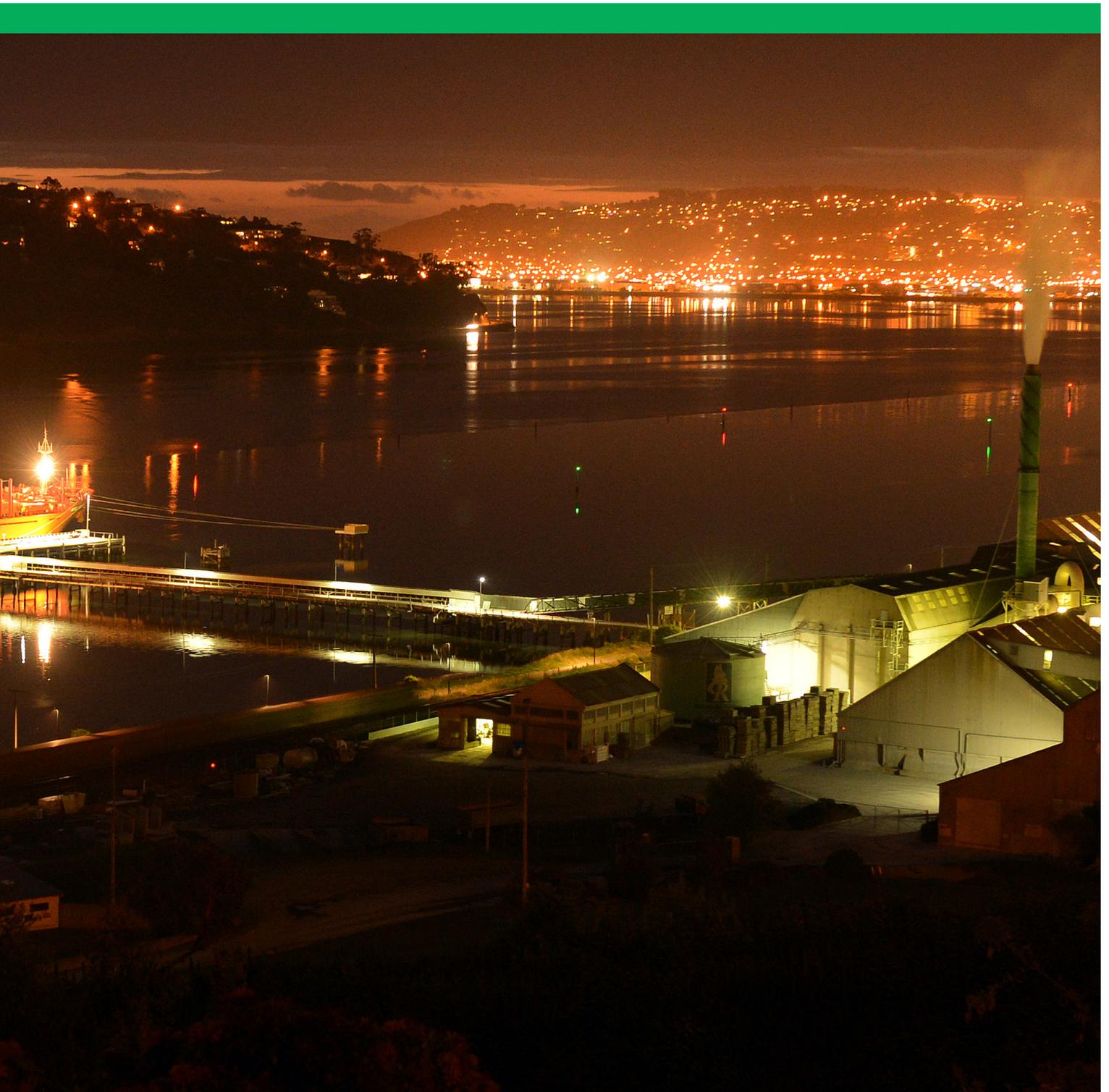


Operations Environmental Report 2016 - 2017



Environmental stewardship is a key priority for farmers and for Ravensdown

Measuring the difference



Thanks for taking time to read Ravensdown's Operations Report for 2017.

As a farmer-owned co-operative, we believe in the power of smarter farming to improve environmental outcomes, strengthen communities, deliver prosperity and ultimately lead to a better New Zealand.

