



2005 Annual Bacteriological Summary of Greater Victoria's Drinking Water

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Executive Summary

The *2005 Annual Bacteriological Summary of Greater Victoria's Drinking Water* is the second report in the Water Quality Division's 2005 annual report series. It extends the bacteriological information given in the *2005 Annual Overview of Greater Victoria's Drinking Water Quality* and details the bacteriological results for the source water, first customer, transmission system, distribution system reservoirs and the distribution systems of individual water purveyors who are part of the Greater Victoria Drinking Water System. When completed, these annual reports are posted on the CRD website at <http://www.crd.bc.ca/water/waterquality/annualreports.htm>

The primary observations and conclusions contained in this report are listed below:

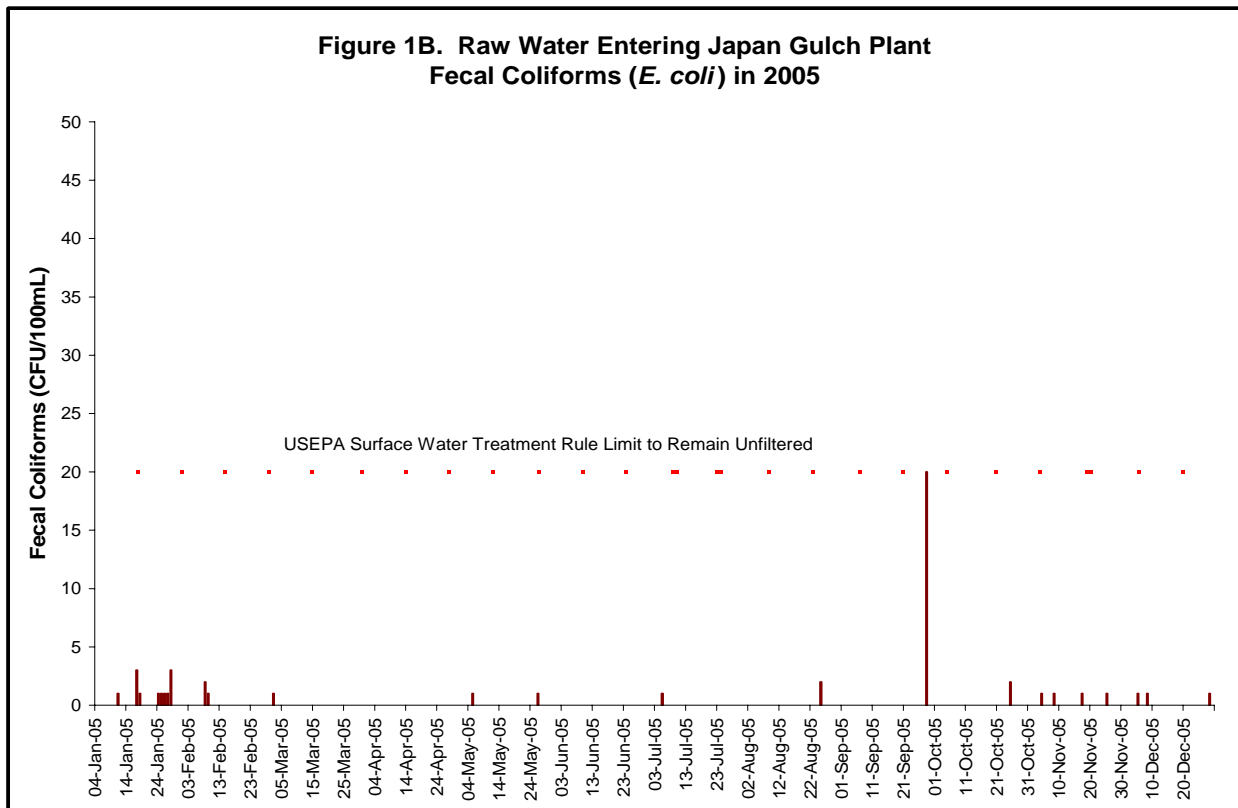
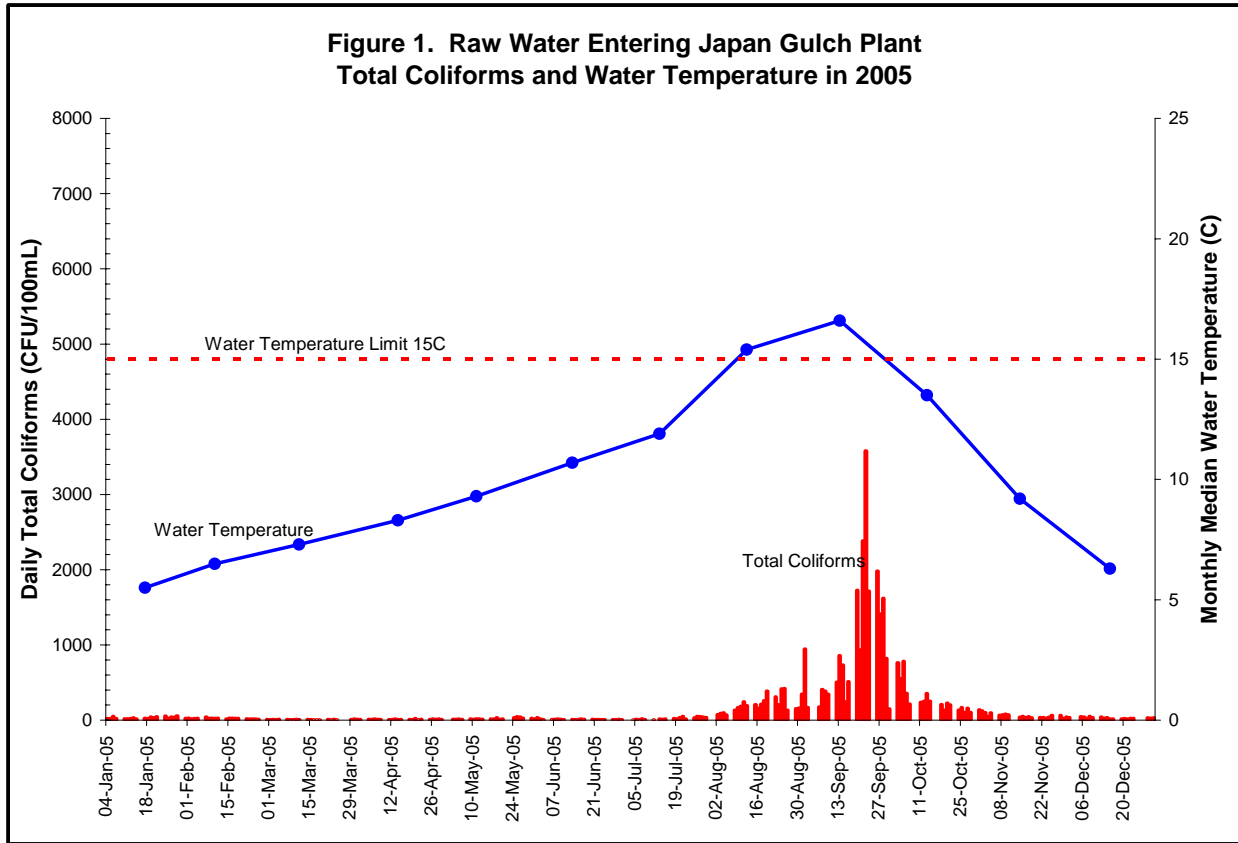
1. **Overall Summary.** In general, the overall bacteriological quality of the drinking water in Greater Victoria in 2005 continued to be very good and easily met the Provincial and Federal bacteriological limits for safe, potable drinking water.
2. **Sample Collection.** In 2005, the Water Quality Division collected and analysed 4,372 bacteriological samples from 150 sampling locations in the Greater Victoria Drinking Water System. This included samples collected from the raw source (untreated water), first customer, transmission mains, distribution system reservoirs and distribution systems. A similar number of samples were collected in 2003 and 2004.
3. **Source Water.** In 2005, as in the past few years, the level of total coliform bacteria in the raw source water entering the treatment plants continued to be elevated during the late summer and peaked on September 22nd (**Figure 1**). The 2005 bacterial levels were similar to those observed in 2004. As in previous years, the quality of the raw water entering the plant easily met the fecal coliform limit of 20 colony forming units per 100 mL in the USEPA Surface Water Treatment Rule and therefore