Consultants Advice Notice

Project:	Linfox DPE Queries	Ref No.:	RCE-19027
From:	Renton Parker	Date:	16th of June, 2019
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	Attention	Company	Email
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Re: DPE Queries in Response to Linfox Preliminary Hazard Analysis

1.0 Introduction

Linfox has proposed to develop a warehouse within the Oakdale Industrial Estate (OIE) which will store a range of goods including materials classified as Dangerous Goods (DGs). The quantities of these materials were identified to exceed the State Environmental Planning Policy No. 33 (SEPP 33) limits; hence, a Preliminary Hazard Analysis (PHA) was prepared in support of the development. The PHA was reviewed by the Department of Planning and Environment (DPE) who have requested additional information before issuing their final assessment. The DPE specifically identified the following queries:

- An evaluation of the impacts of transporting dangerous goods to and from the site in the surrounding area.
- An assessment of the adjoining warehouses within the Oakdale South Industrial Estate that also house dangerous goods. These include Warehouse Lot 2B (DHL warehouse for dangerous goods Classes 2.1, 3, 5.6, 8 and 9) and warehouse 3B (houses DGs class 2 and Class 3). A cumulative impact assessment from the overall site and surrounding potentially hazardous developments should be addressed.
- The conversion of Class 2.1 propellant (LPG) within the aerosol products was based on 25% of LPG propellant. Further supporting information to substantiate this percentage is required. Identify whether this conversion was confirmed with SafeWork NSW.

Each of these queries have been assessed in the following sections to assist with the DPE queries.

2.0 Dangerous Goods Transport Movements

Information has been sought from DHL and Reckitt Benckiser for the respective warehouses of Lot 2B and Lot 3B. They have indicated that they would have several truck movements a day with the movements containing at least one DG product as part of the consignment. It is noted that this does not mean the entire truck is full of DGs but rather there is a DG product on the vehicle along with non-DG products.

The identified movements for each site were 3,750 p.a. and 8,500 p.a. for Lot 2B and Lot 3B. These are much larger warehouses than the proposed Linfox warehouse; therefore, it has been conservatively estimated that Linfox would have vehicular movements of approximately 2,500 movements per year where some of the consignment involves a DG product. Therefore, the total

DG movements along the roads within the vicinity of the OIE would be 3,750 + 8,500 + 2,500 = 14,750 movements per year.

The Health and Safety Executive (HSE, Ref. [1]) provides several failure modes for traffic movements; however, these are primarily based upon tankers carrying DGs and not standard truck vehicles. It is noted that an incident involving tankers are more likely to result in a hazardous scenario as any rupture of the tank vessel will result in a release of DGs. The products transported by the warehouse facilities are packages which are predominantly retail packages (i.e. <20 L). Therefore, for an escalation of the incident to occur, the products would have to be dislodged from the vehicle where they could be exposed to an ignition source. Taking this into account, the value calculated by W S Atkins in the CIMAH safety case has been used as a basis. This failure rate was based on 600 tanker movements p.a. which resulted in a catastrophic incident of $3.6x10^{-6}$ p.a. Dividing this rate through by the movements results in a base accident rate of $6x10^{-9}$ movements/year.

As noted, there is 14,750 movements per year along the OIE roads and potentially other roads within the vicinity leading to the main arterial motorways. Therefore, the accident rate for vehicles carrying DGs is $6x10^{-9}$ x 14,750 = $8.85x10^{-5}$ p.a.

Once an incident occurs, it must be ignited for incident propagation to occur. It is noted that not all movements contain flammable gases or liquids; however, based upon information provided, it is not feasible to estimate this accurately. Therefore, for conservatism, it has been assumed that all movements contain flammable materials which poses a higher ignition risk than non-DG products.

Nonetheless, as the packages are small they can withstand substantially more force before rupturing than larger packages and when the small packages do rupture releases remain relatively small due to the restricted volume of the packages. Therefore, numerous packages would be required to rupture for a fire to occur. It has been assumed that 50% of the accidents which may occur along these roads may result in sufficient packages to rupture to allow for a fire to occur. Therefore, the incident frequency becomes $8.85x10^{-5}$ x 0.5 = $4.425x10^{-5}$ p.a.

