

APPENDIX G QRA SUITABILITY REVIEW KAPUNI GAS TREATMENT PLANT - AECOM

QRA Suitability Review

Kapuni Gas Treatment Plant

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QRA Suitability Review

Kapuni Gas Treatment Plant

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Executive Summary

South Taranaki District Council (STDC)'s current District Plan, which sets objectives, policies and rules for significant hazardous facilities, became fully operative on 22 January 2021 following an extensive stakeholder consultation period in which elements of the Plan, including the use of QRA risk contours, were challenged in the Environment Court. The Environment Court approved use of QRA risk contours in the current Plan in September 2020.

The South Taranaki district contains multiple Oil and Gas Production facilities, which contain hazards with the potential for offsite impacts. The Operators of these Oil and Gas facilities have had Quantitative Risk Assessments (QRAs) commissioned to demonstrate compliance with their legal obligations under the Health and Safety at Work Act, 2015. The Environment Court approved the use of these QRAs, specifically, risk contour plots, in the District Plan to demarcate an area in which "sensitive activity" would be exposed to an unacceptable risk. In addition, STDC uses the risk contour plots to trigger a consent requirement where any proposed changes to the Oil and Gas Production facilities extend the risk contour plots.

Taranaki Energy Watch challenged several aspects of the Proposed District Plan, in the Environment Court. With respect to use of the available QRA risk contour plots, the Environment Court directed STDC, via Court Minute, *Timeframes For Providing Fatality Risk Contours (18 September 2019)*, to verify that the risk contour plot is suitable for use in the Proposed District Plan. Specifically, the Environment Court requested the following in relation to reviewing the existing QRAs:

- *state that sensitive activities outside the risk contours will not be exposed to unacceptable risk (para [6]);*
- *take limitations into account and adopt a precautionary approach (para [8]); and*
- *be accompanied by a statement as to concerns identified by the certifier have or will be addressed by operators (para [8]).*

AECOM has reviewed the Kapuni Gas Treatment Plant QRA and it is AECOM's opinion that:

- The QRA fulfills the requirements, defined by the Environment Court via Court Minute, *Timeframes For Providing Fatality Risk Contours (18 September 2019)*, to be used "as is" in the District Plan.
- The 1×10^{-6} Location Specific Risk Contour presented in Figure 8-2, Section 8.2.3 – Sensitivity Case 2 Risk Contours, QRA Report, Revision 1, August 2021 can be used for the purposes of the District Plan.
- The 1×10^{-6} Location Specific Risk Contour presented in Figure 8-2, Section 8.2.3 – Sensitivity Case 2 Risk Contours, QRA Report, Revision 1, August 2021:
 - takes into account the limitations of the QRA process and adopts a precautionary approach;
 - having so taken into account the limitations of the QRA process can be relied upon to represent the 1×10^{-6} fatality risk contour for the Kapuni Gas Treatment Plant.

1.0 Introduction

1.1 Background

South Taranaki District Council (STDC)'s current District Plan, which sets objectives, policies and rules for significant hazardous facilities, became fully operative on 22 January 2021 following an extensive stakeholder consultation period in which elements of the Plan, including the use of QRA risk contours, were challenged in the Environment Court. The Environment Court approved use of QRA risk contours in the current Plan in September 2020.

The South Taranaki district contains multiple Oil and Gas Production facilities, which contain hazards with the potential to have offsite impacts. The Operators of these Oil and Gas facilities have had Quantitative Risk Assessments (QRAs) commissioned to demonstrate compliance with their legal obligations under the Health and Safety at Work Act, 2015. Amongst the measures reported in these QRAs is a contour plot of location-specific individual fatality risk (LSIR) for the risk level of 1×10^{-6} chance of fatality per year.

The Environment Court approved the use of these QRAs, specifically, risk contour plots, in the District Plan to demarcate an area in which "sensitive activity" would be exposed to an unacceptable risk. "Sensitive activity" is defined on page 36 in the South Taranaki District Plan (Version: 22 January 2021), hereinafter referred to as just the District Plan, as:

any of the following activities: RESIDENTIAL ACTIVITIES, VISITOR ACCOMMODATION, COMMUNITY ACTIVITIES (including Marae), OPEN SPACE, CAMPING GROUNDS/MOTOR CAMPS, EDUCATION FACILITIES, PAPAKAINGA DEVELOPMENT, HOUSING FOR THE ELDERLY, RESIDENTIAL CARE FACILITIES, CHILDCARE FACILITIES, cafés, restaurants, and hospitals. For activities in the NATIONAL GRID YARD, OPEN SPACE is excluded from the definition of SENSITIVE ACTIVITY.

