

Laboratory Accreditation: Proof of Performance

Introduction

The Canadian Association for Environmental Analytical Laboratories (CAEAL) is committed to working with the laboratory community and their clients to achieve and demonstrate the value of implementing the highest quality standards in Canadian environmental laboratories. While everyone recognizes the inherent value of improved quality assurance which is implicit in laboratory accreditation, we have long realized that it would be much easier to illustrate the advantages if we could point to an objective study showing improved performance at accredited labs.

Our Study

To this end, we have compared the proficiency testing performance of accredited labs from the joint SCC/CAEAL program with the performance of non-accredited labs that received identical proficiency testing samples. Five parameters were chosen for this comparison because of availability of data: biochemical oxygen demand, total suspended solids, chloride, dissolved iron, and fecal coliforms. Laboratories which participated in the proficiency testing studies were required to analyse four samples of different concentrations for each parameter, from which CAEAL determines an overall score through a statistical analysis; the maximum score is 100, a pass is 70, and approximately 5% of the results are expected to be considered unsatisfactory due to the statistical treatment of the data.

Data were available for a total of six proficiency testing studies between 1994 and 1996. The same number of accredited and non-accredited labs were selected for each parameter (by random selection if the entire data set was not used), and the same labs were used throughout the 1994 to 1996 period to avoid the "learning curve" influence of labs that have just joined the program. The number of labs that met the criteria varied from parameter to parameter, ranging from a low of 11 accredited and 11 non-accredited labs for fecal coliform to a high of 27 labs in each category for total suspended solids (see Table 1). In total, 528 sets of results were used in the analysis.

Table 1

Parameter	Pairs of Labs	Data Pairs
Biochemical Oxygen Demand (BOD)	24	144
Total Suspended Solids (TSS)	27	162
Chloride (CL)	13	78
Dissolved Iron (DFE)	13	78
Fecal Coliforms (FCOL)	11	66

Results

The performance of accredited and non-accredited labs has been compared by using three measures: (1) the average score, (2) the number of labs which achieved perfect

scores of 100, and (3) the number of labs which did not achieve satisfactory scores of at least 70 out of 100. The results of these comparisons is shown in the three graphs below for each parameter along with the average for the entire data set.

