IN THE HIGH COURT OF NEW ZEALAND
WELLINGTON REGISTRY CIV

UNDER	**the Judicature Amendment Act 1972 and the Declaratory Judgments Act 1908**
IN THE MATTER	**of an application for judicial review and an application for a declaration**
BETWEEN	**NEW HEALTH NEW ZEALAND INC, an incorporated society having its registered office in Christchurch**
	Plaintiff
AND	**ATTORNEY-GENERAL for and on behalf of the Minister of Health**
	Defendant

AFFIDAVIT OF PATRICK DAVID SLOAN

Dated 1 April 2014

Solicitor
Wynn Williams Lawyers
Homebase
Unit B 195 Marshland Road
Shirley
P O Box 4341
Christchurch
Ph: (03) 379 7622
Fax: (03) 353 0247
Solicitor: Jonathan Gillard

Counsel:
Lisa Hansen
Level 8, Wakefield House
90 The Terrace
PO Box 8045
Wellington 6143
Ph: 914 1052
Fax: (04) 473 3179
Email: l.hansen@barristerscomm.com

I, Patrick David Sloan, director of Christchurch affirm:

1. I am known as Dave Sloan.

2. I am both a member of and the chairman of the plaintiff.

3. The plaintiff is an incorporated society having its registered office in Christchurch. It was incorporated in November 2005.

4. The plaintiff is a consumer-focused health organisation which aims to advance and protect the best interests and health freedoms of consumers.

5. The plaintiff's purpose includes:

   5.1. To provide representation for the consumers of health products and services in New Zealand.

   5.2. To ensure that good quality health information is made available to consumers, at all times.

   5.3. To ensure that a consumer has the right to select such health services and products as may be beneficial to the consumer in the consumer's opinion.

   5.4. To promote sensible regulation of health products and services in the interests of New Zealand consumers.

6. The plaintiff has members throughout New Zealand.

7. One issue that is of interest and concern to the plaintiff is fluoridation of water supplies.

8. Some local authorities in New Zealand add fluoride compounds to their water supplies to a total level of between 0.7 and 1 part per million fluoride. The fluoridating chemicals used are primarily hydrofluosilicic acid (HFA) and sodium silicofluoride (SSF).

MGM

9. The claimed purpose of fluoridation is to improve public health by reducing the incidence of tooth decay.

10. The plaintiff is opposed to fluoridation of water supplies by local authorities for reasons that include:

    10.1. Fluoridation removes a consumer's freedom of choice.

    10.2. Fluoride is potentially harmful to health.

    10.3. Fluoridation of water supplies is not an effective way of providing fluoride for the purposes of preventing dental caries.

    10.4. Fluoridation is in conflict with core principles of modern pharmacology.

    10.5. The fluoride added to water supplies is obtained from the phosphate fertiliser industry and contains heavy metal contaminants including arsenic and lead.

11. In 2013 the plaintiff issued judicial review proceedings against the South Taranaki District Council challenging its December 2012 decision to add fluoride to its Waverley and Patea water supplies.

12. The plaintiff argued that there was no power in the Local Government Act 2002 to fluoridate, that water fluoridation breached s 11 of the New Zealand Bill of Rights Act 1990 (NZBORA) and was neither prescribed by law nor reasonably justified under s 5 of the NZBORA.

13. Substantial evidence was provided by the plaintiff to support its contention that fluoridation is of questionable benefit and there are real risks of harm. If necessary the plaintiff will seek leave to adduce that evidence in this proceeding.

14. In a decision dated 7 March 2014 the High Court dismissed the plaintiff's claim (*New Health NZ Inc v South Taranaki District Council* [2014] NZHC 395) (the decision).

MGH

15. On 26 March 2014 the plaintiff lodged an appeal against the decision in the Court of Appeal.

16. In the decision the judge held that water fluoridation has a therapeutic medical purpose namely preventing tooth decay.

17. This finding was opposed by the South Taranaki District Council.

18. A necessary consequence of the judge's finding is that the chemical compounds used in water fluoridation – HFA and SSF - meet the definition of a "medicine" under the Medicines Act 1981.

19. Medicine is defined in the Medicines Act as any substance or article, other than a medical device that is manufactured, imported, sold, or supplied wholly or principally for administering to one or more human beings for a therapeutic purpose.

20. HFA and SSF are sold to local authorities and used by them principally for the purpose of preventing the disease of dental decay.

21. The Ministry of Health through its business unit MedSafe is responsible for the regulation of therapeutic products.

22. To the best of my knowledge and belief, the Ministry of Health has never regulated HFA and SSF as medicines. This is despite fluorides being listed in the Medicines Regulations 1984 as a prescription medicine, a restricted medicine and a pharmacy-only medicine.

23. The plaintiff is concerned that the Ministry of Health may have a conflict of interest when it comes to the issue of water fluoridation. The Ministry has promoted water fluoridation for many decades. If it were required to regulate the fluoridating chemicals under the Medicines Act, its support for fluoridation may be compromised.

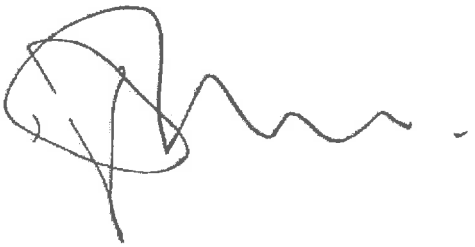
24. I attach the following information to support the plaintiff's claim.

MBM

24.1. Attached and marked "A" is the Standard for the Supply of Fluoride for Use in Water Treatment, New Zealand Water Supply and Disposal Association, Second Edition, 1997.

24.2. Attached and marked "B" is an affidavit provided in the judicial review proceedings by Graham Mark Atkin dated 5 November 2013. I seek leave to adduce that affidavit in support of this claim.

AFFIRMED at Christchurch this 1st day of April 2014



before me:

MEMorrison

A Barrister and Solicitor of the High Court of New Zealand

Margaret Elizabeth Morrison
Solicitor
Christchurch

A

THIS is the Exhibit marked with the letter A referred to in the annexed affidavit of Patrick Sean Sloan sworn at Christchurch this 1st day of April 2014 before me:

M E Morrison

A Solicitor of the High Court of New Zealand

Margaret Elizabeth Morrison
Solicitor
Christchurch

Standard for the Supply of Fluoride for Use in Water Treatment

Second Edition

January 1997

STANDARD FOR THE SUPPLY OF FLUORIDE FOR USE IN WATER TREATMENT

Second Edition

January 1997

The first edition of this standard was prepared for the Water Supply Managers' Group of the New Zealand Water & Wastes Association and the Ministry of Health by Works Consultancy Services Ltd in 1995.

ISBN 1-877134-09-0

Published by:
New Zealand Water & Wastes Association
P O Box 15974, New Lynn, Auckland
Phone: 09 827 5757, Fax: 09 827 2008
Email: water@nzwwa.org.nz, Website: www.nzwwa.org.nz

Contents

1 GENERAL

1.1 Scope

This Standard covers hydrofluosilicic acid (sometimes called hydrofluorosilicic acid), sodium fluoride and sodium silicofluoride, for the addition to water supplies.

1.2 Purpose

The main purpose of this Standard is to provide purchasers, manufacturers and suppliers with the minimum requirements for hydrofluosilicic acid, sodium fluoride and sodium silicofluoride, including physical, chemical and testing requirements.

1.3 Application

This Standard can be referenced in specifications for purchasing and receiving hydrofluosilicic acid, sodium fluoride and sodium silicofluoride, and can be used as a guide for testing the physical and chemical properties of samples of them. The stipulations of this Standard apply when this document has been referenced and only to hydrofluosilicic acid, sodium fluoride or sodium silicofluoride when used for the dosage of water supplies.

1.4 Uses in Water Treatment

Fluoride is added to the water supply to reduce the incidence of dental caries. Hydrofluosilicic acid, sodium fluoride and sodium silicofluoride are the fluoride compounds that are commonly used for this purpose.

1.5 Manufacture of Fluoride Compounds

1.5.1 Hydrofluosilicic acid is produced as a co-product in the manufacture of phosphate fertilisers. Phosphate rock, which contains fluoride and silica, is treated with sulphuric acid. This produces two gases: silicon tetrafluoride and hydrogen fluoride. These gases are passed through scrubbers where they react with water to form hydrofluosilicic acid.

1.5.2 Sodium fluoride is generally produced by neutralising hydrofluosilicic acid with caustic soda (sodium hydroxide) or soda ash.

1.5.3 Sodium silicofluoride is generally produced from the addition of sodium carbonate or sodium chloride to hydrofluosilicic acid.

1.6 Description of Fluoride Compounds

1.6.1 Hydrofluosilicic acid is a strong, corrosive, pale yellow liquid with a characteristic sour odour.

1.6.2 Sodium fluoride is white, odourless, free-flowing, powder or crystals.

1.6.3 Sodium silicofluoride is a white, odourless, free-flowing crystalline powder.

1.7 Methods of Dosing

1.7.1 Hydrofluosilicic acid is normally fed directly into water by means of various liquid feeding devices and metering pumps. Dilution of the acid in the range of 10 to 1 and 20 to 1 (parts water to parts acid) before feeding is not recommended due to the possible formation of an insoluble silica precipitate.

1.7.2 Sodium fluoride is proportionally added to water either as a dry powder, or as a solution of varying strengths. A saturated solution tank eliminates the necessity of weighing the compound, but does require a water meter to measure the amount of water that is used to make up a solution of known strength.

1.7.3 Sodium silicofluoride is fed into water by means of mechanical dry feeders equipped with solution tanks, which should completely dissolve the compound before its introduction into the water. Sodium silicofluoride is less soluble than sodium fluoride, so liquid proportioning of solutions is rarely used and feeding of slurries is not recommended.

1.8 Definitions

The following definitions shall apply in this Standard:

1.8.1	*Fluoride Compounds:*	A group of chemical compounds, consisting of hydrofluosilicic acid, sodium fluoride and sodium silicofluoride, presently used for fluoridation of water.
1.8.2	*Hydrofluosilicic Acid:*	Hydrofluosilicic acid (HFA), or hydrofluorosilicic acid, or fluosilicic acid is an aqueous solution of H_2SiF_6.
1.8.3	*Sodium Fluoride:*	Sodium fluoride is a powder, or crystals, or a combination of both, consisting essentially of NaF.
1.8.4	*Sodium Silicofluoride:*	Sodium silicofluoride, or sodium fluosilicate, is a crystalline powder consisting essentially of Na_2SiF_6.
1.8.5	*Manufacturer:*	The party and manufacturers, fabricates, or produces materials or products.
1.8.6	*Purchaser:*	The person, company or organisation that purchases any materials or work to be performed.
1.8.7	*Reception Point:*	The point of physical transfer of materials from the supplier to the purchaser.
1.8.8	*Supplier:*	The party who supplies material or services. A supplier may or may not be the manufacturer.
1.8.9	*w/w*	weight per unit weight, for example g/kg.

