

REVIEW OF THE RESPONSE BY THE HASTINGS
DISTRICT COUNCIL TO THE CONTAMINATION OF THE
HAVELOCK NORTH WATER SUPPLY

AUGUST 2016

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Introduction

1. On Friday 12 August 2016 the Hastings District Council received the results from the test of a water sample taken from the Havelock North water supply on Thursday 11 August. The results gave a positive indication for the presence of Escherichia coli (E.coli). The result was discussed with the Hawkes Bay District Health Board (HBDHB) on Friday morning. Over the preceding evening the HBDHB had noticed an increase over normal levels of presentations at the hospital for gastroenteritis. With the result of the water test available, the HBDHB was able to link the indications and commenced further consultation within the health sector and with schools. The HDC and HBDHB met on Friday afternoon to discuss the indications and a response. The HDC commenced chlorinating the Havelock North water supply at 1730hrs and at 1830hrs a notice to boil all water and information on the contamination was passed to residents. By midnight, as a result of flushing the system, chlorinated water was assessed as being throughout the Havelock North network.
2. Communications to the community continued over the weekend using various channels. As the scale of the emergency became better understood, on Monday 15 August the HDC response was expanded to provide welfare support to the community and the HDC Emergency Operations Centre (EOC) was activated to help plan and manage the delivery of welfare support. Schools were closed and water tankers were deployed to Havelock North to distribute water. The response continued over the period 15 August to 03 September when the boil water notice was lifted. During that period the response encountered further worrying alarms when a tanker tested positive for the presence of E.coli and separately, a test of the Hastings water supply also returned a positive result. The HBDHB and HDC transitioned to a recovery phase by 23 August. The response is generally considered to have been completed by 05 September with a community recovery process in place.

Terms of Reference

3. Kestrel was engaged by the HDC to conduct a review of the response to the emergency. The aim of the review was to identify aspects of the response that could be improved, and to assist the Council prepare for its participation in the government inquiry. The HBDHB was to conduct its own internal review. The Kestrel review therefore does not

cover the health response by the HBDHB but does review inter-agency cooperation.

4. The HDC review focusses only on the response phase. It was not intended to investigate the cause of the contamination and nor was it asked to consider the options for how water might be supplied to Havelock North in the future. The HDC Terms of Reference are shown at Annex A.
5. The reviewer interviewed HDC staff involved in the response, and key staff from the HBDHB, Red Cross, and the Ministry of Education that had participated in the response. The review developed a timeline of the key response activities that took place during the period 09 August – 05 September 2016 to inform a narrative of the response activities. Annex B is the timeline developed by the review. The review then analysed the response activities against what is considered to be best practice in emergency management in New Zealand to identify areas that warrant improvement. Two international case studies of the management of water crises were reviewed and used as a comparison for the performance of the HDC.

Responsibilities

6. The Local Government Act places the responsibility for providing safe drinking-water on the Council. Under the Health Act 1956 and its subsequent amendments, the Ministry of Health is responsible for the regulation of public health and oversight of drinking-water supplies to ensure that the water from these supplies can be drunk without causing illness. Monitoring of the quality of the community drinking-water supply is the responsibility of the supplier – in this case the HDC. The Public Health Unit of the DHB is responsible for checking that the management of drinking-water supplies conforms to the Drinking Water Standards for New Zealand 2008 (DWSNZ).
7. The DWSNZ are issued by the Ministry of Health and provide standards for drinking-water quality by listing maximum concentrations of microbiological and other contaminants that can be present, and provides the compliance criteria for water supplies in terms of sampling frequencies, testing procedures and the actions to be taken when a transgression of the standard occurs. The Health Act requires drinking-water suppliers to take all practicable steps to comply with the drinking water standards.
8. Up until the time of the emergency the Havelock North water supply system used the Brookvale bores to provide untreated water to the Havelock North community. This source was categorised as a secure confined aquifer (the Tukituki or Te Mata aquifer), which meant that treatment was not required. The water was treated with fluoride for dental health and distributed to consumers through a series of reservoirs and water mains. Testing of the water was governed by the DWSNZ and Havelock North water was being tested at source and from numerous specific points across the network in accordance with the DWSNZ. The Havelock North network has the capability to be connected to the system supplying Hastings by a single line. But at the time of the emergency the two systems were operating independently. Hastings water is sourced from a separate secure confined aquifer (the Heretaunga aquifer) and is untreated except for the addition of fluoride for dental health.
9. Waterborne organisms that can affect human health include the bacteria E.coli and campylobacter, and the protozoa giardia and cryptosporidium. Routine testing of water supplies is designed to detect contaminations that risk public health. The test used

assesses the presence of the bacteria E.coli, which is an indicator of faecal contamination and therefore indicates the potential for the water to also contain campylobacter, giardia and cryptosporidium. The test for E.coli is performed by an independent IANZ accredited laboratory and takes 24 hours to produce a result.

10. HDC practice at the time was to use a presence/absence indicator test for E.coli. If E.coli is found to be present then an enumeration test is made of a follow-up sample to show the concentration of E.coli. The second test can sometimes show up false positives in the first presence/absence test. The DWSNZ provide guidance on follow-up actions depending on the concentrations detected.
11. The water can be tested again for the presence of campylobacter. Identifying the type of campylobacter requires a culture to be developed which takes approximately 3-5 days to develop. Chlorine will kill E.coli and campylobacter. Giardia and cryptosporidium are killed by boiling the water. Treatment of water using methods such as Ultra Violet (UV) light to disrupt the DNA of the organism in a way which prevents it from multiplying in the human gut and causing illness.

The Developing Emergency

12. Water in the Havelock North network was tested on Monday 08 August and the result received by the HDC on Tuesday 09 August, showed an absence of E.coli (which in this review will be referred to as a clear result). Another routine test of the Havelock North supply was made on Thursday and on the morning of Friday 12 August, the HDC Water Services team received the results, which showed a positive for E.coli being present in the sample taken from Hikanui Drive. In accordance with the DWSNZ, at 0944hrs the HDC informed the HBDHB's Drinking Water Assessor (DWA). That morning the Medical Officer of Health's (MOH) team (The Health Protection Team) received laboratory results that showed there were five cases of campylobacter diagnosed from stool samples including one in the Mary Doyle aged care facility in Havelock North. The facility had earlier notified the HBDHB that it suspected it had an outbreak of norovirus. At 1145hrs the Health Protection team leader contacted the MOH to advise of the apparent increase in gastroenteritis in Havelock North. Armed with this information, at 1230hrs the MOH took the initiative and using personal contacts called some Havelock North schools to check on levels of absenteeism. With the assistance of public health nurses more schools in Havelock North were contacted and reports were received of higher than normal levels of absenteeism. Calls were then made to schools outside Havelock North and their levels of absenteeism were reported as normal. The information gained showed Havelock North schools had up to 20% absent while schools elsewhere had between 5% and 10%, which was considered normal. Primary health providers in Havelock North were also called by the HBDHB that day and they indicated high numbers of presentations with gastro illnesses and a high number of requests at pharmacies for treatments for symptoms of gastro.
13. Early afternoon Friday 12 August the HBDHB and HDC met to discuss the indications and the response. Based on the indications and further anecdotes, by 1500hrs the HBDHB had reached the conclusion that they were dealing with an outbreak of a gastro illness most likely caused by a waterborne organism in the Havelock North water supply system. In normal circumstances further enumeration testing would have been conducted on the sample to ascertain the concentration of E.coli. In this case, the indications were such that the HBDHB and HDC agreed to shorten the process and

speed the response and agreed to chlorinate the water ahead of the enumeration test, which would have delayed chlorination until Saturday.

14. The HDC Water Services team began introducing chlorine to the Havelock North supply at the bore and by dosing reservoirs from 1700hrs. The reticulation system was also flushed to draw treated water through it and to ensure it was throughout the network. By midnight the HDC team was confident the whole network was treated. Daily testing of the Havelock North water was started on Saturday 13 August. The results made available on Sunday 14 August were clear.
15. Another coordination meeting took place between the HDC and the HBDHB on Friday 12 August at 1700hrs and agreed the HBDHB would be the lead agency in the response as it was a health related issue. That was an appropriate arrangement and in accordance with the guidance provided by the National Security System and Civil Defence Emergency Management (CDEM). The meeting discussed the value of issuing a boil water notice and the coordination of the wording of messages. Boiling water was seen as a precautionary measure that would minimise the risk of infection from the protozoa cryptosporidium and giardia that could not be eliminated by the chlorine treatment. It was seen as a prudent measure even though these organisms had not been detected. Ministry of Health staff joined the meeting by teleconference and among other aspects discussed the criteria to be used for lifting the notice once it had been put in place. The meeting agreed there was value in putting the boil water notice in place. It was agreed HDC, as the water supplier, was responsible for issuing the notice and later lifting it. The communications staff of both the HBDHB and HDC met at 1745 hrs to develop the messages that would be used to publicise the notice.
16. The notice to boil water was issued by the HDC at 1830hrs on Friday evening through a media release provided to television, radio and print media and published through the HBDHBs and the HDC's websites and on HDC's Facebook account. While the MOH had suggested the use of mailbox drops of leaflets, practical issues such as drafting, printing and distributing the required quantity at that time worked against taking that option that evening. As a result, publicising the message relied heavily on traditional media outlets and social media.
17. For the HDC the initial response had the overall objective of providing safe drinking water to residents. Two subsidiary aspects dominated the HDC considerations initially: The remediation of the water supply system, and managing information to the public. HDC's management of the initial response in support of the HBDHB's management of public health issues was undertaken by a small team of four key senior staff, and frequently with the Mayor in attendance.
18. At the meetings on Friday 12 August the HBDHB had undertaken to contact rest homes and elderly care facilities in Havelock North. As it turned out that was not done until Saturday morning although the task was completed by 1000hrs. It is doubtful if that delay aggravated the situation. Chlorinated water was throughout the network by midnight Friday and therefore any campylobacter in the system would have been destroyed and the chance of any more infections minimised.
19. A joint HBDHB/HDC meeting was convened on Saturday morning 13 August in what would become a twice daily routine. The meeting was informed the HBDHB was unable to contact rest homes on Friday evening but the task had been completed by mid-morning. The HBDHB also reported that an elderly patient at the Mary Doyle rest home

had died. The HBDHB activated its Emergency Operations Centre (EOC) on Saturday. The MOH and HDC Chief Executive (CE) discussed the situation with the Manager of the HB CDEM Group and Regional CEEM Controller and determined there was no need at that stage to scale up the response because neither the HBDHB nor the HDC were overwhelmed and there was no need to declare a state of emergency using the authority in the CDEM Act. A joint press conference was held Saturday afternoon at 1630hrs and a media release was made to all media channels, both organisation's Facebook pages and their websites, and to internal staff and HDC Councillors. At that stage Health's modelling showed there was likely to be an increase in infections but there were no indications of widespread community welfare concerns. While the media uptake of messages on Friday night was less than desired, there was considerable interest and demand on Saturday morning. Links were put in place on social media and in media releases to information sheets on campylobacter and the background to the boil water information.

20. On Saturday morning HDC Environmental Health Officers were used to contact all Havelock North food outlets, cafes, restaurants, bars and moteliors face-to-face to ensure they were aware of the boil water notice. At the same time the Water Services team completed face-to-face visits with all known owners of tanks that were connected to the supply to ensure they were emptied and refilled with chlorinated water.
21. On Sunday 14 August HDC made plans to place a full page update bulletin in Monday's edition of Hawkes Bay Today and in community papers. Radio and television were carrying the contamination emergency as national news headlines and the HDC communications team had established a routine of monitoring and responding to social media posts. The Havelock North iSITE and Library were given posters of the full page material prepared for local newspapers for display from Monday, as were some businesses. Plans were put in place to update school principals and Early Childhood Education centres and for the use of community welfare support teams in Havelock North. Test results of samples from the water reticulation taken on Saturday were reported as clear.
22. By Monday morning the Communications Team thought they had gained ground and had been successful in getting the critical messages to the public. With the help of the HBDHB, rest homes were being monitored and informed, media channels were highly engaged and the social media engagement showed extremely high numbers of views. But the HDC contact centre was not being overloaded with calls and the HDC response team thought the planned use of welfare support teams and Red Cross involvement would provide a highly visible presence in the community and would help increase awareness.
23. On Monday morning 15 August those HDC staff involved in the response had gained a greater appreciation of the scale and the impact of the contamination. The HBDHB reported that 183 presentations had been made to GPs, eleven had presented to hospital and two admitted. At that stage 19 patients had been admitted and two were in critical care. The HBDHB announced that patients had tested positive for campylobacter. There was a growing realisation that the community would need welfare support and the HDC CE directed the HDC EOC be activated to provide more capacity to coordinate and manage the delivery of welfare support. The EOC used the adjacent CDEM facilities and the response was well supported by the Manager of the HB CDEM Group and staff. The CE appointed the HDC Manager of Community Facilities and Programmes to lead the Council's EOC. The EOC position was described variously as the Welfare Controller or the Incident Controller. The structure provided for the Water Services team to continue to manage the remediation of the water system under the leadership and control of the Manager of the Asset Management Group (sometimes

called the Incident Controller Water Services) using the group business continuity plan. Later in the week the HDC response functions (reporting to the CE) included functions focussed on water infrastructure, welfare support, investigations and recovery. The appointment titles used in the EOC confused some staff who were more used to a CDEM response and having a single “controller” managing the response, and were probably more familiar with acting as the lead agency whereas this response had the EOC in support of the health led response and its EOC and Controller.

24. Once established, the HDC EOC tried to gather data to help identify areas in Havelock North that would most likely need assistance. Using HBDHB data, the location of reported cases of illness were mapped. While that approach gave a good indication of where those that had presented to a medical or health facility lived, there were many others who could not be located. Those in care or sick at home could not be tracked or mapped in that way and it can be argued the mapping process could give an inaccurate picture of concentrations. To overcome this issue, the welfare staff set itself the goal of identifying and assisting those most likely to need external help, being the elderly and the very young, those in areas where it was known resources would be stretched, and the areas where it was known there were high numbers of single parents and young families. This approach provided the critical areas that became the focus of the community outreach programme.
25. On the afternoon of Monday 15 August Red Cross were contacted by the Hawkes Bay CDEM Group Welfare Manager and asked to provide resources and experience in community outreach, which under the National Plan for Civil Defence Emergency Management, is the capability Red Cross has undertaken to provide to a response. Red Cross mobilised their Disaster Welfare Support Teams to Hastings to supplement the Hawkes Bay team drawing on resources from Auckland, Rotorua, Tauranga, Whanganui, Wairarapa, Kapiti-Mana and Christchurch. Using Red Cross and local CDEM volunteers, the outreach programme commenced on Tuesday 16 August in the areas of Anderson Park and Arataki/Brookvale and visited 910 homes in two days (16-17 August) conducting basic needs assessment. The outreach programme was completed on Sunday 21 August.
26. In conjunction with the Council, Red Cross established an information hub adjacent to the Havelock North Community Centre to provide information to residents and to distribute small quantities of bottled water and essential consumables as needs demanded. The Red Cross also provided a telephone outreach service to all single living alone elderly living in Havelock North which made 790 calls. A further 179 calls were then made to follow-up on those not contacted on the first call, and in the event of no contact then, Red Cross visited 114 homes to check on residents. Red Cross staff were present at schools when they re-opened prepared to provide unaccompanied minor support to ill pupils. Teams also deployed to 22 Early Childhood Education centres to distribute bottled water, sanitiser and soap. The Red Cross support was reduced in scale from Tuesday 23 August.
27. On the afternoon of Monday 15 August a coordination meeting was convened between the HBDHB, HDC, the Ministry of Education, Chairs of Boards of Trustees and school principals to discuss closing schools. Schools would have struggled to boil enough water for their students and there was concern in the junior schools that it would be difficult to manage hygiene, which could lead to further spread of the illness. Without a state of emergency in place, it was the responsibility of the school’s trustees to decide on closure, and given the circumstances faced, it was agreed that Havelock North schools would close for two days (Tuesday and Wednesday).

