

THE USE OF A CUSTOMER PANEL TO ASSESS WATER QUALITY CHANGES



Paper Presented by:

Jillian Busch

Author:

Jillian Busch, *Water Technologist,*

Gippsland Water



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ABSTRACT

A trial of five water treatment interventions was proposed as a means to identify the cause of ongoing customer dissatisfaction with offensive taste episodes in the Sale water.

To assess the success or otherwise of the treatments, an untrained customer reference panel of 29 households was formed to provide feedback on their experiences with the water over a 3.5 month period. The selection and management of the group was developed and results indicate that the group could recognise different stages of the trial, including interventions that were successful in improving the aesthetic quality of the water. The panel also highlighted an unexpected difference between water sourced from different bores.

1.0 INTRODUCTION

For some years, customers in the rural City of Sale Victoria, have reported a medicinal or phenolic taste in the water. Sale water is supplied from four bores all accessing the same Boisdale aquifer. The water treatment process involves the aeration of this supply to remove the volatile sulphurous compounds, and then conventional treatment utilising potassium permanganate and lime to remove iron and manganese. Chlorine disinfection at a level of 0.35 mg/L, is added prior to storage in two 10ML lined and covered basins.

An external customer satisfaction survey performed in 2002 highlighted that the Sale residents were the most dissatisfied customers of Gippsland Water with the water quality rating 6.8 out of 10. The average score for the entire surveyed population of a further 35 systems- gave a rating of 7.2.

Unpleasant tastes were reported in the water from various locations around Sale and at varying times. Sometimes it was distinguishable at one property yet the houses nearby didn't seem to be affected. One particular property located in a court situation reported that when the flavour was present, the household was unable to drink the water and this could continue for days.

The offensive taste was more noticeable in boiled water and this occurrence usually resulted in the customer having to discard their boiled drinks. A report from one customer highlighted that the taste of the boiled water tainted the jelly that was included in the preparation of a trifle dessert which subsequently had to be disposed after guests reported the offensive taste.

Operationally, these complaints were very difficult to solve or at least provide a non-offensive supply of water. Apart from the usual flushing of the supply to the customer's property, other measures in the field included removing standpipes or stagnant water situations, air scouring and super chlorinating certain areas of the distribution system, to providing temporary supplies to affected house from neighbours property. Whilst these measures assisted during episodes, the taste eventually returned. Samples of this offensive water detected low levels of 2-chlorophenol, 2,4,6-tribromophenol, and 2,6-dibromophenol in previous samples taken from various customers' properties, and an occasional measure of 2-chlorophenol in the bore water, however the taste compound

was usually undetectable.

Laboratory trials and a literature review suggested a number of possible treatment modifications to reduce the problem.

To overcome the formation of the offensive tastes, Gippsland Water proposed a trial of lower chlorine dosing, chloramination disinfection, and Powder Activated Carbon with chlorine disinfection. The program was set to allow for two week blocks of each different treatment option, with baseline periods where the Water Treatment Plant would be operating in the usual way, with the aim of running one bore (Bore 6) only for the trial.

2.0 DISCUSSION

2.1 Customer Reference Group

For these trials to be assessed, an external measure was required. As there had been a number of customers with whom Gippsland Water had worked in the past, it was felt that the best indicator would be receiving feedback directly from customers. A reference group was formed who would provide feedback on the taste and odour of the water supply on a daily basis for the duration of the trial.

2.2 Selection Process

A number of customers who had complained to Gippsland Water in the past were approached, as well as any Gippsland Water staff, family or friends that resided in Sale. The aim was to balance the group members so that there was coverage of residents across the town, with a range of experiences of the water quality.

Table 1: *Categories of Reference Group Members.*

Group Categories	Percent Represented in Reference Group
Previous Sale resident complainers	35%
Associates (Family or friends)	38%
Gippsland Water Employees	28%

An initial survey of potential reference group members determined the suitability based on drinking water direct from the tap without any online filtering or pre consumption activities, and their willingness to participate for the duration of the trial. As the number of active participants was lower than acceptable, further resources were sought by networking from this acceptable list. Table 1 indicates the final reference group makeup of customers who had complained in the past, staff, and family or friends. Further interview questions determined the drinking habits, household details, who in the household would most likely determine a difference in the water, and any other potential interference with the intent of the trial.

2.3 Initial Briefing Session

All participants were invited to an initial briefing session where information about the

trial and expectations of the reference group members were outlined. Each member of the group was given an information kit.

Response sheets were prepared and supplied to enable the participants a means to record date, time, location, taste identification and intensity of taste and odours, if present in the water supply and any relevant comments.

