

The development of pre-incident plans for major hazard facilities and dangerous goods sites

First issued: 29 October 2021
Review date: 17 January 2024
Revision frequency: Triennially
Version number: 1.1

Guideline No. 52

Author: Dangers Goods Unit

Sponsor: Manager, DG Unit

Authorised by: ACFO, Fire Safety

1. PURPOSE

The purpose of this guideline is to provide industry with high-level general information on the development of pre-incident plans (PIP) for dangerous goods (DG) sites and major hazard facilities (MHF).

2. SCOPE

This guideline sets out a PIP's minimum requirements for use by occupiers and or operators of DG sites and MHFs situated in the Fire Rescue Victoria (FRV) fire district, where hazardous materials handling occurs, and processing plants are in use.

3. DEFINITIONS

For the purpose of this document, the following definitions will apply.

Incident refers to an event that requires an emergency operational response from FRV and or other emergency service agencies.

Materials within this guideline maintains the identical reference to the term and definition that exists within the Dangerous Goods (Storage and Handling) Regulations 2022, the Dangerous Goods (Explosives) Regulations 2022, and Schedule 14 of the Occupational Health and Safety Regulations 2017.

Emergency has the same meaning as Regulation 5 of the Dangerous Goods (Storage and Handling) Regulations.

Emergency plan has the same meaning as Regulation 5 of the Occupational Health and Safety Regulations 2017.

Emergency service has the same meaning as Regulation 5 of the Occupational Health and Safety Regulations 2017, noting that Fire Rescue Victoria is the successor at law to the former Metropolitan Fire and Emergency Services Board entity.

4. PRE-INCIDENT PLAN

4.1. What is a pre-incident plan?

A pre-incident plan (PIP) is an integral part of an emergency plan, which is developed to ensure that a strategic approach to all aspects of an emergency response is undertaken prior to, and in the event of an emergency occurring in a hazardous materials storage and handling site (usually a DG site or an MHF). Risks in a DG site or an MHF are dynamic and depend on the operations of a specific material process/storage site.

A PIP is designed to assist the emergency service (e.g., FRV) Incident Controller to deploy resources promptly and safely, particularly to an incident relevant to loss of containment of dangerous goods, explosives and or materials specifically listed within Schedule 14 of the Occupational Health and Safety Regulations 2017.

Preparing a pre-incident plan allows the site to make decisions in advance and will help the emergency response team make better decisions in the event of an emergency.

4.2. Sites requiring pre-incident plans (PIP).

FRV has established a convention whereby the requirement of an emergency plan is mandated as per the following regulations:

- a. Dangerous Goods (Storage and Handling) Regulations 2022, Regulation 53, facilities where dangerous goods are stored and handled in quantities that exceed the relevant quantities specified in the column headed 'Manifest Quantity' in the table in Schedule 2.
- b. Dangerous Goods (Explosives) Regulations 2022, Regulation 38(2)(e) and 79, holding a license to store explosives must establish and maintain an appropriate emergency plan; and
- c. Occupational Health and Safety Regulations 2017, Regulation 375, the operator of a major hazard facility (MHF) must prepare an emergency plan.

However, FRV recommends developing PIPs when a site meets any one of the following criteria:

- i. Where a site operates under the Dangerous Goods (Storage and Handling) Regulations 2022, when the inventory of a dangerous goods exceeds the 'Fire Protection Quantity' in the table in Schedule 2, FRV recommends that PIPs be developed for loss of containment incidents.
- ii. Where a site operates under Dangerous Goods (Explosives) Regulations 2022, PIPs are to be developed where there is a potential for escalation of an event; and
- iii. Where an MHF operates under Occupational Health and Safety Regulations 2017, and 'major incident(s)' are identified and documented in the site Safety Case, FRV recommends PIPS be developed to address all major incidents.

A generic PIP is acceptable when the consequence of multiple incidents (e.g., loss of containment of DGs and materials listed under Schedule 14 of the Occupational Health and Safety Regulations 2017), and their responses are the same. A short-lived incident, e.g., an explosion, may require rescue operations to be undertaken. Therefore, a PIP may also cover how emergency service personnel should approach the incident scene to conduct a rescue operation safely.

Exception: In general, FRV does not expect PIP from the following DG sites. This is because these sites require simple and similar emergency intervention.