Taranaki Energy Watch challenged several aspects of the Proposed District Plan, in the NZ Environment Court. With respect to use of the available QRA risk contour, the Environment Court directed STDC, via Court Minute, *Timeframes For Providing Fatality Risk Contours (18 September 2019)*, to verify that the risk contour is suitable for use in the Proposed District Plan. Specifically, the Environment Court requested the following in relation to reviewing the existing QRAs:

- *state that sensitive activities outside the risk contours will not be exposed to unacceptable risk (para [6]);*
- *take limitations into account and adopt a precautionary approach (para [8]); and*
- *be accompanied by a statement as to concerns identified by the certifier have or will be addressed by operators (para [8]).*

1.2 Objectives

AECOM has been commissioned by Todd Energy Ltd to undertake a review of the Kapuni Gas Treatment Plant (KGTP) QRA to verify whether the location of the risk contour of interest reported in the QRA fulfills the requirements, previously defined by the Environment Court, to be used "as is" in the District Plan. The key documents reviewed are:

- *Worley New Zealand Ltd, Kapuni Gas Treatment Plant – Quantitative Risk Assessment Report – Todd Energy Ltd, Revision 1, August 2021*
- *Worley New Zealand Ltd, Kapuni Gas Treatment Plant – Assumptions Register for FEA and QRA Todd Energy, Revision 1, June 2022*

2.0 Methodology

2.1 Environment Court Issue #1 – Risk Acceptability

The existing New Zealand legislation and guidance material on land use planning, specifically in relation to development of or adjacent to hazardous industry was previously reviewed to determine if any numerical risk criteria exist and to compare this with the measures reported in the existing QRA.

No explicit statement of numerical safety risk criteria for land use planning was identified; however, there is an implied criteria published by New Zealand Quality Planning, which states on its web site (<https://www.qualityplanning.org.nz/index.php/node/1149>, 28 October, 2019):

There are no standard risk criteria for hazardous substances in New Zealand but there are international criteria which are widely referenced. In particular, the New South Wales Hazardous Industry Planning Advisory Papers no. 3 (Risk Assessment) and 4 (Risk Criteria for Land Use Safety Planning) has widely been used in the New Zealand context, and can be reflected in risk any [sic] management area overlays.

This also implies that the safety culture of protection of the community in the State of New South Wales, Australia is comparable with that in New Zealand. The criteria stated in Hazardous Industry Planning Advisory Paper 4 (Risk Criteria for Land Use Safety Planning) is discussed in Section 3.1 of this Report.

It can be argued that the safety culture of protection of the community in the United Kingdom (UK) is also comparable with that in New Zealand and some useful commentary on land use planning is available from the UK Health and Safety Executive, which is the Safety Regulator in the UK. This is discussed in Section 3.2 of this Report.

2.2 Environment Court Issue #2 – Limitations and the Precautionary Approach

The Environment Court recognizes that the results from a QRA can be quite variable. The Environment Court requested that the limitations in QRAs be reviewed and whether the Precautionary Approach has been adopted by the QRA Consultant.

The Precautionary Approach is described in Part 2, Section 7 of the *Hazardous Substances and New Organisms Act 1996* as a duty on persons in control to:

... take into account the need for caution in managing adverse effects where there is scientific and technical uncertainty about those effects

Identifying a boundary around an oil and gas production facility, outside of which the risk of fatality to a person is sufficiently low, could be considered to “contain” an accidental loss of energy from the oil and gas facility. This is a common technique in land use planning for a variety of activities where the impacts of the activity cannot be fully contained within the property on which the activity takes place. Accordingly, utilising QRA to identify the location where this risk has diminished sufficiently i.e. the boundary, should consider how to respond to known uncertainties in the inputs to the QRA. It can be argued that applying the Precautionary Approach would require the boundary to be set such that significant uncertainties are contained within the boundary. This review evaluates the QRA Consultant's approach in this context.

