



caring about you & your environment

MEMORANDUM

4 July 2001

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To: Jane Bradbury, Divisional Manager Environment

copy to: David Benham, Divisional Manager Utility Services

From: Murray Kennedy, Strategy & Asset Manager

Subject: Addition of Fluoride to Drinking Water

For Your: **Action** [] **Comment** [] **Information** []

You have requested a reply to a question raised at the last Environment Committee Meeting. "Is fluoride useful in countering the harmful effects of any toxic substances which might otherwise affect the drinking water?"

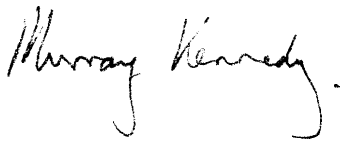
The Water Group of the Regional Council supplies water which complies with "Drinking Water Standards for New Zealand 2000". These Standards are published by the Ministry of Health. There are many parts to the Standard which must be complied with. For the purposes of the question the Priority Determinands are the most relevant.

The attachment provides information about the determinands taken directly from the Drinking Water Standards. The specification for the fluoride sourced by the Water Group requires that any impurities do not contribute more than 10 percent of a maximum allowable value. This is measured after the fluoride has been added to the drinking water.

The Water Group has no Priority Two Determinands and therefore there are no known toxic substances which may have harmful affects. Notwithstanding this point, testing is carried out to determine the concentration of a number of chemicals and

metals in the drinking water. Page 35 of last year's Water Group Business Report, **which** is attached, shows the results of this. The water produced by the Water Group is of a very high quality.

Whether or not fluoride reacts with any of the products in very small concentrations in the water is not known and does not appear to be relevant. What we are able to say is that there are no known toxic substances in the water.

A handwritten signature in black ink that reads "Murray Kennedy". The signature is written in a cursive style with a period at the end.

MD KENNEDY

Strategy & Asset Manager

Enc

**Part of Section 2:
Drinking Water Standards for New Zealand 2000.
Published by the Ministry of Health.**

Note, some parts of the section have been omitted to achieve conciseness.

2.3.1.1 Priority 1 determinands

Priority 1 determinands are determinands whose presence can lead to rapid and major outbreaks of illness.

Contamination of water supplies by pathogens usually arises from faecal material or wastes containing them. Humans, birds or animals may be the source. The determinands that are currently known to fall into this category include the pathogenic bacteria, viruses and protozoa.

Escherichia coli (*E. coli*), a common gut bacterium living in warm-blooded animals, is used as an indicator of the contamination of water by excrement and is a generally accepted indicator for the potential presence of pathogenic viruses and bacteria. However, *E. coli* is not a good indicator of the presence of the pathogenic protozoa *Giardia* and *Cryptosporidium*.

For this reason the current Priority 1 determinands are:

- . *Escherichia coli* (*E. coli*)
- . protozoa (*Giardia* and *Cryptosporidium*).

Priority 1 determinands apply to all community drinking-water supplies in New Zealand and must be monitored in all supplies because they constitute a major public health risk.

2.3.1.2 Priority 2 determinands 2a–2c

Priority 2 determinands are those that are present in a specific supply or the distribution zone, usually at concentrations that exceed 50 percent of the MAV (maximum allowable value). The Ministry of Health will carry out investigations on water supplies from time to time to identify the presence of P2 determinands, until this process is adequately covered by water supply risk assessment procedures carried out by the drinking-water suppliers.

Determinands specified by the Ministry of Health to be Priority 2 determinands for the drinking-water supply under consideration are required to be monitored to establish compliance with the Standards.

Priority 2 determinands are divided into three types: 2a, 2b and 2c.

- **2a: Chemical and radiological determinands that could be introduced into the drinking-water supply by the treatment chemicals at levels potentially significant to public health (usually greater than 50 percent MAV).**

Priority 2a does not include disinfection by-products or determinands introduced into the drinking-water from piping or other construction materials.

- **2b: Chemical and radiological determinands of health significance that have been demonstrated to be in the drinking-water supply at levels potentially significant to public health (usually greater than 50 percent MAV).**

Priority 2b includes chemicals present in the raw water that may not be removed by the treatment process; any disinfection by-products; and determinands introduced into the drinking-water from piping or other construction materials that are present in the water when sampled under normal (flushed) protocols.

Priority 2b does not include determinands introduced by the treatment chemicals or determinands introduced by the consumer's plumbing.

- **2c: Micro-organisms of health significance that have been demonstrated to be present in the drinking-water supply.**

Micro-organisms listed in Table 14.1 may be listed as priority 2c determinands if there is reason to suspect that they are likely to be present in the drinking-water supply.

This may occur, for example, when high numbers of these organisms are present in the raw water and *E. coli* is present in water leaving the treatment plant. The Medical Officer of Health may declare such organisms to be Priority 2 if there are epidemiological grounds for suspecting the drinking-water supply.