28. On Monday 15 August the HDC Water Services team deployed water tankers to Havelock North to provide water sourced from Hastings. The issue had been discussed on the afternoon of Sunday 14 August by the HDC response management team as a way of helping schools overcome the challenge of boiling enough water for students but also to provide the public with a supply of unchlorinated water. The decision to deploy the tankers was a pragmatic response to an awareness of the conditions likely to prevail at schools and is to be commended. The tankers remained in Havelock North until Monday 05 September.
29. On Wednesday 17 August another coordination meeting was convened by the Director of Education for Hawkes Bay and Gisborne to discuss school closures. The meeting involved the HBDHB, HDC, Education, Chairs of Boards of Trustees, Principals and union representatives. It was agreed that Havelock North High School and Iona and Woodford would reopen on Thursday 18 August but the primary schools of Havelock North, Te Mata, Havelock North Intermediate and Hereworth would remain closed until Monday 22 August as it was considered the older pupils had a better ability to manage hygiene.
30. By the evening of Wednesday 17 August staff of the Ministry of Social Development had identified and contacted most of its vulnerable clients in Havelock North including 721 superannuitants living alone and single parents with young children.
31. A set-back with the deployed tankers occurred on Thursday 18 August when one of the tankers tested positive for E.coli in a presence test. All the other tankers were tested and shown to be clear. But to minimise risk, the HDC decided to chlorinate the Hastings water but without the requirement to boil water on the basis that chlorination would immediately eliminate the E.coli and campylobacter if it was present, and at that stage there was no indication that other harmful organisms were present. Flyers were issued to the homes within 1km radius of the infected tanker. The enumeration test results on Friday was negative which was a great relief to the HDC and the community.
32. To compound the issue, a water safety test of Hastings water taken from three sites on Friday 19 August showed positive indications for E.coli on Saturday 20 August. The chlorination of Hastings water introduced after the tanker's positive indication should have already eliminated E.coli and further tests were undertaken. Tests at the same and similar sites in the network taken on Saturday 20 August were all clear and by Sunday 21 August, the HDC was able to announce the test results were clear and labelled the positive indication as a false positive and attributed it to irregularities that could sometimes occur with sampling techniques. The contamination event in Havelock North had led to heightened awareness and additional testing, which put a strain on the systems used to assure quality. Chlorination of the Hastings water supply was continued.
33. By Monday 22 August HDC reported all businesses in Havelock North that had a heavy reliance on drinking water and all motels had received bottled water. Providing the water was intended to assist those businesses to overcome the difficulties they would have in boiling the large quantities of water used.
34. On Tuesday 23 August the HDC made the decision to supply Havelock North with water from the Hastings supply for the foreseeable future. A Havelock North Drinking-Water Supply Reinstatement Plan had been developed by HDC in conjunction with the HBDHB. The plan's primary objective was to reinstate uncontaminated drinking-water to Havelock North by using Hastings water. The plan described how the supply system would be operated, how a flushing programme would be used to ensure Hastings water was throughout the network, and established the criteria and processes required to enable

the boil water notice to be lifted. The flushing plan was assessed by the HBDHB Drinking-Water Assessor on Wednesday 24 August before the plan was implemented.

35. Testing of water at the Brookvale bores continued to be positive. The Brookvale bores 1 and 2 were turned off and isolated on Wednesday 24 August and the Havelock North - Hastings interconnection was opened to allow Hastings water to enter the Havelock North zone and the Reinstatement Plan's flushing procedures were implemented. Flushing continued until 1600hrs on Monday 29 August with further flushing of the extremities of the network continuing beyond that date.
36. On Friday 26 August the HBDHB reported that a total of 604 cases of campylobacter, both confirmed and probable, had been reported since 01 August. Data gathered by the HBDHB after the event for the date on which patients reported illness to have started (the onset date), indicates the number of cases declined steadily after 13 August when chlorination had taken effect.
37. Recovery planning conducted by the HDC from Tuesday 23 August focussed on the water supply network to ensure Havelock North had a safe and reliable supply, and providing assistance to the community to aid recovery. A number of recovery measures were developed. The HDC established a business assistance scheme in conjunction with Havelock North business representatives designed to assist businesses that could show they had been adversely impacted by the water emergency. The assistance would go to those that could show there was a risk the business would fail as result of the impact and/or to businesses that met other criteria established. On Friday 26 August the government announced a support package of \$100,000 to match a similar amount committed by the HDC. The government funds were to go in part, toward promotional activities to be undertaken by the Havelock North Business Association to help promote Havelock North as a destination in a region popular with domestic and international visitors. Ratepayers were given water rates remission for the quarter in which the water emergency occurred and the Inland Revenue Department would waive interest on late tax and GST payments.
38. HDC arranged two public meetings for Havelock North residents scheduled for the evenings of Tuesday 30 and Wednesday 31 August. The meetings provided a panel that included the HDC Mayor and senior HDC staff, HBDHB representatives and HBRC representatives. Following presentations by the panel, residents had the opportunity to ask questions and make statements. The meetings were live-streamed and a video was made available on the HDC website.
39. Tests of Havelock North water during the period 24 August – 02 September after Hastings water was supplied to Havelock North returned clear results and showed the water was not contaminated but the boil water notice remained in place for Havelock North as a precaution and to ensure all the water from Brookvale had been flushed from the network. The Reinstatement Plan set the following criteria that needed to be met before the boil water notice could be lifted:
 - Havelock North supplied from Hastings.
 - Brookvale bores closed and isolated to prevent that water entering any of the Hastings or Havelock North zones.
 - Chlorination of Hastings drinking-water to continue for at least three months.
 - Flushing completed.
 - Two primary Havelock North reservoirs isolated and emptied and cleaned to mitigate risks of recontamination.
 - The smaller high level reservoirs to be visually assessed and their condition documented and agreed for ongoing use by the Drinking Water Assessor.

- Water in the smaller high level zone reservoirs to be supplied with treated Hastings water.
 - All owners known to have on-property storage to be advised to empty storage tanks and dispose to waste.
 - HDC to notify the Drinking Water Assessor which property owners have been advised.
 - Owners of on-property storage to receive communications on procedures for flushing and refilling tanks.
 - Havelock North properties owners to be advised of need to flush their systems. This pamphlet to be developed in conjunction with the HB DHB.
 - Specific advice for flushing internal systems to be provided to sensitive sites such as schools, rest homes, early childhood centres and food premises.
 - Clear tests obtained for three consecutive days.
 - Clearance sampling programme to be implemented to verify success of the flushing programme.
 - Ongoing testing schedule as per the HDC Water Safety Plan.
40. Prior to lifting the boil water notice HDC developed a communications plan to meet the criteria set by the Reinstatement Plan. The communications plan would be implemented with the lifting of the notice and included public nurses contacting rest homes, the Ministry of Education contacting schools, mailbox leaflet drops, contacting businesses and private tank owners and using posters, social media websites and local papers. The information aimed to inform residents on clearing household systems, stored water and tanks. The Reinstatement Plan and the criteria for the lifting the boil water notice were comprehensive and illustrate the lengths to which the HDC and HBDHB went to ensure the residents of Havelock North were supplied with safe water. The cooperation that took place between the HDC and the HBDHB in developing the plan was excellent. In accordance with the Reinstatement Plan and the DWSNZ, the boil water notice was lifted on Saturday 03 September. Daily tests of water in both the Havelock North and Hastings zones in the period after the boil water notice was lifted continued to provide clear results.
41. The review considers the response phase of the emergency to have ended on Monday 05 September after the removal of the boil water notice and continuing clear tests. The response had lasted 25 days. From the population of 13,000 residents it is estimated 5200 became infected. The HDC then began to reduce the number of staff involved and concentrated its efforts on recovery and receiving updates on how the community was faring.

Observations

Timeliness of the Response

42. The response commenced with the HDC informing the HBDHB of the positive test for E.coli immediately it was available and the Medical Officer of Health and HBDHB staff collecting additional data from a variety of sources and connecting those reports to the confirmed campylobacter cases. An argument could be made that health authorities could have seen statistics before Friday 12 August that might have suggested a problem. The review considers that argument unfair. The data available to the HBDHB at the time indicated an outbreak of a gastro infection but did not show the scale until the HBDHB

staff gathered more intelligence and modelled the situation. Data available after the emergency had begun shows that presentations to the HB Regional Hospital with symptoms of nausea, vomiting and diarrhoea rose rapidly after Thursday 11 August and peaked on Saturday 13 August. In addition, information provided to the HBDHB on Friday 12 August showed school absenteeism rose significantly after Thursday 11 August. General practice attendances actually peaked on Tuesday 16 August after the response had commenced. Epidemiology indicators provided by the HBDHB on 22 August and assembled using data gathered by health authorities during the emergency, show that from EpiSurv data (the system used by the health to record and model epidemics), case onset dates started to rise on Saturday 06 August and peaked on Saturday 13 August. But not all patients present to care immediately upon developing symptoms, which leads to a delay in the notification of cases to health authorities and therefore capture in EpiSurv and assist in the modelling of the outbreak. From the HBDHB telephone surveys conducted after the response started, the HBDHB data indicates that the illness peaked on Thursday 11 August. The review concludes that the Medical Officer of Health and HBDHB staff showed great initiative to collect data from a number of sources on Friday 12 August and to use them to support the HDC positive water test result and the report of campylobacter cases. The post-event data shows their actions were timely and appropriate. There is no formula or gauge to show when a developing event like this has crossed a threshold and requires a response. It takes experience and judgement and those attributes were shown by HBDHB staff. The HBDHB staff are to be commended for the way in which they used their awareness, initiative and judgement to activate and coordinate the response. The review concludes that it would have been difficult for the HBDHB or the HDC to make a speedier reaction to the illness in the community given the data they had available at the time.

43. The small team of HDC executives also responded quickly to the emergency to coordinate and direct initial tasks in remediating the Havelock North water supply and providing communications support. From Friday 12 August until the morning of Monday 15 August the HDC team worked closely with the HBDHB to try and gauge the scale of the outbreak. Their initial approach was based on a conscious decision to try to pre-empt an increase in demand for community welfare support. Hence the swift actions to chlorinate the water, provide information to the community and provide tankers.
44. The HDC Water Services team responded to the emergency and their tasks with speed and great commitment, which resulted in them having the water supply chlorinated and flushed by around midnight on Friday night. Throughout the next four weeks the Water Services staff worked long hours to test water to ensure it was safe, and to investigate the possible causes of the contamination.

Alerting and Information Management

45. Providing information to the public in an emergency is critical to the success of the response and it is essential to alert residents to an emerging problem early. Any alert is expected to be timely, reach all points of the community likely to be impacted, and is in a form which is succinct yet conveys the situation and the actions required. An effective alerting system has to be backed-up by an awareness programme that helps residents understand what form the alert takes, when the alert might be used, why it is used by the authorities and explains the actions required. At present there is no national public alerting system in New Zealand; each council is expected to determine its requirements and use the best means available.

46. The HDC maintains a Communications and Marketing group comprising six fulltime positions. Their routine function is to inform the community of Council activities, promote the Hastings district, promote and organise events and help maintain the reputation of the HDC. The team's work supports the Council and all the HDC business groups. Their experience is based on a combination of backgrounds in journalism, marketing and events management. In an emergency involving the HDC, the Communications team is expected to provide the incident controller with public information management as well as support the Mayor and CE, and provide any non-emergency Council communications.
47. The communications team faced a challenge on the evening of Friday 12 August in publicising the boil water notice. At 1830hrs the boil water notice was issued in a media release to print media, television and radio and published on the HDC Facebook account. The team responded well but with hindsight, the time at which the notice was released to the media and the public, meant that it was going to be difficult to get the distribution and uptake they desired, particularly through traditional channels. The message did not at first get the desired penetration of the community and as a consequence, many residents complained during the following weekend that they had not been advised of the problem or the actions they should take.
48. In addition to the traditional media channels, other methods were available but not used. These channels included leaflet drops, the use of emergency loudspeakers, door knocking, telephone trees, road signs, and posters. The Communications Team considered using leaflets but the time required to design and print the numbers required meant they would not have been available on Friday evening. Even if the printing could have been completed, distributing the material on Friday evening would have been nearly impossible due to a lack of staff available in time. Other options that could have been considered were the HDC CDEM vehicle mounted tsunami warning loudspeakers. However on Friday night the Communications team did not know of the existence of the system, and the review was told that using the emergency services and loudspeakers was discarded as it might have caused unnecessary additional alarm. Door knocking on Friday evening offered a viable method but it would have been a challenge to gather enough volunteers and to brief and deploy them in time. Telephone calling via telephone trees was another option for contact but relies on established contact lists and a telephone tree system did not exist in Havelock North. The use of road signs, such as the electronic signs used at roadworks sites, and the distribution of posters around the village also offered a means of relaying the message to some parts of the community, although the effectiveness of these methods late on a Friday evening could be debated.
49. Alerting the elderly and those that were already ill became a significant challenge. The HBDHB had agreed at the coordination meetings held on Friday 12 August, that they would contact all the elderly care facilities in Havelock North but this did not occur until mid-morning Saturday. Post-event, elderly care facilities in Havelock North complained they did not receive messages early enough. There was also a challenge in ensuring elderly at home had been contacted and were aware of the need to boil water. Aged Concern were not used initially to assist in informing the elderly although their database of clients' contacts was made available later and used by the HDC welfare team once the EOC was activated and contacts were made albeit a number of days after the initial warnings were published. A similar process took place to contact elderly living alone at home using Ministry of Social Development information. It was particularly difficult to engage with those that were already ill at home. The ill had limited mobility and contact

with others and in hindsight, were unlikely to receive the HDC messages.

