Mayor and Councillors
KĀPITI COAST DISTRICT COUNCIL **26 AUGUST 2010**

Meeting Status: Public Included

Purpose of Report: For Decision

WATER FLUORIDATION LEVELS

PURPOSE OF REPORT

1 The purpose of this report is to provide the Council with information on reducing fluoride levels to 0.7mg/L within the Waikanae, Paraparaumu and Raumati water supply network and safety issues for infants (bottle fed) or children less than six years of age, taking into account the European Commission and Scientific Committee on Health and Environmental Risks (SCHER Opinion) Report for pre-consultation opinion, dated 18 May 2010.

2 The SCHER opinion is an extensive scientific publication and to take its content into account requires expertise in areas that Council officers do not have. To provide this context Dr. Stephen Palmer, Regional Leader Public Health Services, Medical Officer of Health was asked to provide his input to this report and Dr Palmer will be in attendance at the meeting.

3 Consideration has also been given to the provision of a supply of potable non-fluoridated water in the vicinity of the Waikanae Water Treatment Plant (Waikanae WTP) to enable people to fill their own drinking water containers.

Note: Dr. Palmer has researched the SCHER Opinion Report and its references to provide written inputs for this report. Dr. Palmer represents the Ministry of Health (MoH) on water fluoridation issues in the Wellington Region. Inserts from Dr. Stephen Palmer are shown as *italics.*

SIGNIFICANCE OF DECISION

4 The Council significance policy will not be triggered by this report.

BACKGROUND

5 Water fluoridation is the process of adjusting the level of fluoride in the water supply. Fluoride compounds are usually introduced into the water supply in the form of Sodium Silicafluoride (sometimes referred to as Sodium Fluorosilicate).

6 Water supply sources often contain naturally occurring levels of fluoride. Naturally occurring fluoride levels in Kapiti Coast District Council's raw water supplies are:

- Otaki 0.05 mg/L
- Hautere / Te Horo 0.04 mg/L
- Paekakariki 0.13 mg/L
- Waikane River 0.08 mg/L

7 The Otaki, Hautere and Paekakariki water supply networks do not have additional fluoride added to their water supplies.

8 The Waikanae, Paraparaumu and Raumati (WPR) water supply network is dosed with Sodium Silicafluoride at the Waikanae WTP.

9 Water fluoridation is recommended by The Ministry of Health (MoH) to provide some protection against dental decay. The Drinking Water NZ website lists 48 plants with water fluoridation, supplying 56 communities around New Zealand.

10 The *Drinking Water Standards for New Zealand 2005 (Revised 2008)* released by the MoH set a Maximum Acceptable Value (MAV) of 1.5 mg/L for fluoride. MoH recommends that for oral health reasons, the fluoride content for drinking-water in New Zealand should be in the range of 0.7 to 1.0 mg/L. The dosing range recommended is based on advice from the World Health Organisation (WHO).

11 Sodium Silicafluoride supplied to the Waikanae WTP is sourced from India by ORICA New Zealand Limited for the specific purpose of treating drinking water and meets the "Standard for the Supply of Fluoride for Use with Water Treatment", as published by Water New Zealand an industry association.

12 The chemical breakdown of Sodium Silicafluoride as dosed at the Waikanae WTP is:

- Fluorine 60.6%
- Sodium 24.5%
- Silicon 14.9%
- Chlorine 0.035%

13 Fluoride dosing at the Waikanae WTP is achieved by dry feeding into a contact tank. The amount of chemical added is closely monitored to ensure that levels stay within the range recommended by MoH. The current fluoride dosing target is 1.0 mg/L.

CONSIDERATIONS

Water Supply Regulation Standards

14 Water fluoridation is a public health intervention undertaken by water suppliers at their discretion. There is no regulation that requires the addition of fluoride to a water supply.

15 MoH recommends the continuation of water fluoridation in New Zealand water supplies. Regional Public Health (part of Hutt Valley District Health Board) is contracted by the MoH to deliver public health services on behalf of the Ministry to the greater Wellington region.

Kapiti Coast District Council Fluoride Dosing Levels

16 Dosing at the Waikane WTP is controlled by water flow rates. A fluoride analyser monitors and maintains the dosing range. The current fluoride dosing target is 1.0 mg/L.

17 Sodium Silicafluoride is purchased for use at the Waikanae WTP at an average cost rate of $1.81 per kg. True fluoride costs are based on the volume of water being treated. The cost for fluoride dosing at different rates is outlined in the table below. Associated cost savings from reduced fluoride levels are also included.