2.3.1.3 Priority 3 determinands 3a–3d

- **3a: Chemical and radiological determinands of health significance arising from treatment processes in amounts known not to exceed 50 percent MAV.**
- **3b: Chemical and radiological determinands of health significance which are not known to occur in the drinking-water supply at greater than 50 percent MAV.**

- **3c: Micro-organisms of health significance which are not known to be present in the drinking-water supply.**
- **3d: Determinands of aesthetic significance known to occur in the drinking-water supply.**

Aesthetic determinands are classified as Priority 3 because they do not pose a direct threat to public health. People, however, judge drinking-water mainly by the aesthetic characteristics of appearance, taste and smell, and an aesthetically unacceptable drinking-water supply may cause them to change to an alternative, and potentially unsafe, supply or treatment process. For this reason it is preferable that water supply authorities monitor these determinands, although this is not required to comply with the Standards.

2.3.1.4 Priority 4 determinands 4a–4c

- **4a: Chemical and radiological determinands of health significance which are known not to be likely to occur in the drinking-water supply.**
- **4b: Micro-organisms of health significance which are known not to be likely to be present in the drinking-water supply.**
- **4c: Determinands of aesthetic significance not known to occur in the drinking-water supply.**

Some determinands, including some pesticides, will be Priority 4 for all New Zealand drinking-water because they are not used in this country at present. They are included in the tables to ensure that MAVs are available should the situation change.

Priority 4 determinands may become Priority 2 if the Ministry of Health considers this is warranted.

Water Quality

The health risk due to toxic chemicals in drinking water differs to that caused by microbiological contaminants. It is unlikely that any one substance could result in an acute health problem except under exceptional circumstances, such as significant

for obvious reasons such as taste, odour and appearance.

The problems associated with chemical constituents arise primarily from their ability to cause adverse effects after prolonged periods of exposure.

MEAN VALUES OF CHEMICAL ANALYSIS AT TREATMENT PLANTS

ended 30 June 2000

Parameter	Guideline values ^(A)	TE MARUA		WAINUIOMATA		WATERLOO		GEAR ISLAND	
		No. of samples	Value	No. of samples	Value	No. of samples	Value	No. of samples	Value
Alkalinity (total) mg/L CaCO ₃	—	92	47.6	48	50.3	51	66.5	44	62.6
Aluminium (acid soluble) mg/L	0.15	78	0.03	35	0.06	—	—	—	—
Arsenic (total) mg/L	0.01		<0.001		<0.001		<0.001		<0.001
Boron mg/L	0.3		<0.03		<0.03		0.04		0.04
Cadmium (total) mg/L	0.003		<0.0003		<0.0003		<0.0003		<0.0003
Calcium (total) mg/L	^(B)		15.0		19.0		22.0		9.2
Chloride mg/L	250		7.5		20.0		14.0		16.1
Chromium (total) mg/L	0.05		<0.002		<0.002		<0.002		<0.002
Colour (total) PtCO	10	59	5.0	52	5.0	39	5.0	4	5.0
Conductivity µS/cm @ 25°C	—	2	140.0	2	183.5	2	207.5	26	199.0
Copper (total) mg/L			0.006		<0.001		<0.001		<0.001
Cyanide (total) mg/L	0.05		<0.008		<0.008		<0.008		<0.008
Fluoride mg/L	1.5 ^(C)	188	0.84	177	0.68	189	0.81	28	0.63
Hardness (total) mg/L	200	8	42.1	8	60.9	8	67.4	8	47.9
Iron (total) mg/L	0.2	9	0.03	9	0.09	9	0.11	9	0.09
Langelier saturation index	≥0	4	-1.18	5	-1.40	4	-0.98	4	-1.38
Lead (total) mg/L	0.01		<0.0005		<0.0005		<0.0005		<0.0005
Magnesium (total) mg/L	^(B)		1.1		1.7		3.3		4.7
Manganese (total) mg/L	0.05		<0.001		0.003		0.002		<0.001
Mercury (total) mg/L	0.002		<0.0002		<0.0002		<0.0002		<0.0002
Nickel (total) mg/L	0.02		<0.001		<0.001		<0.001		<0.001
Nitrate mg/L N	3		0.04		0.12	4	0.71	4	0.71
pH	6.5–8.5	91	7.82	41	7.71	37	7.75	112	7.60
Phosphate – (dissolved reactive) mg/L P	—		<0.01		<0.01	4	0.01		0.01
Reactive silica mg/L	—		10.0		12.0		16.0		15.0
Selenium (total) mg/L	0.01		<0.001		<0.001		<0.001		<0.001
Sodium mg/L	200		11.0		11.0		12.0		23.0
Solids (total dissolved) mg/L	1000		93.0		120.0		130.0		120.0
Sulphate mg/L	250		7.9		7.2		6.6		6.6
Zinc (total) mg/L	3		<0.003		<0.003		<0.003		<0.003

(A) Drinking Water Standards for New Zealand (1995)

(B) See 'Hardness'

(C) The fluoride content recommended for drinking water by the Ministry of Health, for oral health reasons, is 0.7 to 1.0 mg/L

A dash in the 'Guideline' column indicates that there is no guideline value