Figure 1

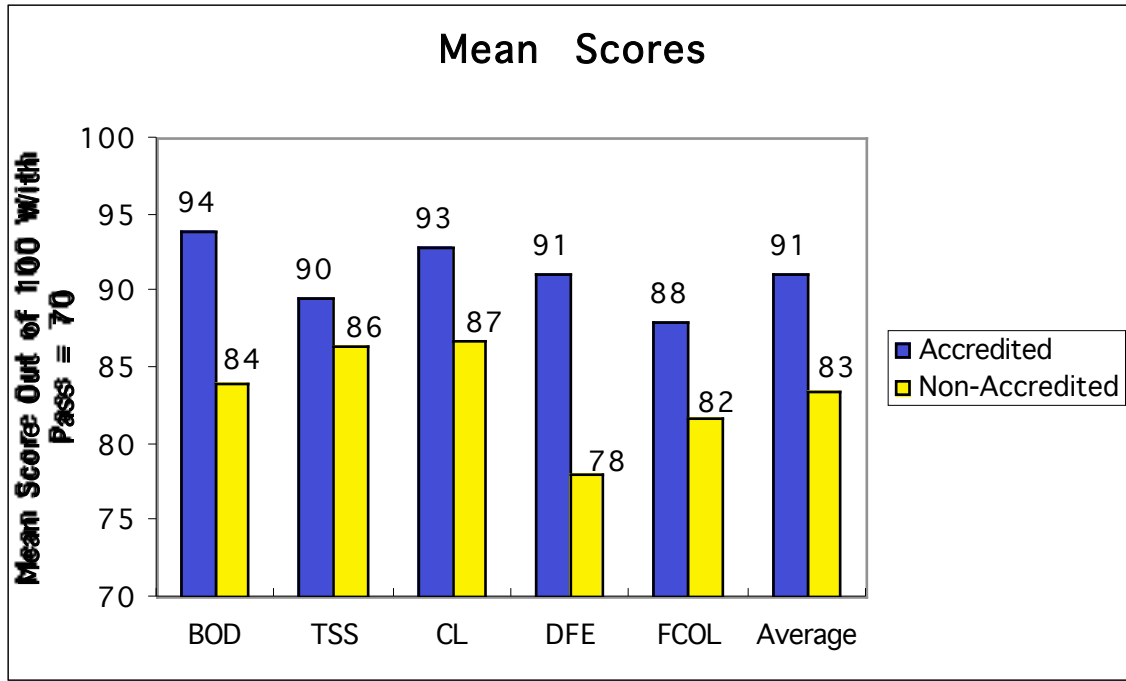


Figure 2

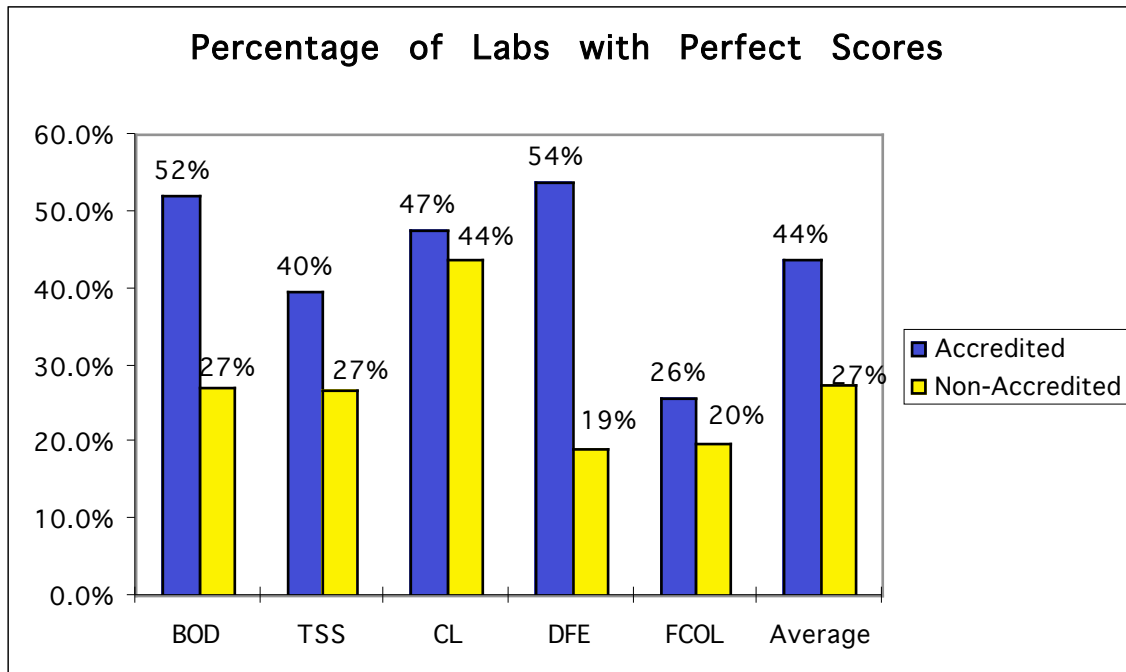
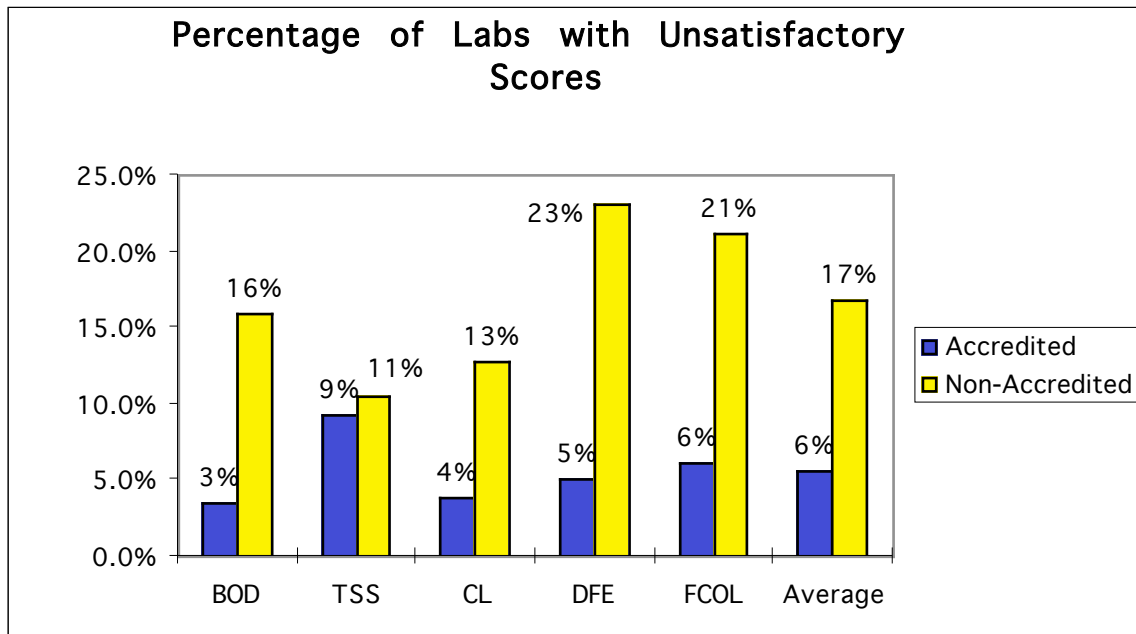


Figure 3



Conclusion

In this comparison, the accredited labs achieved higher mean scores (91% versus 83% for the entire data set), a greater number of perfect scores (44% of accredited labs versus 27% of non-accredited labs) and fewer unsatisfactory scores (6% of accredited labs versus 17% of non-accredited labs) on proficiency testing samples over a three year period. The pattern of results was very consistent; the same conclusion applied to each of the five parameters as well as to the total data set.