

Appendix 12.3 Generic Frequency Estimation Based on the Historical Incident Results

Water Treatment Works

According to the approved EIA report “Integration for Siu Ho Wan and Silver Mine Bay WTW” (AEIAR-158/2011), the generic accident frequency can be estimated based on the information obtained in the historical incidents search, such as the number of water treatment works involved, the operating duration and the total number of accidents which happened within the operating duration.

From the historical incident review, more than half of the chlorine accidents occurred in UK and US. In addition, the actual number of water treatment works in the US was not able to obtain through the assessable resources. As a result, the generic frequency data from the UK has been chosen to compare the generic frequency data from the previous HA report.

No. of Accidents in the UK

Based on the information from Major Hazard Incidents Data Service (MHIDAS) database, the Accidental Release Information Program (ARIP) database and the United Nations Environment Program (UNEP) database, there are 7 chlorine release incidents within 35 years in the UK (**Table A.1**).

Table A.1: Summary of chlorine release incident in the UK

Database	No. of Incident
MHIDAS	7
ARIP	0
UNEP	0
<i>Total</i>	7

No. of Water Treatment Works in the UK

According to “Drinking Water Annual Report 2016” of Drinking Water Inspectorate, England, “Drinking Water Quality in Northern Ireland 2015” of Drinking Water Inspectorate, Northern Ireland and “Drinking Water Quality in Scotland 2015” of Drinking Water Quality Regulator for Scotland, the number of water treatment works across UK is summarized in **Table A.2**.

Table A.2: Summary of Water Treatment Works in the UK in 2016

Region	No. of Water Treatment Works
England and Wales	1,207
Scotland	240
Northern Ireland	25
<i>Total</i>	1,472

Generic Frequency Estimation from the Historical Accident Review

In the estimation, all of the water treatment works in the UK are assumed to have operated throughout 35 years which the accidents happened. Therefore, the generic frequency in the UK can be estimated as follows:

$$7 / (1472 \text{ WTWs} \times 35 \text{ years}) = 1.36 \times 10^{-4} \text{ per plant-year}$$

The sum of the outcome frequencies of all scenarios in this study is 1.03×10^{-3} per plant-year. As a result, the frequencies in this reports are conservative and suitable to be adopted in this study.

Chlorine Transportation

According to WSD HA report on transport of liquid chlorine, a chlorine incident search was undertaken. A major chlorine accident happened in Jiangsu Province on 29 March 05. The accident involved a collision of a 35 tons liquefied chlorine tanker in rural area (farmlands) and resulted in 28 fatalities and 350 people hospitalized. There would be no significant changes in the current risk assessment as the failure frequencies were derived from generic worldwide data. As a result, the frequencies in the approved EIA study on Organic Waste Treatment Facilities Phase 1 (OWTF-P1) are adopted in this study.