

Vehicle Hazard Analysis			Page .1. of .1
Job Description:	Job Address:	Job Area:	Date:
Voltra Electric LV	BHP Olympic Dam	Vehicle System	11/4/2018

IMPORTANT : The requirements of Standards do not override the regulatory authorities or OH&S Legislation. This document is only an extract of the requirements of standards – this is a starting point only, and does not replace the need to read and refer to the full standards

Hazard Analysis shall be carried out by personnel competent in risk assessment, with consultation from the Owner, Operator, Maintenance Personnel, Supplier, Insurer and other persons where applicable. The hazard analysis should be updated continuously at intervals (within 5 years) or when any changes are made to the equipment, the operating environment, the operator or if an incident, such as a fire or collision, occurs.

Type of Hazard Class A Class B Class E Class D

Determine the possible fire scenarios. This includes: What can happen? When and where can it happen? Why and how can it happen? Examples of information that should be included in this section is fuel sources, ignition sources, normal operational conditions, foreseeable misuse and the effects of possible fires. In vehicles, areas in which possible fire scenarios can occur include but are not limited to;

Risk Area	Addressed by System
Battery Compartments x 3	Yes
DC Convertor / Charger	Yes
Hydraulics systems (including piping, hoses, pump and valves)	Yes
Lubrication systems (including engine and transmission systems and grease systems located in engine bay only)	Yes
Braking systems (including retarders, park brakes and service brakes located in engine bay only)	Yes
Electrical systems (including alternators, generators, batteries, wiring and switch gear)	Yes

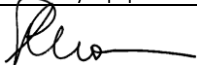

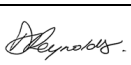
Quantify the risk exposure by determining the likelihood and consequences of the fire scenarios. This shall take into account normal operating conditions as compared to intended operating conditions. This includes, poor maintenance practices, operator use/misuse, inexperienced operators, use of oils and greases, equipment interaction, wear and tear of components and the operating environment (for example; road conditions, equipment speeds or time of day). The analysis should include the following, where applicable;

- Health and safety of the operator and passengers,
- Health and safety of people in the vicinity,
- Property loss
- Production loss,
- Environmental damage.

Prioritize the possible fire risks based upon the likelihood of a fire event occurring and the potential damage caused. This should take into account existing controls such as; the availability of firefighting equipment and/or personnel, egress points, means of fire detection and the availability and response time of external support. If the results of the risk evaluation indicate an unacceptable level of risk exists, then fire risk reduction measures should be undertaken.

What Can Happen? Determine the possible fire scenarios. Include When, Where and How it can happen. Include drawings/schematics.	How likely is this to happen? Quantify the risk exposure by determining the likelihood and consequences of the fire scenarios.	Prioritise the possible fire risks. What risk needs to be addressed first, and how? What existing controls are in place?
Electrical Fire during operation	Unlikely – maintenance of vehicle to be performed to manufacturer’s specifications.	Ensure Maintenance cycle. Complete vehicle shutdown for any for any event.
Environmental fire involving the vehicle	Unlikely	Site specific risk assessment to be performed for specific use

System Design Agreement	
Fire Fighting Agent	FirePro Aerosol
Detection System	Linear Heat Detection - 185°C
Control System	FP-08451 Control Panel – All monitored circuits
Shutdown Protocols	Connected to E-Stop of vehicle.
Operating Limitations	Site Specific Risk Analysis

Hazard Analyst:	Phil Morris	Hazard Analyst:	Simon Monteith	Hazard Analyst:	David Renolds
Position:	Fire Safety Equipment	Position:	Zero Emission Vehicles	Position:	Wormald
Signature:		Signature:		Signature:	

Schematic Drawings – Operator Manuals – System Logbooks – and other relevant documents should be included in commissioning documents.



Reinventing
Fire Suppression

CERTIFICATE OF COMPLETION & CONFORMITY

I/We David Reynolds of Wormald hereby certify that we have completed a FirePro aerosol fire extinguishing installation/extension(s) in accordance with AS5062-2006, in accordance with the manufacturers design documentation.

Name of Client : BHP

Address of Protected Area : Olympic Dam, South Australia

Description of Protected Area : Toyota Landcruiser Utility #JTELV71J007401680

Protected Area	Agent Quantity	Number of Containers	Agent Application Density	Applicable Drawing(s)
Engine Bay	400g	2	189g m ³	3918087-01
Battery Box 1	20g	1	189g m ³	3918087-01
Battery Box 2	20g	1	189g m ³	3918087-01
Battery Box 3	20g	1	189g m ³	3918087-01
DC Convertor / Charger	20g	1	189g m ³	3918087-01

Shutdown installed Yes, delay period for shutdown 5 Sec from detection of event.

Variations from this Standard previously agreed to by the authority having jurisdiction are attached (clause references and related variations included).