Participants of the trial were asked to rank the taste and odours according to the following scale:

- Nil (0)
- Faint (1)
- Mild (2)
- Strong (3)
- Very Strong (4)

Descriptions of the taste or odour were categorised into:

- Chlorine
- Plastic
- Burnt Rubber
- Medicinal
- Metallic
- Earthy
- Other (where the respondent recorded their personal description)

These response sheets were then to be forwarded to Gippsland Water on a weekly basis. Additional items in the kit included reply paid envelopes, contacts list, and copies of the media releases prepared for the trial.

A number of water samples were provided at the briefing session. They included one with the phenolic flavour, a sample of general tap water and another town's water. Reference Group members were able to taste and smell and "practise" the filling in of the response sheets. This also provided a means to gauge individual responses to the various water samples and their rating of sensitivity to the "flavours" expected during the trial.

2.4 Ongoing management of the Reference Group

To provide ongoing encouragement to the group for the duration of the trial, a number of incentives were given. The members received newsletters, and any media releases that were relevant to the trial. Small gifts such as movie tickets and vouchers were provided to the members at regular intervals and as a final appreciation of their participation. A tour of the water treatment facility at Sale and dinner was offered and attended by a number of members, their families and friends.

Regular contact was made with each member to restock the supply of response sheets and reply paid envelopes, or if there was an extended delay in the return of response sheets. This was more likely to be the case for GW staff participating in the trial!

There were a number of withdrawals from the reference group, mostly related to personal issues.

At the conclusion of the trial, a survey was sent to all members seeking ideas for

improvement in the various steps in the trial relating to the response sheets etc, and whether they would be interested in participating again if necessary in the future. Of the responses received, 100% indicated they would participate again.

A final evening briefing session was presented to the group, with the initial findings and the outcomes of the trial.

2.5 Supporting the Trial

Weekly samples of water from a number of sites in the distribution system were collected and provided for testing to an internal Gippsland Water taste panel. Results from this panel were recorded on the same response sheets and used as an internal assessment of the various stages of the trial and confirmation of the reported tastes.

During the trial a separate information file was prepared for use in the Gippsland Water Service Centre for dealing with any other customers that phoned in with complaints relating to stages of the trial. These customers were briefed about the trial and then their comments were recorded in a similar manner to the reference group response sheet.

3.0 CONCLUSION

3.1 Outcomes of trial

At the initial stage of the trial, there were 29 reference group participants with three formally withdrawing through the 14 week trial.

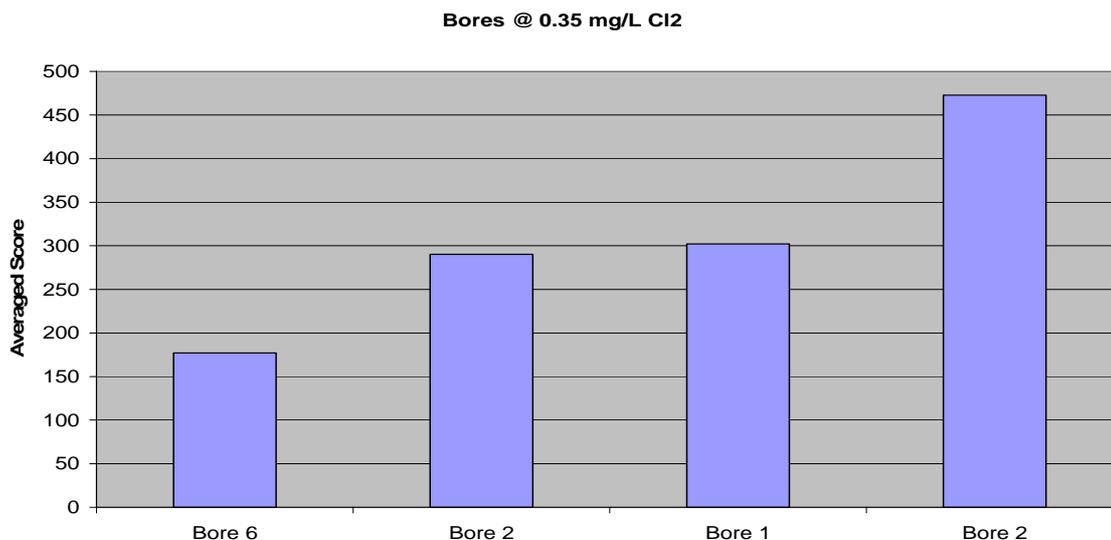
Complete sets of data were received from 11 sites, with a further 9 sets received with less than two weeks incomplete. There were 3 data sets where the participant completed the trial but failed to supply all the completed response sheets.

The responses received from the group were assessed by comments recorded, as well as a summation of the intensities to the tastes observed. Results for each stage were selected from the time periods when the particular treated water would have been present at the location namely four days after leaving the water treatment storage basin.

By week six of the trial it became obvious that the expected phenolic taste had not become evident during any of the stages of the trial to date. This was a surprising outcome and the planned program was adjusted to determine if there was another reason for this experience. The other bores were cycled to supply water to the treatment plant coupled with chlorine dosing at 0.35ppm for short durations, to assess the impact.

