

**SAFE WATER ASSOCIATION, INC.,**

**Plaintiff,**

**vs.**

**Case No. 92 CV 579**

**CITY OF FOND DU LAC,**

**Defendant.**

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**AFFIDAVIT OF DR. JOHN COLQUHOUN  
IN SUPPORT OF MOTION FOR SUMMARY JUDGMENT**

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Nation of New Zealand  
City of Auckland

Dr. John Colquhoun, being first duly sworn on oath and with personal knowledge of the information contained herein, respectfully states to the Court as follows:

**BACKGROUND**

1. I am a dentist and historian, now living in retirement after a career as a researcher, dental practitioner and public health official.
2. I graduated in dentistry from the University of Otago in New Zealand in 1948. After 7 years service in the national School Dental Service, as a teacher and administrator, I entered private practice.
3. In 1971, I became Principal Dental Officer for the Auckland Health District. During this period I carried out research in both dentistry and Auckland social history.
4. Until 1980, I was a keen advocate of water fluoridation. In that year, 1980, I was sent on a world study tour by the New Zealand Department of Health, for the purpose of investigating recent research into fluoridation. On my return I was appointed to the post of Chairman of the Fluoridation Promotion Committee of the New Zealand Dental Health Foundation.
5. After returning from the study tour, I reported the then new discovery that dental decay was declining in "western" counties, with or without fluoridation, and that the differences between decay rates in fluoridated and nonfluoridated places were much less than we had claimed would occur.
6. Nonetheless, like many of my professional colleagues today, I was most reluctant to admit that fluoridation was a failure. I advocated, and my superiors agreed to a new approach based on the belief that fluoridation still provided a marginal benefit. I was reinforced in that belief by my superiors' claim that new statistics, collected for all New Zealand School Dental Service patients (98% of our child population) revealed such a benefit.

**"Doctoring" of Data**

7. I was shocked to discover, when the statistics were sent to me, they revealed no such benefit. In fact, in most Health Districts the percentage of children who were "caries-free" was higher in the non-fluoridated areas than in the

fluoridated areas. I disagreed sharply with my superiors' action in circulating a document, "overview of fluoridation statistics," which omitted the above information, disgracefully "doctored" the remaining statistics, and claimed that a marginal benefit existed.

8. When, in addition, I discovered that dental fluorosis prevalences (a sign of fluoride toxicity) were much higher than expected in fluoridated areas, I publicly changed my stance on fluoridation in 1983.
9. I have continued my research, which gained me a Doctor of Philosophy degree in 1987, and appointment to the post-doctoral position of Honorary Research Fellow of the University of Auckland. Last year (1992) I became editor of the Journal of the International Society for Fluoride Research (Fluoride), a position which provides a good overview of fluoride research in different academic disciplines

### **BENEFITS OF FLUORIDATION**

10. Large reductions in dental decay have occurred in nonfluoridated areas of developed countries, comparable to those in fluoridated areas and sometimes evident before fluorides were used. (Exhibits\_\_\_\_\_).
11. Predicted large differences in tooth decay rates between fluoridated and nonfluoridated communities do not exist. The reductions have continued in fluoridated areas after the maximum (life long) exposure to fluoride.
12. The evidence points to changes in diet and immunity being more likely explanations for most of the reductions. Studies claiming a large benefit from fluoridation, based on data from small selected samples, are not supported by new data from larger surveys and child populations.
13. Most New Zealand water supplies were fluoridated following reports of "spectacular reductions" in dental decay during the nation's first fluoridation trial in the city of Hastings.
14. In actuality, Health Department files, which became available for public scrutiny after application under New Zealand's Official Information Act, revealed that the reductions in dental decay in Hastings were mainly the result of instructions to change diagnostic procedures in School Dental Clinics, affecting the definition of "decay" and the number of fillings inserted. (Exhibit\_\_\_\_\_).
15. The instructions were given after the study commenced and in the area of the experiment only, but were not mentioned in published reports of the study. The experimental control city was abandoned when its decay rates were found to be lower than in fluoridated Hastings.
16. The revelations about the Hastings fluoridation trial have not been refuted. There is no doubt about the good intentions and sincere commitment of the professionals who conducted the experiment. They had faith in their theory that fluoridation would provide an immense benefit, based on their acceptance of evidence from the United States. The remainder of this affidavit examines that evidence and faith.