Completed by:

Name: David Reynolds

Signature:

Company: Wormald Australia

Date Completed: 16/4/2018



FirePro System Commissioning Mobile Plant

Risk Area: Voltra Toyota Landcruiser Utility

Reference: JTELV71J007401680

INSPECTION		
	Tasks	Completed
1. Location of FirePro Aerosol Generators	<ul style="list-style-type: none"> Ensure units are mounted in appropriate location(s). Are the brackets securely mounted. 	Yes
2. Detection Systems	<ul style="list-style-type: none"> Installation of Detection is appropriate for the machine. Detection is securely mounted. <p><i>NOTE : Detection will initiate fire suppression automatically. The detection system must be correct.</i></p>	Yes
3. Cabling requirements	<ul style="list-style-type: none"> Has fire rated and shielded cable used. Has cabling been separated from other electrical cables via conduit or cable tray. Inspect cable fixings to ensure no damaged insulation. 	Yes
4. Control Panel	<ul style="list-style-type: none"> Panel located in an appropriate location and is it securely mounted. Is the power connection to the panel a direct, suitable and dedicated supply to the Panel. Is a separate battery backup installed. 	Yes
5. Signage and Alarms	<ul style="list-style-type: none"> Are appropriate signs / sounder strobes installed. 	Yes
6. Equipment Shutdown	<ul style="list-style-type: none"> Shutdown installed. Shutdown delay in accordance with requirements. 	Yes
COMMISSIONING		
1. FIP Programming	<ul style="list-style-type: none"> Programming of Panel meets client/site requirements. Check Panel for fault(s). 	Yes
2. Activation Testing	<ul style="list-style-type: none"> Activation testing to be performed in accordance with the procedures specific to the FIP installed. Ensure activation simulator lamps have activated Ensure and Alarms have activated. Ensure shut down have activated. 	Yes
3. Fault Monitoring	<ul style="list-style-type: none"> Disconnect cable from FirePro generator - fault should register on the FIP. Where multiple units are installed, this should done separately to test each unit. Remove detector head from base - fault should register on the FIP. 	Yes
4. Earth Testing	<ul style="list-style-type: none"> Using a multimeter, test to ensure that all cables have insulation intact. Earth connection should indicate an open circuit 	Yes
5. Detection Testing	<ul style="list-style-type: none"> ENSURE THE Panel is properly isolated from activating the Firepro system. Apply heat gun or other device to place detectors into alarm. Ensure Visual/Aural Alarms have activated. Where multiple units are installed, this should done separately to test each unit. 	Yes

Inspections all found to be compliant - Tests all completed.

Completed by :

Name: David Reynolds

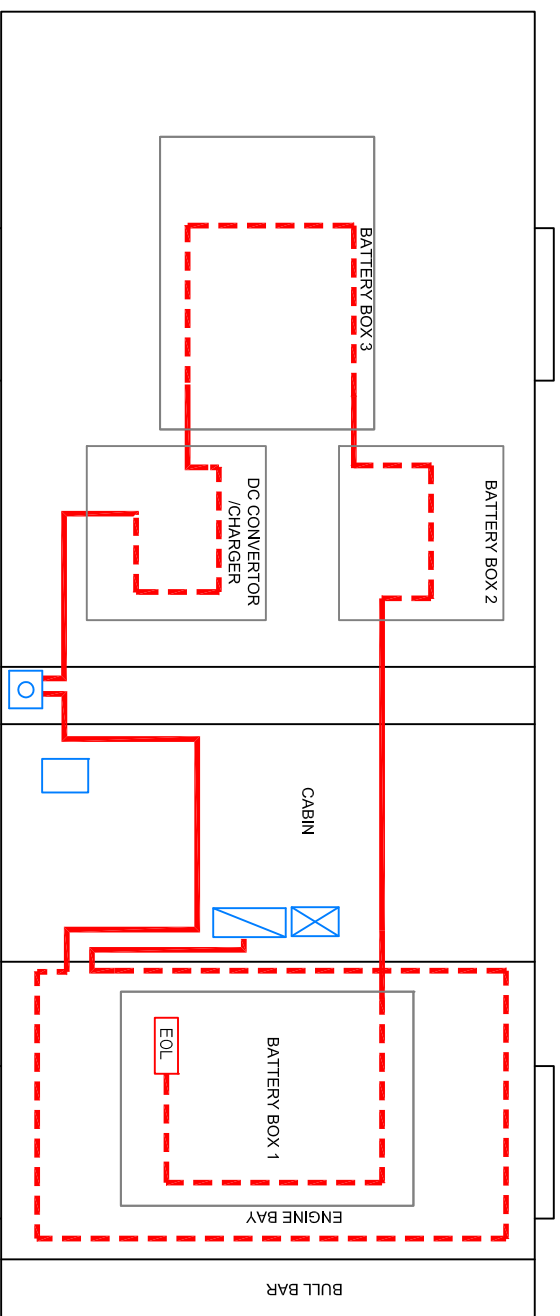
Signature:



Company: Wormald Australia

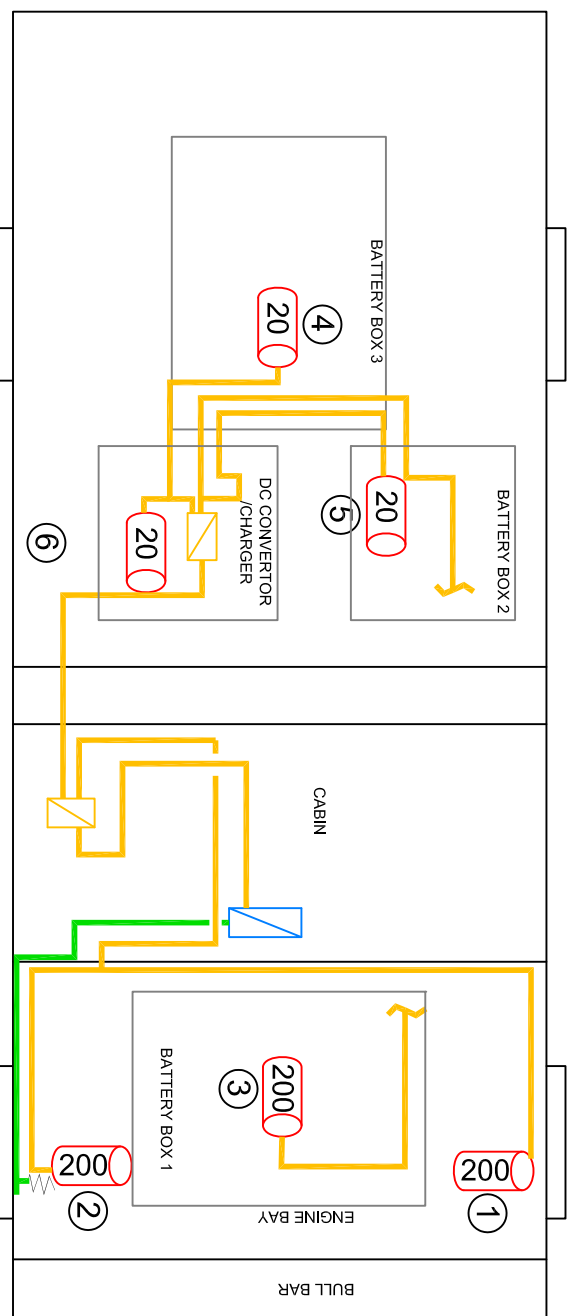
Date Completed:

16/4/18



DETECTION SYSTEM LAYOUT

SYMBOLS	DESCRIPTION
	FIREPRO AEROSOL GENERATOR 200 grams
	FIREPRO AEROSOL GENERATOR 20 grams
	MANUAL ACTUATOR
	ALARM PANEL W/ MANUAL ACTUATION
	ENGINE SHUTDOWN MODULE (5 SECONDS SHUT DOWN DELAY)
	THERMAL FUSE - AGENT RELEASE
	LINEAR DETECTION WIRE 185°
	DETECTION CIRCUIT
	THERMAL FUSE CIRCUIT
	DISCHARGE ACTUATION CIRCUIT
	END OF LINE (EOL)
	POWER CONTROL BACK UP MODULE
	DISCHARGE DELAY MODULE



ACTIVATION SYSTEM LAYOUT

COMPONENTS	PART NO.	QTY
FirePro 200gram SS Aerosol Generator	FP-0020S	4
FirePro 2000gram SS Aerosol Generator	FP-0200S	2
HD SS Bracket (ot suit 100-500	FP-06200	2
Control Panel with 2 detection circuits activate upto 4 generator units	FP-08352	1
Delayed Discharge Module	FP-08850	2
Shutdown Module	FP-08860	2
Power Control Backup Module	FP-08870	1
Remote Activation Switch	FP-14053	1
Remote Activation Switch Bracket	FP-14053B	1
Cable Loom to 6 Generators	FP-08916	1
Battery Lead	FP-14016	1
Thermal Fuse	FP-08825	1
Dust Seals	FP-06930	1
Sign - Vehicle	FP-06961	1
Linear Heat Detection Cable (Per Metre)	FP-09510	12
Detection Fitting Kit	FP-09511	5

GENERATOR	HAZARD AREA	GENERATOR SIZE
1	Engine Bay - Left Side	200 Gram
2	Engine Bay - Right Side	200 Gram
3	Battery Box - Front	20 Gram
4	Battery Box - Rear	20 Gram
5	Battery Box - Rear (Left)	20 Gram
6	Control Box	20 Gram

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REVISIONS			SYSTEM INFORMATION		
DATE	REV	AMENDMENT	BY	CHK	AS PER VEHICLE HAZARD ANALYSIS
11.05.2018	0	AS CONSTRUCTED	L. SAMPANA	D. RENIGESU	

66 HENLEY BEACH ROAD
MILE END SA 5031
Ph: 133 166

PROJECT
TOYOTA LANDCRUISER 79 SERIES
SINGLE CAB UTILITY
JTEL V7 1J0074016880

WORMALD FIREPRO AEROSOL FIRE SUPPRESSION SYSTEM

DRAWING No. 3918087-01
JOB No. 3918087