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Effects of Storage on Analysis Results for the Total and Faecal Coliform Parameters

Final Report to the Department of the Environment

DoE 3705/1
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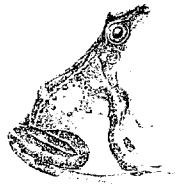

EFFECTS OF STORAGE ON ANALYSIS RESULTS FOR THE TOTAL AND FAECAL COLIFORM PARAMETERS

Final Report to the Department of the Environment

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EXECUTIVE SUMMARY

It is currently recommended that water samples for bacteriological analysis should be tested within six hours of being taken. However, this recommendation is based on the results of studies carried out by the Public Health Laboratory Service in the early 1950's. That work was based on analysis by the Most Probable Number technique, which has now been almost universally replaced by the membrane filtration method for water analysis. This project was therefore commissioned to investigate storage effects using the currently used methodology.

The objective set by the Department of the Environment for this study was to establish whether there was a significant difference between the concentrations of faecal and total coliform bacteria in a water sample analysed after 6, 12 and 24 hours of refrigerated storage. A fixed sampling regime involving bacteriological tests and measurements of temperature, pH and conductivity was specified in the project schedule. It was also specified that three water types should be examined, namely a groundwater, a lowland surface water, and an upland surface water. Monitoring of each water type was carried out over a 12-month period to identify possible seasonal effects, and over 500 samples were included in the study.

Analysis of the results showed that overall there was no evidence of a significant change in either total coliform or faecal coliform counts for samples tested after 6 and 12 hours of refrigerated storage. For samples tested after 6 and 24 hours of refrigerated storage, a drop in counts of total and faecal coliforms was seen. This was of marginal statistical significance for total coliforms, but more significant for faecal coliforms. On average the counts of total coliforms were 5% lower, and those of faecal coliforms were 10% lower after 24 hours storage, compared with 6 hours.

On the basis of the results obtained in this study, extending the allowable period of storage of samples before analysis from 6 to 12 hours should not affect overall results, provided the samples are refrigerated. However, extension of the allowable period of storage to 24 hours would result in lower overall results.

The samples tested in this study were representative of raw, untreated waters. It is not known how far the results could be extrapolated to other water types, such as disinfectant-treated drinking water.

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1. BACKGROUND

In the Spring of 1992, the Department of the Environment (the Department) invited tenders for a research contract to examine the effect of storage of water samples on the results obtained from analyses for total and faecal coliform bacteria.

Currently two documents give advice on sampling and analysis for microbiological parameters. 'Guidance on Safeguarding the Quality of Public Water Supplies' (DoE and WO 1989) specifies that analysis should be undertaken as soon as possible, every attempt being made to start within six hours of sample collection. It also states that where logistics do not allow this, samples may be examined up to 24 hours after collection, provided that they are kept cool (2 to 10 °C) and in the dark. Report 71 'The Bacteriological Examination of Drinking Water Supplies 1982' (DoE 1983) states that samples should be examined as soon as possible, preferably within six hours, and that they should be kept cool in an insulated container.

These recommendations originate from studies carried out by the Public Health Laboratory Service in the early 1950's (PHLS 1952, 1953). However, that work was based on analysis by the Most Probable Number technique, which has now been almost universally replaced by the membrane filtration method for water analysis. This project was therefore commissioned to investigate storage effects using the current methodology.

Other studies have been published, but mostly using American standard methods. These include reports by Standridge and Lesar (1977) and Standridge and Delfino (1983), which consider that extended storage of samples is acceptable, and one by McDaniels and Bordner (1983) which comes to the opposite conclusion.

In October 1992 the Department of the Environment placed a contract with WRc to conduct a study of the effects of sample storage on analytical results, using current standard methods.

This final report presents the work undertaken and the results obtained.

2. OBJECTIVES AND PROGRAMME OF WORK

The objective set by the Department for this study was to establish whether there was a significant difference between the concentrations of faecal and total coliform bacteria in a water sample analysed after 6, 12 and 24 hours of refrigerated storage. A fixed sampling regime involving bacteriological tests and measurements of temperature, pH and conductivity was specified in the project schedule.

It was also specified in the schedule that three water types should be examined, namely a groundwater, a lowland surface water, and an upland surface water. The intention was to use raw waters which were expected to contain coliform organisms, so that quantitative results could be obtained for the effects of storage of samples. Monitoring was to be carried out over a 12-month period to identify possible seasonal effects, and it was estimated that about 500 samples would need to be examined.

3. MATERIALS AND METHODS

3.1 Sampling and analysis procedures

Early work involved planning the logistics of the sampling and analysis processes, as the requirement for one of the analyses to be carried out after 12 hours of storage would inevitably involve out-of-hours working. The scheme settled on was for samples to be taken in the morning at 1000 hours, with the analyses following at 1600 and 2200 hours on the same day, and at 1000 hours the following morning, all timings having a tolerance of 30 minutes either side.

Conductivity, pH and temperature measurements were made at the time of sampling, and then within 15 minutes of each microbiological analysis. Portable micro-processor pH and conductivity meters were used for these measurements, and the same instruments were used at the sampling site and in the laboratory. Temperature measurements were made using the temperature compensation probe of the pH meter. Commercial standard buffers were used to calibrate the pH meter, and a standard conductivity solution supplied by the manufacturers was used to calibrate the conductivity meter. Temperature measurements were calibrated against a NAMAS certified mercury-in-glass thermometer.

A portable refrigerator which could be run from a 12-volt DC supply (via a car cigarette lighter socket) was used to transport samples to the laboratory. This unit was also used to store the samples in the laboratory for the duration of the experiment (operated from a standard 240-volt AC mains supply), since its electronic temperature control was more consistent (± 1 °C) than a normal refrigerator thermostat (usually ± 2-3 °C). The internal temperature of the cabinet was normally monitored using a calibrated mercury thermometer, but on occasions an electronic data logger was used to obtain a continuous record.

Borosilicate glass sample bottles with deep polypropylene screw-threaded caps were used throughout the study. They were sterilised by autoclaving before use.

Analysis for total and faecal coliform organisms was carried out by the membrane filtration technique, as described in Report 71 (DoE 1983). The culture medium used was Membrane Lauryl Sulphate Broth (Oxoid MM615), and Gelman GN-6 mixed cellulose ester membranes (47-mm diameter, 0.45-µm pore size) were employed throughout. The membrane filters and all the culture media used were from single production batches. Incubation conditions used were 4 hours at 30 °C ± 1 °C followed by 14 hours at 37 °C ± 0.5 °C for total coliform organisms, or 14 hours at 44 °C ± 0.25 °C for faecal coliforms.

After incubation, presumptive counts were made, then colonies were sub-cultured for confirmatory tests, again in accordance with Report 71. For total coliforms the fermentation of lactose (in lactose peptone water) with production of acid and gas within 48 hours at 37 °C was taken as positive confirmation. For *Escherichia coli*, the criteria used were production of acid and gas from lactose within 24 hours at 44 °C, and production of indole from tryptophan within 24 hours at 44 °C in tryptone water.

Whenever possible, all the presumptive positive colonies on a membrane were picked off for testing, rather than a selection, to avoid operator bias in choosing colonies, and to increase the precision of the percentage confirmation figures (see Tillett 1993). However, this did mean that it was infeasible to confirm all samples. However, at least one sample was confirmed from each batch of samples taken. All results were recorded for subsequent data analysis.

3.2 Sampling sites

The site used for collection of lowland surface water was on the River Thames, close to the WRc Medmenham Laboratory, while the upland surface water source selected was the Ladybower reservoir near Sheffield.

Groundwater with the required content of coliform organisms proved much harder to obtain. Such sources are generally in controlled situations, not open to the public, so co-operation from water suppliers had to be sought.

The main supply company in the area was approached, but was reluctant to allow access to such supplies to uncontrolled personnel. Subsequently another water supply company granted access to a borehole supply which regularly contained coliform organisms. However, most of the early samples proved negative, and examination of the Company's records showed that occurrence of coliforms in the supply was sporadic, and mainly restricted to the warmer months. Several boreholes at this particular site were sampled, but the coliform content was unreliable, and the situation was clearly unsatisfactory. Later in the study an opportunity arose to use an alternative borehole which provided much more satisfactory samples. This was used in all subsequent tests, but even here the coliform content of the water decreased in the colder weather. As part of the arrangements for sampling the groundwater sources it was agreed that the location of the boreholes would be kept confidential, or at least not mentioned in any reports on the work. It was agreed that this was acceptable to the Department.

3.3 Statistical analysis

Sub-samples withdrawn for analysis from a volume of water are unlikely to contain exactly the same numbers of bacteria. This means in the tests carried out in the present study that the numbers of coliform organisms detected may not necessarily be the same even if there is no effect of storage. Nonparametric statistical tests were applied to the data to determine whether any changes observed reflected true differences, or were merely due to variations from sub-sampling. Pairs of results were compared by the Sign test and the more powerful Wilcoxon matched pair signed rank test.

These statistical tests return the probability (P) of obtaining the particular sets of coliform numbers on the assumption that there is no effect of storage. If P is greater than 5%, it can be reasonably concluded that observed differences in numbers could have arisen by chance from random sub-sampling and that the storage has not affected the results. However, if P is less than 5%, the differences become statistically significant and the

storage is then assumed to be having some effect. The smaller the value of P, the more highly significant the differences and the greater is the certainty that true differences are being observed. The statistical power of an experiment is the ability to detect such differences when they genuinely exist, and can be enhanced by increasing the number of samples. Furthermore, the smaller the effect of storage, the more samples are required to detect a statistically significant difference.

To assess the numbers of samples required to detect statistically significant differences in these experiments, the statistical outcome (significance) was simulated as a function of the number of water samples analysed. The simulation was performed for a variety of potential quantitative differences caused by the storage. As an example, one could use the situation of wishing to be able to detect a 5% difference caused by storage, with statistical inference being carried out at the 5% confidence level. This would be a reasonable minimum precision to aim for, since if one can say with 95% certainty that there will be less than 5% difference in quantitative results after storage, then it can be assumed that the effect of storage of the sample will be negligible.

In the case just described, the simulation indicated that only 30 samples would be needed to detect such a difference. For comparison, to operate at the 1% confidence level (i.e. 99% certainty), the number of samples would have to be increased to 52. To detect a 3% difference in results would need 85 or 145 samples, using the 5% and 1% confidence levels respectively.

These findings assumed reasonably high numbers of coliform organisms in all samples, but in practice this was unlikely to be true, and so more samples would probably be needed than the simulation implied. Nevertheless, the total of 500 samples to be analysed in the course of this project was thought to be enough to demonstrate any systematic effects of storage of the samples.

The non-parametric tests can indicate whether or not there is a significant effect on the bacterial counts as a result of storing the samples, but cannot quantify the differences. However, if the underlying distribution of counts can be confirmed, it is possible to measure the degree of difference using a *t* test. Using purpose-written software, the differences in pairs of counts (i.e. before and after storage) were presented graphically as probability plots. The vertical axis in each case represented the difference in the logarithms of the counts (6-hour count subtracted from 12- or 24-hour count), while the horizontal axis showed percentiles, scaled in such a way that if the differences were normally distributed, then the plot would be a straight line. The percentiles were calculated by arranging all the values for a particular data set (of size n) in ascending order and assigning a position i (over the range i=1 to i=n) to each one. The percentile (p_i) was calculated as:

$$p_i = 100 \times (i - 0.5)/n$$

As the points were found to follow straight lines quite closely, it was considered reasonable to assume that the differences in counts were log normally distributed, and that this analysis could be used to quantify effects of storage.

4. RESULTS

4.1 Effects of storage on presumptive counts of coliforms

In total, 528 samples were analysed as described in the previous section, divided in the proportions of 113 samples of lowland surface water, 95 of upland surface water, and 320 of groundwater. A complete tabulation of the raw data obtained is given in Appendix B of this report. The presumptive counts were used for the statistical analysis, since confirmed counts were not available for all samples. Also the calculation of a confirmed count by multiplying the presumptive count by the proportion which confirm can lead to results with wide confidence limits (Tillett 1993). This would make statistical analysis unsatisfactory, and might give misleading results.

Not all the results were able to be used in the statistical tests. In particular a number of the groundwater samples gave coliform counts of zero before and after storage. These unfortunately give no information on storage effects, and so could not be used. After their elimination, 1429 data pairs remained to be used in the tests.

As well as detecting significant effects caused by storage, it was also necessary to try to quantify these, as mentioned in the previous section. This would not be possible, however, with data pairs where one of the results derived from a count of zero, since the true quantitative difference between the two results was unknown, and logarithmic transformation of the zero results would not be possible. Such results were therefore removed for the initial analysis, although they were included in later tests, described below.

Table 4.1 shows the results of analysis by Sign test of the non-zero results. Here the 6-hour result has been subtracted from the later one in each case, and the numbers of results decreasing, staying constant and increasing after storage have been tabulated. If storage had no effect, the numbers increasing would equal the numbers decreasing, within statistical limits. The table shows the probabilities of obtaining the patterns of results observed, assuming there was no effect of storage.

Table 4.2 shows the same data analysed using the Wilcoxon test, applied in the same way as just described. The greater power of this test results from its taking some consideration of the magnitude of the observed differences, and therefore some differences are seen which are not revealed by the Sign test.

A paired-sample t test was used to obtain an estimate of the magnitude of the storage effects seen, and the results of this analysis are shown in Table 4.3.

This closely follows the results obtained with the Wilcoxon test, although some levels of significance are slightly different. Different patterns of changes were seen with the different water types. For the lowland surface water, total coliform counts rose by 16% on average after 12 hours ($P<0.001$), but were not significantly different from the 6-hour counts after 24 hours storage. Faecal coliform counts were unchanged after 12 hours, but fell by 23% on average after 24 hours ($P<0.01$). In contrast, total coliform counts in the

upland surface water fell after both 12 and 24 hours, while faecal coliform levels followed the same pattern seen with the lowland surface water. For the groundwater the only significant change was in faecal coliform counts after 12 hours, where an increase was observed.

Table 4.1 Sign test on non-zero values

Water	Organism	6 h vs	n	Lower	Equal	Higher	P	Sig.[1]	
Lowland	TC	12 h	112	44	3	65	0.055	NS	
		24 h	113	52	0	61	0.45	NS	
	FC	12 h	105	44	5	56	0.27	NS	
		24 h	111	68	5	38	0.0046	**	(↓)
Upland	TC	12 h	95	53	6	36	0.089	NS	
		24 h	95	62	3	30	0.0011	**	(↓)
	FC	12 h	86	40	12	34	0.56	NS	
		24 h	81	49	8	24	0.0046	**	(↓)
Ground	TC	12 h	103	42	19	42	1.0	NS	
		24 h	92	40	15	37	0.82	NS	
	FC	12 h	78	29	7	42	0.15	NS	
		24 h	84	31	11	42	0.24	NS	
All	TC	12 h	310	139	28	143	0.86	NS	
		24 h	300	154	18	128	0.14	NS	
	FC	12 h	269	113	24	132	0.25	NS	
		24 h	276	148	24	104	0.0066	**	(↓)

1 NS - not significant, * P≤0.05, ** P≤0.01, *** P≤0.001
Arrows in brackets show whether the count rose (↑) or fell (↓) on storage

Combining all the results, the overall indication was of no statistical difference for either organism between the results obtained after 6 hours and 12 hours of storage. In fact the geometric mean counts before and after storage were almost identical. In contrast, the counts of both total and faecal coliforms tended to fall after 24 hours of storage, this being more pronounced for the faecal coliforms. The average reduction amounted to 5% for total coliforms, and 10% for faecal coliforms.

It is difficult to interpret the different patterns of change observed for the three water types, and great care should be exercised in attempting to do so. A change seen in a sub-set of data, which is not seen when the sub-set is incorporated into a larger set, should be treated with caution, because of the different sample sizes involved.

Table 4.2 Wilcoxon tests results - non-zero results

Water	Organism	6 h vs	n	Wilcoxon statistic	P	Sig.[1]	
Lowland	TC	12 h	112	4 095.5	0.0008	***	(↑)
		24 h	113	3 511.5	0.41	NS	
	FC	12 h	105	2 548.5	0.94	NS	
		24 h	111	1 883.0	0.0026	**	(↓)
Upland	TC	12 h	95	1 378.5	0.011	*	(↓)
		24 h	95	1 174.0	0.00011	***	(↓)
	FC	12 h	86	1 333.5	0.77	NS	
		24 h	81	760.5	0.0011	**	(↓)
Ground	TC	12 h	103	1 800.0	0.94	NS	
		24 h	92	1 440.0	0.76	NS	
	FC	12 h	78	1 720.0	0.011	*	(↑)
		24 h	84	1 482.5	0.47	NS	
All	TC	12 h	310	20 592	0.64	NS	
		24 h	300	17 187	0.044	*	(↓)
	FC	12 h	269	16 453	0.22	NS	
		24 h	276	12 100	0.0009	***	(↓)

1 NS - not significant, * P≤0.05, ** P≤0.01, *** P≤0.001
Arrows in brackets show whether the count rose (↑) or fell (↓) on storage

The results listed in Table 4.3 are shown in graphical form in the series of plots in Appendix A. As explained earlier, the graphs show the differences between the logarithms of pairs of counts (i.e. before and after storage), arranged in order and plotted on a horizontal scale such that they will fall on a straight line if they are normally distributed. The vertical bracket on each plot gives the 95% confidence interval for the mean of the observed differences, and thus represents the figures in the last three columns of Table 4.3. Where this bracket includes the line of equality (i.e. zero difference), any difference observed is not statistically significant at the 5% level. However, when the bracket does not include the line of equality, a significant effect of storage is indicated, at least at the 5% level. If the bracket lies above the line of equality, then counts were observed to rise on average, with the opposite true if the bracket lies below the line. This reflects the information shown in the column headed 'Significance' in Table 4.3.

Table 4.3 Paired-sample t test on non-zero values, all data logarithmically transformed

Water	Organism	6 h vs	n	t	P	Sig.[1]	(9)	Mean[2] difference	95% CI Lower	95% CI Higher
Lowland	TC	12 h	112	4.01	0.0001	***	(↑)	+16%	+8%	+25%
		24 h	113	1.06	0.29	NS		+4%	-3%	+11%
	FC	12 h	105	-0.70	0.49	NS		-3%	-13%	+7%
		24 h	111	-3.17	0.0015	**	(↓)	-13%	-21%	-5%
Upland	TC	12 h	95	-2.824	0.0048	**	(↓)	-14%	-23%	-5%
		24 h	95	-4.276	<0.0001	***	(↓)	-20%	-27%	-11%
	FC	12 h	86	0.057	0.96	NS		+0%	-11%	+13%
		24 h	81	-3.34	0.0008	***	(↓)	-22%	-32%	-10%
Ground	TC	12 h	103	0.64	0.52	NS		+3%	-6%	+13%
		24 h	92	-0.088	0.94	NS		+0%	-9%	+9%
	FC	12 h	78	3.09	0.0019	**	(↑)	+17%	+6%	+30%
		24 h	84	1.275	0.20	NS		+8%	-4%	+22%
All	TC	12 h	310	0.59	0.56	NS		+2%	-4%	+7%
		24 h	300	-2.21	0.028	*	(↓)	-5%	-10%	-1%
	FC	12 h	269	1.05	0.30	NS		+3%	-3%	+10%
		24 h	276	-3.07	0.002	**	(↓)	-10%	-16%	-4%

1 NS - not significant, * P≤0.05, ** P≤0.01, *** P≤0.001
Arrows in brackets show whether the count rose (↑) or fell (↓) on storage
2 After antilog transformation.

As mentioned above, quantification of the magnitude of differences caused by storage is made impossible by the presence of results derived from counts of zero. Nevertheless, data pairs with one zero count can still be used to detect differences using the Sign test. Indeed, such data pairs can provide valuable information on effects of storage, for they represent bacterial densities at the limit of detection of the analytical test. Such samples are difficult to find or to produce artificially, but in the present study a total of 255 data pairs of this type were obtained.

An analysis of these results by the Sign test is shown in Table 4.4. Interestingly there is no significant difference in the results before and after storage, suggesting that storing the samples for up to 24 hours would not decrease the likelihood of detecting very low numbers of coliforms. However, in practice the number of results is probably too low to draw definite conclusions.

