
**REPORT TO REGIONAL WATER SUPPLY COMMISSION
MEETING OF WEDNESDAY, 20 JUNE 2007**

SUBJECT 2006 ANNUAL BACTERIOLOGICAL SUMMARY OF GREATER VICTORIA'S DRINKING WATER QUALITY

PURPOSE

Provide details on the bacteriological results for individual water purveyors in the Greater Victoria Drinking Water system.

BACKGROUND

The *2006 Annual Bacteriological Summary of Greater Victoria's Drinking Water* is the second report in the Water Quality Division's 2006 annual report series. It extends the bacteriological information given in the *2006 Annual Overview of Greater Victoria's Drinking Water Quality* and details the bacteriological results for individual water purveyors in the Greater Victoria Drinking Water System as required in the 2003 BC *Drinking Water Protection Regulation*. Section 11 of the regulation states: "*the water supplier must prepare and make public, within six months of the end of the calendar year, an annual report of the results of the monitoring required by the regulation*".

These reports are sent to individual water purveyors, the Chief Medical Health Officer and by regulation, are available to the public.

The reports are also posted on the CRD web site at: <http://www.crd.bc.ca/water/waterquality/annualreports.htm>.

The executive summary and selected charts from the *2006 Annual Bacteriological Summary of Greater Victoria's Drinking Water* are attached. Commission members wishing to review the full report may obtain a copy by contacting Margaret Montague at CRD Water Services by phone 474-9606, or by e-mail mmontague@crd.bc.ca.

RECOMMENDATION

That the Regional Water Supply Commission receive the staff report for information.

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2006 Annual Bacteriological Summary of Greater Victoria's Drinking Water

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June 4, 2007

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EXECUTIVE SUMMARY

The *2006 Annual Bacteriological Summary of Greater Victoria's Drinking Water* is the second report in the Water Quality Division's 2006 annual report series. It extends the bacteriological information given in the *2006 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 suppliers 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 2006 continued to be very good and easily met the Provincial and Federal limits for safe, potable drinking water.
2. **Sample Collection.** In 2006, the Water Quality Division collected and analysed 4,117 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 bacteriological samples were collected in 2004 and 2005.
3. **Source Water.** In 2006, the concentration of total coliform bacteria in the raw source water entering the treatment plants was elevated during October and peaked on October 16th (**Figure 1**). The 2006 bacterial levels were similar to those observed in 2004 and 2005. Nevertheless, 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 2006, there were only two occurrences of total coliform bacteria at the first customer sampling location below the Japan Gulch Treatment Plant. The annual total coliform positive sample rate of 0.8%, comparable to the last several years (**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 *E. coli* 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.** Six of the samples collected from the transmission mains feeding the municipalities contained total coliforms. This result was similar to previous years and indicates that very few total coliform bacteria were being delivered to the municipal distribution systems (**Figure 5A**).
6. **Distribution System Reservoirs.** Samples collected from the distribution system reservoirs showed that the bacteriological levels in these reservoirs continued to be problematic (**Figure 6**) 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 2006 (11.1%). On an individual basis, four 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 was similar to 2005 and slightly higher than in the previous five 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 (**Figure 6B**), 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 2006. The total coliform positive rate of 0.8% was slightly lower than that of 2005 and similar to the previous three years with a trend of declining total coliform positive samples in the Greater Victoria Distribution System (**Figure 7a**).

8. **Individual Municipal Distribution Systems.** In 2006, only one of the municipal distribution systems (Sidney) 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

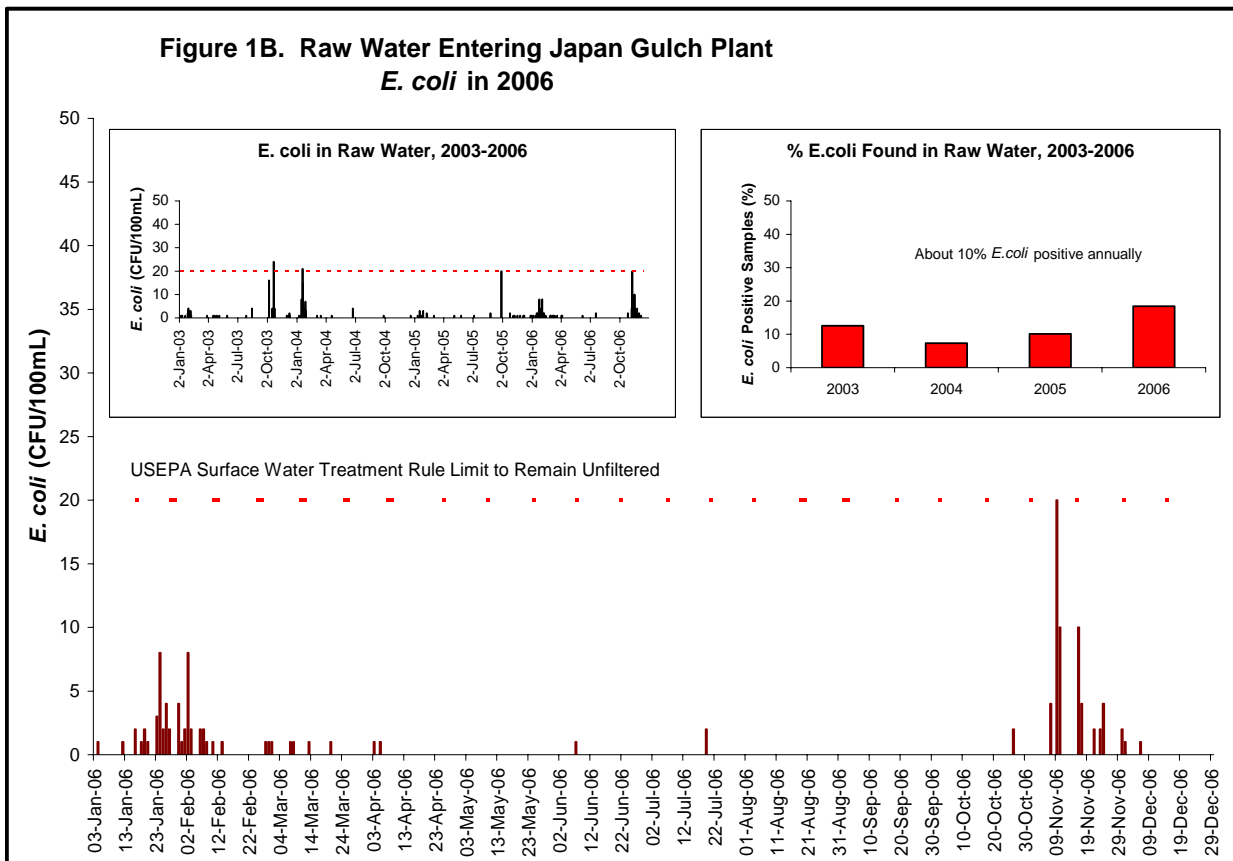
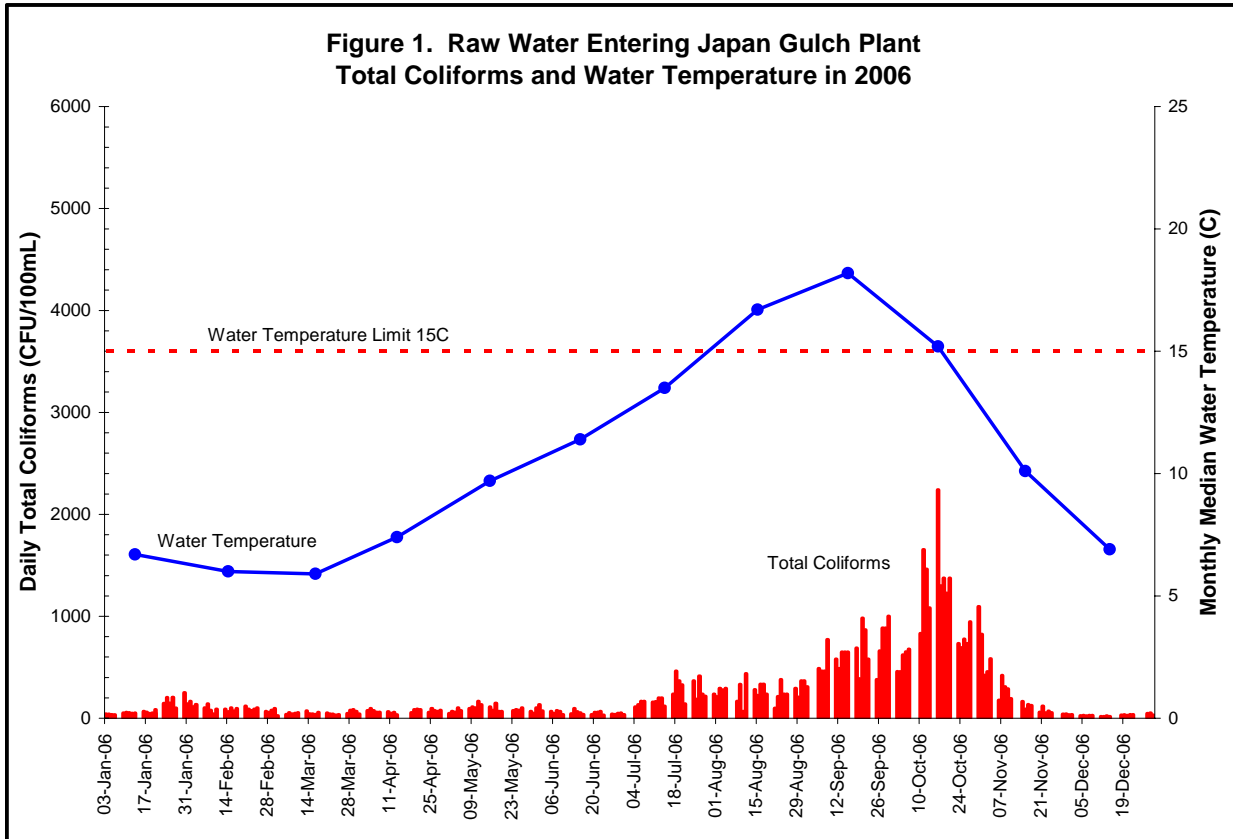
- Central Saanich (Figure 8 and Figure 8a)
- North Saanich (Figure 9 and Figure 9a)
- Oak Bay (Figure 10 and Figure 10a)
- Saanich (Figure 11 and Figure 11a)
- Sidney (Figure 12 and Figure 12a)
- Victoria/Esquimalt (Figure 13 and Figure 13a)
- Juan de Fuca Distribution System (Figure 14 and Figure 14a).