continued to qualify to remain an unfiltered surface water supply under this portion of their regulations (**Figure 1B**). The level of 20 per 100 mL was only reached once during the entire year. Both the median value of 0 per 100 mL and the maximum value of 20 per 100 mL indicate a good quality source that is not subject to contamination.
4. **First Customer.** In 2005, no total coliform bacteria were observed at the first customer sampling location below the Japan Gulch Treatment Plant (**Figure 3**). The annual total coliform positive sample rate of 0.0% was less than 2003 and 2004 and one of the lowest ever observed (**Figure 4**). This improved disinfection of the raw source water was primarily due to the use of the combination of ultraviolet light and free chlorine as primary disinfectants. No fecal coliform bacteria were found in any of the samples collected at this sampling location. These charts provide further assurance of the bacterial safety of Greater Victoria's drinking water.
5. **Transmission Mains.** Three of the samples collected from the transmission mains feeding the municipalities contained total coliforms. This was slightly worse than in 2004 but nevertheless, the annual total coliform positive sample rate of 0.6% was very low and similar to other years (**Figure 5a**). This low rate of coliform positives in the transmission mains showed that very few total coliform bacteria were being delivered to the municipal distribution systems.
6. **Distribution System Reservoirs.** Samples collected from the distribution system reservoirs showed that the bacteriological levels in these reservoirs continued to be problematic and were primarily due to bacteriological regrowth associated with low chlorine residuals and poor water circulation through the reservoirs (**Figure 6A**). When the distribution system reservoirs are considered as a group, the total coliform Guideline level of 10% positive samples was exceeded in August of 2005 (12.1%). On an individual basis, five of the distribution system reservoirs had an annual percentage positive that exceeded the 10% limit (**Figure 6A**). The level of total