Figure 1 shows the averaged data from the responses received during that period. Bore 2 is represented twice as the higher score period is recorded after a stage of the trial where the water was considered the best tasting, and the elevated rating could reflect this change. From the results to the different bores, it was decided to continue the trial using Bore 2 which the reference group identified as causing the strongest tastes.

Figure 1: Averaged Score for Different Bores Used During 0.35mg/L Operation Period



The next stages involved the use of Chloramination and Powder Activated Carbon (PAC) as the perceived solutions to the taste and odour formation. The Chloramination stage was shortened in duration as the local community and reference group members found this process to be too offensive. This was the only stage where reasonable numbers of general public complained about the taste of the water supply. After providing one week's response to these complaints, this stage was aborted and the supply returned to the base line operation of Bore 2 with 0.35mg/l chlorine.

Figure 2: Summary of Responses to the Various Processes Used in the Trial

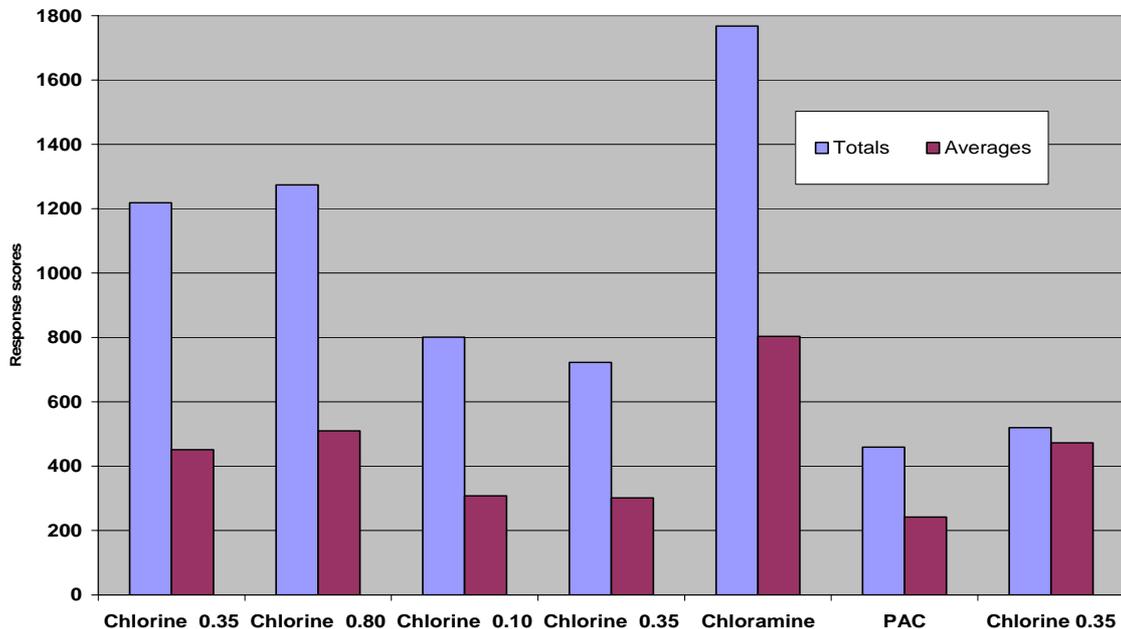


Figure 2 provides an overall impression of the various stages of the trial. The returned response sheets from the reference group members indicated that they could determine a difference in the water supply between low and higher doses of chlorine, the difference with chloramination and PAC dosing, and the unexpected taste difference noted with the bore supplies. The results show that a low dose of chlorine or PAC dosing was most successful in improving the aesthetic quality of the water. Chloramination was the most offensive for the reference group as well as the general public.

One of the limiting factors with this trial was due to the time restraint as a result of the Christmas period. This was evident with the lack of returned response sheets in the final week and the inability to follow up the missing data due to holidays.

Table 2 indicates that the most reliable group to return more than 85% of the expected response sheets were the associates group. This group contained the greatest number of participants including retirees who appear to be the most committed to the trial.

Use of staff is questionable due to the participation rates declining over the survey period.

Table 2: *Greater than 85% Response Sheets were Returned from the Reference Group Categories*

Group Categories	>85% Response Sheet Returns
Previous Sale resident complainers	26%
Associates (Family or friends)	58%
Gippsland Water Employees	15%

These findings now give direction for Gippsland Water on future capital works and processes to reduce the occurrences of offensive tastes in the water supply. Positive outcomes of the trial include that there is at least a larger part of the community that are aware of Gippsland Water operations and service. There is a “trained” group of people that would not hesitate to report unusual tasting water in the future, and can be referenced when necessary to assess the water quality in a non formal way. Gippsland Water now has advocates that don’t appear to be traumatised by their involvement with the trial, and a successful consultative process was displayed with the general community.

4.0 ACKNOWLEDGEMENTS:

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