2 MATERIALS

2.1 Physical Properties

Table 1 gives some physical properties of fluoride compounds.

Property	Fluoride Compound		
	Hydrofluosilicic Acid	Sodium Fluoride	Sodium Silicofluoride
Appearance	Hydrofluosilicic acid is a clear pale yellow aqueous solution	Sodium fluoride is a fine dry powder or a dry crystalline material with no lumps	Sodium silicofluoride is a fine, dry powder containing no lumps
Molecular Formula	H2SiF6	NaF	Na2SiF6
Molecular Weight	144.09	41.99	188.06
pH	1.2 (25% w/w solution)	close to neutral (solution)	3.5 – 4.0 (solution)
Specific Gravity	1.18 – 1.20 (20°C) of 25% w/w solution	2.7 (18°C) 2.56 (41°C)	2.70 (20°C)
Solubility in Water	Completely miscible	1.0 g/100 mL @ 20°C 4.3 g/100 mL @ 25°C	0.43 g/100 mL water (0°C) 0.65 g/100 mL water (17°C) 0.76 g/100 mL water (25°C) 0.94 g/100 mL water (35°C)
Particle Size	N/A	Mesh % Passing No 200 (74 µm) 90-99 No 325 (43 µm) 40-75 No 400 (38 µm) 30-45	Mesh % Passing No 32 (495 µm) 100 No 100 (147 µm) 50-90 No 200 (74 µm) 15.50 No 325 (43 µm) 0-20
Bulk Density	-		about 1.44 kg/L

Table 1: Some Physical Properties of Fluoride Compounds

2.2 Chemical Requirements

2.2.1 Hydrofluosilicic acid shall contain between 18% and 20% hydrofluosilicic acid, H_2SiF_6, w/w.

2.2.2 Sodium fluoride shall have a minimum of 97% w/w sodium fluoride, NaF, corresponding to approximately 43.9% fluoride ions. Moisture shall not exceed 0.3% w/w on delivery at the reception point.

2.2.3 Sodium silicofluoride shall have a minimum of 98% w/w sodium silicofluoride, Na_2SiF_6, corresponding to approximately 59.4% fluoride ions. Moisture shall not exceed 0.3% w/w on delivery at the reception point.

2.3 Impurities

2.3.1 Specific Impurity Limits

2.3.1.1 Based on a maximum dosage of 1.2 mg of fluoride ion/litre of water, commercially available hydrofluosilicic acid, sodium fluoride and sodium silicofluoride are not known to contribute significant quantities of contaminants that adversely affect the potability of drinking water.

2.3.1.2 The limits of specific impurities in fluoride compounds may be set by the purchaser to ensure that the material supplied is suitable for adding to water supplies. In setting impurity limits the purchaser shall take into consideration the expected maximum dosage (MD) of fluoride ion, the maximum acceptable valve (MAV) of a parameter, generally taken from the Drinking-Water Standards for New Zealand 1995, and a safety factor which reflects the maximum percentage of a MAV that may be contributed by a specific impurity. The specific impurity limits may be calculated using the following equation:

$$SIL = \frac{MAV\,(mg/litre) \times 10^6\,(mg/kg)}{MD\,(mg/litre) \times SF}$$

Where

SIL	=	Specific Impurity Limit
MAV	=	Maximum Acceptable Valve
MD	=	Maximum Dosage
SF	=	Safety Factor

2.3.1.3 Appendix A sets out an example calculation of a specific impurity limit, along with a table of MAVs taken from the Drinking-water Standards for New Zealand 1995. Alternative MAVs to those in the Drinking-water Standards for New Zealand may be chosen by the purchaser to reflect their individual requirements. The purchaser may also vary the SF to suit.

2.3.1.4 Specific impurity limits shall be given as weight of impurity by weight of fluoride ion (F^-).

2.3.2 **Insoluble Matter**

2.3.2.1 Insoluble matter in hydrofluosilicic acid shall not exceed 0.2% w/w.

2.3.2.2 Insoluble matter in sodium fluoride shall not exceed 0.6% w/w.

2.3.2.3 Insoluble matter in sodium silicofluoride shall not exceed 0.5% w/w.

2.3.3 **Heavy Metals**

2.3.3.1 Test procedures for heavy metals contents calculated as lead are detailed in the ANSI/ AWWA Standards for Hydrofluosilicic Acid, Sodium Fluoride and Sodium Silicofluoride (B703-89, B701-89 and B702-89 respectively). See Section 5.4.

2.3.3.2 For the purposes of this Standard the term heavy metals refers to the following metals: barium, cadmium, chromium, copper, lead, mercury and nickel.

2.3.3.3 Hydrofluosilicic acid shall not contain more than 0.02% w/w heavy metals expressed as lead (Pb).

2.3.3.4 Sodium fluoride shall not contain more than 0.04% w/w heavy metals expressed as lead (Pb).

2.3.3.5 Sodium silicofluoride shall not contain more than 0.05% w/w heavy metals expressed as lead (Pb).

2.3.4 General Impurities

In addition to any specific impurity limits, fluoride compounds shall not contain any other impurities that may be deleterious to health or aesthetically objectionable as determined in the Drinking-Water Standards for New Zealand 1995. General impurity limits shall be based on a maximum fluoride ion dosage of 1.2 mg/L, the MAV of determinands and a minimum safety factor of 10.

3 DELIVERY

3.1 Packaging and Shipping

3.1.1 Fluoride compounds are toxic and should be handled with care. Suppliers of fluoride compounds must comply with the relevant regulations for classification, marking, packaging, labelling and transporting of material, including the Toxic Substances Regulations 1983 and NZS 5433: 1988, Code of Practice for the Transport of Hazardous Substances on Land.

3.1.2 Hydrofluosilicic acid may be shipped in bulk in road tankers and trailers. Sodium fluoride and sodium silicofluoride may be shipped in 25 kg or 50 kg multi-wall paper bags with polyethylene inner coating.

3.1.3 Tanks for transporting hydrofluosilicic acid shall comply with all conditions as required under the Transport Act 1992 and the Toxic Substances Regulations, and shall not contain any substances that might affect the quality of the hydrofluosilicic acid added to water supplies as specified by this Standard. Refer also to Sections 3.1.3 and 4.1.1.

3.2 Labelling

Each shipment of material shall comply with the New Zealand Standard NZS 5433:1988, *Code of Practice for the Transport of Hazardous Substances on Land* and specifically must be clearly identifiable and be marked and/or accompanied by clear means of giving the following information:

Contents : (Proper Shipping Name)
UN Number:
Hazardous Chemical Classification:
Name of Manufacturer:
Net weight

3.3 Unloading and Storage

3.3.1 Bulk hydrofluosilicic acid shall be unloaded at the purchaser's premises using either a gravity discharge or a pump into an appropriate receiving vessel. The supplier shall provide an appropriate "camlock" or other type of coupling as agreed with the purchaser for connection to the storage tank inlets, if required, which should prevent an incorrect discharge.

3.3.2 Bagged sodium fluoride and sodium silicofluoride shall be transported on pallets for unloading with a forklift or by hand. Bags shall be stored in a dry covered designated storage area. Bagged product shall have an expected shelf life on delivery in dry storage conditions of two years minimum.

3.3.3 Bags damaged prior to delivery will be the responsibility of the supplier, and bags damaged during unloading at the purchaser's premises will be the responsibility of the agent undertaking the unloading.

3.3.4 The condition on delivery of the paper outers of the bags shall not have deteriorated to any extend so as to impede handling or emptying of the bags. Bags with deteriorated paper outers on delivery shall be replaced by the supplier at no cost to the purchaser.

4 SAFETY

4.1 Health and Safety and Environmental Protection

4.1.1 Suppliers of fluoride compounds must comply with the requirements of the Health and Safety in Employment Act 1992, the Transport Act 1962, the Resource Management Act 1991, the Toxic Substances Regulations 1983, and NZS 5433: 1988, and take all practicable steps to protect the purchaser and others and the environment from hazards rising from the transportation, delivery and supply of fluoride compounds.

4.1.2 Within two weeks of award of a contract to supply product, and prior to delivery, the supplier shall provide to the purchaser the following information:

(a) An updated copy of the Material Safety Data Sheet, which as a minimum shall include the following information, as detailed in *Guidance Note for Completion of a Material Safety Data Sheet,* [NOHSC:3001 (1991)]:

- Introductory and Company Details

  Page numbers and total
  Date of issue
  Company, address and phone numbers

- Identification

  Product names, codes and numbers
  Physical description/properties
  Chemical properties
  Other properties
  Uses

- Health Hazard Information

  Health effects
  First aid

- Precautions for Use
- Safe Handling Information
- Other Information and Emergency Contacts

(b) Evidence that drivers have been adequately trained and have adequate knowledge and experience in the handling and delivery of fluoride compounds, including an endorsement on their licence as required under the Transport Act.

4.1.3 A copy of the purchaser's Health and Safety Management Plan shall be made available to the supplier of fluoride compounds. Any practices by the supplier which do not comply with the Health and Safety Management Plan may be grounds for the termination of a supply contract. Health and Safety Management Plans are discussed in the National Guidelines for Health and Safety in the New Zealand Water Industry (1997).

4.2 Protective Equipment

The purchaser and the supplier will be responsible for providing their respective personnel or agents with any necessary safety and protective equipment identified in their Health and Safety Management Plans and ensuring it is used as required.

4.3 Spills

The supplier, their agent or the authorised purchaser's representative responsible for unloading the fluoride compounds, shall immediately attend to and report any spills within the grounds of the property in which the fluoride compound reception point is located. Clean-up and reporting procedures should be specified in Health and Safety Management Plans; they may also be specified in the water treatment plant Consent issued by the Regional Council.

5 TESTING METHODS

5.1 General

5.1.1 The manufacturer or supplier shall test the materials at their own cost in order to provide a Certificate of Compliance as required in Section 7.1.

5.1.2 The purchaser may randomly take samples of the material and have these samples analysed for conformance with this Standard, at the cost of the purchaser. These samples shall be taken at the place of manufacture and/or at the delivery point, as may be agreed upon by the manufacturer or supplier and the purchaser.

5.1.3 When inspection and sampling are to be conducted at the point of manufacture, the manufacturer shall afford the inspector representing the purchaser all reasonable facilities for inspection and sampling of finished material, which shall be so conducted as not to interfere unnecessarily with the operation of the plant.