Incorporating these results into the non-zero ones used above, and using the Sign test, gives the overall analysis shown in Table 4.5. This can be compared with the last section of Table 4.1, and gives a similar pattern of results, with the only significant change being seen in the faecal coliform results, which tend to be lower after 24 hours storage than after 6 hours.

Table 4.4 Analysis by the Sign test of samples where one of the pair of values derived from a colony count of zero

	N	Decrease	Increase	P	Sig.
TC, 6 vs 12 hours	75	36	39	0.82	NS
TC, 6 vs 24 hours	73	40	33	0.48	NS
FC, 6 vs 12 hours	61	31	30	1.00	NS
FC, 6 vs 24 hours	46	22	24	0.88	NS

Table 4.5 Sign test carried out on all samples, including those with a single zero count

Organism	6 h vs	n	Lower	Equal	Higher	P	Sig.
TC	12 h	394	175	28	191	0.43	NS
	24 h	383	195	18	170	0.21	NS
FC	12 h	330	144	24	162	0.33	NS
	24 h	322	170	24	128	0.018	* (↓)

1 NS - not significant, * P≤0.05, ** P≤0.01, *** P≤0.001
Arrows in brackets show whether the count rose (↑) or fell (↓) on storage

In summary, therefore, it is clear that faecal coliform counts tend to fall during storage for 24 hours, compared with results which would have been obtained after 6 hours. The same appears true of total coliform counts, though the effect is less marked, and is best described as of marginal statistical significance, since it is not shown by the Sign test, but only by the more rigorous Wilcoxon and Paired-Sample t tests.

4.2 Variation in confirmation rates

As mentioned earlier, confirmation of presumptive colonies was carried out by sub-culturing all the colonies from a plate, rather than making a selection. This allowed a more realistic percentage confirmation figure to be obtained, but meant that it was not feasible to confirm all samples. However, at least one sample was confirmed from each batch of samples taken.

Table 4.6 shows mean confirmation rates (as percentages) obtained from the various types of water. Overall there was little variation in the observed rates with time. As the data were not truly paired, comparison of values was made using a two-sample t test. The observed differences were not statistically significant in any of the comparisons, so there is no evidence for any systematic change in confirmation rates with storage of samples.

Table 4.6 Mean percentage confirmation rates observed in bacteriological tests

Organism	Time (h)	Lowland	Upland	Groundwater
Total coliforms	6	70	68	74
	12	70	79	74
	24	66	75	73
E. coli	6	80	79	85
	12	81	81	78
	24	71	81	93

4.3 Investigation of seasonal effects

An arbitrary division into four equal seasons was made, with Spring taken as March to May inclusive, Summer being June to August, Autumn being September to November and Winter being December to February. The data used in compiling Table 4.3 were used, that is with results deriving from counts of zero omitted, and a paired-sample t test was carried out on the segregated data sets.

The groundwater results were not included, as the source had been changed during the year, and many samples during the colder months gave negative results. Table 4.7 shows the results of the analysis, in terms of the statistical significance of any differences observed, and the direction of change, if any.

Viewing the results for lowland and upland sources separately, total coliform counts appear to change, in whatever direction, more in the colder part of the year than in the warmer part. Faecal coliform counts do not follow the same pattern, the only significant changes being after 24 hours in Spring and Autumn for the lowland source, and after 12 hours in summer and 24 hours in Autumn for the upland source.

However, combining the two datasets changes the observed pattern, with many of the differences cancelling each other out.

The smaller datasets obtained when dividing the results into seasons make it difficult to identify true trends in the data. Also arbitrary re-definition of the 'seasons' could affect the observed patterns of change. The PHLS (1953) concluded that, despite rigorously controlled experiments, the factors contributing towards storage effects were probably more complex than could be elucidated by a comparatively simple approach. Perhaps the most important thing is to hope that sampling over a 12-month period will have encompassed and compensated for any systematic effects which might exist.

Table 4.7 Seasonal effects: paired t test analysis on logarithmically-transformed data - significance of observed differences[1]

Water	Organism		Spring	Summer	Autumn	Winter
Lowland	TC	6 h v 12 h	*** (↑)	NS	NS	*** (↑)
		6 h v 24 h	** (↓)	NS	NS	** (↑)
	FC	6 h v 12 h	NS	NS	NS	NS
		6 h v 24 h	* (↓)	NS	* (↓)	NS
Upland	TC	6 h v 12 h	** (↓)	NS	NS	* (↓)
		6 h v 24 h	* (↓)	NS	NS	*** (↓)
	FC	6 h v 12 h	NS	* (↓)	NS	NS
		6 h v 24 h	NS	NS	** (↓)	NS
Both	TC	6 h v 12 h	NS	NS	NS	NS
		6 h v 24 h	*** (↓)	NS	NS	NS
	FC	6 h v 12 h	NS	NS	NS	NS
		6 h v 24 h	** (↓)	NS	*** (↓)	NS

1 NS - not significant, * P≤0.05, ** P≤0.01, *** P≤0.001
Arrows in brackets show whether the count rose (↑) or fell (↓) on storage

4.4 Physico-chemical parameters

4.4.1 Temperature

In some of the earliest experiments the samples did not achieve a low enough temperature during transit to the laboratory, even though the thermometer monitoring the cabinet indicated suitable conditions. This was improved by changing to a different shape of sampling bottle, careful distribution of bottles within the cabinet and adjustment of the thermostat. Nevertheless, there was still some difference between temperatures within a batch. This is probably inevitable, since gravity-convection refrigerators do not maintain the same temperature throughout their interiors. Care was taken to ensure that sample bottles could not touch the evaporator panels within the refrigerator, so that there would be no possibility of samples freezing.

Table 4.8 shows the mean temperatures recorded for the various types of sample. After 24 hours the mean temperatures for all samples were between 5 °C and 6 °C.

Table 4.8 Mean water temperatures (°C) recorded for the samples analysed

Time (h)	Lowland	Upland	Groundwater
0	11.0	7.6	11.1
6	6.3	6.7	5.5
12	5.8	6.7	5.6
24	5.7	6.0	5.1

4.4.2 pH value

The mean pH values recorded for the various types of sample are listed in Table 4.9, together with an indication of the statistical significance of any observed changes from one sampling time to the next. All values were fairly close to neutrality. The pH values of the lowland surface water and groundwater had a tendency to rise during storage, while the opposite was true of the upland surface water.

Table 4.9 Mean pH values recorded for the samples analysed

Time (h)	Lowland	Sig.[1]	Upland	Sig.[1]	Groundwater	Sig.[1]
0	7.19		7.27		6.82	
6	7.51	***	6.94	***	7.05	***
12	7.57	NS	6.92	NS	7.07	NS
24	7.61	NS	6.90	NS	7.14	**

1 Statistical significance of the rise or fall of pH compared with the previous entry, calculated by paired-sample t test.

However, overall the changes were quite small, and probably result from alteration of the balance of dissolved gases, the direction of change relating to the different initial conditions of the three water types.

4.4.3 Conductivity

The pattern of changes in conductivity, although appearing unusual, was similar for all water types. From sampling time to 6 hours the conductivity dropped on average, from 6 to 12 hours it rose to varying degrees, then from 12 to 24 hours it dropped again. Mean

conductivity values measured in the various sample types are shown in Table 4.10, which is set out similarly to the previous table.

The pattern of changes was particularly marked in the groundwater samples, but as the borehole had been changed half way through the trial period, the two sources were separated (noted in Table 4.10 as groundwaters a and b). One of the sources showed the pattern of changes described above very markedly, although the second source did not show the rise in conductivity between 6 and 12 hours.

Table 4.10 Mean conductivity values (μS cm^{-1}) recorded for the samples analysed

Time (h)	Lowland	Sig.[1]	Upland	Sig.[1]	Ground a	Sig.[1]	Ground b	Sig.[1]
0	986		129		1134		960	
6	938	***	116	***	1071	**	916	***
12	964	*	119	NS	1221	***	915	NS
24	933	***	111	**	1115	***	880	***

1 Statistical significance of the rise or fall in conductivity compared with the previous entry, calculated by paired-sample t test

As with the pH value, the factor which is most likely to cause a change in conductivity on storage is an alteration in the balance of dissolved gases although Ferguson (1994) considers that adsorption of ions to the inside surface of the sample bottle can also have an effect. Overall the changes seen were fairly small, and may be of little practical significance, though it is notable that changes in conductivity were in the same direction for all water types, whereas the changes in pH value, as noted in the previous section, were not.

5. DISCUSSION

The present study showed rather less variability in total coliform results than was seen by the PHLS in the previous published work (PHLS 1953), although that observed for faecal coliforms was the same. The PHLS report considered that a significant change in count was represented by at least a doubling or halving of the observed count, and that after 24 hours of refrigerated storage 34% of total coliform samples and 25% of faecal coliform samples fell into this category. In the present study the equivalent figures were 11% of total coliform samples, and 25% of faecal coliforms. These figures are not strictly comparable, as the two studies were conducted differently, but give an indication of the scale of the variation.

The earlier PHLS study would be expected to show more variability, as seven different laboratories took part in it, and the samples were from a wider variety of sites than in the present work. This is reflected in the total coliform results, but not in the faecal coliform ones, and the pattern of variation (in terms of which organisms showed the greater variation) was reversed for the two studies. The reasons for this are not clear, but as the study designs and methodologies are different, it is unlikely that a simple cause could be found.

The most important aspect is to consider how these results could be applied in practice, and what the implications are for recommendations for acceptable delays between sampling and analysis.

On the evidence of these results, there should be no problem in storing samples for 12 hours before analysis, as overall there were no statistical differences observed between the 6-hour and 12-hour results. This is not to say that counts would always be the same before and after storage. Clearly from these results and other studies, the observed counts can show quite marked differences when analyses are made before and after storage. However, on average, over a large number of samples, no overall differences would be observed.

Extending the allowable storage to 24 hours is more problematical. For total coliforms the average drop in counts compared with the 6-hour sample was 5%, and the difference was of marginal statistical significance. For faecal coliforms the difference was more significant statistically, and the observed average drop in counts was 10%, which is probably unacceptable. Therefore it is probably not advisable to recommend storage for up to 24 hours, but on occasions, if for some reason analysis within 6 or 12 hours proved impossible, it might be acceptable to retain a sample for up to 24 hours, bearing in mind that counts, especially of faecal coliforms, would tend on average to fall.

6. CONCLUSIONS

It must be emphasised that the samples tested in this study were representative of raw, untreated waters. It is not known how far the results could be extrapolated to other water types, such as disinfectant-treated drinking water.

Overall there was no evidence of a significant change in either total coliform or faecal coliform counts for samples tested after 6 and 12 hours of refrigerated storage.

For samples tested after 6 and 24 hours of refrigerated storage, a drop in counts of total and faecal coliforms was seen. This was of marginal statistical significance for total coliforms, but more significant for faecal coliforms. On average the counts of total coliforms were 5% lower, and those of faecal coliforms were 10% lower after 24 hours storage, compared with 6 hours.

Samples with total or faecal coliform content at the limit of detection, where one of the pair of results was derived from a count of zero colonies, appeared to show no significant difference in the detection of low numbers of organisms after 6, 12 or 24 hours of storage. However, the number of samples concerned was too low to draw definite conclusions.

Rates of confirmation of total coliforms and *E. coli* did not change significantly as a result of storage.

No clear patterns of seasonal effects were seen, but this may have been because of the smaller datasets obtained when separating results into seasons.

On the basis of the results obtained in this study, extending the allowable period of storage of samples before analysis from 6 to 12 hours should not affect overall results, provided the samples are refrigerated.

Extension of the allowable period of storage to 24 hours would result in lower overall results. While probably unacceptable for routine monitoring, this might be acceptable on occasions, rather than obtaining no results at all.

REFERENCES

DoE (1983) *The Bacteriological Examination of Drinking Water Supplies 1982. Reports on Public Health and Medical Subjects No. 71.* Department of the Environment, Department of Health and Social Security and Public Health Laboratory Service. London: HMSO.

DoE and WO (1989) *Guidance on Safeguarding the Quality of Public Water Supplies.* Department of the Environment and Welsh Office. London: HMSO.

Ferguson, C.M. (1994) Refrigerated autosampling for the assessment of bacteriological water quality, *Water Research*, **28,** 841-847.

McDaniels, A.E. and Bordner, R.H. (1983) Effects of holding time and temperature on coliform numbers in drinking water, *Journal of American Water Works Association*, **75,** 458-463.

PHLS (1952) The effect of storage on the coliform and *Bacterium coli* counts of water samples, *Journal of Hygiene*, **50,** 107-125.

PHLS (1953) The effect of storage on the coliform and *Bacterium coli* counts of water samples. Storage for six hours at room and refrigerator temperature, by the Public Health Laboratory Service Water Sub-Committee, *Journal of Hygiene*, **51,** 559-571.

Standridge, J.H. and Lesar, D.J. (1977) Comparison of four-hour and twenty-four-hour refrigerated storage of nonpotable water for faecal coliform analysis, *Applied and Environmental Microbiology*, **34,** 398-402.

Standridge, J.H. and Delfino, J.J. (1983) Effect of ambient temperature storage on potable water coliform population estimations, *Applied and Environmental Microbiology*, **46,** 1113-1117.

Tillett, H.E. (1993) Potential inaccuracy of microbiological counts from routine water samples, *Water Science and Technology*, **27**(3/4), 15-18.

APPENDIX A

PLOTS OF DIFFERENCES IN BACTERIAL COUNTS OBSERVED BEFORE AND AFTER STORAGE

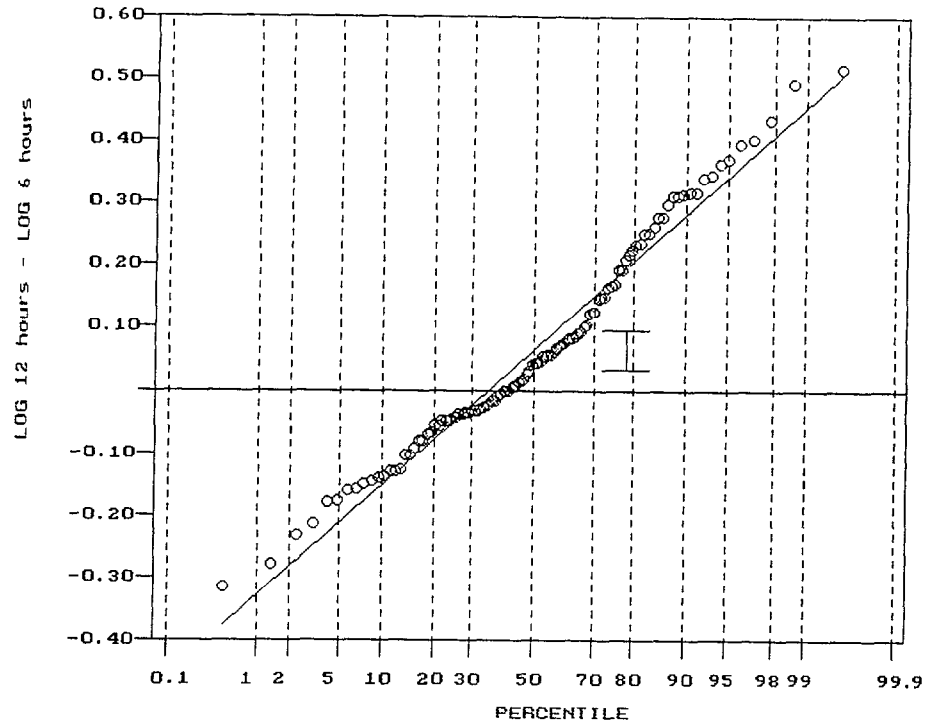

Figure A1 **Results of storage experiments using lowland surface water. Presumptive total coliforms comparing 6 and 12 hours.**

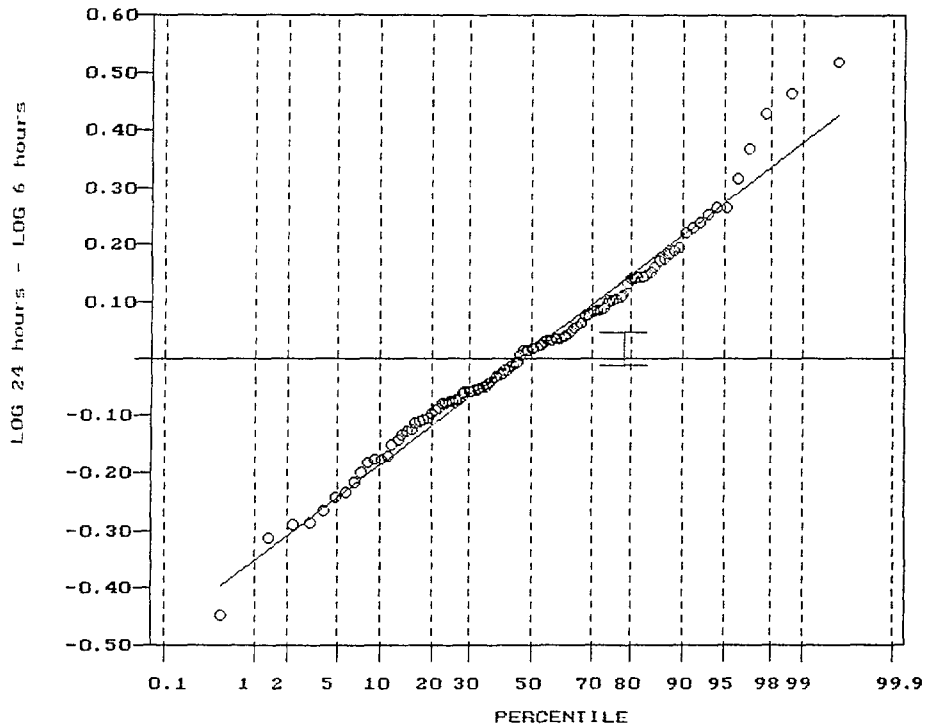

Figure A2 **Results of storage experiments using lowland surface water. Presumptive total coliforms comparing 6 and 24 hours.**

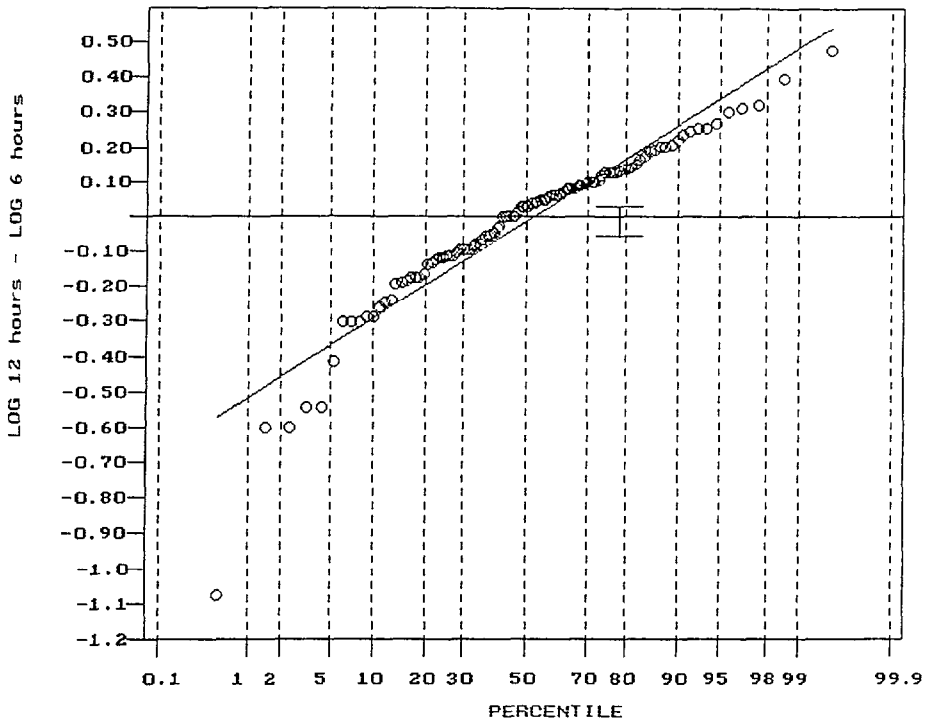

Figure A3 **Results of storage experiments using lowland surface water. Presumptive faecal coliforms comparing 6 and 12 hours.**

