Project Name:	USC VEOLIA PROJECT		Evaluation Date: 20/11/18
Sub-Contractor:	Murray & Associates	Scope of Work:	Surveying

Safety Plan Checklist	Further Action/Comments
✓ Identifies the Site ✓ Company ABN ✓ Contact details ✓ Safety Plan Signed ✓ Responsibilities detailed ✓ Policies Signed & Dated ✓ SWMS for activities ✓ Competency Certificates Signed ✓ A Plant register ✓ Plant certifications as applicable ✓ A Hazardous substance register ✓ A Electrical tool register	***Competency Certificates*** *– Please provide* ***Plant Register*** *– N/A* ***Plant Certifications*** *– N/A* ***Electrical Tool Register*** *– N/A*
SWMS Checklist	**Further Action/Comments**
Company details: ✓ ABN number on all SWMS ✓ Address on all SWMS ✓ Contact details on all SWMS ✓ Name of senior manager who has approved the SWMS on all SWMS ✓ Names of workers consulted in the development of the SWMS ✓ Person responsible for ensuring compliance with SWMS ✓ Are measures are in place to ensure compliance with the SWMS? ✓ Person responsible for reviewing SWMS controls ✓ How will the SWMS control measures be reviewed ✓ Any OHS legislation and relevant standards/codes applicable to the activity/work ✓ Hierarchy of hazard control detailed	***Hierarchy of Hazard Control*** *– Please provide*
Scope of work: ✓ Start date, duration, type of work ✓ High risk work activities nominated ✓ Consultation with relevant contractors ✓ Step-by-step sequence of undertaking the activity/work ✓ Risk assessment of each risk identified using a risk rating matrix	***High Risk Work Activities*** *– Please nominate if applicable*
Training and staffing details: ✓ Skills required ✓ Details of training ✓ List of high risk work licenses and certificate numbers ✓ WHS responsibilities nominated ✓ White/Blue Card & SWMS/WHSMP induction training ✓ Any pre-starts requirements (e.g. permits) required for the activity/work.	*N/A* *N/A*
Hazardous chemical detailed in relevant SWMS: ✓ Is there a register of all chemicals ✓ Copy of SDS sheets ✓ Risk assessment of hazardous chemicals ✓ Nominate the SWMS detailing its use	*Please provide*
Plant and Equipment detailed in relevant SWMS: ✓ Maintenance/service records/logs ✓ Register of plant and equipment	
PPE requirements detailed in relevant SWMS: ✓ PPE identified for specific activities	
Other issues: Has the project WHSMP been referred to during the development of the SWMS? i.e. work at heights Permit to Work system?	

If the above issues have been addressed, the subcontractor's submission is to be acknowledged by a representative of RCQ Construction and records kept.

Checklist Verified By..... **Dated** ……**20/11/18**

SAFE WORK METHOD STATEMENT G61474 - SWMS Rev 0

Address: 15-17 Currie Street, Nambour QLD 4560

P. 07 5441 2188
Andrew Campbell Mob: 0427 649 918
E. andrewc@mursurv.com
W. www.mursurv.com

Prepared By:	Callum Beavis	19/11/2018
Reviewed By:	Kyle Kenna	19/11/2018
Approved By:	Andrew Campbell	19/11/2018

Worker's Participation and Consultation – See page 4 or attached SWMS Review Toolbox.

Project Details

Project Name: RCQ Sunshine Coast University
Project Number: 62024 Murray & Associates
RCQ Contracting: Ryan Riddell 0403 177 419

RCQ Address: Level 1, 17 Duporth Ave, Maroochydore, QLD, 4558

Work Activity / Task Details

Start Date: 20/11/2018 Duration: Unknown

Location: University of the Sunshine Coast, Sippy Downs Drive, Sippy Downs

The following sections on this page to be completed by the person in control of the work activity.

Scope of Works: Brief description of the activity being undertaken on the project	Construction Setout Survey
How will Control Measures be implemented and how will they be monitored :	The Surveyor is responsible for: ▪ Ensuring all identified control measures are adequately and appropriately implemented ▪ Monitoring the work activity to ensure it is undertaken in accordance with the SWMS Name: Callum Beavis..... Date: 19 / 11 / 2018
Emergency Procedures : include what, if any, procedures are to be in place should an emergency arise	Emergency plan/muster point information to be provided on sign in.
Principal contractor Health and Safety Management Plan #	
Plant & Equipment Required	Total Station, GNSS Rover and Base Station, work vehicle
Maintenance Checks : Indicate how and when plant, equipment will be checked	Scheduled servicing and inspection daily.
Material Used : Indicate what material will be used	Stakes, nails, flagging tape, spray paint.
Corrective Action: what corrective action will be taken in the event of an identified failure of the SWMS	Work activity to immediately stop. Review of Safe Work Method Statement with those involved in and the person/s responsible for monitoring the activity. Amended SWMS, where applicable, or alter activity to comply with the SWMS. Report and record event.

Method of Communication: How will this SWMS be communicated to those undertaking the work activity	☒ Toolbox Talk prior to commencement of the work activity.	☒ Pre-start Meeting conducted at the start of the day's work for the duration of the work activity.	☐ Prior to each person undertaking the work activity.

Work Permits/Authorisation – Cross (X) as required						Activity / Task Specific Requirements – Cross (X) as required					
Confined Space Entry	☐	Excavation	☐	Ceiling Space Entry	☐	Access ladder	☐	Safety Signage	☐		☐
Scaffolding	☐	Safe Work	☐	Working Alone	☐	Radio – Phones	☒	Fire Extinguishers	☒		☐
Isolation - Lock out/Tag Out	☐	Road/footpath Closure	☐	Client Specific	☐	First Aid Kit	☒	Competent Observer	☐		☐
Working at Heights	☐	Hot Works	☐		☐	Barricading	☐	Traffic Management / Plan	☐		☐

Required Qualifications & Experience	Duties & Responsibilities of People	Training Required to Complete Task/Work Activity
White Card (construction industry)	Surveying supervisor is responsible for ensuring all relevant control	Introduction to Safe Work Method Statement
University of the Sunshine Coast Site Induction	Measures are implemented and that the activity is monitored.	
RCQ Site Specific Induction	Worker/s to comply with Safe Work Method Statement instructions.	

Hazardous Situations to Consider

Can anyone be struck by or come into contact with anything?
Can anyone be caught in, on, under, against or between something?
Can anyone slip, trip or fall?
Can anyone be exposed to environmental hazards (eg. Fumes, lack of oxygen, noise, temperature extremes, dust, vibrations, radiation, chemicals)?
Can anyone be exposed to physical limitations (eg. Not enough space, lack of access to tools fit for purpose, uncomfortable work position)?
Is anyone at risk from others working in close proximity?
Could process energy be reduced?
Is any environmental damage possible?
Is any property or equipment damage likely?

Risk Assessment and Controls

Appropriate control measures **MUST** be put in place to eliminate the risk, where this is not practical, the identified risk must be minimised. Control measures must be chosen from the highest possible level in the following hierarchy.

☐ **Firstly** try to *Eliminate* the risk.

☐ **Secondly** if this is not possible prevent or minimise exposure by:

- *Substituting* a less hazardous chemical
- *Isolating* the hazardous chemical from the person, or the person from the chemical.
- *Redesigning* the equipment or work process so the work can be done differently.

☐ **Thirdly** where exposure cannot be minimised and as a last resort:

- *Introduce Administrative Controls* such as safe work procedures or instruction.
- Use *Personal Protective Equipment* as the final barrier between people and the chemical

Risk Assessment Matrix Tool

Risk Matrix		Consequence (C)				
		1. Insignificant	2. Minor	3. Moderate	4. Major	5. Catastrophic
Likelihood (L)	A. Almost Certain	15. High	10. High			
	B. Probable	19. Medium	14. High	9. High		
	C. Possible	22. Low	18. Medium	13. High		
	D. Unlikely	24. Low	21. Low	17. Medium	12. High	
	E. Very Unlikely	25. Low	23. Low	20. Medium	16. High	11. High

Acceptable	Acceptable with strict controls	Un-acceptable
Low	Medium / High	

Likelihood (L)	
A	Very likely, may occur daily
B	Highly likely, may occur every week
C	Quite possible, may occur 2-3 months
D	Not expected, may occur once a year
E	Only in exceptional circumstances.

Consequence Assessment Tool

Level	Descriptor	Complaints	Variation from Contract Specification	Cost of Corrective Action	Key Service Delivery Outcomes Jeopardised	Litigation Potential	Loss of Market Access	Environmental Impact	Injury or Damage to Employee, Public or Property
1	Insignificant	Unlikely	None	Cost not visible	No	None	None	None	• First aid treatment injury only • Incident resulting in momentary work stoppage, less than $5K
2	Minor	Minor verbal complaint likely	Minor variation	Resolved locally by Company Management	Not of any consequence	None	None	Some minor contamination of soil, water, air, flora, fauna which is easily and effectively rectified	• Injury requiring medical treatment without loss of a full day • Minor loss or damage to property, between $5K - $50K
3	Moderate	Written complaint certain	Noticeable variation	Resource allocation by Company Management (within budget)	Some outcomes not achieved	Successful litigation unlikely	Minor affect	Minor contamination of soil, water, air, flora, fauna or humans that is well within the ability and resources of the company to rectify	• Injury requiring medical treatment resulting in one or more days off work • Moderate loss or damage to property, between $50K - $100K
4	Major	Significant verbal and written complaint/s certain	Significant variation	High cost of resource allocation (outside budget)	Key outcomes jeopardised	Litigation likely	Moderate affect	Contamination of soil, water air, flora, fauna or humans that requires significant resources to rectify	• Long term illness or serious injury • Major loss or damage to property, between $100K - $500K
5	Catastrophic	Significant complaints made publicly	Significant unjustifiable variation with serious implications	Significant resource allocation with very high cost of corrective action	Key product and service delivery outcomes not achieved	Successful litigation almost certain to follow	Significant affect	Significant and EPA reportable contamination of soil, water, air, flora, fauna or humans requiring significant resources beyond the ability of the company to rectify	• Death or permanent disability • Significant loss or damage to property, more than $500K

Consultation declaration:
I have been consulted in the development /review of Safe Work Procedures as outlined in this Safe Work Method Statement. This SWMS has been created using available information when developing the procedure, such as injury, illness or incident occurring and available information on the hazard including any records of incidents, illnesses and disease.

Name (Block letters)	Signature	Date	Name (Block letters)	Signature	Date
Callum Beavis		20-11-18			
Jonathan Gamlin		20-11-18			

#	Job step Break down into logical steps	Potential hazard Identify the actual and potential hazards	Legislative requirements	Initial risk C	L	R	Control Measures What will eliminate / reduce the risk (in line with the hierarchy of control)	Residual risk C	L	R	Person responsible
1.	Implementation of SWMS, JSEA	Failing to become aware of hazard may cause injury or incident to persons, environment or equipment	Work Health & Safety Act 2011 Construction Work	4	C	8	Conduct a thorough site hazard risk assessment, alert and discuss with all team members of risks identified, document on swms. Contact site/surveying supervisor if unsure of risk or hazard.	3	D	17	WHS, Supervisor, Surveyor and field assistant/s
2.	Getting to job site	Traffic Accident (inc. hazard of pedestrians, road works, children, road works, terrain/washouts)	Transport Infrastructure Act 1994, Work Health & Safety Act 2011, Traffic Road Rules, Traffic Mmgt for construction or maintenance work COP 2008	4	C	8	Obey all Qld State traffic road rules; Drive with duty of care; Do not drive if under influence of alcohol or drugs or using a mobile phone; Avoid distractions; Be observant and aware of eg. pedestrians, children, road works; Be mindful of speed near adjoining residence. Follow fit for work company procedure	3	D	17	Driver and passenger
		Spread of noxious weed	Work Health & Safety Act 2011,	3	C	13	Ensure work vehicle is clean to minimize spread of noxious weed and certify if req.	2	D	21	Driver and passenger

#	Job step Break down into logical steps	Potential hazard Identify the actual and potential hazards	Legislative requirements	Initial risk			Control Measures What will eliminate / reduce the risk (in line with the hierarchy of control)	Residual risk			Person responsible
				C	L	R		C	L	R	
			Land Access Code 2010								
3.	Emergency site evacuation procedure	In an emergency, failure to follow site procedure or have an identified evacuation plan may result in injury, death, equipment loss or environmental damage	Work Health & Safety Act 2011, Managing the work environment and facilities COP 2011	4	C	8	To be provided by RCQ. Otherwise, Evacuation procedure assessment to be made on site by competent person to determine site evacuation procedure. Discuss with team members emergency communication, quickest and safest route to evacuate the site and muster point.	3	D	17	WHS, Supervisor, Surveyor and field assistant/s
4.	Moving about the work area	Working near and within carpark	Work Health & Safety Act 2011	3	C	13	Ensure workers are observant of reversing and moving vehicles. Avoid carpark when undertaking survey.	2	D	21	Surveyor and field assistant/s
		Opening and closing of gates, uncontrolled vehicle.	Work Health & Safety Act 2011	3	C	13	Avoid fences where possible, always leave gates as you have found it. Ensure work vehicle has hand brake applied or vehicle is in gear and turned off to avoid vehicle rolling forward.	2	D	21	Surveyor and field assistant/s
		Tripping hazards eg. walking on uneven ground; Kerb; Sharp sticks and logs, Fences; potholes/excavation	Work Health & Safety Act 2011, Managing the work environment and facilities COP 2011	3	C	13	Be observant and sure footed; Walk around uneven ground, logs and sticks; Find an easier route; Stay away from fences where possible	2	D	21	Surveyor and field assistant/s
		Landowner/public activities eg. violence, machinery and vehicle movement	Work Health & Safety Act 2011	4	C	8	Leave site immediately raise alarm with site supervisor & alert anyone else on site if violence is threatened; Do not discuss job with public or land owner unless authorised to do so. Always ensure professional and courteous conduct. Phone Leanne Amuse- Council Call Centre 1300 307 800	3	D	17	Surveyor and field assistant/s
		Other machinery and operators/vehicle movement	Work Health & Safety Act 2011, Transport Infrastructure Act 1994, Traffic Mmgt for construction or	4	C	8	If working alongside road, ensure safe distance of 3 to 6m is maintained from moving road vehicle; use signage as deemed necessary by competent person. When working within carpark, ensure clear observation of traffic movement to avoid collision.	3	D	17	Surveyor and field assistant/s

#	Job step Break down into logical steps	Potential hazard Identify the actual and potential hazards	Legislative requirements	Initial risk			Control Measures What will eliminate / reduce the risk (in line with the hierarchy of control)	Residual risk			Person responsible
				C	L	R		C	L	R	
			maintenance work COP 2008, Manual of Uniform Traffic Control Devices Part 3 (MUTCD Part 3).								
		Rubbish on work area may cause tripping hazard and/or damage to environment	Work Health & Safety Act 2011, Managing the work environment and facilities COP 2011	3	C	13	Take all rubbish with you and pick up any minor rubbish as required if not too difficult	2	D	21	Surveyor and field assistant/s
		Extreme temperature and humidity conditions causing worker injury eg. Heat Stress, Fatigue, Dehydration, Sun Stroke	Work Health & Safety Act 2011, Managing the work environment and facilities COP 2011	4	C	8	Rest in vehicle or shade, if tired; Drink plenty of water; Wear Sunscreen, Wear large brimmed hat, Plan work breaks in advance and ensure meals are stored in appropriate manner ie. esky with ice; consider work hours to avoid temperature extremes	3	D	17	Surveyor and field assistant/s
		Hazardous weather conditions eg. Storms, Rain, Wind, Lightning strike	Work Health & Safety Act 2011, Managing the work environment and facilities COP 2011	4	C	8	Discontinue work if any sign of storm; Shelter in vehicle, and away from tall timber	3	D	17	Surveyor and field assistant/s
		UV radiation hazard to worker	Work Health & Safety Act 2011, Managing the work environment and facilities COP 2011	4	C	8	Worker to ensure application of sunscreen minimum every 2 hours, is wearing long sleeved UV rated shirt, UV protection sunglasses, wide brimmed hat and avoids working outside in highest UV times of day	3	D	17	Surveyor and field assistant/s
		Interaction with stinging/biting insects and plants, domestic and/or violent animals, snakes	Work Health & Safety Act 2011, Managing the work environment and facilities COP 2011	3	C	13	Use insect repellent; wear long sleeved/legged clothing; check body thoroughly for ticks; leave site if animal becomes aggressive; be mindful and observant of snakes.	2	D	21	Surveyor and field assistant/s
		Disturbing areas of indigenous and historic cultural heritage value	Aboriginal Cultural Heritage Act 2003; Qld Heritage Act 1992;	3	C	13	All team members are to be mindful and observant of cultural heritage finds. The site supervisor is to be contacted immediately of any potential cultural areas found.	2	D	21	Surveyor and field assistant/s

#	Job step Break down into logical steps	Potential hazard Identify the actual and potential hazards	Legislative requirements	Initial risk			Control Measures What will eliminate / reduce the risk (in line with the hierarchy of control)	Residual risk			Person responsible
				C	L	R		C	L	R	
5.	Setting up surveying equipment and tools	Workers or equipment connecting with fences, o/head powerlines, uneven ground	Work Health & Safety Act 2011, Managing the work environment and facilities COP 2011, Working near overhead and underground electric lines COP 2010	4	C	8	Look up and assess BEFORE setting up gear; Be sure footed, be observant, brace or lower the aerial to limit the wind cross section and to prevent the toppling and damage of the equipment	3	D	17	Surveyor and field assistant/s
		manual handling injury	Work Health & Safety Act 2011, Hazardous manual tasks COP 2011	3	C	13	be mindful of correct manual handling techniques, avoid awkward posture strain	2	D	21	Surveyor and field assistant/s
		Hazard to public tripping over survey equipment. Potential for survey equipment to be damaged or stolen	Work Health & Safety Act 2011	4	C	8	Use witches hats or barricading to alert of potential hazard to public and to protect equipment. Survey equipment to be observed to ensure its security.	3	D	17	Surveyor and field assistant/s
6.	Survey marking	Hammer pinch injury	Work Health & Safety Act 2011, Hazardous manual tasks COP 2011	3	C	13	Be mindful of correct manual handling techniques and avoid awkward posture strain and impact injury	2	D	21	Surveyor and field assistant/s
		Hazard of connecting with existing underground services	Work Health & Safety Act 2011, Working near overhead and underground electric lines COP 2010	4	C	8	Survey marks to be placed no deeper than 150mm into ground. Location of underground services to be undertaken by competent person, ensure DBYD information is observed, understood, and then proceed with caution. Potholing to be undertaken by external consultant, location of services should not require any contact with the underground service	3	D	17	Surveyor and field assistant/s
		Survey marking spray paint is a hazardous chemical if inhaled, spillage may cause environmental damage	Work Health & Safety Act 2011, Managing risks of Hazardous chemicals in the workplace COP 2013	3	C	13	Use only in well ventilated area; always face away from the wind; Ensure current SDS application for safety and clean up procedure.	2	D	21	Surveyor and field assistant/s

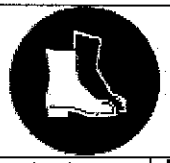
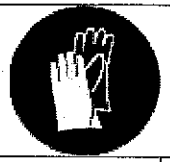
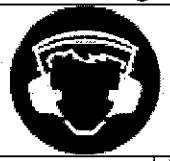
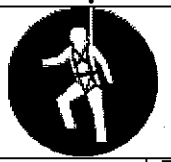
#	Job step Break down into logical steps	Potential hazard Identify the actual and potential hazards	Legislative requirements	Initial risk			Control Measures What will eliminate / reduce the risk (in line with the hierarchy of control)	Residual risk			Person responsible
				C	L	R		C	L	R	
		Impacting areas of significant and/or protected flora and fauna	Nature conservation Act 1992	3	C	13	Vegetation clearing is to be avoided and clear only (mid-storey height vegetation) if absolutely necessary. Minimise exposing ground or disturbance that may cause erosion or uncontrolled sediment.	2	D	21	Surveyor and field assistant/s
7.											

