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Legislative Council Finance Committee

363WF - Upgrading of Disinfection Facilities in Water Treatment Works

Supplementary Information

The above project proposes to provide chlorine generation plant (CGP) in eleven major water treatment works (WTWs) and Tai Lam Chung No. 2 Chlorination Station. On 6 October 2017, members of the Legislative Council Panel on Development (Panel) visited a pilot CGP in Ngau Tam Mei (NTM) WTW. During the visit, Panel members requested the Administration to provide further information on the notification mechanism and contingency plan in case of major chlorine leak from the CGP in WTWs as well as the measures for ensuring the safety of staff responsible for operation and maintenance of the CGP.

2. This note outlines the safety measures for the CGP in WTWs and provides the information requested by the Panel members.

Safety measures for CGP

3. As presented to the Panel members by the Water Supplies Department (WSD) during the visit, there are multi-barrier safety measures for the CGP to prevent leak of chlorine into the environment outside the CGP room giving rise to potential health risk as follows:

(i) The CGP generates chlorine according to the demand of the water treatment process for immediate consumption thereby eliminating the risk of chlorine storage.

(ii) The CGP has incorporated an advanced self-monitoring and control system. On detecting any abnormality of the operation of the plant (including chlorine leak), it will automatically stop the chlorine generation by tripping off the electricity supply to the plant as well as sending an alarm signal to the control room of the WTW.

(iii) The operation of the CGP is under close surveillance by a remote monitoring and control system and a CCTV system at the control room of the WTW, which is manned 24 hours round the clock. Should there be any abnormality being detected such as abnormality of the operation of the plant and/or chlorine leak (see (ii) above and (iv) below), an alarm signal will be sent to the control room and the operator on duty can remotely stop the operation of the CGP and hence generation of chlorine in the control room in case of emergency.

(iv) Further, the CGP room is equipped with chlorine detection sensors. If any of the sensors detects chlorine in the air inside the plant room reaching 1 part per million (ppm)[1], the chlorine detection system will raise an audible and a visual alarm to alert the operation staff, if any, inside the plant room to leave immediately. Besides, an alarm signal will be sent to the control room of the WTW for the operator on duty to follow up.

(v) When the chlorine in the air inside the CGP room is detected to reach 3 ppm, the operation of the "contain and absorb" system will be automatically triggered. It will immediately shut off all ventilation fans and close all motorized louvres and dampers to contain all chlorine within the plant room. At the same time, the chlorine laden air inside the plant room will be drawn by an air extraction system through air duct(s) into a scrubber system for neutralization. The operation of the scrubber system shall be stopped manually when the operator on duty confirms the chlorine in the air inside the plant room is lowered to below 1 ppm. Furthermore, the chlorine detection system will automatically stop the operation of the CGP when the chlorine in the air inside the plant room is detected to reach 3 ppm, if the plant has not yet been stopped by its self-monitoring and control system (see (ii) above) or by the operator of the WTW (see (iii) above).

[1] According to the Environmental Protection Department, human being can be exposed to 3 to 5 ppm of chlorine for 30 minutes to one hour without any adverse effect on health.

(vi) A chlorine detection sensor is installed at the exhaust pipe of the scrubber system to monitor the chlorine in the air discharged into the environment outside the plant room. In case chlorine detected in the discharge air poses potential health risk, it will automatically trigger the shut-down of the scrubber system to ensure no release of chlorine outside the plant room.

4. According to the Risk Assessment Study for the CGP vetted by the related departments, with the above multi-barrier safety measures, the chance of chlorine leak from the CGP into the environment outside the plant room is very low.

Notification mechanism and contingency plan in the event of major chlorine leak

5. When the chlorine in the air in the CGP room is detected to reach 3 ppm, in addition to triggering the operation of the "contain and absorb" system and stopping the operation of the CGP (see paragraph 3(v) above) automatically, the chlorine detection system will automatically send an alarm signal to the Fire Services Department (FSD) for emergency response. Upon arrival at the site, the FSD will assume the overall command on the firefighting and rescue operations. If necessary, the FSD will liaise with other departments concerned according to the contingency plan. The key actions to be taken under the contingency plan including notification of the public and the residents in the affected area are summarised in the **Annex**.

6. The above contingency plan will be updated as and when required. Regular drills for dealing with chlorine leak will be conducted by the WSD in collaboration with the FSD.

Measures for ensuring the safety of staff responsible for operation and maintenance of the CGP

7. A series of training and comprehensive instructions have been provided by the contractor and manufacturer installing and supplying the CGP respectively to WSD staff responsible for operation and maintenance of the plant in NTM WTW. They include an intensive 3-week classroom and on-site training on technical and procedural aspects of the operation,

maintenance, fault finding and trouble-shooting of the CGP as well as the safety precautions. Moreover, the WSD staff have carried out functional tests of the CGP under the direct supervision of the contractor and manufacturer for more than three months. Besides, there will be round the clock emergency support from the contractor in addition to the fixing of any urgent problems and minor defects by the contractor in the Defects Liability Period of one year after commissioning of the plant.

8. Moreover, WSD has provided personal protective equipment including automatic positive pressure breathing apparatus set, protective clothing, gloves, boots and safety helmet, etc. to the operation and maintenance staff.

9. The above safety training and provisions will be provided to the staff responsible for operation and maintenance of CGP in other WTWs in due course.

Development Bureau
Water Supplies Department
October 2017

Annex

Key actions to be taken by departments concerned in the event of a chlorine leak under the contingency plan

Department	Action
Fire Services Department	➢ To take over the overall command on the firefighting and rescue operations from WSD; ➢ To coordinate actions amongst government departments in the implementation of the contingency plan; ➢ To coordinate with Hong Kong Police Force on the arrangements if off-site evacuation is required.
Hong Kong Police Force	➢ To cordon off the affected area; ➢ To warn the public (other than the residents in the affected area) by pre-scripted warning message through appropriate media like TV/radio or directly by loud hailers; ➢ To effect evacuation.
Agriculture, Fisheries and Conservation Department	➢ To cordon off section of the Country Park adjacent to the WTW if applicable; ➢ To effect evacuation of the hikers in the Country Park adjacent to the WTW if applicable.
Transport Department	➢ To divert the related public transport services in the vicinity of the WTW away from the affected area; ➢ To activate the fixed mode of the Emergency Transport Co-ordination Centre.
Other departments	➢ These departments may be called upon for

Department	Action
concerned (i.e. Environmental Protection Department, Government Laboratory, Hong Kong Observatory, Government Flying Services, Hospital Authority and District Office)	their expert support as required.