50. Social media provided an effective channel for conveying the alert to the public. In Havelock North the Council communications team used the HDC Facebook account which is linked to the Hawkes Bay CDEM Facebook site to increase coverage. The review was told that a routine Facebook post by the HDC could be expected to receive about 2000 visits. The boil water message published on the evening of Friday 12 August received over 70,000 visits which indicates social media was an effective channel and made good penetration.
51. The public expect social media channels to be used in an emergency but there are always going to be small segments of the community that do not use social media. Those that do use this channel also expect social media conversations to be two-way and they expect the authority posting the messages to be responsive to issues and concerns raised. To meet those expectations, councils and authorities have to have the capacity to monitor social media traffic and procedures in place, which enable staff to respond quickly. The HDC Communications team performed well and considerable pressure but was hard pushed to meet all the demands in this emergency. To assist with monitoring social media there are electronic systems available to help trawl through social media chat to locate key words, which can indicate trends and issues that need to be acted on. There is potential for such a system to be shared between CDEM partners in Hawkes Bay and it is recommended that the HDC and its CDEM partners consider the options for managing social media traffic in an emergency.
52. A further electronic channel available was the Red Cross developed smartphone app, which can be used by authorities like CDEM and councils to broadcast alert messages to app users. The review was told that at the time of the Havelock North water emergency, the app had only recently been promoted in the HDC area and uptake was low at about 1000 users across the district. In addition, communications staff were not familiar with using the app. As a consequence this channel was not used in this event but it should be promoted and used in any future emergency as another channel of communication.
53. The Ministry of Civil Defence & Emergency Management has sought government funding to introduce a national alerting system based on cell broadcasting technologies but with no success yet. Had such a system been available in an event like the Havelock North water emergency, saying nothing of tsunami warnings, widespread flooding or adverse weather, volcanic ash fall, rural fires, pandemics, chemical emergencies and Police and security issues, specific areas under threat could be alerted electronically in addition to other communications channels, and the distribution increased and the reaction by residents enhanced. The Havelock North incident illustrates the value of a national alerting system.
54. During the period of the weekend 12-15 August the HDC response management team considered the event to be still evolving and there was no imperative to ramp up the response on Saturday or Sunday. As discussed earlier, the response was effective in contacting rest homes and small businesses in Havelock North, and preparing material for distribution from Monday 15 August. The HDC's messaging wanted to avoid causing alarm and panic and assure the public it was doing all it could to rectify the problem and support the community.

55. In emergency management there is an acceptance that alerts and messages at the beginning of an emergency are unlikely to reach all the residents in the target area quickly. This crisis was no different and despite the best efforts of the communications team, there were elements of the community that did not receive the message quickly. The review has identified a number of causal factors:
- The limited capacity of the communications team was stretched.
 - Many of the communications team were comparatively new to HDC and had not completed their training for emergency management.
 - The timing of the release of the boil water notice militated against fast and wide distribution.
56. From Monday 15 August the communications focus on the community was distracted significantly by having to correct misinformation that began appearing in the media. The HDC was accused of knowing about problems with the quality of the bore water on Wednesday 10 August rather than Friday 12 August when the response was initiated. The accusation was based on a newspaper report relating to the closure of Brookvale bore 3 from 2015 not 2016. The misinformation was carried by national media and local outlets and countering the incorrect claim took considerable effort by the Mayor and the communications team to explain the truth, provide the documentation that refuted the misinformation, and to rebuild the trust of the community.
57. The available HDC communications staff applied themselves to their tasks with all the energy they could muster. They will be stung by the criticism they received of the initial response but they did not fail in their task and successfully overcame the initial challenges and got into a rhythm of publishing updates, advice and messages of assurance during the rest of the response. The review concludes there are a number of significant lessons that can be drawn that would enhance communications in a future emergency:
- Communications in an emergency, and particularly with alerts and warnings, should involve broadcasting critical messages as early as possible to provide adequate warning time, using all available channels, and with a message designed as a call to action, and with the messages repeated frequently to encourage wide and deep distribution.
 - Long duration or fast paced emergencies will tax communications capacities and particularly with the considerable use of social media. Understandably the HDC communications capacity is determined by the scale of routine communications activities. In this event the communications team was stretched and under pressure. Additional support was deployed to Hastings from Wellington to assist managing the misinformation episode, but arrangements to draw on communications assistance from neighbouring councils should be enhanced.
 - Communications staff supporting emergencies should complete crisis communications training and have the opportunity to understand the differences between the routine marketing and communications functions and crisis communications.
 - Consistency in messages distributed in an emergency is critical. Geographical separation between the lead agency's EOC and those supporting the response can risk a mismatch. Therefore close coordination such as occurred between the HDC and HBDHB communications teams is vital.
 - The HDC response team did not consider there was a need to scale up the response before Monday 15 August. Had the HDC EOC been activated earlier, more staff with

wider CDEM experience would have been available to assist the communications team and suggest additional ways of getting messages into the community.

Inter-agency Coordination

58. Cooperation and coordination of actions between agencies during the response was very good. Decision-makers in any slow onset emergency such as this, face a number of challenges. The first is around having enough information available that leads them to a conclusion that the situation requires a response. That requires some systems to provide information and guidance as well as the experience and judgement to interpret the data. Second, the decision-maker relies on relationships with other agencies made before the emergency to provide that information and to assist in the response. Third, having gathered data and decided to respond, the decision-maker is faced with determining the likely scale of the problem and therefore the scale of the response required. In many evolving emergencies the tendency is to underestimate the potential scale and too few are brought in to help manage the response initially, which risks being overwhelmed and the emergency escalating. In this case the initiation of the response by the HBDHB and HDC was as swift as could be expected and drew on the knowledge and experience available in both agencies. The number of HDC staff called in to manage the response was adequate based on the HDC's assessment of operational priorities and the impact in the community. There was close coordination and information exchanges between the HDC CE, the MOH and the HB CDEM Group's Regional Controller. Those conversations on Saturday and Sunday confirmed HDC's assessment that an escalation in the response was not warranted at that stage.
59. Public health nurses were effective in contacting schools using their routine relationships to gain a clearer picture of absenteeism in Havelock North and comparing that to schools outside the zone. Education sector coordination meetings were effective in gaining consistency in managing school closures and their later opening, and as a mechanism to share information and messages and provide guidance. Public health nurses were also instrumental in contacting the elderly care facilities on Saturday 13 August and later to relay their situations to the HBDHB EOC.
60. The HDC took responsibility for contacting organisations that could provide tanker support and in managing relationships with the business sector in Havelock North. The Water Services staff arranged the tankers and allocated their locations and monitored the effectiveness of that support. Existing relationships and knowledge of the sector helped ensure this element of the response was effective. The HDC delivered water to cafes and restaurants in Havelock North in an effort to ease their burden, which was also effective.
61. Relationships between agencies in Hawkes Bay that contribute to managing emergencies are close, which makes cooperation and coordination easy. The difficulty is around getting agencies to the table early as a situation is developing so that information and perspectives are shared to assist decisions and promote a swift response. There is no formal mechanism in place for this and coming together to share information relies on judgement and the strength of the relationships. To help maintain strong relationships and enhance any future response, the Hawkes Bay CDEM Group should lead the development of gatherings and discussions between agencies to encourage the sharing of information, improve the understanding of the role of the lead agency and how others might support a response. As a key member of the Hawkes Bay

CDEM Group, HDC should draw on the experience of this response to be the advocate in the Group for relationship development.

Risk Management and Business Continuity

62. Providing drinking-water is an essential service for a Council. The review assumed the HDC would have in place a comprehensive risk management process, business continuity plans and a crisis or emergency management plan which together would assist in managing risks and guide a response to a disruption in the supply of safe drinking-water. The review was shown extensive documentation covering the HDC Risk Management Framework, the Risk Register, the Business Continuity Framework, the Master Business Continuity Plan (BCP), the Business Continuity Plan for Water Services, and the Crisis Management Team “Go Pack”. It was also shown documents that indicate Water Services conducted a desktop exercise in February 2105 to test the business continuity plan but in a flooding scenario which had little relevance to the Havelock North situation. The review was told there is no HDC Emergency Management Plan and the response arrangements which could be expected to be in an emergency management plan are included in BCPs.
63. The HDC risk register was last updated on 18 January 2016. Its risk descriptions are broad in nature and do not specifically describe risks to providing safe water supplies. The review assumed the risk described as “A business interruption caused by some event (eg power failure or fire) that compromises our ability to continue to deliver our services” covers water supply issues. The register assesses that risk as being unlikely, but with a significant consequence and a risk score of moderate. Managing the risk appears to rely on the implementation of business continuity plans as there is no description of the mitigations that have been applied to the system. The review was surprised by the high level at which risks are described and expected critical services such as the provision of safe drinking-water and wastewater management to have a much higher profile and greater detail around how the Council manages those risks.
64. The HDC Business Continuity Framework is a policy document that aims to guide the management of the Council’s “risks of major crisis, emergency, disaster and untoward events which create potential impacts on its people; business operations; customers; other key stakeholder; reputation and revenue.” It lists water and waste water as critical services. The framework also shows the role and composition of the Crisis Management Team (CMT). It is led by the CE and its purpose is to allocate scarce resources to provide the best outcome for the community and Council. In many organisations this information is placed in an Emergency Management Plan.
65. The Master Business Continuity Plan (issued 06 June 2015) provides the criteria for when the CMT might be activated, the assembly areas to be used, and gives a structure and the roles of CMT and an outline of staffing requirements. The Crisis Management Team “Go Pack” is intended to be a ready-reference for members of the CMT and repeats the information contained in the Master Business Continuity Plan but in an abbreviated format. The “Go Pack” was last updated in March 2016. A second part of the Master Business Continuity Plan covers the basics of business continuity planning and refers to individual business group BCPs for the detail.
66. The review expected the Business Continuity Plan for Water Services to show how a response would be put in place. In a very general sense it does that, but the bulk of the plan is oriented to the supply of water rather than the quality of the water supplied and

any disruption to that. While the Water Services team's response to the Havelock North emergency was swift and appropriate, the review was unable to determine if the BCP was used. The review also found that the Water Services BCP shows that the Maximum Acceptable Outage (MAO) time for the supply of water for fire-fighting and drinking is one hour, whereas the MAO for water quality testing and water treatment is three weeks. In addition, in what are assumed to be response times for a disruption in each of the water related services, the recovery actions required to maintain the minimum water supply are given an overall response time of zero - that is to respond immediately. By comparison the response time for water supply quality testing is given as one week, and within that, two days are estimated for determining the nature and impact of the event. The review assumes the MAO time for water quality is based on the assumption that the water is drawn from a confined aquifer. But there is no mention made of the risk, consequences and actions if such an assumption is incorrect.

67. The review was told the risk management system and its processes were a work-in-progress with an objective of bringing together the risk management processes at the operational level (expressed in BCPs) with the identification, analysis and management of Council's risks from the strategic level. The review's conclusions will contribute to that process by highlighting the following issues:

- The risk register should be reviewed to ascertain if the appropriate emphasis has been placed on the risk of suffering a loss of water quality separate from a loss of supply. Maintaining water quality should have a high precedence.
- A minimum acceptable outage time of three weeks for a critical service like water quality and an allowance of one week in which to respond to such a disruption, seems to be inappropriate. The risk management process used to determine MAOs and the composition of the BCP needs to be reviewed and adjusted.
- The BCP for Water Services should be reviewed with a view to putting more emphasis on responding to a loss of water quality and having the plan for a loss of supply closely aligned with the planned response to a water quality issue.
- The manner in which the Council proposes to respond to a crisis or emergency should be reviewed and a decision made on how and where that guidance (or policy) is to be expressed.

Response Management

68. The initial coordination and decision-making group for the HDC was led by the HDC CE. The Mayor was frequently present and closely informed. Others involved included the HDC Communications and Marketing Manager, the Manager of the Asset Management Group and the Manager of the Community Facilities and Programmes Group. This small team was supported by expertise of the Managers of Water Services and Water Supply as well as having outstanding administrative support. The response team operated in support of the HBDHB's management of public health issues and was focussed initially on the HDC's responsibility for the remediation of the Havelock North water supply to provide a safe supply, managing public information and the media, and being ready to provide welfare support to the community if and when the need became apparent. The structure used by the executive team can be seen to have drawn on that provided in the HDC Crisis Management Team documentation.

69. The risk with using a small team like this is that not all information may be available, and an escalation in the crisis can overwhelm it quickly, and sometimes before those in the team appreciate that they have lost the initiative. It is understandable that response

leaders might want to use a small focussed senior team initially to maintain tight control. In this case, during the first two days of the response the need for welfare support appeared to be low scale and the focus was mostly on the water supply and public information. The size of the initial response team could manage those functions. But in addition to the risk of being overwhelmed, a small response team can also unwittingly underestimate the scale or severity of the emergency and particularly as the public see it. With the benefit of hindsight, the review suggests that the HDC EOC could have been activated earlier than it was on Monday 15 August. Earlier activation would have bolstered Friday night's communications efforts, bought more capacity to managing the crisis, relieved the pressure on the small number involved at the outset, and widened the focus to community welfare faster. It would have demonstrated to staff, response partners, media and the community, that the HDC considered the issue to be serious and all resources were being used to manage it. However the decision to activate the EOC requires information and judgement and it is a tough call. Is there value in being proactive and activating early only to find that it is not required, or is it better to wait for more information that shows the scale of the problem to be dealt with and risk being accused of being too slow? In this case, with the information available to him during the weekend, the CE saw no need to escalate the response until Monday 15 August when it became apparent welfare needs were growing.

70. Having decided to activate the EOC on Monday 15 August the review found the following issues:

- The EOC's role was to support the lead agency and the health response but with an operational focus for the HDC on managing the "lifelines" aspects of the water supply and later community welfare. Some staff, including those of the Hawkes Bay CDEM Group on site, were unsure of the structure to be used in the EOC and some were unsure of their roles in it. Eventually the structure used was a truncated version of that used to respond to civil defence emergencies and comprised an Incident Controller and a section to manage the delivery of welfare support to the community supported by planning, intelligence and logistics functions. Staff of the Hawkes Bay CDEM Group office were used to either advise the HDC controller or to fill key appointments. Clearly showing the structure and roles at the start of an activation promotes coordination and effectiveness.
- The welfare support that was provided to Havelock North was focussed on the elderly, the very young and those that needed assistance. That was an appropriate approach. The team coordinated the support available from Aged Concern, Red Cross, Meals on Wheels, Plunket and the Ministry of Social Development. It provided in and out bound calling to manage calls for support, conducted outreach to check on and reassure the more vulnerable, and coordinated additional support that could be mobilised if required, to cover psychological and social concerns and care and protection of children. These services were effective, well managed and greatly appreciated by the community.
- There were sufficient HDC staff and HB CDEM Group staff available to fill the critical EOC appointments. Staff from across the HDC enthusiastically volunteered to help once they knew of the activation with supply exceeding demand and staff turned away. The willingness and degree of ownership of the problem by HDC staff is to be commended. The challenge for the HDC is to ensure they have in place the emergency response structure, the processes and training which enables staff to contribute effectively.