MURRAY & ASSOCIATES
SURVEYORS & TOWN PLANNERS

ABN: 81 075 543 154

62024 - SWMS Rev 00

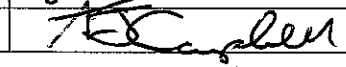
Personal Protection Equipment: Items of PPE indicated by a tick in the boxes provided below are the minimum requirements to be worn by those undertaking the work activity/task. However the person/s undertaking the task/activity must conduct a risk assessment prior to commencing (JHA) to ensure that all potential hazards have been identified and that they are adequately protected.

Hard hat		Boots		Glasses		Gloves		Hi-Vis		Hearing		Respirator		Clothing		Fall protection	
																	
Helmet	☒	Safety boots	☒	Glasses	☒	Cut resistant	☐	Hi-Vis Day	☒	Ear plugs	☐	P1	☐	Coveralls	☐	Harness	☐
Skull cap	☐	Gumboots	☐	Goggles	☐	Chemical	☐	Hi-Vis Night	☐	Ear muffs	☐	P2	☐	Welding	☐	Fall restraint	☐
Wide brim	☐			Face shield	☐	Rubber	☐	Traffic Control	☐			Cartridge	☐	apron		Fall arrest	☐
hat				Weld shield	☐	Welding	☐	UV 40+	☒								

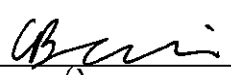
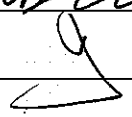
Mandatory | **Task specific.** – Remember PPE is the least effective form of control

References & record of other relevant documents (Codes of Practice, Australian Stds, SOPs , policies, procedures, SWMS.) that need to be referenced in association with this SWMS

MA 045 SOP Fatigue management and Vehicle Safety	MA 067 SOP General	
MA 098 SOP Light vehicle use		
MA 047 SOP Handling Hazardous Chemicals	MA 048 SOP Incident & Injury Management	Equipment list
MA 051 SOP Manual Handling Tasks		
		SWMS No 62024SWMS

Senior Management Representative	Signature	Position	Date
Andrew Campbell		Director	20/11/2018

Workers' declaration:
I have been instructed in the Safe Work Procedures as outline in this Safe Work Method Statement. I clearly understand my responsibilities and that failure to comply with the instruction will lead to disciplinary action, which may result in dismissal.

Name (Block letters)	Signature	Date	Name (Block letters)	Signature	Date
Callum Beavis		20.11.18			
Jonathan Gamlin		20.11.18			

Monitoring and Inspection Checklist

				SWMS No	62024SWMS
Inspection by	Callum Beavis	Position	Surveyor	Date	19.11.2018

Item	Description	Finding	Comment	Actioned by (Date)
1.	Toolbox Talk conducted prior to site mobilisation to include all personnel involved in activity.			
2.	All plant registrations checked along with maintenance/service records.			
3.	Safe Work Method Statements from relevant contractors provide and approved. Signed off by those undertaking the work activity.			
4.	Job sequence and set-up plan provided and agreed to by Site Supervisor			
5.	Appropriate PPE being worn correctly.			

[redacted]

Name of substance	Location of substance	Current MSDS Yes/No	Hazardous Yes/No	Dangerous Goods Yes/No	Class	Risk Assessment Yes/No	Uses	PPE required?
[redacted]id Repellent Tropical Strength Roll on Lotion	Survey vehicle	Yes	No	No		No	personal insecticide	
Banana Boat Sport Sunblock Lotion SFP 30	Survey vehicle	Yes	No	No		No	sunscreen	
[redacted]anana Boat Kids Sunscreen Lotion SFP 100	Survey vehicle	Yes	No	No		No	sunscreen	
Spot marking paint - flouro pink	survey vehicle & stored in shed	Yes	Yes	Yes		Yes	survey marking	safety glasses, protective clothing, respirator if vapours accumulate.
[redacted]pot marking paint - blue	survey vehicle & stored in shed	Yes	Yes	Yes		Yes	survey marking	safety glasses, protective clothing, respirator if vapours accumulate.
[redacted]ot marking paint - flouro orange	survey vehicle & stored in shed	Yes	Yes	Yes		Yes	survey marking	safety glasses, protective clothing, respirator if vapours accumulate.
[redacted]pot marking paint - red	survey vehicle & stored in shed	Yes	Yes	Yes		Yes	survey marking	safety glasses, protective clothing, respirator if vapours accumulate.
[redacted]ot marking paint - orange	survey vehicle & stored in shed	Yes	Yes	Yes		Yes	survey marking	safety glasses, protective clothing, respirator if vapours accumulate.
[redacted]ot marking paint - white	survey vehicle & stored in shed	Yes	Yes	Yes		Yes	survey marking	safety glasses, protective clothing, respirator if vapours accumulate.
[redacted]ot marking paint - green	survey vehicle & stored in shed	Yes	Yes	Yes		Yes	survey marking	safety glasses, protective clothing, respirator if vapours accumulate.
[redacted]ot marking paint - yellow	survey vehicle & stored in shed	Yes	Yes	Yes		Yes	survey marking	safety glasses, protective clothing, respirator if vapours accumulate.

Spot Marking Paint - Black, Red, Blue, Green, Yellow, Orange, Purple, Lemon

Signet Pty Ltd

Chemwatch Hazard Alert Code: 4

Chemwatch: **72-2591**
Version No: **2.1.1.1**
Safety Data Sheet according to WHS and ADG requirements

Issue Date: **13/01/2017**
Print Date: **20/12/2018**
L.GHS.AUS.EN.RISK

SECTION 1 IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

Product Identifier

Product name	Spot Marking Paint - Black, Red, Blue, Green, Yellow, Orange, Purple, Lemon
Synonyms	Item Number :11801,11802,11803, 11804, 11805, 11807, 11809, 11810
Proper shipping name	AEROSOLS
Other means of identification	Not Available

Relevant identified uses of the substance or mixture and uses advised against

Relevant Identified uses	Application is by spray atomisation from a hand held aerosol pack Use according to manufacturer's directions.

Details of the supplier of the safety data sheet

Registered company name	**Signet Pty Ltd**
Address	56 Ingleston Road Wakerley QLD 4154 Australia
Telephone	+61 7 3364 2100
Fax	+1 300 304 305
Website	www.signet.net.au
Email	sales@signet.net.au

Emergency telephone number

Association / Organisation	**Not Available**
Emergency telephone numbers	**1800 039 008 (24 Hours)**
Other emergency telephone numbers	**Not Available**

CHEMWATCH EMERGENCY RESPONSE

Primary Number	Alternative Number 1	Alternative Number 2
+61 1800 951 288	+61 2 9186 1132	Not Available

Once connected and if the message is not in your prefered language then please dial 01

SECTION 2 HAZARDS IDENTIFICATION

Classification of the substance or mixture

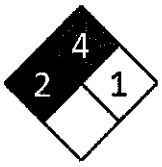
HAZARDOUS CHEMICAL. DANGEROUS GOODS. According to the WHS Regulations and the ADG Code.

CHEMWATCH HAZARD RATINGS

	Min	Max
Flammability	4	
Toxicity	1	
Body Contact	2	
Reactivity	1	
Chronic	2	

0 = Minimum
1 = Low
2 = Moderate
3 = High
4 = Extreme

NFPA 704 diamond



Note: The hazard category numbers found in GHS classification in section 2 of this SDSs are NOT to be used to fill in the NFPA 704 diamond. Blue = Health Red = Fire Yellow = Reactivity White = Special (Oxidizer or water reactive substances)

Poisons Schedule	Not Applicable
Classification [1]	Aerosols Category 1, Eye Irritation Category 2A, Carcinogenicity Category 2, Specific target organ toxicity - single exposure Category 3 (narcotic effects), Chronic Aquatic Hazard Category 3 **LIMITED EVIDENCE*
Legend:	*1. Classified by Chemwatch; 2. Classification drawn from HSIS; 3. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI*

Label elements

Hazard pictogram(s)

SIGNAL WORD	DANGER

Hazard statement(s)

H222	Extremely flammable aerosol.
H319	Causes serious eye irritation.
H351	Suspected of causing cancer.
H336	May cause drowsiness or dizziness.
H412	Harmful to aquatic life with long lasting effects.
AUH044	Risk of explosion if heated under confinement.
AUH066	Repeated exposure may cause skin dryness and cracking.

**LIMITED EVIDENCE*

Supplementary statement(s)

Not Applicable

Precautionary statement(s) General

P101	If medical advice is needed, have product container or label at hand.
P102	Keep out of reach of children.
P103	Read label before use.

Precautionary statement(s) Prevention

P201	Obtain special instructions before use.
P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P211	Do not spray on an open flame or other ignition source.
P251	Pressurized container: Do not pierce or burn, even after use.
P271	Use only outdoors or in a well-ventilated area.
P281	Use personal protective equipment as required.
P261	Avoid breathing mist/vapours/spray.
P273	Avoid release to the environment.
P280	Wear protective gloves/protective clothing/eye protection/face protection.

Precautionary statement(s) Response

P308+P313	IF exposed or concerned: Get medical advice/attention.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P312	Call a POISON CENTER or doctor/physician if you feel unwell.

P337+P313	If eye irritation persists: Get medical advice/attention.
P304+P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

Precautionary statement(s) Storage

P405	Store locked up.
P410+P412	Protect from sunlight. Do not expose to temperatures exceeding 50 °C/122 °F.
P403+P233	Store in a well-ventilated place. Keep container tightly closed.

Precautionary statement(s) Disposal

P501	Dispose of contents/container in accordance with local regulations.

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

Substances

See section below for composition of Mixtures

Mixtures

CAS No	%[weight]	Name
141-78-6	30-60	ethyl acetate
64742-82-1.	1-10	naphtha, petroleum, hydrodesulfurised heavy
64742-95-6.	1-10	naphtha petroleum, light aromatic solvent
Not Available		pigments as
1333-86-4	1-5	carbon black
13463-67-7	1-5	titanium dioxide
Not Available	<10	Ingredients determined not to be hazardous
68476-85-7.	10-30	hydrocarbon propellant

SECTION 4 FIRST AID MEASURES

Description of first aid measures

Eye Contact	If aerosols come in contact with the eyes: ▸ Immediately hold the eyelids apart and flush the eye continuously for at least 15 minutes with fresh running water. ▸ Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids. ▸ Transport to hospital or doctor without delay. ▸ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
Skin Contact	If solids or aerosol mists are deposited upon the skin: ▸ Flush skin and hair with running water (and soap if available). ▸ Remove any adhering solids with industrial skin cleansing cream. ▸ DO NOT use solvents. ▸ Seek medical attention in the event of irritation.
Inhalation	If aerosols, fumes or combustion products are inhaled: ▸ Remove to fresh air. ▸ Lay patient down. Keep warm and rested. ▸ Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures. ▸ If breathing is shallow or has stopped, ensure clear airway and apply resuscitation, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary. ▸ Transport to hospital, or doctor.
Ingestion	▸ Avoid giving milk or oils. ▸ Avoid giving alcohol. ▸ Not considered a normal route of entry. ▸ If spontaneous vomiting appears imminent or occurs, hold patient's head down, lower than their hips to help avoid possible aspiration of vomitus.

Indication of any immediate medical attention and special treatment needed

For acute or short term repeated exposures to petroleum distillates or related hydrocarbons:

- Primary threat to life, from pure petroleum distillate ingestion and/or inhalation, is respiratory failure.
- Patients should be quickly evaluated for signs of respiratory distress (e.g. cyanosis, tachypnoea, intercostal retraction, obtundation) and given oxygen. Patients with inadequate tidal volumes or poor arterial blood gases (pO2 50 mm Hg) should be intubated.
- Arrhythmias complicate some hydrocarbon ingestion and/or inhalation and electrocardiographic evidence of myocardial injury has been reported;

- intravenous lines and cardiac monitors should be established in obviously symptomatic patients. The lungs excrete inhaled solvents, so that hyperventilation improves clearance.
- A chest x-ray should be taken immediately after stabilisation of breathing and circulation to document aspiration and detect the presence of pneumothorax.
- Epinephrine (adrenalin) is not recommended for treatment of bronchospasm because of potential myocardial sensitisation to catecholamines. Inhaled cardioselective bronchodilators (e.g. Alupent, Salbutamol) are the preferred agents, with aminophylline a second choice.
- Lavage is indicated in patients who require decontamination; ensure use of cuffed endotracheal tube in adult patients. [Ellenhorn and Barceloux: Medical Toxicology]

Treat symptomatically.

SECTION 5 FIREFIGHTING MEASURES

Extinguishing media

- Alcohol stable foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.
- Water spray or fog - Large fires only.

SMALL FIRE:
- Water spray, dry chemical or CO_2

LARGE FIRE:
- Water spray or fog.

Special hazards arising from the substrate or mixture

Fire Incompatibility	▸ Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result

Advice for firefighters

Fire Fighting	▸ Alert Fire Brigade and tell them location and nature of hazard. ▸ May be violently or explosively reactive. ▸ Wear breathing apparatus plus protective gloves. ▸ Prevent, by any means available, spillage from entering drains or water course. ▸ If safe, switch off electrical equipment until vapour fire hazard removed. ▸ Use water delivered as a fine spray to control fire and cool adjacent area. ▸ **DO NOT** approach containers suspected to be hot. ▸ Cool fire exposed containers with water spray from a protected location. ▸ If safe to do so, remove containers from path of fire. ▸ Equipment should be thoroughly decontaminated after use.
Fire/Explosion Hazard	▸ Liquid and vapour are highly flammable. ▸ Severe fire hazard when exposed to heat or flame. ▸ Vapour forms an explosive mixture with air. ▸ Severe explosion hazard, in the form of vapour, when exposed to flame or spark. ▸ Vapour may travel a considerable distance to source of ignition. ▸ Heating may cause expansion or decomposition with violent container rupture. ▸ Aerosol cans may explode on exposure to naked flames. ▸ Rupturing containers may rocket and scatter burning materials. ▸ Hazards may not be restricted to pressure effects. ▸ May emit acrid, poisonous or corrosive fumes. ▸ On combustion, may emit toxic fumes of carbon monoxide (CO). Combustion products include: carbon dioxide (CO_2) other pyrolysis products typical of burning organic material. **Contains low boiling substance:** Closed containers may rupture due to pressure buildup under fire conditions.
HAZCHEM	Not Applicable

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

See section 8

Environmental precautions

See section 12

Methods and material for containment and cleaning up

Minor Spills	▸ Clean up all spills immediately. ▸ Avoid breathing vapours and contact with skin and eyes.

	▸ Wear protective clothing, impervious gloves and safety glasses. ▸ Shut off all possible sources of ignition and increase ventilation. ▸ Wipe up. ▸ If safe, damaged cans should be placed in a container outdoors, away from all ignition sources, until pressure has dissipated. ▸ Undamaged cans should be gathered and stowed safely.
Major Spills	▸ Clear area of personnel and move upwind. ▸ Alert Fire Brigade and tell them location and nature of hazard. ▸ May be violently or explosively reactive. ▸ Wear breathing apparatus plus protective gloves. ▸ Prevent, by any means available, spillage from entering drains or water courses ▸ No smoking, naked lights or ignition sources. ▸ Increase ventilation. ▸ Stop leak if safe to do so. ▸ Water spray or fog may be used to disperse / absorb vapour. ▸ Absorb or cover spill with sand, earth, inert materials or vermiculite. ▸ If safe, damaged cans should be placed in a container outdoors, away from ignition sources, until pressure has dissipated. ▸ Undamaged cans should be gathered and stowed safely. ▸ Collect residues and seal in labelled drums for disposal.

Personal Protective Equipment advice is contained in Section 8 of the SDS.