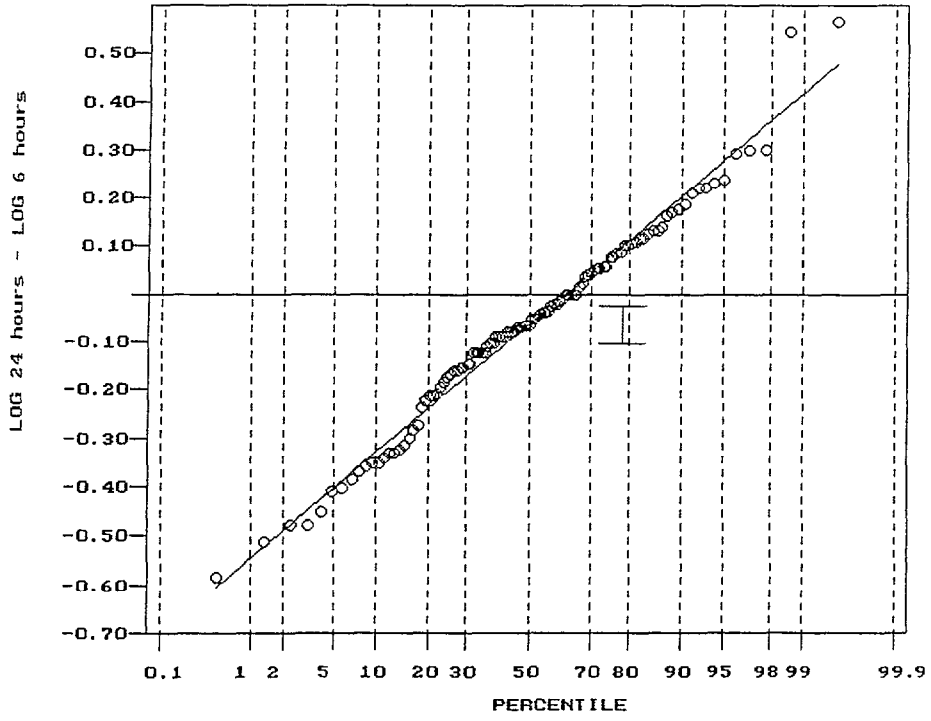

Figure A4 **Results of storage experiments using lowland surface water. Presumptive faecal coliforms comparing 6 and 24 hours.**

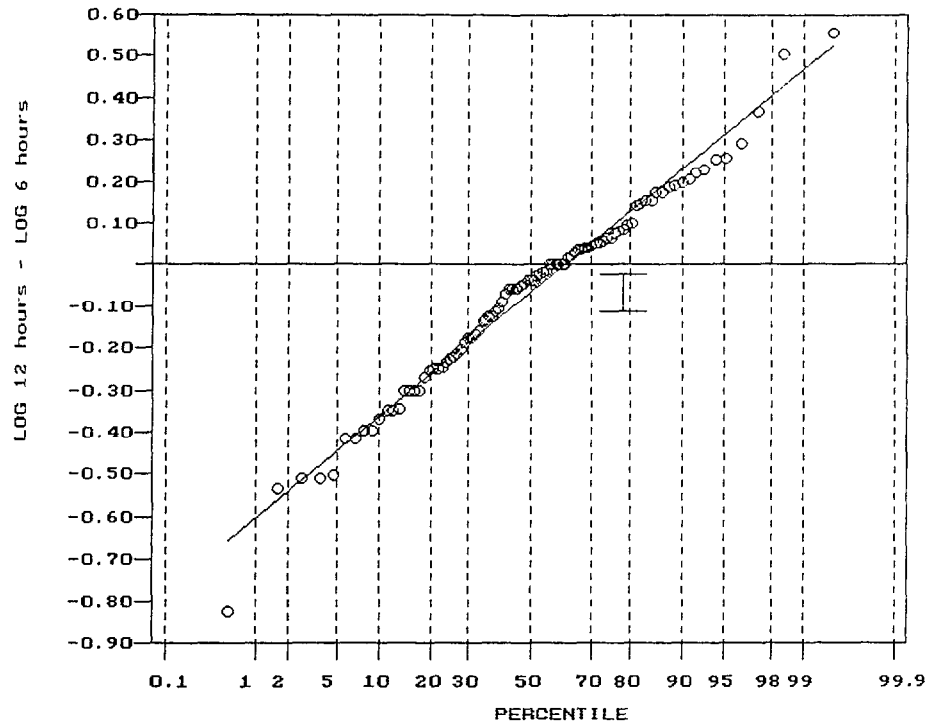

Figure A5 **Results of storage experiments using upland surface water. Presumptive total coliforms comparing 6 and 12 hours.**

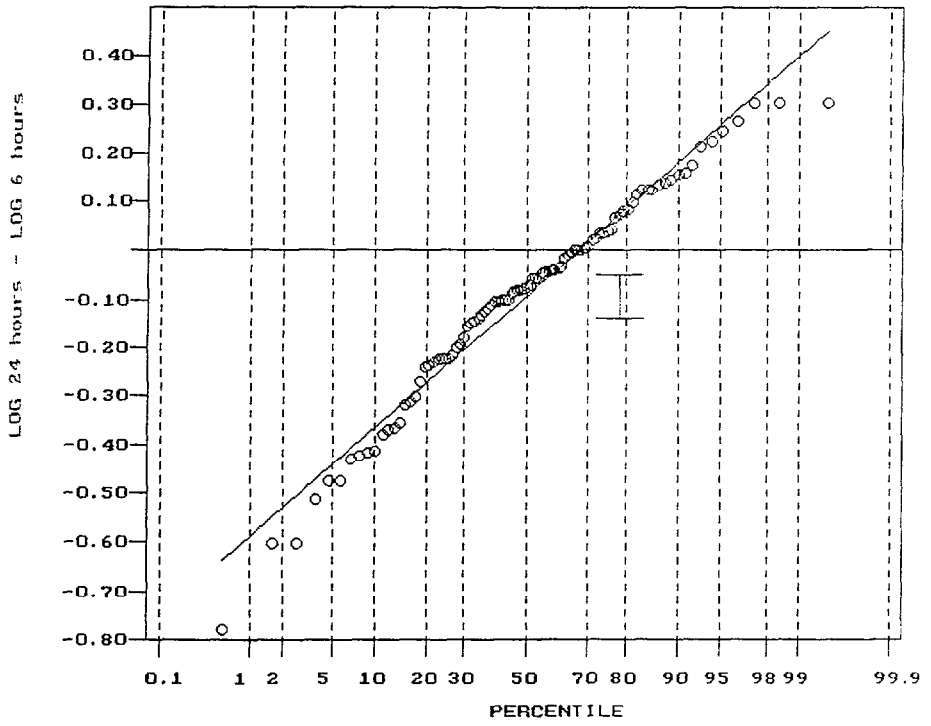

Figure A6 **Results of storage experiments using upland surface water. Presumptive total coliforms comparing 6 and 24 hours.**

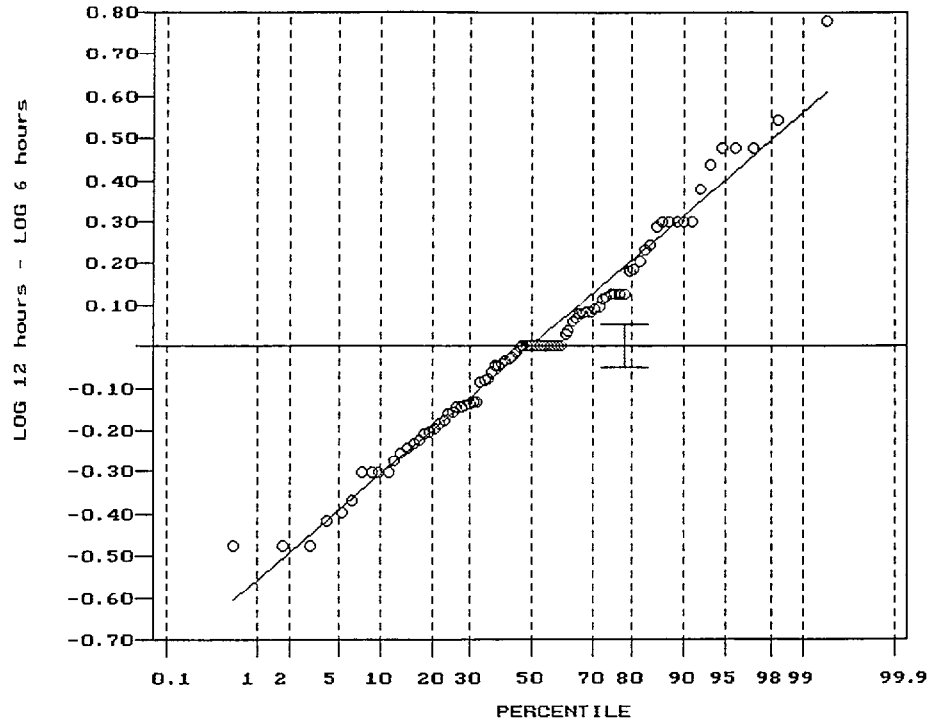

Figure A7 Results of storage experiments using upland surface water. Presumptive faecal coliforms comparing 6 and 12 hours.

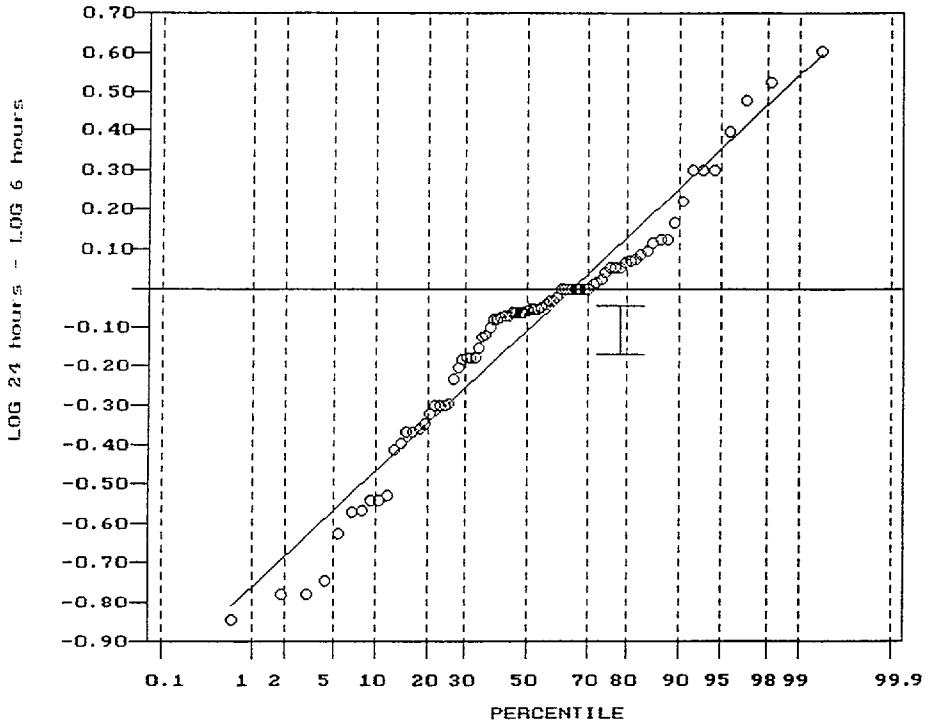

Figure A8 Results of storage experiments using upland surface water. Presumptive faecal coliforms comparing 6 and 24 hours.

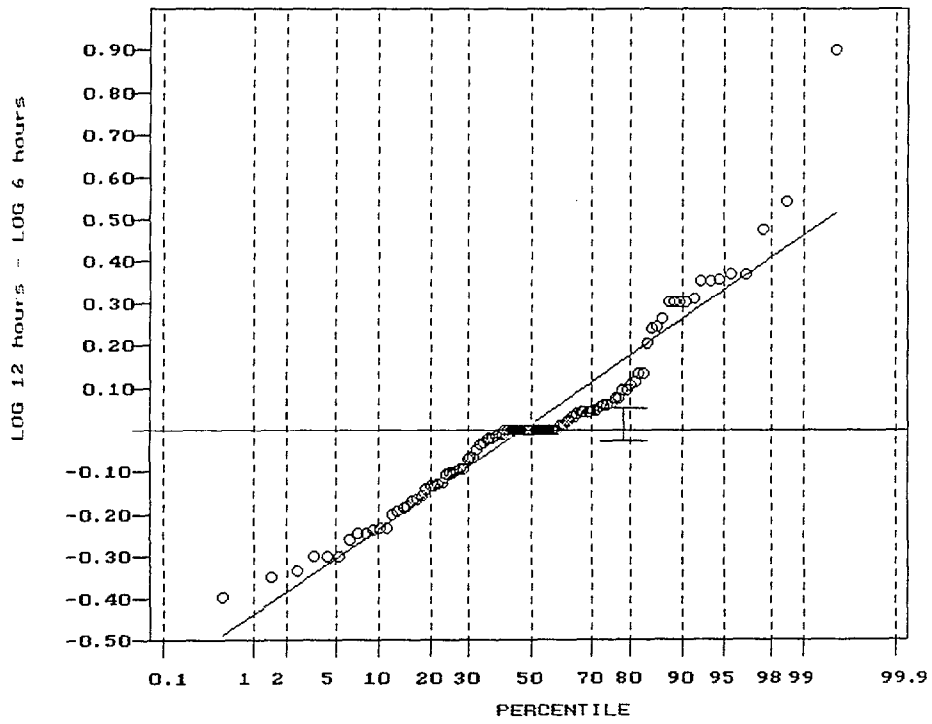

Figure A9 Results of storage experiments using groundwater. Presumptive total coliforms comparing 6 and 12 hours.

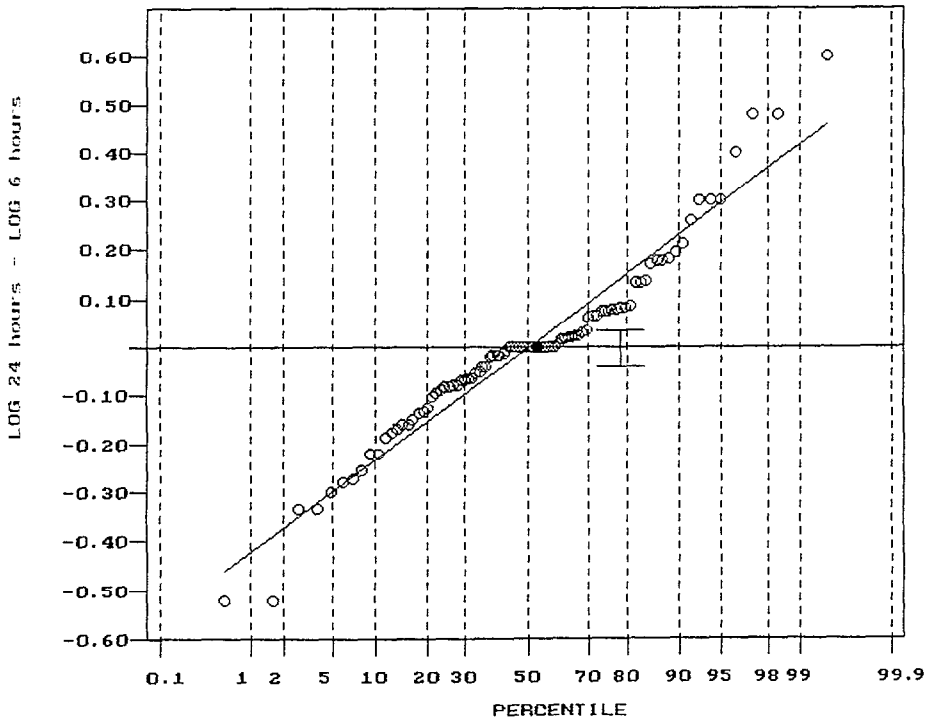

Figure A10 Results of storage experiments using groundwater. Presumptive total coliforms comparing 6 and 24 hours.

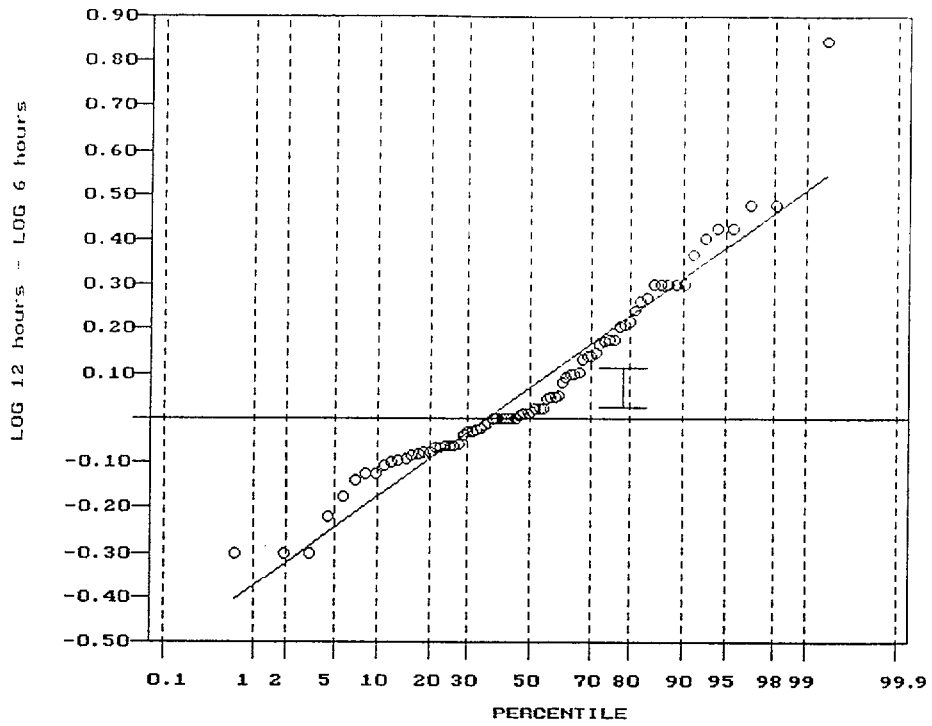

Figure A11 Results of storage experiments using groundwater. Presumptive faecal coliforms comparing 6 and 12 hours.

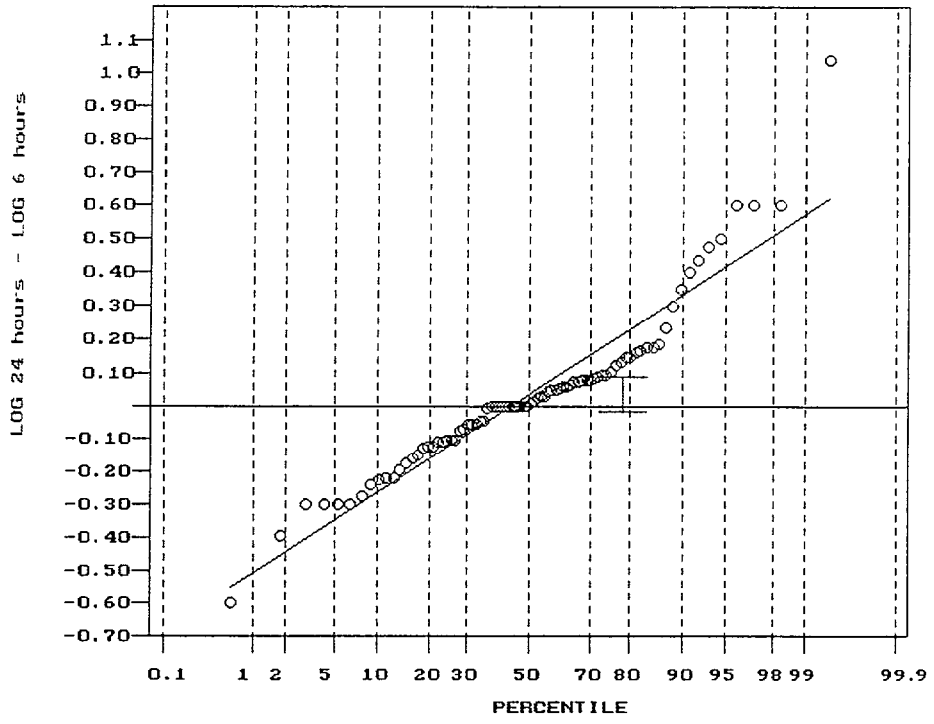

Figure A12 Results of storage experiments using groundwater. Presumptive faecal coliforms comparing 6 and 24 hours.