5.1.4 Analytical testing methods shall be as specified in this Standard in Section 5.4.

5.1.5 If the analysis of a sample taken at the place of manufacture shows the material does not comply with the requirements of this Standard, the purchaser may require that the manufacturer provide a certified analysis from a suitably Telarc registered organisation (or equivalent) for successive deliveries.

5.1.6 If the analysis of a sample taken at the point of delivery shows the material does not comply with the requirements of this Standard, a notice of non-conformance must be provided by the purchaser to the supplier in accordance with Section 7.4.

5.2 Sampling

5.2.1 The sampling procedure shall be agreed by the purchaser and supplier prior to the award of a contract to supply product.

5.2.2 The sample size shall be determined in order to provide a representative sample of the material and shall be agreed by the purchaser and the supplier.

5.2.3 A suitable sampling procedure is set out in Appendix B of this Standard.

5.3 Sample Preparation

5.3.1 Prior to the award of the contract to supply product the preparation of the sample for analysis shall be agreed by the purchaser and supplier giving consideration to the analytical testing to be undertaken, given that samples prepared by different methods may give different results when tested.

5.3.2 A suitable sample preparation procedure for the analytical tests detailed in Section 5.4 is set out in Appendix B of this Standard.

5.4 Standard Tests

5.4.1 For standard tests for the properties of fluoride compounds, refer to the following ANSI/AWWA Standards.

Hydrofluosilicic Acid ANSI/AWWA B703-89

- Hydrofluosilicic acid content
- Heavy metals

Sodium Fluoride ANSI/AWWA B701-89

- Size of particles
- Insoluble matter
- Moisture content
- Sodium fluoride and fluoride content - electrode method
  - titration method
- Heavy metal content

Sodium Silicofluoride ANSI/AWWA B702-89

- Size of particles
- Insoluble matter
- Moisture content
- Sodium silicofluoride and fluoride content
- Heavy metals

5.4.2 If specific impurity limits are specified, then the purchaser must state the testing methods to be used to determine compliance with the limits. Once samples are suitably prepared, test methods for specific impurities may be found in *Standard Methods for the Examination of Water and Wastewater*, 19th Edition, 1995.

6 SUPPLY CONTRACT

6.1 Contract

The purchaser may enter into a contract with a supplier for the supply of hydrofluosilicic acid, sodium fluoride, or sodium silicofluoride, in accordance with this Standard.

6.2 Acceptable Conditions

Acceptable conditions of supply are outlined in Appendix C of this Standard or as agreed between the supplier and the purchaser.

7 QUALITY ASSURANCE

7.1 Certificate of Compliance

7.1.1 The manufacturer or supplier shall provide the purchaser with a certificate of compliance that states that the material furnished in accordance with the purchaser's order complies with all applicable requirements of this Standard.

7.1.2 The purchaser may require that the supplier provide a certified analysis of the material, from a mutually agreed upon laboratory at the commencement of the contract and thereafter at three monthly intervals or as agreed between purchaser and supplier. The purchaser may also require that the supplier provide a certified analysis for insoluble matter or particular impurities, from a mutually agreed upon laboratory, for each delivery or as agreed between purchaser and supplier.

7.2 Method of Manufacture

7.2.1 The quality of a water supply chemical is greatly influenced by the method of manufacture and quality of raw material used. If other than recognised methods of manufacture, or if unusual raw materials are used, the potential may exist for impurities to be present, or poor quality chemical to be produced, that may be inconsistent with good water supply practice.

7.2.2 If the method of manufacture, source and/or quality of raw material used is changed during the period of the contract, then additional samples shall be analysed at the manufacturer's or supplier's cost, to demonstrate that the changes have not affected compliance with this Standard.

7.3 Weight Certificate

Delivered bulk product shall be weighed over certified weighbridges and the docket produced on delivery.

7.4 Rejection

7.4.1 Notice of Non-conformance

If the fluoride compound delivered does not meet the requirements of this Standard, a notice of non-conformance must be provided by the purchaser to the supplier within 10 working days after receipt of the shipment at the point of destination. The results of the purchaser's tests shall prevail unless the supplier notifies the purchaser within five working days after receipt of the notice of complaint that a retest or inspection is desired. On receipt of the request for a retest, the purchaser shall forward to the supplier one of the sealed samples taken in accordance with Section 5. In the event that the results obtained by the supplier upon retesting do not agree with the results obtained by the purchaser, the other sealed sample shall be forwarded, unopened, for analysis to a referee laboratory agreed upon by both parties. The results of the referee analysis or inspection shall be accepted as final.

The cost of the referee analysis shall be paid by the supplier if the material does not meet the requirements of this Standard, and shall be paid by the purchaser if the material does meet the requirements of this Standard.

7.4.2 Material Removal

7.4.2.1 If the material does not meet the impurity limit requirements of this Standard, the supplier shall remove the material from the premises of the purchaser when requested by the purchaser. Removal of material shall be at no cost to the purchaser.

7.4.2.2 If the material meets the impurity limits but not the fluoride content requirements of this Standard, a price adjustment may be agreed between the supplier and the purchaser. In the event that a price adjustment cannot be agreed, the supplier shall remove the material from the premises of the purchaser if required by and at no cost to the purchaser.

7.4.2.3 The material that shall be removed shall include the rejected material and any other material the rejected material may have contaminated, for example contents of a tank into which a bulk delivery has been unloaded, if required by the purchaser.

7.4.2.4 All material removed shall be concurrently replaced with material conforming to this Standard with an appropriate compliance certificate at no cost to the purchaser.

Appendix A: Specific Impurity Limits

Commercially available hydrofluosilicic acid, sodium fluoride and sodium silicofluoride are not known to contribute significant quantities of contaminants that adversely affect the potability of drinking water.

A1 Example Calculations

Specific Impurity Limits (SIL) have been calculated based on a maximum dosage (MD) of fluoride ion/litre of water and the maximum acceptable value (MAV) of a parameter taken from the Drinking-Water Standards for New Zealand 1995. The safety factor (SF) used in the calculation should be a minimum of 10, which reflects the view that no more than 10 percent of a MAV should be contributed by a given impurity in a water supply chemical.

The SIL, values were determined using the following equation:

$$SIL = \frac{MAV\ (mg/L) \times 10^6\ mg/kg}{MD\ (mg/L) \times SF}$$

An example calculation is as follows:

Arsenic:

MAV	=	0.01 mg/litre
MD	=	1.2 mg/litre
SF	=	10

$$SIL\ (As) = \frac{0.01 \times 10^6}{1.2 \times 10}$$

$$= 833\ mg\ As/kg\ F$$

For a 20% w/w H_2SiF_6 (HFA) solution, this SIL equates as follows:

$$SIL\ (As) = 833\ mg \times 0.20 \times \frac{113.99\ (6 \times MW\ of\ F)}{144.09\ (MW\ of\ HFA)}$$

$$= 132\ mg\ As/kg\ HFA$$

For a 97% NaF product, this SIL equates as follows:

$$SIL\ (As) = 833\ mg \times 0.97 \times \frac{19.00\ (MW\ of\ F)}{41.99\ (MW\ of\ NaF)}$$

$$= 366\ mg\ As/kg\ of\ NaF\ product$$

For a 98% Na_2SiF_6 product, this SIL equates as follows:

$$SIL\ (As) = 833\ mg \times 0.98 \times \frac{113.99\ (6 \times MW\ of\ F)}{188.06\ (MW\ of\ Na_2SiF_6)}$$

$$= 495\ mg\ As/kg\ of\ Na_2SiF_6\ product$$

A2 Specific impurity Limits based on maximum dosage of 1.2 mg of fluoride per litre of water, and a safety factor of 10

Determinand	mg of Determinand per kg of Product		
	hydrofluosilicic acid	*sodium fluoride*	*sodium silicofluoride*
Antimony	40	110	148
Arsenic	132	366	495
Cadmium	40	110	148
Chromium	660	1830	2475
Lead	132	366	495
Manganese	660	1830	2475
Mercury	26	73	99
Molybdenum	924	2562	3465
Nickel	264	732	990
Selenium	132	366	495

The above table of specific impurity limits has been calculated based on the maximum acceptable value (MAV) of a determinand taken from the Drinking-Water Standards for New Zealand 1995, as shown below. Because fluoride is dosed at such a low level, it is improbable that the determinands with a MAV greater than say 0.1 mg/L could ever be found in fluoride compounds to such an extent that the determinand would reach 50% of the MAV in the final water. Therefore the above table only lists those determinands with a MAV < 0.1 mg/L.

Antimony	0.003	mg/L
Arsenic	0.01	mg/L
Barium	0.7	mg/L
Boron	0.3	mg/L
Cadmium	0.003	mg/L
Chromium	0.05	mg/L
Copper *	1	mg/L
Iron *	0.2	mg/L
Lead	0.01	mg/L
Manganese *	0.5	mg/L
Mercury	0.002	mg/L
Molybdenum	0.07	mg/L
Nickel	0.02	mg/L
Selenium	0.01	mg/L
Zinc *	3	mg/L

* For aesthetic parameters, guideline values are given. In the case of copper and manganese, the health based MAV is higher than the aesthetic parameter guideline value.

Appendix B: Sampling Procedure

B1 Sampling Method

B1.1 General

B1.1.1 Sampling and preparation shall be conducted as expeditiously as possible in order to avoid undue exposure of the material to the air.

B1.1.2 The sampling method must give a gross sample that is representative of the material, and which may be divided to provide representative samples for analysis. Samples for analysis shall be provided in triplicate. Samples shall be sealed in airtight moisture proof containers.

B 1.1.3 One sample is for the immediate use of the purchaser for testing of the shipment. The other two samples shall be retained until it is known from the results of the laboratory examination that the shipment meets the requirements of this Standard. The second sample shall be delivered to the supplier if requested within five days of notification of the examination results of the first sample. The third sample is for the use of a referee laboratory if there is a controversy over the analyses.

B 1.1.4 Each sample shall be labelled to identify it by such information as the material, the name of the purchaser, package number, and date received. Each label shall be signed by the sampler.

B1.2 Sample Size

B 1.2.1 The sample size must provide a gross sample that is representative of the material.

B1.2.2 The size of the gross sample and the samples for analysis shall be agreed by the purchaser and the supplier, giving consideration to obtaining representative samples and the requirements of the laboratory to undertake analyses.

B1.3 Sodium Fluoride and Sodium Silicofluoride

B1.3.1 If the sodium fluoride and sodium silicofluoride is packaged, a minimum of 2%, and preferably 5%, of the number of the packages shall be sampled. No sample shall be taken from a broken package. Samples from individual packages shall be combined to form a gross sample.

