Fire Safety Study

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Fire Rescue Victoria

Guideline No. 54
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1. PURPOSE

The purpose of this guideline is to:

a) Provide industry with high-level information on the development of a Fire Safety Study (FSS) for a facility, which contains:

   ii. Dangerous Goods (DGs) exceeding the manifest quantity specified in Schedule 2 of the Dangerous Goods (Storage and Handling) Regulations 2022 [1];

   iii. A significant quantity of hazardous substances and materials, as defined in Chapter 4 of the Occupational Health and Safety Regulations 2017 [2];

   iv. Relevant materials, including their threshold quantities, which are identified within Schedule 14 and subject to the requirements of Part 5.2 of the Occupational Health and Safety Regulations 2017;

   v. A battery energy storage system (BESS);

   vi. Waste recycling processes and

b) Identify the settings in which authorised representatives of Fire Rescue Victoria (FRV) may request that a FSS be complied.

2. SCOPE

This guideline is applicable to facilities situated within the FRV fire district.

The guideline identifies the minimum expectations of a FSS, which is compiled and referred to FRV (or the Fire Rescue Commissioner) for review in accordance with legislated requirements or published codes of practice. This guideline also distinguishes between other types of fire safety related documents that are prepared for other purposes.

3. DEFINITIONS

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

Battery Energy Storage System (BESS): refers to technology that stores energy using rechargeable battery systems, allowing for the management and stabilization of power supply. BESS is used in various applications, including renewable energy integration, grid stabilization, peak load shaving, and backup power.

Dangerous Goods, Hazardous Materials and Schedule 14 Materials: within this guideline maintains the identical reference to the terms and definitions that exist within the Dangerous Goods (Storage and Handling) Regulations 2022, the Dangerous Goods (Explosives) Regulations 2022 [3], and Schedule 14 of the Occupational Health and Safety Regulations 2017.

Emergency/Emergency plan: is defined in the respective Dangerous Goods and Occupational Health and Safety Regulations. Refer to the regulations that are applicable to a site.

Facility: refers to a building or property, including any infrastructure situated within a building or on the property.

FRV fire district: has the same meaning as Section 4 of the *Fire Rescue Victoria Act 1958* [4].

Incident: refers to an incident that requires an emergency operational response from Fire Rescue Victoria (FRV) and/or other emergency service agencies.

NSW HIPAP 2 Guidelines: NSW Government, department of planning published Hazardous Industry Planning Advisory Paper No 2, Fire Safety Study Guidelines [5].

Pre-Incident Plan (PIP): as per the definition in FRV Guideline GL-52 [6].

4. WHAT IS A FIRE SAFETY STUDY?

A Fire Safety Study (FSS) is a systematic analysis aimed at identifying and mitigating fire-related hazards associated with a building, property, or a facility to which this guideline applies.

The objective of an FSS is to ensure that the existing or proposed fire prevention, detection, protection and fighting measures are appropriate for the specific fire hazard and adequate to meet the extent of potential fires. A FSS also assesses the risk of explosion and toxic exposure.

Whilst there are other types of fire safety reports that are prepared for differing legislative, technical and environmental settings, a FSS is the only document that FRV will consider when requests for written advice are made by industry in association with the specific settings identified by this guideline.

To help industry prepare a FSS, a list of FRV's responses to frequently asked questions has been included within Appendix A of this guideline.

5. PREPARING A FIRE SAFETY STUDY

5.1. EXPECTATIONS OF A FIRE SAFETY STUDY

A FSS is a supporting document that accompanies an application for written advice to FRV. FRV affirms that the NSW HIPAP 2 Guidelines that are published by the New South Wales Government's Department of Planning, is the most appropriate technical reference document for industry to utilise when developing a FSS.

Whilst alternative processes for documenting a FSS may exist within other international jurisdictions, FRV strongly encourages the use of the NSW HIPAP 2 Guidelines by industry, as it generally ensures that FRV's reviews are conducted with minimal disruption.

When prepared in accordance with the NSW HIPAP 2 Guidelines, the FSS must demonstrate that the control measures associated with the facility's identified risks are sufficiently appropriate. Additionally, FRV also expects that any other control measures and or assessment methodologies that were identified and agreed to at the initial scoping meeting involving the facility operator or developer's consultant(s), are sufficiently addressed when the FSS is submitted to FRV.

Consistent with the NSW HIPAP 2 Guidelines' intent, any deviation from a relevant design standard must be documented in the FSS report. This information is considered useful when assessing the adequacy of control measures as it is important to be aware of any design deviations which were agreed at the time of the FSS.

5.2. CLEARLY DOCUMENTING THE OUTCOMES OF A FIRE SAFETY STUDY

Whilst a FSS report has many uses, it is extremely useful during the preparation of an emergency plan and a fire protection system.

For example, the length of a jet fire flame and the diameter of a pool fire may be calculated, and the results plotted into tables to determine different levels of heat flux. The information from these tables can be used to define assumptions around exclusion zones, safe egress pathways used for evacuation or assist in defining the location of staging points or placement of mobile and permanent firefighting equipment. As a FSS determines consequence zones for recognised events, it is unsafe to have evacuation areas within consequence zones and it is unreasonable to expect people to access emergency equipment, such as hydrants, shutdown buttons within these zones.

5.3. STAKEHOLDER ENGAGEMENT AND COMMITMENT

A FSS needs to be compiled collaboratively encompassing the operational objectives of the operator or developer of the facility (as applicable). In many instances, this collaborative approach may also encompass the objectives and requirements of the facility's insurer. Where a FSS makes recommendations that are essential to the safe operation of the facility, the operator or developer of the facility must consider every recommendation and determine whether to accept or reject those recommendations. This should be undertaken through an informed and documented justification process.