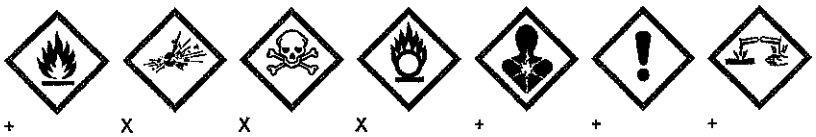
SECTION 7 HANDLING AND STORAGE

Precautions for safe handling

Safe handling	The conductivity of this material may make it a static accumulator., A liquid is typically considered nonconductive if its conductivity is below 100 pS/m and is considered semi-conductive if its conductivity is below 10 000 pS/m., Whether a liquid is nonconductive or semi-conductive, the precautions are the same., A number of factors, for example liquid temperature, presence of contaminants, and anti-static additives can greatly influence the conductivity of a liquid. ▸ Avoid all personal contact, including inhalation. ▸ Wear protective clothing when risk of exposure occurs. ▸ Use in a well-ventilated area. ▸ Prevent concentration in hollows and sumps. ▸ DO NOT enter confined spaces until atmosphere has been checked. ▸ Avoid smoking, naked lights or ignition sources. ▸ Avoid contact with incompatible materials. ▸ When handling, **DO NOT** eat, drink or smoke. ▸ **DO NOT** incinerate or puncture aerosol cans. ▸ **DO NOT** spray directly on humans, exposed food or food utensils. ▸ Avoid physical damage to containers. ▸ Always wash hands with soap and water after handling. ▸ Work clothes should be laundered separately. ▸ Use good occupational work practice. ▸ Observe manufacturer's storage and handling recommendations contained within this SDS. ▸ Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.
Other information	▸ Keep dry to avoid corrosion of cans. Corrosion may result in container perforation and internal pressure may eject contents of can ▸ Store in original containers in approved flammable liquid storage area. ▸ **DO NOT** store in pits, depressions, basements or areas where vapours may be trapped. ▸ No smoking, naked lights, heat or ignition sources. ▸ Keep containers securely sealed. Contents under pressure. ▸ Store away from incompatible materials. ▸ Store in a cool, dry, well ventilated area. ▸ Avoid storage at temperatures higher than 40 deg C. ▸ Store in an upright position. ▸ Protect containers against physical damage. ▸ Check regularly for spills and leaks. ▸ Observe manufacturer's storage and handling recommendations contained within this SDS.

Conditions for safe storage, including any incompatibilities

Suitable container	▸ Aerosol dispenser. ▸ Check that containers are clearly labelled.
Storage incompatibility	▸ Compressed gases may contain a large amount of kinetic energy over and above that potentially available from the energy of reaction produced by the gas in chemical reaction with other substances



\+ X X X + + +

X — Must not be stored together
0 — May be stored together with specific preventions
+ — May be stored together

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
Australia Exposure Standards	ethyl acetate	Ethyl acetate	200 ppm / 720 mg/m3	1440 mg/m3 / 400 ppm	Not Available	Not Available
Australia Exposure Standards	naphtha, petroleum, hydrodesulfurised heavy	White spirits	790 mg/m3	Not Available	Not Available	Not Available
Australia Exposure Standards	naphtha, petroleum, hydrodesulfurised heavy	Petrol (gasoline)	900 mg/m3	Not Available	Not Available	Not Available
Australia Exposure Standards	carbon black	Carbon black	3 mg/m3	Not Available	Not Available	Not Available
Australia Exposure Standards	titanium dioxide	Titanium dioxide	10 mg/m3	Not Available	Not Available	Not Available
Australia Exposure Standards	hydrocarbon propellant	LPG (liquified petroleum gas)	1000 ppm / 1800 mg/m3	Not Available	Not Available	Not Available

EMERGENCY LIMITS

Ingredient	Material name	TEEL-1	TEEL-2	TEEL-3
ethyl acetate	Ethyl acetate	1,200 ppm	1,700 ppm	10000 ppm
naphtha, petroleum, hydrodesulfurised heavy	Naphtha, hydrotreated heavy; (Isopar L-rev 2)	350 mg/m3	1,800 mg/m3	40,000 mg/m3
naphtha, petroleum, hydrodesulfurised heavy	Petroleum distillates; petroleum ether; includes clay-treated light naphthenic [64742-45-6]; low boiling [68477-31-6]; petroleum extracts [64742-06-9]; petroleum base oil [64742-46-7]; petroleum 50 thinner, petroleum spirits [64475-85-0], Soltrol, VM&P naphtha [8032-32-4]; Ligroine, and paint solvent; petroleum paraffins C5-C20 [64771-72-8]; hydrotreated light naphthenic [64742-53-6]; solvent refined light naphthenic [64741-97-5]; and machine coolant 1	1,100 mg/m3	1,800 mg/m3	40,000 mg/m3
naphtha, petroleum, hydrodesulfurised heavy	Naphtha (coal tar); includes solvent naphtha, petroleum (64742-88-7), naphtha (petroleum) light aliphatic, rubber solvent (64742-89-8), heaevy catalytic cracked (64741-54-4), light straight run (64741-46-4), heavy aliphatic solvent (64742-96-7), high flash aromatic and aromatic solvent naphtha (64742-95-6)	1,200 mg/m3	6,700 mg/m3	40,000 mg/m3
naphtha, petroleum, hydrodesulfurised heavy	Stoddard solvent; (Mineral spirits, 85% nonane and 15% trimethyl benzene)	300 mg/m3	1,800 mg/m3	29500 mg/m3
carbon black	Carbon black	9 mg/m3	99 mg/m3	590 mg/m3
titanium dioxide	Titanium oxide; (Titanium dioxide)	30 mg/m3	330 mg/m3	2,000 mg/m3
hydrocarbon propellant	Liquified petroleum gas; (L.P.G.)	65,000 ppm	2.30E+05 ppm	4.00E+05 ppm

Ingredient	Original IDLH	Revised IDLH
ethyl acetate	2,000 ppm	Not Available
naphtha, petroleum, hydrodesulfurised heavy	20,000 mg/m3 / 1,100 ppm / 1,000 ppm	Not Available
naphtha petroleum, light aromatic solvent	Not Available	Not Available
carbon black	1,750 mg/m3	Not Available

titanium dioxide	5,000 mg/m3	Not Available
hydrocarbon propellant	2,000 ppm	Not Available

MATERIAL DATA

Exposure controls

Appropriate engineering controls

Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.
The basic types of engineering controls are:
Process controls which involve changing the way a job activity or process is done to reduce the risk.
Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use.
Employers may need to use multiple types of controls to prevent employee overexposure.

General exhaust is adequate under normal conditions. If risk of overexposure exists, wear SAA approved respirator.
Correct fit is essential to obtain adequate protection.
Provide adequate ventilation in warehouse or closed storage areas.
Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

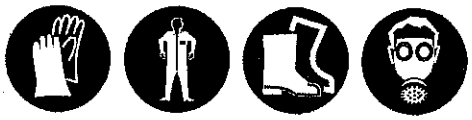
Type of Contaminant:	Speed:
aerosols, (released at low velocity into zone of active generation)	0.5-1 m/s
direct spray, spray painting in shallow booths, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favourable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min.) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

Personal protection



Eye and face protection

- Safety glasses with side shields.
- Chemical goggles.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent]

Skin protection

See Hand protection below

Hands/feet protection

- No special equipment needed when handling small quantities.
- **OTHERWISE:**
- For potentially moderate exposures:
- Wear general protective gloves, eg. light weight rubber gloves.
- For potentially heavy exposures:
- Wear chemical protective gloves, eg. PVC. and safety footwear.

Body protection

See Other protection below

Other protection	No special equipment needed when handling small quantities. **OTHERWISE:** ▸ Overalls. ▸ Skin cleansing cream. ▸ Eyewash unit. ▸ Do not spray on hot surfaces. ▸ The clothing worn by process operators insulated from earth may develop static charges far higher (up to 100 times) than the minimum ignition energies for various flammable gas-air mixtures. This holds true for a wide range of clothing materials including cotton. ▸ Avoid dangerous levels of charge by ensuring a low resistivity of the surface material worn outermost. BRETHERICK: Handbook of Reactive Chemical Hazards.

Recommended material(s)

GLOVE SELECTION INDEX

Glove selection is based on a modified presentation of the:
"Forsberg Clothing Performance Index".
The effect(s) of the following substance(s) are taken into account in the ***computer-generated*** selection:
Spot Marking Paint - Black, Red, Blue, Green, Yellow, Orange, Purple, Lemon

Material	CPI
BUTYL	C
BUTYL/NEOPRENE	C
CPE	C
HYPALON	C
NATURAL RUBBER	C
NATURAL+NEOPRENE	C
NEOPRENE	C
NEOPRENE/NATURAL	C
NITRILE	C
NITRILE+PVC	C
PE/EVAL/PE	C
PVA	C
PVC	C
SARANEX-23	C
SARANEX-23 2-PLY	C
TEFLON	C
VITON/CHLOROBUTYL	C

* CPI - Chemwatch Performance Index
A: Best Selection
B: Satisfactory; may degrade after 4 hours continuous immersion
C: Poor to Dangerous Choice for other than short term immersion
NOTE: As a series of factors will influence the actual performance of the glove, a final selection must be based on detailed observation. -
* Where the glove is to be used on a short term, casual or infrequent basis, factors such as "feel" or convenience (e.g. disposability), may dictate a choice of gloves which might otherwise be unsuitable following long-term or frequent use. A qualified practitioner should be consulted.

Respiratory protection

Type AX Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

Where the concentration of gas/particulates in the breathing zone, approaches or exceeds the "Exposure Standard" (or ES), respiratory protection is required.
Degree of protection varies with both face-piece and Class of filter; the nature of protection varies with Type of filter.

Required Minimum Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
up to 10 x ES	AX-AUS	-	AX-PAPR-AUS / Class 1
up to 50 x ES	-	AX-AUS / Class 1	-
up to 100 x ES	-	AX-2	AX-PAPR-2 ^

^ - Full-face
A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO2), G = Agricultural chemicals, K = Ammonia(NH3), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

- Cartridge respirators should never be used for emergency ingress or in areas of unknown vapour concentrations or oxygen content.
- The wearer must be warned to leave the contaminated area immediately on detecting any odours through the respirator. The odour may indicate that the mask is not functioning properly, that the vapour concentration is too high, or that the mask is not properly fitted. Because of these limitations, only restricted use of cartridge respirators is considered appropriate.
- Cartridge performance is affected by humidity. Cartridges should be changed after 2 hr of continuous use unless it is determined that the humidity is less than 75%, in which case, cartridges can be used for 4 hr. Used cartridges should be discarded daily, regardless of the length of time used

Aerosols, in common with most vapours/ mists, should never be used in confined spaces without adequate ventilation. Aerosols, containing agents designed to enhance or mask smell, have triggered allergic reactions in predisposed individuals.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	Aerosol; not miscible with water.

Physical state	Liquid	**Relative density (Water = 1)**	0.8
Odour	Not Available	**Partition coefficient n-octanol / water**	Not Available
Odour threshold	Not Available	**Auto-ignition temperature (°C)**	Not Available

pH (as supplied)	Not Applicable	Decomposition temperature	Not Available
Melting point / freezing point (°C)	Not Available	Viscosity (cSt)	Not Available
Initial boiling point and boiling range (°C)	Not Available	Molecular weight (g/mol)	Not Applicable
Flash point (°C)	-81 (hydrocarbon propellant)	Taste	Not Available
Evaporation rate	Not Available	Explosive properties	Not Available
Flammability	HIGHLY FLAMMABLE.	Oxidising properties	Not Available
Upper Explosive Limit (%)	Not Available	Surface Tension (dyn/cm or mN/m)	Not Available
Lower Explosive Limit (%)	Not Available	Volatile Component (%vol)	Not Available
Vapour pressure (kPa)	Not Available	Gas group	Not Available
Solubility in water	Immiscible	pH as a solution (1%)	Not Available
Vapour density (Air = 1)	Not Available	VOC g/L	Not Available

SECTION 10 STABILITY AND REACTIVITY

Reactivity	See section 7
Chemical stability	▸ Elevated temperatures. ▸ Presence of open flame. ▸ Product is considered stable. ▸ Hazardous polymerisation will not occur.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11 TOXICOLOGICAL INFORMATION

Information on toxicological effects

Inhaled	Inhalation of aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual. Limited evidence or practical experience suggests that the material may produce irritation of the respiratory system, in a significant number of individuals, following inhalation. In contrast to most organs, the lung is able to respond to a chemical insult by first removing or neutralising the irritant and then repairing the damage. The repair process, which initially evolved to protect mammalian lungs from foreign matter and antigens, may however, produce further lung damage resulting in the impairment of gas exchange, the primary function of the lungs. Respiratory tract irritation often results in an inflammatory response involving the recruitment and activation of many cell types, mainly derived from the vascular system. Common, generalised symptoms associated with toxic gas inhalation include: ▸ central nervous system effects such as depression, headache, confusion, dizziness, progressive stupor, coma and seizures; ▸ respiratory system complications may include acute pulmonary oedema, dyspnoea, stridor, tachypnoea, bronchospasm, wheezing and other reactive airway symptoms, and respiratory arrest; ▸ cardiovascular effects may include cardiovascular collapse, arrhythmias and cardiac arrest; ▸ gastrointestinal effects may also be present and may include mucous membrane irritation, nausea and vomiting (sometimes bloody), and abdominal pain. Inhalation hazard is increased at higher temperatures. Acute effects from inhalation of high concentrations of vapour are pulmonary irritation, including coughing, with nausea; central nervous system depression - characterised by headache and dizziness, increased reaction time, fatigue and loss of co-ordination Central nervous system (CNS) depression may include nonspecific discomfort, symptoms of giddiness, headache, dizziness, nausea, anaesthetic effects, slowed reaction time, slurred speech and may progress to unconsciousness. Serious poisonings may result in respiratory depression and may be fatal. **WARNING**:Intentional misuse by concentrating/inhaling contents may be lethal.
Ingestion	Accidental ingestion of the material may be damaging to the health of the individual. Not normally a hazard due to physical form of product. Considered an unlikely route of entry in commercial/industrial environments

	Central nervous system (CNS) depression may include nonspecific discomfort, symptoms of giddiness, headache, dizziness, nausea, anaesthetic effects, slowed reaction time, slurred speech and may progress to unconsciousness. Serious poisonings may result in respiratory depression and may be fatal.
Skin Contact	Repeated exposure may cause skin cracking, flaking or drying following normal handling and use. Skin contact with the material may damage the health of the individual; systemic effects may result following absorption. Spray mist may produce discomfort Open cuts, abraded or irritated skin should not be exposed to this material Entry into the blood-stream through, for example, cuts, abrasions, puncture wounds or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.
Eye	Evidence exists, or practical experience predicts, that the material may cause eye irritation in a substantial number of individuals and/or may produce significant ocular lesions which are present twenty-four hours or more after instillation into the eye(s) of experimental animals. Repeated or prolonged eye contact may cause inflammation characterised by temporary redness (similar to windburn) of the conjunctiva (conjunctivitis); temporary impairment of vision and/or other transient eye damage/ulceration may occur. Direct contact with the eye may not cause irritation because of the extreme volatility of the gas; however concentrated atmospheres may produce irritation after brief exposures.. The liquid produces a high level of eye discomfort and is capable of causing pain and severe conjunctivitis. Corneal injury may develop, with possible permanent impairment of vision, if not promptly and adequately treated.
Chronic	On the basis, primarily, of animal experiments, concern has been expressed that the material may produce carcinogenic or mutagenic effects; in respect of the available information, however, there presently exists inadequate data for making a satisfactory assessment. Prolonged or repeated skin contact may cause drying with cracking, irritation and possible dermatitis following. Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems. Principal route of occupational exposure to the gas is by inhalation. **WARNING**: Aerosol containers may present pressure related hazards.

	TOXICITY	IRRITATION
Spot Marking Paint - Black, Red, Blue, Green, Yellow, Orange, Purple, Lemon	Not Available	Not Available
ethyl acetate	TOXICITY Dermal (rabbit) LD50: >18000 mg/kg[2] Inhalation (mouse) LC50: 22.5 mg/l/2H[2] Oral (rat) LD50: 5620 mg/kg[2]	IRRITATION Eye (human): 400 ppm
naphtha, petroleum, hydrodesulfurised heavy	TOXICITY Dermal (rabbit) LD50: >1900 mg/kg[1] Oral (rat) LD50: >4500 mg/kg[1]	IRRITATION Not Available
naphtha petroleum, light aromatic solvent	TOXICITY Dermal (rabbit) LD50: >1900 mg/kg[1] Inhalation (rat) LC50: >7331.62506 mg/l/8h*[2] Oral (rat) LD50: >4500 mg/kg[1]	IRRITATION Not Available
carbon black	TOXICITY dermal (rat) LD50: >2000 mg/kg[1] Oral (rat) LD50: >15400 mg/kg[2]	IRRITATION Not Available
titanium dioxide	TOXICITY dermal (hamster) LD50: >=10000 mg/kg[2] Oral (rat) LD50: >2000 mg/kg[1]	IRRITATION Skin (human): 0.3 mg /3D (int)-mild *
hydrocarbon propellant	TOXICITY Not Available	IRRITATION Not Available
Legend:	*1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2.* Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances*	

NAPHTHA PETROLEUM, LIGHT AROMATIC SOLVENT

For Low Boiling Point Naphthas (LBPNs):

Acute toxicity:

LBPNs generally have low acute toxicity by the oral (median lethal dose [LD50] in rats > 2000 mg/kg-bw), inhalation (LD50 in rats > 5000 mg/m3) and dermal (LD50 in rabbits > 2000 mg/kg-bw) routes of exposure

Most LBPNs are mild to moderate eye and skin irritants in rabbits, with the exception of heavy catalytic cracked and heavy catalytic reformed naphthas, which have higher primary skin irritation indices.

Sensitisation:

LBPNs do not appear to be skin sensitizers, but a poor response in the positive control was also noted in these studies

Repeat dose toxicity:

The lowest-observed-adverse-effect concentration (LOAEC) and lowest-observed-adverse-effect level (LOAEL) values identified following short-term (2-89 days) and subchronic (greater than 90 days) exposure to the LBPN substances. These values were determined for a variety of endpoints after considering the toxicity data for all LBPNs in the group. Most of the studies were carried out by the inhalation route of exposure. Renal effects, including increased kidney weight, renal lesions (renal tubule dilation, necrosis) and hyaline droplet formation, observed in male rats exposed orally or by inhalation to most LBPNs, were considered species- and sex-specific These effects were determined to be due to a mechanism of action not relevant to humans -specifically, the interaction between hydrocarbon metabolites and alpha-2-microglobulin, an enzyme not produced in substantial amounts in female rats, mice and other species, including humans. The resulting nephrotoxicity and subsequent carcinogenesis in male rats were therefore not considered in deriving LOAEC/LOAEL values.