B 1.3.2 Care shall be taken to include a proportional amount of lumps and fines, to obtain representative material.

B1.3.3 Sodium fluoride and sodium silicofluoride shall be sampled using a sampling tube or other effective device that measures at least 2 cm in diameter.

B 1.3.4 The gross sample, of at least 8 kg or as agreed, shall be mixed thoroughly and quartered and quartered again to provide eight 0.5 kg samples. Six of these samples shall be sealed in air tight, moisture-proof, plastic or glass containers. Two samples shall be for use by the purchaser. The other four shall be retained to be used for retesting as provided for in Section B1.1.3.

To quarter the sample, tip it on to a clean surface so that it forms a conical or hemispherical pile. With a clean knife, cut the pile vertically, dividing the pile into four equal parts. Make up a new pile with these four parts, and repeat the quartering process.

B1.3.5 Each sample container shall be labelled to identify it, dated, and shall be signed by the sampler.

B 1.4 Hydrofluosilicic Acid

B1.4.1 A composite sample should be taken from the tank truck or taken at five equally spaced time intervals during the unloading of the tank truck. The total sample volume shall equal at least 2 litres or as agreed. Special sampling arrangements may be necessary at unmanned water treatment plants, particularly if a new load is pumped into a tank that still has some fluoride in it.

B1.4.2 The gross sample (2 litres) should be thoroughly mixed, and three 0.5 litres samples retained. They shall be sealed in air tight, moisture-proof, plastic or glass containers.

B 1.4.3 Each sample container shall be labelled to identify it and shall be signed by the sampler.

B2 Sample Preparation

B2.1 The preparation of subsamples for testing may affect the results obtained from identical samples so appropriate and consistent preparation procedures are most important.

B2.2 Appropriate preparation techniques and test procedures must be agreed by the purchaser and the supplier.

B2.3 Test procedures are detailed in the following ANSI/AWWA Standards:

ANSI/AWWA B703-89 Hydrofluosilicic Acid
ANSI/AWWA B701-89 Sodium Fluoride
ANSI/AWWA B702-79 Sodium Silicofluoride

Appendix C: Supply Contract

C1 Contract

The following provides an outline of acceptable conditions of supply of product, to be included in a contract between a purchaser and a supplier for the supply of hydrofluosilicic acid/sodium fluoride/sodium silicofluoride *(delete those not applicable)* in accordance with this Standard, or as agreed by the purchaser and the supplier.

C2 Contract Period

A nominated contract period shall be set as part of a supply contract and shall commence from the date of entering into contract.

C3 Annual Requirements

An approximate annual requirement of product shall be provided for the information of the supplier. However, no guarantee can be given to these amounts as they will vary with water treatment plant throughput and customer consumption.

C4 Delivery

C4.1 The reception point for the supply of hydrofluosilicic acid/sodium fluoride/sodium silicofluoride *(delete those not applicable)* shall be designated and agreed between the supplier and the purchaser.

C4.2 Delivery of an order to the purchaser's specified reception point shall be made within seven days of receipt of the order or at any other mutually agreed time.

C4.3 Delivery of hydrofluosilicic acid shall be in full tanker or compartment loads, unless a prior agreement between the supplier and the purchaser has been reached as to the load size.

C4.4 Delivery shall be made between the hours of 7.30 am and 4.00 pm Monday to Friday, excluding public holidays, unless a prior arrangement is made between the supplier and the purchaser, and discharged only with the authorisation of the purchaser's representative or operating personnel.

C4.5 Delivery dockets shall be provided giving the weight of the product and the proportion of fluoride ion. Bulk deliveries shall be weighed over certified weighbridges.

C4.6 The purchaser may check the solution proportion of available fluoride ion in the fluoride compound after delivery.

C5 Payment

C5.1 Payment will be made in full by the purchaser by the 20th of the month following that in which deliveries are made and correctly invoiced by the supplier, unless otherwise agreed.

C5.2 Invoices shall state the order number, docket number, weight of product supplied and the proportion of available fluoride ion or fluoride compound.

C5.3 Payment will be made on measured quantities unless otherwise agreed.

C6 Contract Sum

C6.1 Suppliers shall submit quotes in NZ$/tonne for the product offered. The quoted price shall allow for delivery including off-loading to the nominated reception points unless otherwise agreed.

C6.2 The quote shall hold firm for the duration of the contract period.

C6.3 The quote shall be exclusive of GST, but inclusive of any applicable duties or charges.

C7 Insurance

The supplier shall make their own arrangements for insurance of the order while in transit to the reception point. Responsibility will pass to the purchaser once the delivery has been made to the purchaser's storage facility.

C8 Subletting

The supplier shall not assign or sublet the contract or any part of the contract without the written consent of the purchaser.

C9 Cancellation

The purchaser shall reserve the right to cancel the contract for non-compliance with the Standard or failure to deliver within the allotted time.

REFERENCES

ANSI/AWWA Standard for Hydrofluosilicic Acid. ANSI/AWWA B703-89, AWWA, 1989.

ANSI/AWWA Standard for Sodium Fluoride. ANSI/AWWA B701-89, AWWA, 1989.

ANSI/AWWA Standard for Sodium Silicofluoride. ANSI/AWWA B702-89, AWWA, 1989.

Drinking-Water Standards for New Zealand Ministry of Health, Wellington_ 1995.

Guidance Note for Completion of a Material Safety Data Sheet. National Occupational Health and Safety Commission, Australia NOHSC:3001 (1991).

Health and Safety in the Employment Act. 1992.

National Guidelines for Health and Safety in the New Zealand Water Industry, New Zealand Water and Wastes Association, Auckland, 1997.

NZS 5433: 1988 Code of Practice for the Transport of Hazardous Substances on Land. SANZ, Wellington.

Resource Management Act. 1991.

Standard Methods for the Examination of Water and Wastewater. 19th Ed. APHA, AWWA, WEF, 1995.

Transport Act. 1992.

Toxic Substances Regulations. 1983.

'B'

THIS is the Exhibit marked with the letter "B" referred to in the annexed affidavit of Peter de Beyer Sworn at Christchurch This 1st day of April 2014 before me: MSMorrison A Solicitor of the High Court of New Zealand

Margaret Elizabeth Morrison
Solicitor
Christchurch

IN THE HIGH COURT OF NEW ZEALAND
NEW PLYMOUTH REGISTRY **CIV 2013-443-107**

UNDER	**the Judicature Amendment Act 1972 and the Declaratory Judgments Act 1908**
IN THE MATTER	**of an application for judicial review and an application for a declaration**
BETWEEN	**NEW HEALTH NEW ZEALAND INC**
	Plaintiff
AND	**SOUTH TARANAKI DISTRICT COUNCIL**
	Defendant

AFFIDAVIT OF GRAHAM MARK ATKIN
Dated 5 November 2013

Solicitor
Wynn Williams Lawyers
Homebase
Unit B 195 Marshland Road
Shirley
P O Box 4341
Christchurch
Ph: (03) 379 7622
Fax: (03) 353 0247
Solicitor: Jonathan Gilland

Counsel
Lisa Hansen
Level 8, Wakefield House
90 The Terrace
PO Box 8045
Wellington 6143
Ph: 914 1052
Fax: (04) 473 3179
Email: l.hansen@barristerscomm.com

I, Graham Mark Atkin, company director of Lower Hutt affirm:

1. I am known as Mark Atkin.

2. I have a Bachelor's degree in Chemistry, conferred in 1980, and an Honours degree in Law, conferred in 2003, both from Victoria University of Wellington.

3. I completed my Masters level thesis for my Law degree on decisionmaking on fluoridation in New Zealand in 2002.

4. I have been involved in the fluoridation issue since the 1970s, and most intensively since 1999. I have read significant amounts of original research on this subject, both supporting and opposing fluoridation. I have conducted my own analyses of Government data on this issue.

5. I was a submitter to the South Taranaki District Council and my submission is contained at Volumes 3 and 4 of the Common Bundle.

6. I have read the affidavits of Stewart Jesamine, Gregory Simmons, John McMillan, Howard Wilkinson, Robyn Haisman-Welsh, Robin Wyman and Sandra Pryor.

7. I have been asked by the plaintiff to provide information to the court about the chemicals used in fluoridation in response to claims by the defendant's witnesses that fluoridation is safe.

Process of HFA production

8. The natural form of fluorine that occurs in NZ water and around the world is calcium fluoride. The natural level of calcium fluoride in NZ is typical 0.01ppm to 0.2ppm, but can be up to 0.3ppm. This is the common or typical level of calcium fluoride in water around the world. Some parts of the world have excessive levels of calcium fluoride (up to 35ppm). This causes crippling and sometimes fatal adverse health effects.

9. Fluoridation is defined by the US Heritage Dictionary as "The addition of a fluorine compound to a drinking water supply for the purpose of reducing tooth decay". It is the addition of fluorine compounds to achieve an elevated level of fluorine in the water supply.

10. In 2001 I made a request under the Local Government Official Information and Meetings Act of the Wellington Regional Council about the chemicals used in water fluoridation.

11. I received the documents attached and marked "A".

12. I refer specifically to the production of Hydrofluorosilicic Acid ("HFA"), and summarise that process.

    a. The HFA is derived from superphosphate manufacture. Toxic fluoride gases (Hydrofluoric Acid and Silicon Tetrafluoride) are produced in the manufacture of superphosphate. It is illegal to allow these gases to escape into the atmosphere due to their toxicity and environmental impact.

b. To meet emission limits, the gases are "scrubbed" from the effluent stacks by spraying water into the stacks. The gases chemically react with the water to produce HFA and fine particles of silica ("white sand"). This process is required whether or not the plant supplies HFA for water fluoridation purposes.

c. If the plant supplies HFA for water fluoridation purposes the scrubber system is modified to produce a more concentrated solution of HFA.

d. The HFA is filtered to remove the silica. It undergoes not other refinement or purification before being sold for use in water fluoridation.

13. The chemistry and toxicology of fluorosilicates and lack of adequate study of these compounds is discussed in Kathleen Thiessen's affidavit dated 29 October 2013 at paragraph [61].

14. The HFA contains heavy metal contaminants. These include, notably, arsenic, mercury, and lead.

15. The allowable levels of heavy metal contaminants in products used for water fluoridation is set in New Zealand by Water NZ (formerly the Water and Wastes Association of NZ), in its standard published in 1997. This is a private, industry-funded, organization; not a Government organization. The standard defines "water treatment grade"

16. Hirzy *et al*[1] describe the HFA meeting this standard as "Technical grade". That is consistent with my understanding of the range of chemical grades, from Analytical grade and "BP" (pharmaceutical) grade through to industrial or Technical grade.