### **"Classic" Studies**

17. The 'classic' research of fluoridation led to its endorsement in the 1950s. The research was in two stages: that establishing acceptance of an inverse fluoride-caries relationship (towns with higher natural water fluoride levels were supposed to have lower average levels of tooth decay); and the North American fluoridation trials.
18. Researchers in the United States Public Health Service claimed to establish

an inverse relationship between natural water fluoride levels and dental caries. This inverse relationship was in addition to an earlier established direct relationship between water fluoride levels and prevalence of dental fluorosis. Dean reported the fluorosis relationship based on studies in the 1930s of hundreds of United States communities. (Dean T. Distribution of mottled enamel in the United States. Public Health Reports 1933; 48: 703-734.)

19. In contrast, his famous 1942 report of an inverse fluoride-caries relationship, which became the basis of widespread endorsement and practice of water fluoridation, presented data from only 21 communities in four States. Yet data from earlier caries surveys in hundreds of communities were available to Dean. The question arises: why did Dean present only 21 of them?
20. The early fluorosis studies, mainly by others, were reported on by Dean who included on his survey forms a place for each child's caries status. Although not as uniformly collected as his later personal surveys, caries data were included in the array of fluorosis surveys, as well as in a survey made in 1933-34 in 26 States, which did not include data on fluorosis.
21. Only two cities from Dean's 1938 paper on caries data were included in his 1942 paper. Some data from the 1933-34- survey (particularly for Indiana and Ohio) were included, but not data from South Dakota and Wisconsin. Proponents argue that Dean could not have had enough data on fluoride levels from latter communities. In fact, he had a great deal of data from South Dakota. (Dean HT, Elvove E, Poston RF. Mottled enamel in South Dakota. Public Health Reports 1939; 54:212-28.)
22. In 1939 he and McKay reported fluorosis data from 375 areas in 26 States which included also caries data. These caries data could have been compared with later data from low-fluoride areas where fluorosis was not endemic. Instead, caries scores from only a few of the communities were ever published.
23. Dean argued that he had to limit his analysis to the smaller number of cities because of the need to have reliable information like water histories. But Dean later acknowledged that even the 21 cities' water histories were not accurate using his own criteria, namely continuous exposure of the observed group during childhood and an unchanged water source. (Exhibit\_\_\_\_).
24. Critics argue that the earlier data from the other communities, which were collected with less pro-fluoridation bias, should also have been reported. Also, factors other than fluoride (e.g. socio-economic and dietary differences, or other drinking water elements), not considered by Dean and other authors, could explain the variations in caries incidence. After Dean's studies reporting an inverse fluoride-caries relationship, about 23 others followed. They all presented data from selected communities.
25. Critics claim that belief in a fluoride-caries relationship at low natural water-fluoride levels, on which the whole fluoridation theory rests, arose from presentation of highly selected data. (Exhibit\_\_\_\_).
26. When all the available data are put together there is a clear fluorosis correlation with low levels of water-fluoride (Exhibit\_\_\_\_, Figure 2), while the dental caries correlation is much less evident (Exhibit\_\_\_\_, Figure 3).
27. Proponents have argued that the studies providing the caries data set in Figure 3 had been carried out by different examiners using different standards of diagnosis. That does not explain why Dean reported on only 21 communities in his classic study, out of the hundreds for which data were available. Also, a similar argument would apply to the dental fluorosis data set in Figure 2, because the assessment of dental fluorosis is also subject to diagnostic variation.
28. It seems clear that fluoride ingestion is more strongly related to fluorosis

than to dental caries, and that the claims of an inverse relationship between caries and water fluoride was at best exaggerated. It is true that caries are affected by more factors than is the case with fluorosis. But, given the magnitude of the claimed fluoride benefit, one could reasonably expect a fluoride-caries correlation to be much more evident in Figure 3. Recent data and some from the past do not support such a relationship. (Exhibit\_\_\_\_\_).