9. **Chlorine Residual.** The median annual chlorine residual at the first customer sampling location below the Japan Gulch Plant was 1.21 mg/L (similar to 2004 and 2005). Overall, within the distribution system, the median annual chlorine residual was 0.65 mg/L, slightly higher than that found in 2005 and 2003 (0.63 mg/L) and identical to 2004 (0.65 mg/L). Within the municipal distribution systems, the median annual chlorine residual varied from a low of 0.52 mg/L for Sidney to a high of 0.69 mg/L for Victoria.

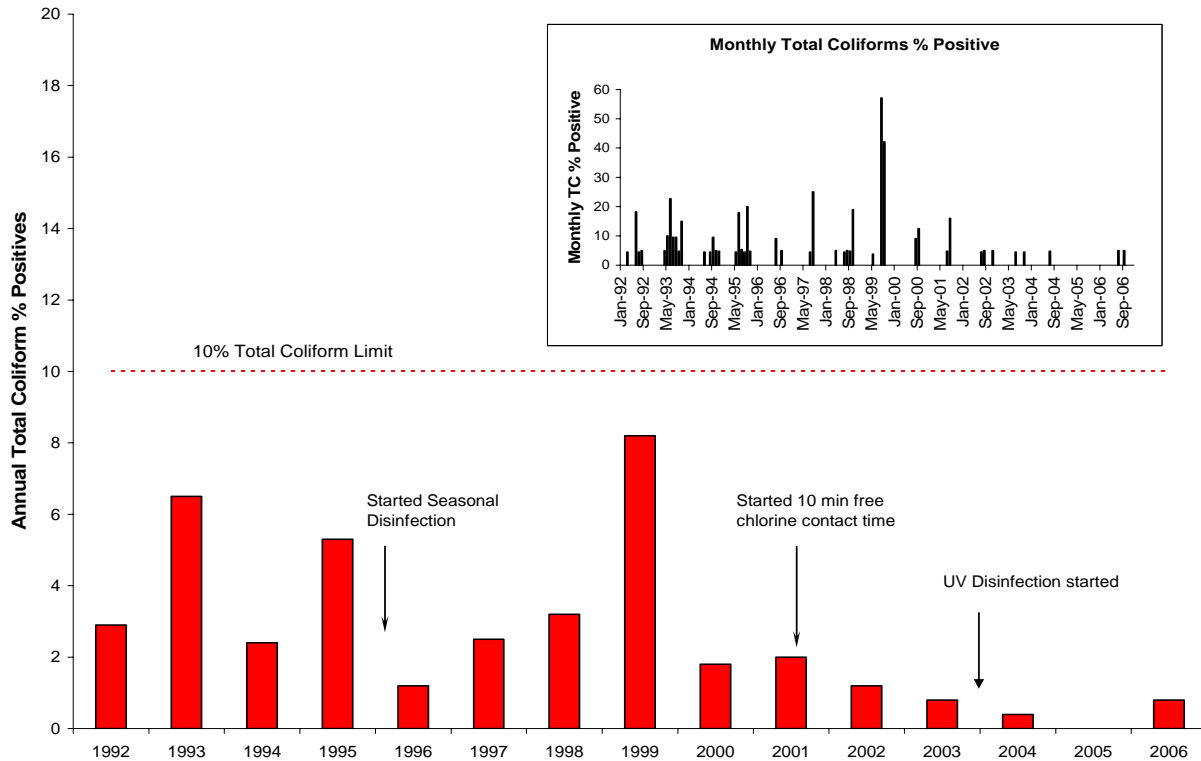
10. **Water Temperature.** At the Japan Gulch Plant, the coldest daily water temperature recorded was 4.0°C in January while the warmest was 18.2°C in September 2006 (two and a half degrees cooler than in 2004). Similarly, the water at the first customer location was cooler than in past years. The Guideline limit of 15°C was exceeded from August 2, 2006 to October 16, 2006 which was better than in previous years. The lower water temperature in 2005 and 2006 was primarily due to the raising of the water level in Sooke Reservoir.

RECOMMENDATIONS

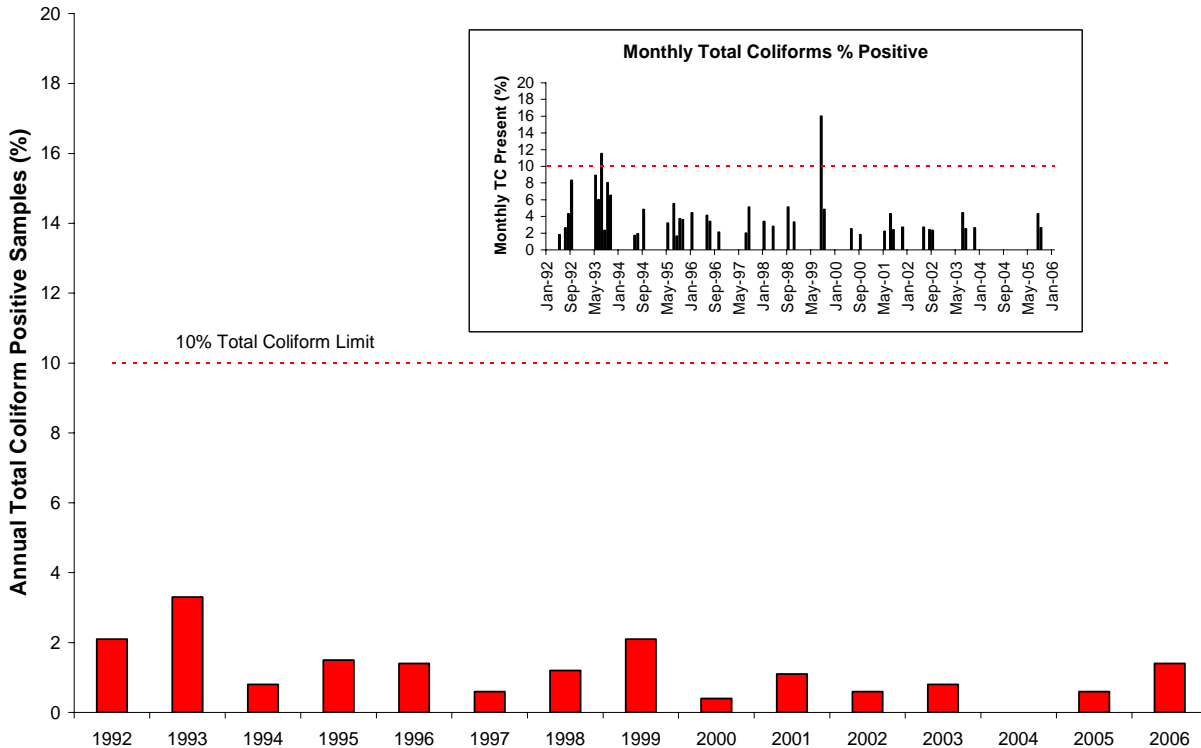
1. **Improve Distribution Reservoir Circulation.** It is recommended that the program of improving the circulation of the water in the distribution reservoirs be expanded to include those reservoirs that exceeded the total coliform limits in 2006.