17. *Fine Chemicals and Chemical Solutions* defines "technical grade" at http://www.reagents.com/products/reagents/grades.html as:

> A grade suitable for general industrial use.

18. *The Science Company* at http://www.sciencecompany.com/Chemical-Grade-Designations-W53C665.aspx defines "technical grade" as:

> A good quality chemical grade used for commercial or industrial purposes. Not pure enough to be offered for food drug or medicinal use of any kind.

19. The allowable heavy metal contaminant levels under the Water NZ standard are:

[1] Hirzy JW, Carton RJ, Bonanni CD, Montanero CM, Michael F, Nagle MF. 2013. Comparison of hydrofluorosilicic acid and pharmaceutical sodium fluoride as fluoridating agents—A cost–benefit analysis. *Environmental Science & Policy* 29: 81-86 (May)

Contaminant	mg/kg (mg per kg of fluorine)
Antimony	148
Arsenic	495
Cadmium	148
Lead	495
Mercury	99
Nickel	990
Selenium	495

20. I have written to Water NZ asking how these limits were derived. Water NZ has provided no information that meets that request.

21. Once the chemical is diluted one million times by the public water supply, the levels fall below the Maximum Allowable Values (MAVs) set in the NZ Water Standards. It is my understanding that the MAVs for these contaminants do not ensure absolute safety. They just recognise that it is impossible to remove naturally occurring levels of the substances. They are therefore set at a practical level that avoids an excessive health risk.

22. In 1983 Rebecca Hamner, Deputy Assistant Administrator For Water, U.S. EPA, stated in a letter to a Mr Leslie Russell dated 30 March 1983:

> In regard to the use of fluosilicic acid as the source of fluoride for fluoridation, this agency regards such use as an ideal solution to a long standing problem. By recovering by-product fluosilicic acid from fertilizer manufacturing, water and air pollution are

minimized, and water authorities have a low-cost source of fluoride available to them.

23. This letter is attached and marked "B".

24. Of the contaminants there are two metals for which the US EPA's Maximum Contaminant Level Goal is zero: arsenic and lead.

25. Arsenic is a known human carcinogen for which there is no safe level.

26. It is my understanding that fluoridation chemical would typically add 0.43 ppb arsenic to the finished water. I attach the transcript of a letter marked "C" from Thomas Reeves (CDC) to Paul Connett dated January 2001 advising of 0.43 level. Analysis by Opflow found the level to be within the range of 0.248 to 0.306 ppb. A document entitled "Treatment Chemicals Contribute to Arsenic Levels" is attached and marked "D".

27. In the USA, fluoride levels are typically increased from an average of 0.2 ppm to the new standard of 0.7 ppm.[2] In NZ we typically increase levels from a typical 0.1 ppm to 0.85 ppm. Using the NSF data, the typical contribution of arsenic from HFA in NZ is therefore 0.645 ppb. This is based on the following calculations (using the NSF figure).

Amount used in USA = 0.7-.0.2.= 0.5/litre
Amount used in NZ = 0.85 - 0.1 = 0.75
Arsenic contributed by 0.5 = 0.43 ppb
Arsenic contributed by 0.75 = 0.43 x
0.75/0.5 = 0.645 ppb
Consumption used for fluoridation level is

[2] ibid

1.5 litres water per day
0.645 x 1.5 x 3.5 x 10^{-5} x 4.4 m people x
52% / 70 years = 1.107 deaths per year

28. Applying EPA's risk factor of 3.5 x 10^{-5} deaths per 70 year lifetime per microgram arsenic we would expect 1.1 cancer deaths per year with the present 52% of the population drinking fluoridated water, or 2.1 deaths per year if all NZ were fluoridated. This assumes people drink 1.5 litres of water per day, being the basis for current fluoridation levels. The calculation does not allow for the additional exposure from beverages and foods made with fluoridated water, or absorption through the skin during showering or bathing.

29. The unit risk of 3.5 x 10^{-5} was derived from data appearing in Table III D-2[a] in "Environmental Protection Agency. National primary Drinking Water Regulations; Arsenic and clarifications to compliance and new source contaminants monitoring; Final Rule: *Federal Register* **66** (14), 6975-7066 January 22, 2001. The referenced table appears at page 7008.

30. The Taranaki District Health Board has advised in response to an Official Information Act request by Imelda Hitchcock of Timaru that it did not hold a certificate of human health safety for HFA; nor has it ever sought one. A copy of that letter is attached and marked "E".

31. On 21 October 2013 I asked the Defendant if it holds a certificate of human health safety for HFA. The Defendant's response of 30 October

2013 advises that it does not have and has not sought such a certificate of safety. A copy of the letter is attached and marked "F".

AFFIRMED at Wellington this 5th)

day of November 2013

before me:

A Barrister ~~and Solicitor~~ of the High Court of New Zealand
Sandra Catherine McIver

'A'

THE REGIONAL COUNCIL

THIS is the Exhibit marked with the letter "A" referred to in the annexed affidavit of GRAHAM MARK ATKIN sworn at WELLINGTON this 5th day of NOVEMBER 2015 before me:

A Solicitor of the High Court of New Zealand

caring about you & your environment

Office of the Chairperson

File: E/1/5/2
Ltr Mark Atkin re Fluoride from Chairman.doc

15 October 2001

Mr Mark Atkin
5 Tarras Grove
Kelson
Hutt City

Dear Mr Atkin

Fluoride

In your letter of 27 September, you requested information on five fluoride related issues The response to these particular issues are:

1. The Wellington Regional Council has corresponded with its supplier by email. A copy of the various emails are attached.
2. A copy of report 01.686 considered by the Council is attached.

With regards to issues 3, 4 and 5, the Council has asked Fernz Chemicals for a response. The request letter and the reply are attached. We do not have any further information about the fluoride production in Japan.

Yours faithfully

STUART MACASKILL
Chairman

Mark Atkin,
5 Tarras Grove,
Kelson,
Hutt City.

27 Septemeber 2001.

Stuart MacGaskill,
Wellington Regional Council.

Request under Local Government Official Information and Meetings Act 1987.

In light of the WRC's position that the fluoride-containing chemicals used in the water supply are not industrial waste products, please supply the following:

1) Copies of the correspondence between the WRC and suppliers of these chemicals relating to their production.
2) A copy of the WRC's report on this matter.

Please advise the following if not contained in the above:

3) What is the primary purpose of the industrial installations in question (in processes the rock phosphate); is it to produce fluorides or is it to produce superphosphate.
4) What products are produced from this processing and what are their relative proportions.
5) Where in the processing is the fluoride extracted, specifically is it or is it not from the scrubbers on the exhaust flues, and in the case of the New Zealand plant, would that plant be allowed under its resource consent/discharge permit to emit the hydrofluorosilicic acid into the environment (by decommissioning the scrubbers or otherwise).

Yours faithfully,

2661

3.17.1

Helga Perry

From: Cast, Nicola [Nicola.Cast@nz.nufarm.com]
Sent: Tuesday, 21 August 2001 08:13
To: 'Dan Roberts'
Subject: RE: Fluoride Manufacture

This is just a quick note to confirm I am still working on your request. I am just awaiting confirmation regarding the grade of HFA that is used in the product.

Regards

Nicola Cast

-----Original Message-----
From: Dan Roberts [mailto:Dan.Roberts@wrc.govt.nz]
Sent: Monday, 13 August 2001 11:35
To: 'Cast, Nicola'
Subject: RE: Fluoride Manufacture

Many thanks for your assistance however I wonder whether you can glean any information from your supplier of sodium silicofluoride .I understand that it is manufactured in Japan.
We have the MSDS but require if possible the actual process of manufacture. there is a certain amount of discussion occuring as to whether it is delved from a waste product resulting from the production of fertilizer.
Sorry to hassle you .
Dan Roberts.

> -----Original Message-----
> From: Cast, Nicola [SMTP:Nicola.Cast@nz.nufarm.com]
> Sent: Monday, 13 August 2001 07:24
> To: 'Dan.Roberts@WRC.govt.nz'
> Subject: Fluoride Manufacture
>
> Dan,
>
> Hopefully this is the information you require. There is not great detail about Sodium Silicofluoride manufacture, this is all the information they provided. If you require more I will give it another go.
>
> Thank you.
>
> Nicola Cast
> Technical Rep
> Fernz Chemicals
>
> phone 025 248 1022
>
> <<Fluoride Manufacture.doc>>
>
>

Fernz Chemicals

Fernz Chemicals (NZ) Kiwitahi Road, PO Box 105, Morrinsville, New Zealand
Telephone 64-7-889 3400, Facsimile 64-7-889 7457
Nufarm Ltd Registered Office: Victoria, Australia. NZ Branch Office: Auckland, New Zealand
A Trading Division of Nufarm Ltd

B 4 6

M. Kennedy

Wellington Regional Council
PO Box 11-646
WELLINGTON

Attention: Mr M Kennedy

Dear Mr Kennedy,

Thank you for your questions regarding the production of fluoride chemicals for the addition to potable water treatment in New Zealand.

The three questions, which have been raised, are as follows:

3 The HFA plant is owned by an entirely separate company to the Super Phosphate manufacture. The actual HFA facility is located in a Super Phosphate manufacturing plant. The HFA plant is operated specifically to meet the requirement for fluoridation of New Zealand water supplies.

The HFA production unit is separate from the main scrubber systems but in order to operate, it draws fluoride compounds from the main scrubber system (the HFA plant was moved to this site in 1995, due to fertiliser industry restructuring. Up until this time the super phosphate manufacturing site in question had not been capable of making HFA for supply but had systems to deal with gas emissions and scrubber liquor).

4 The product produced in the HFA plant is solely for the purpose of supplying fluoride chemicals for potable water in New Zealand and is manufactured within the NZWWA supply managers' standards.

5 The main scrubber system for a super phosphate process is integral and allows for the handling of emissions in a manner that achieves resource consent and discharge consent. The HFA plant is not required to operate the super phosphate operations.

I trust these answers address your questions and reiterate that this product is made to nationally and internationally published standards.

Yours sincerely

S. Eccles

Sean Eccles
Sales and Marketing Manager

73161

THE REGIONAL COUNCIL

caring about you & your environment

Report 01.686
29 August 2001
File: B/4/6/1

Report to the Wellington Regional Council
from Murray Kennedy, Strategy and Asset Manager

Manufacture of Fluoridation Products

1. Purpose

To provide advice on the manufacture of fluoridation products.

2. Background

In July, the Council considered Report 01.524 – Water Fluoridation Petition. The petition claimed that sodium silicofluoride added to our drinking water is an industrial waste. Councillors requested information on the fluoride manufacturing processes.

