions, cardiac arrhythmias, coma and respiratory collapse
- aspiration into the lungs causes pneumonitis with initial choking, gasping, coughing and haemoptysis
- inhalation may cause nausea, vomiting, headache, dizziness, respiratory tract irritation, euphoria, delirium, tremor, lethargy, ataxia and drowsiness
- dermal exposure can cause irritation, drying, cracking, erythema and blistering; rarely, systemic toxicity may arise
- ocular exposure may cause irritation to the eyes, causing an immediate stinging and burning sensation with lacrimation


Environment

- avoid release to the environment; inform the Environment Agency of substantial incidents


Hazard Identification

Standard (UK) dangerous goods emergency action codes





Turpentine substitute, packing group II

UN		1300	Turpentine substitute, packing group II	
EAC		3YE	Use normal foam. Wear normal fire kit in combination with breathing apparatus*. Spillages and decontamination run-off should be prevented from entering drains and watercourses. Substance can be violently or explosively reactive. There may be a public safety hazard outside the immediate area of the incident [†]	
APP		–	–	
Hazards	Class	3	Flammable liquids	
	Sub-risks	–	–	
HIN		33	Highly flammable liquid (flashpoint below 23°C)	
<p>UN – United Nations number, EAC – emergency action code, APP – additional personal protection, HIN – hazard identification number</p> <p>* Normal firefighting clothing is appropriate, ie breathing apparatus conforming to BS EN 137 worn in combination with fire kit conforming to BS EN 469, firefighters' gloves conforming to BS EN 659 and firefighters' boots conforming to Home Office specification A29 or A30</p> <p>[†] People should stay indoors with windows and doors closed, ignition sources should be eliminated and ventilation stopped. Non-essential personnel should move at least 250 m away from the incident</p> <p>Reference Dangerous Goods Emergency Action Code List, National Chemical Emergency Centre (NCEC), Part of Ricardo-AEA. The Stationery Office, 2015.</p>				

Turpentine substitute, packing group III

UN		1300	Turpentine substitute, packing group III	
EAC		3Y	Use normal foam. Wear normal fire kit in combination with breathing apparatus*. Danger that the substance can be violently or explosively reactive. Spillages and decontamination run-off should be prevented from entering drains and watercourses	
APP		–	–	
Hazards	Class	3	Flammable liquids	
	Sub-risks	–	–	
HIN		30	Flammable liquid (flashpoint between 23°C and 60°C inclusive) or flammable liquid or solid in the molten state with a flashpoint above 60°C, heated to a temperature equal to or above its flashpoint, or self-heating liquid	
<p>UN – United Nations number, EAC – emergency action code, APP – additional personal protection, HIN – hazard identification number</p> <p>* Normal firefighting clothing is appropriate, ie breathing apparatus conforming to BS EN 137 worn in combination with fire kit conforming to BS EN 469, firefighters' gloves conforming to BS EN 659 and firefighters' boots conforming to home office specification A29 or A30</p> <p>Reference</p> <p>Dangerous Goods Emergency Action Code List, National Chemical Emergency Centre (NCEC), Part of Ricardo-AEA, The Stationery Office, 2015.</p>				

Classification, labelling and packaging (CLP)*

Hazard class and category	Asp. Tox. 1	Aspiration hazard, category 1	
	Muta. 1A	Germ cell mutagenicity, category 2	
	Carc. 1B	Carcinogenicity, category 1B	
	STOT RE 1	Specific organ toxicity after repeated exposure, category 1	
Hazard statement	H304	May be fatal if swallowed and enters airways	
	H340	May cause genetic defects	
	H350	May cause cancer	
	H372	Causes damage to organs (central nervous system)	
Signal words	DANGER		
<p>* Implemented in the EU on 20 January 2009</p> <p>Reference</p> <p>European Commission. Harmonised classification – Annexe VI to Regulation (EC) No. 1272/2008 on Classification, Labelling and Packaging of Substances and Mixtures. http://echa.europa.eu/information-on-chemicals/cl-inventory-database (accessed 07/2015).</p>			