**Figure 4. Treated Water at First Customer below Japan Gulch Plant
Annual % Samples with Total Coliforms Present, 1992 - 2006**



**Figure 5A. Transmission Mains - Annual % Samples with
Total Coliforms Present, 1992-2006**



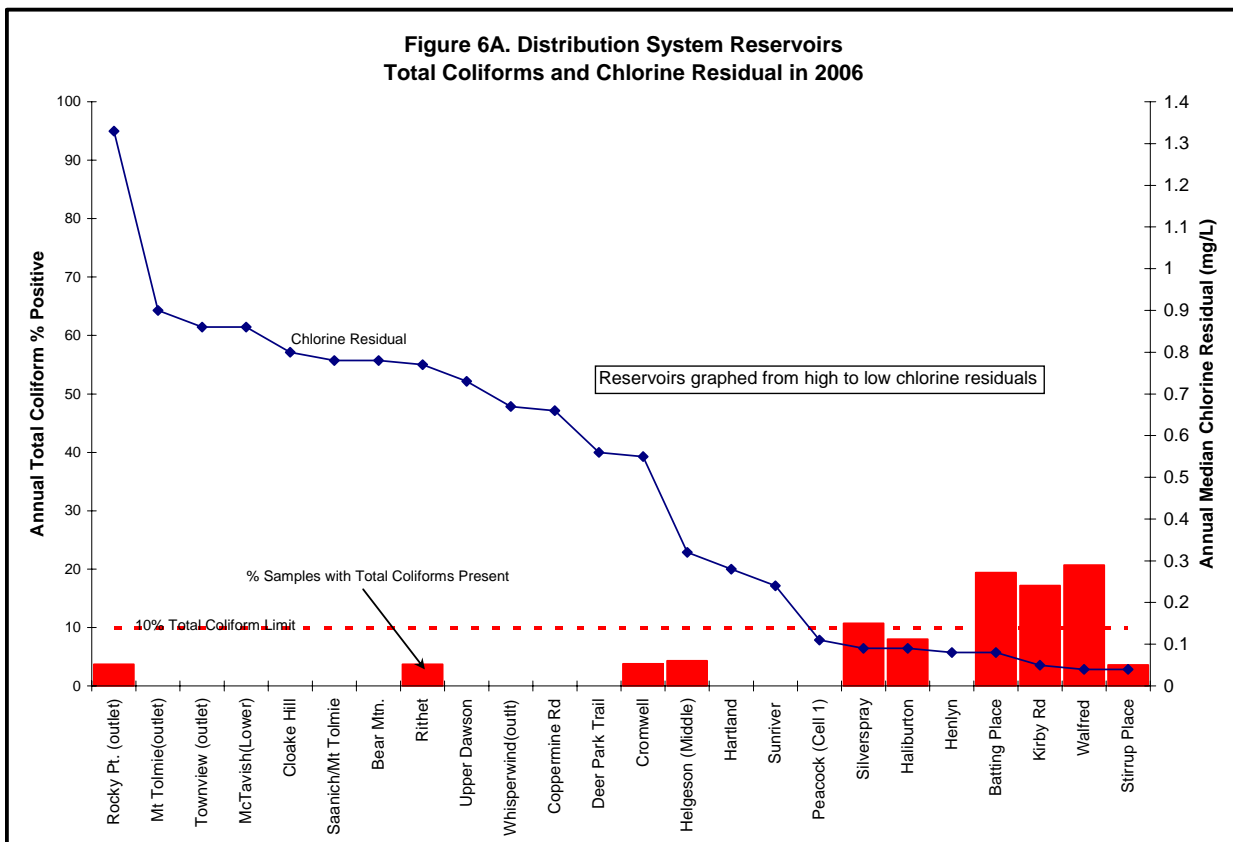
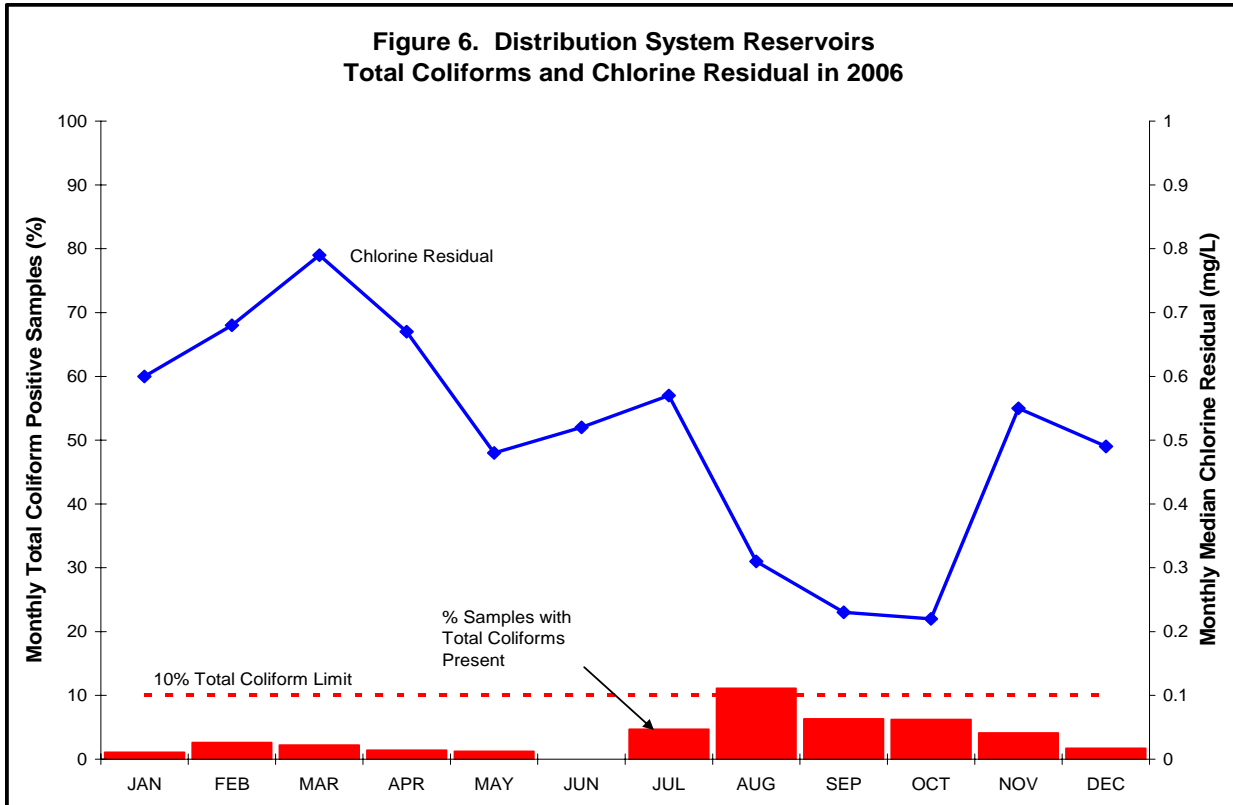
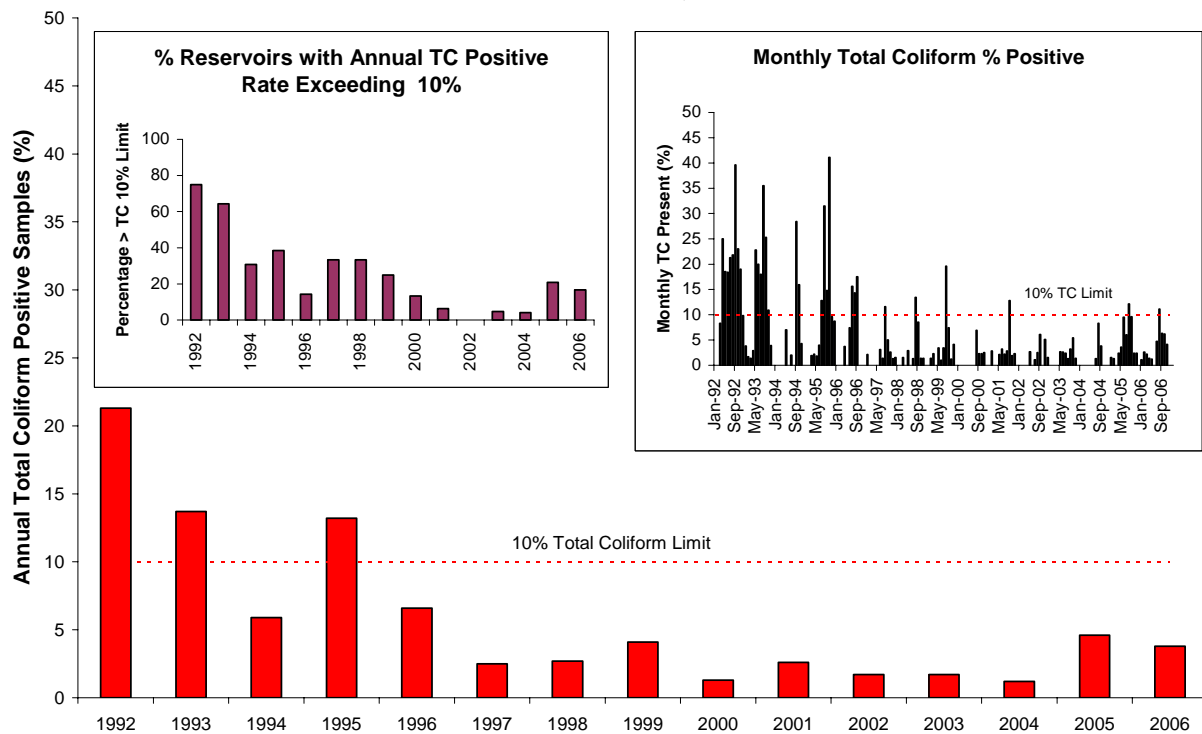