coliform occurrence in the reservoirs in 2005 was slightly higher than in the past three years. However, while over the past decade, there has been a general improvement in the bacteriological quality of the water in the distribution system reservoirs, a number of the reservoirs continued to exceed the limits.

7. **Greater Victoria Distribution System.** When the results of all the individual distribution systems are considered as a whole, the Greater Victoria Distribution System complied with both the Provincial Regulation and the Federal Guidelines for bacteriological water quality during all months of the year. Total coliforms were found during eight months in 2005 (**Figure 7**). While the total coliform positive rate of 1.4% was slightly higher than that of the previous three years, the trend of declining total coliform positive samples continued in the Greater Victoria Distribution System (**Figure 7a**).
8. **Individual Municipal Distribution Systems.** In 2005, only one of the municipal distribution systems (Central Saanich) slightly exceeded the monthly total coliform limit of 10% in one month. However, in general, the bacteriological water quality of all of the municipal distribution systems has improved over time (since 1992). This includes
 - Central Saanich (**Figure 8** and **Figure 8a**)
 - North Saanich (**Figure 9** and **Figure 9a**)
 - Oak Bay (**Figure 10** and **Figure 10a**)
 - Saanich (**Figure 11** and **Figure 11a**)
 - Sidney (**Figure 12** and **Figure 12a**)
 - Victoria/Esquimalt (**Figure 13** and **Figure 13a**)
 - Juan de Fuca Distribution System (**Figure 14** and **Figure 14a**).
9. **Chlorine Residual.** The median annual chlorine residual at the first customer sampling location below the Japan Gulch Plant was 1.22 mg/L (similar to 2004). Overall, within the distribution system, the median annual chlorine residual was 0.63 mg/L, slightly lower than that found in 2004 (0.65 mg/L) and similar to that found in 2003 (0.63). Within the municipal distribution systems, the median annual chlorine residual varied from a low of 0.36 mg/L for the Western Communities to a high of 0.80 mg/L for Oak Bay.
10. **Water Temperature.** At the Japan Gulch Plant, the coldest daily water temperature recorded was 2.7°C in January while the warmest was 17.9°C in August 2005 (three degrees cooler than in 2004). The Guideline limit of 15°C was exceeded from August 25, 2005 to September 29, 2005 which was better than in previous years. Compared to other Canadian cities, the summer temperature of the drinking water in Greater Victoria is quite warm. The lower water temperature in 2005 was primarily due to the raising of the water level in Sooke Reservoir.

RECOMMENDATIONS

1. **Improve Distribution Reservoir Circulation.** It is recommended that the program of improving the circulation of the water in the distribution reservoirs be expanded to include those reservoirs that exceeded the total coliform limits in 2005.