Physicochemical Properties

CAS number	8052-41-3
Molecular weight	144 (mean)
Empirical formula	White spirit is a mixture of straight and branched chain paraffins, naphthene and alkyl aromatic hydrocarbons
Common synonyms	Stoddard solvent, mineral spirit, naptha, turpentine substitute
State at room temperature	Clear colourless liquid
Volatility	Vapour pressure: 1.5 mmHg at 25°C
Specific gravity Vapour density	0.75–0.85 (water = 1) 4.5–5 (air = 1)
Flammability	Flammable
Lower explosive limit	0.6%
Upper explosive limit	8.0%
Water solubility	Insoluble
Reactivity	Reacts with strong oxidants, causing a fire and explosion hazard. Attacks some forms of plastics, rubber and coatings
Reaction or degradation products	Emits acrid fumes and may explode when heated to decomposition
Odour	Kerosene-like odour
References	
<p>Hazardous Substances Data Bank. Stoddard solvent. HSDB No. 7171 (last revision date 23/06/2005; cited 08/2015). US National Library of Medicine: Bethesda MD. http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB (as accessed 07/2016) International Programme on Chemical Safety. International Chemical Safety Card entry for Stoddard solvent. ICSC 0361, 2004. World Health Organization: Geneva.</p>	

Reported Effect Levels from Authoritative Sources

Exposure by inhalation

ppm	mg/m ³	Signs and symptoms	Reference
>100	>590	Respiratory irritation, headache and drowsiness	a, b
<p>These values give an indication of levels of exposure that can cause adverse effects. They are not health protective standards or guideline values</p> <p>References</p> <p>a International Programme on Chemical Safety. White Spirit. Environmental Health Criteria 187, 1996. World Health Organization: Geneva.</p> <p>b European Commission. Recommendation from the Scientific Committee on Occupational Exposure Limits for 'White Spirits', 2007.</p>			

Exposure by ingestion

mL	Signs and symptoms	Reference
10–30	Potentially fatal following aspiration into the lungs	a
<p>These values give an indication of levels of exposure that can cause adverse effects. They are not health protective standards or guideline values</p> <p>Reference</p> <p>a International Programme on Chemical Safety. White Spirit. Environmental Health Criteria 187, 1996. World Health Organization: Geneva.</p>		

Ocular exposure

ppm	mg/m ³	Signs and symptoms	Reference
>102	>600	Irritation	a
<p>These values give an indication of levels of exposure that can cause adverse effects. They are not health protective standards or guideline values</p> <p>Reference</p> <p>a International Programme on Chemical Safety. White Spirit. Environmental Health Criteria 187, 1996. World Health Organization: Geneva.</p>			

Published Emergency Response Guidelines

Emergency response planning guideline (ERPG) values

	Listed value (ppm)	Calculated value (mg/m ³)
ERPG-1*	Data not available	
ERPG-2 [†]		
ERPG-3 [‡]		
<p>* Maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing other than mild transient adverse health effects or perceiving a clearly defined, objectionable odour</p> <p>[†] Maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms which could impair an individual's ability to take protective action</p> <p>[‡] Maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing life-threatening health effects</p>		

Acute exposure guideline levels (AEGLs)

	ppm				
	10 min	30 min	60 min	4 hours	8 hours
AEGL-1*	Data not available				
AEGL-2 [†]					
AEGL-3 [‡]					
<p>* Level of the chemical in air at or above which the general population could experience notable discomfort</p> <p>[†] Level of the chemical in air at or above which there may be irreversible or other serious long-lasting effects or impaired ability to escape</p> <p>[‡] Level of the chemical in air at or above which the general population could experience life-threatening health effects or death</p>					

Exposure Standards, Guidelines or Regulations

Occupational standards

	LTEL (8-hour reference period)		STEL (15-min reference period)	
	ppm	mg/m ³	ppm	mg/m ³
WEL	Not given			
WEL – workplace exposure limit, LTEL – long-term exposure limit, STEL – short-term exposure limit				

Public health guidelines

Drinking water standard	No guideline value specified
Air quality guideline	No guideline value specified
Soil guideline values and health criteria values	No guideline value specified

Health Effects

Major route of exposure

- systemic toxicity most commonly occurs after inhalational exposure, although systemic toxicity may occur following intentional ingestion and rarely after skin contact
- pulmonary toxicity is most likely to occur following ingestion (due to aspiration)