### **North American Fluoridation Trials**

29. The preliminary results from the first (Grand Rapids-Muskegon) North American fluoridation trial, which commenced in 1945, led to the official endorsement of fluoridation in 1950, by the United States Public Health Service, soon followed by the Dental and Medical Associations and various other professional organizations and authorities. Other critics (Exner, Sutton & Ziegelbecker) drew my attention to the flaws in this trial, which are described.
30. The preliminary results had claimed a 51.3 per cent reduction in decay, after 4 1/2 years, for children aged 6 years in Grand Rapids. But when we look at the scores for 6-year-olds which were published three years later, we find that an impossible 70.45 per cent reduction was recorded in the first year of the trial and that there was then an increase but no overall reduction in the following years.
31. The explanation is not hard to find. All children from the 79 schools in Grand Rapids were examined at the commencement of the trial, but in succeeding years only a selected sample, claimed to be representative, being the children from 25 of the 79 schools. In the control city of Muskegon all children were examined throughout the period.
32. Examination of the published data for other age groups also confirms that the sample of 25 schools was not representative of the population being studied. The reported DMFT of some age groups, approximately one year after the initial examinations, was lower than that of the same children when they were a year younger! For example, the 10-year olds had DMFT 4.9 in 1945. In 1946, when they had become 11-year-olds, they had DMFT 4.2.!
33. Fluoridated water cannot turn decayed, missing and filled teeth into sound ones. It follows that the large recorded tooth decay reductions, which were mostly in the first year, resulted from selecting an unrepresentative sample.
34. Muskegon was fluoridated 6 1/2 years after the trial commenced, and was lost as an experimental control. An official report at the time has revealed that decay had also declined in the control city. (J Am Water Works Assoc 1956; 44:1-9).
35. A critical examination of other early fluoridation trials revealed similar flaws, also detected by others. The basic limitations of the classic fluoridation trials were described over 30 years ago: poor research design including inadequate experimental controls, poor adjustment of sample size, lack of 'blind' examinations to safeguard against examiner bias and variability, inadequate baseline measures and negligible statistical analysis. (Exhibit\_\_\_\_\_).

### **Recent Evidence**

36. In 1989 I visited Geneva and collected, from the World Health Organization's Oral Health Data Bank, the records of extensive caries surveys in countries where water fluoride levels were also recorded (Bangladesh, Greece, Hungary, Libya, Malta, Morocco, Nigeria, Spain,

- Zimbabwe). In none of the countries is a fluoride-caries relationship evident.
37. The late Professor Jackson, a leading British fluoridation proponent, commented: "On the question of efficacy, we do not have to rely on the inadequate studies of the past". But recent fluoridation studies claiming a benefit are little better than the early ones. A prime example is the "Anglesey" study of which Jackson was Principal author.
  38. Critiques of that study explained why its claimed "strictly blind conditions" were worthless: a fluoridated semi-rural island was compared with a non-fluoridated "control". The control, chosen years after the study commenced, with no pre-fluoridation information on it, was mainland urban area that one would expect to have a higher caries rate. The critiques have not been refuted. (Exhibit\_\_\_\_\_).
  39. Other examples are the Wick and Stranraer non-blind studies in Scotland, which claim to show, by comparing the "DMFT" (or "dmft" for temporary teeth) of small samples of young children, that dental decay increased suddenly after fluoridation of the local water supplies was stopped.
  40. In Stranraer the DMF of 10-year-olds was reported to rise, after defluoridation, by only 4 per cent in 6 years, the increase consisting wholly of the "missing and filled" component.
  41. In Wick, the children examined for the study were 5-to 6-year olds who have few if any permanent teeth. The 'rise' consisted almost entirely of a 61 per cent increase in the number of temporary teeth extracted (this is the "m" component - the "decayed and filled" component increased by only 0.4%). Such an increase reflects a change in the treatment pattern of Wick dentists, following the decision to defluoridate. No doubt the dentists believed they were responding to real increases in decay. But statistics obtained from much larger numbers of children show no increase in dental decay following cessation of fluoridation.
  42. Space does not permit here a critique of the numerous other recent studies. Methods of selecting compared groups are not always clear. Younger age groups are frequently chosen, which leaves unanswered the question whether fluoride only delays the onset of caries. Most studies are not blind, and are conducted by committed fluoridationists. The most damning criticism is the observation of Diesendorf that one still cannot find a single properly-controlled blind fluoridation trial in which the test and control populations are similar and were chosen randomly. (Exhibit\_\_\_\_\_).
  43. In contrast to the fluoridation studies, much well-designed dental research indicates that local ('topical') applications of fluoride are more effective in arresting tooth decay than are systemic uses which lead to "fluoride-induced toxicological problems". This research has been reviewed by European dental scientists who argue that water fluoridation is no longer necessary.
  44. Defenders of fluoridation have suggested that, although some inadequacies may have been present in the early fluoridation studies, the fact that almost all of them agreed in their results was a confirmation of their findings. Diesendorf has observed that a large number of poor studies does not equal one good one. Quantity is no substitute for quality of research.
  45. Diesendorf has also pointed out (personal communication 1988) that the reported decay reductions were nearly always the same (mostly 50-60% in permanent teeth) whether one measured the difference between test and control groups at a fixed time, or between the same test group at different times. There is no way that the independent variables involved could always be the same. The extreme uniformity of results should be taken as evidence that papers which obtained the magical 50-60 per cent reduction were more likely to be submitted for publication and to gain approval by referees and editors.