71. The Incident Controller was the Manager Community Facilities and Programmes Group and was appointed by the CE. The Incident Controller had about six months experience with the HDC but had previous experience in dealing with emergencies and providing community support in Australia and some experience in a smaller territorial local authority in New Zealand. The review was told the Controller felt ill-prepared for the role because of inadequate training and familiarisation, and insufficient guidance. The poor understanding of procedures probably contributed to tensions about how welfare support was to be provided at the local level in an emergency managed by the Council, and as provided for in the National CDEM Plan. It is the responsibility of the Council's Controller to plan for and deliver the support required in the community. But for that to be effective, the planned welfare support needs to be based on the advice and support provided by the Group Welfare Manager, who through chairing the Group's Welfare Coordinating Group, carries the responsibility for coordinating agencies' readiness and ability to support a response and has the experience to advise the controller. The Group Welfare Manager is not intended to set the tasks to be undertaken in a Council led response but to advise the controller on how best the welfare support might be provided. Greater familiarity by staff in HDC with roles and procedures would contribute to a better coordinated response.
72. Immediately after the HDC EOC was established on Monday, two levels of response management were in use. At first the CE retained his small team including the bulk of the communications and public information function, geographically separate from the EOC. Centralisation eases communications and control and enhances coordination while separation risks inconsistency and poor coordination. Later, the EOC did become the sole venue for managing the welfare response and the associated response communications. Only a few of the agencies supporting the welfare support provided Liaison Officers to the HDC EOC and the HDC did not have one at the HBDHB fulltime although the HDC Manager of the Asset Management Group and Manager of Communications and Marketing attended the HBDHB's twice daily update meetings. Liaison Officers are an important conduit for coordination, providing advice to Controllers and planning staff and sharing information. HDC EOC processes should provide for greater use of Liaison Officers.
73. The response to this event provides HDC with an opportunity to review the way it considers emergencies and to update its guidance. As described in the Risk Management and Business Continuity section there are at least two emergency management structures available - the CMT approach and that used to manage civil defence emergencies. These arrangements are too different and can confuse staff. To compound the problem, some staff differentiate between an internal Council issue or an outage that requires the BCP to be used, an internal Council crisis, and a civil defence emergency. But in reality an emergency is an emergency, and the response arrangements have to be able to deal with the impact and consequences irrespective of their origin. In small organisations with a fixed pool of staff available to support a response, and infrequent use of response structures and therefore low levels of familiarity, a standard response structure should be used to minimise confusion, standardise roles and procedures, ease training and enhance a response. The review suggests the Coordinated Incident Management System (CIMS) should be used as the basis for the Council's plans for managing an emergency irrespective of its origin. That structure can be scaled to meet the scale of the emergency. It is recommended that HDC review its structures for managing emergencies and base the structural arrangement and processes on that used in CDEM. Having agreed a structure, it is

recommended the HDC implement staff training to enhance staff familiarity and readiness to respond.

To Declare or Not to Declare

74. Neither the HBDHB nor the HDC declared a state of emergency during the response. The review was told consideration was given to the value of declaring a state of local emergency using either the provisions in the Health Act for a drinking water emergency or those in the Civil Defence Emergency Management Act in a discussions on Saturday 13 August between CE and the HB CDEM Group Regional Controller and on Monday 15 August with Ministry of Civil Defence & Emergency Management staff added. The Mayor and the CE discussed whether to declare a local state of emergency on Saturday but considered their systems were coping and a declaration was not required. A declaration under the Health Act would be a consideration for the HBDHB and the Minister of Health. A declaration under the CDEM legislation falls to the Council and the Mayor.
75. In the case of a CDEM declaration, guidance provided by the Director of the Ministry of Civil Defence & Emergency Management to members of CDEM Groups is that the primary consideration for declaring is whether the special powers provided by the Act under a state of emergency are required or deemed to be required to best manage the emergency. The Director's guidance provides additional conditions to guide when a declaration should be made. A declaration could be made when the situation meets the Act's interpretation of an emergency, the council's ability to manage the response particularly with respect to utilities and social services is compromised, additional powers are required, and where a declaration adds value to the response. In this case there was no need for additional powers and the council's resources had not been overwhelmed and the consensus was that a declaration was not required. In arriving at that position the review was told there was some debate as to whether the situation could be deemed an emergency. The review considers the situation involved a disruption to an essential lifeline utility that had caused illness and distress and endangered the safety of residents, and it was a situation that could not be dealt with by the emergency services and required a coordinated response. Under the CDEM Act those conditions suggest it met the criteria for a local emergency.
76. Resolving the question of declaring or not then comes to the judgement of the value a declaration could have added to the response and then the consideration of the timing for a declaration. The review has concluded the value of a declaration would have been through the strong signal it would give of the Council's appreciation of the severity and scale of the emergency, the assurance that it would give residents that the Council was taking the situation seriously and doing all it could to resolve the problem, and provide added emphasis to the response for the media. The CDEM Director's guidance suggests that if making a declaration, it should be made early. To gain the value from a declaration in the Havelock North case, it would have to have been made on Saturday morning. Again, slow onset emergencies present challenges for decision-makers and in this case the review recognises that at that stage, the response team considered the situation was in hand and a declaration was not required. By the time the EOC was activated and the full response structure stood-up, the immediate impact value of a declaration had passed. Nevertheless there continued to be questions raised in the media as to why there was no state of emergency declared.

Community Leadership

77. Mayors are expected to provide community leadership and take responsibility for the policies and performance of the Council. Community leadership becomes particularly critical in an emergency when the community needs information, guidance and assurance and the Council is expected to provide an authoritative voice. The Mayor of Hastings was informed of the contamination early in the response and was available to the Council executive team to better understand the nature and scale of the problem as well as influence the communications messages. He took the lead in engaging with the community and the media to explain the situation and provide assurance that the Council was doing it all it could to provide residents with safe drinking-water. The Mayor had two areas of concern – assuring the residents would have access to safe water, and maintaining the reputation of the district nationally and internationally. The latter aspect could easily have dominated the Council's approach to the response but the Mayor was able to achieve a good balance.
78. On Monday 15 August the Mayor and the CE jointly issued a public apology for the contamination and undertook to communicate Council's progress in the investigation of the cause and the outcome. The Mayor became the spokesperson for the Council in interactions with the media and played a strong role in countering misinformation about Council's knowledge of the condition of the source of water. He participated in the development of the proposal to provide residents with rates remissions and businesses with economic assistance. He presented at the two public meetings held on 30 and 31 August in which he was forthright and honest.
79. The Mayor's involvement in the response provides a good example to others. In an emergency like this it is an imperative for the Mayor to be seen to be taking responsibility for the Council's part in the contamination, while providing strong leadership and showing compassion. Those are the attributes needed in a community leader in an emergency and this response illustrates to others the behaviours and involvement expected in a response.

Comparison of Responses

80. The review took the opportunity to compare the response made by the HDC with responses made to similar situations in Walkerton, Ontario in 2000 and in Sydney in 1998. Information on the Walkerton emergency has been drawn from the government of Ontario inquiry into the causes of the contamination. The Sydney water crisis has been used as a case study by the Australia New Zealand School of Government and the case study material has been used in this review to provide comparisons. The comparisons made by this review are subjective and are the assessments of the reviewer. The assessments are not criticisms of the management of the responses made in Walkerton and Sydney but are the reviewer's observations developed to compare the three performances. Annexes C and D provide summaries of the two emergencies.
81. The environmental situation in Walkerton shares some similarities with Havelock North. Both systems drew water from a source in an agricultural area. The Walkerton supply carried a higher risk of contamination as it drew from an unconfined source. The Havelock North water was categorised as being drawn from a confined aquifer and was not being treated before the outbreak, but it was tested routinely. The Walkerton source should have been treated and tested but it was not. Both systems involve contamination with E.coli. The 1998 Sydney water crisis also arose from a contamination by

cryptosporidium and giardia and with the potential to infect a very large population.

82. The Walkerton infections were attributed to staff not testing water correctly and deliberately falsifying results and reports which resulted in contaminated and untreated water being distributed to a community that thought its water was treated and safe to drink. The Walkerton emergency caused 2300 residents or 48% of the population of 4800 to become ill, with seven deaths and some people, particularly the young, likely to suffer enduring effects. In Sydney no illnesses were reported that could be attributed to contaminated water but the response to positive tests resulted in wide scale boil-water alerts and a loss of public confidence in the water supplier. In Havelock North an estimated 5200 may have been infected or about 40% of the population. The Sydney crisis highlights the challenge of sampling and interpreting test results and translating them across a large network. The subsequent Sydney inquiry revealed the “The extensive research which has now been undertaken creates doubt about many of the laboratory results obtained during these events. Cryptosporidium and giardia may not have been present on the drinking water in the high numbers originally reported. However, it is clear that having regard to the information available at the time a conservative public health response was appropriate.”
83. The response to an emergency involving a critical service such as drinking-water could be expected to be swift once an issue was detected. The response could be expected to also show quick notification to the public about the emergency and what they should do, high cooperation and coordination between agencies to ensure information is shared, and firm calm community leadership that generates trust. The HDC reacted quickly to the detection of E.coli in the Havelock North water by informing health authorities immediately. The Sydney Water Corporation also reacted quickly by informing health authorities as soon as a positive test result was received. The Walkerton operator however, deliberately falsified and withheld test results which resulted in a delay of four days before the health authorities were informed. Having been informed of the presence of E.coli, the HBDHB and HDC responded quickly by chlorinating the water and then issuing a boil water notice as an added precaution. It took seven hours from the notification to the HBDHB to start the chlorination in Havelock North, and the boil water notice was published 8.5 hours after notifying the health authority. Once the Walkerton health unit had confirmed cases of E.coli infections they reacted immediately by issuing a boil water advisory still assuming the water was being chlorinated. In Sydney variations in test results across the network confused the response and by one measure, it took 12 days (15-27 July) from the first test result to the time the public were notified and a boil water alert published. From the time of extremely high readings of contamination it still took one day until the public were informed.
84. The communications channels used to alert the public and to advise them of actions to be taken were similar in Havelock North and Walkerton but the time of the day differed. Both emergencies struggled to get good coverage at first. The Walkerton Inquiry suggested the channels they used were limited and should have included local television broadcasters and leaflet drops. Social media is assessed as not being prevalent in May 2000 and is not listed as a channel used in Walkerton. In Havelock North the evening timing of the release is judged to have limited the distribution of the message but the review has identified other channels that could have been used the next day to widen coverage. In Sydney, Sydney Water tried to play down the incident while the health authority attempted to be proactive and honest with the public. Sydney Water’s low-key approach was to use letterbox drops and newspaper advertisements whereas NSW

Health wanted to issue a media release warning residents to boil their water until further notice. Again in 1998 social media was not available. The consistency in messages published by both the HBDHB and HDC was high whereas in Sydney inter-agency tensions resulted in messages not being coordinated and a sequence of opposing statements and retractions, which did nothing to assure the public.

85. Cooperation and coordination between agencies involved in the emergency in Hastings were good. On the surface, the relationship and cooperation between the Walkerton health unit and the water supplier also appeared to be good but because of the lack of oversight of the water operation, the health unit had been grossly misled. The relationship between the two Sydney organisations at the start of the event was sound and in accordance with protocols in place at the time. But differences in opinion on how the public should be informed and a lack of coordination quickly destroyed the relationship and trust, and resulted in criticism by the media, the public and state politicians. The inquiry found in favour of NSW Health as providing the prudent approach when dealing with public health.
86. The greatest difference between the cases is the operating approach shown by the organisations with the responsibility to provide safe drinking-water. Walkerton's operators had engaged in a host of improper practices for years and the operation was not closely monitored or audited. By comparison both Sydney Water and the HDC Water Services team followed the guidance provided closely. The HDC team maintained an honest and trusted relationship with the HBDHB in its supervisory role. Sydney Water, as a state owned corporation, took a more formal approach to its relationship with NSW Health.
87. Community leadership during an emergency is important for assuring the community. In Walkerton the Mayor was informed of the outbreak on the day the health unit began its response but he was not asked or encouraged to do anything specific, and as a consequence the Mayor took no steps to further disseminate the warning to the community. In Hastings the Mayor was informed early on Friday 12 August of the emergency and he worked closely with the HDC executive to develop media updates and he was active in the community and with the media as spokesperson. In Sydney there is nothing to indicate the city authorities got involved in the emergency. But it was state politicians who became involved and through the media criticised Sydney Water's response describing it as a shambles.
88. By using the Walkerton and Sydney cases for comparison, the review found the response by the HDC was as quick as it could be once the problem had been detected, although some might question why the boil water notice was not issued at the same time as the decision to chlorinate. The answer lies in the reasoning that chlorination would kill campylobacter, the organism identified as the likely cause of the contamination, and there was no indication of cryptosporidium or giardia at that stage and therefore no imperative to boil water. The situation in Walkerton was different. In deciding to issue a boil water advisory the health unit assumed the water was being chlorinated (as it should have been), which should have eliminated campylobacter and boiling water was a precautionary measure intended to eliminate cryptosporidium and giardia. Cooperation and coordination between agencies involved in the Havelock North event was assessed as good and community leadership was strong and honest compared to Walkerton and Sydney and in Havelock North contributed to assuring the community that their water was safe to drink and helped move them towards normalcy. A common weakness in all

three responses however, was around public alerting and not using all the communication channels available.

Areas for Improvements

89. The response to the Havelock North emergency is assessed to have been quick, well-coordinated and effective. Coordination between agencies was characterised by clarity around who had the lead for the response, a clear division of responsibilities and a willingness to share information and cooperate. Staff at the HBDHB and HDC showed outstanding commitment to the response and to resolving the situation. The calm and forthright style of the Mayor's leadership of the community and Council staff contributed to confidence and understanding. Commendable though the response was, the review also identified a number of areas that could be improved to enhance a future Council response to an emergency.

Alerting and Communications

90. The effectiveness of the response was hampered by the perception that critical messages were not delivered in a timely manner at first and the channels used did not enable segments of the community to receive the messages. The review considers a number of factors were in play which prevented better communications in the initial stages of the response:

- The timing at which the boil water notice was issued on the evening of a Friday 12 August made it difficult for broadcasters to give the message emphasis and even harder for the response to arrange for the use of other channels. Some media outlets did not even pick-up the media releases made on Friday evening.
- At the time the boil water notice was publicised, the message had a very local focus and was probably not considered sufficiently newsworthy to have it broadcast as "breaking news" by national broadcasters.
- Informing the aged care facilities was delayed when the HBDHB did not make contact with them until mid-morning Saturday.
- All available staff of the HDC Communications and Marketing group were committed to the response and worked well despite the pressure. Plans to supplement them by using communications staff from neighbouring councils should be developed to supplement resources in future responses.
- Communications efforts were redoubled on Saturday through the use of contact teams in the village, the HBDHB contacting rest homes, and Water Services contacting owners of private tanks. Nevertheless, alternative channels to the traditional media channels were not developed probably because available capacity was committed.
- The communications team was inexperienced in HDC's emergency management as their training had not been completed. Part of the training should explore the differences between the routine communications function and crisis communications.

91. The lesson drawn from the communications experience is that in an emergency, all channels available have to be used as early as practicable. The general philosophy in a response should be precautionary and based on communicating as early as possible, with as high a frequency as possible using every channel available. It is better to have to apologise for flooding the community with messages than to apologise for undershooting. The communications challenges encountered on Friday night were not insignificant. The communications team had a strong and effective social media

presence. Had there been resources available it is assessed more could have been done on Saturday and Sunday to inform the public but the combination of limited resources and the opportunity missed on Saturday to escalate the response by activating the EOC and providing some additional non-communications capacity, limited the effectiveness of communications over the first few days of the response.

92. Consideration should be given to the following aspects of communications:

- Review the capacity of the communications team for emergencies and develop plans to supplement existing capacity.
- Implement a training and familiarisation programme for the communications team that will develop their understanding of the Council's role in emergencies and how they contribute to a response.