Only a limited number of studies of short-term and subchronic duration were identified for site-restricted LBPNs. The lowest LOAEC identified in these studies, via the inhalation route, is 5475 mg/m3, based on a concentration-related increase in liver weight in both male and female rats following a 13-week exposure to light catalytic cracked naphtha. Shorter exposures of rats to this test substance resulted in nasal irritation at 9041 mg/m3

No systemic toxicity was reported following dermal exposure to light catalytic cracked naphtha, but skin irritation and accompanying histopathological changes were increased, in a dose-dependent manner, at doses as low as 30 mg/kg-bw per day when applied 5 days per week for 90 days in rats

No non-cancer chronic toxicity studies (= 1 year) were identified for site-restricted LBPNs and very few non-cancer chronic toxicity studies were identified for other LBPNs. An LOAEC of 200 mg/m3 was noted in a chronic inhalation study that exposed mice and rats to unleaded gasoline (containing 2% benzene). This inhalation LOAEC was based on ocular discharge and ocular irritation in rats. At the higher concentration of 6170 mg/m3, increased kidney weight was observed in male and female rats (increased kidney weight was also observed in males only at 870 mg/m3). Furthermore, decreased body weight in male and female mice was also observed at 6170 mg/m3

A LOAEL of 714 mg/kg-bw was identified for dermal exposure based on local skin effects (inflammatory and degenerative skin changes) in mice following application of naphtha for 105 weeks. No systemic toxicity was reported.

Genotoxicity:

Although few genotoxicity studies were identified for the site-restricted LBPNs, the genotoxicity of several other LBPN substances has been evaluated using a variety of in vivo and in vitro assays. While in vivo genotoxicity assays were negative overall, the in vitro tests exhibited mixed results.

For in vivo genotoxicity tests, LBPNs exhibited negative results for chromosomal aberrations and micronuclei induction, but exhibited positive results in one sister chromatid exchange assay although this result was not considered definitive for clastogenic activity as no genetic material was unbalanced or lost. Mixtures that were tested, which included a number of light naphthas, displayed mixed results (i.e., both positive and negative for the same assay) for chromosomal aberrations and negative results for the dominant lethal mutation assay. Unleaded gasoline (containing 2% benzene) was tested for its ability to induce unscheduled deoxyribonucleic acid (DNA) synthesis (UDS) and replicative DNA synthesis (RDS) in rodent hepatocytes and kidney cells. UDS and RDS were induced in mouse hepatocytes via oral exposure and RDS was induced in rat kidney cells via oral and inhalation exposure. Unleaded gasoline (benzene content not stated) exhibited negative results for chromosomal aberrations and the dominant lethal mutation assay and mixed results for atypical cell foci in rodent renal and hepatic cells.

For in vitro genotoxicity studies, LBPNs were negative for six out of seven Ames tests, and were also negative for UDS and for forward mutations LBPNs exhibited mixed or equivocal results for the mouse lymphoma and sister chromatid exchange assays, as well as for cell transformation and positive results for one bacterial DNA repair assay. Mixtures that were tested, which included a number of light naphthas, displayed negative results for the Ames and mouse lymphoma assays Gasoline exhibited negative results for the Ames test battery, the sister chromatid exchange assay and for one mutagenicity assay . Mixed results were observed for UDS and the mouse lymphoma assay.

While the majority of in vivo genotoxicity results for LBPN substances are negative, the potential for genotoxicity of LBPNs as a group cannot be discounted based on the mixed in vitro genotoxicity results.

Carcinogenicity:

Although a number of epidemiological studies have reported increases in the incidence of a variety of cancers, the majority of these studies are considered to contain incomplete or inadequate information. Limited data, however, are available for skin cancer and leukemia incidence, as well as mortality among petroleum refinery workers. It was concluded that there is limited evidence supporting the view that working in petroleum refineries entails a carcinogenic risk (Group 2A carcinogen). IARC (1989a) also classified gasoline as a Group 2B carcinogen; it considered the evidence for carcinogenicity in humans from gasoline to be inadequate and noted that published epidemiological studies had several limitations, including a lack of exposure data and the fact that it was not possible to separate the effects of combustion products from those of gasoline itself. Similar conclusions were drawn from other reviews of epidemiological studies for gasoline (US EPA 1987a, 1987b). Thus, the evidence gathered from these epidemiological studies is considered to be inadequate to conclude on the effect

s of human exposure to LBPN substances.

No inhalation studies assessing the carcinogenicity of the site-restricted LBPNs were identified. Only unleaded gasoline has been examined for its carcinogenic potential, in several inhalation studies. In one study, rats and mice were exposed to 0, 200, 870 or 6170 mg/m3 of a 2% benzene formulation of the test substance, via inhalation, for approximately 2 years. A statistically significant increase in hepatocellular adenomas and carcinomas, as well as a non-statistical increase in renal tumours, were observed at the highest dose in female mice. A dose-dependent increase in the incidence of

primary renal neoplasms was also detected in male rats, but this was not considered to be relevant to humans, as discussed previously.Carcinogenicity was also assessed for unleaded gasoline, via inhalation, as part of initiation/promotion studies. In these studies, unleaded gasoline did not appear to initiate tumour formation, but did show renal cell and hepatic tumour promotion ability, when rats and mice were exposed, via inhalation, for durations ranging from 13 weeks to approximately 1 year using an initiation/promotion protocol However, further examination of data relevant to the composition of unleaded gasoline demonstrated that this is a highly-regulated substance; it is expected to contain a lower percentage of benzene and has a discrete component profile when compared to other substances in the LBPN group.

Both the European Commission and the International Agency for Research on Cancer (IARC) have classified LBPN substances as carcinogenic. All of these substances were classified by the European Commission (2008) as Category 2 (R45: may cause cancer) (benzene content = 0.1% by weight). IARC has classified gasoline, an LBPN, as a Group 2B carcinogen (possibly carcinogenic to humans) and "occupational exposures in petroleum refining" as Group 2A carcinogens (probably carcinogenic to humans).

Several studies were conducted on experimental animals to investigate the dermal carcinogenicity of LBPNs. The majority of these studies were conducted through exposure of mice to doses ranging from 694-1351 mg/kg-bw, for durations ranging from 1 year to the animals' lifetime or until a tumour persisted for 2 weeks. Given the route of exposure, the studies specifically examined the formation of skin tumours. Results for carcinogenicity via dermal exposure are mixed. Both malignant and benign skin tumours were induced with heavy catalytic cracked naphtha, light catalytic cracked naphtha, light

straight-run naphtha and naphtha Significant increases in squamous cell carcinomas were also observed when mice were dermally treated with Stoddard solvent, but the latter was administered as a mixture (90% test substance), and the details of the study were not available. In contrast, insignificant increases in tumour formation or no tumours were observed when light alkylate naphtha, heavy catalytic reformed naphtha, sweetened naphtha, light catalytically cracked naphtha or unleaded gasoline was dermally applied to mice. Negative results for skin tumours were also observed in male mice dermally exposed to sweetened naphtha using an initiation/promotion protocol.

Reproductive/ Developmental toxicity:

No reproductive or developmental toxicity was observed for the majority of LBPN substances evaluated. Most of these studies were carried out by inhalation exposure in rodents.

NOAEC values for reproductive toxicity following inhalation exposure ranged from 1701 mg/m3 (CAS RN 8052-41-3) to 27 687 mg/m3 (CAS RN 64741-63-5) for the LBPNs group evaluated, and from 7690 mg/m3 to 27 059 mg/m3 for the site-restricted light catalytic cracked and full-range catalytic reformed naphthas. However, a decreased number of pups per litter and higher frequency of post-implantation loss were observed following inhalation exposure of female rats to hydrotreated heavy naphtha (CAS RN 64742-48-9) at a concentration of 4679 mg/m3, 6 hours per day, from gestational days 7-20. For dermal exposures, NOAEL values of 714 mg/kg-bw (CAS RN 8030-30-6) and 1000 mg/kg-bw per day (CAS RN 68513-02-0) were noted . For oral exposures, no adverse effects on reproductive parameters were reported when rats were given site-restricted light catalytic cracked naphtha at 2000 mg/kg on gestational day 13 .

For most LBPNs, no treatment-related developmental effects were observed by the different routes of exposure However, developmental toxicity was observed for a few naphthas. Decreased foetal body weight and an increased incidence of ossification variations were observed when rat dams were exposed to light aromatized solvent naphtha, by gavage, at 1250 mg/kg-bw per day. In addition, pregnant rats exposed by inhalation to hydrotreated heavy naphtha at 4679 mg/m3 delivered pups with higher birth weights. Cognitive and memory impairments were also observed in the offspring.

Low Boiling Point Naphthas [Site-Restricted]

For trimethylbenzenes:

Absorption of 1,2,4-trimethylbenzene occurs after oral, inhalation, or dermal exposure. Occupationally, inhalation and dermal exposures are the most important routes of absorption although systemic intoxication from dermal absorption is not likely to occur due to the dermal irritation caused by the chemical prompting quick removal. Following oral administration of the chemical to rats, 62.6% of the dose was recovered as urinary metabolites indicating substantial absorption . 1,2,4-Trimethylbenzene is lipophilic and may accumulate in fat and fatty tissues. In the blood stream, approximately 85% of the chemical is bound to red blood cells Metabolism occurs by side-chain oxidation to form alcohols and carboxylic acids which are then conjugated with glucuronic acid, glycine, or sulfates for urinary excretion . After a single oral dose to rats of 1200 mg/kg, urinary metabolites consisted of approximately 43.2% glycine, 6.6% glucuronic, and 12.9% sulfuric acid conjugates . The two principle metabolites excreted by rabbits after oral administration of 438 mg/kg/day for 5 days were 2,4-dimethylbenzoic acid and 3,4-dimethylhippuric acid . The major routes of excretion of 1,2,4-trimethyl- benzene are exhalation of parent compound and elimination of urinary metabolites. Half-times for urinary metabolites were reported as 9.5 hours for glycine, 22.9 hours for glucuronide, and 37.6 hours for sulfuric acid conjugates.

Acute Toxicity Direct contact with liquid 1,2,4-trimethylbenzene is irritating to the skin and breathing the vapor is irritating to the respiratory tract causing pneumonitis. Breathing high concentrations of the chemical vapor causes headache, fatigue, and drowsiness. In humans liquid 1,2,4-trimethylbenzene is irritating to the skin and inhalation of vapor causes chemical pneumonitis . High concentrations of vapor (5000-9000 ppm) cause headache, fatigue, and drowsiness . The concentration of 5000 ppm is roughly equivalent to a total of 221 mg/kg assuming a 30 minute exposure period (see end note 1). 2. Animals - Mice exposed to 8130-9140 ppm 1,2,4-trimethylbenzene (no duration given) had loss of righting response and loss of reflexes Direct dermal contact with the chemical (no species given) causes vasodilation, erythema, and irritation (U.S. EPA). Seven of 10 rats died after an oral dose of 2.5 mL of a mixture of trimethylbenzenes in olive oil (average dose approximately 4.4 g/kg) . Rats and mice were exposed by inhalation to a coal tar distillate containing about 70% 1,3,5- and 1,2,4-trimethylbenzene; no pathological changes were noted in either species after exposure to 1800-2000 ppm for up to 48 continuous hours, or in rats after 14 exposures of 8 hours each at the same exposure levels . No effects were reported for rats exposed to a mixture of trimethyl- benzenes at 1700 ppm for 10 to 21 days

Neurotoxicity 1,2,4-Trimethylbenzene depresses the central nervous system. Exposure to solvent mixtures containing the chemical causes headache, fatigue, nervousness, and drowsiness. Occupationally, workers exposed to a solvent containing 50% 1,2,4-trimethylbenzene had nervousness, headaches, drowsiness, and vertigo (U.S. EPA). Headache, fatigue, and drowsiness were reported for workers exposed (no dose given) to paint thinner containing 80% 1,2,4- and 1,3,5-trimethylbenzenes

Results of the developmental toxicity study indicate that the C9 fraction caused adverse neurological effects at the highest dose (1500 ppm) tested.

Subchronic/Chronic Toxicity Long-term exposure to solvents containing 1,2,4-trimethylbenzene may cause nervousness, tension, and bronchitis. Painters that worked for several years with a solvent containing 50% 1,2,4- and 30% 1,3,5-trimethylbenzene showed nervousness, tension and anxiety, asthmatic bronchitis, anemia, and alterations in blood clotting; haematological effects may have been due to trace amounts of benzene

Rats given 1,2,4-trimethylbenzene orally at doses of 0.5 or 2.0 g/kg/day, 5 days/week for 4 weeks. All rats exposed to the high dose died and 1 rat in the low dose died (no times given); no other effects were reported. Rats exposed by inhalation to 1700 ppm of a trimethylbenzene isomeric mixture for 4 months had decreased weight gain, lymphopenia and neutrophilia .

Genotoxicity: Results of mutagenicity testing, indicate that the C9 fraction does not induce gene mutations in prokaryotes (Salmonella tymphimurium/mammalian microsome assay); or in mammalian cells in culture (in Chinese hamster ovary cells with and without activation). The C9 fraction does not does not induce chromosome mutations in Chinese hamster ovary cells with and without activation; does not induce chromosome aberrations in the bone marrow of Sprague-Dawley rats exposed by inhalation (6 hours/day for 5 days); and does not induce sister chromatid exchange in Chinese hamster ovary cells with and without activation.

Developmental/Reproductive Toxicity: A three-generation reproductive study on the C9 fraction was conducted CD rats (30/sex/group) were exposed by inhalation to the C9 fraction at concentrations of 0, 100, 500, or 1500 ppm (0, 100, 500, or 1500 mg/kg/day) for 6 hours/day, 5 days/week. There was evidence of parental and reproductive toxicity at all dose levels. Indicators of parental toxicity included reduced body weights, increased salivation, hunched posture, aggressive behavior, and death. Indicators of adverse reproductive system effects included reduced litter size and reduced pup body weight. The LOEL was 100 ppm; a no-observed-effect level was not established Developmental toxicity, including possible develop- mental neurotoxicity, was evident in rats in a 3-generation reproductive study

No effects on fecundity or fertility occurred in rats treated dermally with up to 0.3 mL/rat/day of a mixture of trimethyl-benzenes, 4-6 hours/day, 5 days/week over one generation

For C9 aromatics (typically trimethylbenzenes - TMBs)

Acute Toxicity

Acute toxicity studies (oral, dermal and inhalation routes of exposure) have been conducted in rats using various solvent products containing predominantly mixed C9 aromatic hydrocarbons (CAS RN 64742-95-6). Inhalation LC50's range from 6,000 to 10,000 mg/m 3 for C9 aromatic naphtha and 18,000 to 24,000 mg/m3 for 1,2,4 and 1,3,5-TMB, respectively. A rat oral LD50 reported for 1,2,4-TMB is 5 grams/kg bw and a rat dermal LD50 for the C9 aromatic naphtha is >4 ml/kg bw. These data indicate that C9 aromatic solvents show that LD50/LC50 values are greater than limit doses for acute toxicity studies established under OECD test guidelines.

Irritation and Sensitization

Several irritation studies, including skin, eye, and lung/respiratory system, have been conducted on members of the category. The results indicate that C9 aromatic hydrocarbon solvents are mildly to moderately irritating to the skin, minimally irritating to the eye, and have the potential to irritate the respiratory tract and cause depression of respiratory rates in mice. Respiratory irritation is a key endpoint in the current occupational exposure limits established for C9 aromatic hydrocarbon solvents and trimethylbenzenes. No evidence of skin sensitization was identified.

Repeated Dose Toxicity

Inhalation: The results from a subchronic (3 month) neurotoxicity study and a one-year chronic study (6 hr/day, 5 days/week) indicate that effects from inhalation exposure to C9 Aromatic Hydrocarbon Solvents on systemic toxicity are slight. A battery of neurotoxicity and neurobehavioral endpoints were evaluated in the 3-month inhalation study on C9 aromatic naphtha tested at concentrations of 0, 101, 452, or 1320 ppm (0, 500, 2,220, or 6,500 mg/m3). In this study, other than a transient weight reduction in the high exposure group (not statistically significant at termination of exposures), no effects were reported on neuropathology or neuro/behavioral parameters. The NOAEL for systemic and/or neurotoxicity was 6,500 mg/m3, the highest concentration tested. In an inhalation study of a commercial blend, rats were exposed to C9 aromatic naphtha concentrations of 0, 96, 198, or 373 ppm (0, 470, 970, 1830 mg/m3) for 6 hr/day, 5 days/week, for 12 months. Liver and kidney weights were increased in the high exposure group but no accompanying histopathology was observed in these organs.

The NOAEL was considered to be the high exposure level of 373 ppm, or 1830 mg/m3. In two subchronic rat inhalation studies, both of three months duration, rats were exposed to the individual TMB isomers (1,2,4-and 1,3,5-) to nominal concentrations of 0, 25, 100, or 250 ppm (0, 123, 492, or 1230 mg/m3). Respiratory irritation was observed at 492 (100 ppm) and 1230 mg/m3 (250 ppm) and no systemic toxicity was observed in either study. For both pure isomers, the NOELs are 25 ppm or 123 mg/m3 for respiratory irritation and 250 ppm or 1230 mg/m3 for systemic effects.

Oral: The C9 aromatic naphtha has not been tested via the oral route of exposure. Individual TMB isomers have been evaluated in a series of repeated-dose oral studies ranging from 14 days to 3 months over a wide range of doses. The effects observed in these studies included increased liver and kidney weights, changes in blood chemistry, increased salivation, and decreased weight gain at higher doses. Organ weight changes appeared to be adaptive as they were not accompanied by histopathological effects. Blood changes appeared sporadic and without pattern. One study reported hyaline droplet nephropathy in male rats at the highest dose (1000 mg/kg bw-day), an effect that is often associated with alpha-2mu-globulin-induced nephropathy and not considered relevant to humans. The doses at which effects were detected were 100 mg/kg-bw day or above (an exception was the pilot 14 day oral study - LOAEL 150 mg/kg bw-day - but the follow up three month study had a LOAEL of 600 mg/kg/bw-day with a NOAEL of 200 mg/kg bw-day). Since effects generally were not severe and could be considered adaptive or spurious, oral exposure does not appear to pose a high toxicity hazard for pure trimethylbenzene isomers.

