List of Major Assumptions

Parameter	Value	Remarks
PHI (Onsite Chlorine)		
Maximum chlorine storage quantity in the chlorine store	37 tonnes	in 1-tonne drums;
Annual consumption of chlorine	148 tonnes /year	Refer to Table 13.1 in the hazard assessment
Number of chlorine truck deliveries	25 trucks / year	Note 1 of Table 2.25 in the hazard assessment.
Chlorine onsite transport mode	by truck; from TKO Area 137 Pier to chlorine store	Onsite road transport. Refer to Figure 13.7 in the hazard assessment.
Chlorine offsite transport mode	by barge; unloading at TKO Area 137 Pier	No offsite road transport. Refer to Figure 13.14 in the hazard assessment.
Volume of chlorine store	4200 m^3	Refer to Table 1 in Annex E. Greater than 1848 m^3 for the chlorine store of Sheung Shui WTW.
Length of overhead crane	~10 m	2 units of overhead crane rather than single 20m crane. Refer to the seismic hazard assessment in Annex E.
Construction material of the chlorine store	reinforced concrete frame structure with unreinforced infill masonry walls	Refer to the seismic hazard assessment in Annex E.
Classification of the chlorine store	Group 1 building with C/D ratio > 1 (= 2.2) in the column shear check and allowable shear stress 0.14 N/mm^2.	Refer to the seismic hazard assessment in Annex E. Details of evaluation and parameters refer to Tables 3, 4 and 5 in Annex E.
Layout of chlorine drum storage area and main beams	refer to Figure 1 in Annex E; 2 main beams in 300 mm width	To ensure the average number of damaged chlorine drums in earthquake is 6. Refer to Figure 1 of the seismic hazard assessment in Annex E.
Separation distance between chlorine store and the site boundary	The setback distance between the chlorine building and explosive trucks / TKO Area 137 Pier shall provide sufficient clearance so that the overpressure resulting from explosion of explosive trucks or the explosives offloading operation that reaches the chlorine building is less than 2 psi.	In (iii) External Explosion under Hazard Identification Review (HAZID) in Section 13.2.7; Item 3.6 in Table 13.10;

Parameter	Value	Remarks
	Approximately 100m for chlorine gas dispersion	Section 13.4.7
Offsite Transport of Chlorine		
Transport mode	Chlorine drums deliveries to the Desalination Plant by barge via marine route and unloading at TKO Area 137 Pier	No offsite road transport. Refer to Figure 13.14 in the hazard assessment.
Chlorine container type	1-tonne drum	
Delivery frequency	12 deliveries per year	Section 13.37
Total number of drums to be delivered	148 drums per year	Section 13.37
Sodium Hypochlorite Assessment		
Concentration of NaOCl solution	10-12 % (wt)	Stored in 25m^3 tanks; Refer to Table 13.39 for the summary of chemical operations.
Number of NaOCl storage tanks	6 separated tanks, not connected	Refer to Table 13.39 for the summary of chemical operations.
Number of deliveries of NaOCl	24 deliveries per year	Refer to Table 13.39 for the summary of chemical operations.
Feedline unloading rate of NaOCl solution to tank	10 L/s	Refer to Table 13.39 for the summary of chemical operations.
Concentration of HCl solution	10 % (wt)	Stored in 40m^3 tanks
Number of HCl storage tanks in chemical building	2 separate tanks, not connected	Refer to Table 13.39 for the summary of chemical operations.
Number of deliveries of HCl	9 tankers per year	Refer to Table 13.39 for the summary of chemical operations.
Concentration of HCl in FeCl3 solution	5 % (wt)	Stored in 190 m^3 tanks
Number of FeCl3 storage tanks in chemical building	8 separated tanks, not connected	Refer to Table 13.39 for the summary of chemical operations.
Number of deliveries of FeCl3	243 tankers per year	Refer to Table 13.39 for the summary of chemical operations.
Concentration of H2SO4 solution	98 % (wt)	Stored in 62 m^3 tanks
Number of H2SO4 storage tanks in chemical building	4 separated tanks, not connected	Refer to Table 13.39 for the summary of chemical operations.
Number of deliveries of H2SO4	42 tankers per year	Refer to Table 13.39 for the summary of chemical operations.
Concentration of citric acid solution	50 % (wt)	Stored in a 8m^3 tank