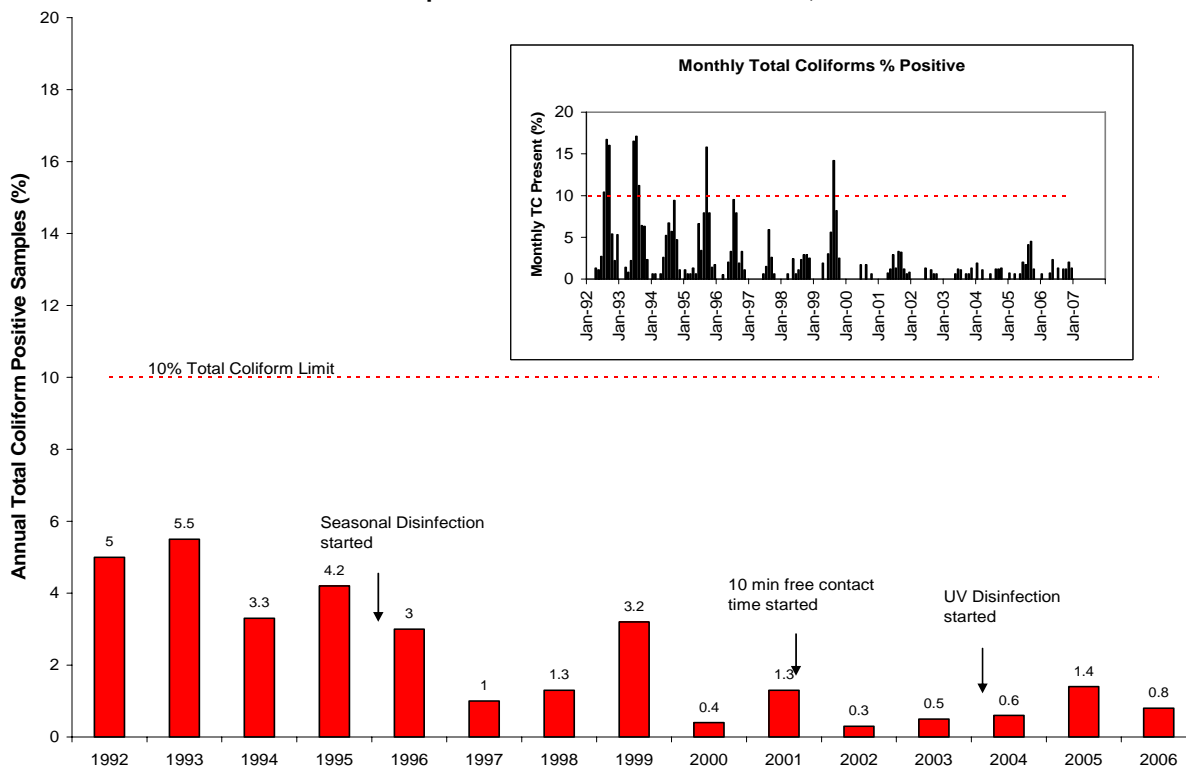
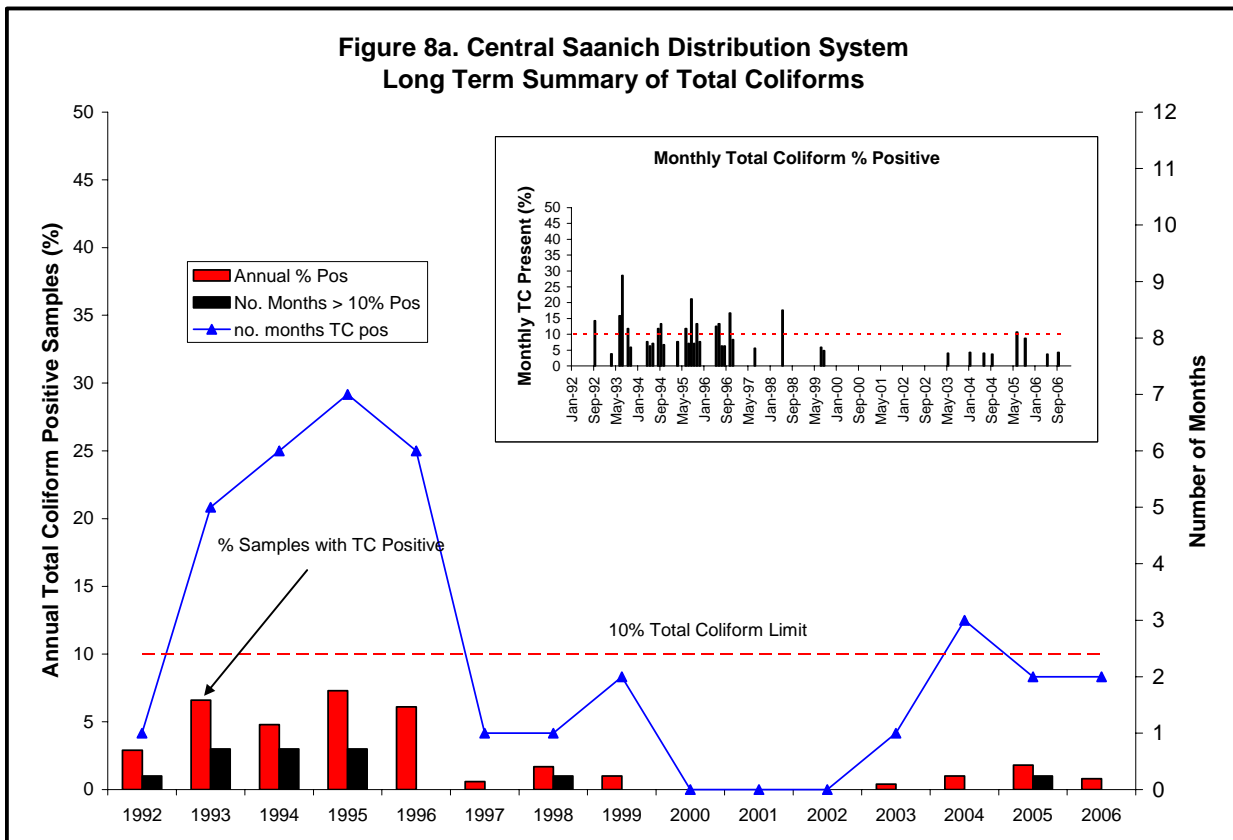
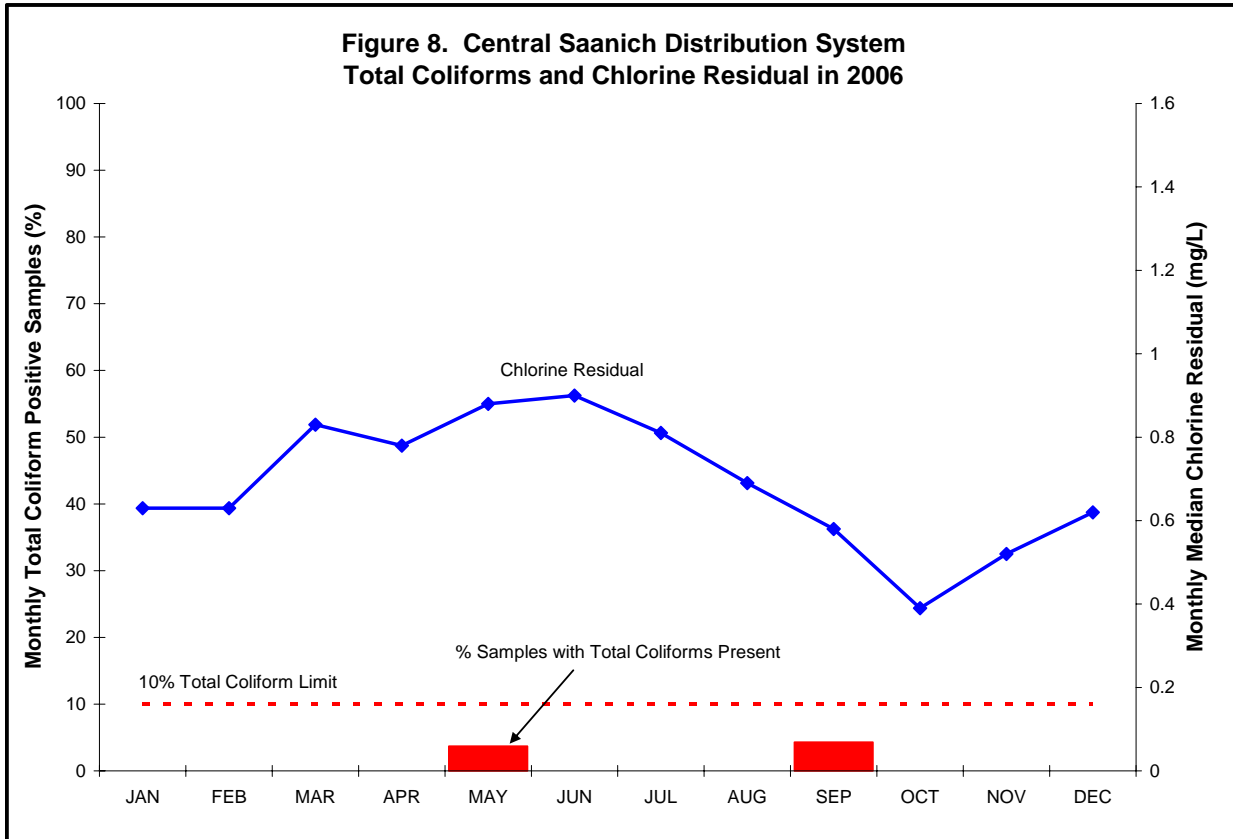
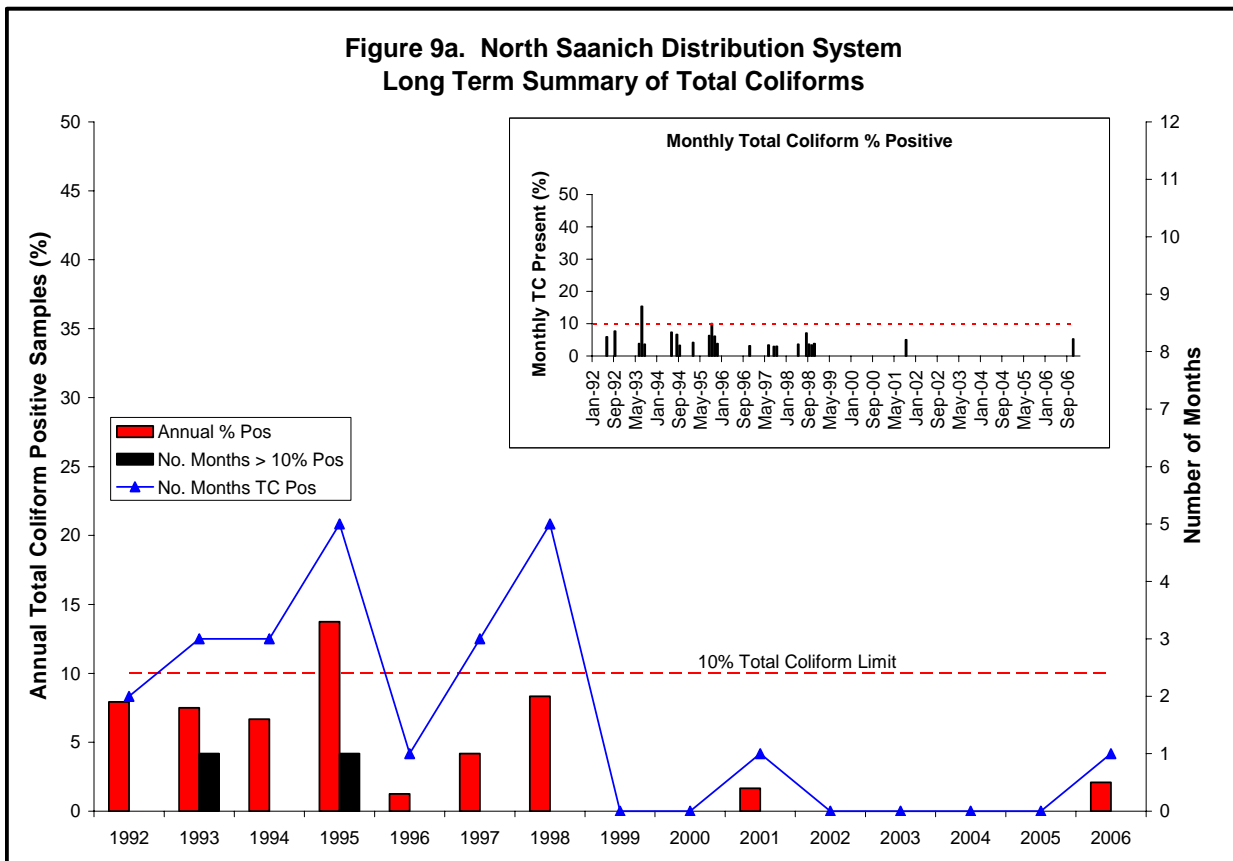
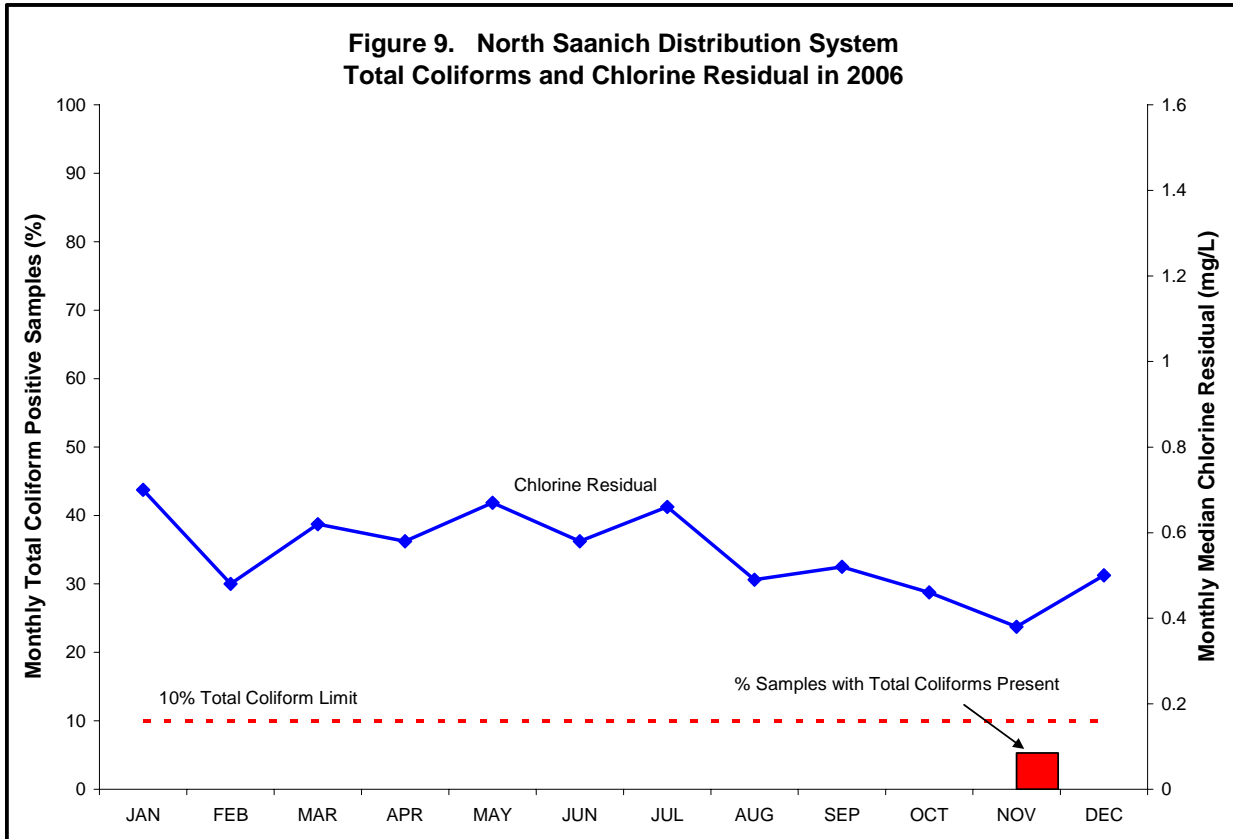