Two different types of fluoride are added to raise the natural fluoride level in the drinking water;

- Sodium fluorosilicate, a powder which is added at Te Marua and Waterloo water treatment plants,
- Hyrdofluorosilicic acid, a liquid which is added at the Gear Island water treatment plant.

Advice has now been received from FERNZ Chemicals, the supplier of both products, as to how they are manufactured.

3. Manufacture of Sodium Silicofluoride

FERNZ Chemicals source this product from Mitsui Chemicals in Japan. Mitsui use the following process to manufacture it.

(i) React natural phosphoric ore (which contains a fluoride compound) with sulphuric acid. One of the products of this reaction is hydrofluosilicic acid.

(ii) Concentrate the hydrofluosilicic acid.

(iii) Add sodium hydroxide (caustic soda) to hydrofluosilicic acid to obtain sodium silicofluoride.

4. Manufacture of Hydrofluosilicic Acid

FERNZ Chemicals manufacture hydrofluosilicic acid at Mt Maunganui. The process is the same as 3(i) and 3 (ii) above.

5. Comment

The recent petition was organised under the banner of the Pure Water Association, as part of its campaign to have fluoridation stopped. The association has been persistent in the view that the fluoride additive was an industrial waste. Following Council consideration of the petition, three letters about fluoridation were published by the Evening Post on 28 July, Attachment 1. It is alleged the Council is using toxic industrial waste. This is incorrect. The two fluoridation products used by the Council are made through standard chemical processes. Both use naturally occurring phosphate rock.

6. Recommendations

(1) That the report is received and its contents noted.

(2) That the Pure Water Association is advised how the fluoride used by the Council is manufactured.

Report prepared by:

M D KENNEDY
Strategy and Asset Manager

Approved for submission:

DAVID BENHAM
Divisional Manager, Utility Services

Attachments:

Attachment 1

Helga Perry

From: Cast, Nicola [Nicola.Cast@nz.nufarm.com]
Sent: Friday, 31 August 2001 16:58
To: 'Dan.Roberts@WRC.govt.nz'
Subject: FW: Sodium Silicofluoride Manufacture

Dan,

I have finally had a reply from Shinwa (our Sodium Silicofluoride supplier. This is a copy of the last of many e-mails that were send to them and the reply. Hopefully this contains enough information. If not please get back to me and I will continue the sega.

Regards

Nicola Cast
Fernz Chemicals
phone 025 248 1022

----Original Message----
From: Shinwa Trading (Tatekawa) [mailto:hiro@shinwatrading.com]
Sent: Thursday, 30 August 2001 13:11
To: Cast, Nicola
Subject: Re: Sodium Silicofluoride Manufacture

Aug. 30, 2001

"Mitsui" advised as follows.

1) Raw materials for Hydrosilicofluoric Acid are:-

Phosphoric Ore and
Sulphuric Acid

2) Production process for Hydrosilicofluoric Acid are:-

a) React Phosphoric Ore and Sulphuric Acid

Phosphoric Ore include Fluoborate, Silicate, P, Ca etc and decompose by Sulphuric Acid and liquid of Hydrosilicofluoric Acid is obtained.

$$6HF + SiO2 = H2SiF6 + 2H2O$$

b) Heat and cool down above Hydrosilicofluoric Acid liquid to make concentrated liquid

c) Add Caustic Soda into concentrated liquid of Hydrosilicofluoric Acid and obtain Sodium Silicofluoride

lope above information is OK but if you have further question, lease do not hesitate to contact us again.

egards

—— Original Message ——
From: Cast, Nicola <Nicola.Cast@nz.nufarm.com>
To: <hiro@shinwatrading.com>
Sent: Wednesday, August 29, 2001 9:18 AM
Subject: Sodium Silicofluoride Manufacture

> Hiro,
>
> I am just wondering how you are going regarding getting the information my
> customer requires regarding the quality of the Hydrofluorosilicic acid
used
> in Sodium Silicofluoride manufacture. This is becoming a very urgent
issue
> as local ratepayers require the information as they believe they are
getting
> a waste product. Verification would be most appreciated.
>
> Thank you.
>
> Nicola Cast
> Femz Chemicals
> Fax +64 +4 568 3595
>
> **********
> This email and any files transmitted with it are confidential and
> intended solely for the use of the individual or entity to whom they
> are addressed. If you have received this email in error please notify
> the sender.
>
> **********

3|7|1

Helga Perry

From: Cast, Nicola [Nicola.Cast@nz.nufarm.com]
Sent: Monday, 13 August 2001 07:24
To: 'Dan.Roberts@WRC.govt.nz'
Subject: Fluoride Manufacture

Fluoride Manufacture.doc

Dan,

Hopefully this is the information you require. There is not great detail about Sodium Silicofluoride manufacture, this is all the information they provided. If you require more I will give it another go.

Thank you.

Nicola Cast
Technical Rep
Fernz Chemicals

phone 025 248 1022

<<Fluoride Manufacture.doc>>

> with new viruses.
>
> If you do not know or trust the sender of this message
> do not open the attachments. If it appears to contain
> work related material contact the IT help desk,
> otherwise delete it.
>
> For information on the WRC's policy regarding Email
> viruses look at the WRC Intranet page http://wrcweb/CouncilDocs/Email.doc
>
> ---
> << File: Fluoride Manufacture.doc >>

Fluoride Manufacture

Hydrofluosilicic Acid

Fluosilicic acid is a by-product of superphosphate production.

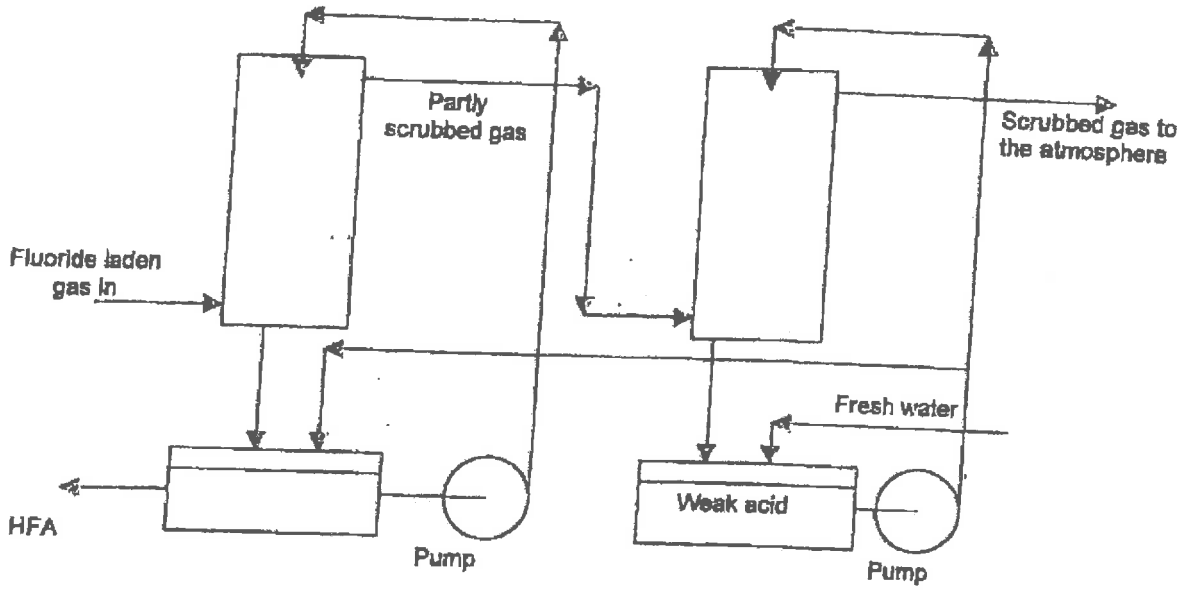
Superphosphate is manufactured by mixing together finely ground phosphate rock and Sulphuric Acid. A vigorous reaction occurs with considerable gas evolution. The gases given off are mainly steam and carbon dioxide, but there is also a small quantity of fluoride. This arises from fluoride and silica impurities in the phosphate rock and is principally silicon tetrafluoride. Every fertiliser works has a gas scrubber as an integral part of its manufacture plant because of the gas production. Silicon tetrafluoride reacts readily with water, so the gas scrubber is essentially a means of contacting the gas stream with small droplets of water. The reaction with water hydrolyses the silicon tetrafluoride according to the equation:

$$3SiF_4 + 2H_2O \leftrightarrow 2H_2SiF_6 + SiO_2$$

In this way 99% of the fluoride is removed from the gas stream, leaving only a very small quantity to be emitted to the atmosphere. The liquid from the scrubber is usually a dilute solution of fluosilicic acid, with solid silica suspended in it. To gain water treatment quality fluoride the scrubber is slightly modified to produce a higher quality product. The scrubbing process is divided into two or more stages with acid of different concentration in each. The yields an acid of approximately 16% H_2SiF_6, but can be variable. The following diagram shows a typical scrubber installation. Water and gas are made to flow "countercurrent" to each other so that gas rich in fluoride is contacted by strong acid and gas weak in fluoride meets very dilute acid. Strong acid is pumped away from the first scrubber and filtered to remove silica before being sold.

Sodium Silicofluoride

Sodium Silicofluoride is then made using fluorosilicic acid that undergoes a complex neutralising reaction using sodium carbonate.



Typical Fluoride Gas Scrubbing Plant

B

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAR 30 1983

OFFICE OF
WATER

Leslie A. Russell, D.M.D.
363 Walnut Street
Newtonville, Mass. 02160

Dear Dr. Russell:

Thank you for your letter of March 9, 1983, in regard to the fluoridation of drinking water.

The information available to the Environmental Protection Agency is that fluoridation is a safe and effective means for reducing the occurrence of dental caries. The fluoridation process has been endorsed by several Presidents of the United States and by several Surgeons General, including the current Surgeon General, Dr. C. Everett Koop. A copy of Dr. Koop's statement on fluoridation is enclosed.

Water treatment chemicals, including fluosilicic acid, have been evaluated for their potential for contributing to the contamination of drinking water. The Water Treatment Chemicals Codex, published by the National Academy of Sciences, prescribes the purity requirements for fluosilicic acid and other fluoridation chemicals.

In regard to the use of fluosilicic acid as a source of fluoride for fluoridation, this Agency regards such use as an ideal environmental solution to a long-standing problem. By recovering by-product fluosilicic acid from fertilizer manufacturing, water and air pollution are minimized, and water utilities have a low-cost source of fluoride available to them. I hope this information adequately responds to your concern.

