

HARBOUR TOWN SCENARIO SUMMARY

Background

Harbour Town Water Supply served a total population of 7,300, providing groundwater to Harbour Town (5,300 people) and the rural residential subdivision, New Harbour, located to the west (2,000 people).

The source water came from 5 secure bores located over 2 sites, one to the east of Main Street and a second site near the entrance to the New Harbour subdivision. The 5 bores were given multiple bore status in 2011. The original site had 3 bores (#1-3) of a similar depth which served the town and went through a validated UV unit before entering the reservoir and being distributed to the town. The UV treatment was chosen following transgressions and an outbreak of Salmonellosis 15 years ago, subsequently when the water sources proved to be secure the community voted to continue treatment as an additional barrier. The turbidity meter associated with the UV unit was not reliable, but turbidity from the source water was known to be low and UV intensity was checked by operators.

The New Harbour site had two newer bores (#4 and 5) of similar depths serving the subdivision.

2017 Gastroenteritis Outbreak

Day 1 (Friday)

The local PHU received information from Harbour Town Hospital of 15 cases of severe gastroenteritis presenting over the previous 24 hours. Normally the hospital saw 1-2 cases. The Medical Officer of Health (MOH) suspected a point source outbreak and commenced an investigation. Two Health Protection Officers (HPOs) were assigned to interview the patients and try to ascertain a common source of infection.

The Drinking Water Assessor (DWA) received advice from the Harbour Town Council of a positive *E. coli* detection from samples taken the previous day at 2 sites in the water reticulation system. The other 2 samples had come back negative for *E. coli*. No samples had been taken directly from the bores or the storage reservoirs. The Council then took further samples for *E. coli* enumeration from the reservoirs, reticulation system and from each of the 5 bores. The DWA, being aware of the potential gastroenteritis outbreak notified the MOH of the *E. coli* results. The MOH called a meeting with the DWAs and HPOs to discuss the incident and to confirm the next steps.

By 4pm the HPOs had finished their patient interviews and there was no common food borne source found for the outbreak. Onset of symptoms ranged from 12 to 72 hours and there had not been a mass gathering event in the previous week.

Another 20 patients had presented to the hospital or their doctor since the first notification. Most of the hospital patients had provided faecal samples for analysis however the results would not be available for 2-3 days. The pharmacy had also notified the PHU of an unusual increase in people presenting with diarrhoea and/or vomiting. Local schools had reported an unusually high level of absenteeism over the past two days. Most of the patients were from within the Harbour Town drinking water supply area.

The Council took further samples to a laboratory for *E. coli* testing and the results were to be available within 24 hours. The Council reported that they had discovered damage to the

reservoir roof whilst taking samples. They believed this might have occurred three weeks prior during a storm.

The DWA reviewed the history of the water supply and it revealed an outbreak of Salmonellosis 10 years previously, associated with the water supply, however there was no definitive source of contamination listed. There was no detailed information about this incident found in the PHU files. The DWA reviewed the history of reported cases of Salmonellosis in the area and the numbers for the current month were slightly elevated compared to the previous 36 months.

By 5pm the Council had agreed to commence chlorination, undertake an inspection of the reservoirs and had issued a Boil Water Notice. The Council's contingency plan was discovered to be out of date and they did not have a current Communication Plan.

Day 2 (Saturday)

By 10am the local hospital had 25 patients, with a further 70 potential non-hospitalised cases. Most cases were mild to moderate. One patient (a 1 year old child) was in a critical condition.

The Council announced that they had issues with their chlorinator and that it was not up and running yet. They had bought in expert help but it could be a day before it was fixed. The reservoir had been super chlorinated by hand. The damage to the reservoir roof was discovered to be sufficient to allow access for small animals and birds. The damage was to be fixed that day.

By 5pm the chlorinator was fixed and continuous chlorination had been commenced immediately prior to the reservoir storage. The PHU asked the Council to test for FAC in the reticulation system. The roof had not been fixed but the Council was looking at a temporary solution.

The lab test results from the previous day's samples had come back with:

Reservoir	50 MPN/100mL
Site 1	<1 MPN/100mL
Site 2	3.2 MPN/100mL
Site 3	2.6 MPN/100mL
Site 4	<1 MPN/100mL
Site 5	<1 MPN/100mL
Site 6	27 MPN/100mL

The Council took further samples including samples from the bores. The Mayor notified the media of the results and stated that 70% of the results were false positives or false negatives. The media had then requested a statement from the DHB about the results.