Immediate signs or symptoms of acute exposure

Route	Signs and symptoms
Inhalation	<p>Drowsiness which may lead to coma, ataxia, convulsions, cardiac arrhythmias and respiratory arrest.</p> <p>Cardiac arrhythmias (in particular ventricular fibrillation) appear to be due to sensitisation of the myocardium to catecholamines. This may be further precipitated by exercise following exposure. Direct inhalation of aerosols also may cause death due to bradycardia and cardiac arrest from vagal stimulation by rapid chilling of the larynx</p>
Ingestion	Nausea, vomiting and abdominal pain. Rarely: diarrhoea, haematemesis and melaena, corrosive damage and perforation
Aspiration in the lungs	Aspiration into the lungs causes pneumonitis. Initial features include choking, gasping, coughing and haemoptysis. Signs and symptoms may progress over 24-48 hours with wheeze, breathlessness, bronchospasm, hypoxia, fever and leukocytosis. Chest x-ray changes include patchy shadowing and pulmonary oedema (may be delayed for 24-72 hours). In severe cases shock and cardiorespiratory arrest can occur. Rarer complications include pleural effusions or pneumatoceles, lipid pneumonia, emphysema, pneumothorax and pneumomediastinum
Systemic features	Drowsiness leading to coma, ataxia, convulsions, cardiac arrhythmias, and respiratory collapse. Rarely: abnormal LFTs, acute kidney injury, myocarditis, intravascular haemolysis and disseminated intravascular coagulation
Dermal	<p>Brief exposures cause irritation, drying and cracking</p> <p>Prolonged contact may cause transient pain with erythema, blistering, necrosis, partial thickness burns and possibly full thickness burns. Rarely, systemic toxicity may arise. Dermatitis may develop after repeated exposures</p>
Ocular	May be irritating to the eyes, causing an immediate stinging and burning sensation with lacrimation
<p>Reference</p> <p>TOXBASE. White Spirit, 03/2016. http://www.toxbase.org (accessed 11/2016).</p>	

Decontamination at the Scene

Summary

The approach used for decontamination at the scene will depend upon the incident, location of the casualties and the chemicals involved. Therefore, a risk assessment should be conducted to decide on the most appropriate method of decontamination.

Following disrobe, improvised dry decontamination should be considered for an incident involving white spirit **unless casualties are demonstrating signs or symptoms of exposure to caustic or corrosive substances.**

People who are processed through improvised decontamination should subsequently be moved to a safe location, triaged and subject to health and scientific advice. Based on the outcome of the assessment, they may require further decontamination

Emergency services and public health professionals can obtain further advice from Public Health England (Centre for Radiation, Chemical and Environmental Hazards) using the 24-hour chemical hotline number: 0344 892 0555.

Disrobe

The disrobe process is highly effective at reducing exposure to HAZMAT/CBRN material when performed within 15 minutes of exposure.

Therefore, disrobe must be considered the primary action following evacuation from a contaminated area.

Where possible, disrobe at the scene should be conducted by the casualty themselves and should be systematic to avoid transferring any contamination from clothing to the skin. Consideration should be given to ensuring the welfare and dignity of casualties as far as possible.

Improvised decontamination

Improvised decontamination is an immediate method of decontamination prior to the use of specialised resources. This should be performed on all contaminated casualties, unless medical advice is received to the contrary. Improvised dry decontamination should be considered for an incident involving chemicals **unless the agent appears to be corrosive or caustic.**

Improvised dry decontamination

- any available dry absorbent material can be used such as kitchen towel, paper tissues (eg blue roll) and clean cloth
- exposed skin surfaces should be blotted and rubbed, starting with the face, head and neck and moving down and away from the body

- rubbing and blotting should not be too aggressive, or it could drive contamination further into the skin
- all waste material arising from decontamination should be left in situ, and ideally bagged, for disposal at a later stage

Improvised wet decontamination

- water should only be used for decontamination where casualty signs and symptoms are consistent with exposure to caustic or corrosive substances such as acids or alkalis
- wet decontamination may be performed using any available source of water such as taps, showers, fixed installation hose-reels and sprinklers
- when using water, it is important to try and limit the duration of decontamination to between 45 and 90 seconds and, ideally, to use a washing aid such as cloth or sponge
- improvised decontamination should not involve overly aggressive methods to remove contamination as this could drive the contamination further into the skin
- where appropriate, seek professional advice on how to dispose of contaminated water and prevent run-off going into the water system

