GAS IMPORT JETTY AND PIPELINE PROJECT
ENVIRONMENT EFFECTS STATEMENT
INQUIRY AND ADVISORY COMMITTEE

TECHNICAL NOTE

TECHNICAL NOTE NUMBER:	TN 051
DATE:	2 November 2020
LOCATION:	Gas Import Jetty and Pipeline Works
EES/MAP BOOK REFERENCE:	Technical Report K – Safety, hazard and risk assessment
SUBJECT:	Response to IAC RFI 102 and 103 - Section 12.1: Safety, hazard and risk (risk methodology).
SUMMARY	Explanation of risk methodologies used in the safety risk assessment. Advice on how the major safety and hazard risks associated with each component of the Project and how each is to be addressed.
REQUEST:	This technical note has been prepared in response to the Request for Further Information provided to the proponents by the Crib Point Inquiry and Advisory Committee dated 16 September 2020.

[102] – Explain the risk methodologies used in the safety risk assessment, including how they have been applied to the various components of the Project, including the FSRU, CPRF, Pipeline, MLVs, PEDF and the Pakenham End of line scraper station

1. The methodology and purpose of the primary risk assessment tools are included in Appendix A of EES Technical Report K: *Safety, hazard and risk assessments*.
2. Each component of the Project has been subject to multiple risk assessment tools as applicable for the design. All components have undergone multiple Hazard Identification Studies (HAZIDs) and Hazard and Operability Studies (HAZOPs). A safety management study has been completed for the proposed pipeline alignment, while the FSRU, Crib Point Receiving Facility and Pakenham Delivery Facility have undergone Quantitative Risk Assessment (QRA) studies.
3. Safety studies and risk assessment studies are ongoing during the detailed design and will continue during construction and operations. Each of the Project components has its own regulatory requirements but all areas will be required to demonstrate the adequacy of the risk identification processes used in the design and the adequacy of controls implemented via a Safety Case provided to the relevant regulator for approval.
4. On the Gas Import Jetty Works risk methodologies, refer to evidence by Ms Kate Filippin (document 81), paragraph 10, which summarises Ms Filippin's key findings and opinions in relation to the GIJW and states:

   a. The range of preliminary hazard identification and risk assessment studies undertaken for the Gas Import Jetty Works are considered suitable for this stage of the project. Other studies are planned for the design phase. These are the types of studies that are expected to be undertaken at a later stage and this is considered appropriate.

   d. A QRA has been undertaken based on the preliminary design for the Gas Import Jetty Works. This QRA has utilised the accepted industry-standard methods based on the guidelines in the New South Wales (NSW) Hazardous Industry Planning Advisory Papers

(HIPAP). Paper No. 3 (HIPAP 3) [7] and Paper No. 6 (HIPAP 6) [8] present a standard method for conducting QRA and are utilised for QRA studies in all states of Australia.

j. In line with the guidance from HIPAP and the approach considered appropriate for this type of project, an iterative approach to assessing risk is being undertaken. Further risk studies will be undertaken as part of the Formal Safety Assessment required by the Gas Safety (Safety Case) Regulations for the jetty gas piping and Crib Point Receiving Facility. This will include studies to demonstrate the adequacy of controls and to demonstrate risks are reduced so far as is reasonably practicable (SFAIRP). AGL intend to follow this approach for the FSRU. A recommendation has been made to continue this iterative approach as the project progresses.

5. On the Pipeline Works risk methodologies, refer to evidence by Ms Kate Filippin, (document 81), paragraph 11, which states:

   a. In line with AS/NZS 2885 Pipeline – Gas and liquid petroleum, Parts 1 – 6 [12], safety management studies, including risk assessment workshops, have been undertaken covering the pipeline and Pakenham Delivery Facility.

   b. The studies undertaken consider the pipeline route and design to date. As should be expected, the studies have been, or will be, updated as the design process progresses.

   k. In line with the guidance from HIPAP and the approach considered appropriate for this type of project, an iterative approach to assessing risk is being undertaken. Further risk studies will be undertaken as part of the Formal Safety Assessment required by the Gas Safety (Safety Case) Regulations for the pipeline works. This will include studies to demonstrate the adequacy of controls and to demonstrate risks are reduced so far as is reasonably practicable. A recommendation has been made to continue this iterative approach as the project progresses.

   And further at paragraph 83 in relation to the Pakenham Delivery Facility Ms Filippin notes:

   A QRA was performed for the preliminary design of the Pakenham Delivery Facility to evaluate the risk to surrounding land use. An evaluation of the risk from major failures associated with the pipeline facilities is a requirement of Energy Safe Victoria (ESV) under the Gas Safety (Safety Case) Regulations. This QRA utilised the accepted industry-standard methods based on the guidelines in HIPAP for assessing offsite risk for hazardous industries. HIPAP 3 and HIPAP 6 present a standard method for conducting QRA and are utilised for QRA studies in all states of Australia.

[103] – Provide advice on the major safety and hazard risks associated with each component of the Project and how each is to be addressed. This may be in the form of a tabulated risk register similar to those included in other sections of the EES.

6. The risk assessment process assesses the consequence and the probability of an event. The high consequence, low probability events which have the potential to result in fatalities are all associated with loss of hydrocarbon containment, either LNG at the FSRU or natural gas on the Jetty topsides equipment through to injection of the gas into the VTS at Pakenham.

7. Loss of containment can result in the major hazards identified in Section 5 of EES Technical Report K: *Safety, hazard and risk assessments*. Loss of containment has the potential to occur at many different locations throughout the process (multiple equipment, piping locations etc) which potentially operate at different conditions and have potentially different causes of containment loss.