Mutagenicity

In vitro genotoxicity testing of a variety of C9 aromatics has been conducted in both bacterial and mammalian cells. In vitro point mutation tests were conducted with Salmonella typhimurium and Escherichia coli bacterial strains, as well as with cultured mammalian cells such as the Chinese hamster cell ovary cells (HGPRT assay) with and without metabolic activation. In addition, several types of in vitro chromosomal aberration tests have been performed (chromosome aberration frequency in Chinese hamster ovary and lung cells, sister chromatid exchange in CHO cells). Results were negative both with and without metabolic activation for all category members. For the supporting chemical 1,2,3-TMB, a

single in vitro chromosome aberration test was weakly positive. In in vivo bone marrow cytogenetics test, rats were exposed to C9 aromatic naphtha at concentrations of 0, 153, 471, or 1540 ppm (0, 750, 2,310, or 7,560 mg/m3) 6 hr/day, for 5 days. No evidence of in vivo somatic cell genotoxicity was detected. Based on the cumulative results of these assays, genetic toxicity is unlikely for substances in the C9 Aromatic Hydrocarbon Solvents Category
Reproductive and Developmental Toxicity
Results from the three-generation reproduction inhalation study in rats indicate limited effects from C9 aromatic naphtha. In each of three generations (F0, F1 and F2), rats were exposed to High Flash Aromatic Naphtha (CAS RN 64742-95-6) via whole body inhalation at target concentrations of 0, 100, 500, or 1500 ppm (actual mean concentrations throughout the full study period were 0, 103, 495, or 1480 ppm, equivalent to 0, 505, 2430, or 7265 mg/m3 , respectively). In each generation, both sexes were exposed for 10 weeks prior to and two weeks during mating for 6 hrs/day, 5 days/wks. Female rats in the F0, F1, and F2 generation were then exposed during gestation days 0-20 and lactation days 5-21 for 6 hrs/day, 7 days/wk. The age at exposure initiation differed among generations; F0 rats were exposed starting at 9 weeks of age, F1 exposure began at 5-7 weeks, and F2 exposure began at postnatal day (PND) 22. In the F0 and F1 parental generations, 30 rats/sex/group were exposed and mated. However, in the F2 generation, 40/sex/group were initially exposed due to concerns for toxicity, and 30/sex/group were randomly selected for mating, except that all survivors were used at 1480 ppm. F3 litters were not exposed directly and were sacrificed on lactation day 21.
Systemic Effects on Parental Generations:
The F0 males showed statistically and biologically significantly decreased mean body weight by ~15% at 1480 ppm when compared with controls. Seven females died or were sacrificed in extremis at 1480 ppm. The F0 female rats in the 495 ppm exposed group had a 13% decrease in body weight gain when adjusted for initial body weight when compared to controls. The F1 parents at 1480 ppm had statistically significantly decreased mean body weights (by ~13% (females) and 22% (males)), and locomotor activity. F1 parents at 1480 ppm had increased ataxia and mortality (six females). Most F2 parents (70/80) exposed to 1480 ppm died within the first week. The remaining animals survived throughout the rest of the exposure period. At week 4 and continuing through the study, F2 parents at 1480 ppm had statistically significant mean body weights much lower than controls (~33% for males; ~28% for females); body weights at 495 ppm were also reduced significantly (by 13% in males and 15% in females). The male rats in the 495 ppm exposed group had a 12% decrease in body weight gain when adjusted for initial body weight when compared to controls. Based on reduced body weight observed, the overall systemic toxicity LOAEC is 495 ppm (2430 mg/m3).
Reproductive Toxicity-Effects on Parental Generations: There were no pathological changes noted in the reproductive organs of any animal of the F0, F1, or F2 generation. No effects were reported on sperm morphology, gestational period, number of implantation sites, or post-implantation loss in any generation. Also, there were no statistically or biologically significant differences in any of the reproductive parameters, including: number of mated females, copulatory index, copulatory interval, number of females delivering a litter, number of females delivering a live litter, or male fertility in the F0 or in the F2 generation. Male fertility was statistically significantly reduced at 1480 ppm in the F1 rats. However, male fertility was not affected in the F0 or in the F2 generations; therefore, the biological significance of this change is unknown and may or may not be attributed to the test substance. No reproductive effects were observed in the F0 or F1 dams exposed to 1480 ppm (7265 mg/m3). Due to excessive mortality at the highest concentration (1480 ppm, only six dams available) in the F2 generation,, a complete evaluation is precluded. However, no clear signs of reproductive toxicity were observed in the F2 generation. Therefore, the reproductive NOAEC is considered 495 ppm (2430 mg/m3), which excludes analysis of the highest concentration due to excessive mortality.
Developmental Toxicity - Effects on Pups: Because of significant maternal toxicity (including mortality) in dams in all generations at the highest concentration (1480 ppm), effects in offspring at 1480 ppm are not reported here. No significant effects were observed in the F1 and F2 generation offspring at 103 or 495 ppm. However, in F3 offspring, body weights and body weight gain were reduced by ~ 10-11% compared with controls at 495 ppm for approximately a week (PND 14 through 21). Maternal body weight was also depressed by ~ 12% throughout the gestational period compared with controls. The overall developmental LOAEC from this study is 495 ppm (2430 mg/m3) based on the body weights reductions observed in the F3 offspring.
Conclusion: No effects on reproductive parameters were observed at any exposure concentration, although a confident assessment of the group exposed at the highest concentration was not possible. A potential developmental effect (reduction in mean pup weight and weight gain) was observed at a concentration that was also associated with maternal toxicity.
for petroleum:
Altered mental state, drowsiness, peripheral motor neuropathy, irreversible brain damage (so-called Petrol Sniffer's Encephalopathy), delirium, seizures, and sudden death have been reported from repeated overexposure to some hydrocarbon solvents, naphthas, and gasoline
This product may contain benzene which is known to cause acute myeloid leukaemia and n-hexane which has been shown to metabolize to compounds which are neuropathic.
This product contains toluene. There are indications from animal studies that prolonged exposure to high concentrations of toluene may lead to hearing loss.
This product contains ethyl benzene and naphthalene from which there is evidence of tumours in rodents
Carcinogenicity: Inhalation exposure to mice causes liver tumours, which are not considered relevant to humans. Inhalation exposure to rats causes kidney tumours which are not considered relevant to humans.
Mutagenicity: There is a large database of mutagenicity studies on gasoline and gasoline blending streams, which use a wide variety of endpoints and give predominantly negative results. All in vivo studies in animals and recent studies in exposed humans (e.g. petrol service station attendants) have shown negative results in mutagenicity assays.
Reproductive Toxicity: Repeated exposure of pregnant rats to high concentrations of toluene (around or exceeding 1000 ppm) can cause developmental effects, such as lower birth weight and developmental neurotoxicity, on the foetus. However, in a two-generation reproductive study in rats exposed to gasoline vapour condensate, no adverse effects on the foetus were observed.
Human Effects: Prolonged/ repeated contact may cause defatting of the skin which can lead to dermatitis and may make the skin more susceptible to irritation and penetration by other materials.
Lifetime exposure of rodents to gasoline produces carcinogenicity although the relevance to humans has been questioned. Gasoline induces kidney cancer in male rats as a consequence of accumulation of the alpha2-microglobulin protein in

	hyaline droplets in the male (but not female) rat kidney. Such abnormal accumulation represents lysosomal overload and leads to chronic renal tubular cell degeneration, accumulation of cell debris, mineralisation of renal medullary tubules and necrosis. A sustained regenerative proliferation occurs in epithelial cells with subsequent neoplastic transformation with continued exposure. The alpha2-microglobulin is produced under the influence of hormonal controls in male rats but not in females and, more importantly, not in humans.
	Inhalation (rat) TCLo: 1320 ppm/6h/90D-I * [Devoe]
CARBON BLACK	Inhalation (rat) TCLo: 50 mg/m3/6h/90D-I Nil reported
TITANIUM DIOXIDE	The material may produce moderate eye irritation leading to inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis. The material may cause skin irritation after prolonged or repeated exposure and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) and swelling epidermis. Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis. For titanium dioxide: Humans can be exposed to titanium dioxide via inhalation, ingestion or dermal contact. In human lungs, the clearance kinetics of titanium dioxide is poorly characterized relative to that in experimental animals. (General particle characteristics and host factors that are considered to affect deposition and retention patterns of inhaled, poorly soluble particles such as titanium dioxide are summarized in the monograph on carbon black.) With regard to inhaled titanium dioxide, human data are mainly available from case reports that showed deposits of titanium dioxide in lung tissue as well as in lymph nodes. A single clinical study of oral ingestion of fine titanium dioxide showed particle size-dependent absorption by the gastrointestinal tract and large interindividual variations in blood levels of titanium dioxide. Studies on the application of sunscreens containing ultrafine titanium dioxide to healthy skin of human volunteers revealed that titanium dioxide particles only penetrate into the outermost layers of the stratum corneum, suggesting that healthy skin is an effective barrier to titanium dioxide. There are no studies on penetration of titanium dioxide in compromised skin. Respiratory effects that have been observed among groups of titanium dioxide-exposed workers include decline in lung function, pleural disease with plaques and pleural thickening, and mild fibrotic changes. However, the workers in these studies were also exposed to asbestos and/or silica. No data were available on genotoxic effects in titanium dioxide-exposed humans. Many data on deposition, retention and clearance of titanium dioxide in experimental animals are available for the inhalation route. Titanium dioxide inhalation studies showed differences — both for normalized pulmonary burden (deposited mass per dry lung, mass per body weight) and clearance kinetics — among rodent species including rats of different size, age and strain. Clearance of titanium dioxide is also affected by pre-exposure to gaseous pollutants or co-exposure to cytotoxic aerosols. Differences in dose rate or clearance kinetics and the appearance of focal areas of high particle burden have been implicated in the higher toxic and inflammatory lung responses to intratracheally instilled vs inhaled titanium dioxide particles. Experimental studies with titanium dioxide have demonstrated that rodents experience dose-dependent impairment of alveolar macrophage-mediated clearance. Hamsters have the most efficient clearance of inhaled titanium dioxide. Ultrafine primary particles of titanium dioxide are more slowly cleared than their fine counterparts. Titanium dioxide causes varying degrees of inflammation and associated pulmonary effects including lung epithelial cell injury, cholesterol granulomas and fibrosis. Rodents experience stronger pulmonary effects after exposure to ultrafine titanium dioxide particles compared with fine particles on a mass basis. These differences are related to lung burden in terms of particle surface area, and are considered to result from impaired phagocytosis and sequestration of ultrafine particles into the interstitium. Fine titanium dioxide particles show minimal cytotoxicity to and inflammatory/pro-fibrotic mediator release from primary human alveolar macrophages in vitro compared with other particles. Ultrafine titanium dioxide particles inhibit phagocytosis of alveolar macrophages in vitro at mass dose concentrations at which this effect does not occur with fine titanium dioxide. In-vitro studies with fine and ultrafine titanium dioxide and purified DNA show induction of DNA damage that is suggestive of the generation of reactive oxygen species by both particle types. This effect is stronger for ultrafine than for fine titanium oxide, and is markedly enhanced by exposure to simulated sunlight/ultraviolet light. **Animal carcinogenicity data** Pigmentary and ultrafine titanium dioxide were tested for carcinogenicity by oral administration in mice and rats, by inhalation in rats and female mice, by intratracheal administration in hamsters and female rats and mice, by subcutaneous injection in rats and by intraperitoneal administration in male mice and female rats. In one inhalation study, the incidence of benign and malignant lung tumours was increased in female rats. In another inhalation study, the incidences of lung adenomas were increased in the high-dose groups of male and female rats. Cystic keratinizing lesions that were diagnosed as squamous-cell carcinomas but re-evaluated as non-neoplastic pulmonary keratinizing cysts were also observed in the high-dose groups of female rats. Two inhalation studies in rats and one in female mice were negative. Intratracheally instilled female rats showed an increased incidence of both benign and malignant lung tumours following treatment with two types of titanium dioxide. Tumour incidence was not increased in intratracheally instilled hamsters and female mice. In-vivo studies have shown enhanced micronucleus formation in bone marrow and peripheral blood lymphocytes of intraperitoneally instilled mice. Increased Hprt mutations were seen in lung epithelial cells isolated from titanium dioxide-instilled rats. In another study, no enhanced oxidative DNA damage was observed in lung tissues of rats that were intratracheally instilled with titanium dioxide. The results of most in-vitro genotoxicity studies with titanium dioxide were negative. * IUCLID
HYDROCARBON PROPELLANT	for Petroleum Hydrocarbon Gases: In many cases, there is more than one potentially toxic constituent in a refinery gas. In those cases, the constituent that is most toxic for a particular endpoint in an individual refinery stream is used to characterize the endpoint hazard for that stream. The hazard potential for each mammalian endpoint for each of the petroleum hydrocarbon gases is dependent upon each petroleum hydrocarbon gas constituent endpoint toxicity values (LC50, LOAEL, etc.) and the relative

concentration of the constituent present in that gas. It should also be noted that for an individual petroleum hydrocarbon gas, the constituent characterizing toxicity may be different for different mammalian endpoints, again, being dependent upon the concentration of the different constituents in each, distinct petroleum hydrocarbon gas.
All Hydrocarbon Gases Category members contain primarily hydrocarbons (i.e., alkanes and alkenes) and occasionally asphyxiant gases like hydrogen. The inorganic components of the petroleum hydrocarbon gases are less toxic than the C1 - C4 and C5 - C6 hydrocarbon components to both mammalian and aquatic organisms. Unlike other petroleum product categories (e.g. gasoline, diesel fuel, lubricating oils, etc.), the inorganic and hydrocarbon constituents of hydrocarbon gases can be evaluated for hazard individually to then predict the screening level hazard of the Category members
Acute toxicity: No acute toxicity LC50 values have been derived for the C1 -C4 and C5- C6 hydrocarbon (HC) fractions because no mortality was observed at the highest exposure levels tested (~ 5 mg/l) for these petroleum hydrocarbon gas constituents. The order of acute toxicity of petroleum hydrocarbon gas constituents from most to least toxic is:
C5-C6 HCs (LC50 > 1063 ppm) > C1-C4 HCs (LC50 > 10,000 ppm) > benzene (LC50 = 13,700 ppm) > butadiene (LC50 = 129,000 ppm) > asphyxiant gases (hydrogen, carbon dioxide, nitrogen).
Repeat dose toxicity: With the exception of the asphyxiant gases, repeated dose toxicity has been observed in individual selected petroleum hydrocarbon gas constituents. Based upon LOAEL values, the order of order of repeated-dose toxicity of these constituents from most toxic to the least toxic is:
Benzene (LOAEL .>=10 ppm) >C1-C4 HCs (LOAEL = 5,000 ppm; assumed to be 100% 2-butene) > C5-C6 HCs (LOAEL = 6,625 ppm) > butadiene (LOAEL = 8,000 ppm) > asphyxiant gases (hydrogen, carbon dioxide, nitrogen).
Genotoxicity:
In vitro: The majority of the Petroleum Hydrocarbon Gases Category components are negative for *in vitro* genotoxicity. The exceptions are: benzene and 1,3-butadiene, which are genotoxic in bacterial and mammalian *in vitro* test systems.
In vivo: The majority of the Petroleum Hydrocarbon Gases Category components are negative for *in vivo* genotoxicity. The
exceptions are benzene and 1,3-butadiene, which are genotoxic in *in vivo* test systems
Developmental toxicity: Developmental effects were induced by two of the petroleum hydrocarbon gas constituents, benzene and the C5 -C6 hydrocarbon fraction. No developmental toxicity was observed at the highest exposure levels tested for the other petroleum hydrocarbon gas constituents tested for this effect. The asphyxiant gases have not been tested for developmental toxicity. Based on LOAEL and NOAEL values, the order of acute toxicity of these constituents from most to least toxic is:
Benzene (LOAEL = 20 ppm) > butadiene (NOAEL .>=1,000 ppm) > C5-C6 HCs (LOAEL = 3,463 ppm) > C1-C4 HCs (NOAEL >=5,000 ppm; assumed to be 100% 2-butene) > asphyxiant gases (hydrogen, carbon dioxide, nitrogen).
Reproductive toxicity: Reproductive effects were induced by only two petroleum hydrocarbon gas constituents, benzene and isobutane (a constituent of the the C1-C4 hydrocarbon fraction). No reproductive toxicity was observed at the highest exposure levels tested for the other petroleum hydrocarbon gas constituents tested for this effect. The asphyxiant gases have not been tested for reproductive toxicity. Based on LOAEL and NOAEL values, the order of reproductive toxicity of these constituents from most to least toxic is:
Benzene (LOAEL = 300 ppm) > butadiene (NOAEL .>=6,000 ppm) > C5-C6 HCs (NOAEL .>=6,521 ppm) > C1-C4 HCs (LOAEL = 9,000 ppm; assumed to be 100% isobutane) > asphyxiant gases (hydrogen, carbon dioxide, nitrogen)

NAPHTHA, PETROLEUM, HYDRODESULFURISED HEAVY & CARBON BLACK & HYDROCARBON PROPELLANT

No significant acute toxicological data identified in literature search.

NAPHTHA, PETROLEUM, HYDRODESULFURISED HEAVY & NAPHTHA PETROLEUM, LIGHT AROMATIC SOLVENT

Studies indicate that normal, branched and cyclic paraffins are absorbed from the mammalian gastrointestinal tract and that the absorption of n-paraffins is inversely proportional to the carbon chain length,with little absorption above C30. With respect to the carbon chain lengths likely to be present in mineral oil, n-paraffins may be absorbed to a greater extent that iso- or cyclo-paraffins.
The major classes of hydrocarbons have been shown to be well absorbed by the gastrointestinal tract in various species. In many cases, the hydrophobic hydrocarbons are ingested in association with dietary lipids. The dependence of hydrocarbon absorption on concomitant triglyceride digestion and absorption,is known as the "hydrocarbon continuum hypothesis", and asserts that a series of solubilising phases in the intestinal lumen, created by dietary triglycerides and their digestion products, afford hydrocarbons a route to the lipid phase of the intestinal absorptive cell (enterocyte) membrane. While some hydrocarbons may traverse the mucosal epithelium unmetabolised and appear as solutes in lipoprotein particles in intestinal lymph, there is evidence that most hydrocarbons partially separate from nutrient lipids and undergo metabolic transformation in the enterocyte. The enterocyte may play a major role in determining the proportion of an absorbed hydrocarbon that, by escaping initial biotransformation, becomes available for deposition in its unchanged form in peripheral tissues such as adipose tissue, or in the liver.

CARBON BLACK & TITANIUM DIOXIDE

WARNING: This substance has been classified by the IARC as Group 2B: Possibly Carcinogenic to Humans.