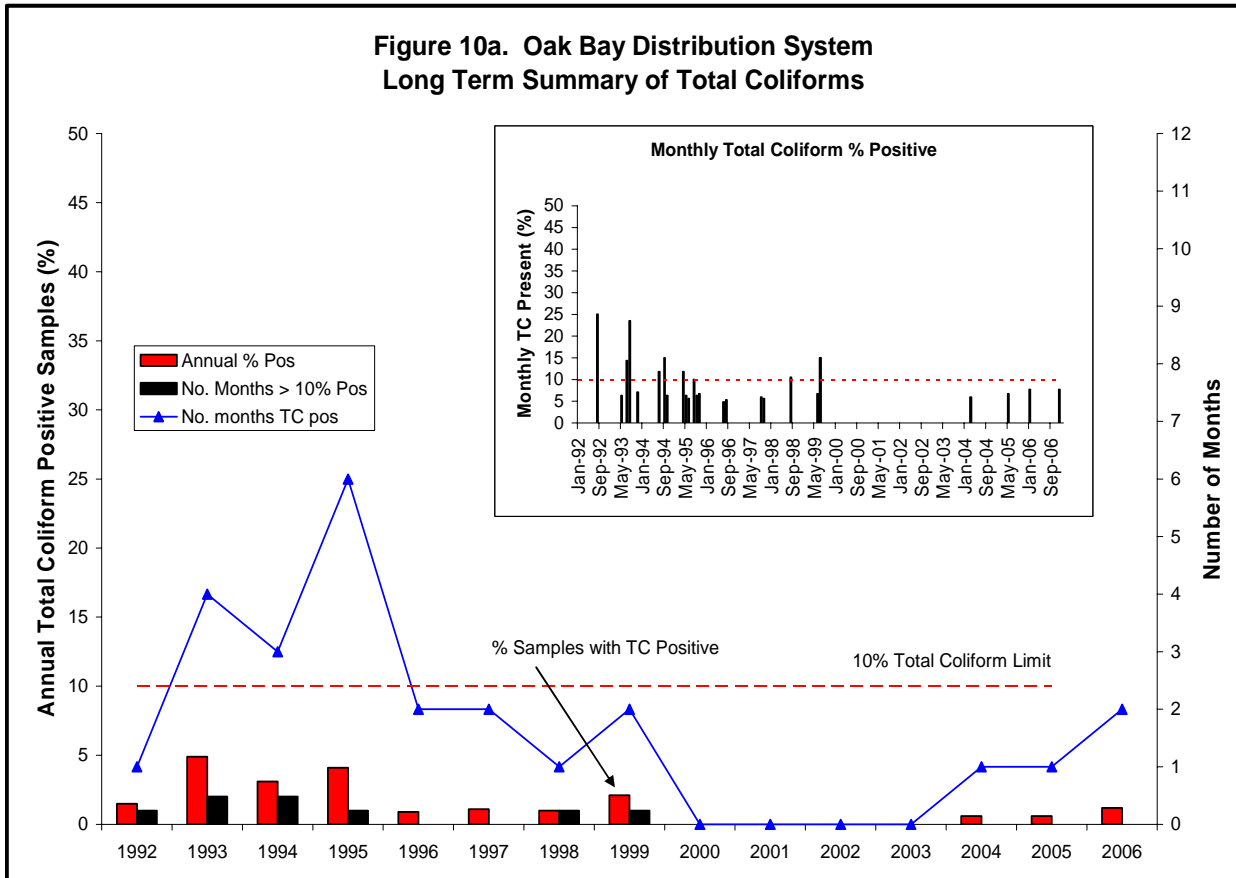
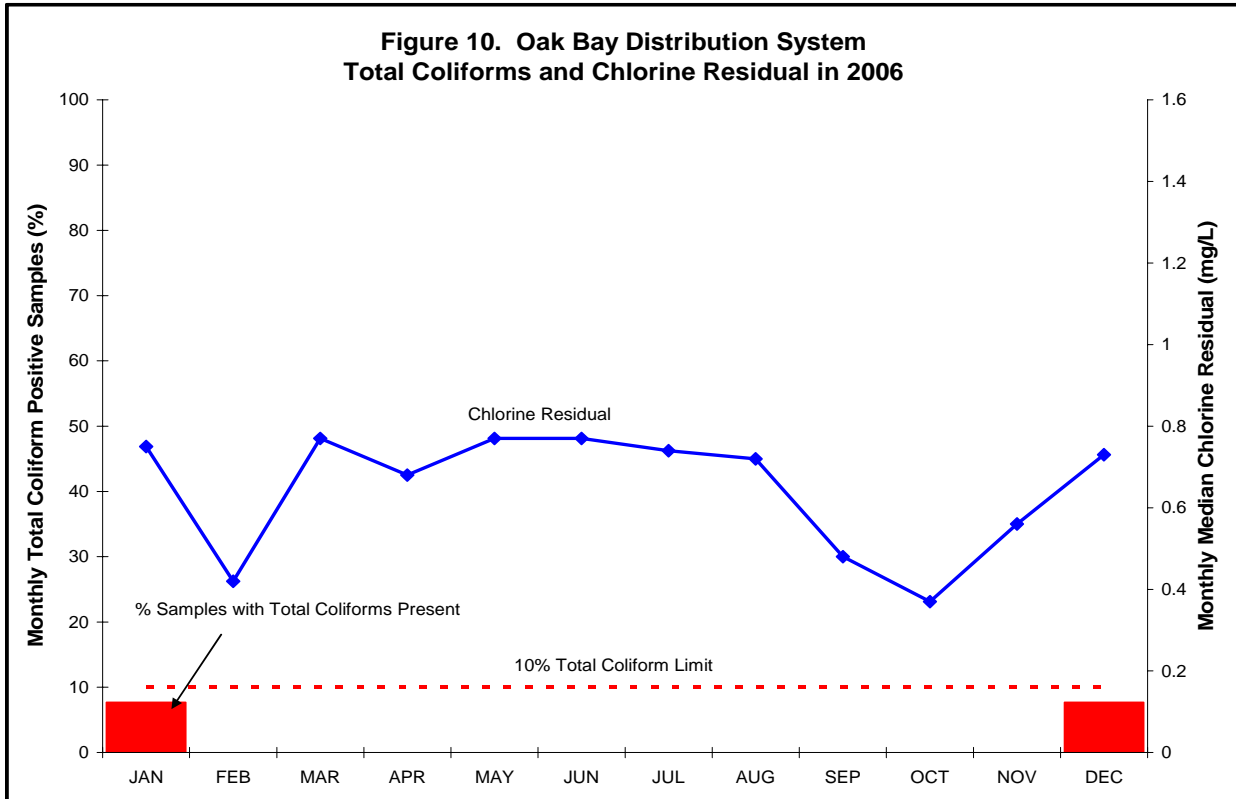
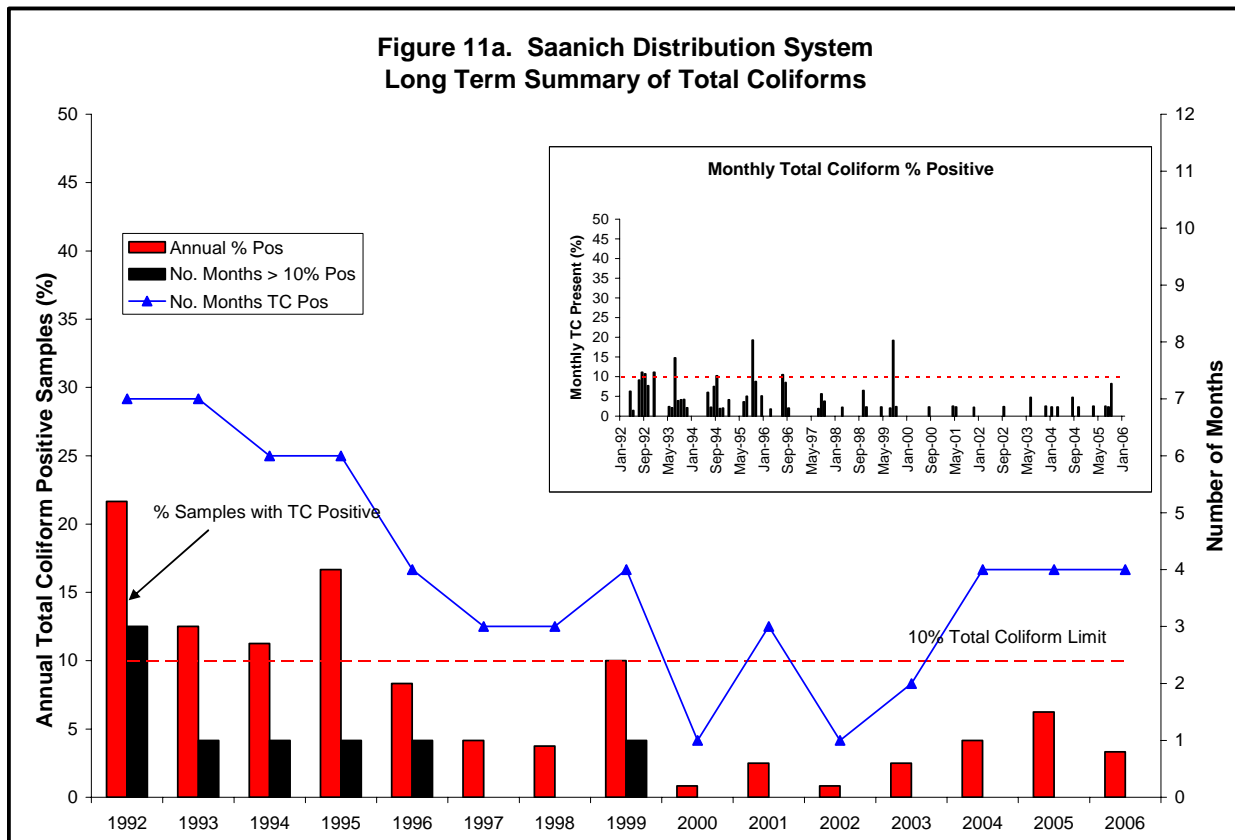
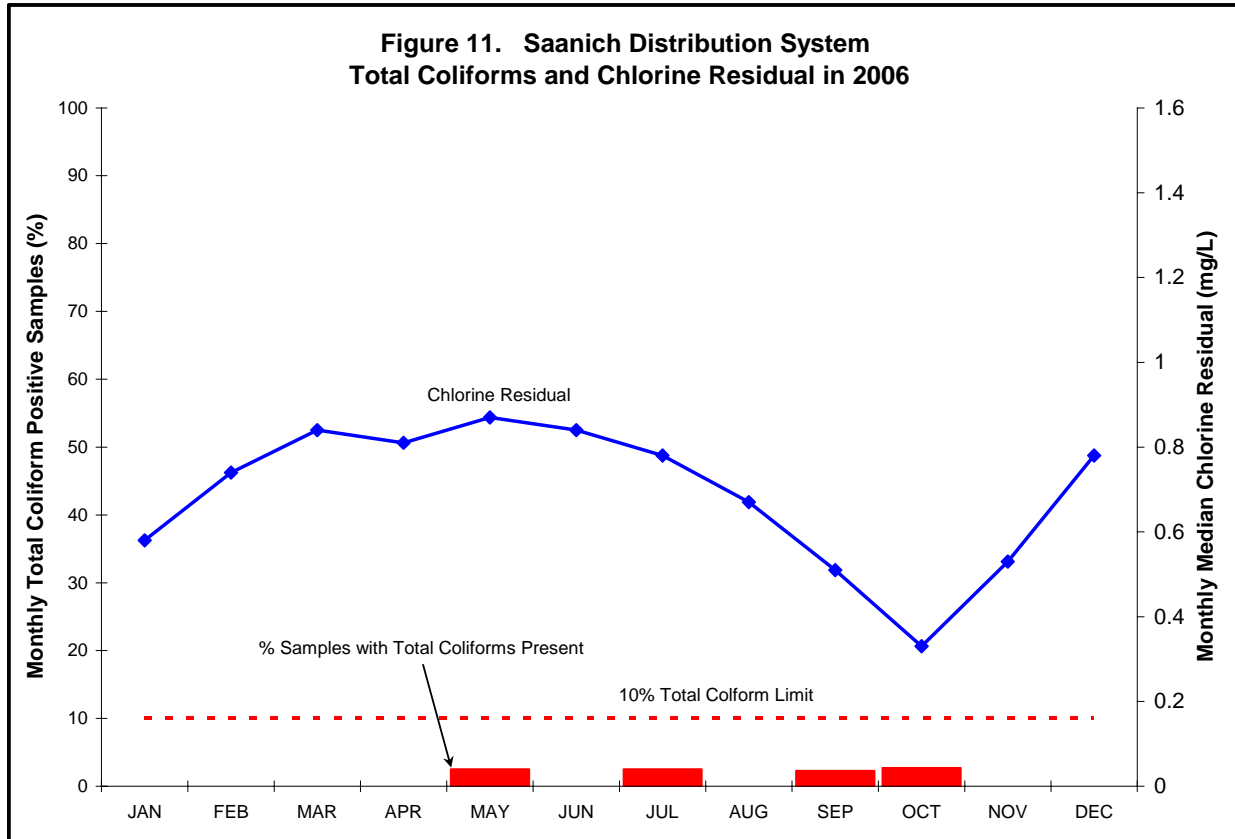