8. Safety studies conducted for the Project assess in detail each operational area and the necessary controls that are both in place in the design, as well as any need for additional controls to be added to the design. These studies have been provided on a confidential basis to the IAC as part of confidential Technical Note 50 (Response to RFI 105 and 111).

9. It is noted that Ms Filippin (document 81) lists the relevant studies for the Pipeline at paragraph 65 as follows:

   a. Pipeline route selection and identification process
   b. Pipeline Heat Radiation Release Calculation

c. Detailed Design SMS for the pipeline
d. HAZOP for the pipeline and associated facilities.

10. A Safety Management Study (SMS) was prepared for the pipeline and this has been provided to the IAC on a confidential basis (document 96). In relation to the SMS, Ms Filippin confirms (at paragraph 78 of document 81) that:

> *The SMS process undertaken for the pipeline was reviewed and considered suitable and was detailed to a level that would be typically expected for the stage of the project. The SMS process followed the approach specified in AS/NZS 2885. That is:*
> *a. Location analysis and classification*
> *b. Threat identification*
> *c. Threat control*
> *d. Failure analysis of threats where failure is possible*
> *e. Qualitative risk assessment and treatment of residual risk.*

11. Further, at paragraph 81, Ms Filippin notes:

> *An iterative approach to risk assessment is being undertaken as the project design progresses. It is expected that further risk studies will be undertaken as part of the FSA required by the Gas Safety (Safety Case) Regulations for the pipeline. This will include studies to demonstrate the risks have been reduced SFAIRP and that the pipeline and associated facilities can be operated safely. This is in line with the guidance from AS/NZS 2885 and the Pipeline Licence requirements and is considered appropriate for this type of project.*

12. Similarly, for the Gas Import Jetty Works, safety and hazard risks will continue to be assessed and addressed through Safety Case regimes under the *Gas Safety Act* 1997 and (it is anticipated, if the FSRU becomes a Major Hazard Facility) the *Occupational Health & Safety Act* 2004. Ms Filippin states at paragraph 45:

> *An iterative approach to risk assessment is being undertaken as the project design progresses. This is in line with the guidance from HIPAP and the approach is considered appropriate for this type of project. Further risk studies are planned as part of the Formal Safety Assessment (FSA) required by the Gas Safety (Safety Case) Regulations for the jetty gas piping and Crib Point Receiving Facility. This will include studies to demonstrate the risks have been reduced SFAIRP and that the facilities can be operated safely. As outlined above, should the FSRU be classified as an MHF under the OHS Regulations, there will be a further requirement to develop a safety case for the FSRU which must incorporate an adequate demonstration that risks from the facility have been reduced SFAIRP.*

13. All hazards will be assessed using Inherent Safety in Design practices and controls implemented using a hierarchy of hazard controls. The hierarchy is given below, (as is appropriate for loss of containment hazards) in decreasing preference;

    a. Elimination of the Hazard – Change in engineering design (materials/equipment items/layout) so that the risk no longer exists

    b. Substitution – If elimination of the hazard is not possible, can substitutions be made that reduces the hazard or the likelihood of the hazard.

    c. Engineering Controls – Implementation of instrumented control and shutdown systems that react to prevent an incident or minimise the potential consequence.

    d. Administrative Controls – Operational procedures that work to isolate the hazard from the process (control of heavy machinery access) or isolate people from the hazard (restricted access zones)

14. Mitigation measures have been proposed to demonstrate the implementation of the hierarchy of hazard controls (see Section 11 of EES Technical Report K: *Safety, hazard and risk assessments*).

15. In relation to mitigation measures MM-HR01 – Gas Import Jetty Works safety standards (now EPR-HR01 in Document 174) and MM-HR02 – Pipeline Works safety standards, Ms Kate Filippin notes (document 81, paragraph 48 and 102):

    The underlying assumptions for the risk analysis assume that the operations have been designed to an appropriate set of standards. It is expected and appropriate for the [Gas Import Jetty Works / Pipeline Works] to be designed, constructed and operated in accordance with the standards and guidelines accepted in Australia.

16. On mitigation measure MM-HR03 – Process control system and automated emergency shutdown systems (now EPR-HR03 in Document 174), Ms Kate Filippin notes (document 81, paragraph 50 and 103):

    The inclusion of automated emergency shutdown systems is in line with best practice operations to manage and control emergency situations. Automated shutdown reduces the consequences of an incident due to the speed of the response.

    … Monitoring via attended control rooms adds an additional layer of protection, as emergency response can be instigated if necessary.

    …The inclusion of two mainline valves along the pipeline allows for isolation in an emergency and reduces the potential consequence should a breach occur in the pipeline. The underlying assumptions for the risk analysis assume these measures have been incorporate in the design.

17. On mitigation measure MM-HR07 – Emergency response plans, Ms Kate Filippin notes (document 81, paragraph 55 and 56):

    The EES describes that emergency response plans are to cover the practices and procedures for detection and shutdown in an emergency, contingency planning, training, continuous improvement monitoring and performance standards for critical controls. The plans will be developed to align with accepted standards for emergency response. An emergency management framework will be developed to provide the linkages between the different stakeholders.

    The development and implementation of emergency response plans are considered an essential mitigation measure and must be developed for any facility of this type. It is normal practice to develop these once the design phase has progressed beyond its preliminary phase. The approach to development of the plans involves consultation with a range of stakeholders and agencies. This is considered an appropriate mitigation measure.

CORRESPONDENCE: N/A

ATTACHMENTS: N/A