- A (vehicle) fuel station – that stores and handle diesel, petrol (octane # 91, 95, 98), blended fuel (E10), LPG and CNG.
- Hardware, tools, or paint retail shop; e.g., Bunnings or similar;
- A building where wholesale or retail trade is conducted, where the contents of the facility are principally used for construction; and
- An agricultural farm, e.g., use of diesel fuel to run a farm's equipment.

4.3. FRV and other government agencies

FRV has a close working relationship with WorkSafe Victoria (WSV), Environment Protection Authority (EPA), as well as with individual MHF and DG sites to facilitate review of a site emergency plan.

For the MHF sites, FRV participates in the review of Safety Cases under provisions of a memorandum of understanding (MOU) with WorkSafe Victoria (WSV). FRV also provides written advice to MHF and DG sites in relation to emergency planning, fire protection system design, and other related aspects in accordance with Victorian legislation.

Any changes at an MHF and a DG site that affect a site emergency plan (i.e., risk control measures to mitigate the consequence of an incident) must be addressed in consultation with FRV via an [Application for Written Advice](#) (AWA).

Note: From 1 July 2021, an [Application for Written Advice](#) will incur fees in accordance with Regulation 21 of the Fire Rescue Victoria (General) Regulations 2020.

4.4. Where to keep PIPs?

FRV has longstanding conventions that detail the requirements of the contents of the Emergency Information Book (EIB) and the location of an EIB. As PIPs are an integral part of an emergency plan, FRV recommends that the PIPs be kept on the premises in a place where it is readily accessible to the Emergency Services. Therefore, PIPs should be part of an EIB, preferably under *Section 5 – Safety data sheets*. Refer to FRV guidelines [“Introduction to the Emergency Information Book”](#) for details.

4.5. Expectations from FRV (Why a PIP?)

A well-developed PIP provides key information to the emergency services so that they can respond promptly and safely to mitigate potential damage from an incident.

Providing accurate, relevant, and up-to-date information allows for effective intervention, reduces delays during a response, and contributes to a safe workplace for responders while responding to an emergency.

A PIP could be used for setting out an emergency response training and an emergency exercise scenario. A PIP also provides instruction to the onsite emergency response team (ERT) to follow prior to the arrival of emergency services, e.g., FRV, Country Fire Authority (CFA).

4.6. Pre-incident plan (PIP) template

For an MHF or DG site, the contents of a PIP should be submitted to FRV for review and advice together with the site's emergency plan. PIP is an integral part of an emergency plan therefore, its revision frequency should be the same as the emergency plan. If there is a change in circumstances at the premises, or PIPs are reviewed then an updated version shall be submitted to FRV for advice.

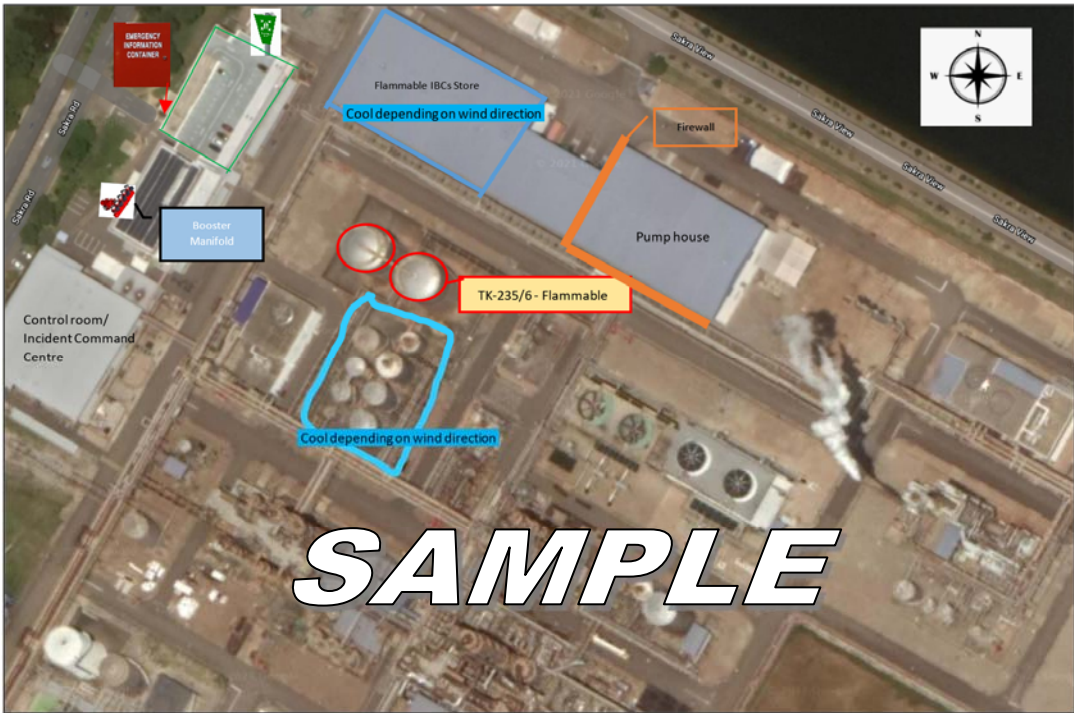
The emergency plan review is a legal requirement as per Regulation 53 of the Dangerous Goods (Storage and Handling) Regulations 2022 (for DG sites) and Regulation 379(4)(a) of the Occupational Health and Safety Regulations 2017 (for MHF).