46. Structures and processes studied in the social sciences include "professional networks and the institutionalization of a single mind set". Thomas Kuhn and others have described the hold which scientific theories, once accepted, can exert on the minds of the professional communities involved. Subsequent research becomes "a strenuous and devoted attempt to force nature into the conceptual boxes supplied by professional education". Dental and medical students learn only the case in favor of fluoridation.
47. Fluoridation has been described as dentistry's "magic bullet". The concept of selective toxicity - of injuring harmful cells or agents in the human body without damaging other cells-originated with Paul Ehrlich, a founder of modern medical science and chemotherapy. According to this still prevalent system of belief, diseases are caused by hostile agents which can be destroyed without harm to the rest of the body by a magic bullet, which takes the form of a wonder drug (such as salvarsan). An antibiotic (such as penicillin), a magic metal (such as radium) or some other instrument of high technology. Our enthusiastic readiness to support fluoridation reflected an earnest desire to find a simple solution to the problem of rampant dental decay. We also believed that fluoridation would not abolish tooth decay entirely, but would reduce it to controllable levels.
48. Re-examination of fluoridation research suggests that early biases, albeit unconsciously held, were strong. In the first phase of the classic research the investigators expected to find less decay in mottled teeth, and were intent on finding quantitative data which they felt certain existed.
49. In the fluoridation trials which commenced in 1945 the experimenters had in mind the 50-60 per cent reduction which had been claimed to occur in naturally fluoridated areas, and their primary concern appears to have been to produce the same results. The subjective nature of caries diagnosis and the fact that the examiners were usually fully aware which children had been exposed to fluoridated water, would facilitate such results.
50. The inadequacies of the method of measuring caries prevalence which was chosen for the fluoridation trials ("DMF", or number of "decayed, missing and filled teeth or tooth surfaces) have been noted elsewhere. (Exhibit\_\_\_\_). Using the chosen measure, any comparison of tooth decay in groups of children, even with a single examiner, is influenced by different diagnostic standards. That is because the DMF which the examiner records includes a count of fillings and extractions performed earlier by various dentists.
51. Even in the rare 'blind' study (examiner unaware whether or not a child had received fluoride) the dentists who filled or extracted the child's teeth usually were aware, so professional bias could still influence the results.
52. After fluoridation became official policy in 1950, the intense public controversy would make it politically necessary that the results come out 'right'. In one rare published case the early results were not right, after three years' trial. (Scrivener CA. Unfavorable report from Kansas community using artificial fluoridation of city water supplies for three year period. J Dent Res 1951; 30:465, Exhibit\_\_\_\_).
53. How many such 'wrong' results were simply not reported or published cannot be known. In view of the revelations already made, it seems probable that, as in the Hastings study, the tendency would be to make the results come 'right'. When facts did not fit the theory, they were made or interpreted to conform to the theory.
54. The time has arrived to acknowledge the weaknesses and flaws in the theoretical foundation of fluoridation.

## **HEALTH AND SAFETY RISKS**

55. Fluoridation was endorsed before environmental issues and possible long-term effects became the concerns which they are today, and which have led many countries to reject fluoridation. For example: Denmark banned fluoridation on the recommendation of its Agency for Environmental Protection which pointed out that long-term effects on some people (such as bottle-fed infants, and older people with impaired kidney function) were not known.
56. In Sweden, which has also rejected it, a Commission reported that "the combined and long-term environmental effects of fluoride are insufficiently known." Holland discontinued it after reports of adverse effects (and tooth decay has continued to decline in Holland, despite the warnings of an increase if fluoridation, was stopped).
57. Czechoslovakia and Finland stopped it last year. Even in Canada where health authorities still endorse fluoridation, the National Research Council has reported that "accumulation of fluoride in animals and man induces metabolic and biochemical changes, the significance of which has not yet been fully assessed."
58. Although the U.S. Environmental Protection Agency still officially supports fluoridation, its own employed scientists have publicly challenged its fluoride policies, which they allege are continued because of political pressures and cover-ups. (Exhibit\_\_\_\_, Carton; exhibit\_\_\_\_, Marcus).