Dosing Rate	Cost of Fluoride	Average Cost per day	Average Cost per year
1.0 mg/L	$1.81/kg	$36.20	$13,213
0.8 mg/L	$1.45/kg	$28.96	$10,570
0.7 mg/L	$1.27/kg	$25.34	$9,249

Reduction Rate	Cost Saving	Average Saving per day	Cost Saving per year
0.2 mg/L	$0.36/kg	$7.24	$2,643
0.3mg/L	$0.54/kg	$10.86	$3,964

Note: Operational costs are effectively negligible.

18 Dosing of any chemical compound is subject to minor fluctuations in concentration based on the complexity of the process and the quality of the monitoring and dosing equipment utilised.

19 This risk is minimised at the Waikanae WTP due to the many monitoring systems in place. The monitoring systems include; online wet chemistry instrument, daily weight lost, daily laboratory tests and weekly independent laboratory tests.

20 The 2009/10 average fluoride concentration for the WPR water network was 0.97 mg/L. The range was 0.7 to 1.29 mg/L. The level of fluoride trended near the 1.0 mg/L end of the recommended MoH range and did not exceed the MAV of 1.5 mg/L.

21 Reducing the dosage to 0.8 mg/L would ensure that the minimum level of 0.7 mg/L is maintained, as recommended by MoH.

22 Greater Wellington Regional Council target 0.8 mg/L to ensure their minimum level of 0.7 mg/L is maintained.

23 A change to the rate of fluoride dosing is a simple procedure at the Waikanae WTP. Any minor dosing adjustment can be easily made and would only require simple re-setting of the dosing alarm.

24 Fluoride handling is regulated by the Hazardous Substances & New Organisms Act 1996. Operating with fluoride powder is one of a number of managed hazardous risks at the Waikanae WTP.

25 The administration of fluoride does not incur additional risk or costs with regards to employment and training of staff. Water treatment staff deal with a number of different chemicals and the training provided to staff ensures the safe management of all chemicals including fluoride.

European Commission (SCHER Opinion) Report

26 The SCHER opinion is an extensive scientific publication and to take its content into account requires expertise in areas that Council officers do not have. To provide this context Dr. Stephen Palmer, Regional Leader Public Health Services, Medical Officer of Health was asked to provide his input to this report. The following sections of the report in italics have been provided by Dr Palmer.

27 *The SCHER Opinion was released in May 2010 and is described as a "pre-consultation opinion" formulated by the Scientific Committee on Health and Environmental Risks (SCHER)[1]. Public submissions are requested and there will be a hearing on 17 September 2010 in Brussels.*

28 *SCHER undertook a critical review of any new evidence on the hazard profile, health effects, and human exposure to fluoride and the fluoridating agents of drinking water. This included a range of adverse health effects including dental and skeletal fluorosis, bone fractures, effect on DNA, cancer, effect on nerves and the nervous system, effect on reproduction and effect on development.*

29 *Based on epidemiological evidence SCHER concluded that when fluoride is added to drinking water by European member states to a level between 0.8 - 1.2mg/L there is no evidence that water fluoridation:*

- *Leads to the occurrence of skeletal fluorosis;*
- *Increases the prevalence of osteosarcoma (bone cancer);*
- *Impairs the neurodevelopment children or influences IQ;*
- *Has adverse thyroid effects;*
- *Influences male and female reproductive capacity.*

30 *SCHER concluded that the systemic exposure to fluoride in drinking water is associated with an increased chance of dental fluorosis in a dose-response manner. For children up to 8 years with a daily fluoride intake of less than 0.1 mg/kg bodyweight there is no significant occurrence of "moderate" forms of fluorosis in permanent teeth.*

31 *SCHER noted that the epidemiological evidence shows that dental fluorosis ("very mild" and "mild" forms) is seen in both fluoridated and non-fluoridated areas.*

[1] Scientific Committee on Health and Environmental Risks. Critical review of any new evidence on the hazard profile, health effects, and human exposure to fluoride and the fluoridating agents of drinking water. European Commission. May 2010 [will be referred to as the SCHER Opinion]

32 *SCHER did not consider epidemiological evidence on the prevalence and trends for "moderate" and "severe" dental fluorosis or any observational epidemiological studies. Instead SCHER relied on modelling systemic exposure to fluoride from water and other sources and comparing results with the upper tolerable daily limit.*

Safety Issues for Infants (bottle fed)

33 *SCHER estimated the systemic fluoride exposure (daily intake of fluoride from all sources) of infants from milk and infant formula (see Table 1).*

Table 1: *Estimated systemic fluoride exposure of infants from milk and formulas*[2]