Sincerely yours,

Rebecca Hanmer

Rebecca Hanmer
Deputy Assistant Administrator
for Water

Enclosure

THIS is the Exhibit marked with the letter "B" referred to in the annexed affidavit of GRAHAM MACKEATHN
AFFIRMED [illegible] at Wellington this 7th day of March 1995 before me:

Barrister
A Solicitor of the High Court of New Zealand

'C'

THIS is the Exhibit marked with the letter C.... referred to in the annexed affidavit of AFFIRMED GRAHAM MARK ATKIN this 6th day of November 2013 before me:

A Barrister of the High Court of New Zealand

Manufacture of Fluoride Chemicals

Letter from Thomas Reeves, CDC Fluoridation Engineer to Paul Connett, Director Fluoride Action Network. (IFIN 2001)

"The Manufacture of Fluoride Chemicals

"A number of questions have been raised about the fluoride chemicals used in water fluoridation.

"This communication will attempt to respond to those concerns.

"All of the fluoride chemicals used in the U.S. for water fluoridation, sodium fluoride, sodium fluorosilicate, and fluorosilicic acid, are byproducts of the phosphate fertilizer industry. The manufacturing process produces two byproducts: (1) a solid, calcium sulfate (sheetrock, CaSo4); and (2) the gases, hydrofluoric acid (HF) and silicon terafluoride (SiF4). A simplified explanation of this manufacturing process follows: Apatite rock, a calcium mineral found in central Florida, is ground up and treated with sulfuric acid, producing phosphoric acid and the two byproducts, calcium sulfate and the two gas emissions. Those gases are captured by product recovery units (scrubbers) and condensed into 23% fluorosilicic acid. Sodium fluoride and sodium fluorosilicate are made from this acid.

"The question of toxicity, purity, and risk to humans from the addition of fluoride chemicals to the drinking water sometimes arises. Almost all of over 40 water treatment chemicals that may be used at the water plant are toxic to humans in their concentrated form, e.g., chlorine gas and the fluoride chemicals are no exception. Added to the drinking water in very small amounts, the fluoride chemicals dissociate virtually 100% into their various components (ions) and are very stable, safe, and non-toxic.

"Opponents of water fluoridation have argued that the silicofluorides do not completely dissociate under conditions of normal water treatment and thus may cause health problems. To counter these claims, the basic chemistry of this dissociation has been carefully reviewed. Scientists at the U.S.Environmental Protection Agency (EPA) and CDC epidemiologists have examined the research that opponents of water fluoridation cite. Both groups have concluded that these charges are not credible.

"The claim is sometimes made that no health studies exist on the silicofluoride chemicals used in water fluoridation. That is correct. We, the scientific community, do not study health effects of concentrated chemicals as put into water, we study the health effects of the treated water, i.e., what those chemicals become: fluoride ion, silicates and the hydrogen ion. The health effects of fluoride have been analyzed by literally thousands of studies over 50 years and have been found to be safe and effective in reducing tooth decay. The EPA has not set any Maximum Contaminant Level (MCL) for the silicates as there is no know health concerns for them at the low concentrations found in drinking water. Of course, the hydrogen ion is merely a measurement of the pH of the water.

"Concern has been raised about the impurities in the fluoride chemicals. The American Water Works Association (AWWA), a well-respected water supply industry association, sets standards for all chemicals used in the water treatment plant, including fluoride chemicals. The AWWA standards are ANSI/AWWA B701-99 (sodium fluoride), (ANSI/AWWA B702-99 (sodium fluorosilicate) and ANSI/AWWA B703-00 (fluorosilicic acid). Also, the National Sanitation Foundation (NSF) sets standards and does product certification for products used in the water industry, including fluoride chemicals. ANSI/NSF Standard 60 sets standards for purity and provides testing and certification for the fluoride chemicals. Standard 60 was developed by NSF and a consortium of associations, including AWWA and the American National Standards Institute (ANSI),. Standard 60 provides for product quality and safety assurance that aims to prevent the addition of harmful levels of contaminants from water treatment chemicals. More than 40 states have laws or regulations requiring product compliance with Standard 60. NSF tests the fluoride chemicals for the 11 regulated metal compounds that have an EPA MCL. In order for a product [for example, fluorosilicic acid] to meet certification standards, regulated metal contaminants must be present at the tap [in the home] at a concentration of less than the percent of the MCL when added to drinking water at the recommended maximum use level. EPA has not set any MCL for the silicates as there is no know health concerns, but Standard 60 has a Maximum Allowable Level (MAL) of 16 mg/L [for sodium silicates as corrosion control agents] primarily for turbidity reasons. NSF tests have shown the silicates in the water samples to be well below these levels.

"Arsenic, according to NSF tests, had an average of 0.43 ug/L (parts per billion) in the drinking water attributable to the fluoride chemical. Opflow, a monthly magazine from the AWWA, has found the arsenic levels in the finished water from the fluorosilicic acid to be 0.245ug/L [Opflow, Vol 26, No. 10, October, 2000]. The NSF Standard 60 has a Maximum Allowable Level (MAL) of 2.5 ug/L and EPA has a MCL of 50 ug/L, although they have proposed to lower their MCL to 5 ug/L. As you can see arsenic is less than 1/10th of even the proposed EPA MCL. Finally, tests by NSF and other independent testing laboratories have shown no detectable levels of radionuclides in product samples of fluoride chemicals. There is no evidence that any of the known impurities in the fluoride chemicals have failed to meet any of these standards.

"Opponents of water fluoridation have sometimes charged that "industrial grade fluoride" chemicals are used at the water plant instead of pharmaceutical grade chemicals. All the standards of AWWA, ANSI, and NSF apply to these industrial grade fluoride chemicals to ensure they are safe. Pharmaceutical grade fluoride compounds are not appropriate for water fluoridation, they are used in the formulation of prescription drugs.

"Finally, it is sometimes alleged that the fluoride from natural sources, like calcium fluoride, is better than fluorides added "artificially", such as from the fluoride chemicals presently used. There is no difference.

"There is no reason to change the opinion of CDC that water fluoridation is safe and effective.

"DOH"

(Written at bottom) Reference - Tom Reeves, water engineer, CDC Jan-2001

'D'

THIS is the Exhibit marked with the letter... D.....
referred to in the annexed affidavit of
GRAHAM MARK ATKIN
AFFIRMED/SWORN at Wellington
this 5th day of November 2015 before me:

A Solicitor of the High Court of New Zealand

Treatment Chemicals Contribute to Arsenic Levels

By Cheng-nan Weng, Darrell B. Smith, And Gary M. Huntley

Arsenic is an issue that water utilities no longer can avoid. The US Environmental Protection Agency is expected to propose a reduction in the federal drinking water standard on arsenic from 50 µg/L to 5 µg/L later this year, although USEPA is also considering setting the maximum contaminant level at 3 µg/L, 10 µg/L, and 20 µg/L. The final arsenic rule is due by Jan. 1, 2001.

Utilities should test their sources of water for arsenic and compare them with the proposed levels of 3, 5, and 10 µg/L. However, testing source water alone may not be sufficient to determine the arsenic load in finished water. Some treatment chemicals may also contain trace amounts of arsenic. Utilities should review and estimate the maximum possible arsenic concentrations contributed by the chemicals they use in drinking water treatment. Even trace amounts add up and may contribute a substantial portion—possibly up to 10 percent—of a 3 or 5 µg/L maximum contaminant level.

Connecticut Experience

The South Central Connecticut Regional Water Authority has three surface water treatment plants (SWTPs) and five wellfields. Recently, SCCRWA calculated the arsenic burden derived from chemicals routinely used to treat surface and groundwater at these facilities. Those chemicals are listed in Table 1.

To estimate the trace arsenic levels in the bulk treatment chemicals, data from the suppliers' analysis report or product specifications were used. The resulting trace arsenic concentrations in the finished water that were contributed by the treatment chemicals were computed by one of the following two methods:

1. For those chemicals with dosages expressed as mg/L of product chemicals (such as polymer, sulfuric acid, bimetallic zinc metaphosphate, and potassium permanganate), the resulting trace arsenic concentration in the finished water was computed by multiplying the chemical dosage by the trace arsenic level in the bulk treatment chemical.

2. For other chemicals (such as alum, ferric chloride, caustic soda, and fluorosilicic acid), a dilution factor was determined by dividing the chemical concentration by the chemical dosage. The resulting trace arsenic concentration in the finished water was computed by dividing the trace arsenic level in the bulk treatment chemical by the dilution factor.

Information produced by several calculations is tabulated as follows:

- Table 2 shows the maximum possible arsenic concentrations contributed by treatment chemicals for one surface water treatment plant that uses alum (0.279 µg/L arsenic contributed).
- Table 3 shows the maximum possible arsenic concentrations contributed by treatment chemicals for the wellfield, which uses sodium hypochlorite for disinfection (0.249 µg/L arsenic contributed).

Sodium hydroxide	3	Not used
Sulfuric acid	1	Not used
Alum	2	Not used
Potassium permanganate	2	Not used
Ferric chloride	1	Not used
Synthetic polymer A	1	Not used
Synthetic polymer B	1	Not used
Chlorine	3	4
Sodium hypochlorite	Not used	1
Bimetallic zinc metaphosphate	3	5
Fluorosilicic acid	3	5

Table 1. Chemicals routinely used by the South Central Connecticut Regional Water Authority, and the number of facilities where they are used.

- Table 4 shows the range of maximum arsenic contribution by treatment chemicals for the SCCRWA (range of all compounds, 0.0002-0.245 µg/L).
- Table 5 compares in finished water the calculated amount of arsenic that is contributed by treatment chemicals with the analytical result (overall calculated range, 0.248—0.306 µg/L; analytical result <1µg/L in all cases).

These data show that in finished water the theoretical arsenic concentrations attributable to normal dosages of water treatment chemicals are extremely low (Tables 2, 3, and 4). This conclusion is supported by the analytical data (Table 5), which show arsenic concentrations to be below 1.0 µg/L in all of the SCCRWA's surface and groundwater treatment facility finished waters.

Conclusion

If the standard were set at 3 µg/L, about 10 percent of the MCL would come from the treatment chemicals, hardly a minimal amount. It is also interesting to note that about 90 percent of the arsenic that would be contributed by treatment chemicals is attributable to fluoride addition.

If your processes include the addition of chemicals, ask your manufacturer for the amount of arsenic in each. If necessary, obtain conversion charts for diluted products, as well. Then calculate how much arsenic those chemicals will add to your finished water. If the total is close to the MCLs proposed by USEPA, you have reason for concern.

To find out more about the proposed arsenic rule, go to the agency's Web site, <www.epa.gov/safewater/arsenic.html>, or call the Safe Drinking Water Hotline at (800) 426-2791.

