35.0 SAFETY AND PLANT HAZARDS

The Kerepehi WTP is an industrial site and has hazards associated with mechanical and electrical equipment as well as chemicals. All personnel working on the site must have PPE available to them. Steel capped boots or gumboots must be worn at all times, and high visibility vest is required if there are vehicles such as forklifts, large trucks, excavators, cranes etc. moving about the site.

The specific hazards at the WTP are discussed in the following sections. See also HDC health and safety guidelines for further information on Hazard identification and management.

35.1 FLOCCULATION TOWERS

The flocculation towers are located above ground and are accessible from the top of the clarifiers via stairs and a walkway. Only the stairs and walkway should be used for access except during maintenance. When maintenance is being carried out the mixers should be isolated and tagged and the flocculation tanks should be fully drained down.

Emergency stop buttons are located on near the mixer motors.

35.2 CLARIFIER

There should be no entry to parts of the clarifier other than the walkway around its border and the platform for the sludge scraper. An exception to this is during maintenance, when all mechanical and electrical equipment that forms part of the clarifier is isolated and tagged. If entry to the clarifier is required, it must be fully drained down.

An emergency stop button is located near each sludge scraper motor.

35.3 MEMBRANE FEED TANKS

The membrane feed tanks are located above ground and have a walkway to one side and over one tank. There should be no entry to any parts of the tanks. An exception to this is during maintenance, if entry to the filter is required, it must be fully drained down.

35.4 CHEMICALS

A number of chemicals are dosed at the Kerepehi WTP. Many of these chemicals are handled by operators. During handling of any chemical, personnel must wear the appropriate PPE. This includes but is not limited to:

- PACl – gloves, face mask and safety glasses should be worn as a minimum.

- Chlorine gas – breathing apparatus must be available in case of emergency. In the event of a chlorine gas leak, no personnel should enter the chlorine area unless they are wearing an appropriate breathing apparatus.

- Caustic Soda - gloves, face mask, safety glasses and overalls should be worn as a minimum.

35.5 CONFINED SPACES

Any pump station, manhole, basin, chamber, or enclosure above or below ground where there is room for a person to enter but entry is restricted or the space lacks ventilation, in and around the WTP is a confined space.

Any confined space should not be entered without the appropriate training, checks, safety equipment and supervision. This includes but is not limited to:

- Testing for toxic and explosive gases

- Testing for adequate oxygen levels

- Appropriate safety equipment such as breathing apparatus, harnesses, and ropes are available

- Two trained observers on hand for emergency response

Entry into any confined space should only be undertaken by personnel with training and experience with confined space entry.

If there is a problem or uncertainty with safety issues, personnel should advise their supervisor immediately.

36.0 EMERGENCY PROCEDURES

If an emergency situation arises in the WTP, this table may be used to assist operators with the actions to be taken. The plant supervisor should be informed immediately of any emergency onsite.

Table 22: Emergency Procedures

	Emergency	Action
1.	Power Failure	During a power failure: - All drives in the plant stop running - All pumps are stopped - All actuated valves fail closed The PLC and instrumentation are backed up by an uninterruptable power supply (UPS) for 6 hours. The operator should organise for a temporary generator to be installed if the power cut will last longer than 4 hours.
2.	Chlorine leak	Follow plant evacuation procedures. Inform staff and public located downwind (as indicated by windsock).
3.	Coagulation Failure	Coagulation failure in the flocculation towers may lead to excessive turbidity carry-over from the clarifiers causing blinding of the membranes. The membranes are designed to be able to cope with turbidities of up to 100 NTU. The operator can respond to coagulation failure in a number of ways: - Perform jar testing and rectify dose rates. - Initiate clarifier-to-waste if appropriate. - Consult membranes O&M for membrane recovery sequence.
4.	Chemical leak on delivery of PACl	The stormwater valve from the chemical delivery area should be closed prior to delivery. This will contain a chemical leak in the delivery bund. If a PACl leak occurs, delivery should be ceased immediately. Prior to undertaking any spill removal, the plant supervisor and Orica should be informed. Also refer to the PACl MSDS. The operator should then procure an appropriate submersible pump with which to pump out the contents of the bund to a containment vessel. The submersible pump can be dropped into the chamber on the road side of the bund. The PACl should then be disposed of offsite. The delivery area should be thoroughly washed down while pumping out the chamber. The pH of the remaining water in the chamber should be tested prior to re-opening the stormwater valve. The hose connection on the chemical delivery line can be used to flush out the line into the storage tank if necessary.