The following steps were undertaken to identify limitations in the QRA modelling and to evaluate whether the Precautionary Approach has been applied:

1. Confirm the QRA method used by the QRA Consultant is appropriate.
2. Breakdown the QRA calculation into its component parts.
3. Examine the inputs to the components for sources of variability as well as assumptions about them used by the QRA Consultant, with particular emphasis on the impact on the location of the risk contour of interest.
4. Qualitatively assess the degree and direction of the variability with respect to:
 - It's effect on the location of the risk contour.

- Whether the QRA Consultant's choices are consistent with the Precautionary Approach.

Where the QRA Consultant's approach to identified limitations is consistent with the Precautionary Approach, and therefore reflected in the LSIR risk contour of interest to STDC, those limitations are not discussed in this report.

In this report, a statement that an issue may "underestimate the location of the offsite LSIR contour" is to be read as meaning that the correct location of the offsite LSIR contour may be further away from the source of the hazard than reported.

2.3 Environment Court Issue #3 – Review Concerns

It is understood that the objective of this review is to verify whether the location of the risk contour of interest reported in the QRA fulfills the requirements, previously defined by the Environment Court, to be used "as is" in the District Plan. Issues of concern are highlighted throughout the evaluation of the technical components in the following sections and considered in forming the conclusion in Section 5.0.

2.4 Qualifications

The following qualifications apply to the review documented in this Report:

1. This Report describes a "peer review" of the existing QRA by a Technical Safety practitioner, only for the purpose of assessing its suitability for use in the District Plan, but in no way constitutes certification of the existing QRA.
2. Assessment of completeness of Operations data is outside the scope of the review.
3. Assessment of correctness of plant process conditions is outside the scope of the review.
4. Assessment of correctness of transcription between data sources and calculation is outside the scope of the review.
5. Assessment of correctness of calculations is outside the scope of the review.
6. There are separate and specific regulations managing pipelines. Therefore, this review does not consider pipelines in the QRA.
7. There are separate and specific regulations managing transportation of hazardous substances. Therefore, this review does not consider transportation in the QRA.

3.0 Risk Acceptability

The LSIR level of 1×10^{-6} chance of fatality per year has been chosen to demarcate the area in which “sensitive activity” would be exposed to an unacceptable risk from the area where “sensitive activity” would not be exposed to an unacceptable risk. This criterion was agreed between the risk experts involved in the Environment Court case in South Taranaki as a suitable representation of this boundary as all Oil and Production facilities in the South Taranaki district are located in rural areas and the most likely type of sensitive activity that may seek to establish near an existing facilities is a residential dwelling. This criterion forms part of the standard applied by Regulators in other jurisdictions of comparable safety culture with regards to protection of the community to that in New Zealand. Below are some extracts from published information by two such Regulators, which provide some context around the choice of LSIR, including caveats. It should be noted that, in the context of safety risk, both referenced Regulators define “sensitive activity” differently to the District Plan. This results in some of the activities listed in Section 1.11, Page 36 of the District Plan under “sensitive activity” having different LSIR levels in other jurisdictions.

3.1 Australia, New South Wales State Government – Department of Planning, Industry & Environment

Australia's New South Wales State Government Department of Planning, Industry & Environment, in its published *Hazardous Industry Planning Advisory Paper, HIPAP4*, Section 2.4.2.1-Fatality, states:

The Department has adopted a fatality risk level of one in a million per year (1×10^{-6} per year) as the limit for risk acceptability for residential area exposure. This risk criteria, which is demonstrably very low in relation to the background risk shown in Table 1, has been adopted by the Department when assessing the safety implications of industrial development proposals. It is also appropriate in considering land use proposals in the vicinity of potentially hazardous facilities.

...

The one in a million criteria assumes that residents will be at their place of residence and exposed to the risk 24 hours a day and continuously day after day for the whole year. In practice this is not the case and this criterion is therefore conservative.

In relation to other classes of occupants HIPAP4 also states:

People's vulnerability to the hazard and their ability to take evasive action when exposed to the hazard also need to be taken into account.

and this:

People in hospitals, children at school or old-aged people are more vulnerable to hazards and less able to take evasive action, if need be, relative to the average residential population. A lower risk than the one in a million criteria (applicable for residential areas) may be more appropriate for such cases. On the other hand, uses such as commercial and open space do not involve continuous occupancy by the same people. The individual's occupancy of these areas is on an intermittent basis and the people present are generally mobile. As such, a higher level of risk (relative to the permanent housing occupancy exposure) may be tolerated.