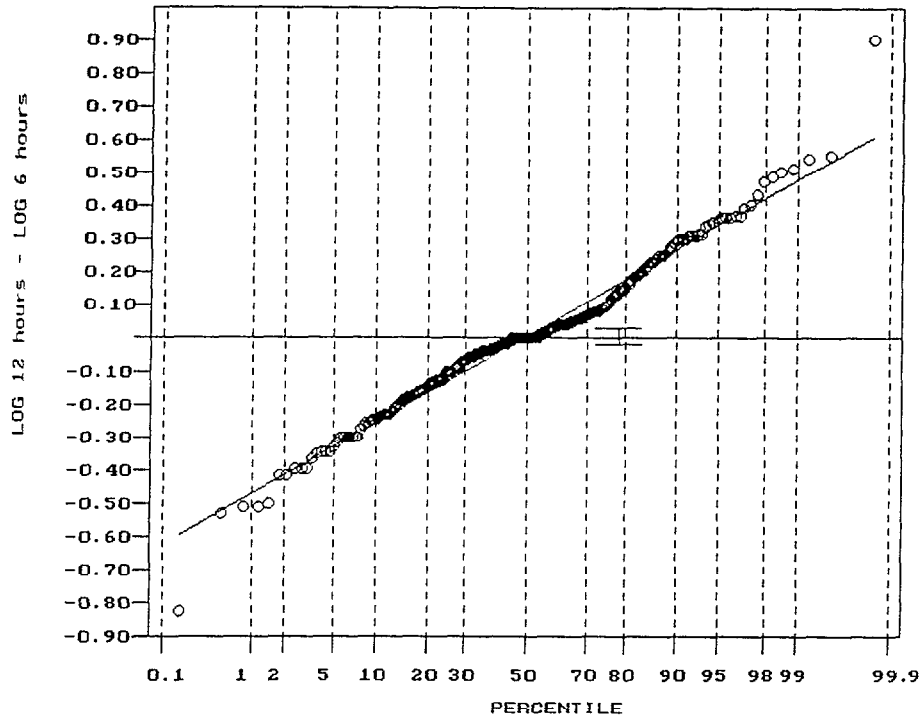

Figure A13 Results of storage experiments combining all samples. Presumptive total coliforms comparing 6 and 12 hours.

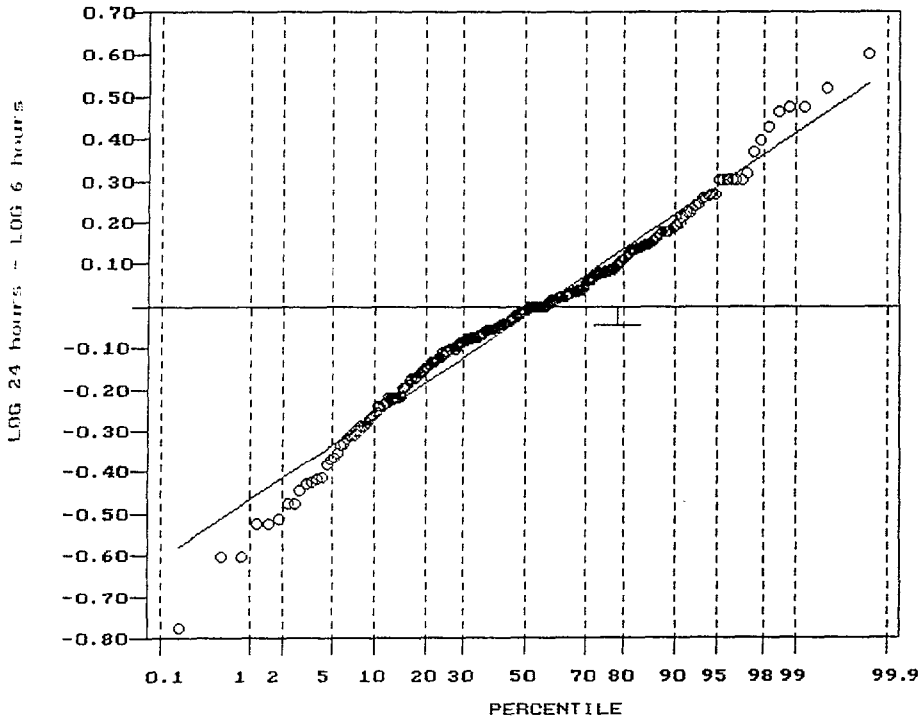

Figure A14 Results of storage experiments combining all samples. Presumptive total coliforms comparing 6 and 24 hours.

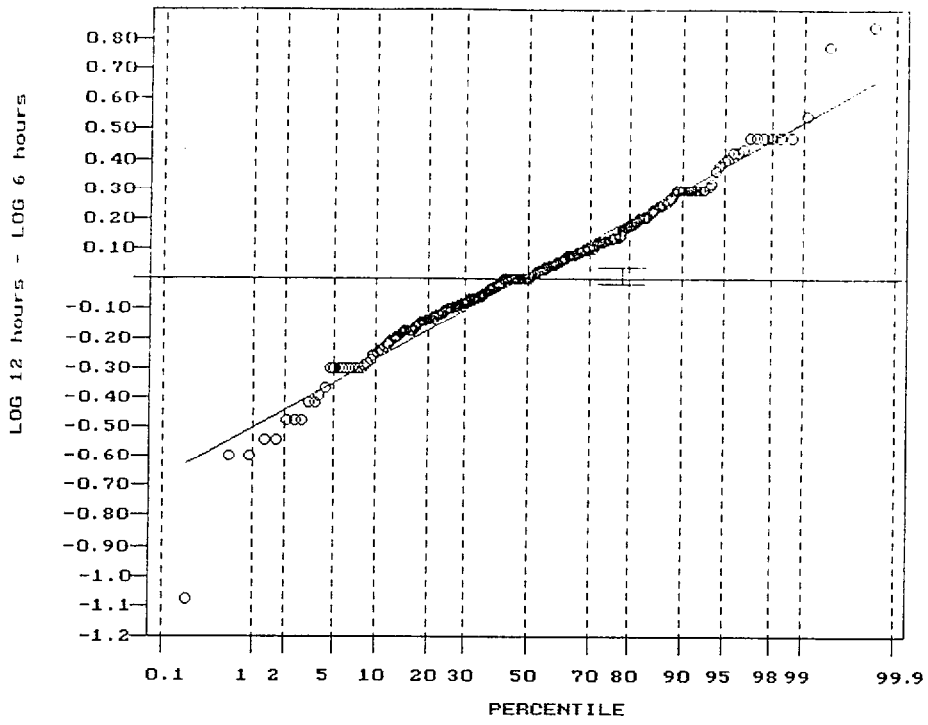

Figure A15 Results of storage experiments combining all samples. Presumptive faecal coliforms comparing 6 and 12 hours.

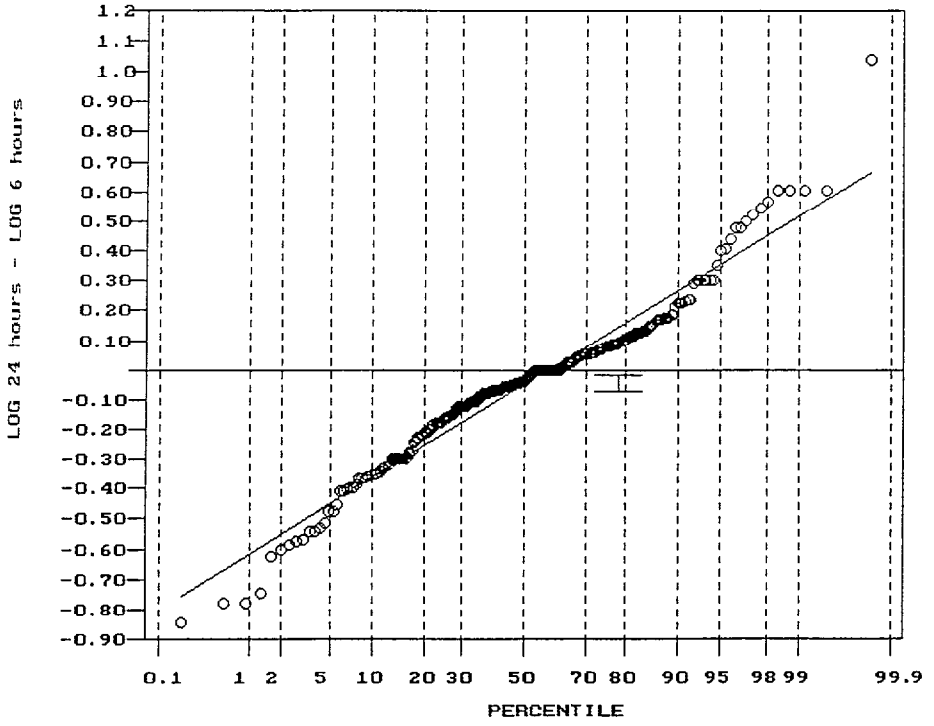

Figure A16 Results of storage experiments combining all samples. Presumptive faecal coliforms comparing 6 and 24 hours.

APPENDIX B

COMPLETE LISTING OF DATA OBTAINED DURING THE STUDY

07007 STORAGE OF COLIFORM SAMPLES

Tabulated data. TC and FC counts in cfu per 100 ml. Temperature in °C, conductivity in µS/cm.

			0 hours			6 hours			12 hours			24 hours			6 hours			12 hours			24 hours		
Sample	Date	Wat. type	Temp	Cond	pH	Temp	Cond	pH	Temp	Cond	pH	Temp	Cond	pH	TC	% Conf	FC	% Conf	TC	% Conf	FC	% Conf	TC	% Conf	FC	% Conf
1	15/12/92	Lowland	12.3	800	7.69	10.5	723	7.93	9.5	718	7.79	9.9	714	7.87	6700		5800		11900		3000		6100		2300	
2	15/12/92	Lowland	12.6	722	7.97	10.5	713	7.84	5.9	711	7.87	10.0	712	7.90	9600		3800	82	13400		4700		6300		3100	
3	15/12/92	Lowland	12.0	755	8.02	10.6	755	7.78	5.6	815	7.91	10.2	829	7.92	5900		4200				4600		5700	91	2800	
4	15/12/92	Lowland	11.9	730	7.94	10.6	708	7.74	4.9	723	7.93	10.3	724	8.02	9900		6000		11600		4000		6600		2900	
5	15/12/92	Lowland	11.7	725	7.88	10.6	712	7.04	3.9	717	8.08	10.7	718	8.06	6400		5000		12700	100	3800	97	7400		2900	
6	12/01/93	Lowland	9.1	558	6.90	10.2	550	6.95	10.3	562	6.56	9.6	562	6.36	13300		5100		33000	61	6400		31000		6900	
7	12/01/93	Lowland	10.1	557	7.16	9.1	555	6.90	9.1	557	6.87	9.6	560	6.84	10000		6600		31000		7900		33000		7300	
8	12/01/93	Lowland	9.2	565	7.11	9.4	553	6.47	9.3	562	6.89	9.1	561	6.94	11000		7400		36000		7400		32000		6200	82
9	12/01/93	Lowland	9.5	565	7.06	9.3	558	6.92	9.3	557	6.94	9.0	560	6.99	13000	93	6900	100	21000		7900		27000		6900	
10	12/01/93	Lowland	9.5	562	7.05	10.0	564	7.01	9.4	562	6.95	9.1	561	7.00	11200		6400		23000		8600	53	19000	81	6200	
11	01/02/93	Lowland	9.9	549	7.41		520		8.0	681	6.61	9.5		7.24	13100		3500		10300		2800		13500	72	3200	55
12	01/02/93	Lowland	9.4	1084	7.70	8.8	942	7.37	8.0	928	6.67	9.5		7.33	12800		2700		11800		3700		17800		2800	
13	01/02/93	Lowland	9.8	1222	7.60	9.0	978	7.80	8.2	1358	7.38	9.4		7.32	14400	57	2700	75	14900	65	3100	75	14900		3400	
14	01/02/93	Lowland	10.0	1086	7.60	9.1	1019	7.75	8.9	1257	7.37	9.5		7.35	10900		2000		11700		3500		15800		3000	
15	01/02/93	Lowland	10.4	981	7.57	9.6	1290	7.62	9.2	1866	7.47	10.2		7.34	11100		2800		11200		3000		16600		3800	
16	01/02/93	Lowland	10.4	1052	7.49	9.1	1320	7.64	8.9	1820	7.46	10.2		7.37	11100		3200		15600		2800		13400		2600	
17	01/02/93	Lowland	10.7	1399	7.49	9.4	1349	7.64	9.7	1862	7.39	10.2		7.35	11800		1900		12100		3900		19700		2800	
18	01/02/93	Lowland	10.8	1024	7.49	8.8	1024	7.66	10.1	1526	7.37	10.1		7.33	11100		2200		10900		3500		17000		2500	
19	08/02/93	Lowland	10.1	701	7.25	7.9	688	7.29	7.8	678	7.11	6.1	684	7.33	13600		3000		12600		2800		14200		2700	
20	08/02/93	Lowland	9.1	702	7.11	6.1	698	6.52	7.3	674	7.34	6.6	695	6.59	14100		2000		12900		3600		13700		2600	
21	08/02/93	Lowland	9.6	699	7.33	7.7	693	7.39	7.2	780	7.39	6.7	679	7.43	12600		2000		14000		3100		13300		2400	
22	08/02/93	Lowland	9.4	701	7.28	6.5	693	7.43	6.5	688	7.40	5.7	693	7.40	13900		2400		13900		2000		12600		2400	
23	08/02/93	Lowland	10.3	724	7.35	7.6	698	7.40	6.9	711	7.39	6.2	777	7.48	10400		2200		12600		2200		13200		2700	
24	08/02/93	Lowland	9.7	708	7.27	7.1	672	7.41	6.8	781	7.42	5.9	695	7.42	14600		2700		11500		1800		15100		2200	
25	08/02/93	Lowland	10.4	706	7.27	7.5	652	7.42	6.6	694	7.44	6.5	676	7.49	12600		1500		11100		2200		15400		2500	
26	08/02/93	Lowland	10.3	699	7.29	6.5	681	7.41	7.2	795	7.45	6.4	685	7.47	9400	67	1800	61	11400	67	2900	68	13000	56	1900	75
27	16/02/93	Lowland	10.0	685	6.59	5.8	670	7.11	3.8	672	7.28	5.0	672	7.09	5200		1800		7300		2000		9000		1700	
28	16/02/93	Lowland	9.6	692	7.19	4.4	670	7.31	3.2	664	7.29	3.0	661	7.34	7000	40	2000	70	6400	58	2000	100	5600	71	1700	72
29	16/02/93	Lowland	10.0	699	7.25	4.4	671	7.23	3.8	665	7.31	3.2	664	7.36	6500		1800		7700		2200		9700		1100	
30	16/02/93	Lowland	9.9	698	7.26	5.4	671	7.29	3.9	667	7.31	3.7	671	7.39	6300		1300		5400		1800		7600		1700	
31	16/02/93	Lowland	10.0	701	7.17	5.0	675	7.32	3.6	669	7.36	4.1	669	7.22	6400		2200		7400		1700		8000		2100	
32	09/03/93	Lowland	8.8	646	8.74	6.1	637	8.75	6.4	638	8.64	5.5	636	8.71	7600		1000		15600		1100		4800		890	
33	09/03/93	Lowland	7.9	643	8.69	5.8	621	8.67	4.9	630	8.44	5.4	630	8.66	6800		1400		12900		1600		5900		890	
34	09/03/93	Lowland	7.3	644	8.68	5.9	621	8.68	4.9	634	8.63	5.2	631	8.60	6400		1000		17400		1600		5600		1700	
35	09/03/93	Lowland	7.2	645	8.69	5.9	631	8.63	4.9	636	8.70	5.2	630	8.62	6400		780		14000		1400		6300		1200	
36	09/03/93	Lowland	7.3	646	8.72	6.3	640	8.63	5.6	640	8.58	5.4	640	8.62	5800	95	1100	77	14700	88	2300	90	6100	72	1600	87
37	30/03/93	Lowland	11.4	970		8.0	1221	6.74	6.4	1000	7.79	6.1	931	7.18	8300		1800		9400		2800		6400		1400	
38	30/03/93	Lowland	11.7	1263		6.8	1211	7.91	5.8	1093	7.91	5.1	947	7.72	10900		3800		12700		2600		5600		1800	
39	30/03/93	Lowland	11.9	1259		7.4	1192	7.94	5.6	909	7.97	5.3	940	7.82	12300		2700		11000		2800		6000		1400	
40	30/03/93	Lowland	11.7	1000		7.4	931	7.95	5.8	983	7.99	4.5	941	7.90	13200		2800		15700		3000		8000		2400	
41	30/03/93	Lowland	11.9	1049		6.9	910	8.00	5.4	1184	8.02	5.0	933	7.95	12700		3200		11800		2100		9000		1400	
42	30/03/93	Lowland	11.8	1013		7.0	1196	8.00	5.7	1200	8.06	5.0	967	8.02	13200		2900		11800		2200		9700		1900	
43	30/03/93	Lowland	11.6	982		7.9	1214	6.50	6.1	1149	8.04	5.0	1256	8.03	12600		3900		11600		2000		7200		1300	
44	30/03/93	Lowland	11.5	1283		6.3	954	7.94	5.4	1140	8.05	5.5	1153	8.05	6200	65	2600	83	13700	76	3200	79	8400	56	1600	76
45	22/06/93	Lowland	17.5	1071	7.26	6.4	923	7.74	7.7	1005	7.82	5.8	1018	7.04	4700		500		5200		600		4200		1000	
46	22/06/93	Lowland	17.5	1071	7.26	6.1	913	7.04	6.9	980	7.25	5.3	1046	7.88	5500		600		3800		800		4100		200	
47	22/06/93	Lowland	17.5	1071	7.26	5.8	955	7.14	6.3	1220	7.50	5.9	1037	7.99	4600		1100		4800		1300		5300		1000	
48	22/06/93	Lowland	17.5	1071	7.26	6.0	908	7.09	6.5	1065	7.54	5.7	1029	7.82	5000		800		4800		400		4700		600	
49	22/06/93	Lowland	17.5	1071	7.26	5.4	912	7.71	5.3	995	7.35	5.3	1011	7.51	1900		800		3900		400		5100		600	
50	22/06/93	Lowland	17.5	1071	7.26	5.1	941	7.63	5.7	975	7.20	5.6	1023	7.61	4800		700		7500		200		4700		300	
51	22/06/93	Lowland	17.5	1071	7.26	6.0	950	7.13	5.3	1008	7.35	5.2	1010	7.25	5100		600		3600		500		5500		800	
52	22/06/93	Lowland	17.5	1071	7.26	4.9	992	7.20	5.5	1020	7.49	5.2	1112	7.29	4000		900		4400		1000		4300		400	
53	22/06/93	Lowland	17.5	1071	7.26	5.0	921	7.33	6.2	1275	7.52	5.3	1065	7.31	4600		700		5700		1200		5200		0	
54	22/06/93	Lowland	17.5	1071	7.26	4.8	973	7.17	5.5	1005	7.51	5.1	1005	7.40	4100	83	900	71	3800	60	800	63	3900		400	
55	02/08/93	Lowland	18.6	1834	7.62	7.2	1760	7.53	5.3	1675	7.41	4.6		7.31	4800		600		3200		400		6100		500	
56	02/08/93	Lowland	18.6	1834	7.62	7.4	1734	8.05	5.4	1651	7.91	4.1	1604	7.79	3800		600		3400		700		5400		500	
57	02/08/93	Lowland	18.6	1834	7.62	7.1	1754	8.06	5.1	1740	7.96	4.5	1628	7.81	4400		200		3200		500		5700		700	
58	02/08/93	Lowland	18.6	1834	7.62	5.4	1655	8.15	4.9	1672	7.81	4.2	1578	8.21	3900		300		3500		600		5000		1100	
59	02/08/93	Lowland	18.6	1834	7.62	5.3	1617	8.19	4.2	1774	7.23	3.7	1760	8.23	4700		300		3800		500		5200		600	
60	02/08/93	Lowland	18.6	1834	7.62	6.7	1667	8.20	4.3	1775	7.91	4.1	1691	8.17	4700		700		4000		400		4200		500	
61	02/08/93	Lowland	18.6	1834	7.62	6.8	1670	8.20	4.9	1685	7.81	4.3	1523	8.31	5700		200		3000		600		5000		0	
62	02/08/93	Lowland	18.6	1834	7.62	5.3	1620	8.20	5.1	1560	7.94	3.8	1591	7.95	3200		1000		2900		500		5900		600	
63	02/08/93	Lowland	18.6	1834	7.62	6.5	1758	8.19	4.8	1639	7.95	4.0	1623	7.91	5100		400		3800	56	600	83	4300	70	300	45
64	21/09/93	Lowland	14.8	762	7.05	4.1		7.09	5.8	678	6.72	4.3		7.21	17600		3800		20000		4800		21000		4300	
65	21/09/93	Lowland	14.8	762	7.05	4.3		7.14	5.6	614	7.25	4.9		7.80	17400		3500		36000		4700		27000		4000	

07007 STORAGE OF COLIFORM SAMPLES

Tabulated data. TC and FC counts in cfu per 100 ml. Temperature in °C, conductivity in µS/cm.