Table 22: Emergency Procedures		
	Emergency	**Action**
5.	Chemical leak during delivery of Caustic	The stormwater valve from the chemical delivery area should be closed prior to delivery. This will contain a chemical leak in the delivery bund. If a Caustic leak occurs, delivery should be ceased immediately. Prior to undertaking any spill removal, the plant supervisor and Orica should be informed. Also refer to the Caustic MSDS. The operator should then procure an appropriate submersible pump with which to pump out the contents of the bund to a containment vessel. The submersible pump can be dropped into the chamber on the road side of the bund. The Caustic should then be disposed of offsite. The delivery area should be thoroughly washed down after pumping out as much of the chemical as possible. Caution: Heat may be involved in contact with water. The pH of the remaining water in the chamber should be tested prior to re-opening the stormwater valve. The hose connection on the chemical delivery line can be used to flush out the line into the storage tank if necessary. Note: Caustic freezes at 13°C, as such there is a risk of caustic freezing in the bund.
6.	PACl leak inside bund	If a PACl leak occurs inside the bund, PACl dosing should be ceased immediately and the leaking pipework/tank isolated if possible. Prior to undertaking any spill removal, the plant supervisor should be informed. Also refer to the PACl MSDS. The operator should then procure an appropriate submersible pump with which to pump out the contents of the bund to a containment vessel. The PACl should then be disposed of offsite. Replacement of the leaking pipework and/or tank can then be undertaken. Note: The pumps bund drains into the tank bund

Table 22: Emergency Procedures		
	Emergency	**Action**
7.	PACl leak outside bund	If a PACl leak occurs outside the bund, PACl dosing or delivery should be ceased immediately, the leaking pipework isolated if possible and the plant supervisor informed. The contaminated area should be evacuated. Prior to approaching the contaminated area the operator should wait for the pipework to be isolated (if possible) and don appropriate PPE (refer to the PACl MSDS). If contamination of sewers or waterways has occurred advise local emergency services immediately. The spilt chemical should then be contained with an appropriate absorbent material. The material containing the PACl can then be disposed of offsite. Replacement of the leaking pipework can then be undertaken.
8.	Caustic leak inside bund	If a Caustic leak occurs inside the bund, PACl dosing should be ceased immediately and the leaking pipework/tank isolated if possible. Prior to undertaking any spill removal, the plant supervisor should be informed. Also refer to the PACl MSDS. The operator should then procure an appropriate submersible pump with which to pump out the contents of the bund to a containment vessel. The PACl should then be disposed of offsite. Replacement of the leaking pipework and/or tank can then be undertaken.
9.	Caustic leak outside bund	If a Caustic leak occurs outside the bund, PACl dosing or delivery should be ceased immediately, the leaking pipework isolated if possible and the plant supervisor informed. The contaminated area should be evacuated. Prior to approaching the contaminated area the operator should wait for the pipework to be isolated (if possible) and don appropriate PPE (refer to the PACl MSDS). If contamination of sewers or waterways has occurred advise local emergency services immediately. The spilt chemical should then be contained with an appropriate absorbent material. The material containing the PACl can then be disposed of offsite. Replacement of the leaking pipework can then be undertaken. Caution: Heat may be involved in contact with water.

Table 22: Emergency Procedures		
	Emergency	**Action**
10.	Large diameter main failure	Stop all pumps which provide pressure to the main. Isolate and/or drain the pipework if possible. Clamp the leaking area if possible. Caution: Should a pipeline break occur in the membrane building, the first activity should be to prevent water ingress into the electrical room.
11.	Personnel falling into open water tanks	HDC to confirm safety requirements and actions (life buoy necessary).
12.	Fire	See site specific fire evacuation procedures.
13.	Unauthorised access	Unauthorised access onto the water treatment plant site is illegal and dangerous due to the presence of chemicals. If unauthorised
14.	Earthquake	Consult HDC civil defence plan. Check for obvious signs of settlement. Check all pipework runs and connections for damage. Organise for a structural engineer to check the structures onsite for damage. Note: It is important for the WTP to continue to produce water during a civil defence emergency such as an earthquake due to fire-fighting and other requirements. As such the plant may need to be run manually to ensure water is produced despite DWSNZ compliance.
15.	Flood	Ensure the power to the site is turned off. Attempt to prevent water ingress to the electrical rooms.
16.	Other civil emergency	Consult HDC civil defence plan. Note: It is important for the WTP to continue to produce water during a civil defence emergency such as an earthquake due to fire-fighting and other requirements. As such the plant may need to be run manually to ensure water is produced despite DWSNZ compliance.