A higher level of risk still is generally considered acceptable in industrial areas.

The following is a copy of Table 2 from HIPAP4 indicating LSIR criteria that differ (highlighted) for some of the same “sensitive activities” listed in the District Plan:

Land Use	Suggested Criteria (risk in a million per year)
Hospitals, schools, child-care facilities, old age housing	0.5
Residential, hotels, motels, tourist resorts	1
Commercial developments including retail centres, offices and entertainment centres	5
Sporting complexes and active open space	10
Industrial	50

3.2 United Kingdom – UK Health and Safety Executive

The UK's Health and Safety Executive in its publication, *Reducing Risks Protecting People - HSE's decision-making process*, states in paragraph 138 in Part 3 of the publication:

... in the case of most housing developments, for example, HSE advises against granting planning permission for any significant development where individual risk of death for the hypothetical person is more than 10 in a million per year, and does not advise against planning permission on safety grounds for developments where such individual risk is less than 1 in a million per year.

However, the UK HSE qualifies its statement as follows:

Somewhat different criteria are applied to sensitive developments where those exposed to the risk are more vulnerable, e.g. schools, hospitals or old people's homes, or to industrial or leisure developments, reflecting the different characteristics of the hypothetical person used to assess individual risk.

4.0 Kapuni Gas Treatment Plant

4.1 Facility Description Relative to Land Use Context

The Kapuni Gas Treatment Plant (KGTP) includes facilities for processing conventional natural gas produced from onshore wells in the Kapuni Field and piped to the facility via the Kapuni Production Station (KPS), where hydrocarbon condensate is removed. At KPGT natural gas is processed to Sales Quality Gas and exported from site via pipeline. Liquefied Petroleum Gas (LPG), Natural Gas Liquids (NGL) and Liquefied Carbon Dioxide are processed to saleable products and exported from site via tanker truck. LPG and NGL are flammable and therefore give rise to risks associated with fire and explosion, which can extend beyond the site's property boundary. The land surrounding the site is as follows:

- Immediately to the north is the KPS.
- Approximately 500m due east is the Ballance Ammonia-Urea Plant.
- The land beyond the KGTP, KPS and Balance Plant is generally rural, open space sparsely populated used for pastoral purposes.

4.2 QRA Method Review

The QRA Consultant has used a standard approach and software tool (DNV-GL's Safeti Version 8.22) to develop the QRA. The approach and software tool have proven to be acceptable to WorkSafe New Zealand and Safety and Planning Regulators elsewhere internationally. Further, the QRA software has undergone considerable validation against actual field tests, with hazardous materials typically found in oil and gas production facilities.

It is understood that this QRA was commissioned in anticipation of its use in the District Plan. Within that purpose the objective of the particular QRA is stated in the QRA Report (QRA Report Section 2.2) as being to:

- *"... develop risk contours to assess land use compatibility in accordance with the NSW Hazardous Industry Planning Advisory Paper No.4 (HIPAP 4) "Risk Criteria for Land Use Planning.";*

The QRA Consultant has only calculated the LSIR, which is the measure of interest for use in the District Plan.

The QRA Consultant has made various assumptions, which are relevant to the suitability of the reported offsite LSIR risk contours for use in land use planning. The specific assumptions involved are discussed in the following sections.

To aid in understanding how variations discussed in the following sections impact the risk profile and therefore LSIR risk contour location the following explanation is provided. The QRA software calculates the risk from a single event at each location in a grid overlaid on the site. A representation of the grid overlay on a hypothetical site is depicted in Figure 1.