Sample	Date	Wat. type	0 hours Temp	Cond	pH	6 hours Temp	Cond	pH	12 hours Temp	Cond	pH	24 hours Temp	Cond	pH	6 hours TC	% Conf	FC	% Conf	12 hours TC	% Conf	FC	% Conf	24 hours TC	% Conf	FC	% Conf
66	21/09/93	Lowland	14.8	762	7.05	4.4		7.23	5.0	585	7.57	4.7		7.67	20900		4200		35000		4500		17000		4800	
67	21/09/93	Lowland	14.8	762	7.05	4.1		7.25	4.1	594	7.55	4.9		7.95	21300		4400		35000		4800		23000		4800	
68	21/09/93	Lowland	14.8	762	7.05	4.7		7.29	4.7	638	7.80	4.5		7.95	20300		4600		37000		3700		28000		4500	
69	21/09/93	Lowland	14.8	762	7.05	4.6		7.37	5.3	646	7.82	4.9		8.00	14700		2500		34000		3400		23000		4900	
70	21/09/93	Lowland	14.8	762	7.05	4.8		7.41	5.0	622	7.90	5.0		7.99	17900		3900		42000		4500		20000		3700	
71	21/09/93	Lowland	14.8	762	7.05	4.9		7.60	5.7	604	7.96	4.9		8.06	18300		4100		27000		3300		19000		3500	
72	21/09/93	Lowland	14.8	762	7.05	5.0		7.78	5.3	602	8.02	5.1		8.01	16300		3200		24000		4300		30000		2600	
73	21/09/93	Lowland	14.8	762	7.05	5.1		7.80	6.6	634	8.00	5.3		8.02	16400	93	3400	83	34000	45	3800	78	23000	67	3400	78
74	26/10/93	Lowland	9.3	745	6.93	5.5	632	6.87	4.8	715	6.76	4.9	713	7.26	5900		1500		5500		1800		6300		1900	
75	26/10/93	Lowland	9.3	745	6.93	5.8	668	7.13	5.3	693	7.47	4.8	663	6.99	6500		2000		8000		1100		5100		1400	
76	26/10/93	Lowland	9.3	745	6.93	6.2	771	7.27	5.4	676	7.58	4.6	670	7.39	6300		2100		6000		1800		6800		1800	
77	26/10/93	Lowland	9.3	745	6.93	6.1	783	7.30	4.4	728	7.71	4.4	706	7.54	7200		1700		6800		1100		4800		600	
78	26/10/93	Lowland	9.3	745	6.93	6.2	809	7.37	6.0	709	7.72	4.4	784	7.60	8100		1400		5800		1300		4400		1800	
79	26/10/93	Lowland	9.3	745	6.93	5.9	714	7.43	4.8	708	7.81	4.4	689	7.67	7800		1400		5400		1500		6100		1100	
80	26/10/93	Lowland	9.3	745	6.93	6.4	824	7.44	4.8	705	7.92	4.7	699	7.72	7700		2200		4500		1800		6500		1500	
81	26/10/93	Lowland	9.3	745	6.93	6.2	775	7.48	4.4	703	7.92	4.3	802	7.70	7700		1600		5100		1600		7200		1600	
82	26/10/93	Lowland	9.3	745	6.93	6.4	729	7.49	5.7	762	7.96	4.4	742	7.68	6600	31	1400	84	4900	56	2600	88	7200	13	1700	44
83	23/11/93	Lowland	5.0	1650	6.92	4.7	1726	6.78	5.9	1835	6.75	5.4	1698	6.98	6200		900		6300		900		5200		800	
84	23/11/93	Lowland	5.0	1650	6.92	5.3	1869	7.13	4.4	1795	7.12	5.0	1689	7.28	6300		1400		6300		400		4900		1000	
85	23/11/93	Lowland	5.0	1650	6.92	4.5	1817	7.42	4.7	1894	7.57	4.8	1609	7.53	8300		800		6900		700		6800		1100	
86	23/11/93	Lowland	5.0	1650	6.92	4.8	1868	7.26	4.1	1895	7.87	4.5	1520	7.63	7200		800		6000		1000		6300		900	
87	23/11/93	Lowland	5.0	1650	6.92	4.7	1638	7.47	4.4	1872	7.62	4.7	1606	7.75	8200		1000		6100		900		7800		700	
88	23/11/93	Lowland	5.0	1650	6.92	4.7	1878	7.54	5.2	1926	7.73	4.3	1605	7.71	6500		1100		5700		1500		5700		500	
89	23/11/93	Lowland	5.0	1650	6.92	5.0	1639	7.57	4.6	1911	7.81	5.0	1616	7.79	6600		1500		6700		1200		6100		800	
90	23/11/93	Lowland	5.0	1650	6.92	5.3	1628	7.61	4.4	1850	7.83	4.7	1842	7.79	9300		2300		5700		1300		4800		600	
91	23/11/93	Lowland	5.0	1650	6.92	5.9	1671	7.60	5.2	1758	7.81	5.4	1638	7.85	8900	72	2600	79	4300	71	1000	93	6000	69	800	60
92	14/12/93	Lowland	6.7	1397	6.93	4.9	1120	7.22	4.8	1091	7.25	4.1	1043	7.13	21000		5400		36000		7100		25000		5000	
93	14/12/93	Lowland	6.7	1397	6.93	4.6	1104	9.96	4.3	1065	7.43	4.0	1049	7.11	23000		4100		26000		5800		28000		4500	
94	14/12/93	Lowland	6.7	1397	6.93	4.5	1047	7.37	4.1	1065	7.33	4.2	1175	7.40	24000		6400		32000		4700		43000		4800	
95	14/12/93	Lowland	6.7	1397	6.93	4.2	1043	7.52	3.9	1056	7.52	3.6	1104	7.57	25000		5000		39000		6000		32000		6000	
96	14/12/93	Lowland	6.7	1397	6.93	4.1	1106	7.63	4.1	1205	7.63	3.6	1113	7.69	18000		4800		32000		6000		25000		4400	
97	14/12/93	Lowland	6.7	1397	6.93	4.2	1038	7.57	4.4	1055	7.69	3.6	1039	7.72	34000		6100		32000		4600		30000		5100	
98	14/12/93	Lowland	6.7	1397	6.93	4.3	1152	7.69	4.5	1073	7.67	3.8	1049	7.75	28000		6000		37000		4600		29000		3700	
99	14/12/93	Lowland	6.7	1397	6.93	4.3	1035	7.66	3.7	1047	7.72	3.8	1049	7.78	28000		5600		31000		4400		10000		4800	
100	14/12/93	Lowland	6.7	1397	6.93	4.4	1104	7.65	6.4	1315	6.88	4.9	1063	7.78	32000	94	6100	88	34000	80	4700	87	24000	50	4200	95
101	07/03/94	Lowland	9.1	418	6.42	5.9	424	6.38	6.0	450	6.55	5.5	399	6.47	6700		1800		8500		0		6200		700	
102	07/03/94	Lowland	9.1	418	6.42	5.8	431	6.85	5.9	482	6.98	5.4	411	6.94	8600		1500		8600		0		7200		700	
103	07/03/94	Lowland	9.1	418	6.42	5.9	442	6.96	5.3	446	7.15	5.1	407	7.25	6900		1700		6800		0		6100		700	
104	07/03/94	Lowland	9.1	418	6.42	5.6	435	7.21	5.0	446	7.48	5.3	436	7.47	10100		1200		7300		300		5900		600	
105	07/03/94	Lowland	9.1	418	6.42	5.3	460	7.26	5.1	448	7.48	5.3	437	7.57	5400		1500		7900		0		5800		700	
106	07/03/94	Lowland	9.1	418	6.42	5.9	451	7.27	5.2	448	7.50	5.4	441	7.65	6800		1200		8600		300		6900		900	
107	07/03/94	Lowland	9.1	418	6.42	5.8	444	7.37	5.4	452	7.54	5.2	445	7.69	6000		1100		8000		800	80	5000		1400	
108	07/03/94	Lowland	9.1	418	6.42	5.8	454	7.35	5.0	447	7.67	4.9	447	7.72	6800		1100		8200		700		5700		1900	84
109	07/03/94	Lowland	9.1	418	6.42	5.6	460	7.34	6.1	453	7.68	4.8	444	7.76	7300		1200		8300		100		8000		1200	
110	07/03/94	Lowland	9.1	418	6.42	5.8	534	7.36	6.1	462	7.69	5.2	451	7.76	5600		1300		6800		0		6000		900	
111	07/03/94	Lowland	9.1	418	6.42	5.5	462	7.39	6.4	455	7.70	5.2	459	7.78	6500		800		11100		0		7400		1300	
112	07/03/94	Lowland	9.1	418	6.42	5.6	482	7.38	6.2	525	7.70	4.8	452	7.77	7500		1400		7200		0		5400		1100	
113	07/03/94	Lowland	9.1	418	6.42	5.5	465	7.37	6.3	518	7.71	5.4	448	7.74	4900	55	300	88	9300	95	0		6000	95	500	

07007 STORAGE OF COLIFORM SAMPLES

Tabulated data. TC and FC counts in cfu per 100 ml. Temperature in °C, conductivity in µS/cm.

Sample	Date	Wat. type	0 hours Temp	Cond	pH	6 hours Temp	Cond	pH	12 hours Temp	Cond	pH	24 hours Temp	Cond	pH	6 hours TC	% Conf	FC	% Conf	12 hours TC	% Conf	FC	% Conf	24 hours TC	% Conf	FC	% Conf
1	02/03/93	Upland	3.3	98	7.82	6.0	114	7.09	6.0	92	7.96	5.5	91	7.71	125		3		48		3		76		2	
2	02/03/93	Upland	3.3	98	7.82	5.4	102	6.88	5.9	95	7.54	5.0	92	7.66	99		3		74		1		87		10	50
3	02/03/93	Upland	3.4	93	7.84	6.1	95	6.74	5.9	95	7.26	4.7	93	7.63	102		5	100	75		0		79		2	
4	02/03/93	Upland	3.4	93	7.84	5.8	92	6.61	5.9	108	7.02	4.8	93	7.53	68		1		79		2		74		3	
5	02/03/93	Upland	3.4	118	7.84	4.9	108	6.66	5.8	109	6.92	4.6	93	7.42	71		3		78		1		84		4	
6	02/03/93	Upland	3.4	118	7.84	5.2	106	6.61	7.5	98	6.78	6.5	98	7.26	100		3		67		3		73		2	
7	02/03/93	Upland	3.3	123	7.82	4.9	95	6.66	6.4	97	6.75	4.6	94	6.97	74		1		74		3		107		2	
8	02/03/93	Upland	3.3	123	7.82	5.1	110	6.67	6.4	108	6.78	4.8	94	6.94	137		3		76		2		114		3	
9	02/03/93	Upland	3.3	115	7.94	5.5	94	6.83	7.7	113	6.66	6.9	99	7.15	66		2		73		2		92		5	
10	02/03/93	Upland	3.3	115	7.94	5.4	94	6.73	6.4	108	6.64	4.9	93	6.87	98	55	1		93	85	6	50	62	44	4	
11	16/03/93	Upland	4.5	99	8.95	5.9	86	8.33	7.0	90	8.34	6.2	89	8.30	72		32		75		23		35		14	
12	16/03/93	Upland	4.7	105	8.83	6.1	80	7.87	6.0	90	8.20	6.0	80	7.86	75		23		42		15		32		20	
13	16/03/93	Upland	4.6	101	8.50	6.3	80	7.71	6.0	84	8.00	6.0	82	7.86	104		25		56		18		82		21	
14	16/03/93	Upland	4.5	90	8.25	5.5	80	7.61	6.2	86	7.86	5.6	82	7.67	137		20		43		20		57		17	
15	16/03/93	Upland	4.6	101	8.38	4.1	84	7.51	6.0	85	7.84	5.7	87	7.61	91		29		39		26		40		17	
16	16/03/93	Upland	4.6	86	8.31	4.4	72	7.37	6.1	74	7.74	5.9	73	7.56	121		46		76		23		117		41	
17	16/03/93	Upland	4.8	98	8.04	6.0	83	7.45	6.3	83	7.59	6.1	85	7.70	91		29		35		18		67		19	
18	16/03/93	Upland	4.8	97	8.10	5.3	84	7.30	6.5	83	7.39	5.8	82	7.36	107		17		48		34		41		25	
19	16/03/93	Upland	5.2	88	8.13	5.8	84	7.27	6.7	85	7.31	6.4	84	7.24	140		20		41		26		52		19	
20	16/03/93	Upland	5.6	87	8.30	5.6	101	7.23	7.2	86	7.24	8.0	89	7.05	90		40		55		28		52		18	
21	16/03/93	Upland	5.3	87	8.27	5.3	91	7.19	8.1	90	7.14	8.0	91	6.99	69		23		63		35		70		11	
22	16/03/93	Upland	5.2	95	7.92	5.2	87	7.90	8.3	87	7.22	7.5	86	6.95	98		21		49		28		97		16	
23	16/03/93	Upland	5.2	87	8.32	5.2	88	7.23	8.5	87	7.30	8.3	88	7.06	60		14		51		24		90		14	
24	16/03/93	Upland	5.2	86	8.00	5.2	86	7.09	7.7	85	7.14	8.6	84	6.87	74		14		42		49		53		13	
25	16/03/93	Upland	5.3	86	8.02	5.3	87	7.10	7.7	89	7.13	7.5	85	6.72	94		15		53		29		45		25	
26	16/03/93	Upland	5.1	86	8.19	5.1	87	7.12	8.6	87	7.05	7.5	88	6.84	82		18		37		29		44		19	
27	16/03/93	Upland	5.1	86	8.01	5.1	88	7.08	8.6	88	6.98	7.3	86	6.87	62	65	15	45	43	85	23	75	49	90	13	44
28	27/04/93	Upland	10.5	210	7.16	10.9	187	7.51	7.3	194	7.26	6.8	191	7.54	78		15		53		8		50		4	
29	27/04/93	Upland	10.5	210	7.16	9.4	169	7.31	8.4	199	7.34	6.8	151	7.18	48		7		35		4		48		3	
30	27/04/93	Upland	10.5	210	7.16	10.4	186	7.05	9.0	233	6.86	6.9	147	6.90	56		6		44		7		42		1	
31	27/04/93	Upland	10.5	210	7.16	9.8	196	6.90	7.3	190	6.60	7.3	202	6.78	57		7		44		3		56		1	
32	27/04/93	Upland	10.5	210	7.16	8.0	162	6.84	7.1	195	6.61	7.4	154	6.70	55		5		66		2		42		4	
33	27/04/93	Upland	10.5	210	7.16	8.4	158	6.74	7.6	195	6.71	7.3	148	6.68	66		7		43		8		38		3	
34	27/04/93	Upland	10.5	210	7.16	8.9	163	6.74	8.8	197	6.81	7.6	156	6.64	49		12		45		6		67		2	
35	27/04/93	Upland	10.5	210	7.16	8.1	152	6.72	7.7	192	6.59	7.9	155	6.60	55		9		49		5		46		9	
36	27/04/93	Upland	11.0	191	7.12	13.2	173	7.29	8.9	201	6.68	7.3	156	7.36	490		300		220		370		540		250	
37	27/04/93	Upland	11.0	191	7.12	11.9	156	7.16	9.7	201	6.70	7.2	143	7.23	330		200		330		240		470		260	
38	27/04/93	Upland	11.0	191	7.12	11.4	158	6.96	9.7	196	6.65	7.0	143	6.98	400		280		350		340		340		280	
39	27/04/93	Upland	11.0	191	7.12	11.5	165	6.84	9.1	200	6.71	7.1	138	6.84	480		290		390		260		520		340	
40	27/04/93	Upland	11.0	191	7.12	12.8	162	6.78	11.5	202	6.67	8.3	153	6.74	280		250		550		330		470		220	
41	27/04/93	Upland	11.0	191	7.12	12.6	171	6.75	10.9	199	6.68	8.5	163	6.73	350		310		440		290		350		340	
42	27/04/93	Upland	11.0	191	7.12	12.5	155	7.11	11.1	200	6.72	8.9	159	6.71	330		330		310		240		260		300	
43	27/04/93	Upland	11.0	191	7.12	13.3	173	6.67	10.4	209	6.62	8.6	165	6.61	330	93	330	100	470	88	210	86	440	88	390	100
44	25/05/93	Upland	11.3	238	7.00	7.1	212	7.15	6.9	165	7.20	5.4	214	6.96	160		10		180		10		170		0	
45	25/05/93	Upland	11.3	238	7.00	7.0	185	7.12	6.4	179	7.09	5.4	222	6.99	200	17	10		120		10		140		10	
46	25/05/93	Upland	11.3	238	7.00	6.9	173	7.11	6.0	172	7.03	5.5	200	6.95	130		0		180		0		110		20	100
47	25/05/93	Upland	11.3	238	7.00	6.7	173	7.03	5.0	171	7.01	4.8	201	6.94	60		0		90		20		110		0	
48	25/05/93	Upland	11.3	238	7.00	6.4	181	7.02	4.8	212	7.02	4.7	181	6.92	100		0		160		10		50		0	
49	25/05/93	Upland	11.3	238	7.00	6.7	216	7.05	5.6	173	7.00	5.2	189	6.95	110		10		120		10		180	47	10	
50	25/05/93	Upland	11.3	238	7.00	6.6	225	7.02	5.8	157	7.00	5.1	178	6.92	120		20	50	150		20		140		0	
51	25/05/93	Upland	11.3	238	7.00	6.6	216	7.05	6.3	138	6.98	5.8	173	6.90	50		0		180		20	100	100		0	
52	25/05/93	Upland	11.3	238	7.00	6.5	231	7.01	5.9	212	6.88	6.0	183	6.97	50		0		160	55	10		100		10	
53	26/07/93	Upland	14.4	384	6.74	9.2	293	6.81	7.0	279	6.75				630		133		630		115		520		116	
54	26/07/93	Upland	14.4	384	6.74	9.0	270	6.75	6.4	373	6.84				830		134		490		126		550		114	
55	26/07/93	Upland	14.4	384	6.74	7.9	261	6.76	5.7	194	6.81				700		112		630		122		580		115	
56	26/07/93	Upland	14.4	384	6.74	6.5	243	6.85		258	6.92				650		116		570		105		530		103	
57	26/07/93	Upland	14.4	384	6.74	8.3	257	6.82		294	6.94				620		115		680		114		630		102	
58	26/07/93	Upland	14.4	384	6.74	7.7	260	6.91		269	6.95				520		125		620		115		470		146	
59	26/07/93	Upland	14.4	384	6.74	8.7	261	6.83		327	6.91				510		130		590		125		620		134	
60	26/07/93	Upland	14.4	384	6.74	8.2	253	6.86		245	6.92				560		127		610		104		510		111	
61	26/07/93	Upland	14.4	384	6.74	9.2	370	6.85		261	6.89				580	69	143	78	810	81	105	80	530	68	121	83
62	12/10/93	Upland	10.2	97	6.72	6.9	87	6.94	7.5	98	6.65	5.5	90	6.75	290		65		280		25		170		33	
63	12/10/93	Upland	10.2	97	6.72	7.5	106	6.81	7.0	104	6.76	5.3	86	6.66	240		85		210		51		210		33	
64	12/10/93	Upland	10.2	97	6.72	6.5	93	6.80	5.6	96	6.73	5.0	93	6.65	280		80		320		97		260		23	
65	12/10/93	Upland	10.2	97	6.72	5.4	88	6.78	5.3	93	6.71	5.1	88	6.63	160		43		240		103		220		27	

07007 STORAGE OF COLIFORM SAMPLES

Tabulated data. TC and FC counts in cfu per 100 ml. Temperature in °C, conductivity in µS/cm.