Fluoride Concentration		***Fluoride Intake (mg/kg/day) with Varying Baby Formula Intakes (ml/kg/day)***		
Drinking Water	*Baby Formula*	*Formula Intake 170 ml/kg/day*	*Formula Intake 150 ml/kg/day*	*Formula Intake 120 ml/kg/day*
0.1 mg/L	*0.200 mg/L*	*0.034*	*0.030*	*0.024*
0.8 mg/L	*0.804 mg/L*	*0.137*	*0.121*	*0.096*
1.5 mg/L	*1.420 mg/L*	*0.241*	*0.213*	*0.170*
3.0 mg/L	*2.740 mg/L*	*0.466*	*0.411*	*0.329*
Human Milk	---	*0.001*	*0.001*	*0.001*

34 *New Zealand (NZ) currently uses a lower upper limit for infants based on 0.1 mg/kg body weight per day. The SCHER estimates show that some infants receiving infant formula made up with water at a fluoride level of 0.8 mg/L may exceed the upper limit if this lower upper limit is used.*

35 *The SCHER Opinion uses the UK DoH (1994) upper limit of 0.22 mg/kg body weight per day and considered if the level of fluoride in drinking water is higher than 0.8 mg/L for infants up to 6 months.*

36 *An Environmental Science and Research (NZ) (ESR)Report*[3] *found that bottle fed infants exceeded the upper daily limit approximately one-third of the time for formula prepared with fluoride level at 0.7 mg/L and greater than 90% of the time for formula prepared with fluoride level at 1.0 mg/L.*

37 *A FSANZ*[4] *Assessment*[5] *found that infant formula made up using fluoridated water 0.6 - 1.0 mg/L could result in dietary intakes at or above the upper limit of 0.7 mg/day for 0 – 6 month olds.*

38 *Modelling by ESR did not show that the upper limit was exceeded for 6-12 month old infants, 1-3 -year-old toddlers, or 5-6 -year-old children. The*

[2] SCHER Opinion. Page 25, Table 9
[3] Cressey P et al. Estimated Dietary Fluoride Intake For New Zealanders. ESR. July 2009. www.esr.cri.nz
[4] FSANZ: Food Standards Australia New Zealand
[5]. Application A588 Voluntary Addition Of Fluoride To Packaged Water, FSANZ, May 2009. http://www.foodstandards.gov.au/standardsdevelopment/

report noted that FSANZ used a higher level of fluoride in water for their intake modelling.

Safety Issues for Children Under Six Years of Age

39 *Table 2 summarises the SCHER estimated total daily systemic exposure to fluoride for children 1 - 6 years of age.*

Table 2: *Estimated Total Daily Systemic Exposure to Fluoride for Children aged between 1 - 6 years[6] including Fluoride Available in Toothpaste.*

Intake Description	***Fluoride Intake (mg/day)***	***Fluoride Toothpaste Intake*** *Systemically 40% Fluoride available daily ***	
		0.05 % F Intake	*0.15 % F Intake*
*SUM of food, beverages and supplements **	*0.553*	*Range 0.100 – 0.300*	*Range 0.300 – 0.900*
0.5 litres of water + food intake	*0.953*	*1.053 – 1.253*	*1.253 – 1.853*
1.0 litres of water + food intake	*1.353*	*1.453 – 1.653*	*1.653 - 2.253*
1.5 litres of water + food intake	*1.753*	*1.853 – 2.053*	*2.053 - 2.653*

Table 2 Notes:

1) Fluoridated drinking water assessed at a concentration of 0.8 mg of fluoride per litre.

2) Toothpaste intake estimated with twice daily brushing

* *This value represents intake from food (0.042 mg/day), beverages (0.011 mg/day) and approved food supplement (0.50 mg/day) based upon anticipated upper level of use (EFSA, 2008)*

** *Contribution based upon a fluoride concentration of 0.5% and 0.15%, toothpaste with 40% systemic absorption and the usage of 0.5 g/day (least case) and 1.5 g/day (worst case).*

40 *The upper tolerable fluoride limit for children aged three years is 1.5 mg/day. The SCHER opinion uses 1.5mg/day for children aged between 1 - 6 years of age. The upper limit is exceeded when more than 1.0 litre of water containing 0.8 mg/L fluoride is consumed along with tooth-brushing using normal strength fluoride toothpaste. If 1.5 litres of water is consumed by a child at this fluoride concentration, the upper limit is exceeded without using toothpaste.*

41 *Modelling by ESR did not show that the upper limit was exceeded for 6-12 month old infants, 1-3 -year-old toddlers, or 5-6 -year-old children. The report noted that FSANZ used a higher level of fluoride in water for their intake modelling.*