Whilst numerous packages would be required to rupture for this incident to ignite. Cox Lees and Ang (Ref. [1]) provide an ignition probability for a flammable liquid release with a flow exceeding 50 kg/s of 0.08. Based on limited volume of packages and the particular release characteristics of numerous rupture packages, it is considered conservative to apply an ignition probability of 0.08 which is based on a steady flow release from a pipe / tank of >50 kg/s. Therefore, a truck fire would have a frequency of $4.425x10^{-5}$ x 0.08 = $3.54x10^{-6}$ p.a.

The permissible fatality risk in industrial areas is 50 chances per million per year (pmpy). Assuming a fatality risk of 100% for persons exposed to a fire originating from a truck incident, the fatality risk becomes $3.54x10^{-6}$ p.a. which is below the 50 chances pmpy. It is noted the fatality risk is likely substantially lower than this given that fatalities from radiant heat exposure is a combination of radiant heat and the exposure period. As radiant heat is attenuated with distance and that able-bodied persons not directly impacted by the incident can evacuate the area, the assumption of a fatality of 100% is highly conservative. Nonetheless, the fatality risk from transport routes within the OIE and on the roads within the vicinity is less than the acceptable criteria for the industrial areas which these vehicles travel through.

3.0 Cumulative Impact Assessment

A review of the OIE indicates it is currently separated into three main precincts:

- Oakdale East
- Oakdale Central
- Oakdale South

The DG warehouses identified for assessment within the cumulative assessment are Lot 2B (DHL warehouse at 5 Millner Avenue), Lot 3B (RB warehouse at 3 Oakdale Close) and the Linfox warehouse 1D. It is noted that each of these warehouses actually reside in each of the separate precincts with Warehouse 2B located in Oakdale East, Lot 3B located in Oakdale Central and Lot 1D located in Oakdale South.

These warehouses are separated from each other within the individual precincts by distances of ~500 m. The PHAs prepared for each of the warehouses were reviewed to identify the impacts from the warehouses to assess the cumulative impacts. The worst case incident involves a full warehouse fire which has impact distances at 4.7 kW/m^2 of:

- Lot 2B: 134 m
- Lot 3B: 120 m
- Lot 1D: 72 m

As the separation distance between these warehouses exceeds the impact distance there would be no cumulative impact which was assessed in Section 6.6 of the PHA noting that the section refers to Oakdale South when referring to “the estate”.

There may be toxic bi-products produced from a full warehouse fire which may have farther reaching effects than the radiant heat from a fire. For this to have a cumulative impact it would be necessary for all the warehouses to have a full warehouse fire with wind conditions to blow into a central point to allow for cumulative effects. The full warehouse fire frequency identified for each of the warehouses was 3.53 pmpy; hence, the frequency of a cumulative toxic bi-product smoke affect would be 3.53×10^{-6} x 3.53×10^{-6} x 3.53×10^{-6} which would result in a frequency of 4.4×10^{-17} which is negligible. Noting this does not take into account the wind directions required for this to occur.

Cumulative impacts would not occur as a result of the new Linfox warehouse as the warehouses containing DGs are all located in separate precincts within the OIE, the separation distances between the warehouses exceed the impact distances of impact contours, or the frequency of a cumulative event is negligible. Therefore, cumulative impacts have not been assessed further.

4.0 LPG Conversion

The assumption of 25% LPG for propellant has been an assumption that has been used, to my knowledge, for at least the last 7 years. This assumption has been used in countless SEPP 33 assessments, several warehouse PHAs including; Lot 2B (DHL), Lot 3B (RB), 16 Darling St (Axalta), 55 Yarrawa St (Mainfreight), 55 Yarrunga St (Mainfreight), 23-107 Erskine Park (DHL), etc.

The original assumption was based on analysis of a client’s product list (MMP) who calculated that 25% of the product is propellant. This was then tested with the DPE in consultation with a former employee (Ramez) who validated acceptance by the DPE (note: this correspondence occurred at a former employee and the email trail no longer exists).

Lot 3B is a Major Hazard Facility (MHF) and was reviewed thoroughly by SafeWork NSW as part of the Safety Case to issue the site a license and the 25% assumption was accepted by SafeWork as part of the Safety Case.

There has been extensive history with both the DPE and SafeWork NSW in relation to the assumption of 25% propellant for LPG aerosols which has been used in this assessment.

Yours faithfully,

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5.0 References

[1] Health and Safety Executive, Health Failure Rate and Event Data for use within Risk Assessments, United Kingdom: Health and Safety Executive, 2012.

[2] A. W. Cox, F. P. Lees and M. L. Ang, "Classification of Hazardous Locations," Institution of Chemical Engineers, Rugby, Warwickshire, 1991.