Sample	Date	Wat. type	0 hours Temp	Cond	pH	6 hours Temp	Cond	pH	12 hours Temp	Cond	pH	24 hours Temp	Cond	pH	6 hours TC	% Conf	FC	% Conf	12 hours TC	% Conf	FC	% Conf	24 hours TC	% Conf	FC	% Conf
66	12/10/93	Upland	10.2	97	6.72	4.8	89	6.77	4.9	94	6.70	5.4	91	6.61	240		85		230		71		210		23	
67	12/10/93	Upland	10.2	97	6.72	4.9	93	6.76	5.8	95	6.69	5.1	92	6.64	200		97		210		80		260		23	
68	12/10/93	Upland	10.2	97	6.72	5.4	94	6.75	6.6	94	6.67	5.1	93	6.61	200		106		30		73		180		19	
69	12/10/93	Upland	10.2	97	6.72	5.0	90	6.74	6.2	97	6.66	5.0	98	6.63	240		98		290		70		190		29	
70	12/10/93	Upland	10.2	97	6.72	5.5	97	6.72	10.1	103	6.61	5.6	105	6.59	320	55	101	57	240	82	63	85	290	95	29	78
71	06/11/93	Upland	6.7	134	6.57	6.3	104	6.68	5.3	102	6.06	5.6		6.66	24		14		37		15		17		13	
72	06/11/93	Upland	6.7	134	6.57	6.4	121	6.78	5.8	104	6.16	5.6		6.91	22		10		34		12		24		9	
73	06/11/93	Upland	6.7	134	6.57	6.0	106	6.65	5.8	103	6.36	5.3		6.53	20		8		34		14		25		9	
74	06/11/93	Upland	6.7	134	6.57	5.5	105	6.61	5.5	107	6.44	5.1		6.59	24		9		21		12		19		11	
75	06/11/93	Upland	6.7	134	6.57	5.1	122	6.60	5.6	93	6.56	5.3		6.51	15		8		16		22		20		10	
76	06/11/93	Upland	6.7	134	6.57	5.8	106	6.59	5.7	103	6.65	5.3		6.48	25		8		23		10		23		9	
77	06/11/93	Upland	6.7	134	6.57	6.1	125	6.58	5.3	96	6.77	5.4		6.48	19		17		34		10		20		12	
78	06/11/93	Upland	6.7	134	6.57	6.1	108	6.56	5.6	94	6.78	5.3		6.49	18		9		30		12		24		12	
79	06/11/93	Upland	6.7	134	6.57	6.0	101	6.57	6.6	100	6.78	5.4		6.48	21	100	15	100	33	88	11	87	21	84	17	94
80	18/01/94	Upland	2.9	66	7.13	5.0	70	6.98	5.7	62	6.75	5.2	58	6.53	80		20		40		40		30		10	
81	18/01/94	Upland	2.9	66	7.13	4.6	70	6.74	5.6	70	6.77	5.0	59	6.67	60		20		40		20		20		10	
82	18/01/94	Upland	2.9	66	7.13	5.1	85	6.72	5.0	66	6.70	5.2	62	6.48	130		10		40		20		40		0	
83	18/01/94	Upland	2.9	66	7.13	5.1	65	6.71	4.8	64	6.69	5.0	62	6.49	100		20		50		10		60		20	
84	18/01/94	Upland	2.9	66	7.13	5.0	66	7.71	5.4	67	6.68	5.0	65	6.51	50		10		20		10		30		20	
85	18/01/94	Upland	2.9	66	7.13	5.0	64	6.72	5.3	65	6.68	4.9	64	6.48	70		40	100	100		0		30		30	
86	18/01/94	Upland	2.9	66	7.13	4.5	63	6.71	4.8	65	6.70	4.8	64	6.50	30		20		70		10		60		0	
87	18/01/94	Upland	2.9	66	7.13	4.9	74	6.73	5.7	67	6.68	4.9	66	6.51	40		0		40		20		70	86	50	100
88	18/01/94	Upland	2.9	66	7.13	5.1	65	6.70	5.3	64	6.68	4.9	71	6.55	50		10		50		30		30		0	
89	18/01/94	Upland	2.9	66	7.13	5.0	74	6.73	5.1	64	6.68	4.8	64	6.55	50		10		20		20		30		0	
90	18/01/94	Upland	2.9	66	7.13	5.1	74	6.71	5.7	65	6.69	4.8	63	6.54	120	91	10		60		10		20		20	
91	18/01/94	Upland	2.9	66	7.13	5.3	74	6.72	5.2	65	6.67	5.0	63	6.55	50		30		90		40		60		0	
92	18/01/94	Upland	2.9	66	7.13	5.2	75	6.71	5.4	64	6.67	5.1	64	6.52	130		20		40		60	83	50		20	
93	18/01/94	Upland	2.9	66	7.13	5.0	75	6.72	5.0	65	6.67	5.0	71	6.54	120		0		70	71	20		30		20	
94	18/01/94	Upland	2.9	66	7.13	4.8	65	6.71	5.1	65	6.68	4.9	69	6.55	80		20		90		20		20		10	
95	18/01/94	Upland	2.9	66	7.13	4.9	66	6.70	5.2	64	6.66	4.9	70	6.50	60		30		60		10		20		20	

07007 STORAGE OF COLIFORM SAMPLES

Tabulated data. TC and FC counts in cfu per 100 ml. Temperature in °C, conductivity in µS/cm.

			0 hours			6 hours			12 hours			24 hours			6 hours				12 hours				24 hours			
Sample	Date	Wat. type	Temp	Cond	pH	Temp	Cond	pH	Temp	Cond	pH	Temp	Cond	pH	TC	% Conf	FC	% Conf	TC	% Conf	FC	% Conf	TC	% Conf	FC	% Conf
1	06/04/93	Ground	10.6	981	7.56	7.4	1065	7.44		1042	7.51	7.4	976	7.08	1		1		3		2	0	4		2	
2	06/04/93	Ground	10.6	981	7.56	7.0	1072	7.90		1064	7.55	7.0	927	7.46	10		1		11		3	67	3		1	
3	06/04/93	Ground	10.6	981	7.56	7.3	1066	7.62		1113	7.52	7.1	924	7.55	4		0		7		2	0	3		1	
4	06/04/93	Ground	10.6	981	7.56	7.6	798	7.70		1089	7.53	7.1	875	7.57	10	40	2	50	11	67	2	0	3		0	
5	06/04/93	Ground	10.6	981	7.56	8.4	1031	7.78		1010	7.64				2		0		7		1	100				
6	06/04/93	Ground	10.6	981	7.56	7.9	890	7.71		1042	7.46	7.4	1126	7.58	4		0		3		1	0	4	75	2	100
7	06/04/93	Ground	10.6	981	7.56	7.2	837	7.71		1053	7.56	7.4	1084	7.59	3		1		7		2		2		1	
8	06/04/93	Ground	10.6	981	7.56	7.7	853	7.72		1055	7.53	7.4	1117	7.60	1		0		8		2		2		1	
9	06/04/93	Ground	10.6	981	7.56	7.4	851	7.70		1101	7.52	7.8	941	7.61	5		0		8		1		3		0	
10	14/04/93	Ground	10.6	928	7.16	8.5	865	6.91	5.3	1135	7.20	8.2	880	6.94	0		0		0		0		0		0	
11	14/04/93	Ground	10.6	928	7.16	8.2	965	7.15	6.5	1080	7.37	6.2	855	7.30	1		0		2		0		0		0	
12	14/04/93	Ground	10.6	928	7.16	7.8	887	7.20	7.0	1076	7.46	5.6	840	7.36	0		0		0		0		0		0	
13	14/04/93	Ground	10.6	928	7.16	7.5	854	7.30	7.1	1094	7.45	6.0	847	7.44	0		0		0		0		0		0	
14	14/04/93	Ground	10.6	928	7.16	6.7	868	7.30	6.7	1083	7.44	5.6	890	7.49	0		0		0		0		0		0	
15	14/04/93	Ground	10.6	928	7.16	7.5	869	7.29	6.8	1096	7.39	6.1	813	7.49	0		0		0		0		0		0	
16	14/04/93	Ground	10.6	928	7.16	8.1	860	7.36	6.7	1147	7.40	6.4	859	7.59	0		0		0		0		0		0	
17	14/04/93	Ground	10.6	928	7.16	7.4	920	7.38	6.2	1093	7.41	6.3	924	7.59	0		0		0		0		0		0	
18	14/04/93	Ground	10.6	928	7.16	8.5	883	7.34	8.6	1119	7.46	6.8	859	7.59	0		0		0		0		0		0	
19	20/04/93	Ground	12.0	1097	7.15	7.1	876	7.34		1080	7.24	6.8	1060	7.05	0		0		0		0		0		0	
20	20/04/93	Ground	12.0	1097	7.15	7.9	835	7.38		1060	7.37	5.9	1045	7.39	0		0		0		0		0		0	
21	20/04/93	Ground	12.0	1097	7.15	7.8	903	7.35		1048	7.37	5.5	1042	7.41	0		0		0		0		0		0	
22	20/04/93	Ground	12.0	1097	7.15	6.5	869	7.35		1035	7.36	5.7	1061	7.48	0		0		0		0		0		0	
23	20/04/93	Ground	12.0	1097	7.15	8.1	1021	7.37		1059	7.38	5.9	1059	7.47	0		0		0		0		0		0	
24	20/04/93	Ground	12.0	1097	7.15	8.7	890	7.36		1085	7.36	6.1	1070	7.48	0		0		0		0		0		0	
25	20/04/93	Ground	12.0	1097	7.15	8.7	1088	7.36		1047	7.40	6.6	1077	7.45	0		0		0		0		0		0	
26	20/04/93	Ground	12.0	1097	7.15	8.7	853	7.38		1065	7.37	7.0	1089	7.50	0		0		0		0		0		0	
27	20/04/93	Ground	12.0	1097	7.15	10.0	1148	7.37		1108	7.38	7.9	938	7.51	0		0		0		0		0		0	
28	05/05/93	Ground	11.5	591	6.81	4.5	719	7.33		820	7.17	4.5	960	6.95	0		0		0		0		0		0	
29	05/05/93	Ground	11.5	591	6.81	4.7	802	7.13		749	7.27	4.2	982	7.35	0		0		1		0		0		0	
30	05/05/93	Ground	11.5	591	6.81	4.9	830	7.18		1040	7.30	4.9	999	7.46	0		0		0		0		0		0	
31	05/05/93	Ground	11.5	591	6.81	4.3	812	7.16		1027	7.30	5.6	1051	7.53	0		0		0		0		0		0	
32	05/05/93	Ground	11.5	591	6.81	4.3	823	7.15		1029	7.28	5.7	1039	7.56	0		0		0		0		0		0	
33	05/05/93	Ground	11.5	591	6.81	4.9	845	7.14		1049	7.29	5.8	1031	7.54	0		0		0		0		0		0	
34	05/05/93	Ground	11.5	591	6.81	4.8	850	7.14		1001	7.33	5.7	994	7.57	0		0		1		0		0		0	
35	05/05/93	Ground	11.5	591	6.81	5.5	937	7.16		980	7.45	5.7	1008	7.56	0		0		0		0		0		0	
36	05/05/93	Ground	11.5	591	6.81	6.9	850	7.14		1048	7.45	5.9	1020	7.63	1		0		1		0		0		0	
37	18/05/93	Ground	12.0	1033	7.68	7.3	899	7.13	6.4		7.37	6.0	1120	7.10	0		0		0		0		0		0	
38	18/05/93	Ground	12.0	1033	7.68	7.9	951	7.19	6.5		7.24	6.1	1054	7.39	0		0		0		0		0		0	
39	18/05/93	Ground	12.0	1033	7.68	7.5	947	7.19	6.0		7.23	6.3	1078	7.38	0		0		0		0		0		0	
40	18/05/93	Ground	12.0	1033	7.68	6.3	921	7.21	7.9		7.23	6.0	1068	7.45	0		0		0		0		0		0	
41	18/05/93	Ground	12.0	1033	7.68	6.2	912	7.24	6.7		7.30	5.6	1081	7.54	0		0		0		0		0		0	
42	18/05/93	Ground	12.0	1033	7.68	6.7	961	7.23	6.3		7.35	5.8	1067	7.49	0		0		0		0		0		0	
43	18/05/93	Ground	12.0	1033	7.68	7.3	962	7.24	6.3		7.36	6.2	1091	7.46	0		0		0		0		0		0	
44	18/05/93	Ground	12.0	1033	7.68	6.6	932	7.26	5.5		7.36	5.8	1041	7.53	0		0		0		0		0		0	
45	18/05/93	Ground	12.0	1033	7.68	8.1	880	7.27	8.4		7.56	5.8	1039	7.41	0		0		0		0		0		0	
46	02/06/93	Ground	11.4	1304	7.06	6.1	1324	7.11		1081	7.18	5.6	988	7.13	0		0		0		0		0		0	
47	02/06/93	Ground	11.4	1304	7.06	5.9	1343	7.28		1323	7.20	5.1	980	7.27	0		0		0		0		0		0	
48	02/06/93	Ground	11.4	1304	7.06	6.0	1260	7.23		1384	7.30	5.0	1047	7.28	0		0		0		0		0		1	100
49	02/06/93	Ground	11.4	1304	7.06	6.0	1358	7.28		1383	7.40	5.4	1064	7.28	0		0		0		0		0		0	
50	02/06/93	Ground	11.4	1304	7.06	5.8	1236	7.29		1323	7.32	5.5	1087	7.40	0		0		0		0		0		0	
51	02/06/93	Ground	11.4	1304	7.06	5.9	1086	7.25		1363	7.32	5.7	1055	7.39	0		0		0		0		0		0	
52	02/06/93	Ground	11.4	1304	7.06	5.8	1317	7.30		1399	7.30	5.6	1045	7.42	0		0		0		0		0		0	
53	02/06/93	Ground	11.4	1304	7.06	6.0	1057	7.28		1412	7.28	5.9	1086	7.37	0		0		0		0		0		0	
54	02/06/93	Ground	11.4	1304	7.06	6.0	1149	7.27		1315	7.32	6.0	1089	7.41	0		1	0	1	100	0		0		0	
55	08/06/93	Ground	13.7	1168	7.11	5.1	846	7.02	5.0	1194	7.17	5.4	1173	7.19	0		0		0		0		0		0	
56	08/06/93	Ground	13.7	1168	7.11	5.4	911	7.14	5.6	982	7.22	5.9	934	7.28	3	0	0		0		0		0		0	
57	08/06/93	Ground	13.7	1168	7.11	5.9	980	7.19	5.9	950	7.27	6.0	908	7.34	0		0		0		0		0		1	
58	08/06/93	Ground	13.7	1168	7.11	5.6	942	7.21	5.8	985	7.30	5.4	955	7.38	0		0		1	100	0		0		0	
59	08/06/93	Ground	13.7	1168	7.11	5.5	936	7.25	5.6	1230	7.29	5.4	914	7.39	1		0		1		0		0		0	
60	08/06/93	Ground	13.7	1168	7.11	5.6	906	7.23	5.6	960	7.31	6.2	950	7.40	0		0		1		1		0		0	
61	08/06/93	Ground	13.7	1168	7.11	5.4	903	7.26	6.8	922	7.39	5.8	975	7.58	1		0		0		0		0		0	
62	08/06/93	Ground	13.7	1168	7.11	5.8	913	7.28	6.2	1196	7.35	5.5	980	7.50	0		0		0		0		1	100	0	
63	08/06/93	Ground	13.7	1168	7.11	5.6	967	7.32	5.8	1135	7.44	5.4	1078	7.62	0		0		0		0		0		1	100
64	16/06/93	Ground	12.4	1314	7.22	5.6	1040	6.93	5.1	1395	7.28	5.1	1326	7.22	0		0		0		0		0		1	100
65	16/06/93	Ground	12.4	1314	7.22	5.7	1139	7.12	5.2	1281	7.25	5.0	1349	7.38	0		0		0		0		0		0	

07007 STORAGE OF COLIFORM SAMPLES

Tabulated data. TC and FC counts in cfu per 100 ml. Temperature in °C, conductivity in µS/cm.