[6] SCHER Opinion. Page 24, Table 8

SCHER Opinion - Conclusions

42 *The SCHER Opinion is consistent with recent reviews and does not contribute new information on the safety of fluoridated water for bottle fed infants and children less than 6 years. New Zealand differs in that it does not recognise the UK DoH (1994) upper limit of 0.22 mg/kg body weight per day for infants and instead uses the lower 0.1 mg/kg body weight per day.*

43 *Safety issues for infants (bottle fed) or children under six years of age have been considered, taking into account the adopted opinions from the (SCHER) Report, dated 18 May 2010, along with recent NZ studies and the FSANZ risk assessment.*

44 *SCHER concluded that no adverse health effects could be substantiated for water fluoridated where level of fluoride is between 0.8 - 1.2mg/L. Modelling by SCHER, ESR and FSANZ show that there is a theoretical risk of exceeding the upper limit for daily intake of fluoride for infants and children less than 6 years.*

45 *Moderate and severe dental fluorosis continues to be very rare in Australia and New Zealand FSANZ concluded that exceeding the upper limit for daily intake of fluoride is not a safety issue.*

Provision of Potable Non-Fluoridated Supply in the Vicinity of the Waikanae Water Treatment Plant

46 The Waikanae WTP is a controlled site due to the issues associated with chemical storage and site operations.

47 Access to the site is strictly controlled to ensure the integrity of the treatment process. Only authorised card holders or approved visitors may enter the site. Staff would not recommend allowing any additional access to the Waikane WTP.

48 The treatment process at the plant is complex and includes several process streams that collectively treat incoming raw water to the required standards. A significant reconfiguration of the treatment process would be required to allow a flow of raw water to be excluded from the fluoride dosing process while ensuring this water still receives all of the other treatment processes at the plant.

49 There is a concern that modifying the treatment process would add unnecessary risks and process complications to the Waikanae WTP. The risk will increase if the supply point was made available outside the extent of the treatment plant site.

50 If demand was significant then consideration could be given to providing dedicated filling points at existing Council sites within Otaki and Paekakariki.

Legal Considerations

51 There are no legal issues for Council.

Delegation

52 There are no delegations relating to this issue and it must be considered by the Council.

Consultation

53 There has been extensive consultation through the Annual Plan process on the addition of Fluoride to the Waikane, Pararparaumu and Raumati water supplies.

Policy Implications

54 There are no policy issues for Council.

Publicity Considerations

55 Issues around water fluoridation have been discussed in the media by both the health authorities and by the Fluoride Action Network. It is proposed that information on any decision made as a result of this report be provided to the media for publication.

Other Considerations

56 There are no other considerations.

CONCLUSIONS

57 Modification of the treatment process and access requirements at the Waikanae WTP, to provide public access to non fluoridated water, presents an unacceptable level of risk to the integrity of the treatment plant and current process.

58 Access to Non-Fluoridated water is available within the Otaki, Hautere and Peakakariki water supply zones at public drinking water fountains.

59 Reducing the level of fluoride dosing in the Waikanae WTP by targeting a new minimum level of 0.8 mg/L will not significantly impact on current operational procedures. Supply costs of fluoride compounds will reduce by $2,643 per year. There are no operational risks associated with reducing fluoride dosing levels.

60 Reducing the dosing level of fluoride to 0.7mg/L may result in dosing under the minimum recommended by MoH. Targeting a dosing rate of 0.8 mg/L will help mitigate this risk.

61 Council's current approach is consistent with the *Drinking Water Standards for New Zealand* and MoH's recommendation for water fluoridation.

62 Advice received from Dr. Palmer is that the SCHER Opinion is consistent with recent reviews and does not contribute new information on the safety of fluoridated water for bottle fed infants and children less than 6 years.

63 *Safety issues for infants (bottle fed) or children under six years of age have been considered, taking into account the adopted opinions from the (SCHER) Report, dated 18 May 2010. along with recent NZ studies and the FSANZ risk assessment.*

64 *SCHER concluded that no adverse health effects could be substantiated for water fluoridated where level of fluoride is between 0.8 - 1.2mg/L. Modelling by SCHER, ESR and FSANZ show that there is a theoretical risk of exceeding the upper limit for daily intake of fluoride for infants and children less than 6 years.*

65 *Moderate and severe dental fluorosis continues to be very rare in Australia and New Zealand FSANZ concluded that exceeding the upper limit for daily intake of fluoride is not a safety issue.*

RECOMMENDATIONS

66 That Council approve a reduction in the fluoride dosing levels to 0.8 mg/L, understanding that dosing is unlikely to fall below the minimum level recommended by MoH.

67 That Council does not provide a supply of potable non-fluoridated water in the vicinity of the Waikanae WTP.

Report prepared by:	**Approved for submission by:**
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