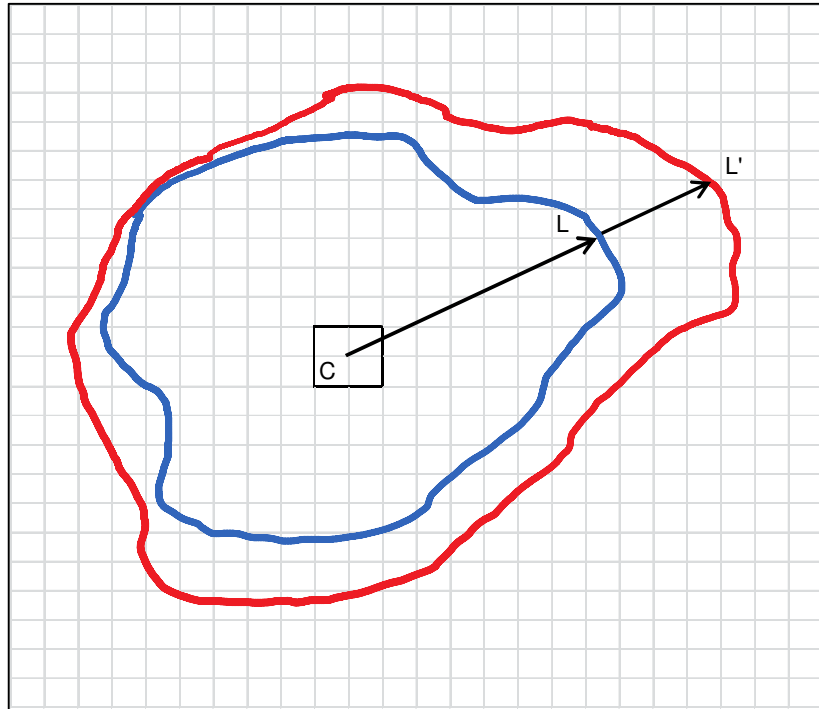


Figure 1 Risk Calculation Grid and LSIR Contour Plot

The software repeats the risk calculation for all events. The total risk at each point is the sum of the risks from all the separate events. To produce the risk contour plot the software finds grid points of equal risk and connects them, depicted by the blue contour.

The risk level can also be presented for a “slice” through the contour along a radial path. Figure 2 presents a hypothetical risk profile along the path outward from the risk source (point C) to the edge of the contour (point L) representing the summation of risk at each point with stacked bars. In the presented example, the acceptable risk criterion is overlaid as a horizontal yellow line. Considering a facility with two hazard scenarios, the distance to reach an acceptable risk level, or the exclusion zone, would be achieved at distance L.

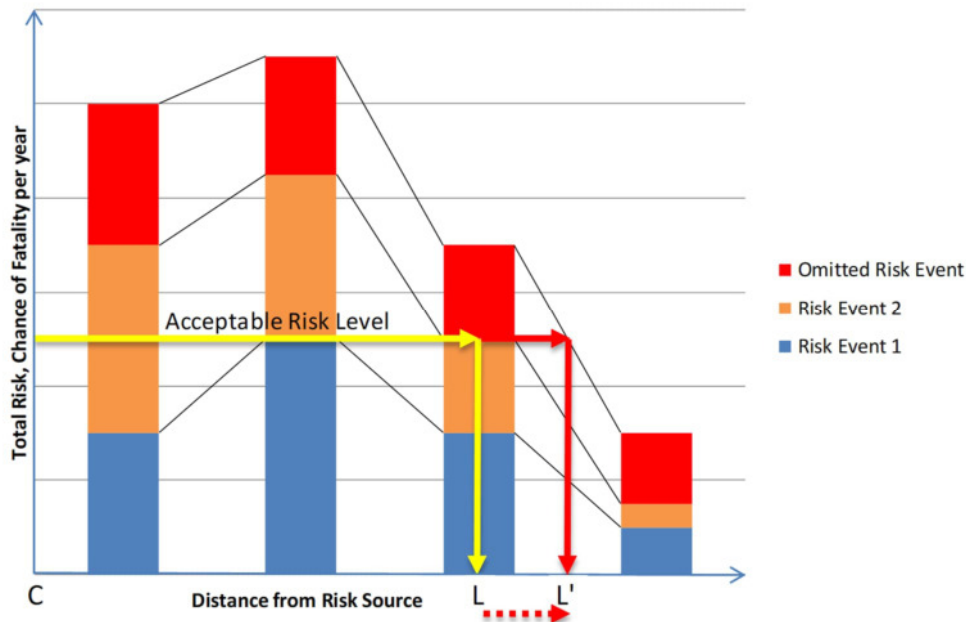


Figure 2 Risk Profile along a Radial Path Outward from the Risk Source

Figure 2 also indicates the effect of hazard omission; if the top bar in the stack represents a relevant risk event omission the spatial location of the acceptable risk level moves further out from the risk source to L' and would result in a shift in the risk contour plot, depicted by the red contour. It should be noted that it is not necessarily the case that the shift is of an equal amount around the whole contour.