Sample	Date	Wat. type	0 hours Temp	Cond	pH	6 hours Temp	Cond	pH	12 hours Temp	Cond	pH	24 hours Temp	Cond	pH	6 hours TC	% Conf	FC	% Conf	12 hours TC	% Conf	FC	% Conf	24 hours TC	% Conf	FC	% Conf
66	16/06/93	Ground	12.4	1314	7.22	5.6	1121	7.19	5.0	1078	7.37	4.8	1025	7.38	1	100	0		0		1	100	3		0	
67	16/06/93	Ground	12.4	1314	7.22	5.4	1118	7.21	4.8	1112	7.19	4.7	1027	7.54	0		0		0		0		0		0	
68	16/06/93	Ground	12.4	1314	7.22	5.1	1046	7.27	4.9	1125	7.37	5.0	1067	7.56	1		0		0		0		0		0	
69	16/06/93	Ground	12.4	1314	7.22	4.9	1051	7.31	5.0	1121	7.38	4.8	1382	7.50	0		0		0		0		0		0	
70	16/06/93	Ground	12.4	1314	7.22	5.1	1037	7.30	5.0	1123	7.23	5.0	1045	7.56	1		0		0		0		0		0	
71	16/06/93	Ground	12.4	1314	7.22	5.0	1059	7.25	4.8	1092	7.25	4.8	1104	7.46	0		0		0		0		0		0	
72	16/06/93	Ground	12.4	1314	7.22	4.8	1103	7.27	5.1	1163	7.29	4.9	1030	7.56	0		0		0		0		0		0	
73	29/06/93	Ground	12.6	1378	7.27	5.2	1363	7.32	4.7	916	7.30	5.2	1218	7.34	0		0		0		0		0		0	
74	29/06/93	Ground	12.6	1378	7.27	4.9	1230	7.28	5.2	918	7.45	5.9	1137	7.53	0		0		0		0		0		0	
75	29/06/93	Ground	12.6	1378	7.27	5.1	1383	7.34	4.0	1058	7.45	5.6	1212	7.58	0		0		0		0		0		0	
76	29/06/93	Ground	12.6	1378	7.27	4.8	1340	7.34	4.4	1365	7.40	4.7	1138	7.58	0		0		0		0		0		0	
77	29/06/93	Ground	12.6	1378	7.27	5.5	1332	7.38	4.0	1340	7.51	5.6	1277	7.62	0		0		0		0		0		0	
78	29/06/93	Ground	12.6	1378	7.27	5.0	1042	7.32	4.4	1325	7.41	5.0	1204	7.54	0		0		1		0		0		0	
79	29/06/93	Ground	12.6	1378	7.27	5.3	1241	7.31	4.8	1364	7.42	4.2	1187	7.56	0		0		1		0		1		0	
80	29/06/93	Ground	12.6	1378	7.27	5.2	1046	7.32	3.6	1352	7.43	4.3	1347	7.55	0		0		0		0		0		0	
81	29/06/93	Ground	12.6	1378	7.27	5.6	1118	7.32	5.2	1075	7.42	5.4	1101	7.51	0		0		0		0		0		0	
82	06/07/93	Ground	12.8	1318	7.00	5.5	1122	7.29	5.0	1020	7.12	5.0	1038	7.21	0		0		0		0		0		0	
83	06/07/93	Ground	12.8	1318	7.00	5.3	1075	7.32	6.2	1120	7.05	4.5	1082	7.38	0		0		0		0		0		0	
84	06/07/93	Ground	12.8	1318	7.00	5.8	1068	7.34	7.5	1125	7.19	4.6	1051	7.42	0		0		0		0		0		0	
85	06/07/93	Ground	12.8	1318	7.00	5.4	1003	7.33	6.2	1362	7.25	5.0	1058	7.47	0		0		0		0		0		0	
86	06/07/93	Ground	12.8	1318	7.00	4.9	1043	7.37	4.7	1120	7.24	4.7	1027	7.56	0		0		0		0		0		0	
87	06/07/93	Ground	12.8	1318	7.00	4.3	1027	7.35	4.7	1360	7.20	4.9	1067	7.55	0		0		0		0		0		0	
88	06/07/93	Ground	12.8	1318	7.00	5.1	1114	7.38	5.3	1071	7.28	4.8	1103	7.55	1		0		1		0		0		0	
89	06/07/93	Ground	12.8	1318	7.00	4.9	1078	7.35	6.0	1356	7.24	5.1	1071	7.56	0		0		1		0		0		0	
90	13/07/93	Ground	11.9	1238	7.22	4.1	1342	7.20	4.6	1116	7.04	5.1	1064	7.12	0		0		0		0		0		0	
91	13/07/93	Ground	11.9	1238	7.22	4.6	1378	7.29	5.1	1012	7.28	5.5	1094	7.37	0		0		0		0		0		0	
92	13/07/93	Ground	11.9	1238	7.22	4.5	1075	7.31	4.7	1076	7.29	5.4	1130	7.42	0		0		0		0		0		0	
93	13/07/93	Ground	11.9	1238	7.22	4.7	1011	7.33	5.1	1280	7.30	5.1	1366	7.38	0		0		0		0		0		0	
94	13/07/93	Ground	11.9	1238	7.22	4.6	1113	7.34	4.1	1322	7.28	4.7	1363	7.33	0		0		0		0		0		0	
95	13/07/93	Ground	11.9	1238	7.22	4.5	1379	7.34	4.9	1372	7.25	5.5	1063	7.44	0		0		0		0		0		0	
96	13/07/93	Ground	11.9	1238	7.22	4.9	1385	7.36	4.2	1364	7.26	5.1	1044	7.39	0		0		0		0		0		0	
97	13/07/93	Ground	11.9	1238	7.22	4.7	1160	7.36	3.5	1295	7.28	5.0	1104	7.38	0		0		0		0		0		0	
98	13/07/93	Ground	11.9	1238	7.22	4.8	1019	7.36	4.6	1089	7.29	4.8	1112	7.40	0		0		0		2		1		0	
99	20/07/93	Ground	12.2	1013	7.09	5.3	1510	7.10	5.3		6.76	4.5		6.96	0		0		0		0		0		0	
100	20/07/93	Ground	12.2	1013	7.09	5.1	1041	7.11	5.4		6.82	4.1		7.10	0		0		0		1		0		0	
101	20/07/93	Ground	12.2	1013	7.09	5.5	1541	7.12	5.0		6.88	4.1		7.12	0		0		1		0		0		0	
102	20/07/93	Ground	12.2	1013	7.09	4.8	1312	7.19	3.7		6.84	3.5		7.32	0		0		0		0		0		0	
103	20/07/93	Ground	12.2	1013	7.09	4.5	1230	7.17	3.9		6.94	3.5		7.26	0		0		0		0		0		0	
104	20/07/93	Ground	12.2	1013	7.09	5.0	1247	7.20	4.6		6.86	3.6		7.26	0		0		0		0		0		0	
105	20/07/93	Ground	12.2	1013	7.09	5.1	1109	7.01	5.1		6.96	3.9		7.27	0		0		0		0		0		0	
106	20/07/93	Ground	12.2	1013	7.09	4.8	1312	7.11	5.0		6.91	3.8		7.33	0		0		0		0		0		0	
107	20/07/93	Ground	12.2	1013	7.09	4.7	1389	7.14	5.2		7.06	4.6		7.32	1		0		0		0		0		0	
108	17/08/93	Ground	11.7	1247	7.36	5.3	1211	7.29	5.9	1935	7.12	5.9	1192	7.14	0		0		0		0		1		0	
109	17/08/93	Ground	11.7	1247	7.36	4.8	1038	7.27	6.2	1886	7.47	4.3	1057	7.27	0		0		0		0		0		0	
110	17/08/93	Ground	11.7	1247	7.36	5.1	1081	7.31	5.0	1730	7.49	4.1	1063	7.32	0		0		0		0		0		0	
111	17/08/93	Ground	11.7	1247	7.36	5.4	1057	7.33	4.9	1312	7.47	4.0	1124	7.51	0		0		0		0		1		0	
112	17/08/93	Ground	11.7	1247	7.36	4.9	1032	7.41	4.1	1319	7.53	4.3	1173	7.73	1		0		0		0		0		0	
113	17/08/93	Ground	11.7	1247	7.36	5.0	1021	7.40	4.4	1759	7.50	4.6	1109	7.40	0		0		0		0		0		0	
114	17/08/93	Ground	11.7	1247	7.36	5.4	1101	7.35	4.9	1749	7.76	4.5	1213	7.57	1		0		0		0		0		0	
115	17/08/93	Ground	11.7	1247	7.36	4.6	1067	7.38	4.5	1577	7.78	4.7	1061	7.73	0		0		0		0		0		0	
116	17/08/93	Ground	11.7	1247	7.36	4.7	1043	7.40	4.8	1817	7.76	4.6	1051	7.47	0		0		1		0		0		0	
117	24/08/93	Ground	11.9	1043	7.15	6.5	1509	6.96	5.4	1530	7.04	5.9	1837	7.11	2		0		0		0		0		0	
118	24/08/93	Ground	11.9	1043	7.15	6.1	1485	7.17	5.4	1650	7.29	4.2	1884	7.32	0		0		0		3		1		1	
119	24/08/93	Ground	11.9	1043	7.15	6.9	1214	7.22	4.6	1627	7.40	4.0	1639	7.41	0		0		0		0		0		4	
120	24/08/93	Ground	11.9	1043	7.15	6.7	1482	7.24	4.1	1549	7.45	4.3	1611	7.43	2		1		1		1		0		4	
121	24/08/93	Ground	11.9	1043	7.15	6.1	1586	7.30	3.9	1571	7.46	4.6	1620	7.51	0		1		3		0		0		0	
122	24/08/93	Ground	11.9	1043	7.15	6.0	1369	7.16	4.9	1613	7.48	4.1	1739	7.50	0		0		1		1		0		0	
123	24/08/93	Ground	11.9	1043	7.15	6.2	1401	7.29	4.9	1589	7.45	4.2	1789	7.67	0		0		0		3		0		2	
124	24/08/93	Ground	11.9	1043	7.15	5.8	1473	7.32	4.4	1580	7.47	4.6	1613	7.76	2		0		0		1		0		3	
125	24/08/93	Ground	11.9	1043	7.15	4.7	1386	7.30	4.7	1584	7.50	4.2	1810	7.73	2		1		0		0		0		0	
126	14/09/93	Ground	12.6	1971	7.00				5.3	2010	6.76	5.6	1910	9.94	1270		420		1410		360		1370		330	
127	14/09/93	Ground	12.6	1971	7.00				5.1	2160	7.10	4.6	1820	7.18	1060		300		1110		370		1610		420	
128	14/09/93	Ground	12.6	1971	7.00				5.5	2070	7.17	4.7	1809	7.22	1070		390		1330		410		1290	73	430	
129	14/09/93	Ground	12.6	1971	7.00				4.5	1950	7.25	4.9	1814	7.26	990		390		950		320				330	
130	14/09/93	Ground	12.6	1971	7.00				5.3	1940	7.30	4.6	1844	7.29	1350		380		1090		350				470	

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Tabulated data. TC and FC counts in cfu per 100 ml. Temperature in °C, conductivity in µS/cm.

Sample	Date	Wat. type	0 hours Temp	Cond	pH	6 hours Temp	Cond	pH	12 hours Temp	Cond	pH	24 hours Temp	Cond	pH	6 hours TC	% Conf	FC	% Conf	12 hours TC	% Conf	FC	% Conf	24 hours TC	% Conf	FC	% Conf
131	14/09/93	Ground	12.6	1971	7.00				5.2	1877	7.27	5.1	1835	7.31	1150		380		1110		420				340	
132	14/09/93	Ground	12.6	1971	7.00				4.7	1833	7.34	5.8	1869	7.31	1280		260		1150		420				330	
133	14/09/93	Ground	12.6	1971	7.00				5.3	1895	7.28	5.9	1868	7.34	1190		280		1100		410				320	
134	14/09/93	Ground	12.6	1971	7.00				8.1	2030	7.27	6.7	1974	7.34	890	65	400	68	990	47	290	64			480	100
135	19/09/93	Ground	11.2	1895	7.14	4.5	1254	7.03				4.8	1152	7.07	1		1		0		0		1		0	
136	19/09/93	Ground	11.2	1895	7.14	5.6	1642	7.20				4.9	1340	7.27	1		2		1		0		0		1	
137	19/09/93	Ground	11.2	1895	7.14	5.3	1682	7.24				4.6	1578	7.19	0		1		1		0		0		1	
138	19/09/93	Ground	11.2	1895	7.14	5.4	1543	7.29				4.7	1579	7.32	1		0		0		2		3		0	
139	19/09/93	Ground	11.2	1895	7.14	5.1	1760	7.28				4.3	1567	7.34	3		0		0		0		0		0	
140	19/09/93	Ground	11.2	1895	7.14	5.3	1451	7.28				4.5	1568	7.35	0		0		1		0		1		2	
141	19/09/93	Ground	11.2	1895	7.14	5.7	1711	7.28				4.8	1571	7.36	0		0		0		0		1		0	
142	19/09/93	Ground	11.2	1895	7.14	5.9	1339	7.28				5.0	1590	7.37	0		0		0		0		0		1	
143	19/09/93	Ground	11.2	1895	7.14	5.7	1412	7.25				5.1	1591	7.36	0		0		0		1		1		1	
144	29/09/93	Ground	12.3	791	7.03	4.1	713	7.01	5.0	691	6.82	5.0	745	6.99	129		140		160		140		150		160	
145	29/09/93	Ground	12.3	791	7.03	3.9	719	7.07	5.7	749	6.99	5.2	762	6.98	132		95		230		240		130		260	
146	29/09/93	Ground	12.3	791	7.03	4.5	734	7.08	5.7	731	7.05	4.9	750	7.07	134		170		130		230		160		180	
147	29/09/93	Ground	12.3	791	7.03	4.4	727	7.13	4.9	767	7.01	5.2	762	7.00	115		85		150		140		120		270	
148	29/09/93	Ground	12.3	791	7.03	4.9	721	7.07	5.0	756	7.08	5.0	776	7.12	102		102		230		140		140		230	
149	29/09/93	Ground	12.3	791	7.03	4.3	695	7.11	5.3	770	6.97	5.1	793	7.14	115		99		270		230		170		170	
150	29/09/93	Ground	12.3	791	7.03	4.6	690	7.15	5.0	786	7.02	4.7	792	7.15	105		79		240		210		110		200	
151	29/09/93	Ground	12.3	791	7.03	4.4	728	7.16	4.4	767	7.07	4.1	784	7.16	140	100	150	95	160	100	190	83	120	100	230	100
152	05/10/93	Ground	12.2	798	6.81	6.1	769	6.85	5.1	738	6.62	5.1	711	6.81	380		65		280		61		280		57	
153	05/10/93	Ground	12.2	798	6.81	5.9	795	6.86	5.6	743	6.80	4.9	753	6.83	430		63		280		60		200		70	
154	05/10/93	Ground	12.2	798	6.81	5.8	797	6.89	5.8	776	6.88	5.3	739	6.88	250		63		340		70		340		65	
155	05/10/93	Ground	12.2	798	6.81	5.5	860	6.88	5.6	732	6.88	4.7	719	6.91	360		62		210		78		200		69	
156	05/10/93	Ground	12.2	798	6.81	5.7	799	6.89	4.7	759	6.89	4.6	726	6.96	360		50		210		75		290		58	
157	05/10/93	Ground	12.2	798	6.81	4.9	803	6.90	5.7	713	6.95	5.1	731	7.00	380		38		300		70		440		56	
158	05/10/93	Ground	12.2	798	6.81	5.0	910	6.91	6.1	729	6.98	4.9	739	7.10	190		55		350		69		310		65	
159	05/10/93	Ground	12.2	798	6.81	5.2	820	6.94	4.7	730	7.05	6.0	718	7.20	360		47		380		70		300		68	
160	05/10/93	Ground	12.2	798	6.81	4.7	819	6.97	5.9	722	7.03	4.3	732	7.40	250	100	65	100	180	64	66	70	390	31	69	83
161	19/10/93	Ground	9.8	817	6.75	5.9	820	6.86	4.1	680	6.84	5.4	799	6.89	280		40		380		48		510		54	
162	19/10/93	Ground	9.8	817	6.75	5.8	788	6.91	5.9	750	6.36	5.5	795	7.03	530		55		420		57		560		56	
163	19/10/93	Ground	9.8	817	6.75	5.6	808	6.92	4.8	745	6.65	5.0	790	7.01	460		55		290		48		380		43	
164	19/10/93	Ground	9.8	817	6.75	5.6	885	6.91	4.7	763	6.47	5.4	797	6.99	420		66		360		57		400		49	
165	19/10/93	Ground	9.8	817	6.75	5.7	799	6.90	4.9	781	6.55	5.0	784	7.01	380		62		440		58		370		48	
166	19/10/93	Ground	9.8	817	6.75	5.9	835	6.90	5.2	875	6.70	5.1	799	6.99	390		45		330		39		390		55	
167	19/10/93	Ground	9.8	817	6.75	5.7	810	6.90	5.8	775	6.67	5.2	801	7.01	450		44		330		49		410		53	
168	19/10/93	Ground	9.8	817	6.75	6.1	812	6.91	4.5	776	6.70	5.1	799	7.02	380		52		420		45		310		51	
169	19/10/93	Ground	9.8	817	6.75	5.9	801	6.90	6.2	887	6.58	5.1	811	7.02	430	65	53	83	290	52	43	90	370	57	41	89
170	02/11/93	Ground	10.3	837	6.83	6.4	974	6.94	6.0	775	6.86	4.9	794	6.71	37		8		21		6		24		7	
171	02/11/93	Ground	10.3	837	6.83	5.9	953	6.93	5.1	780	6.88	5.1	734	6.96	25		4		25		7		30		6	
172	02/11/93	Ground	10.3	837	6.83	5.9	912	6.96	5.1	745	6.93	5.0	779	6.99	31		4		25		6		21		2	
173	02/11/93	Ground	10.3	837	6.83	6.2	919	6.97	5.1	737	6.92	4.9	759	6.98	19		5		19		4		23		7	
174	02/11/93	Ground	10.3	837	6.83	5.8	902	6.98	5.2	746	7.12	4.8	765	7.01	20		8		22	85	11		24		8	
175	02/11/93	Ground	10.3	837	6.83	6.3	921	6.98	5.6	713	6.97	5.1	784	7.00	16		8		19		8		24		9	
176	02/11/93	Ground	10.3	837	6.83	6.1	934	6.99	5.0	757	7.02	5.0	782	6.99	31		3		23		8		22	77	4	
177	02/11/93	Ground	10.3	837	6.83	5.9	920	7.00	5.6	726	6.98	5.0	785	7.01	22		1		24		7	86	30		11	91
178	02/11/93	Ground	10.3	837	6.83				7.5	769	6.87	4.9	777	7.02	29	45	8	57	16		4		24		4	
179	09/11/93	Ground	10.3	823	6.47	6.1	873	6.88	5.6	752	6.48	5.1	672	0.85	14		1		9		2		15		4	
180	09/11/93	Ground	10.3	823	6.47	6.3	881	6.74	5.4	807	6.90	5.0	845	6.68	15		5		12		0		11		2	
181	09/11/93	Ground	10.3	823	6.47	6.0	882	6.94	5.4	767	7.00	4.9	731	6.92	18		4		8		3		16		4	
182	09/11/93	Ground	10.3	823	6.47	6.2	819	6.97	5.8	787	7.03	5.1	775	6.91	21		4		12		4		11		1	
183	09/11/93	Ground	10.3	823	6.47	5.9	831	6.98	5.7	781	7.07	5.0	779	6.92	14		7	86	13	54	6	71	17	53	4	
184	09/11/93	Ground	10.3	823	6.47	5.9	817	6.99	5.9	842	7.07	5.0	801	6.96	14		3		12		0		12		2	
185	09/11/93	Ground	10.3	823	6.47	6.0	816	7.00	5.7	794	7.10	5.2	797	6.93	4		1		9		2		10		1	
186	09/11/93	Ground	10.3	823	6.47	6.1	820	7.01	5.3	787	7.17	4.9	793	6.98	19	47	2		11		1		15		3	
187	09/11/93	Ground	10.3	823	6.47	6.0	819	7.02	6.8	775	7.16	5.0	802	6.99	15		5		6		0		8		6	67
188	30/11/93	Ground	9.2	1809	6.61	5.0	1908	6.77	4.4	1977	6.34	4.6	1538	7.02	41		25		19	94	15		19		15	
189	30/11/93	Ground	9.2	1809	6.61	5.5	1930	6.91	4.2	1894	6.91	4.3	1829	6.80	20	100	29		41		24		21	100	20	
190	30/11/93	Ground	9.2	1809	6.61	4.3	1845	6.91	4.9	1977	6.96	4.2	1778	7.08	28		22		28		41		27		13	
191	30/11/93	Ground	9.2	1809	6.61	3.3	1759	6.92	3.6	1808	6.90	4.2	1763	7.08	35		20	95	24		28		21		18	
192	30/11/93	Ground	9.2	1809	6.61	3.5	1779	6.92	4.5	1903	6.67	4.3	1747	7.08	26		25		28		21		25		15	
193	30/11/93	Ground	9.2	1809	6.61	4.1	1794	6.91	4.7	1858	6.92	4.0	1750	7.08	21		27		25		26		25		19	
194	30/11/93	Ground	9.2	1809	6.61	4.6	1788	6.91	4.4	1819	7.02	4.8	1734	7.09	29		24		37		16		20		24	
195	30/11/93	Ground	9.2	1809	6.61	4.7	1763	6.92	4.1	1831	7.04	4.7	1743	7.09	29		15		33		24	100	20		16	

07007 STORAGE OF COLIFORM SAMPLES

Tabulated data. TC and FC counts in cfu per 100 ml. Temperature in °C, conductivity in µS/cm.