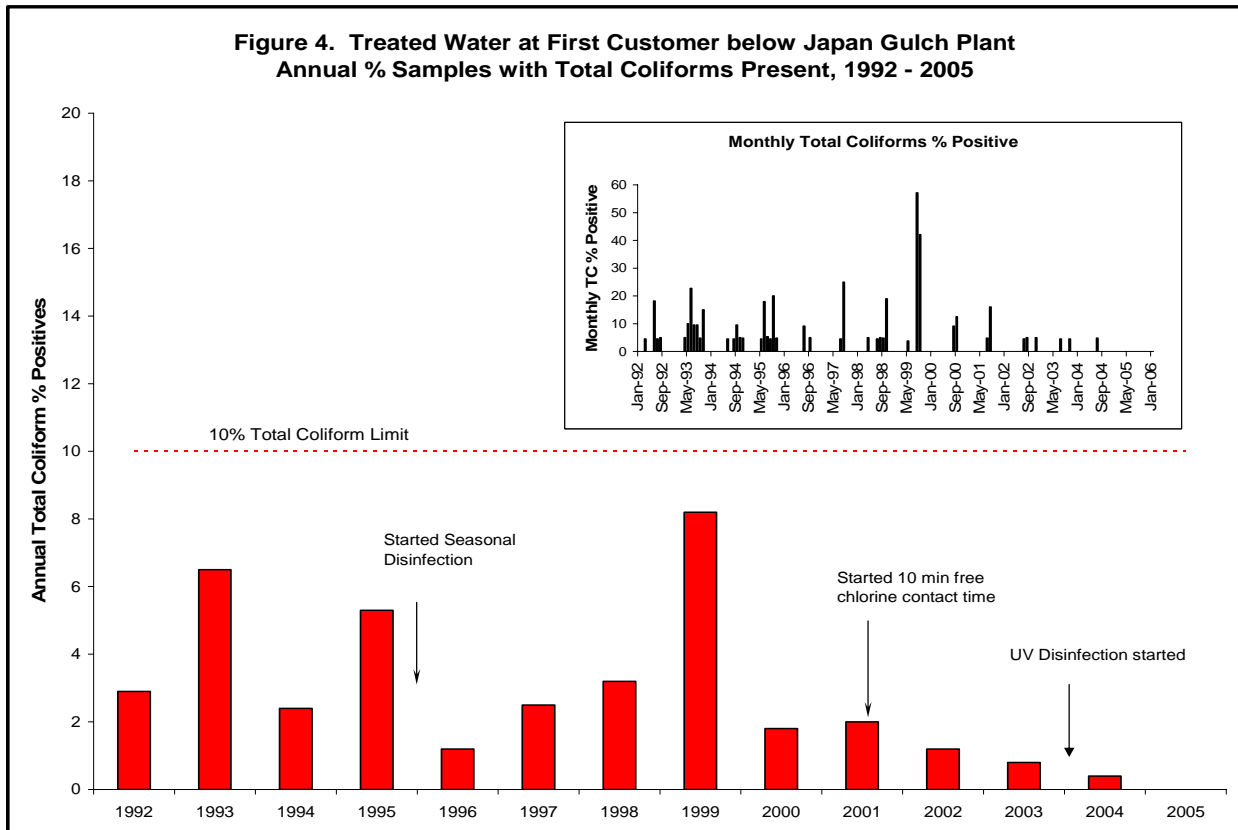
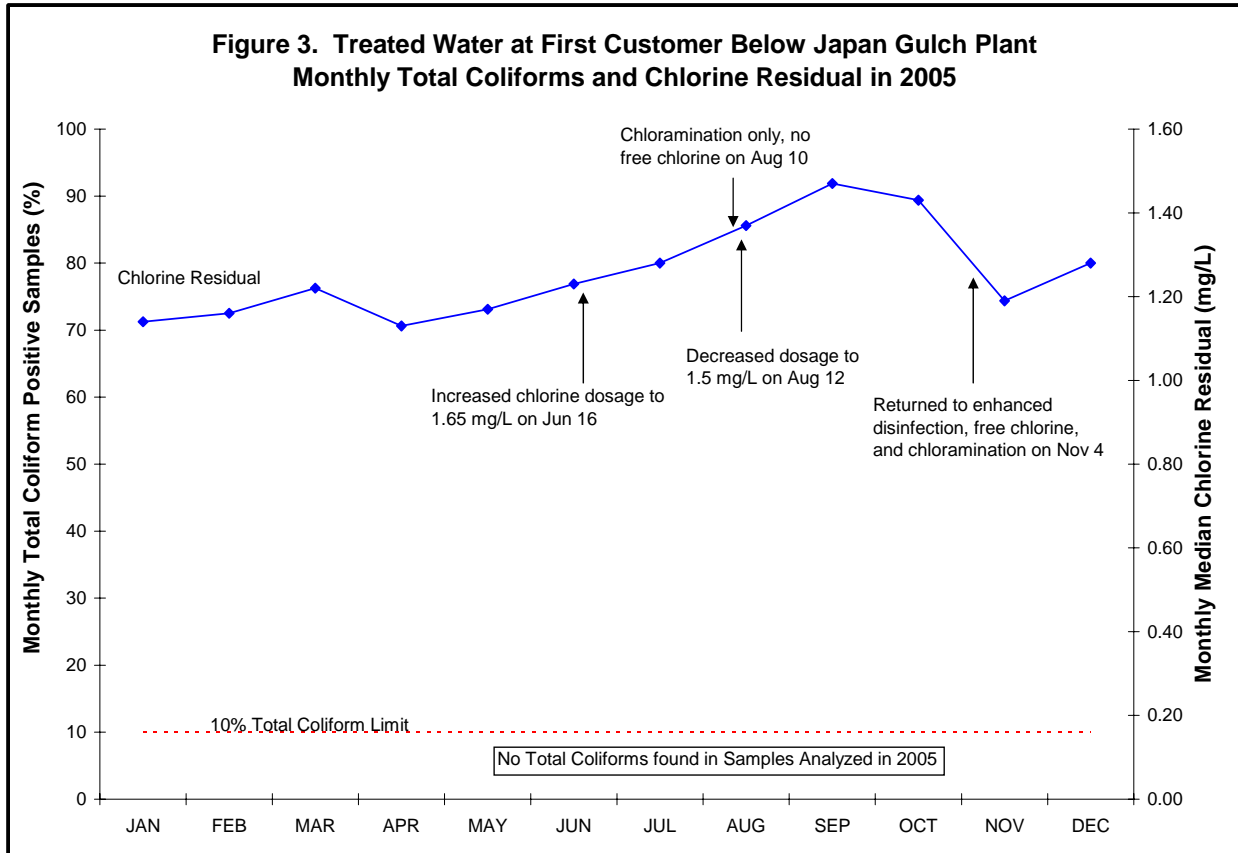