4.3 Hazard Identification

Generally, the QRA Consultant has identified the range of hazards typical of the type of facilities being studied.

Of note, the QRA Consultant has excluded BLEVE of LPG tankers for all tanker activities on site i.e. transit along internal (site) roads and standing in the loadout bay on the basis of its interpretation of TNO Purple Book Guidance, which states: *In general, the external impact LOCs for road tanker accidents do not have to be considered in an establishment if measures have been taken to reduce road accidents, like speed limits.* The QRA Consultant also cites the presence of a deluge cage over the LPG loadout area (QRA Report, Section 5.3, Table 5.1, Note 4).

This review acknowledges that the TNO Purple Book Guidance at Note 1 to Table 3.19 recommends “external impact Loss of Containments” be excluded from QRA for the reasons it states and this is a common approach used in QRAs, which has been accepted by WorkSafe New Zealand and Regulators elsewhere and generally accepted by the Oil and Gas Industry. However, Note 2 to Table 3.19 of the TNO Purple Book Guidance addresses “fire under tank” but does not indicate that it should be excluded for the reasons it states. When stationed in a loadout bay and hooked-up to the loadout equipment it effectively becomes part of the “process”, including the loadout pad typically being designed to prevent spills in loadout activities from flowing off the pad. The QRA Consultant in fact reflects this by including hose failure in its scenarios. Prima facie, the conditions for a BLEVE exist. However, the QRA Consultant notes that the loadout facility is equipped with a deluge system. It is expected that if a

BLEVE scenario were to be included in the QRA, the probability of occurrence would be reduced so far by operation of the deluge system that the contribution to offsite risk would be rendered insignificant. It is for this reason alone that the exclusion of a tanker BLEVE is considered reasonable.

4.4 Leak Frequency Identification

In general, no issues of concern were identified with respect to Leak Frequency Identification.

The QRA Consultant identifies that the reference data used is from the OGP Process Release Frequency Database (QRA Report Section 4.2.2) to estimate the frequency of an individual leak of a particular size. The QRA Consultant has followed the OGP Guidance with respect to the use of Modification Factors (QRA Report Section 4.2.4 and Assumptions Register Section 4.3.3).

This is a common database used in QRAs and has been accepted by WorkSafe New Zealand and Regulators elsewhere and are generally accepted by the Oil and Gas Industry.

4.5 Ignition Probability Identification

No issues of concern were identified with respect to Ignition Probability Identification.

The QRA Consultant identifies in Section 4.2.6 of the QRA Report that the reference data used is from:

- International Association of Oil and Gas Producers (OGP), Risk Assessment Data Directory, Ignition Probabilities, Report No. 434-6.1 September 2019; and
- UKOOA IP Research Report, Ignition Probability review, Model Development and Look-up Correlations, January 2006

which have been used in QRAs accepted by Regulators in New Zealand and elsewhere. They are generally accepted by the Oil and Gas Industry.

The Immediate Ignition/Delayed Ignition ratio selected for ignition probability is 30:70 (Assumptions Register Section 4.4), which is also consistent with the recommendation in the UKOOA IP Research Report, Ignition Probability review, Model Development and Look-up Correlations, January 2006.

4.6 Event Trees Selection (flammable events)

No issues of concern were identified with respect to Consequence Models Selection. The QRA Consultant appears to have adopted Event Trees appropriate to the range of hazards typical of the type of facilities being studied. The nature of the Event Trees is *implied* in the discussion in the Assumptions Register, Section 4.4, Early and Delayed Ignition Probabilities, rather than depicted schematically.

The QRA Consultant has assumed 100% success in operation of the Plant Emergency Shutdown (ESD) system in the Base Case and 98% success in Sensitivity Case 1 and has demonstrated through the Sensitivity Case that the lower probability of success does not cause a significant change in the LSIR risk contour.

4.7 Consequence Models Selection

No issues of concern were identified with respect to Consequence Models Selection. The QRA Consultant has exclusively used DNV-GL's consequence models.