Interagency Coordination

93. The speed of a response and the flow of information to the public are critical measures of effectiveness of a response. Slow onset emergencies present a challenge to decision-makers in determining when the situation is big enough or is considered to be heading in a direction that is bad enough, that it warrants a decision to act. Without set criteria to guide decision-making around when to act, experience, judgement and personal attitudes become important. In this case there was no tendency to down-play the severity of the problem. The review recognises that some of those with the responsibility for deciding if a response is required and what scale it should be at, might underestimate the trajectory of an emergency or want to wait for more evidence, or wish to downplay the severity of the problem. Leaders have to understand their personal style in decision-making, appreciate the impact it can have on others in an emergency, and develop an approach which balances prudence and caution with impulse.

94. Once the indications of the problem had been accepted on the morning of Friday 12 August, the cooperation between agencies was good. As the lead agency, Health was well supported by the HDC and the HBDHB's existing relationships with primary health organisations and pharmacies ensured support to the community was available and data was shared. But in addition to health indicators, there were also indicators in other sectors that could corroborate what was happening in the health sector. The challenge is to put the jigsaw together to form a clear picture and decide a response is needed. Relationships between agencies are the foundation for bringing together those holding parts of the puzzle. To help build the relationships and encourage early information sharing, the HDC should encourage the Hawkes Bay CDEM Group to take the lead in developing ways in which information can be shared.

Risk Management and Business Continuity Planning

95. The ability to respond to the impact of an emergency, no matter how the emergency might have started, is a crucial element of risk management but not the only element. Risk analysis, risk reduction and business continuity planning are important precursors to a response. The more that can be done in risk reduction and preparedness, the less that has to be done in a response and recovery. Providing safe drinking-water is a critical deliverable for the Council and the function carries considerable operational and reputational risk. While the review acknowledges the Council has work underway in its approach to risk management, the HDC's risk management documentation and BCPs for water services do not yet convey the importance of the service, nor adequately cover the

risks or show how a response is to be managed. The review of the response adds further emphasis to the work underway to ensure there is close alignment between the strategic and the operational levels of HDC's risk management and business continuity planning, and clarification of the HDC's response arrangements.

Response Structure and training

96. Notwithstanding the overall success of the response, the review detected a lack of clarity and familiarity around the response management structure, and the roles and responsibilities that are to be used in it. Currently there are two different response structures published and a differentiation between Council emergencies and civil defence emergencies that implies which of the two structures should be used. The response to the water emergency confused the picture further by using truncated versions of the published arrangements. In small organisations with a limited pool of staff to support a response and infrequent occasions when a response is undertaken, staff can be confused by inconsistencies in structure, terminology, roles and procedures. The Council's ability to respond effectively to its next emergency depends on staff training, which in turn relies on the availability and clarity of the emergency management plan. It is recommended the Council review its arrangements for managing emergencies with a view to consolidating the structure to provide one consistent approach, clear procedures and guidance on its functioning, and training and exercises using them to improve staff familiarity and confidence.

Conclusion

97. On receiving a test result on Friday 12 August that indicated the presence of E.coli in the Havelock North water supply, the response by HDC staff was swift and in accordance with the DWSNZ. The reaction by the HBDHB to the indication was also fast and showed commendable initiative and good judgement in collating the indications and concluding they were dealing with a waterborne organism in the Havelock North network causing an outbreak of gastroenteritis illness. Together the two authorities responded to the indications of the outbreak at a pace that would be difficult to better.
98. The HDC team focussed on their responsibility to provide the Havelock North community with safe drinking water as soon as was practicable. They quickly gained an appreciation of what had to be done and rapidly implemented chlorination and flushing even without waiting for an enumeration test that the DWSNZ procedures suggest should be completed to show the level of contamination. The joint HDC/HBDHB team was confident the water would be safe to drink once chlorination was throughout the network but included the requirement to boil water as an additional safeguard to help minimise the risk of further infection, even though it was going to be to a burden to residents. The HDC effort to have chlorinated water throughout the network by the morning of Saturday 13 August would have limited further escalation of the illness.
99. The Council's effort to quickly communicate the problem to the community began well but by the time the decision to issue a boil water notice was made late on the Friday afternoon, their efforts were hampered by the tyranny of the timing, which affected the depth of coverage and speed at which the HDC's messages became known to residents. Sections of the community felt they had been let down despite further intensive efforts over the weekend to get the messages distributed. On Saturday morning businesses in the hospitality sector were well served with information from the HDC response team and

visits by Environmental Health Officers and after a late start, the HBDHB had also informed rest homes and elderly care facilities by mid-morning Saturday. There were also practical issues with communicating effectively with those who were already ill. The ill tended to be housebound and not communicating with others through any means. But there were additional communications channels that could have been used to increase coverage but the combination of resource capacities available, timings, and the appreciation of the scale and severity of the problem by the initial HDC response team counted against decisions to use some of those methods.

100. HDC ramped up the level of their response management on Monday 15 August when the scale of the impact on community welfare needs was more apparent, by activating the EOC to provide welfare support to Havelock North. The EOC did not function smoothly at first due to a combination of a lack of clarity around form and function, the absence of a few key staff who were ill, and some staff inexperience. There was adequate staff available and a clear objective but the EOC lacked a clear structure, well defined individual roles and some staff lacked familiarity with EOC procedures. Nevertheless the EOC staff developed a sound plan for assisting residents starting with a focus on the most vulnerable. They mustered the Red Cross and CDEM volunteers to implement the plan and the resulting outreach programme was effective.
101. Hindsight suggests the response could have been escalated and the EOC activated earlier than Monday 15 August. But escalating a response is a tough judgement call for senior management. Sometimes it might be seen as over-reacting, but it is better to be seen to be reactive and ready to assist those impacted than being accused of being tardy and unresponsive. A decision to make a declaration of a local state of emergency faces similar challenges. A declaration could increase anxiety in the community unnecessarily but it could also have the value of enhancing community and media awareness of the issue and provide a strong indication of the Council's attention to the emergency. No declaration was made by the Council in this case on the basis that the situation was assessed as under control, resources had not been overwhelmed and no additional powers were needed. To be of value to the response, a declaration would have had to have been made on Saturday morning and again, at that time the scale and severity of the problem was judged by the initial HDC response team as to not warrant a declaration. A declaration might have provided added impetus to the response messages and ramped up providing welfare support. But it is another tough call that relies on information, experience and judgement.
102. The appearance of misinformation on the Council's knowledge of the quality of water at Brookvale distracted the media and the communications effort and eroded the trust the community had in the Council and its response. The Mayor with support from communications, worked assiduously to counter the false claim and to restore public confidence.
103. The coordination between agencies during the response was excellent. It started with the relationship between the HBDHB and the HDC that led to the rapid and coordinated initiation of the response and was seen in the agreement on agency roles in a health led response. It enabled information sharing and a drive to ensure consistency in messages and a comprehensive risk based plan to guide the reinstatement of the water supply. The engagement and cooperation the response achieved in the education sector, with the involvement of social agencies and with small businesses contributed to effective communications, common understandings and contributions to decision-

making. Consistency in information flows between agencies developed a sense of control that reassured residents.

104. Community leadership shown by the Mayor of Hastings was forthright, compassionate and apologetic, and that too helped reassure the community. There was a good division of responsibilities between the roles of the CE and the Controller and the leadership role of the Mayor. The HDC response team kept the Mayor well informed and supported, and particularly in the role of media spokesperson. The personal attributes and the approach displayed by the Mayor provide a good example for others in managing an emergency.
105. A comparison of the HDC response in Havelock North with the responses to similar cases of managing water safety emergencies in Walkerton, Ontario in 2000 and Sydney in 1998 by using inquiry reports and case study material, show how effective the Hastings response was. Once the problem in the Havelock North water was detected, the response was swift, accurate and well-coordinated. Communicating with the public at the onset of the emergency in Havelock North was well intentioned but hampered by timings and resources. Communications has been identified as a critical area that deserves improvement as the means used to reach the majority of the community initially lacked penetration. In most other measures used in the comparison, the Havelock North response was assessed to be at least as effective if not better.
106. As with the report of the inquiry into the Walkerton emergency, the review of the HDC response has been undertaken with the benefit of hindsight and with access to information after the event that may not have been available to the responders. In any emergency decisions and actions taken in the response use the data, experience, judgement and capacities and processes available at the time. Overall the response was effective and well managed. But in any event like this, not everything runs smoothly and there will always be areas for improvement and this review has identified some aspects that could enhance the HDC's response to an emergency in the future. In addition to the communications function, the review identified some improvements in the HDC emergency management structure, staff training and capacity, business continuity planning, and cooperation and coordination with regional partners in a response. These improvements will be incremental enhancements and do not detract from what the review considers to have been a fast, well-coordinated and effective response, in which staff enthusiastically applied themselves to assisting those impacted by the emergency.

Recommendations

107. It is recommended that the HDC:
- Review the capacity of the communications team for emergencies and develop plans to supplement existing capacity.
 - Recognising the inexperience of staff, implement the training and familiarisation programme for the communications team to develop their understanding of the Council's role in emergencies and their contribution to a response.
 - In conjunction with the HB CDEM Group advocate to Government for the introduction of a national public alerting system using technology such as cell broadcasting.

- In conjunction with the Hawkes Bay CDEM Group, advocate for the development of relationships and mechanisms for sharing information between agencies to provide early indicators of potential emergencies.
- Review the Council's risk management process and BCPs for water services to ensure there is close alignment between risk management, business continuity planning, readiness and response arrangements.
- Review the HDC arrangements for managing emergencies with a view to consolidating the structure to provide one consistent approach with clear procedures and guidance on how it is to function.
- Enhance the training and response exercises to improve staff familiarity and confidence in using the agreed response structure and emergency management procedures.



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02 November 2016

Annexes:

- A. Terms of Reference
- B. Timeline of the Response to Havelock North Water Contamination
- C. Summary of 2000 Walkerton Water Emergency
- D. Summary of 1998 Sydney Water Crisis

TERMS OF REFERENCE

Review of Hastings District Council Response to Havelock North water contamination Incident August 2016

Background

A water sample from the Havelock North water supply taken on Thursday 11 August, gave a positive presence indicator for E.coli contamination on Friday 12th August. Over the preceding day the Hawke's Bay District Health Board (HBDHB) had noticed an increase over normal levels of gastroenteritis presentation. A phone survey of schools in the Hawke's Bay indicated increased absences in the Havelock area. The HBDHB linked these indicators and alerted the District Council. The District Council commenced chlorination of the Havelock North water supply at 5.30pm Friday 12 August (decision made at 3.00pm). Meetings of Health Officials and Council staff continued into the evening with a decision to implement a boil water notice as a precaution.

It quickly became clear that the contamination had affected a large number of the Havelock North residents and people who had visited Havelock in the preceding week. A major response on August 15th the Hastings Council established a Welfare Incident Management Team.

Subsequent survey results indicated that the infection was relatively evenly distributed across the village and across age groups. The District Health Board subsequently identified that this was a single source campylobacter outbreak over and above normal underlying levels of campylobacter in the community.

The response started with Council in crisis management/business continuity response mode, feeding into the Health EOC with Health as lead agency. Alongside this, a welfare response operation was established. When the DHB scaled back its emergency response as the health emergency eased, the Council assumed the role of lead agency and also increased recovery activity. The response structure was disestablished on 5 September and has been replaced by the recovery structure detailed in the Recovery Strategy. The Strategy is supported by a more detailed Recovery Action Plan that is used to ensure activities to give effect to the Strategy are completed.

The Government has initiated an independent formal enquiry into the incident and related factors. The Terms of reference for that enquiry are attached as appendix 1. The enquiry is not expected to report until March 2017.

Terms of Reference

This internal review is established to provide input into two primary tasks;

- Enable the Council to identify areas for improvement in its response¹ to emergency and business continuity incidents.
- Assist the Council in providing information as to its response and its understanding of the improvement opportunities.

For the foregoing reasons the terms of reference are wide ranging but have been developed with the expectation that this review is not intended nor should it be considered as established to in any way supplant the Government led enquiry.

Review Objectives

- To assist the Council to identify areas for improvement in its response to similar emergencies in the future
- To assist the Council to identify areas for improvement in its business continuity arrangements.
- To assist the Council to provide information to the Government inquiry as to its response and understanding of improvement opportunities.

Scope of Review

In undertaking the review the reviewer will

- Establish the timeline of response activities carried out by all agencies involved in the response.
- Assess the timeliness and effectiveness of inter-agency coordination and decision-making between the Hawke's Bay District Health Board and the Council.
- Gauge the effectiveness and timeliness of the provision of information to the public during the response.
- Evaluate the effectiveness of contingency plans used to provide alternative supplies of water to the community.
- Evaluate the cooperation between agencies involved in the response.
- Analyse the role of the Council's community leadership in the response and in assuring the affected community.
- Assess the mechanisms used by the Council to manage the response.
- Consider whether there might have been value in declaring a state of local emergency to aid the response.
- Benchmark the response activities against other incidents of a similar nature including but not limited to the 1998 Sydney Water Crisis and the 2000 Walkerton Water Contamination incident.

In completing the tasks the reviewer will have full access to all Council staff, records and required facilities.

Deliverables

¹ "Response" includes all elements of the Council response including, but not limited to Asset Management, Communications, Welfare, Investigations, Community support, economic development, coordination and cooperation with other agencies.

The reviewer will provide a report suitable for presentation to the Council and the Government Inquiry. The Report is to be completed and delivered on a date to be agreed with the Chief Executive Hastings District Council.

TIMELINE OF THE RESPONSE TO HAVELOCK NORTH WATER CONTAMINATION

As at Thursday, 20 October 2016

Introduction

The review of the Hastings District Council's (HDC) response to the contamination of the Havelock North drinking water supply was required to establish a timeline of activities undertaken as part of the response over the period of Tuesday 09 August 2016 to Monday 05 September 2016. The timeline was generated from interviews with key personnel involved in the response from the HDC and the Hawkes Bay District Health Board (DHB), and records such as media releases and Situation Reports. The timeline was checked for accuracy by those that contributed to its development and was used by the review to understand the sequence of indications, decisions and actions and inform observations and recommendations.

Timeline

Date	DHB	HDC	HBRC	Other
Tues 09 Aug		HDC receives results of routine water test at Havelock North High School. Results are clear.		
Wed 10 Aug				
Thurs 11 Aug		Havelock North water tested by HDC. Locations included Brookvale Bore#1 and at 41 Hikanui Drive.		
Friday 12 Aug	HBDHB public health service (PHS) were alerted to a gastroenteritis outbreak in Havelock North (HN) and the following sequences of events unfolded between 0800 – 1200hrs: <ul style="list-style-type: none"> Increased number of presentations and admissions to Hasting 	HDC receives results of Thursday's tests. Result is positive presence test for E.coli from the Hikanui Drive sample. Brookvale Bore #1 is clear. HDC notifies DWA of positive test result at 0944hrs.		