Sample	Date	Wat. type	0 hours Temp	Cond	pH	6 hours Temp	Cond	pH	12 hours Temp	Cond	pH	24 hours Temp	Cond	pH	6 hours TC	% Conf	FC	% Conf	12 hours TC	% Conf	FC	% Conf	24 hours TC	% Conf	FC	% Conf
196	30/11/93	Ground	9.2	1809	6.61	4.5	1777	6.91	5.9	1860	7.17	4.9	1772	7.09	21		30		24		28		25		19	80
197	07/12/93	Ground	11.6	1369	6.59	5.6	1390	7.00	5.6	1255	7.00	5.2	1286	7.13			1		5		1		6		1	
198	07/12/93	Ground	11.6	1369	6.59	5.5	1327	6.87	5.1	1359	6.98	5.1	1257	6.97			1		3		3		7		4	
199	07/12/93	Ground	11.6	1369	6.59	5.0	1402	7.03	4.7	1217	7.07	4.5	1220	7.14			0		6		3	67	13	38	3	
200	07/12/93	Ground	11.6	1369	6.59	4.0	1217	7.03	4.5	1197	7.07	4.6	1207	7.12			2		11	91	0		6		1	
201	07/12/93	Ground	11.6	1369	6.59	3.5	1195	7.00	4.7	1360	7.05	4.9	1203	7.13			1		7		0		7		1	
202	07/12/93	Ground	11.6	1369	6.59	4.8	1231	7.01	4.5	1231	7.02	4.7	1217	7.13			2		6		1		6		6	100
203	07/12/93	Ground	11.6	1369	6.59	4.8	1216	7.00	4.9	1231	7.03	4.7	1227	7.13			1		5		2		9		1	
204	07/12/93	Ground	11.6	1369	6.59	4.1	1194	6.98	5.0	1336	7.02	5.0	1218	7.13			0		7		1		3		3	
205	07/12/93	Ground	11.6	1369	6.59	4.3	1211	6.99	5.9	1299	6.89	4.9	1213	7.12			0		4		1		7		2	
206	11/01/94	Ground	9.5	1535	7.10	5.9	1234	6.77	5.1	1344	6.54	5.3	988	6.95	85		31		56		35		73		37	
207	11/01/94	Ground	9.5	1535	7.10	5.4	1266	6.94	4.7	1279	6.89	4.4	877	7.00	75		44		73		35		72		33	
208	11/01/94	Ground	9.5	1535	7.10	5.3	1235	6.98	3.7	1228	6.80	5.1	1056	7.01	70		38		67		39		71		45	
209	11/01/94	Ground	9.5	1535	7.10	5.1	998	6.96	5.2	1431	6.87	4.9	1021	7.01	68		37		70		39		57		46	
210	11/01/94	Ground	9.5	1535	7.10	5.1	1272	6.94	4.5	1173	6.86	4.5	1101	7.02	67		41		72		40		70		36	
211	11/01/94	Ground	9.5	1535	7.10	5.3	1007	6.92	5.1	1398	6.84	4.9	993	7.04	73		41		75		43		77		32	
212	11/01/94	Ground	9.5	1535	7.10	5.4	979	6.93	4.3	1225	6.83	4.8	1006	7.06	71		47		67		48		82		35	
213	11/01/94	Ground	9.5	1535	7.10	5.2	1094	6.91	4.5	1192	6.85	5.0	1042	7.07	70		37		55		29		62		31	
214	11/01/94	Ground	9.5	1535	7.10	5.2	1081	6.92	6.3			5.2	989	7.09	76	80	49	80	53	86	41	75	69	88	26	80
215	25/01/94	Ground	10.6	612	6.51	5.5	534	6.85	5.4	516	6.87	4.5	461	6.81	0		0		20		10		10		0	
216	25/01/94	Ground	10.6	612	6.51	5.1	538	6.98	6.2	508	6.86	4.6	460	6.90	10		0		0		10		10		0	
217	25/01/94	Ground	10.6	612	6.51	5.1	525	6.99	6.3	505	6.67	4.6	505	6.77	10		0		0		10		10		0	
218	25/01/94	Ground	10.6	612	6.51	5.0	531	7.00	4.1	498	7.05	4.5	506	6.95	0		10		10		0		20		0	
219	25/01/94	Ground	10.6	612	6.51	5.2	517	6.96	5.6	507	7.00	4.0	532	6.98	0		0		10		10	100	30	100	0	
220	25/01/94	Ground	10.6	612	6.51	4.8	535	6.99	5.3	491	6.90	5.0	524	7.00	10	100	0		0		0		10		0	
221	25/01/94	Ground	10.6	612	6.51	5.0	537	6.93	5.6	530	6.96	4.7	533	7.04	0		0		0		10		10		0	
222	25/01/94	Ground	10.6	612	6.51	5.5	562	6.95	5.5	497	7.08	4.3	528	7.04	10		0		0		0		10		0	
223	25/01/94	Ground	10.6	612	6.51	4.6	588	6.93	5.6	504	6.95	4.3	574	7.06	0		0		0		0		0		0	
224	25/01/94	Ground	10.6	612	6.51	4.9	641	6.93	4.7	513	7.03	4.8	526	7.07	0		0		0		0		0		0	
225	25/01/94	Ground	10.6	612	6.51	5.1	567	6.94	4.6	513	7.08	5.1	596	7.08	0		10	100	0		0		0		10	100
226	25/01/94	Ground	10.6	612	6.51	5.2	616	6.93	4.2	530	7.09	5.0	533	7.10	0		0		0		0		10		0	
227	25/01/94	Ground	10.6	612	6.51	5.0	608	6.93	5.1	588	7.13	5.1	533	7.10	0		0		10		0		0		0	
228	25/01/94	Ground	10.6	612	6.51	5.3	545	6.94	4.9	579	7.17	4.9	539	7.03	0		10		20	100	0		0		0	
229	25/01/94	Ground	10.6	612	6.51	5.0	631	6.94	5.2	494	6.82	4.7	526	7.01	10		0		0		0		0		0	
230	25/01/94	Ground	10.6	612	6.51	4.9	622	6.93	4.8	494	7.17	4.3	528	7.00	0		0		20		10		0		0	
231	01/02/94	Ground	10.1	601	6.59	5.2	486	6.66	4.9	520	6.71	4.8	586	6.93	0		0		0		0		0		0	
232	01/02/94	Ground	10.1	601	6.59	5.1	496	6.78	4.9	590	6.88	4.1	590	6.74	0		0		20	67	0		10		0	
233	01/02/94	Ground	10.1	601	6.59	5.3	488	6.82	4.5	511	6.92	4.2	520	6.96	10		0		10		0		0		0	
234	01/02/94	Ground	10.1	601	6.59	5.1	508	6.82	4.4	522	6.90	4.3	524	6.95	10		0		0		0		20		0	
235	01/02/94	Ground	10.1	601	6.59	4.6	577	6.82	5.0	536	6.85	4.7	536	6.95	10	100	0		10		0		0		0	
236	01/02/94	Ground	10.1	601	6.59	4.5	529	6.81	5.1	518	6.87	4.8	600	6.94	0		0		0		0		20	75	0	
237	01/02/94	Ground	10.1	601	6.59	5.1	542	6.80	4.8	537	6.82	4.4	606	6.93	0		0		10		0		0		0	
238	01/02/94	Ground	10.1	601	6.59	4.8	615	6.80	4.8	529	6.86	4.2	535	6.93	0		0		0		0		0		0	
239	01/02/94	Ground	10.1	601	6.59	4.9	548	6.73	4.6	531	6.89	4.1	535	6.93	10		0		0		0		10		0	
240	01/02/94	Ground	10.1	601	6.59	5.1	524	6.83	4.9	521	6.90	4.4	538	6.94	0		0		0		0		0		10	
241	01/02/94	Ground	10.1	601	6.59	5.0	538	6.85	4.8	537	6.91	4.5	537	6.94	0		0		0		0		10		0	
242	01/02/94	Ground	10.1	601	6.59	5.2	617	6.83	5.0	532	6.89	4.7	616	6.96	10		0		0		0		0		0	
243	01/02/94	Ground	10.1	601	6.59	5.1	543	6.82	4.4	519	6.92	5.0	548	6.92	10		0		0		0		0		0	
244	01/02/94	Ground	10.1	601	6.59	5.0	620	6.80	4.9	523	6.86	4.9	551	6.92	10		0		0		0		0		0	
245	01/02/94	Ground	10.1	601	6.59	4.7	538	6.81	4.7	531	6.85	4.8	550	6.93	10		0		0		0		0		0	
246	01/02/94	Ground	10.1	601	6.59	4.8	597	6.80	5.0	532	6.88	5.0	536	6.93	0		0		0		0		0		0	
247	01/02/94	Ground	10.1	601	6.59	5.1	542	6.88	5.1	557	6.89	5.3	551	6.83	0		0		0		0		0		0	
248	01/02/94	Ground	10.1	601	6.59	4.8	549	6.87	5.0	554	6.91	5.1	556	7.03	10		0		10		0		10		0	
249	01/02/94	Ground	10.1	601	6.59	4.6	555	6.89	4.9	550	6.91	5.0	548	7.01	0		0		10		0		0		0	
250	01/02/94	Ground	10.1	601	6.59	4.9	631	6.89	4.9	556	6.90	5.1	552	7.02	0		0		0		0		10		10	100
251	01/02/94	Ground	10.1	601	6.59	5.2	631	6.90	5.1	552	6.91	5.0	554	7.00	0		0		0		0		0		0	
252	01/02/94	Ground	10.1	601	6.59	5.0	634	6.88	5.0	559	6.89	5.0	555	7.02	0		0		0		0		0		0	
253	01/02/94	Ground	10.1	601	6.59	4.7	632	6.84	4.8	553	6.91	4.8	550	7.03	0		0		0		0		10		0	
254	01/02/94	Ground	10.1	601	6.59	5.0	560	6.89	4.8	557	6.91	5.2	548	6.99	0		0		10		0		0		0	
255	01/02/94	Ground	10.1	601	6.59	4.9	629	6.90	5.0	556	6.90	5.1	557	7.01	10		10	100	10		0		0		0	
256	22/02/94	Ground	12.1	615	5.88	4.8	542	6.56	4.9	555	6.58	4.6	510	6.54	10		0		10		0		20		0	
257	22/02/94	Ground	12.1	615	5.88	5.3	499	6.45	5.4	568	6.58	5.0	498	6.70	10		0		0		0		10		0	
258	22/02/94	Ground	12.1	615	5.88	4.9	578	6.58	4.8	571	6.56	4.4	503	6.73	0		0		0		0		20		0	
259	22/02/94	Ground	12.1	615	5.88	4.5	590	6.58	5.0	582	6.62	4.8	512	6.75	0		0		0		0		30	33	0	
260	22/02/94	Ground	12.1	615	5.88	5.5	598	6.57	5.1	589	6.61	5.2	518	6.70	10		0		20	100	0		10		0	

07007 STORAGE OF COLIFORM SAMPLES
Tabulated data. TC and FC counts in cfu per 100 ml. Temperature in °C, conductivity in µS/cm.

Sample	Date	Wat. type	0 hours Temp	Cond	pH	6 hours Temp	Cond	pH	12 hours Temp	Cond	pH	24 hours Temp	Cond	pH	6 hours TC	% Conf	FC	% Conf	12 hours TC	% Conf	FC	% Conf	24 hours TC	% Conf	FC	% Conf
261	22/02/94	Ground	12.1	615	5.88	4.9	604	6.59	5.3	593	6.67	4.5	523	6.73	10		0		10		0		0		0	
262	22/02/94	Ground	12.1	615	5.88	5.3	596	6.56	4.7	593	6.68	4.8	519	6.70	10		0		0		0		0		0	
263	22/02/94	Ground	12.1	615	5.88	5.8	602	6.56	5.4	602	6.73	4.8	526	6.70	20	100	0		0		0		0		0	
264	22/02/94	Ground	12.1	615	5.88	5.5	603	6.58	4.9	588	6.74	4.5	516	6.71	10		0		10		0		0		0	
265	22/02/94	Ground	12.1	615	5.88	4.7	588	6.58	4.9	598	6.77	4.3	585	6.70	20		0		0		0		0		0	
266	22/02/94	Ground	12.1	615	5.88	5.4	601	6.61	5.0	603	6.58	4.8	598	6.70	10		0		10		0		10		0	
267	22/02/94	Ground	12.1	615	5.88	4.6	530	6.61	5.2	587	6.66	4.6	588	6.71	0		0		0		0		0		0	
268	22/02/94	Ground	12.1	615	5.88	5.9	607	6.83	5.3	589	6.71	5.9	543	6.72	0		0		10		0		0		0	
269	22/02/94	Ground	12.1	615	5.88	5.8	604	6.77	4.8	595	6.76	5.7	549	6.52	0		0		0		0		10		0	
270	22/02/94	Ground	12.1	615	5.88	5.7	610	6.74	5.5	601	6.72	5.5	540	6.72	0		0		0		0		0		0	
271	22/02/94	Ground	12.1	615	5.88	5.6	605	6.68	5.2	258	6.62	5.4	549	6.73	0		10		10		0		0		0	
272	22/02/94	Ground	12.1	615	5.88	5.8	539	6.67	4.9	543	6.68	5.7	615	6.72	20		0		10		0		30	67	0	
273	22/02/94	Ground	12.1	615	5.88	5.5	609	6.68	5.4	588	6.73	5.8	540	6.72	20		0		0		0		0		0	
274	22/02/94	Ground	12.1	615	5.88	5.9	610	6.68	5.3	573	6.77	5.4	541	6.75	10		0		0		0		0		0	
275	22/02/94	Ground	12.1	615	5.88	5.2	546	6.68	4.8	599	6.81	5.5	544	6.71	0		0		20	50	0		10		10	100
276	22/02/94	Ground	12.1	615	5.88	5.6	590	6.77	5.2	601	6.89	5.1	549	6.73	20		10	0	10		0		0		0	
277	22/02/94	Ground	12.1	615	5.88	5.1	589	6.84	5.2	602	6.82	5.6	563	6.72	20		0		0		0		10		0	
278	22/02/94	Ground	12.1	615	5.88	5.0	605	6.82	4.9	591	6.73	5.4	547	6.72	0		0		0		0		10		0	
279	22/02/94	Ground	12.1	615	5.88	5.7	607	6.77	5.0	609	6.67	5.6	545	6.70	0		10	100	0		0		10		0	
280	22/02/94	Ground	12.1	615	5.88	5.1	608	6.67	5.1	583	6.79	5.1	555	6.73	0		0		0		0		0		0	
281	22/02/94	Ground	12.1	615	5.88	4.9	612	6.68	5.4	592	6.82	5.0	541	6.73	10		0		20		0		0		0	
282	22/02/94	Ground	12.1	615	5.88	5.3	590	6.67	5.3	597	6.83	5.9	543	6.75	10		0		10		0		0		0	
283	22/02/94	Ground	12.1	615	5.88	5.4	595	6.82	5.7	593	6.71	5.8	561	6.71	20		10		0		0		0		0	
284	22/02/94	Ground	12.1	615	5.88	5.8	621	6.72	5.6	612	6.71	5.7	547	6.71	20	50	0		20		0		0		0	
285	22/02/94	Ground	12.1	615	5.88	5.6	622	6.72	5.5	613	6.68	5.6	548	6.70	10		10		20		0		0		0	
286	23/03/94	Ground	8.6	1398	6.51	5.1	1337	6.84	5.8	1330	6.51	5.3	1364	6.87	0		0		0		0		10		0	
287	23/03/94	Ground	8.6	1398	6.51	5.0	1364	6.91	5.9	1308	6.79	5.9	1326	6.70	0		0		0		0		0		0	
288	23/03/94	Ground	8.6	1398	6.51	4.6	1294	6.95	5.7	1301	6.33	5.2	1398	6.93	0		0		10		0		0		0	
289	23/03/94	Ground	8.6	1398	6.51	4.8	1330	6.96	5.2	1266	6.33	5.1	1406	6.91	0		0		0		0		0		0	
290	23/03/94	Ground	8.6	1398	6.51	4.8	1283	6.96	5.7	1235	6.81	4.6	1386	6.93	0		0		10		0		0		0	
291	23/03/94	Ground	8.6	1398	6.51	4.9	1346	6.93	5.6	1224	6.80	5.0	1399	6.94	0		0		10		0		10		0	
292	23/03/94	Ground	8.6	1398	6.51	5.2	1367	6.90	5.6	1296	6.87	4.9	1380	6.97	0		0		10		0		10		0	
293	23/03/94	Ground	8.6	1398	6.51	5.0	1357	6.90	6.2	1317	6.91	4.9	1381	6.96	0		0		0		0		0		0	
294	23/03/94	Ground	8.6	1398	6.51	5.0	1309	6.90	5.4	1447	6.96	4.7	1298	7.00	0		0		0		0		10		0	
295	23/03/94	Ground	8.6	1398	6.51	4.9	1315	6.91	6.0	1300	6.95	5.0	1224	6.99	0		0		10		0		10		0	
296	23/03/94	Ground	8.6	1398	6.51	4.8	1304	6.91	5.6	1297	6.96	5.4	1238	7.02	0		0		0		0		0		0	
297	23/03/94	Ground	8.6	1398	6.51	4.7	1310	6.91	5.7	1307	6.99	4.8	1388	7.01	0		0		0		0		0		0	
298	23/03/94	Ground	8.6	1398	6.51	4.9	1325	6.90	5.6	1272	6.99	5.6	1411	7.02	0		0		20		0		0		0	
299	23/03/94	Ground	8.6	1398	6.51	5.0	1351	6.91	6.9	1303	7.01	5.3	1378	7.03	0		0		0		0		0		0	
300	23/03/94	Ground	8.6	1398	6.51	5.1	1346	6.90	5.9	1437	6.94	5.1	1361	7.01	0		0		0		0		0		0	
301	23/03/94	Ground	8.6	1398	6.51	5.0	1352	6.91	9.8	1609	6.89	5.3	1298	7.00	0		0		0		0		0		0	
302	23/03/94	Ground	8.6	1398	6.51	4.6	1382	6.91	9.3	1528	6.96	5.0	1311	7.03	0		0		0		0		0		0	
303	23/03/94	Ground	8.6	1398	6.51	4.5	1351	6.90	9.7	1593	6.97	4.9	1381	6.86	0		0		10		0		0		0	
304	23/03/94	Ground	8.6	1398	6.51	5.2	1352	6.96	9.1	1553	7.01	5.0	1356	6.89	0		0		0		0		0		0	
305	23/03/94	Ground	8.6	1398	6.51	5.1	1363	6.98	7.9	1346	7.00	4.8	1361	6.88	0		0		0		0		10		0	
306	23/03/94	Ground	8.6	1398	6.51	5.1	1367	6.90	8.6	1336	7.04	5.0	1365	6.90	0		0		20		0		0		0	
307	23/03/94	Ground	8.6	1398	6.51	4.8	1362	6.92	9.4	1368	7.03	5.3	1363	6.91	0		0		0		0		0		0	
308	23/03/94	Ground	8.6	1398	6.51	4.7	1359	6.92	9.9	1393	7.01	5.5	1368	6.91	10		0		0		0		0		0	
309	23/03/94	Ground	8.6	1398	6.51	5.0	1367	6.91	9.2	1403	7.04	4.8	1382	6.93	0		0		20		0		0		0	
310	23/03/94	Ground	8.6	1398	6.51	5.0	1362	6.90	9.4	1388	7.04	4.9	1359	6.91	10		10		10		0		10		0	
311	23/03/94	Ground	8.6	1398	6.51	5.1	1359	6.92	9.6	1603	7.08	4.8	1361	6.92	10		0		10		0		0		0	
312	23/03/94	Ground	8.6	1398	6.51	5.1	1353	6.96	9.7	1620	7.03	4.7	1375	6.99	0		0		0		0		0		0	
313	23/03/94	Ground	8.6	1398	6.51	5.0	1351	6.91	8.8	1415	7.01	5.0	1378	7.00	0		0		10		0		0		0	
314	23/03/94	Ground	8.6	1398	6.51	4.8	1362	6.90	9.3	1529	7.08	5.1	1381	6.98	10		10		0		10		10		0	
315	23/03/94	Ground	8.6	1398	6.51	4.7	1361	6.89	9.4	1558	7.10	5.1	1323	6.99	10		0		0		0		10		0	
316	23/03/94	Ground	8.6	1398	6.51	4.5	1360	6.92	10.9	1633	7.07	5.0	1336	7.00	0		0		0		0		0		0	
317	23/03/94	Ground	8.6	1398	6.51	4.9	1369	6.91	10.9	1358	7.09	4.9	1371	7.01	0		0		0		0		10		0	
318	23/03/94	Ground	8.6	1398	6.51	5.0	1372	6.90	11.0	1698	7.00	4.8	1352	6.99	0		0		20		0		0		0	
319	23/03/94	Ground	8.6	1398	6.51	5.0	1352	6.85	9.6	1430	7.12	5.0	1359	7.01	0		0		30		0		30		0	
320	23/03/94	Ground	8.6	1398	6.51	4.9	1364	6.91	9.0	1590	7.13	5.1	1348	7.02	0		0		0		0		0		0	