Day 3 (Sunday)

By 4pm the cases of gastroenteritis had continued to rise. The bore sample E. coli results had come back as:

Bore 1	<1 MPN/100mL
Bore 2	<1 MPN/100mL
Bore 3	<1 MPN/100mL
Bore 4	<1 MPN/100mL
Bore 5	2.6 MPN/100mL

Day 4 (Monday)

By 9am the number of gastro cases had started to decline. Chlorination was continuing and the chlorine residuals were adequate.

Patient faecal samples indicated Salmonella and confirmation testing was being undertaken. Results of the reservoir sampling were still pending. The Boil Water Notice was still in effect.

The HPOs reviewed the Council's Water Supply Plan, focusing on the adequacy of their risk assessment. They noticed that the Council had not identified contamination of the reservoir from roof damage as a hazard and that they had listed the 'desire of the community to not chlorinate drinking water' as their reason for not chlorinating. Any associated risk was to be managed by good maintenance practices in the reticulation. The plan had been approved 4 years previously and had not been reviewed since. It did not have an adequate contingency plan.

By 5pm the HPOs had concluded that the Water Supply Plan was no longer reflective of the drinking water scheme. They suspected the issue with the reservoir was due to poor maintenance and that the bores were no longer 'secure'.

Day 7 (Thursday)

The previous night Seafront City (which was also in the PHUs district) was hit by a 7.0 earthquake. There was massive damage to bores, reservoirs and the reticulation system. Bores popped out of the ground and most of the mains were damaged. The sewerage system was also extensively damaged and it lay close to the water system. All access in and out of Seafront City was blocked. There was a total loss of water supply and water security. It was expected to take weeks to repair the damage.

Day 10 (Sunday)

By 9am Harbour Town Council had approached the PHU for their support to lift the Boil Water Notice.

Extracts from the Final Report on Implementation of the Water Supply Plan:

The Water Supply Plan (WSP) for Harbour Town was approved in 2013. As the supply source was secure groundwater there were few improvements detailed in the WSP. The improvements detailed were around improving standard operating procedures (SOPs) and introducing better recording systems. In general these were running behind the detailed schedules and were not being allocated sufficient resources.

Non-conformances related to DWA findings where requirements of the approved WSP were not met or where the on-site visit had identified critical inadequacies in the approved WSP.

Recommendations were suggestions where the DWA believed improvements could be made relating to good practice.

WSP Implementation

Catchment

The WSP was written for secure source groundwater and the water supplier acknowledged the importance of ongoing catchment management. The WSP signalled in the improvement schedule that work would be undertaken in conjunction with the regional council to ensure

that landowners within the catchment were aware of the water supply and associated catchment protection zone. This work was signalled as 'on-going' but no evidence was provided to show that the Council was working to educate landowners within the catchment or that it was working with the Regional Council regarding catchment protection zones. Changes in the regional plans provided opportunities for Council to become engaged in consultation but these opportunities were not taken.

Non-conformance 1: The Council has not undertaken engagement with the regional council or individual landowners within the catchments as was indicated in the WSP improvement schedule.

Council agreement: Renewed WSP to include more specific actions and timeframes regarding catchment protection and best practice land management.

Treatment

For the Harbour Town distribution zone UV treatment is being used as an additional barrier. Records were requested of the management of this treatment. The operator could source in the treatment plant the original manual that the UV unit came with but this has not been transferred into SOPs that detail the day to day operation. The UV unit warned "Very low UV – replace lamps" at the time of the visit. The operator reported that the lamps had been replaced 'not too long ago' and reported that the warning had continued when the lamps were replaced, the operators thought it was an electrical fault. In addition, the turbidity meter has been found to be unreliable. UV intensity is recorded occasionally in the treatment plant log book but on questioning the operator was unsure of the parameters within which it should be operating. Although the UV is not used for protozoa compliance it is acknowledged as an additional barrier within the WSP and therefore the management of the UV unit should follow the original manual.

Non-conformance 2: The WSP has the UV unit as an additional barrier for the Harbour Town Treatment plant sources (wells 1,2 and 3) but little evidence was available to demonstrate that this unit is being effectively managed and run as per the original manual for its operation and as reflected in the WSP risk tables.

Council agreement: UV operation will be 'overhauled' and new SOPs written.

Reservoir/Distribution

The supply has two reservoirs, one at each plant, the WSP had identified as a risk due to the lack of formal inspections of the reservoirs. This was to be addressed by writing SOPs for reservoir inspections and also other distribution maintenance aspects, these were to be completed by June 2016. Although this date has not yet been reached it is close and no evidence was presented that this is being worked on.

Recommendation 1: To meet the timeframe for preparation of SOPs it is recommended that this should be prioritised.