	<p>Hospital for diarrhoea and vomiting (Ds&Vs) overnight</p> <ul style="list-style-type: none"> • Health protection officers (HPOs) instigated an investigation into the emerging HN situation and found: <ul style="list-style-type: none"> - Gilmour's Pharmacy HN reported 10-15 people with D&V seeking anti-diarrhoeal medication - 5 notifications campylobacter in HN (later revised to 3) - 1 confirmed campylobacter case at Mary Doyle rest home • Medical Officer of Health (MOH) informed of increasing incidence of unwell people in HN and agreed to discuss chlorination of the HN water supply with HDC and take water sampling for campylobacter prior to chlorination. <p>1200 – 1400 hours</p> <ul style="list-style-type: none"> • MinoH advised of the situation • MOH contacted HN primary schools to ascertain the level of student absenteeism (subsequently finding that HN schools each had an estimated 20% or more of 			
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	<p>absenteeism rates).</p> <p>1400 hours</p> <ul style="list-style-type: none"> • PHS convenes an outbreak meeting with HDC, MPI, ESR, MoH staff in attendance. <p>Meeting agreed:</p> <ul style="list-style-type: none"> - There was likely a problem with HN drinking water - HBDHB advised HDC of its recommendation for the issuing of boil water notice and chlorination of HN drinking water supply. <p>1600 hours</p> <p>1645 – 1830 hours</p> <ul style="list-style-type: none"> • HBDHB-led campylobacter outbreak response meeting convened with senior DHB, MinoH and HDC staff in attendance. • Key actions from the meeting included: <ul style="list-style-type: none"> - Issue a boil water notice advisory as precautionary approach and HDC were assigned responsibility for issuing the notice to HN community - HDC would maintain chlorination and water sampling regimen - Joint HBDHB & HDC media release be developed - Primary care and HN ARC advised of 	<ul style="list-style-type: none"> • HDC in attendance at PHS meeting and actions agreed (as per DHB timeline) • HDC operational staff commence work to introduce chlorination. <p>1645 hrs</p> <p>HDC group manager Asset Management and Marketing and Communications manager attend HBDHB outbreak response meeting</p> <p>Meeting agreed to issue advisory and that Council were responsible for water whilst DHB would own health but be the lead agency overall.</p> <p>1700hrs</p> <ul style="list-style-type: none"> • HDC introduces chlorination of Havelock North supply, dosing of reservoirs. Havelock North water supply network fully flushed with chlorinated water and tested for chlorine levels by midnight. 		
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	<p>situation and liaison maintained over weekend</p> <ul style="list-style-type: none"> • HDC advised DHB they were not able to distribute boil water notice by letter box drop Friday evening. • Based on information at the time, a full CIMS response would not be activated and an incident management team was established and PHS would continue to manage the situation through prescribed processes overnight. <p>1845 – 2130 hours</p> <ul style="list-style-type: none"> • Media communications prepared and released to TV & radio outlets and posted on DHB and HDC website and facebook pages. • HBDHB PHS continued to manage the outbreak situation and reconvene Saturday 13 Aug at 1000hrs 			
		<ul style="list-style-type: none"> • HDC call centre briefed and asked to report in morning. [Combined views on HDC and DHB Facebook by 2230hrs over 120,000.] • Plan for meeting at 1000hrs in morning to see what results for water tests revealed and a health update from Public Health and DHB. 		
Sat 13 Aug	MPN test (2nd test) from Thursday sample confirms E-coli in water supply.			
	0730 – 1230 hrs	<ul style="list-style-type: none"> • Chlorination is throughout Havelock 		

	<ul style="list-style-type: none"> • Aged residential care (ARC) facilities in HN contacted by infection prevention & control staff. <p>0900 - 1200 hrs</p> <ul style="list-style-type: none"> • HB DHB incident management team and HDC staff meet at Napier health Centre to review situation. • DHB report that 24/7 Te Mata health centres in HN and the Hastings Health Centre reported increased presentations of D&V cases overnight, and one death reported at Mary Doyle ARC facility. • HBDHB CEO briefed on situation and decision was made to activate HBDHB emergency operations centre (EOC). • PHS continued to focus on surveillance case finding plan 	<p>supply as of midnight Friday.</p> <ul style="list-style-type: none"> • Daily water testing of HN water supply. • Environmental Health team despatched to all motels and food handling businesses / premises on Havelock water supply. • HDC issues an individual media release on water update to local media outlets and posts on HDC Facebook site, HN Business Assn databases received all media updates. 		
<ul style="list-style-type: none"> • Discussion held between Regional CDEM Controller, Medical Officer of Health and HDC CEO. Declaration of CDEM Emergency not considered necessary. • Joint HBDHB & HDC media release prepared and submitted to TV, Radio outlets and posted on FB sites 				
	<p>1300 hrs</p> <ul style="list-style-type: none"> • DHB activates its Emergency Operations Centre (EOC) • DHB deploys District Nurses to 	<ul style="list-style-type: none"> • HDC activates incident response and attends daily 1000hrs and 1600hrs Sitrep (situation report) 		

	<p>ARC facilities to assess, triage & administer treatment.</p> <ul style="list-style-type: none"> DHB supports Havelock North general practices (GPs) and pharmacies, providing additional stocks of medication and hydration fluids. 	<p>meetings set up by DHB</p>		
<p>Joint HBDHB & HDC Press Conference held 1630hrs</p>				
Sun 14 Aug	<ul style="list-style-type: none"> High number of gastro-enteritis presentations seen at general practices and 2 people admitted to hospital related to gastro-enteritis Case definition & case finding plan integrated into coordinated information management system (CIMS) process. PHS & Ministry of Education (MoEd) meeting held & joint communication agreed. PHS provided information for schools and early childhood education centres (ECEC). HBDHB & HDC align their communications and ensure consistent messaging. 	<ul style="list-style-type: none"> Chlorination reported throughout Havelock North water supply system since midnight Friday. HDC had discussions with MOE re water. Results of Saturday's water tests are clear following treatment with Chlorination. Boil water notice remains in place. HDC continues to update issues and requests to residents to check on neighbours as well as respond to questions via contact centre and Facebook. HDC prepare statement to community to be placed in Monday HB Today and Community papers 		
<ul style="list-style-type: none"> Two joint (HBDHB & HDC) media releases issued [also placed on Facebook and distributed through databases, websites] providing advice on boiling water and 				

campylobacter pamphlet links made available in releases and Facebook posts, Healthline numbers promoted throughout same.				
Mon 15 Aug	<ul style="list-style-type: none"> • High number of gastro enteritis cases reported by primary care. • Institute of Environmental Science & Research (ESR) provide surveillance support & MoH deploy communications, and water engineer resource to HBDHB EOC. • Information flyer posted on public notice boards • FAQs fact sheet prepared 	<ul style="list-style-type: none"> • HDC Mayor and CEO issue apology and update on water to community (prepared Sunday 14 August) • 4 media release updates issued separately and jointly. DHB [Facebook etc.] giving people latest clear results, latest info regarding numbers of people reporting peaked, school closures, ongoing responses to contact centre and Facebook queries from community. • HDC issue map of area served by Havelock North water to help clarify for non-Havelock residents. • Boil water notice remains. 	<ul style="list-style-type: none"> • HB Regional Council advises it has introduced weekly water monitoring programme to replace its monthly tests normally carried out at this time of year. HBRC also announced it has conducted run-off modelling and interviews with landowners in the vicinity of the bores. 	<ul style="list-style-type: none"> • Emergency meeting held between DHB, Ministry of Education and school principals and Chairs of Boards of Trustees. Decision taken to close Havelock North schools for two days (Tues 16 Aug and Wed 17 Aug).
Daily joint media conferences facilitated by HBDHB commence				
		<ul style="list-style-type: none"> • HDC deploys water tankers to Havelock North to provide chlorine free water sourced from Hastings Supply to schools (and the public) due to school difficulties in boiling water. • HDC activate a CDEM Operations Centre in Hastings to manage community welfare response in respect of identified needs. 		<ul style="list-style-type: none"> • Red Cross deploys support to Hastings from across other regions.

		<p>Red Cross asked to assist.</p> <ul style="list-style-type: none"> Daily test results notified via Facebook, databases and websites 		
Tues 16 Aug	<ul style="list-style-type: none"> DHB announce that campylobacter is likely cause of infections. First telephone survey of 250 households (10% of HVN population) conducted. Press conference 11.00am organised – at DHB Commence 3 review processes: <ul style="list-style-type: none"> DHB lead review of water HDC technical environmental factors Epidemiology study 	<ul style="list-style-type: none"> Welfare line operating 24 hours established by HDC in conjunction with Red Cross and Hastings CDEM for those requiring urgent support. 3 Media release updates issued – Facebook and full media HDC EOC structure populated and produces first Site Rep at 1230 and a second at 1600hrs. HDC reports that since Fri 12 Aug and chlorination of the water, tests on Havelock North water have been clear. Water safe to drink if boiled. HDC announce Watercare of Auckland have offered a loan of a UV water treatment system. When installed the UV treatment will be in addition to chlorination and will deactivate protozoa such as cryptosporidium and giardia. 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Age Concern undertakes to provide their database to enable contacts to be made. Outreach and door-knocking conducted in Havelock North by Red Cross and Civil Defence volunteers commencing in areas whose residents were identified as most at risk focussed on Anderson Park and Arataki /Brookvale. 3/26 Early childhood education centre (ECEC) closed. General Practices & HBDHB specialist services contact vulnerable/at risk patients to ascertain their wellbeing. Resources deployed from other DHBs to assist PHS and District Nursing team

Wed 17 Aug	<ul style="list-style-type: none"> • DHB publishes Frequently Asked Questions (FAQs) bulletin. • Monitoring of potential secondary campylobacter cases • Information released to pharmacies and primary care on oral rehydration for affected people 	<ul style="list-style-type: none"> • HDC reports door-knocking in Anderson Park and Brookvale has covered 400 homes using Red Cross and CDEM volunteers. • Affected people statistics are consistent. • HDC started providing water to businesses, rest homes and pre-schools. This continued until the Boil Notice was rescinded. • HDC Response Controller meet with DHB to discuss support during response and recovery period. • Tanker indicator test at Havelock North High - flyer produced and delivered to 1 km radius of Havelock High residents, FAQ s updated on websites and links on Facebook. 	<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> • Schools to remain closed until Mon 22 Aug: Havelock North Primary, Lucknow School, Te Mata Primary, Havelock North Intermediate and Hereworth. • Havelock North High School, Woodford and Iona to reopen Thurs 18 Aug. Decision based on better ability of older children to manage hygiene. • MSD identified and contacted its most vulnerable clients including 721 superannuitants living alone and single parents with young children. • Red Cross set up an information tent at the Havelock North Function Centre. This presence was maintained until 7th September.
<ul style="list-style-type: none"> • Joint daily Press conference 11.30am FAQs updated on both websites, Facebook, schools returning to school tomorrow, ongoing queries via contact centre and Facebook answered. 				
Thurs 18 Aug	<ul style="list-style-type: none"> • DHB commences post-campylobacter complications surveillance and communication plans. • Second household 	<ul style="list-style-type: none"> • A tanker in Havelock North tested (17 Aug) and found with e-coli positive presence indicator. It is one of nine tankers filled from Hastings and deployed and other 	<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> • Rugby Hawkes Bay decides to cancel all junior rugby training and games.

	<p>telephone survey conducted.</p> <ul style="list-style-type: none"> • Surveillance plan revised 	<p>eight are tested clear. As a precaution HDC decides to chlorinate Hastings and Flaxmere water and therefore all tanker water will be chlorinated. No boil water notice for Hastings.</p> <ul style="list-style-type: none"> • A mailbox information drop was delivered to homes in 1km radius of Havelock North High School advising of tanker contamination. • Tonkin and Taylor report on investigation of contamination of No 3 bore in July 2013 after heavy rain made available to public. No 3 bore was closed in Oct 2015. 		
<ul style="list-style-type: none"> • Joint daily Press conference focused on accurate reporting of key messages to clarify misinformation circulating in the community 				
Fri 19 Aug	<ul style="list-style-type: none"> • DHB reports numbers of HN gastroenteritis cases is declining. • Informative gastro enteritis video-clip produced and uploaded to DHB website • Notification and information to primary care advising of post-complications (Gillian Barre Syndrome, Reactive Arthritis) 	<ul style="list-style-type: none"> • 3 media release and updates on water issued by HDC • Ongoing Facebook, contact centre and enquiries answered. • Test on tanker that was positive 17 August 2016 is clear when test enumerated. • HDC advise residents that tankers will be withdrawn at 1630hrs and refilled during weekend. Tankers will be cleaned and sterilised, refilled 	<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> • ESR interim report published on HDC website indicates several strains of campylobacter found in Havelock North samples, and suggests source is likely to be ruminant. • Junior hockey, netball and football cancelled for Hastings and Havelock North. • MinoH requests action plan for each water

		<p>with chlorinated water and tested.</p> <ul style="list-style-type: none"> • Havelock North residents informed that Red Cross/CDEM information hub will be open in the village over the weekend 1000-1500hrs. • HDC commences field investigations to identify possible sources of contamination. • Mayor responds to continuing misinformation that Council was aware of contamination on Wednesday 10 August. Misinformation discovered to have been circulated in part by an HDC Councillor. 		management agency
<ul style="list-style-type: none"> • Joint daily Press conference provides FAQs updated on both websites, Facebook, schools returning to school tomorrow, ongoing queries via contact centre and Facebook answered. 				
Sat 20 Aug	<ul style="list-style-type: none"> • CEO issues release to publicly praise work of DHB staff. 	<ul style="list-style-type: none"> • HDC operates full welfare and customer service response through weekend. • HDC reports tests of Hastings water supplies at 3 locations (including Frimley bore) show positive for e-coli. Chlorination introduced 18 Aug after positive result in tanker therefore has been treating the water and making it safe for drinking – no further action required but follow up on test locations to determine if 		

		<p>suitable sampling locations (Omahu Rd and Tarbet St PS).</p> <ul style="list-style-type: none"> • Agreement between HDC Water staff and Drinking Water Assessors that Chlorination of Hastings water will remain for three months iaw DWSNZ in response to positive tests. • HDC reports that chlorination of Havelock North water supplies is effective. Boil water notice remains in place. 		
Sun 21 Aug	<ul style="list-style-type: none"> • DHB issues another FAQs fact sheet • DHB reports declining numbers being seen by GPs and hospital but emphasises need for vigilance and good hygiene. 	<ul style="list-style-type: none"> • HDC retested Hastings water at sites that showed positive results for e-coli. All 15 sites are clear. • HDC announces tankers will return to Havelock North on Mon 22 Aug. All have been re-sterilised, filled and tested clear. Tankers are to be located at ANZ Bank parking, Havelock North High School, Te Mata Primary School, Havelock North Primary School, Lucknow School, Hereworth School, Iona and Woodford. • Tests of Hastings water (Hastings, Flaxmere, and Bridge Pa) are clear. Reported 	•	<ul style="list-style-type: none"> • Red Cross outreach programme completed. • Gastroenteritis faecal specimens commence testing at LabTest, Akld.