Acute Toxicity	✗	**Carcinogenicity**	✓
Skin Irritation/Corrosion	✗	**Reproductivity**	✗
Serious Eye Damage/Irritation	✓	**STOT - Single Exposure**	✓
Respiratory or Skin sensitisation	✗	**STOT - Repeated Exposure**	✗
Mutagenicity	✗	**Aspiration Hazard**	✗

Legend: ✗ *– Data either not available or does not fill the criteria for classification*

✔ – *Data available to make classification*

SECTION 12 ECOLOGICAL INFORMATION

Toxicity

Spot Marking Paint - Black, Red, Blue, Green, Yellow, Orange, Purple, Lemon	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	Not Available	Not Available	Not Available	Not Available	Not Available

ethyl acetate	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	LC50	96	Fish	54.314mg/L	3
	EC50	48	Crustacea	1-350mg/L	2
	EC50	96	Algae or other aquatic plants	4.146mg/L	3
	BCF	24	Algae or other aquatic plants	0.05mg/L	4
	NOEC	48	Algae or other aquatic plants	>1-mg/L	2

naphtha, petroleum, hydrodesulfurised heavy	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	EC50	72	Algae or other aquatic plants	=13mg/L	1
	NOEC	72	Algae or other aquatic plants	=0.1mg/L	1
	LC50	96	Fish	4.1mg/L	2
	EC50	48	Crustacea	4.5mg/L	2
	EC50	72	Algae or other aquatic plants	>1-mg/L	2
	LC50	96	Fish	4.1mg/L	2
	EC50	48	Crustacea	4.5mg/L	2
	EC50	72	Algae or other aquatic plants	>1-mg/L	2
	LC50	96	Fish	18mg/L	2
	EC50	48	Crustacea	1.4mg/L	2
	EC50	72	Algae or other aquatic plants	3.7mg/L	2
	LC50	96	Fish	4.1mg/L	2
	EC50	48	Crustacea	4.5mg/L	2
	EC50	72	Algae or other aquatic plants	>1-mg/L	2
	NOEC	72	Algae or other aquatic plants	<0.1mg/L	1
	LC50	96	Fish	0.00746mg/L	4
	EC50	48	Crustacea	0.058mg/L	4
	BCF	96	Fish	0.2mg/L	4
	NOEC	168	Crustacea	<=0.05mg/L	4
	LC50	96	Fish	4.1mg/L	2
	EC50	48	Crustacea	3.7mg/L	4
	EC50	72	Algae or other aquatic plants	>1-mg/L	2
	NOEC	72	Algae or other aquatic plants	<0.1mg/L	1
	LC50	96	Fish	4.1mg/L	2
	EC50	48	Crustacea	4.5mg/L	2
	EC50	72	Algae or other aquatic plants	>1-mg/L	2
	NOEC	72	Algae or other aquatic plants	<0.1mg/L	1
	LC50	96	Fish	0.14mg/L	2
	EC50	96	Algae or other aquatic plants	0.277mg/L	2
	NOEC	720	Crustacea	0.024mg/L	2

naphtha petroleum, light aromatic solvent	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	LC50	96	Fish	4.1mg/L	2
	EC50	48	Crustacea	3.2mg/L	2
	EC50	72	Algae or other aquatic plants	>1-mg/L	2
	NOEC	72	Algae or other aquatic plants	=1mg/L	1

	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
carbon black	LC50	96	Fish	>100mg/L	2
	EC50	48	Crustacea	>100mg/L	2
	EC50	72	Algae or other aquatic plants	>10-mg/L	2
	EC10	72	Algae or other aquatic plants	>10-mg/L	2
	NOEC	96	Fish	>=1-mg/L	2

	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
titanium dioxide	LC50	96	Fish	>1-mg/L	2
	EC50	48	Crustacea	>1-mg/L	2
	EC50	72	Algae or other aquatic plants	5.83mg/L	4
	NOEC	336	Fish	0.089mg/L	4

	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
hydrocarbon propellant	LC50	96	Fish	24.11mg/L	2
	EC50	96	Algae or other aquatic plants	7.71mg/L	2
	LC50	96	Fish	24.11mg/L	2
	EC50	96	Algae or other aquatic plants	7.71mg/L	2

Legend: *Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 (QSAR) - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data*

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
DO NOT discharge into sewer or waterways.

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
ethyl acetate	LOW (Half-life = 14 days)	LOW (Half-life = 14.71 days)
titanium dioxide	HIGH	HIGH

Bioaccumulative potential

Ingredient	Bioaccumulation
ethyl acetate	HIGH (BCF = 3300)
titanium dioxide	LOW (BCF = 10)

Mobility in soil

Ingredient	Mobility
ethyl acetate	LOW (KOC = 6.131)
titanium dioxide	LOW (KOC = 23.74)

SECTION 13 DISPOSAL CONSIDERATIONS

Waste treatment methods

Product / Packaging disposal

- DO NOT allow wash water from cleaning or process equipment to enter drains.
- It may be necessary to collect all wash water for treatment before disposal.
- In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.
- Where in doubt contact the responsible authority.
- Consult State Land Waste Management Authority for disposal.
- Discharge contents of damaged aerosol cans at an approved site.
- Allow small quantities to evaporate.
- DO NOT incinerate or puncture aerosol cans.
- Bury residues and emptied aerosol cans at an approved site.

SECTION 14 TRANSPORT INFORMATION

Labels Required

Marine Pollutant	NO Not Applicable
HAZCHEM	Not Applicable

Land transport (ADG)

UN number	1950
UN proper shipping name	AEROSOLS
Transport hazard class(es)	Class: 2.1 Subrisk: Not Applicable
Packing group	Not Applicable
Environmental hazard	Not Applicable
Special precautions for user	Special provisions: 63 190 277 327 344 381 Limited quantity: 1000ml

Air transport (ICAO-IATA / DGR): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Sea transport (IMDG-Code / GGVSee)

UN number	1950
UN proper shipping name	AEROSOLS
Transport hazard class(es)	IMDG Class: 2.1 IMDG Subrisk: Not Applicable
Packing group	Not Applicable
Environmental hazard	Not Applicable
Special precautions for user	EMS Number: F-D, S-U Special provisions: 63 190 277 327 344 381 959 Limited Quantities: 1000ml

Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

SECTION 15 REGULATORY INFORMATION

Safety, health and environmental regulations / legislation specific for the substance or mixture

ETHYL ACETATE(141-78-6) IS FOUND ON THE FOLLOWING REGULATORY LISTS

Australia Exposure Standards
Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals
Australia Inventory of Chemical Substances (AICS)
Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Appendix B (Part 3)

NAPHTHA, PETROLEUM, HYDRODESULFURISED HEAVY(64742-82-1.) IS FOUND ON THE FOLLOWING REGULATORY LISTS

Australia Exposure Standards
Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals
Australia Inventory of Chemical Substances (AICS)
Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Appendix E (Part 2)
Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 5
International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs
International Air Transport Association (IATA) Dangerous Goods Regulations - Prohibited List Passenger and Cargo Aircraft

NAPHTHA PETROLEUM, LIGHT AROMATIC SOLVENT(64742-95-6.) IS FOUND ON THE FOLLOWING REGULATORY LISTS

Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals
Australia Inventory of Chemical Substances (AICS)
Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Appendix E (Part 2)
Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 5

CARBON BLACK(1333-86-4) IS FOUND ON THE FOLLOWING REGULATORY LISTS

Australia Exposure Standards
Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals
Australia Inventory of Chemical Substances (AICS)
International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs

TITANIUM DIOXIDE(13463-67-7) IS FOUND ON THE FOLLOWING REGULATORY LISTS

Australia Exposure Standards
Australia Inventory of Chemical Substances (AICS)
International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs

HYDROCARBON PROPELLANT(68476-85-7.) IS FOUND ON THE FOLLOWING REGULATORY LISTS

Australia Exposure Standards
Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals
Australia Inventory of Chemical Substances (AICS)
Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Appendix E (Part 2)
Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 5

National Inventory Status

National Inventory	Status
Australia - AICS	No (Ingredients determined not to be hazardous) Non-disclosed ingredients
Canada - DSL	No (Ingredients determined not to be hazardous) Non-disclosed ingredients
Canada - NDSL	No (ethyl acetate; naphtha petroleum, light aromatic solvent; hydrocarbon propellant; naphtha, petroleum, hydrodesulfurised heavy; carbon black; Ingredients determined not to be hazardous) Non-disclosed ingredients
China - IECSC	No (Ingredients determined not to be hazardous) Non-disclosed ingredients
Europe - EINEC / ELINCS / NLP	No (Ingredients determined not to be hazardous) Non-disclosed ingredients
Japan - ENCS	No (Ingredients determined not to be hazardous) Non-disclosed ingredients
Korea - KECI	No (Ingredients determined not to be hazardous) Non-disclosed ingredients
New Zealand - NZIoC	No (Ingredients determined not to be hazardous) Non-disclosed ingredients
Philippines - PICCS	No (Ingredients determined not to be hazardous) Non-disclosed ingredients
USA - TSCA	No (Ingredients determined not to be hazardous) Non-disclosed ingredients
Legend:	*Yes = All ingredients are on the inventory* *No = Not determined or one or more ingredients are not on the inventory and are not exempt from listing(see specific ingredients in brackets)*

SECTION 16 OTHER INFORMATION

Revision Date	13/01/2017
Initial Date	Not Available

Other information

Ingredients with multiple cas numbers

Name	CAS No
naphtha, petroleum, hydrodesulfurised heavy	64742-82-1., 64741-92-0., 8052-41-3., 1030262-12-4., 8032-32-4., 8030-30-6., 64742-88-7., 64742-89-8., 8002-05-9., 61789-95-5., 64742-48-9., 101795-02-2., 8031-06-9., 8030-31-7., 50813-73-5., 54847-97-1., 121448-83-7., 8031-38-7., 8031-39-8.
naphtha petroleum, light aromatic solvent	64742-95-6., 25550-14-5.
titanium dioxide	13463-67-7, 1317-70-0, 1317-80-2, 12188-41-9, 1309-63-3, 100292-32-8, 101239-53-6, 116788-85-3, 12000-59-8, 12701-76-7, 12767-65-6, 12789-63-8, 1344-29-2, 185323-71-1, 185828-91-5, 188357-76-8, 188357-79-1, 195740-11-5, 221548-98-7, 224963-00-2, 246178-32-5, 252962-41-7, 37230-92-5, 37230-94-7, 37230-95-8, 37230-96-9, 39320-58-6, 39360-64-0, 39379-02-7, 416845-43-7, 494848-07-6, 494848-23-6, 494851-77-3, 494851-98-8, 55068-84-3, 55068-85-4, 552316-51-5, 62338-64-1, 767341-00-4, 97929-50-5, 98084-96-9
hydrocarbon propellant	68476-85-7., 68476-86-8.

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

Definitions and abbreviations

PC—TWA: Permissible Concentration-Time Weighted Average
PC—STEL: Permissible Concentration-Short Term Exposure Limit
IARC: International Agency for Research on Cancer
ACGIH: American Conference of Governmental Industrial Hygienists
STEL: Short Term Exposure Limit
TEEL: Temporary Emergency Exposure Limit。
IDLH: Immediately Dangerous to Life or Health Concentrations
OSF: Odour Safety Factor
NOAEL :No Observed Adverse Effect Level
LOAEL: Lowest Observed Adverse Effect Level
TLV: Threshold Limit Value
LOD: Limit Of Detection
OTV: Odour Threshold Value
BCF: BioConcentration Factors
BEI: Biological Exposure Index

RCQ CONSTRUCTION Built for Life

APP-SP:07B HAZARDOUS CHEMICAL RISK ASSESSMENT FORM

ASSESSMENT NUMBER	SIGNET 11814
Hazardous chemical: Spot Marking Paint	**CAS numbers:**
How used: Spray on ground to mark set out features	
Location (used): On site to [redacted] USC	**Used by:** Field Surveyor

Nature of hazard:

- ☐ Toxic
- ☐ Corrosive
- ☑ Harmful
- ☑ Irritant
- ☑ Other hazard/s (specify): Flammable
- ☑ Sensitiser (may cause allergic- type skin or respiratory reaction)
- ☐ Carcinogenic (may cause cancer)
- ☐ Mutagenic (may cause mutations/ genetic change)
- ☐ Teratogenic (may cause birth defects)

Frequency and duration of use:	**Quantities used (e.g. per shift):**

Monitoring	**Yes**	**No**
Health surveillance is required	☐	☑
Air monitoring program required	☐	☑

Could cause injury to/or via:

- ☑ Eyes
- ☑ Inhalation
- ☐ Injection
- ☑ Skin
- ☑ Ingestion/ swallowing

What control measures are In place or proposed	☑ Present	☑ Recommended
Isolation	☐	☐
Fume cupboard	☐	☐
General ventilation	☐	☐
Natural ventilation	☑	☐
Other engineering controls Safe Storage out of sunlight & < 50°C	☑	☐
Safe work methods (e.g. pumping instead of pouring)	☑	☐
Reduce quantity ~~and/or concentration~~ Not used often.	☑	☐
Information (at least SDS and label)	☑	☐
Ongoing training (hazards, safe use, PPE, health surveillance if applicable)	☐	☐
Personal protective equipment (list): Long Sleave Shirts, Long Pants	☑	☐
Other measures		
First aid supplies/equipment (e.g. safety shower)	☐	☐
First aid training	☐	☐
Evacuation plan, emergency plan and equipment required.	☐	☐
Other controls (specify):	☐	☐

Conclusion:

- ☑ Risks not significant now and not likely to increase
- ☐ Risks significant but effectively controlled at the moment
- ☐ Risks significant and not adequately controlled at the moment
- ☐ Uncertain about risks; more detailed assessment required

Action required to reduce risks:
(check adequacy of controls and whether any exposure routes are at risk)

- ☑ No
- ☐ Yes (specify):

Assessment carried out by: Andrew Campbell	Signature: [signature]	Date 13/12/18
Assessment approved by:	Signature:	Date:

Next assessment due: 13/12/19

Risk Assessment and Controls

Appropriate control measures **MUST** be put in place to eliminate the risk, where this is not practical, the identified risk must be minimised. Control measures must be chosen from the highest possible level in the following hierarchy.

- **Firstly** try to *Eliminate* the risk.
- **Secondly** if this is not possible prevent or minimise exposure by:
  - *Substituting* a less hazardous chemical
  - *Isolating* the hazardous chemical from the person, or the person from the chemical.
  - *Redesigning* the equipment or work process so the work can be done differently.
- **Thirdly** where exposure cannot be minimised and as a last resort:
  - *Introduce Administrative Controls* such as safe work procedures or instruction.
  - Use *Personal Protective Equipment* as the final barrier between people and the chemical

Likelihood

Level	*Descriptor*	*Definition*	*Indicative frequency*
A	Almost certain	Is expected to occur in most circumstances.	80 – 99%
B	Likely	Will probably occur in most circumstances.	60 – 79%
C	Possible	Might occur at some time.	40 – 59%
D	Unlikely	Could occur at some time.	20 – 39%
E	Rare	May occur only in exceptional circumstances.	1 – 19%

Table to Determine the Overall Level of Risk

Likelihood	*Consequence*				
	Insignificant	Minor	Moderate	Major	Extreme
Almost certain	Moderate	High	High		
Likely	Moderate	Moderate	High	High	
Possible	Low	Moderate	Moderate	High	High
Unlikely	Low	Low	Moderate	Moderate	High
Rare	Low	Low	Low	Moderate	Moderate

Adopted from template provided by SafeWork Australia

Safety Plan

Sub-Contractor: Murray & Associates QLD Pty Ltd
ABN 81 075 543 154
Contact Person Andrew Campbell
Contact Number Office 5441 2188 Mobile 0427 649 918
Project Name: USQ Sustainable Energy Project
Location: University of Sunshine Coast
Client: RCQ
Project Description: Set Out Works for Plant Room, Water Tank and Cart Park
Estimated Duration of Works: 4 Months

Authorised By: Andrew Campbell

Position: Director

Signature:

Date: 13/12/18

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MURRAY& ASSOCIATES
SURVEYORS & TOWN PLANNERS

Murray & Associates (Qld) Pty Ltd ACN 075 543 154 ABN 81 075 543 154 www.mursurv.com info@mursurv.com

WORKPLACE HEALTH & SAFETY POLICY

Murray & Associates (QLD) Pty Ltd (known as the Company) provides *"Land Survey and Town Planning Services"* in Queensland and recognises the fundamental rights of all employees and sub-contractors to a safe and healthy working environment. Work, Health and Safety (WHS) standards are openly recognised by the Company, as a major contributor to improvements in service quality, cost efficiency and a harmonious working environment. Reducing workplace incidents will permit the Company to be more competitive thus benefiting our Employees, our Contractors, our Customers and the Company. If an Employee or contractor is injured or becomes ill, an appropriate rehabilitation program will commence as soon as practical. The company's vision is to deliver excellence in WHS performance to our business community by:

- Monitoring and reviewing our safety management performances;
- Promoting health and well-being;
- Promoting open communication at all levels of employment and business undertakings;
- Promoting continual workplace performance and knowledge;
- Allocating areas of WHS responsibility and accountability to all positions.

To achieve these objectives as part of our Health, Safety & Environmental (HSE) Management System, the Company shall:

- Openly provide this Policy to any relevant individual, organisation or agency, as requested;
- Establish measurable objectives and targets to ensure continued improvement aimed at eliminating work-related injury or illness;
- Ensuring WHS has the same priority as other business imperatives;
- Complying to relevant Legislations and the utilisation of relevant "State" and "National" Codes of Practice, Australian Standards and/or Company specific processes to monitor and review the HSE Management System and current safety practices;
- Providing adequate resources to ensure the HSE Management System is maintained;
- Maintain a structure to routinely review the documented HSE Management System;
- Identify, assess, implement appropriate controls and monitor and review the effectiveness of the controls to manage workplace health and safety of our Employees and Others affected by our business undertaking, in a consistent manner;
- Provide and maintain meaningful, open communication processes with all Employees, Contractors, Customers and/or their representatives, and Independent Specialists;
- Coordinate and/or provide Employees with information, instruction, training and supervision to ensure their work-related tasks are undertaken in the safest possible manner;
- Except that Executive Management has the primary responsibility to develop, maintain, implement, review, promote the HSE Management System, in consultation with the Employees;
- Ensure each Employee understands the intent of this Policy, to cooperate with the Company's HSE Management System, to protect their own and Other's health, safety and wellbeing, at their workplace, and also complying to Our Customers WHS/HSE Management System when on-site at the Customers workplaces.