#### **Dental Fluorosis**

59. Indirectly related to questions of safety are reports that the fluoride type of tooth mottling is much more prevalent and severe than was originally predicted. The mottling, called dental fluorosis, consists of patches of softened, more porous tooth enamel.
60. This mottling effect was originally described as a sign of fluoride toxicity (and it still is, outside the English-speaking medical world).
61. Recent studies report that in fluoridated communities dental fluorosis affects 25-50 per cent of the children, some so severely that their teeth are discolored and pitted. (Exhibits\_\_\_\_\_). Only 10-12 per cent, with barely detectable mottling, had been predicted by proponents.
62. Critics of fluoridation have difficulty believing that only tooth-forming cells are damaged by fluoride, and suspect that other adverse effects have been similarly underestimated. There is evidence of more general harm. (Exhibit\_\_\_\_\_).
63. A New Zealand cohort study has reported that, far from fading (as we claimed would occur with the mild form found following fluoridation) the condition in some children deteriorates, resulting in teeth of "unsatisfactory appearance"-that is, the patches become discolored and pitted.
64. Some of the authors of these reports suggested lowering present levels of fluoride intake in order to reduce the mottling. As a result, two cities, Dunedin and Hastings, have lowered their water fluoride level to below 1 part per million.

#### **Skeletal Fluorosis**

65. We have always known that fluoride can affect bones as well as teeth, causing osteofluorosis, which is difficult to differentially diagnose from the various kinds of arthritis.
66. It was claimed however that this disease occurred only after high doses, resulting in increased bone mass and high fluoride content of the bones. In

- fact, high doses were sometimes deliberately given to treat osteoporosis, a disease in which bone mass is decreased. But last year and this year, comprehensive studies in America and Britain - far more thorough and comprehensive than any previous ones - have suggested that fluoridated water, as well as fluoride treatment for osteoporosis, actually makes bones more fragile and liable to fracture. (Exhibits\_\_\_\_\_).
67. Fractured bones in old people are increasing. Hip fractures are reaching epidemic proportions. Rockwood revealed that hip fractures in New Zealand have more than tripled over the past 38 years. (Exhibit\_\_\_\_\_).
68. It is claimed that these recent studies are not relevant to the fluoridation issue for two reasons. First, the recent studies showed only weak correlations between fluoridated water and hip fractures and such an association, it is argued, does not establish a cause. However, confounding variables were considered in the studies (unlike the earlier ones which claimed that fluoride reduced fracture risk) and the correlations, though weak, were significant - more significant and stronger, actually, than the inverse associations now claimed between fluoridated water and tooth decay.
69. The second argument is that very high doses were used in the clinical trials of fluoride treatment of osteoporosis. But Finnish studies have reported high bone fluoride levels in old people who drank fluoridated water for more than 10 years (levels as high as some recorded following fluoride therapy for osteoporosis) especially if they had osteoporosis or impaired kidney function. (Alhava et al., Acto Orthopaedica Scandinavica 56 161-166 1985).
70. Even normally functioning kidneys excrete only around half the fluoride we ingest. Children's and especially infants' kidneys, and impaired kidneys, excrete even less. The rest accumulates in the skeleton. We have always known that, but we believed the effect from fluoridated water would be insignificant - and early studies based on small populations in naturally fluoridated areas seemed to support our view. Now recent studies on large populations suggest a long term cumulative detrimental effect.

### **Fluoride Sensitivity**

71. Research in other countries has shown that some people are sensitive to fluoridated water, suffering adverse effects like skin rashes and gastric upsets. We should remember how slow the medical profession was to recognize the existence of food sensitivity.

### **Overdosing of Babies**

72. Nature filters fluoride out of the milk of animals and humans. So bottle-fed babies drinking milk made from fluoridated water receive much higher doses of fluoride than occurs in nature. (Exhibit\_\_\_\_\_). Defenders of fluoridation admit that this happens, but claim no harm has been proven. The possibility of harm should be investigated, but so far has not been.

### **Uncontrolled Dosing of the Population**

73. Fluoride is a poison, comparable to arsenic and lead, as any toxicology textbook can confirm. It is a powerful inhibitor of many biological processes. Although the concentration of fluoride in drinking water can be controlled, the actual dose received by each member of the public is uncontrolled (and therefore unsafe), because it depends on how much water

- or other fluoride-containing substances each person consumes.
74. Fluoridation to any level remains uncontrolled dosing with a toxic substance which accumulates in the bodies of humans and animals, as well as in soils and plants.

#### **CONCLUSION**

75. It is my best judgment, reached with a high degree of scientific certainty, that fluoridation is invalid in theory and ineffective in practice as a preventive of dental caries. It is dangerous to the health of consumers.
76. I make this Affidavit in support of the Plaintiff's Motion for Summary Judgment.
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