Parameter	Value	Remarks
Number of citric acid storage tanks in chemical building	1 tank	Refer to Table 13.39 for the summary of chemical operations.
Number of Deliveries of citric acid	4 tankers per year	Refer to Table 13.39 for the summary of chemical operations.
Road tanker unloading rate for chemicals	10 L/s	Refer to Table 13.39 for the summary of chemical operations.
Quantity of Chemical in the storage tank for refill	50% of one storage tank	It is supposed the storage tank is empty for refill. However, due to human error (Operator and WSD staff fail to identify the empty tank for refill), non-empty tank is refilled. Storage tanks are separated and not connected.
Reaction between NaOCl and acids.	Irreversible reaction is assumed	As a conservative approach, amount of chlorine produced in the irreversible reaction is maximal. Refer to Section 13.4.7 for the chemical reactions assumed.
Reaction efficiency for C6H8O7 to react with NaOCl	0.01	C6H8O7 is a weak acid, 1% reaction efficiency is conservatively assumed based on acid-base equilibrium. Refer to 13.4.7 for the chemical reactions assumed.
The case of right product delivered into the wrong tank is eliminated.	There are safety measures in placed to avoid right product delivered into the wrong tank, e.g. - hoses and couplers for transferring of NaOCl, H2SO4, HCl, FeCl3, H2SO4 and C6H8O7 are different in size to avoid connecting road tankers of incompatible chemicals to corresponding storage tanks - Warning signs will be displayed at the inlet of each storage tank to show chemical name and to warn the potential hazards of mixing incompatible chemicals. - NaOCl will be delivered by barges. Dedicated chemical feedline with connection points will be used for transferring NaOCl from barges to storage bulk tanks. HCl, FeCl3, H2SO4 and C6H8O7 will be delivered by road	Refer to safety measures in Table 13.39.

Parameter	Value	Remarks
	tankers. No other chemicals will be delivered with NaOCl by the same barge at the same time. - HCl, FeCl3, H2SO4 and C6H8O7 will be stored in double containment tanks. - HCl, FeCl3, H2SO4 and C6H8O7 flowing outside of the chemical building will be collected by road side drains. Moreover, road humps will help to prevent acids moving towards the NaOCl storage area. - Perimeter drain will be installed surrounding the NaOCl bund to collect spill from overtopping. Temporary storage tank will be connected to the drainage system for the NaOCl storage area to prevent from mixing with HCl / FeCl3 / H2SO4 / C6H8O7 or discharging directly to the sea. - NaOCl facilities are located 290 m far away from the chemical building.	
Liquid Carbon Dioxide		
Number of CO2 storage tank	16 unit	Section 13.5.3
Type of storage tank	Vacuum insulated	Section 13.5.3
Storage tank capacity	100 tonnes per tank	Section 13.5.3
Type of vaporizer	Ambient	Section 13.5.3
Transport mode	By road tanker	Section 13.5.3
Safety measures considered in the frequency analysis	- Vacuum insulated, double containment - 2 sets of pressure relief valves (PRVs) on inner containment. The 2 sets of PRVs are connected by a switchover valve. Each set consists of 2 PRVs. - Plate pressure relief device on outer containment (considered on storage tanks only) - Trycock for overfilling alarm and warning - High level alarm to operating staff at control room for liquid level monitoring and warning.	Annex J1 Fault tree analysis and Annex J2 HAZID worksheet
Separation distance between CO2 storage area and the explosive truck during offsite	Set back the CO2 storage with sufficient clearance so that the overpressure resulting from explosion of explosive vehicle	Ref. 3.6 in the HAZID worksheet of Annex J2

Parameter	Value	Remarks
transport	during offsite transport that reaches the storage is less than 2 psi.	
Separation distance between CO2 storage area and the explosive offloading pier	Set back the CO2 storage with sufficient clearance so that the overpressure resulting from explosion of explosives at the offloading pier that reaches the storage is less than 2 psi.	Ref. 3.6 in the HAZID worksheet of Annex J2
Separation distance between CO2 storage area and the site boundary	Approximately 100m	Section 13.5.6; for avoiding offsite toxic impact
Other DGs		
Not applicable		