The end point used for flammable cloud dispersion, which can influence the extent of impacts from flash fires and therefore the position of the risk contour of interest for land use planning has been set at 1/2 Lower Flammability Limit. This adequately accounts for the real behaviour of dispersing clouds and is consistent with application of the Precautionary Approach.

4.8 Climate Data Identification

No issues of concern were identified with respect to Climate Data Identification. The QRA Consultant has sourced its data from the New Zealand National Climate Database for the Hawera Weather Station, which is approximately 18km from the facility.

4.9 Vulnerability Models Selection

In general, no issues of concern were identified with respect to Vulnerability Models Selection.

The QRA Consultant identifies in the Section 4.2.8 of the QRA Report and Section 4.11 of the Assumptions Register, that the reference data used is from:

- Hazardous Industry Planning Advisory Paper No 4 (HIPAP4): Risk Criteria for Land Use Safety Planning, New South Wales Department of Planning, January 2011; and
- Dutch TNO Publication, CPR16E Methods for the Determination of Possible Damage ('The Green Book')

which have been used in QRAs accepted by Regulators in New Zealand and elsewhere. They are generally accepted by the Oil and Gas Industry.

The QRA Consultant has appropriately justified the assumption of no fatality outside the envelop of a flash fire (Assumption Register, Section 4.11).

4.10 Sensitivity Analysis

No issues of concern were identified with respect to the sensitivity analysis.

Sensitivity Case 1 examined the potential impact of failure of the ESD system and has already been discussed in Section 4.6 of this report.

Sensitivity Case 2 examined the risk from the maximum capability of the site with the available equipment i.e. standby and mothballed equipment in service. Mothballed equipment was noted as being "preserved" and therefore capable of being returned to service whereas decommissioned equipment was noted as not being preserved and was appropriately excluded from the sensitivity case.

Whilst not expressed as a sensitivity case, the QRA Consultant has also examined the potential for cumulative effects between the KPS and KGTP on offsite risk, which was previously not accessible due to different ownership. It indicates that the offsite risks from each site do not interact in such way as to widen the offsite risk contours.

It is recommended that the risk contours presented for Sensitivity Case 2 (QRA Report, Section 8, Figure 8-2) be used for Todd Energy's application for District Plan amendment.

5.0 Conclusion

In relation to the Environment Court's requirements for QRA risk contours to be used in the District Plan, the following findings are made:

- Appropriate QRA sensitivity analysis has been performed, including:
 - failure of the Plant Emergency Shutdown System
 - return to service of standby or mothballed plant, representing the maximum capability of the available plant
 - interaction of risks between KPS and KGTP.

It is AECOM's opinion that:

- The QRA fulfills the requirements, defined by the Environment Court via Court Minute, *Timeframes For Providing Fatality Risk Contours (18 September 2019)*, to be used "as is" in the District Plan.
- The 1×10^{-6} Location Specific Risk Contour presented in Figure 8-2, Section 8.2.3 – Sensitivity Case 2 Risk Contours, QRA Report, Revision 1, August 2021 can be used for the purposes of the District Plan.
- The 1×10^{-6} Location Specific Risk Contour presented in Figure 8-2, Section 8.2.3 – Sensitivity Case 2 Risk Contours, QRA Report, Revision 1, August 2021:
 - takes into account the limitations of the QRA process and adopts a precautionary approach;
 - having so taken into account the limitations of the QRA process can be relied upon to represent the 1×10^{-6} fatality risk contour for the Kapuni Gas Treatment Plant.

6.0 Standard Limitation

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Any estimates of potential costs which have been provided are presented as estimates only as at the date of the Report. Any cost estimates that have been provided may therefore vary from actual costs at the time of expenditure.

7.0 References

1. South Taranaki District Council, *South Taranaki District Plan*, 2021
2. Environment Court of New Zealand, *Timeframes For Providing Fatality Risk Contours (18 September 2019)*, *TEW v STDC – Minute 18 Sept 2019*, September 2019
3. Worley New Zealand Ltd, *Kapuni Gas Treatment Plant – Quantitative Risk Assessment Report – Todd Energy Ltd., Revision 1*, August 2021
4. Worley New Zealand Ltd, *Kapuni Gas Treatment Plant – Assumptions Register for FEA and QRA – Todd Energy Ltd., Revision 1*, June 2022
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