Cheng-nan "Mike" Weng, PhD, DEE, is senior water quality engineer; Darrell B. Smith is vice president of water quality and research, and Gary M. Huntley is water treatment manager for South Central Connecticut Regional Water Authority, 90 Sargent Drive, New Haven, CT 06511; (203) 624-6671.

Treatment Chemical	Amount of Arsenic in Product	Dosage	Calculation of Contribution	Arsenic Contribution
50% alum	0.25 mg/L	10 mg/L*	Chemical concentration of 50% alum = 650 mg/mL Dilution factor = 650 x 1,000÷10 = 65,000 Arsenic contribution = 0.25÷65,000 mg/L	0.00385 µg/L
Polymer A	< 0.5 mg/L	2.0 mg/L	Arsenic contribution = 0.5 mg/L x 2 mg/L	0.001µg/L
50% Sodium hydroxide (NaOH)	1.5 mg/L (maximum)	12.5 mg/L* (maximum)	Chemical concentration of 50% NaOH = 770 mg/mL Dilution factor = (770 x 1,000)÷12.5 = 61,600 Arsenic contribution = 1.5÷61,600 mg/L	0.024 mg/L
Fluorosilicic acid (H_2SiF_6)	Maximum = 80 mg/L Normal = 28 mg/L	1.0 mg/L* as F	H_2SiF_6 solution contains 20% F or 244.8 mg/mL of F F dosage = 1.0 mg/L as F Dilution factor = 244.8 x 1,000÷1.0 = 244,800 Maximum arsenic contribution = 60 / 244,800 mg/L = 0.245 µg/L Normal arsenic contribution = 28 ÷244,800 mg/L=0.114 µg/L	0.114 µg/L (normal) 0.245 µg/L (maximum)
Bimetallic zinc metaphosphate	<2 mg/L	1.7 mg/L	Arsenic contribution = 2 mg/L x 1.7 mg/L	0.0034 µg/L
Potassium permanganate ($KMnO_4$)	4.8 mg/L	0.35 mg/L	Arsenic contribution = 4.8 mg/L x 0.35 mg/L	0.00168 µg/L
Chlorine	All manufacturer reports indicate that arsenic is not present in gaseous chlorine.			0
Total arsenic contributed by treatment chemicals				0.279 µg/L (maximum)

*Based on dry equivalents.

Table 2. Arsenic contributed by chemicals used to treat surface water at Lake Gallard Water Treatment Plant

Table 3. Arsenic contributed by chemicals used to treat groundwater at North Cheshire Wellfield

Treatment Chemical	Amount of Arsenic in Product	Dosage	Calculation of Contribution	Arsenic Contribution
Sodium hypochlorite (NaOCl)	0.8 mg/L (maximum)	1.2 mg/L	1 lb of chlorine reacts with 1.128 lb of caustic soda to produce 1.05 lb of NaOCl. An excess of caustic soda is used as a stabilizer. Based on the arsenic concentration in the 50% caustic soda, the maximum arsenic concentration in the NaOCl is estimated to be 0.8 mg/L. Arsenic contribution = 0.8 mg/L x 1.2 mg/L	0.00096 µg/L
Fluorosilicic acid (H_2SiF_6)	60 mg/L (maximum)	1.0 mg/L as F	Dilution factor = 244.8 x 1,000÷1.0 = 244,800 Maximum arsenic contribution = 60÷244,800 mg/L	0.245 µg/L
Bimetallic zinc metaphosphate	<2 mg/L	1.7 mg/L	Arsenic contribution = 2 mg/L x 1.7 mg/L	0.0034 µg/L
Total arsenic contributed by treatment chemicals				0.249 µg/L (maximum)

Treatment Chemical	Dosage (mg/L)	Contribution (mg/L)
Sodium hydroxide	8.0–12.5	0.0160–0.024
Sulfuric acid	20	0.0002
Alum	10–80	0.00385–0.0308
Potassium permanganate	0.30–0.35	0.0014–0.00168
Ferric chloride	7	0.007
Synthetic polymer A	2.0	0.001
Synthetic polymer B	4.0	0.004
Chlorine	1.2–2.8	0.000
Sodium hypochlorite	1.2	0.00096
Bimetallic zinc metaphosphate	1.5–1.7	0.0030–0.0034
Fluorosilicic acid	1.0	0.245

Table 4. Maximum finished water arsenic concentrations based on chemical dosages applied in the treatment facilities

Treatment Facility	Maximum Finished Water Arsenic Concentration (µg/L)	Minimum Finished Water Arsenic Concentration (µg/L)
Lake Gallard WTP*	0.279	<1
Lake Bellonstall WTP	0.269	<1
West River WTP	0.206	<1
North Cheshire Wellfield	0.249	<1
All other wellfields (1–4)	0.245	<1

*Water treatment plant

Table 5. Maximum finished water arsenic concentrations based on chemical dosages applied in the treatment facilities

'E'

[redacted]
TARANAKI DISTRICT HEALTH BOARD

Taranaki District Health Board
Private Bag 2016
New Plymouth 4342
New Zealand
Telephone 06 753 6139
Facsimile 06 753 7770
Email corporate@tdhb.org.nz
Website www.tdhb.org.nz

28 March 2013

THIS is the Exhibit marked with the letter "E" referred to in the annexed affidavit of GRAHAM MARK ATKIN sworn at Wellington this 5th day of March 2013 before me:

A Solicitor of the High Court of New Zealand
Barrister

Imelda Hitchcock
6a Ranfurly Street
TIMARU

Response emailed to: imeldah@xtra.co.nz

Dear Ms Hitchcock

Thank you for your request for information under the Official Information Act dated 28 February 2013.

Responses to your requests are below:

Request 1
All certificates of human health safety showing water fluoridation chemicals at 0.07 to 1ppm is safe, provided by endorsing organisations.

Response
Taranaki District Health Board is not aware of any certificates under the name of "certificates of human health safety".

Request 2
All requests made by the Taranaki District Health Board to any person for a certificate of human health safety for water fluoridation chemicals at 0.07 to 1ppm.

Response
Taranaki District Health Board has not made any request for a "certificate of human health safety" for water fluoridation chemicals at 0.07 to 1ppm.

Request 3
All certificates of human health safety of water fluoridation chemicals at 0.07 to 1ppm held by the Taranaki District Health Board.

Response
Taranaki District Health Board does not hold any "certificates of human health safety".

Request 4
The citations for all the human health safety studies on which you rely in claiming water fluoridation with silicofluorides at 0.07 to 1ppm, is safe.

Response
The citations for human health safety studies on which we based our advice that fluoridation is safe at concentrations of fluoride ions at 0.07 to 1ppm are listed below:

Human Health Studies and Systematic Reviews

- 1999 National & Medical Research Council, Australia. Review of Water Fluoridation.
- 2000 York Report (UK – National Health Service) A Systematic Review of Public Water Fluoridation.
- 2002 Medical Research Council, United Kingdom Water Fluoridation and Health.
- 2002 World Health Organisation Fluorides – Environmental Health Criteria 227.
- 2003 World Health Organisation, Diet, Nutrition and the Prevention of Chronic Diseases.
- 2007 National & Medical Research Council, Australia. A Systematic Review of the Efficacy and Safety of Fluoridation.
- 2007 World Cancer Research Fund/ American Institute for Cancer Research, Food, Nutrition, Physical Activity and the Prevention of Cancer: A Global Perspective.
- 2010 European Commission Scientific Committee on Health and Environmental Risks (SCHER). Critical Review of Any New Evidence on the Hazard Profile, Health Effects, and Human Exposure to Fluoride and the Fluoridating Agents of Drinking Water.
- Developmental Fluoride Neurotoxicity: A Systematic Review and Meta-Analysis. Choi AL, Sun G, Zhang Y, Grandjean P. Environmental Health Perspectives 2012 Oct;120(10):1362-8.
- Do L, Levy S, Spencer A. Association Between Infant Formula Feeding and Dental Fluorosis and Caries in Australian Children. Journal of Public Health Dentistry 2012, 72 (2), 112-121.
- Fluoride Neurotoxicity: Review of Evidence from Drinking Water Studies. National Fluoride Information Service Advisory. June 2011.
- Fluoridation of Water Supplies – An Evaluation of the Recent Epidemiological Evidence (2000) Environmental Science and Research Ltd.

Regulatory Frameworks that Support Safety

- New Zealand Drinking Water Standards 2005 (Revised 2008).
- Food Standards Australia New Zealand
- Fluoride in Drinking Water. A Scientific Review of EPAs Standards. National Research Council (United States), 2006. Washing, NRC.

Yours sincerely

Becky Jenkins
SERVICE MANAGER – POPULATION HEALTH

'F'

South Taranaki District Council

30 October 2013

THIS is the Exhibit marked with the letter... F ..... referred to in the annexed affidavit of GRAHAM MARK ATKIN AFFIRMED/SWORN at WELLINGTON this 5th day of November 2013 before me:

A Solicitor of the High Court of New Zealand

Mr Mark Atkin
5 Tamas Grove
Lower Hutt 5010

Dear Mark

Official Information Request – Certificates of human health safety

We have received your request for official information dated 21 October 2013 in which you make two requests for information:

1. All certificates of human health safety held by the Council for the fluoridation chemicals hydrofluorosilicic acid and sodium hexafluorosilicate, showing these chemicals to be safe to humans when added to drinking water to provide a fluoride content of 0.7ppm to 1.0ppm. This includes certificates issued by suppliers or manufacturers of the chemicals, and certificates provided by fluoridation-endorsing agencies.

2. All requests made by the Council for a certificate of human health safety for the fluoridation chemicals hydrofluorosilicic acid and sodium hexafluorosilicate, showing these chemicals to be safe to humans when added to drinking water to provide a fluoride content of 0.7ppm to 1.0ppm.

The Council is unclear as to what you mean by *certificates of human health safety*, or as to the basis on which certificates can or should be held by the Council.

This aside, the Council has undertaken a search of its records and has no documents which are recorded as *certificates of human health safety* for hydrofluorosilicic acid and sodium hexafluorosilicate, nor does the Council have any record of making requests for such documents from other agencies.

Because the Council does not hold the information you are requesting and has no grounds for considering it exists or could be held by another organisation, the Council must refuse your request in accordance with Section 17 (g) of the Local Government Official Information Act 1987.

If you can provide further clarification about the information you are seeking, you can make a further request.

Yours faithfully

Craig Stevenson
Chief Executive

craig.stevenson@stdc.govt.nz

Private Bag 902, Hawera 4640
Phone: 06 278 0555
Freephone: 0800 111 323
Fax: 06 278 8765
Website: www.southtaranaki.com