Authorised By: Andrew J. Campbell **Signature:**

Position: Director

Endorsed
Date: 6/8/2014

Sunshine Coast
15-17 Currie Street Nambour
2/9 First Ave Maroochydore
PO Box 246 Nambour 4560
Phone (07) 5441 2188 (N)
Phone (07) 5443 9646 (M)

Caboolture
4/75 King Street
PO Box 377 Caboolture 4510
Phone (07) 5495 1478
Fax (07) 5495 1729

Gympie
24 Reef Street
PO Box 57 Gympie 4570
Phone (07) 5482 1484
Fax (07) 5482 8296

Emerald
Unit 1, 17 Opal Street
PO Box 665 Emerald 4720
Phone (07) 4987 5363
Fax (07) 4982 2808

Roma
22 Lewis Street
PO Box 1244 Roma 4455
Phone (07) 4622 1666
Fax (07) 4622 8298

Chinchilla
39 Heeney Street
PO Box 243 Chinchilla 4413
Phone (07) 4662 8100

Roles and responsibilities

Sub-Contractors

Contractors who are engaged for this project are responsible for:

- fulfilling the duties of PCBU for their own operations
- identifying all high risk construction work associated with their activities and ensuring safe work method statements are developed and implemented
- complying with the duties as listed under 'Workers'
- following all safety policies and procedures and site rules
- complying with the site WHS Management Plan
- complying with any direction given to them by the principal contactor
- undertaking site-specific induction before starting work and signing off that they have completed this induction
- ensuring the workers they engage undertake site specific
- ensuring they have the correct tools and equipment and these are in a serviceable condition for the task

Workers

All workers on this project (including those employed by contractors) are responsible for:

- taking reasonable care of their own health and safety
- taking reasonable care that their conduct does not adversely affect others
- complying with instruction, so far as they are reasonably able
- cooperating with reasonable notified policies or procedures

People with specific WHS roles and responsibilities

<List the names of those with specific WHS roles and their specific responsibilities>

Name Callum Beavis	Responsibility HSE Rep on Site
Name Jon Gamlin	Responsibility HSE Rep on SIte
Name Craig Andrews	Responsibility Quality Manager

Certificate of Competency - Tools

Company: Murray & Associates QLD Pty Ltd

This certificate certifies that employees listed herein are competent in the following work processes, plant and equipment and have met the requirements of safe working and/or operation of plant within the scope of manufacturer's instructions, regulations, codes of practice and known work methodologies.

Work process, plant and equipment type	
Using Grinders N/A	**Using Quick Cut** N/A
Using Drills N/A	**Using Power Tools** N/A
Using Hand Tools	**Ladders** N/A
Using Lifting Aids N/A	**Nailing Tools** N/A

Employer Representative:	Andrew Campbell
Position:	Director
Employer Rep Signature	
Date:	13-12-2018

Employee Name:	Role	Signature	Date
Callum Beavis	Surveying Associate		20.11.18
Jon Gamlin	Survey Technician		20.11.18

Certificate of Competency - PPE

Company: Murray & Associates QLD Pty Ltd

This certificate certifies that employees listed herein are competent in using the following safety equipment within the scope of manufacturer's instructions, regulations, codes of practice and known work methodologies.

Work PPE	
Safety Glasses	Safety Boots
Safety Face Shield N/A	Safety Harness N/A
Safety Hard Hat	
Safety Gloves	

Employer Representative:	Andrew Campbell
Position:	Director
Employer Rep Signature	
Date:	13-12-2018

Employee Name:	Role	Signature	Date
Jon Gamlin	Survey Technician		20.11.18
Callum Beavis	Surveying Associate		20.11.18

Certificate of Competency - SWMS

Company: Murray & Associates QLD Pty Ltd

This certificate certifies that employees listed herein are competent in the following SWMS work processes, including the use of plant and equipment and have met the requirements of safe working within the scope of manufacturer's instructions, regulations, codes of practice and known work methodologies.

SWMS competent in		
SWMS: 62024 - SWMS	SWMS:	SWMS:
SWMS:	SWMS:	SWMS:
SWMS:	SWMS:	SWMS:
SWMS:	SWMS:	SWMS:

Employer Representative:	Andrew Campbell
Position:	Director
Employer Rep Signature	AJ Campbell
Date:	13-12-2018

Employee Name:	Role	Signature	Date
Jon Gamlin	Survey Technician		20.11.18
Callum Beavis	Surveying Associate		20.11.18

SOP: MA 098

Revision: 0

Title: **Light Vehicle Use (Standard Operating Procedure)**

1. Purpose

The purpose of this standard operating procedure is to define the requirements for Murray & Associates (QLD) Pty Ltd owned light and road going vehicle use, journey management and off site travel by all Murray & Associates (QLD) Pty Ltd employees and contractors.

2. Scope

This procedure applies to all employees and contractors who undertake work tasks on behalf of Murray and Associates (QLD) Pty Ltd, using a vehicle on work related business, including travelling to and from work.

3. Responsibility

All employees and contractors that are required to operate a vehicle for Murray & Associates (QLD) Pty Ltd company vehicle must be deemed competent, authorised to drive and shall comply with the following:

- Hold a current full class C Australian Drivers License (or equivalent) that has been valid for 2 years or more;
- Probationary license holders are permitted to drive company vehicles, and are to ensure that appropriate 'P' plate signage is installed on vehicle;
- Learner license holders are permitted to drive company vehicles, provided they are supervised by a full class C license holder at all times, and are to ensure that appropriate 'L' plate signage is installed on vehicle;
- Employees or contractors who drive company vehicles must complete minimum training requirements within 6 months of employment;
- Employees or contractors are expected to maintain a level of fitness to ensure they meet the requirement of their job role;
- Drivers are responsible for following QLD road rules at all times;
- Drivers license must be carried at all times when in charge of the vehicle;
- Drivers must obey any license conditions.

4. Competency based training

Employees who are required to drive on an unsealed road on site and outside of a work site, must complete a four wheel drive on unsealed roads (Light Vehicle Operation & 4WD Basic Course RIIVEH305A, RIIVEH201B, TLIC1051A) or equivalent.

Employees who may be required to perform complex four wheel drive vehicle operation, will be required to complete training as deemed necessary.

5. Disqualification

In the event that a driver loses his/her license for any reason, they must notify their supervisor immediately and forfeit all company driving privileges.

6. Safe Use of Murray & Associates (QLD) Pty Ltd Light and Road Going Vehicle

6.1 Minimum Vehicle and Operating Safety Standards

Vehicle selection shall take account of work tasks, application, environment, roll-over and crash worthiness

6.2 General Rules

When operating a company vehicle, the following rules shall apply:

- Where advised by supervisor, complete a pre-start safety checklist (MA099) as per company procedure, or; conduct a vehicle safety check as per Appendix 1. All faults must be recorded;
- Smoking is prohibited in all company vehicles;
- Driving while under the influence of drugs or alcohol is strictly prohibited;
- Drivers are responsible to maintain their fitness appropriate to their work task including driving company vehicles;
- Where an employee is taking medication or has a medical condition that may affect their ability to operate machinery or drive a vehicle, it is their responsibility to relay this information to their immediate supervisor;
- When entering or exiting the company vehicle, ensure this is done using 3 points of contact to minimize hazard of slipping injury;
- A lights-on policy is mandatory on high risk work sites, or as stipulated by the site supervisor;
- Queensland Road Rules must be adhered to at all times;
- Driver must not drive faster than the posted speed limit, or slower according to road and weather conditions;
- Driver is to be observant of road work driving conditions, and adhere to safety roadway signage;
- Driver is to ensure that the vehicle travelling in front is not closer than at least 3 full seconds, to allow for safer braking space;
- Driver and passenger/s must ensure seatbelt is used and fitted correctly for any travel/or vehicle motion over 15km/hr.

6.3 Vehicle Maintenance

All company vehicles must :

- Be regularly maintained and kept in a safe and tidy condition. All minor maintenance such as oil/water levels, refuelling and cleaning are the responsibility of the allocated driver;
- Have a Vehicle Prestart checklist (MA 099) completed weekly, or as advised;
- Have a clean windscreen to minimize poor vision.

It is the responsibility of the supervisor to ensure these occur :

- Safety faults found during the inspection must be reported immediately to the supervisor;
- Company vehicle must contain first equipment and fire extinguisher that is maintained and current;
- Company vehicle must be inspected to ensure weed and seed hygiene requirements and certification, as per worksite procedure.

Drivers are responsible to advise their supervisor if the service kilometre mark has been reached.

Odometer readings must be reported when refuelling vehicles

7. Vehicle Operation

- Ensure vehicle is clean and free of weed before leaving for job site. Where advised by supervisor, ensure certification is carried out by qualified person, and store copy in vehicle at all times.
- Insert IVMS key if applicable;
- Check lights, beacons and alarms for operation;
- Fit seat belt;
- Start up the company vehicle and ensure adequate warm up;
- Do not leave company vehicle unattended whilst it is running;
- Be familiar with ground conditions at the worksite;
- Ensure communication equipment is fully operational and communication procedure is utilized at all relevant times;
- Be observant of other personnel and other vehicle location, give way as per site Qld road rules and site specific rules.

7.1 Vehicle Breakdown

In the event of a vehicle breakdown the supervisor must be notified. Arrangements will then be made to recover the vehicle. In the event of breakdown, becoming bogged or other situation that prevents drivers from reaching their destination, they are to remain with the vehicle.

7.2 Vehicle Accidents

All vehicle accidents or incidents must be reported as soon as safely possible to your supervisor, following incident reporting/response procedure (MA048 Incident & Injury Mmgt SOP).

If the driver is involved in a traffic incident, stop the vehicle and depending on the nature of the incident, alert emergency response, and give assistance to any medical emergency (if safe to do so). If the incident is of a minor nature, obtain relevant details (name of people involved, vehicle registration numbers, other parties address/contact details/insurance details, and photos of the incident) for insurance purposes and complete an incident report (MA037).

8. Journey Management Planning

Notice of intention to travel is required in all situations, however the method of notification varies according to the level of risk involved with the journey. Local vehicle travel is 2hr or less, to any work related destination. If the vehicle journey is longer than 2 hrs driving to destination, then a documented Journey Management Plan may be required. Check with your supervisor of journey management plan requirements, as specific to work travel destination.

9. Mobile phones and other portable media devices

Mobile phones and other portable media devices shall not be used whilst operating company vehicles, unless a hands free kit is installed in the vehicle. Vehicle operators who are required to use a mobile phone shall pull off the road to a safe position prior to use.

10. Driver Fatigue

All employees shall comply with fatigue management as documented in MA045 Fatigue Management and Vehicle Safety SOP.

11. Night Driving

Driving at night or in the hours of darkness is to be avoided. Drivers shall exercise extreme caution when driving at night or dusk/dawn, due to the presence of livestock and wildlife along the roadway.

12. Disciplinary action

Employees found in breach of the rules stated in this document will be subject to disciplinary action and approval to drive company vehicles in the future may be revoked.

13. Crossing Rivers/Flood Ways

Employees are not to attempt a crossing if water levels are 0.4 meters or higher or if employees believe that doing so is not safe.

14. Emergency Response

Emergency response shall be initiated in any of the following:

- If a driver fails to arrive or make contact within 1 hour of their stated arrival/scheduled call in time;
- Other notification is received that an incident has occurred.
- All incidents must be notified following procedure MA048 Incident & Injury Mmgt SOP and reporting form MA 037.

15. Appendix 1.

Vehicle Safety Checklist

- Fuel tank is full
- Water and oil levels are adequate and measure between minimum & full reading
- Windscreen, mirrors and windows are undamaged
- Windscreen wipers are working properly
- Lights and indicators work
- Brakes are working
- Tyres are correctly inflated and adequate tread
- Seatbelts are working and in good condition
- First aid kit is complete, fully stocked, and within service date
- Horn is working
- Vehicle tool kit is complete
- Fire extinguisher is within service and accessible
- Stored items are secure in back seat or ute tray, to avoid items becoming airborne in the event of harsh braking
- Water is stored
- Vehicle registration is current
- Weed/hygiene certificate complete, if required
- Service date for vehicle is not expired

16. References

- WHS Act 2011 legislation
- MA 045 Fatigue Management & Vehicle Safety SOP
- MA 048 Incident & Injury management SOP
- MA 069 Local Vehicle Travel SOP
- MA 099 Pre-Operational Safety Vehicle Inspection List

Murray & Associates are dedicated to the continual improvement of their WHS systems. We welcome and encourage your suggestions and comments on how the Light Vehicle Use SOP can be improved.

SOP: MA.045.8/13 Revision:

Title: **Fatigue Management & Vehicle safety SOP**

1.0 Purpose

To manage fatigue related risk whilst undertaking work and or vehicle related activities for Murray & Associates Pty Ltd.

Why is fatigue a problem?

Fatigues increases the risk of incidents and long-term health problems

Fatigue causes an increased risk of incidents because of tiredness and lack of alertness. When workers are fatigued they are more likely to exercise poor judgment and have a slower reaction to signals. This can increase all risks on site because fatigued workers are less able to respond effectively to changing circumstances, leading to an increased likelihood of incidents due to human error.

Fatigue can also result in long-term health problems, such as:

- digestive problems
- heart disease
- stress
- harmful drug and alcohol use, and
- mental illness.

2.0 Scope

This procedure applies to all employees and contractors of Murray and Associates who undertake work and vehicle travel on the company's behalf.

3.0 Responsibility

All employees and contractors who undertake work and vehicle travel on the company's behalf is responsible for understanding and implementing these procedures.

4.0 Minimizing fatigue whilst in charge of a vehicle

- Familiarize yourself with the SWMS and JSEA and any other SOPs applicable to the days' work
- Drive a maximum of 2hr then a 15min rest break (walk around, get some fresh air)
- Drive another 2 hours and then take a 30min rest break
- Drive a maximum 5 hours (taking a rest break at 2 hour intervals, as shown above)
- For drives over 2 hours in length, a Journey Management Plan must be completed.
- Have a journey route mapped out, before leaving for the drive.
- Be responsible for doing a self assessment for fatigue. If you are tired, pull over and have a rest break, or if possible ask your passenger to drive.
- Do not work more than 12 hours in the day, including driving time.
- Adhere to check in safety texts.
- Drink water regularly
- While driving with Air Conditioning switched on, do not have it on recirculate. ie. allow fresh air into car.

4.1 **Fatigue symptoms when driving include:**

- yawning
- sore or heavy eyes
- slower reaction times
- finding you're daydreaming and not concentrating on your driving
- driving speed creeps up or down
- impatience
- impaired driving performance such as poor gear changes
- stiffness and cramps
- loss of motivation

If you are a passenger with a fatigued driver, insist on a rest break at the next opportunity, and offer to take over driving if you are able and rested.

If you are the driver who is fatigued, look for a safe place to pull completely off the road, and rest. Until you are able to do so, use fresh air and conversation to help you stay alert. Don't resume driving until you are alert. Remember that in the first minute or so after you wake up from a nap, you will not be alert enough to drive safely.

5.0 Minimizing fatigue whilst performing work duties

- Improve job control and the other risk factors associated with stress
- Communicate stress-related issues with your supervisor
- Avoid working during periods of extreme temperature
- Take regular breaks, drink lots of water and cool down in the shade
- Control exposure to hazardous substances and environments
- Tell your employer about any medical conditions that may limit your ability to work or make you susceptible to fatigue

-

6.0 Minimizing fatigue in general

- The best sleep is night sleep
- Seven to eight hours uninterrupted sleep is adequate
- Seek medical advice for excessive snoring, irregular breathing and insomnia
- Avoid excessive consumption of alcohol – it affects quality of sleep
- Avoid stimulants – they delay the need for sleep
- Do not consume coffee or tea before going to bed
- If you have a medical condition, you should seek advice from your doctor.
- Tell your employer about any medical conditions that may limit your ability to work or make you susceptible to fatigue
- Ask your doctor for an alternative medication if it causes you drowsiness when you need to be awake
- Maintain a basic level of fitness
- Exercise regularly
- Keep your weight in check – obesity contributes to sleeping disorders

All activities must follow Murray & Associates QLD Pty Ltd policies and procedures. If the Principle has additional policies and requirements then they take priority over and above our standard policies and procedures.

SOP: MA 051

Revision: 0

Title: **Hazardous Manual Handling (Standard Operating Procedure)**

1.0 Purpose

The purpose of this SOP is to provide a process for identifying and controlling the risks associated with hazardous manual handling tasks.

Manual handling tasks cover a wide range of activities. These may include stacking shelves; repeated actions such as entering data into a computer or hammering pegs into the ground; lifting equipment from work vehicles.

Some manual handling tasks are hazardous and may cause musculoskeletal disorders.

Musculoskeletal disorders may include conditions such as:

- sprains and strains of muscles, ligaments and tendons;
- back injuries, including damage to the muscles, tendons, ligaments, spinal discs, nerves, joints and bones;
- joint and bone injuries or degeneration, including injuries to the shoulder, elbow, wrist, hip, knee, ankle, hands and feet;
- nerve injuries or compression (e.g. carpal tunnel syndrome);
- muscular and vascular disorders as a result of hand-arm vibration;
- soft tissue hernias;
- chronic pain.

Musculoskeletal disorders can occur in two ways:

- gradual wear and tear to joints, ligaments, muscles and inter-vertebral discs caused by repeated or continuous use of the same body parts, including static body positions
- sudden damage caused by strenuous activity, or unexpected movements such as when loads being handled move or change position suddenly.

A hazardous manual handling task requires a person to lift, lower, push, carry or otherwise move, hold or restrain any person, animal or thing involving one or more of the following:

- repetitive or sustained force
- high or sudden force
- sustained or awkward posture
- exposure to vibration.

2.0 Scope

This procedure applies to all employees and contractors who undertake work tasks on behalf of Murray and Associates (QLD) Pty Ltd.

3.0 Responsibility

All employees and contractors are responsible for reading and understanding "Hazardous Manual Handling SOP". Duty of care applies to employers and employees/contractors. Your employer is responsible to minimize risk of injury and incident to workers, and workers are obliged to use the safe working procedures provided to minimize risk of injury or incident.