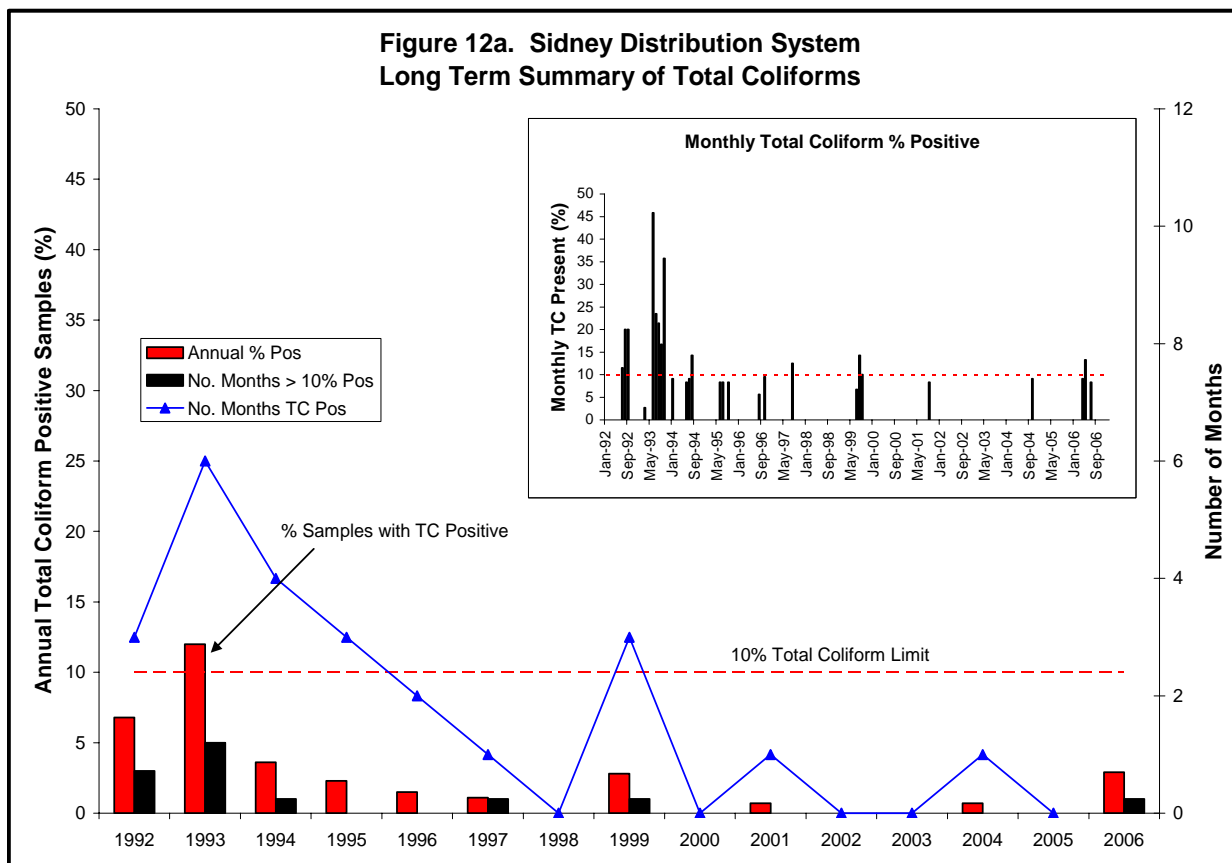
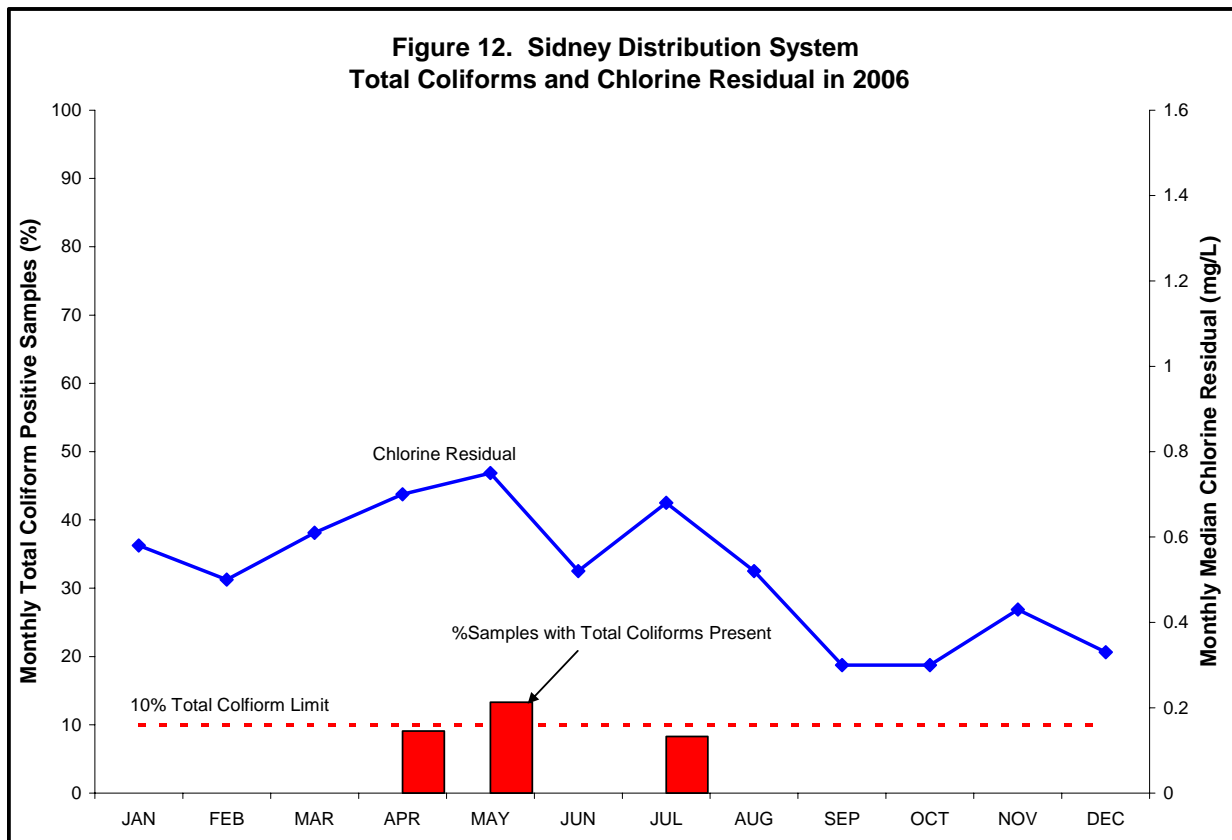
Figure 6B. Distribution System Reservoirs - Annual % Samples with Total Coliforms Present, 1992-2006**Figure 7a. Greater Victoria Distribution System Combined Annual % Samples with Total Coliforms Present, 1992-2006**