		<p>positive test for Hastings water attributed to anomaly due to irregularities in sampling techniques because of extra sampling being done.</p> <ul style="list-style-type: none"> HDC utilised helicopter surveillance of immediate catchment of supply bores. 		
Mon 22 Aug	<ul style="list-style-type: none"> DHB advises transition of its outbreak response to recovery phase. Surveillance data estimates 54% of households and 28% of HN population are affected by the gastroenteritis outbreak. Daily monitoring of school absenteeism rates Preparation of strategic recovery communication plan Case definition revised to include all enteric pathogens 	<ul style="list-style-type: none"> HDC reports all business and motels in Havelock North have received bottled water acknowledging the difficulty they would have had in boiling the large quantities of water they need. HDC reports Hastings, Flaxmere and Bridge Pa water tests are clear. HDC reports Havelock North water tested from treated supply area are also clear. Boil water notice remains. 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> All schools and Early Childhood Education Centres reopened. Red Cross outreach programme completed
	<ul style="list-style-type: none"> HBDHB & HDC outbreak recovery planning commenced 			
Tues 23 Aug	<ul style="list-style-type: none"> Third household telephone survey conducted Communication update issued to schools, primary health care 	<ul style="list-style-type: none"> Haumoana School reports positive test for e-coli in its private bore. School closed. HDC decides to chlorinate Haumoana, Te 	<ul style="list-style-type: none"> HBRC observed capping private bores that could provide a pathway for 	<ul style="list-style-type: none"> Schools open and report good attendances. Red Cross support completed and redeployed.

	<p>services & ARC facilities.</p> <ul style="list-style-type: none"> • HBDHB recovery plan developed and implemented 	<p>Awanga and Clive bores as a safeguard.</p> <ul style="list-style-type: none"> • HDC makes decision to supply Havelock North with Hastings water for the foreseeable future. The two networks are to be connected and Havelock North system to be flushed with Hastings water. • HDC Recovery Plan developed. Objectives: provide long term safe, stable, trusted water supply; assist individuals and community to adjust post contamination; assist businesses to recovery and remain viable and vibrant part of HB economy; re-establish reputation of Havelock North and Hastings. • HDC initiated drone survey of catchment around bore. • HDC hosts joint Press conference. HBRC choose not to attend. 	<p>the contamination.</p>	
<p>Wed 24 Aug</p>	<ul style="list-style-type: none"> • Laboratory surveillance meeting held to revise specimen testing protocol. • HBDHB maintaining a virtual EOC 	<ul style="list-style-type: none"> • Brookvale bores 1 and 2 turned off. Havelock North supplied from Hastings bores. • Havelock reservoirs emptied. • Public meeting announced by HDC for Tues 30 and 	<ul style="list-style-type: none"> • HBRC's Environment and Services Committee meets and is provided with a brief by Dr Stephen Swabey on the HBRC 	<ul style="list-style-type: none"> • Junior rugby games will be played in Hastings and Napier next weekend.

	<ul style="list-style-type: none"> • PHS continues with its recovery plan • Planning for debrief meetings 	<p>Wed 31 Aug. Meeting to be live streamed and recorded. HDC coordinate HBDHB and HBRC for panel.</p> <ul style="list-style-type: none"> • Joint HBDHB & HDC information for private bore owners issued. • Flyers begin to be delivered to all Havelock North residents inviting to Public meetings and updating on water. 	<p>science investigation of the campylobacter outbreak.</p>	
Thurs 25 Aug	<ul style="list-style-type: none"> • Ongoing surveillance and follow up of affected non-domiciled HN people 	<ul style="list-style-type: none"> • Ongoing Facebook, contact centre and enquiries answered. • Flushing commences to draw Hastings water through to Havelock network. 	<ul style="list-style-type: none"> • HBRC announces it will conduct a formal investigation into the conditions of the Havelock North water supply bores as a source of contamination. • HBRC issues media release and notifies HDC of investigation 	<ul style="list-style-type: none"> • Primary health care services report decrease in gastro-enteritis presentations and school absenteeism rates decreasing.
Fri 26 Aug		<ul style="list-style-type: none"> • HDC announces proposal to provide Havelock North ratepayers impacted by the crisis with water rates remission. • HDC announces recovery package for Havelock North 		<ul style="list-style-type: none"> • Tukituki MP, Minister Craig Foss, announces Government will provide \$100,000 towards support to business recovery. • MSD announces Work and Income

		<p>business community. Council sets aside \$100,000 with \$10,000 already committed to Havelock North Business Association.</p> <ul style="list-style-type: none"> • Tests of Hastings water clear. • Tests of Havelock North network show treated water remains safe to drink as long as it is boiled. • HDC provides update. Brookvale Road bores are closed. Havelock North water is supplied from Hastings bores. Contractors are flushing Havelock North network to ensure Hastings sourced water replaces water from Brookvale. Boil water notice remains in place. • Ongoing media, Facebook, contact centre and enquiries answered. 		<p>advisers will be available in Havelock North on Monday 29 Aug.</p>
Sat 27 Aug		<ul style="list-style-type: none"> • Tests of Hastings water clear. • Tests of Havelock North network show treated water remains safe to drink as long as it is boiled. 		
Sun 28 Aug				

Mon 29 Aug	<ul style="list-style-type: none"> • DHB services return to business as usual and PHS continues to operate in outbreak recovery mode • Business as usual recovery report released • Situation reporting moved to exception reporting from 30.8.16 	<ul style="list-style-type: none"> • Tests of Hastings water clear. • Ongoing Facebook, contact centre and enquiries answered. • Tests of Havelock North network show treated water remains safe to drink as long as it is boiled. • Flushing of Havelock North network completed but extremities of system may require further flushing. 	<ul style="list-style-type: none"> • HBRC sends letters to region's Councils and other well owners asking them to check the condition of well-heads and surrounding areas to minimize risk of contamination. 	
Tues 30 Aug	<ul style="list-style-type: none"> • Public meeting convened in Havelock North with panel of HBHDC, DHB, and HBRC 			
Wed 31 Aug		<ul style="list-style-type: none"> • Tests of Havelock North network show treated water remains safe to drink as long as it is boiled. • Tests conducted 31 Aug show positive and indicate not all parts of the Havelock North network have been flushed completely. HDC announce boil water notice cannot be lifted until three consecutive daily tests show clear. Boil water notice is to remain in place. 		
<ul style="list-style-type: none"> • Second public meeting convened in Havelock North with panel of HDC, HBDHB, and HBRC. 				
Thurs 01 Sep	<ul style="list-style-type: none"> • DHB advises testing by Massey University shows that none of the samples taken in period 19-22 Aug 	<ul style="list-style-type: none"> • Video of public meeting published online. • HDC communications plan developed in 		

	<p>showed cryptosporidium or giardia.</p> <ul style="list-style-type: none"> • Reactive arthritis surveillance planning commenced 	<p>preparation for lifting boil water notice. Plan provides for mailbox drops, public nurses contacting aged care facilities, contacting schools through Min Ed and DHB, business contacted personally and with flyers and mailbox drop, face to face visits to private tank owners, and for the public media releases, Facebook websites and HB Today. John had on Fri – wrong day</p> <ul style="list-style-type: none"> • Tankers remain in Havelock North 		
Fri 02 Sep		<ul style="list-style-type: none"> • HDC advise that business recovery/ assistance package is not designed to provide compensation for losses. Recovering losses is likely to turn on issues of legal liability. First assistance grant made. Details of assistance scheme released. • Tests of Havelock North water show treated water remains safe to drink as long as it is boiled. • Ongoing Facebook, contact centre and enquiries answered. 		

<p>Sat 03 Sep</p>	<ul style="list-style-type: none"> • PHS communication plan re: lifting of boil water notice 	<ul style="list-style-type: none"> • HDC water tests of Havelock North are clear. Results confirm water from the Hastings source is now through the Havelock North network fully. • In consultation with health authorities, HDC lift boil water notice following third clear test in consecutive days. • Hastings water is to be chlorinated for at least three months and will be tested daily. • HDC communications plan associated with lifting boil water notice initiated - HDC communications plan developed in preparation for lifting boil water notice. Plan provides for mailbox drops, public nurses contacting aged care facilities, contacting schools through Min Ed and DHB, businesses contacted personally and with flyers and mailbox drop, face to face visits to private tank owners, and for the public media releases, Facebook websites and HB Today and provides residents with advice on clearing household systems and managing stored water that may be water from the 	<ul style="list-style-type: none"> • HBRC issues public notice to Hawkes Bay landowners and occupiers covering their obligations to manage and maintain water bores. 	
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		contaminated bore. HDC contractors visit houses with on-site storage.		
Mon 05 Sep	<ul style="list-style-type: none"> Revised gastroenteritis case definition 	<ul style="list-style-type: none"> Water tankers removed from Havelock North on Monday 05 Sep. HDC community welfare team moves to recovery. Daily tests of water are clear for both Hastings and Havelock North. 		
Tues 06 Sep	<ul style="list-style-type: none"> Gastro enteritis outbreak ended 	<ul style="list-style-type: none"> MSD withdrew from Hub (Community Centre) and hub Shut Down. 		
Tues 27 Sept	<ul style="list-style-type: none"> Fourth household telephone survey conducted. 			
Mon 4 Oct	<ul style="list-style-type: none"> Reactive arthritis surveillance screening survey administered 			
Wed 19 Oct	<ul style="list-style-type: none"> Reactive arthritis surveillance confirmatory interviews begin 			

Summary of Walkerton Water Crisis May 2000

Reference: Report of the Walkerton Inquiry Part 1 published by the Ontario Ministry of the Attorney General 2002.

Walkerton is a small town of 4800 residents in the province of Ontario, Canada, located about 150 kms northwest of Toronto. In May 2000 Walkerton's drinking water system became contaminated with E.coli. Seven people died and more than 2300 were infected. The tragedy triggered alarm about the safety of drinking water across the province of Ontario and the government of Ontario ordered an inquiry to ascertain the causes of the contamination and to investigate the safety of drinking water in Ontario.

The Walkerton drinking water system was owned by the municipality and operated by the Walkerton Public Utilities Commission. Walkerton drinking water was drawn from ground water taken from three wells and designed to be treated at each well with chlorine before it entered the distribution system.

For a five day period leading up to the crisis (08-12 May 2000) 134 mm of rain fell in Walkerton with the heaviest rainfall occurring on Friday 12 May when 70mm fell. During the period 09-15 May one of the three wells was used as the primary source for water with a second well cycling on and off periodically. The third well was not in use.

The first signs of illness emerged on 18 May when twenty children were absent from one school and two pupils were admitted to hospital. The following day an outbreak of enteric was reported at a retirement home and residents started to contact hospitals and doctors with symptoms of enteric illness. The first death occurred on Monday 22 May. The illness spread quickly in the community over the following few days and the Walkerton hospital became inundated with patients and calls.

The illness was attributed to E.coli and campylobacter. The illness usually resolves itself without treatment other than hydration and electrolyte replacement. But for the very young and the elderly the infection can cause more serious consequences including anaemia, low platelet counts, acute kidney failure and in some cases death. Cattle manure is the common source of the strains of E.coli and campylobacter detected in Walkerton. The bacteria can be transmitted to humans through drinking contaminated water.

The foreman of the Walkerton Public Utilities Commission undertook routine daily checks of the operating wells on Saturday 13 May. The purpose of the daily checks was to record data on pumping rate flows, chlorine usage and to measure the chlorine residuals in the treated water. But the inquiry found that for more than 20 years it had been the practice of the Utilities Commission employees not to measure the chlorine residuals on most days and to make fictitious entries for residuals in the daily operating sheets. The inquiry concluded that on Saturday 13 May the operating well was very likely to have been contaminated by E.coli

and campylobacter to a level, which would have overwhelmed the chlorine being added at the well. Had the chlorine residual levels been measured as the routine tests intended the extent of the contamination would have been detected and steps could have been taken to protect the system and community. The well providing Walkerton's water was not checked adequately in the days leading up to the outbreak. That well was turned off on 15 May, three days before the outbreak was detected, and another well was opened but without a chlorinator fitted. Instead of turning off that source, untreated water was allowed to enter the network for four days.

On 16 May water samples purported to have been taken from points in the Walkerton network were submitted to a laboratory for microbiological tests. The inquiry found that samples had not been taken from the points required but were most likely drawn from a tap in the workshop. The following day Public Utilities Commission staff were advised that three samples had tested positive for the presence of E.coli. One of the samples had undergone a more elaborate membrane filtration test which showed gross contamination. The laboratory did not forward the test results to environmental authorities, which resulted in the local Walkerton health unit not being notified of the results for another six days.

On Thursday 18 May indications of widespread illness started with the hospitalisation of two children, large numbers of students absent from school and members of the public contacting the water supplier to inquire about the safety of the water, only to be assured the water was safe. The following day the health emergency escalated rapidly to involve more students and the residents of a retirement home and long-term care facility. Some residents who were concerned about the water at this time took the initiative and boiled their water or used bottled water.

It was on Thursday 18 May that a paediatrician suspecting the illness in the two children admitted to hospital had been caused by E.coli, contacted the local health unit, which triggered an investigation of the water supply.

The health unit contacted the Public Utilities Commission on Friday 19 May and an employee assured them the water was "okay", whilst knowing by then that the tests were not clear and that the water was untreated. The water supplier then began flushing and chlorinating the supply, continuing to do so through the weekend. During the next day the health unit was reassured by the reports of residual chlorine levels in the network and took the step of advising residents that the water was safe to drink and not the cause of the problem.

On Sunday 21 May the hospital confirmed a patient had contracted E.coli. The health unit immediately responded by issuing a boil water advisory notice at 1330hrs that was broadcast on local commercial radio stations and contacting public institutions but it was not broadcast on television, the CBC radio, or by using leaflets. Some people did not become aware of the advisory that day. The Medical Officer of Health informed the Mayor on the Sunday but did ask him to do anything and the Mayor took no steps to further disseminate the warning to the community.

The health unit took its own samples from 20 different locations in the network on Sunday 21 May. During the following week the Public Utilities Commission employee failed to disclose to health and environmental authorities the adverse results from the 15 May tests, or to honestly represent the occurrences around the operation of the wells and the lack of chlorination in the lead up to the outbreak of the illness. On Tuesday 23 May the Commission employee produced for the environmental authority the adverse results faxed to him on Wednesday 17 May although he also provide falsified daily well operating records.

Also on Tuesday 23 May the health unit received the test results from their sampling which showed positive for E.coli. The two positive samples had been taken from dead ends in the network, which explained why the contaminants were still present after extensive flushing and chlorination. It was on this day that the health unit was first informed of the adverse test results received from samples taken on 15 May.

Inquiry's Conclusions

The inquiry by the Ontario Government was directed at the circumstances that caused the Walkerton outbreak. As a result it does not investigate how the response to the emergency was managed except to comment on the role of the municipality and the Mayor, the use of boil water notices and how the public were informed.

The role of the health unit was examined by the Inquiry in an effort to determine if a boil water advisory could have been issued earlier. It found the health unit issued its advisory two days after it was notified of the outbreak in Walkerton. Health staff worked diligently but the assurances provided by the Public Utilities Commission staff that the water was safe led them to accept that the water was safe and pointed them away from water as a source of the illness. In addition the Inquiry concluded that issuing a boil water advisory was a significant step requiring careful balancing of precaution and the need to protect public health against the social and economic consequences of the advisory, and the potential to undermine the credibility of the health unit. The Inquiry considered the health unit's actions in issuing the advisory were appropriate, prudent and balanced. The health unit distributed the advisory to the community by broadcasting on local radio stations, distributing leaflets and contacting some institutions directly. Some residents did not become aware of the advisory on the day it was issued. It was suggested using local television stations and pamphlets may have been a better approach and would have publicised the advisory more widely.