Figure 5A. Transmission Mains - Annual % Samples with Total Coliforms Present, 1992-2005

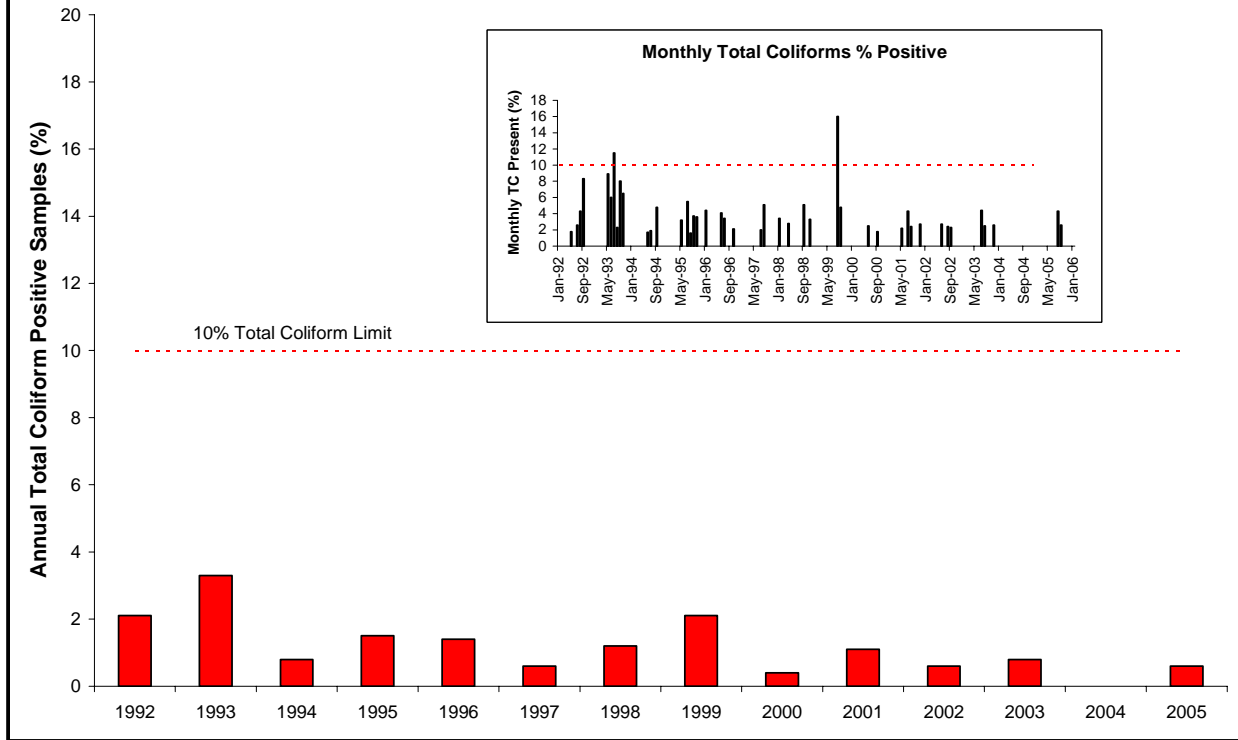


Figure 6A. Distribution System Reservoirs Total Coliforms and Chlorine Residual in 2005