FRV recommends that the information contained within Appendix A of this guideline be included in a PIP. Some of these recommendations may not be relevant to a specific emergency scenario thus a site should consider relevant information only. Typically, a PIP contains the following information as a minimum and is expected to be limited to 2 to 3 pages.

5. REFERENCES

- [1] Occupational Health and Safety Regulations 2017
- [2] Dangerous Goods (Storage and Handling) Regulations 2022
- [3] Dangerous Goods (Explosives) Regulations 2022
- [4] Fire Rescue Victoria (General) Regulations 2020
- [5] www.frv.vic.gov.au/dangerous-goods-0


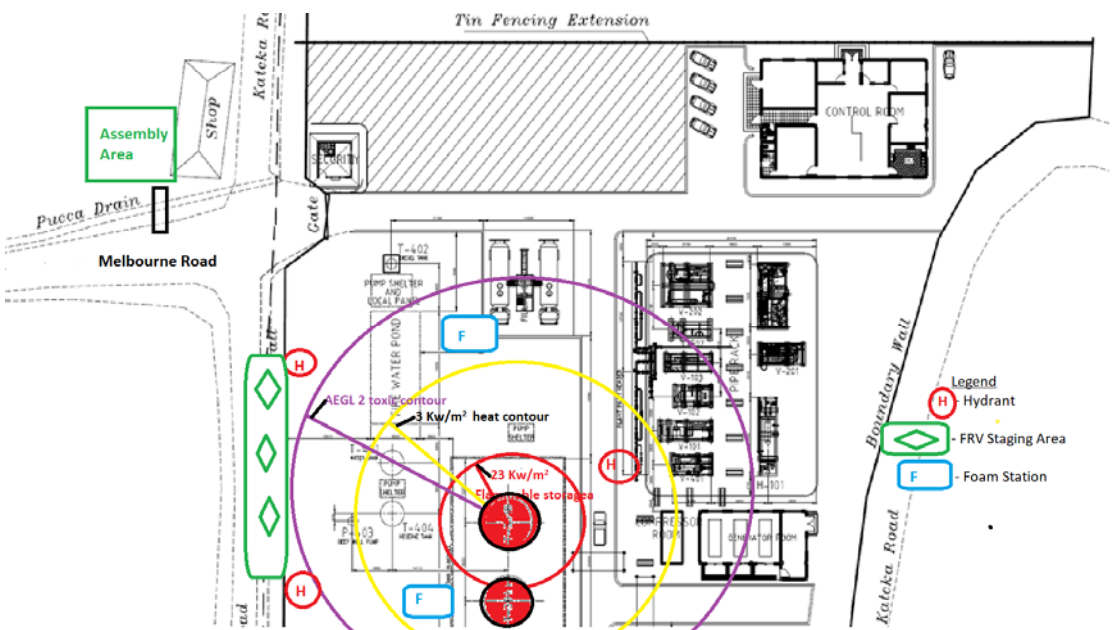
APPENDIX A – PRE-INCIDENT PLAN TEMPLATE

Section 1	PIP Title:	e.g. Tank TK-235/36 fire in the bulk flammable storage area		
	Location:	e.g. West tank farm loading and unloading area		
	Incident Scenario:	Title of the top event – e.g. <i>Bund fire following a loss of containment from tank TK-235/236, potential Toxic gas release from the process, etc.</i>		
Section 2	Material(s) Details			
	Trade name:	e.g. Methanol	UN number:	e.g. 1203
	Physical state:	e.g. Liquid/Gas	Hazchem code:	e.g. 2YE
	Largest container inventory:	e.g. 30,000 m ³	ADG code:	DG Class & Packing group, e.g. Class 3, PKG II
	Bund capacity:	Total area:	e.g. 240 m ²	GHS Hazard classification:
Section 3	Equipment/area picture – tank, vessel, reactor, compressor, isotainer, etc. Prefer a top view picture. An example is given below – red circle referring to the incident location(s), i.e. <i>Tank TK-235/6 fire in the bulk flammable storage area.</i>			
	 <p style="font-size: 2em; font-weight: bold; text-align: center; color: white; text-shadow: 2px 2px 0px black;">SAMPLE</p>			