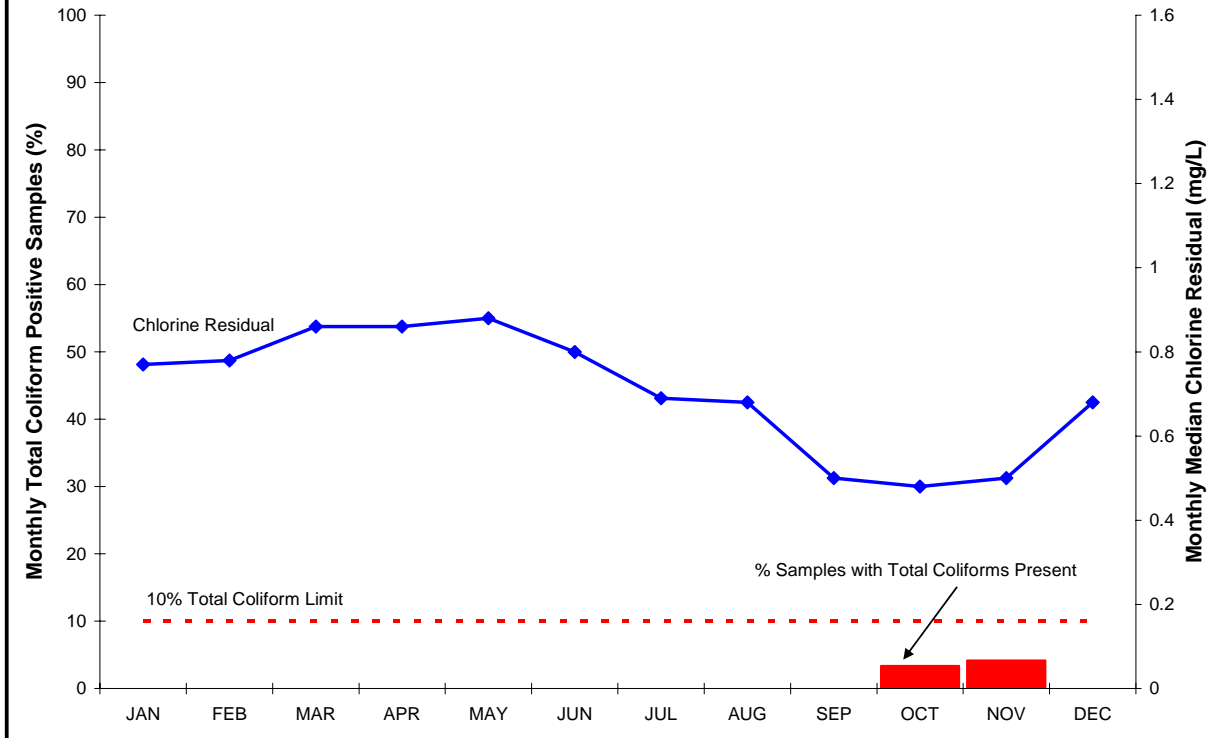




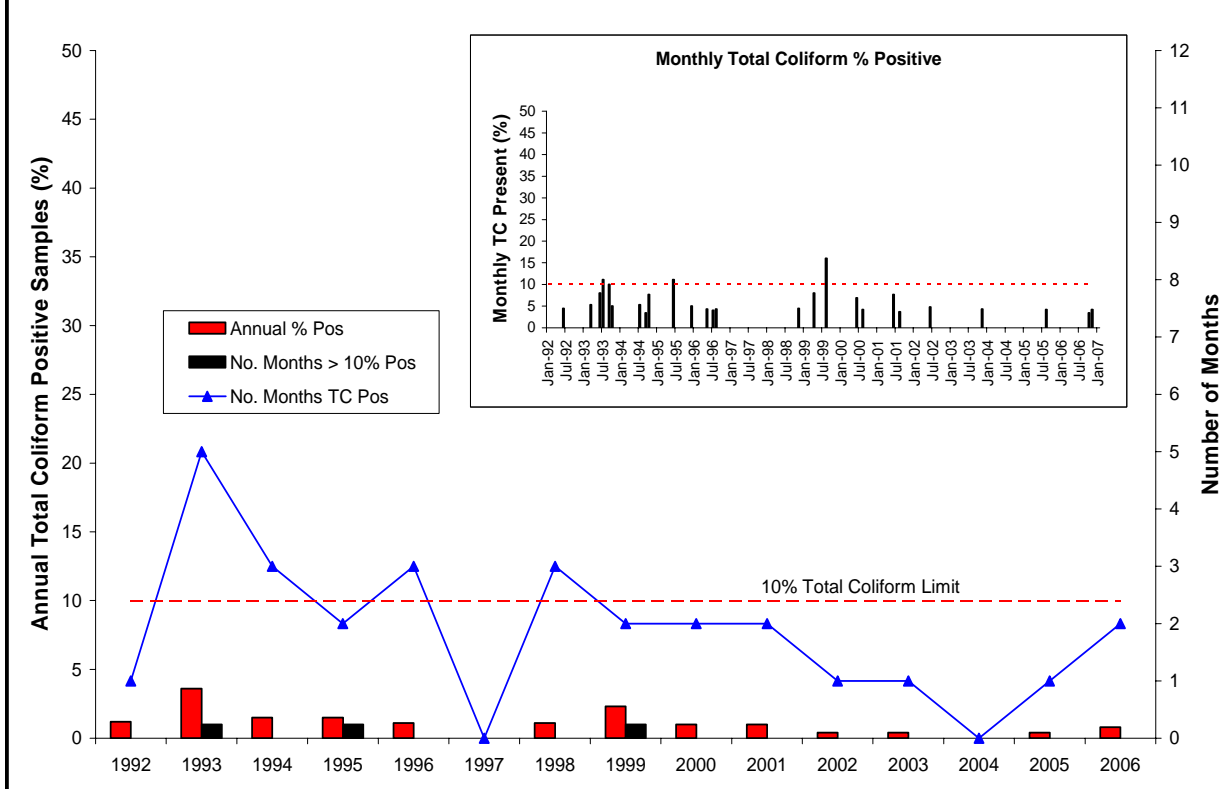




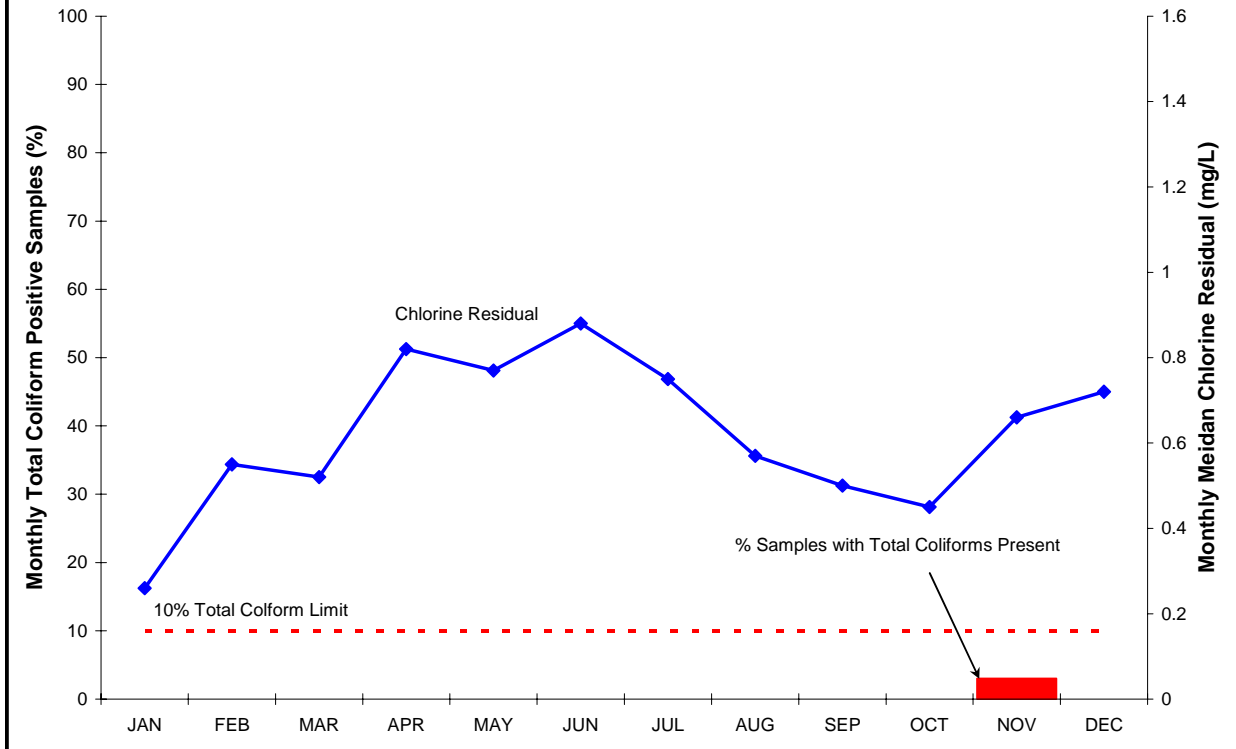
**Figure 13. Victoria/Esquimalt Distribution System
Total Coliforms and Chlorine Residual in 2006**



**Figure 13a. Victoria/Equimalt Distribution System
Long Term Summary of Total Coliforms**



**Figure 14. Juan de Fuca Water Distribution System
Total Coliforms and Chlorine Residual in 2006**



**Figure 14a. Juan de Fuca Water Distribution System
Long Term Summary of Total Coliforms**