The Inquiry found that even though the mayor was well informed and knew people were becoming ill, he did not offer to help inform them of the contamination and the boil water advisory. Nor did the council invoke its emergency plan which could have assisted in publicising the boil water advisory. By the time council considered using the emergency plan the boil water advisory was well known within the community.

The Walkerton Public Utilities Commission engaged in a host of improper operating practices over a long period that included misstating samples points, operating the wells without chlorination, making false entries in daily operating sheets, failing to measure chlorine residuals daily, failing to adequately chlorinate the water, and submitting false annual reports to the Ministry of the Environment. In addition senior utilities commission staff lacked a full appreciation of the health risks associated with the failure to operate the system properly and of the importance of adhering to the treatment and monitoring requirements. Inadequate staff training was a factor in the poor performance of the utility.

The Inquiry concluded the primary cause of the Walkerton outbreak was contamination of the supply by farm manure spread near a well and contaminants entering the system on or shortly after 12 May. The outbreak would have been prevented by the use of continuous chlorine residual and turbidity monitors at the well, and the scope of the outbreak would probably have been substantially reduced if the water supplier had measured residual chlorine levels daily as they were expected to have done. The improper operating practices of the water supplier went undetected and were a major contributor to the outbreak. In addition the Public Utilities Commission staff concealed water test results from the health unit on Friday 19 May. Had they been made aware of the adverse test results that day and been made aware that no chlorinator was in use, a boil water advisory would have been

issued on 19 May (instead of on 21 May) and 300-400 fewer residents would have been infected.

The Walkerton emergency caused 2300 residents (48% of the population of 4800) to become ill, seven deaths and some people, particularly the young to likely suffer enduring effects.

Assessment

Putting aside the impact of the improper operating procedures and the deliberate falsification of records that occurred in the Walkerton emergency, there are some similarities to the Havelock North emergency in the environmental conditions and the response mechanism as well as some obvious differences.

Both systems drew water from a source in an agricultural area. Compared to the Havelock North source, the Walkerton supply carried a higher risk of contamination. The Havelock North water was categorised as being drawn from a confined aquifer. The Walkerton source should have been treated and tested. It was not. The Havelock North supply did not need to be treated before the outbreak but it was being tested routinely.

Measures of Response

	Walkerton	Havelock North
When the public became aware of outbreak	18 May	unclear
When water tested positive	17 May	12 Aug
When health authority became aware of problem	18 May	12 0944
When response actions initiated	21 May	12 1500
Chlorination	19 May ~	12 1700
Public alert	21 1330	12 1830
Boil water	21 1330	12 1830

The following measure and comparisons of the response can be made although the very different circumstances surrounding the Walkerton outbreak have to be taken into account:

Time between health authorities becoming aware of problem and the first response action

Walkerton	Three days 18-21 May and issuing boil water advisory
Havelock North	7 hours on 12 Aug by implementing chlorination

Time between water supplier receiving positive result and response action

Walkerton	4 days due to false information
Havelock North	7 hours and chlorination

Time between health authority becoming aware of problem and alerting the public

Walkerton	Immediately through issuing boil water advisory
Havelock North	8.5 hours and issuing boil water notice

The HDC reacted quickly to the detection of E.coli in the Havelock North water by informing health authorities. The Walkerton operator deliberately falsified and withheld test results which resulted in a delay to the response from that perspective. Having been informed of the presence of E.coli the HBDHB and HDC responded quickly by chlorinating the water and then issuing a boil water notice as an added precaution. Once the Walkerton health unit had confirmed cases of E.coli infections they reacted immediately by issuing a boil water advisory, still assuming the water was being chlorinated. In Hastings it took seven hours from the notification to HBDHB to start the first response action being chlorination, and

treated water was throughout the network 13 hours later. The Havelock North boil water notice was published to the community 8.5 hours after notification was made to the health authority.

As the Inquiry showed, in the Walkerton case public awareness of the severity of the outbreak became significant on Thursday 18 May through presentations of ill residents at health practices and suspicions being discussed with the health unit. However the positive test results received by the water supplier/operator on Wednesday 17 May were not passed to the health unit until 23 May six days later. On Friday 19 May the water supplier gave the health unit false information which assured them the water was safe. Having been assured the water was safe the Walkerton health unit responded to the problem on Sunday 21 May when the hospital confirmed a patient had contracted E.coli and the unit's response was immediate by issuing a boil water advisory notice at 1330hrs. The operator had however begun chlorination and flushing on Friday 19 May.

The communications channels used to alert the public and to advise them of actions to take were similar in Havelock North and Walkerton but the time of the day differed. Both emergencies struggled to get good coverage at first. The Walkerton Inquiry suggested the channels used were limited and should have included local television broadcasters and leaflet drops. Social media is assessed as not being prevalent in May 2000 and is not listed as a channel used in Walkerton. In Havelock North the late evening timing of the release is judged to have limited the distribution of the message but the review has identified other channels that could have been used the next day to widen coverage.

In Walkerton the Medical Officer of Health informed the Mayor on the Sunday of the outbreak and the response but did not ask or encourage him to do anything specific. As a consequence the Mayor took no steps to further disseminate the warning to the community. In Hastings the Mayor was informed early on Friday 12 August of the emergency and he worked closely with the HDC executives to develop media updates. He was later active in the community.

The greatest difference between the two cases is the operating approach shown by the organisations with the responsibility to provide safe drinking-water. Walkerton's operators had engaged in a host of improper practices for years. The operation was not closely monitored or audited. The HDC Water Services team followed the guidance provided by the DWSNZ closely and they maintained an honest and trusted relationship with the health authority in its supervisory role. On the surface, the relationship and cooperation between the Walkerton health unit and the water supplier appeared to be good but because of the lack of oversight of their operations, the health unit had been misled. Cooperation and coordination between agencies in Hastings were good.

SUMMARY OF SYDNEY WATER CRISIS 1998

Reference: Australia New Zealand School of Government Case Study Program 22/09/14

In July 1998 the Sydney Water Corporation learnt that routine samples collected from the Prospect filtration plant and the Potts Hill reservoir contained low levels of cryptosporidium and giardia contamination. The Prospect filtration plant processed about 85% of Sydney's water and supplied in excess of 3.0 million people. Water was sourced from a catchment area near the Blue Mountains and piped to the filtration plant. Water to other areas of Sydney was taken off the line before the Prospect plant and diverted to the Orchard Hills plant. The Prospect plant filtered and treated the water with chlorine and fluoride. Filtration removed at least 99.9% of chlorine-resistant parasites of the size of cryptosporidium and giardia. When the filters became clogged they were back-washed and that water was separated for additional treatment before being re-released into the system. The procedure was critical to maintaining plant efficiency and if not performed properly, could contaminate incoming water.

Sydney Water immediately began investigating the problem and informed the New South Wales Health Department. Sydney Water thought the contamination was probably the result of cleansing the system but it was unable to identify the exact cause or the extent of the contamination.

There were two organisations involved in managing Sydney's water. Sydney Water, a state-owned corporation, was responsible for the supply of water and the disposal of sewage and wastewater in Sydney. The New South Wales Department of Health was responsible for regulating Sydney Water in relation to public health outcomes and in particular the provision of safe drinking-water. Under the Health Act, the Minister for Health held emergency powers which could be used to restrict or prevent the use of water that might be a threat to public health. A Memorandum of Understanding signed by the two organisations outlined their cooperation including provision for Sydney Water to immediately notify NSW Health of health hazards. NSW Health was to be responsible for providing a regulatory programme and water safety guidelines although Sydney Water was not compelled to act on the advice. Both parties agreed to share information and data related to water monitoring and public health issues and to coordinate their responses to significant events.

Sydney Water had an Incident Management Plan in place and monitored for cryptosporidium and giardia even though the official NH & MRC Guidelines did not specify acceptable levels for the parasites, nor recommend routine testing due to the complexity of the process and the time involved.

The first incident occurred on 15 July 1998 when a low-level positive test result was received for both cryptosporidium and giardia in samples taken from the outlets at Prospect and Potts

Hill reservoir. Sydney Water notified NSW Health that morning. The low levels of contamination did not pose a significant risk and the agencies agreed on retesting. The retest results were within acceptable limits. The following day Sydney Water received clear results from all tests except for a site at Sydney Hospital which showed a low positive. Local flushing in that area and a retest was ordered by Sydney Water. NSW Health were advised of the results and the actions.

On 23 July samples from the hospital showed a higher positive result for both parasites but surrounding areas were clear. This led Sydney Water to conclude the incident was probably a localised event involving cross-contamination at the hospital. A meeting was held with hospital engineers, which agreed to empty the storage tank. Again NSW Health were advised of the results and the actions to be taken and those were endorsed. The next day all samples were clear except for low-positives for the hospital and Art Gallery. The issue was still considered a localised incident and the hospital tank was emptied again. Tests were undertaken nearby and local mains were flushed. NSW Health escalated their information to the Director General of Health who informed the Minister for Health, and he in turn informed the Premier.

On Saturday 25 July more positive tests were received from three central Sydney sites but at much higher concentrations than previously. Sydney Water's test programme was expanded and Prospect was re-tested for the first time since the initial indication 10 days earlier. NSW Health was advised of the results along with Sydney Water's assessment that the high readings could be attributed to the presence of biofilm containing the cysts being dislodged during flushing. Both agencies searched for possible causes of the contamination but none were identified.

On Sunday 26 July extremely high readings were obtained from three downtown sites and the nearby Crown Street reservoir. Test results elsewhere including the Prospect plant and Potts Hill reservoir were clear however the first positive result outside the CBD was recorded in the suburb of Greenacre. Sydney Water immediately began scouring and flushing the system served by the Crown Street reservoir. Attempts to locate the source were again unsuccessful and no breaches of the system were detected. The NSW Health water unit was updated on the day's findings. NSW Health acknowledged the very high readings posed a risk to public health. They also knew that providing the organisms were being released into the system as a result of flushing, they were likely to be dead and not a health risk. At this stage no illnesses had been reported.

On Monday morning a joint water-health teleconference was convened to try to resolve questions about the contamination issue. Sydney Water's hypothesis was that localised episodes of negative pressure had allowed untreated water into the system. When it came to the question of informing the public both organisations agreed a boil water alert should be issued for the eastern CBD. Sydney Water wanted a low-key approach using letterbox drops and newspaper advertisements. NSW Health wanted to issue a media release warning residents to boil their water until further notice. After considerable discussion NSW Health's plan of making a media release was adopted and it was agreed both organisation's media teams would work together on the statement. Members of the Sydney Water Board and the Minister responsible were informed with a suggestion that a probable cause was earthworks on a highway.

The media teams struggled to agree the content of the release. NSW Health wanted to include details of how long water should be boiled and provide fact sheets for cryptosporidium and giardia. Sydney Water maintained they would be using a media conference to notify the media and public. The NSW Health representative refused to

participate in a media conference as it would inflate the issue. Senior management of Sydney Water became involved and disputed the need for the complex fact sheets and directed they were not to be used with a media release. The dispute delayed the release of a message. Relationships deteriorated to the extent that NSW Health withdrew a clause in the draft that showed their support for Sydney Water's actions. Sydney Water issued the release at 1745 hrs but without confirming the draft with NSW Health.

Next morning (28 July) NSW Health felt it necessary to prepare another media release to explain why the boil water notice had been issued and explain the link between the presence of cryptosporidium in water and illness. Unfortunately the version published in the Sydney Morning Herald only used part of the explanation provided by NSW Health by stating no relationship had been established between finding cryptosporidium in drinking-water at any level and effects on human health. Media interest in the story heightened and both organisations began receiving criticism over the delay between receiving high readings and informing the public.

On the afternoon of 29 July Sydney Water met with NSW Health to discuss more positive test results and the need to extend the boil water notice. Tensions between the media units arose again. NSW Health thought a new media release was to be made. Sydney water thought an advertisement would be placed. NSW Health forced a media release to be made by involving the Minister for Health who contacted the Minister responsible for Sydney Water.

Late on 29 July Sydney Water found tests of a tank at the Prospect plant showed positive although it was not in use. But the positive test indicated a second tank was likely to be positive too and that the parasites could be introduced into the network in regular bursts. Tests taken later only showed higher readings and raised several potential scenarios for the contamination. While the confused pattern of readings from sites around the city made it difficult to pinpoint the source, there was now a possibility that the whole system downstream of the Prospect plant was contaminated at a high level. Sydney Water held meetings at various levels including political to discuss sources and actions. Late in the evening of 29 July Sydney Water prepared a media release that would warn users in the entire Prospect system. The release was expected to be shared with NSW Health before it was published but before that was done, senior Sydney water executives changed some of the wording to tone down the message and make it less alarmist. In addition Sydney Water senior executives were concerned that a "Sydney wide" boil water alert was excessive and they directed the release should only refer to the smaller Potts Hill network as there had been clear results from the Prospect plant whereas Potts Hill's were positive. Unfortunately for Sydney Water, NSW Health released a statement with the "Sydney wide" alert before they were ready. Sydney Water Chairman verbally abused the senior NSW Health media manager and instructed his staff to "kill the story" on the grounds that it was inaccurate.

On the morning of 30 July residents of Sydney became aware of the widened water contamination scare. They stocked up on bottled water while the media criticised the reputation Sydney would gain and described the management of the response as a shambles. During that day the state Premier and Ministers discussed the worsening situation and agreed an inquiry would be held. Sydney Water informed the Premier and Ministers of that the likely cause of the contamination was a canal leading to the Prospect plant or backwashing conducted at the plant. With that advice Ministers agreed to NSW Health's proposal to extend the area covered by the warning. Sydney Water informed Ministers that the supply canal had been shut off and water to Sydney was by-passing the Prospect plant and being drawn from the Warragamba plant (upstream of Prospect), which

was treating it with chlorine. Unbeknownst to the senior Sydney Water officials attending the Minister's meeting, the Prospect plant was still in operation. They then had to carefully manage the relationship with the politicians and clarify the operation in the media.

On 04 August the entire city was given the all-clear. But on 24 August another outbreak was detected and a city wide boil water alert was issued again. That alert was lifted on 04 September only to be reinstated for the entire metropolitan area the next day! Relief finally came on 19 September when the alert was lifted.

An interim report was issued by the inquiry which found it unlikely the localised contamination at the hospital was sourced from the Potts Hill reservoir. The inquiry was also dubious that the Prospect plant was the source. A second inquiry report found that NSW Health had acted appropriately in unilaterally releasing the Prospect wide alert on 29 July. Sydney Water was criticised for killing the NSW Health media release and limiting the scope in the new statement, and for a lack of effective decision-making, and its failure to accurately and adequately advise its Minister. The Inquiry's third report found that the laboratory results obtained during the crisis were doubtful. Cryptosporidium and giardia may not have been present in the water in the high numbers originally reported. The inquiry acknowledged the science of detecting contamination and determining the impact on health was imprecise. Therefore with the information available at the time, a conservative public health response was appropriate. No illnesses were attributed to the outbreak.