APPENDIX A – PRE-INCIDENT PLAN TEMPLATE (Continued)

Section 4	Potential Consequences						
	Scenario:		e.g., pool fire, flash fire, jet fire, secondary fire, vapour explosion, dust explosion, toxic fume, BLEVE, etc.				
	Scenario spill area:		e.g., 150 m ²				
	Scenario risk profile						
	Smoke:		e.g., may emit toxic & corrosive fume				
	Vapour:		e.g., toxic if inhaled, 20 meters for AEGL-2				
	Radiant heat distribution:		e.g., 20 meters for 3 kW/m ²				
	Water run-off:		e.g., Firewater run-off may contain toxic compound				
Surrounding hazards:		e.g., the potential for escalation, isolation required for power and utilities, consideration for wind direction, consideration for interruption on a public road,					
Section 5	Fixed firefighting/toxic vapour suppression equipment <i>(for responding to the above scenario)</i>						
	e.g. - Firewater system: Firewater main, supplied from the western fire pump house - Fire hydrant and hose reel system: comprising of 4 hydrants in zone 1, 2 & 3, and 2 hoses reels, etc. - Follow similar info for foam, water monitor, sprinkle, deluge system etc.						
	Foam	Type used:	Brand name	Delivery method:	e.g., Fixed foam monitor		
		Percentage rate:	e.g., 3% or 6%		System description:	e.g., remotely operated foam applies, manual activation available at the western area of XXXX litre of bulk foam supply to the foam monitor	
		Location stored:	e.g., foam station at the warehouse				
	Water and foam delivery requirements <i>(refer to the fire safety study or similar calculation for the design basis)</i>						
	Fire type	Total solution required (L/min)	Total concentrate required (L)	Application rate (L/min/m ²)	Cooling water (L/min)	Minimum foam application time (min)	Total water required (L/min) including supplementary
	e.g., Bund fire						
	Notes: e.g., - Additional foam concentrates available at _____ - Additional water supply from third-party contractor - Supplementary hydrant allowances - Additional fire equipment available, e.g., portable foam trailer, fire hose, fog nozzle, etc.						

APPENDIX A – PRE-INCIDENT PLAN TEMPLATE (Continued)

Section 6	Firefighting strategy and precautions	
	<p>Relevant photos (fire system, isolation/shutdown valve, E-Stop, etc)</p> 	<ul style="list-style-type: none"> - Tactical planning - Use of firefighting equipment - Cooling water/boundary cooling - First response scenario (on-site emergency response team actions while waiting for FRV/CFA arrival) - Escalation potential, etc.
Section 7	3.0kW/m² heat contour impact map and applicable toxic exposure impact map	
	<p>e.g., 3kW/m² impact map, FRV staging area, hydrant assembly point, foam station, hose reel location, etc.</p>  <div style="border: 1px solid black; padding: 5px; text-align: center; margin-top: 10px; font-size: 24px; font-weight: bold;">SAMPLE</div>	

APPENDIX A – PRE-INCIDENT PLAN TEMPLATE (Continued)

SECTION 1: PIP INTRODUCTION

The information to be included in this section should provide a high-level introduction to a pre-incident plan (PIP).

PIP Title

One sentence title of an incident's consequence such as 'Tank Fire', 'Explosion in a Reactor', 'Run Away Reaction', etc.

PIP Location

This refers to the location of major equipment, where the emergency would occur, and includes impact areas, usually a sub-area of a process plant or bulk storage yard.

Incident Scenario

The purpose of this section is to provide a short description of an incident's consequence. For example, a bund fire following a loss of containment (LOC) from a bulk storage tank, which has the potential for a BLEVE (boiling liquid expanding vapour explosion).

SECTION 2: MATERIAL(S) DETAILS

The purpose of this section is to provide relevant information to identify material and recognise its hazardous properties. A single PIP may involve multiple materials. Material details are mostly available in the safety data sheets (SDS). This section also requires the material's largest inventory and bund capacity.