Additional notes

- following improvised decontamination, remain cautious and observe for signs and symptoms in the decontaminated person and in unprotected staff
- if water is used to decontaminate casualties this may be contaminated, and therefore hazardous, and a potential source of further contamination spread
- all materials (paper tissues etc) used in this process may also be contaminated and, where possible, should not be used on new casualties
- the risk from hypothermia should be considered when disrobe and any form of wet decontamination is carried out
- people who are contaminated should not eat, drink or smoke before or during the decontamination process and should avoid touching their face
- consideration should be given to ensuring the welfare and dignity of casualties as far as possible. Immediately after decontamination the opportunity should be provided to dry and dress in clean robes/clothes

Interim wet decontamination

Interim decontamination is the use of standard fire and rescue service (FRS) equipment to provide a planned and structured decontamination process prior to the availability of purpose-designed decontamination equipment.

Decontamination at the scene references

National Ambulance Resilience Unit. Joint Emergency Services Interoperability Programme (JESIP). Initial operational response to a CBRN incident. Version 1.0, September 2013.

NHS England. Emergency Preparedness, Resilience and Response (EPRR). Chemical incidents: planning for the management of self-presenting patients in healthcare settings. April 2015.

Clinical Decontamination and First Aid

Clinical decontamination is the process where trained healthcare professionals using purpose designed decontamination equipment treat contaminated persons individually.

Detailed information on clinical management can be found on TOXBASE – www.toxbase.org.

Important notes

- if the patient has not been decontaminated following surface contamination, secondary carers must wear appropriate NHS PPE for chemical exposure to avoid contaminating themselves
- carry out decontamination after resuscitation; resuscitate the patient according to standard guidelines

Clinical decontamination following surface contamination

- avoid contaminating yourself
- do NOT allow smoking nearby. There may be a risk of fire
- carry out decontamination in a well-ventilated area, preferably with its own ventilation system
- the patient should remove soiled clothing and wash him/herself if possible
- put soiled clothing in a sealed container to prevent escape of volatile substances
- wash hair and all contaminated skin with liberal amounts of water (preferably warm) and soap
- pay special attention to skin folds, fingernails and ears

Dermal exposure

- decontaminate (as above) the patient following surface contamination
- for extensive or prolonged exposure there may be systemic effects – see ingestion
- burns totalling more than 15% of body surface area in adults (> 10% in children) will require standard fluid resuscitation as for thermal burns
- cover affected area with a clean non-adherent dressing
- chemical burns should be reviewed by a burns specialist. Excision or skin grafting may be required
- other supportive measures as indicated by the patient's clinical condition

Ocular exposure

- if symptomatic, immediately irrigate the affected eye thoroughly

- for patients at home, use lukewarm tap water, trickled into the eye or in a small cup held over the eye socket; an eye dropper is an alternative
- if symptoms persist seek medical assistance
- in hospital immediately irrigate the affected eye thoroughly with 0.9% saline 1000 mL (for example via an infusion bag with a giving set). A Morgan Lens may be used if anaesthetic has been given. Irrigate for 10-15 minutes
- refer for ophthalmological assessment if there is doubt regarding the management of corneal damage
- other supportive measures as indicated by the patient's clinical condition

Inhalation

- maintain a clear airway and ensure adequate ventilation
- give oxygen if indicated
- monitor vital signs, cardiac rhythm and measure blood sugar
- perform 12 lead ECG in all patients who require assessment
- other supportive measures as indicated by the patient's clinical condition

Ingestion

- maintain a clear airway and ensure adequate ventilation
- give oxygen if indicated
- gastric lavage should **not** be undertaken due to the increased risk of aspiration
- monitor vital signs, cardiac rhythm and measure blood sugar (BM)
- perform a 12-lead ECG in all patients who require assessment
- other supportive measures as indicated by the patient's clinical condition

Clinical decontamination and first aid references

TOXBASE	http://www.toxbase.org (accessed 11/2016)
TOXBASE	White Spirit, 03/2016
TOXBASE	Petroleum distillates – inhalation, 10/2016
TOXBASE	Petroleum distillates – features and management, 10/2016
TOXBASE	Petroleum distillates – skin contact, 03/2010
TOXBASE	Eye irritants, 01/2016

This document from the PHE Centre for Radiation, Chemical and Environmental Hazards reflects understanding and evaluation of the current scientific evidence as presented and referenced here.

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