When a formal application for written advice is made to FRV, a written statement of commitment from the facility's operator or developer, which addresses the implementation of those recommendations contained within the FSS, must also accompany the application.

6. REFERENCES

[1] Dangerous Goods (Storage and Handling) Regulations 2022

[2] Occupational Health and Safety Regulations 2017

[3] Dangerous Goods (Explosives) Regulations 2022

[4] *Fire Rescue Victoria Act 1958*

[5] NSW Government, department of planning, Hazardous Industry Planning Advisory Paper No 2 - Fire Safety Study Guidelines

[6] FRV Fire Safety Guideline GL-52: The development of pre-incident plans (PIP) for major hazard facilities (MHF) and dangerous goods sites

APPENDIX A

FREQUENTLY ASKED QUESTIONS (FAQS)

Q: **Who can conduct a FSS or who should I engage to conduct an FSS?**

A: A FSS should be conducted by competent professionals with expertise in fire safety, process safety and risk engineering, preferably with specific experience in the understanding and interpretation of the following as a minimum:

- Victorian OH&S Regulations 2017, Dangerous Goods (Storage & Handling) Regulations 2022, latest version of Australian Dangerous Goods Code WorkSafe Victoria publication – Code of practice: The storage and handling of dangerous goods, etc.
- Australian and international fire protection system design standards. e.g., AS 2419 series, AS 2118 series, AS 1851, AS 2941, NFPA 11, NFPA 13, NFPA 16, NFPA 855, etc.
- Australian and international dangerous goods or hazardous material storage and handling standards. e.g., AS 1940, AS 1596, AS 4681, AS 3833, AS 3780, AS 4452, etc.
- Risk engineering and risk management. e.g., ISO 31000 – Risk management, NSW HIPAP No. 4 - Risk Criteria for Land Use Planning, NSW HIPAP 6 - Guidelines for Hazard Analysis, etc.
- Environment Protection Authority Victoria guidelines. e.g., 1667.3, 1759.1 etc.
- Process Safety - refers to the management of processes and operations within industries to prevent major incidents involving hazardous materials, such as chemicals, petroleum, and gases. e.g., AIChE publications, IChemE publications, CCPS publications, etc.
- Consequence assessment competency - refers to the ability of individuals to evaluate and quantify the potential consequences of various hazards or events, especially fire, explosion, and toxicity. In the context of FSS, consequence assessment involves assessing the possible outcomes or impacts of a loss of containment incidents that could occur within a given system or environment. Expertise in use and interpretation of various well recognised consequence modelling software. e.g. DNV – Phast, Safati; Gexcon – Effects, RiskCurves, FLACS CFD; etc.
- Hold an undergraduate academic qualification in engineering, preferably in chemical, process, or mechanical disciplines. A post graduate academic qualification in fire safety and risk engineering is also desirable.
- Sound knowledge of the emergency planning requirements for facilities where hazardous materials are stored and handled, including a sound knowledge of AS 3745.
- Minimum 5 years of industry experience.

Q: Is a FSS only needed for an established facility?

A: A FSS could be conducted both for a new development or an existing development. For a new facility, preliminary design documentation is required.

Q: Must the operator of a facility engage a consultant for conducting an FSS?

A: An operator of the facility can undertake a FSS, if they have a suitably qualified and independent competent person in the employ of the company to undertake such function. The operator should seek to appoint a consultant with the relevant qualifications and experience to undertake a FSS, should the operator identify the need.

Q: What resources are needed to develop an FSS?

A: Resources include access to relevant data, expertise in fire safety, process safety and risk engineering, and collaboration with stakeholders to ensure comprehensive risk assessment and strategy development. Usually, a FSS requires access to the following documents:

- Study area, local context of the proposed facility including - site layout drawing, site description and surrounding land use description.
- General description of the plant and operations.
- Process flow diagrams for the facility.
- Typical inventories of dangerous goods materials, e.g., combustible, flammable, corrosive, toxic, etc.; DG manifest and safety data sheets.
- Proposed Fire Service Plan, (e.g., ring main, fire hydrants, sprinkler, fire-rated structures, fireproofing, flame/gas detection, isolation & shutdown systems etc.
- Details of the facility's fire water supply (e.g., pump configuration, available flow, pressure, firewater make-up etc.).
- Firewater containment and waste disposal proposal.
- Site drainage system, storm water isolation and firewater run-off containment.
- Relevant previous studies / reports.
- Communication infrastructure such as a Fire Detection Control and Indicating Equipment (FIP) and Emergency Warning Control and Indicating Equipment (EWIS) etc.

Q: Is computer modelling mandatory for a FSS?

A: The inclusion of computer modelling outcomes within a FSS assists FRV's delegated officials with the interpretation and understanding of various hazardous scenarios. FRV may request a copy of the computer software file for verification and validation.

Q: What should be a facility fire water run-off containment capacity?

A: The assessment of containment for firewater run-off shall adhere to the guidelines outlined in the FRV Fire Safety Guideline GL-12: Control of Firewater Runoff. In accordance with best practices, the determination of firewater run-off containment should align with the facility's worst-case firewater demand.

For instance, in compliance with Clause 4.2.8 of AS 2419.1:2021, which mandates a 4-hour duration for required fire hydrant flow, the facility must ensure containment equivalent to 4 hours of the specified hydrant flow volume. Additionally, if the facility incorporates a sprinkler system necessitating a 60-minute flow duration, the total firewater containment should encompass 4 hours of hydrant flow plus 60 minutes of sprinkler flow.

Another good reference document for determination of firewater run-off containment capacity is the "*Best practice guidelines for contaminated water retention and treatment systems*", published by NSW government, July 1994.