4.0 Procedure

The following steps are to be applied to manage the risks associated with hazardous manual handling tasks with the potential to cause musculoskeletal disorders.

4a) Identify manual tasks that are hazardous.

Consultation with workers, observation of the work task, investigation of trends in incident and injury reports and information sought from external sources can be used to identify hazards that may arise from manual tasks. These hazards will generally involve interaction between the worker and:

- The work task and how is performed
- The tools, equipment and objects handled
- The physical work environment

Supervisors, WHS personnel and workers are responsible for identification of hazards and are to complete and lodge form MA052 'Identification of Hazard report form'.

4b) Assess the risks of musculoskeletal disorders associated with the hazardous manual handling task.

A risk assessment by WHS personnel using form MA042 'Risk Assessment form' should be conducted for any manual handling task that has been identified as being hazardous, unless the risk and control method is well known.

Determine the risk factor by considering if the task involves: repetitive movement; sustained or awkward postures; repetitive or sustained forces; long duration; high or sudden force and/or; vibration. Does the work area design and layout, the weight and size of thing being handled, tools being used or system of work procedures contribute to the hazard.

4c) Implement suitable risk control measures.

Risk control measures (using the hierarchy of controls ie. Elimination, Substitution, Engineering, Administrative, PPE) are to be implemented via appropriate consultation methods and training.

4d) Review the effectiveness of control measures.

Periodic review of implemented hazardous manual handling controls is to be undertaken. This procedure may be the same as initial hazard identification and include the following:

- Are the control measures working effectively in both their design and operation, without creating new risks?
- Are workers actively involved in the risk management process? Are they openly raising health and safety concerns and reporting problems promptly?
- Have new work methods or new equipment reduced physical strain or difficulty?
- Has instruction and training on hazardous manual tasks and the implemented control measures been successful?
- Is the frequency and severity of MSDs reducing over time?
- Is an alteration planned to any structure, plant or process that is likely to result in a worker being exposed to a hazardous manual task?
- Has an incident occurred as a result of a worker being exposed to a hazardous manual task?
- If new information becomes available, does it indicate current controls may no longer be the most effective?

5.0 References

- WHS Act 2011 legislation
- Hazardous manual tasks Code of Practice 2011.

6.0 Referenced Documents and forms

- MA052 'Identification of Hazard report form'
- MA042 'Risk Assessment form'

Murray & Associates are dedicated to the continual improvement of their WHS systems. We welcome and encourage suggestions and comments on how the Hazardous Manual Handling SOP can be improved.

SOP: MA 047.0

Revision: 0

Title: **Handling Hazardous Chemicals General (Standard Operating Procedure)**

1.0 Purpose

This procedure describes the correct method for the safe handling, cleanup, and medical response to hazardous chemicals (as supplied by Murray & Associates (QLD) Pty Ltd) and used by the employees and contractors of Murray & Associates (QLD) Pty Ltd, when undertaking work tasks for Murray & Associates (QLD) Pty Ltd.

2.0 Scope

This procedure applies to all employees and contractors who use hazardous chemicals (supplied by the employers, Murray and Associates (QLD) Pty Ltd), when undertaking work tasks.

3.0 Responsibility

All employees and contractors who use hazardous chemicals are responsible for reading and understanding "Handling Hazardous Chemicals SOP" in association with relevant SDS for the hazardous chemical being used.

4.0 Register of hazardous chemicals

Hazardous chemicals that are handled, transported by, or stored on Murray & Associates (QLD) Pty Ltd worksites have been identified, and entered into a Hazardous Chemicals Register (MA 040). This register is reviewed whenever a new hazardous chemical is introduced or discontinued.

5.0 Activity type

Any work related activity using :

- Aerosol paint (spot marking) cans;
- Some aerosol insect repellant and/or deodorisers;
- Vehicle fuels, oils, coolants and other fluids – All vehicle servicing is done off-site and by an external service provider;
- Fire extinguisher mediums;
- Printer cartridges;
- Some office cleaning agents;
- Some first aid kit supplies;
- Batteries used in surveying equipment – sealed sources.

6.0 General advisory statement

Prior to using a hazardous chemical:

A risk assessment of all new chemicals should be undertaken before using a chemical to ensure that all risks and known hazards are managed and ensuring that:

- An MSDS is on file and employees are aware of risks when handling chemical;
- Consider if PPE is required to protect employee;
- Consider appropriate storage location and compatibility with other chemicals;
- Ensuring hazardous chemicals are on the hazardous chemicals register. Note, not all chemicals may be on this register, only those that are hazardous, so it is extremely important to first read the product label of all chemicals and if there is any doubt obtain an MSDS.

When handling chemicals (Office and field work) ensure:

- The user has read the MSDS for the chemical/s to be used and follow the safety instructions;
- The user is wearing appropriate PPE as stated in the MSDS;
- The user to identify that the correct label is on the container, i.e. make sure you know the label matches the contents;
- The user ensures containers are in good condition, e.g. no leaks, broken handles, check that the lid is secure to eliminate release of the substance;
- The user and supervisor or others, check work area for safety risks, e.g. trip hazards, ignition sources if handling flammable liquids;
- The user and supervisor or others, ensure there is adequate ventilation and if not possible, refer to the MSDS for ventilation / respiratory protection advice;
- Always use appropriate PPE, and always stay up-wind of any potential vapours.
- If decanting chemicals, ensure the container you are using is approved / suitable for the chemical as some types of metals / plastics react adversely to certain chemicals, if in doubt contact your supervisor/manager;
- Do not take hazardous chemicals or flammable liquids into a confined space without approval through the confined space permit system;
- Do not take flammable or explosive liquids into "hot work" areas or electrical exclusion zones (e.g. within 3 meters of a switch board or power point or as directed by the Customer's directive).

7.0 Chemical Spills and Disposal

- In the event that a spill should occur at any "Company" office, immediately contain the spill and use absorbent material if safe to do so.
- Always use appropriate PPE, and always stay up-wind of any potential vapours. If there is any doubt always refer to the MSDS, safety and containment is the first priority and in any event, to control safety of yourself and others, and control potential environmental harm.
- All chemical disposals must comply to local government regulations and as indicated on the MSDS. In most instances hazardous chemicals less than 20kg can be placed into a leak-proof containment bag, sealed tight and placed in general rubbish, but this is dependent to the locality and must be checked first before disposal. Otherwise hazardous waste can be disposed of at designated refuse tips.
- All chemical disposals at the Customers site, the "Company" employees must comply with that site's rules/procedures.
- All acid spills should be nuetralised first (if possible) before clean-up commences.
- In the event of any hazardous chemical or unknown substance spill, PPE must be worn and suitable to the purpose – refer MSDS.

8.0 First Aid

- The user has read the MSDS for the chemical/s to be used and follow the first aid instructions;
- Ring 000 immediately, if the incident is life threatening or potential danger to environment.

9.0 Fire Fighting measures

- The user has read the MSDS for the chemical/s to be used and follow the fire fighting instructions and suggested extinguishing media to be used;
- Ring 000 immediately, if the incident is life threatening or potential danger to environment.

All activities must follow Murray & Associates QLD Pty Ltd policies and procedures. If the Principle contractor has additional policies and requirements then they take priority over and above our standard policies and procedures.

Murray & Associates are dedicated to the continual improvement of their WHS systems. We welcome and encourage suggestions and comments on how the Handling Hazardous Chemicals SOP can be improved.

SOP: MA 048/2.14

Revision: 0

Title: **Incident & Injury Management Standard Operating Procedure**

1.0 Purpose

The purpose of this SOP is to provide a process for WHS Incident reporting and investigation.

2.0 Scope

This procedure applies to all employees and stakeholders of Murray & Associates Pty Ltd.

3.0 Responsibility

All stakeholders performing work for Murray & Associate are responsible for understanding and implementing these procedures.

- Workers are required to report all incidents to their supervisor or WHS Officer immediately.
- Supervisors and WHS Officers are to ensure that incident reporting is completed in accordance with this SOP and Incident Report form (MA 037) is detailed.
- WHS and managers will determine the level of investigation to an incident.
- The PCBU and WHS will ensure correct procedures to notifiable incidents to WHSQ.
- The Manager and WHS will ensure that hazard controls are implemented and monitored.

4.0 Procedure

All incidents are to be reported to the relevant Supervisor, WHS Officer or Director as soon as possible, by telephone in the first instance and followed by a copy of a completed Incident Report form (MA 037).

An incident may be an event that causes injury, illness or death to a worker, or a member of the public as a result from work performed by this company.

An incident may also include a near miss or hazard that has the potential to cause harm to a worker, member of public, or the environment.

For the purpose of this procedure, there are two types of incidents:

- Notifiable Incident
- All other Incidents

5.0 Notifiable Incident

An incident is notifiable if it arises out of the conduct of a business or undertaking and results in the death, serious injury or serious illness of a person or involves a dangerous incident.

An injury or illness is notifiable if the person requires:

- immediate treatment as an in-patient in a hospital
- medical treatment (treatment by a doctor) within 48 hours of exposure to a substance
- suffers any infection to which the carrying out of work is a significant contributing factor, including any infection that is reliably attributable to carrying out work:
- defined occupational zoonoses contracted in the course of work involving the handling or contact with animals, animal hides, skins, wool or hair, animal carcasses or animal waste products:

A dangerous incident is an incident in relation to a workplace that exposes a worker or any other person to a serious risk to a person's health or safety emanating from an immediate or imminent exposure to:

- an uncontrolled escape, spillage or leakage of a substance
- an uncontrolled implosion, explosion or fire
- an uncontrolled escape of gas or steam
- an uncontrolled escape of a pressurised substance
- electric shock
- the fall or release from a height of any plant, substance or thing
- the collapse, overturning, failure or malfunction of, or damage to, any plant that is required to be authorised for use in accordance with the regulations
- the collapse or partial collapse of a structure
- the collapse or failure of an excavation or of any shoring supporting an excavation
- the inrush of water, mud or gas in workings, in an underground excavation or tunnel
- the interruption of the main system of ventilation in an underground excavation or tunnel.

5.1 Response to Notifiable Incident

In the event of a serious injury or illness of a person or a dangerous incident occuring, the worker should take action to:

- Ensure the area is safe for yourself, the patient and others. Alert personnel to the situation.
- Apply emergency first aid DRSABCD (Danger; Response; Send for help; Airway; Breathing; CPR; Defibrillation)
- Contact emergency service (000)
- Contain or limit the hazard if necessary and if you are confident of your skill level
- Protect property
- Contact and inform the Supervisor, PCBU or WHS Officer of the incident

A person conducting a business or undertaking (PCBU) is required to make the notification to WHSQ immediately after becoming aware that a notifiable incident arising from the business or undertaking has occurred.

Notification to the WHSQ must be by the fastest possible means.

- phone on 1300 369 915 (WHSQ), including after hours
- complete and submit the online incident notification form http://www.deir.qld.gov.au/workplace/contact-us/incidents/index.htm#incident

The person with management or control of a workplace at which a notifiable incident has occurred must ensure, so far as is reasonably practicable, that the site where the incident occurred is not disturbed, unless it is for a prescribed reason, until an inspector arrives at the site. The site includes any plant, substance, structure or thing associated with the notifiable incident.

A prescribed reason to disturb an incident site is action:

- to assist an injured person
- to remove a deceased person
- that is essential to make the site safe or to minimise the risk of a further notifiable incident
- that is associated with a police investigation
- for which an inspector or WHSQ has given permission - a direction that a scene may be disturbed may be given in person or by a telephone call.

Complete an Incident Report form (MA 037).

The PCBU is to contact family members to inform and offer assistance if relevant and/or to assist police with providing the family contact information. Emergency employee contact information is confidential and held with office managers.

Worker compensation agency should be notified, and necessary actions undertaken by manager.

5.2 Recovery to a Notifiable Incident

The PCBU, Supervisor and WHS Officer are to assist with WHSQ incident investigation.

The information from the completed Incident Report form (MA 037) is used for risk assessment and hazard identification.

A full investigation of the incident (using form MA 041) will be conducted. In order to gather facts for recreating the event may require interviews with involved persons and witnesses. This will ensure that detailed incident information, factors contributing to incident and recommended actions to prevent further occurrence of the hazard can be documented, implemented and monitored.

Debriefing and verbal communication with involved workers should be arranged as soon as possible. Consultation with the workers may highlight their need for professional counselling services to recover from the incident.

Ensuring the workplace returns to the normal operating state before the incident, should be encouraged to happen as soon as possible.

6.0 All other Incidents

In the event of low grade injury, illness, near miss or hazard the worker should take action to:

- Ensure the area is safe for yourself, the patient and others. Alert personnel to the situation.
- Assess level of first aid requirements (DRSABCD) and apply as necessary
- Contain or limit the hazard if necessary and if you are confident of your skill level
- Protect property
- Contact and inform the Supervisor or WHS Officer of the incident
- Complete an Incident Report form (MA 037/5.13).

6.1 WHS response to Non-notifiable Incidents

The information from the completed Incident Report form (MA 037) is used for risk assessment and hazard identification. During this investigation process the contributing factors to the incident should be highlighted, and recommendations to hazard reduction or hazard elimination can be made.

Depending on the nature of the incident will determine the level of investigation of the incident.

Tracking of incident report hazard identification, recommendations and control implementations is achieved through MA 054 'Incident Report Register' and MA 079 'Incident Investigation Register'.

Consultation of recommended hazard controls, additions or alterations made, and then implementation of new hazard control will be tracked through MA 086 'WHS Communication'.

New risks and hazards identified will be added to the MA 064 'Risk Hazard Register'.

7.0 References

- WHS Act 2011 legislation
- Queensland Government, Workplace Health and Safety.

8.0 Referenced Documents and forms

- MA 037 Incident Report Form
- MA 041 Incident Investigation Form
- MA 054 Incident Report Register
- MA 079 Incident Investigation Register
- MA 086 WHS Communication

Murray & Associates are dedicated to the continual improvement of their WHS systems. We welcome and encourage suggestions and comments on how the Incident & Injury Management SOP can be improved.

Andrew Campbell
WHS Officer
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SOP: MA 067.1

Revision: 1.1

Title: **Performing General Survey Work incl Detail, Set Out, As Constructed**

1.0 Purpose

This procedure describes the correct method for undertaking general survey work that occurs on a daily basis.

2.0 Scope

This procedure applies to all employees who perform survey tasks in the field and within the mineral resources sector.

3.0 Responsibility

Everyone who performs work in the field is responsible for understanding and implementing these procedures.

4.0 Procedure

4.1 Materials

- 4.1.1 Total Station and range pole
- 4.1.2 GPS Equipment
- 4.1.3 4 x 4 Vehicle
- 4.1.4 First Aid Equipment
- 4.1.5 Tripods and prisms
- 4.1.6 Barrier fence or other visible warning barrier
- 4.1.7 Star Picket Driver, sledge hammer and shovel
- 4.1.8 Gloves and eye protection if installing star picket
- 4.1.9 2 way radios
- 4.1.10 Mobile phone
- 4.1.11 10 Litres of Water and camel back or similar
- 4.1.12 High visibility, full length clothing. Work boots, hard hat and/or hat as required. Sunscreen.

4.2 Procedure

4.2.1 **Mobilisation/Demobilisation**

MUST HAVE VEHICLE HYGEINE/ WEED CERTIFICATION
Prepare a journey management strategy, notify your supervisor
Carry out the vehicle prestart check list
Ensure all the equipment required is in the vehicle. This forms part of the vehicle prestart check list.
Check the first aid kits, personal and vehicle, and water supply.
Follow road rules and travel to weather conditions.
Take regular breaks, as a minimum every 2 hours.
Ensure you are back at camp/office within 12 hours

4.2.2 **Perform Surveys**

THESE ARE GENERAL GUIDELINES. FOR SPECIFIC INSTRUCTION ON THE SETTING UP OF GPS EQUIPEMENT AND USE OF HAND TOOLS PLEASE REFER TO THEIR SPECIFIC SOP.

Check in with site supervisor. Attend and contribute to morning and afternoon tool boxes.
Sign onto relevant JSEA's and prepare specific JSEA for additional activities that aren't prescribed or covered in general duties.
Ensure all vehicles have current weed hygiene. Monitor and review if vehicles change properties.
Determine who is a qualified First Aid provider.
Select a radio channel to be used during work. Decide on call in times and make sure crews work together when away from vehicle.
Carry hand held radio when not in vehicle.
Decide on the location of a muster point in the event of emergency.
Check weather conditions and monitor forecast to reduce chance of exposure to severe weather.
No smoking on site except in designated areas. All butts to be placed in bins.
Consume food and water at regular intervals.
Monitor colleagues for signs of heat stress and fatigue.

Be aware of snakes and/or dangerous fauna. If a snake is spotted, report it immediately and make others aware of their whereabouts.
If walking in long grass or on a flow line scout gaiters MUST be worn.
Sunglasses/eye protection should be worn at all times while outside. This should minimise risk of exposure to eye hazards while walking/driving through vegetation.
When traversing site by foot avoid uneven/unstable ground. Take extra care in gullies and in blade plough and pulled terrain.
Liaise with Cultural Heritage and Environment Monitors and be mindful of sites containing significant cultural, flora and fauna issues.
Gates MUST be left as found and used where possible.
Prior to crossing fences assess the risk and ask for assistance when required.

4.2.3 **Marking points with pegs and stakes**

Eye and hand protection will be worn while handling wooden stakes and fibreglass stakes.
A stake driver will be used to install fibreglass stakes in favour of a mallet or hammer.
If installing wooden survey pegs to mark boundary see SOP for installing boundary marks.

4.2.4 **Setting up GPS Base Station**

See SOP for Setting up Base Station

4.2.5 **Driving and use of ATV's on site**

Murray and Associates doesn't own any ATV's. The use of ATV's will be determined by the principle. Only employees who are certified as having completed ATV training will be able to use them.
The same procedures for Mobilisation/Demobilisation apply to driving on site.
Avoid pot holes, washouts and bull dust.
Follow LO conditions.
Check for farm traffic and heavy vehicles while driving on site.
Follow principles' SOP for ATV operation if using on site.

All activities must follow Murray & Associates QLD Pty Ltd policies and procedures. If the Principle has additional policies and requirements then they take priority over and above our standard policies and procedures.