Trade Name

The subject material(s) trade/chemical/scientific name is important to identify them and recognise their hazards. A material name can be redacted if it is a commercially sensitive one such as materials used in the defence and safety industries.

ADG Code, Hazchem Code and UN Number

The Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code) sets out the requirements for transporting dangerous goods by road or rail. ADG code properties, i.e. DG Class and Packing Group would help to mitigate the risk of harm during an emergency intervention.

Hazchem Codes (also called Emergency Action Codes) are standardised codes that provide critical information for emergency services intervention. It provides critical information to the emergency services on the action to be taken to combat a loss of containment, fire, explosion or toxic exposure incident (in an emergency), which involves a hazardous substance. It basically offers guidance on emergency procedures to deal with an incident. Essentially, the Hazchem Code doesn't identify the contents (that's what the UN number is for) but rather the basic method of dealing with an accident.

The United Nations (UN) number is a four-digit number that identifies dangerous goods, hazardous substances and articles in the framework of international transport. The UN number system is administered by the United Nations and is accepted generally worldwide.

GHS Classification

The Globally Harmonised System (GHS) of classification and labelling of chemicals provides criteria for the classification of physical hazards (e.g. flammable liquid - category 1), health hazards (e.g. acute toxicity - inhalation category 1), and environmental hazards (e.g. aquatic

toxicity – category 1). It is a system used internationally to classify and communicate chemical hazards with consistent terms and information on chemical labels and safety data sheets (SDS).

SECTION 3: EQUIPMENT/AREA PICTURE

The purpose of this section is to provide a legible top view photo/map of the potential incident impacted area. FRV will use this map for tactical planning and resource deployment.

Photos will assist emergency service crews to set up a safe staging area and assess any escalation potential from one incident scenario to others. It is expected to see proper labelling on key equipment, access ways, manifolds, staging areas, etc.

SECTION 4: POTENTIAL CONSEQUENCES

The purpose of this section is to provide information about potential consequences arising from a major incident event. These should align with the site's relevant risk assessment.

Potential consequences

FRV recommends the following information to be considered in this section:

- Include potential risk, to which an emergency responder may be exposed during an emergency intervention. e.g., burning of Polyurethane insulation material may emit acute toxic inhalable Cyanide smoke;
- 3kW/m² threshold impact map is to be used in an emergency intervention for locating/accessing fire-fighting equipment and it is the tenable access limit for emergency responders as detailed in FRV guideline GL-17; and
- Clarification of any escalation potential to address both the direct impact of an incident and the potential for propagation and secondary incident.

The escalation potential is to be included using relevant risk assessment/ risk study or a recognised standard; specifically, the separation distance, the radiant heat exposure isopleth and toxic's dangerous dose isopleth shall be aligned with the consequence modelling to indicate if escalation and or exposure is likely.

SECTION 5: FIRE-FIGHTING EQUIPMENT

The purpose of this section is to provide information about the site's in-house fire-fighting equipment, that is, the firewater systems including foam installations, hose reels, hydrants, boosters, fire pumps, sprinkler and deluge systems, trailer monitors, etc.

Firewater and foam demand

The firewater system must be capable of supplying the combined fire water flow rate for the fire zone with the largest estimated demand, defined as the sum of foam/water requirements for extinguishment plus supplementary hydrant allowances prescribed by AS 2419.1. This should refer to the largest credible fire scenario or worst-case firewater demand.

This section shall also provide a summary of the firewater and foam requirements for the relevant PIP scenario. In some locations where escalation is found to be likely, combined fire zones should be assessed to determine the effects of supplementary cooling water.

SECTION 6: FIRE-FIGHTING STRATEGY AND PRECAUTIONS

The purpose of this section is to provide high-level instructions for the emergency service personnel to follow. These instructions will mitigate the risk of harm during an emergency intervention.

This section should include some relevant photos, e.g. firefighting systems, process isolation points such as fire system water supply valves, remotely operated firewater monitor switches/valves, process shutdown or isolation points, e-stops, etc.

SECTION 7: HEAT AND TOXIC CONTOUR

The purpose of this section is to provide an impact map for 3kW/m^2 heat flux for flammable materials and a relevant dispersion radius for acute toxic vapour/gas concentrations/dangerous doses.

In addition to the heat contour and acute toxicity impact maps, FRV also recommends including the emergency services staging area, the location of hydrants, areas covered by sprinkler and deluge systems, etc.