The way we enable smarter farming is by helping farmers reduce their environmental impact and optimise value from the land. So there is an expectation among our farmer-owners as well as from neighbours, regulators and other members of the community that we are 'walking the talk' when it comes to our own environmental impact.

That's why we've been producing an environmental report like this since 2001. These reports are about stating the facts, measuring performance, identifying progress and setbacks.

Our drive for transparency and stakeholder engagement takes many forms and you can also take a look at our integrated report on the website to see how we are tracking on other fronts. The eventual goal is to integrate environmental metrics with our other priority areas into one report format.

We are also undertaking a detailed assessment of our greenhouse gas emissions and look to be in a position to report more on this next year, and on ways we can reduce this footprint.

Nourishing New Zealand soils
We provide the nutrients that nourish New Zealand's soil which, in turn, feed the plants and animals that deliver the products that command a premium on the world stage. Smarter farming is all about smarter choices for the environment. We pay attention to sales of course, but as a farmer-owned co-operative, it's not our policy to sell farmers more than they need.

Ravensdown has a proud tradition of innovation in the responsible use of nutrients, supported by a field team containing the highest number of qualified Certified Nutrient Management Advisors in the country. The field team has been boosted by the introduction of Ravensdown Environmental consultants who assist farmers with environmental planning and resource consents.

We pioneer technologies like precision aerial spreading, whole-farm soil testing and interactive maps that provide an on-farm audit trail of what's been applied where.

You can find out more about these products and services on our website.

Impact of operations
This report deals with our manufacturing operations, fertiliser stores and lime quarries. Ravensdown uses consistent measures to track our environmental performance at our three superphosphate manufacturing sites in order to identify trends and rectify any shortfalls.

Power usage, emissions, noise and dust are four key areas of scrutiny. Our asbestos removal programme is a major investment across the business. By making progress on these fronts, we are also seeing efficiency gains and benefits in terms of the health, safety and wellbeing of our staff and contractors

Thank you for taking an interest in our operations and our environmental credentials. We appreciate you taking the time to read this report and learn about what our team is doing to make progress on the environmental front.

Greg Campbell
Chief Executive Officer
4 August 2017



Award for landscaping around the new Christchurch Office

Manufacturing sites



Dunedin Works - Community Liaison Group



One of the 3 new signs on the 'Dunedin' Recreational Trail



Dunedin Works new ozone generation and injection unit



Christchurch Works new central alleyway



Christchurch Works new intake (with old intake in the background)

Emissions across all three superphosphate manufacturing sites are closely tracked. Fluoride and sulphur dioxide emissions per tonne of fertiliser output continue to be at reduced levels. Updates from each superphosphate manufacturing site are provided below

Napier Works

On 1 December 2016 there was a fire in the sulphur store that caused minor damage. In the precautionary approach taken with the control of the fire, emergency services evacuated some neighbouring industrial and residential properties. Following the fire evacuation the company made efforts to meet individually with those affected to explain the circumstances. The fire did not disrupt sulphuric acid manufacture, and only one day's superphosphate manufacture was lost. All water used for control of the fire was captured by the site system.

Christchurch Works

- Central Alleyway final section nearing completion. This will fully enclose the key working area for Loader operations, reducing tracking of product around the site, and have a positive impact on reducing road staining and nutrient loss from the site
- New intake to supply the stores on the southern side of the complex; fully enclosed reducing opportunity of product ending up on store rooves and then entering storm water system.

Christchurch Office

- Received City Council Community Pride Garden Award

Dunedin Works

- Community Liaison Group established in 2001, continues strongly. Made up of representatives from Ravensbourne, the wider West Harbour community, Dunedin City Council and Otago Regional Council. Meets 2-3 times a year
- Recreational Track – worked with Rotary in the preparation and installation of 3 information signs on the recreational track between the Works and the Otago Harbour
- An ozone generation and injection system has been installed to mitigate odour from the manufacturing process. This replaces the sodium hypochlorite addition system that was in place
- Wharf conveyor belt upgrade to reduce the risk of product spillage into the harbour. Includes new style wipes and additional belt scrapers

Stores network and lime quarries



The Stores Network

- Winton Store donates a large plot of land adjacent to the store for the Winton Community Garden
- Asbestos removal programme continues with emphasis on Timaru, Masterton, Nelson, and Severn St

During the year the Timaru Store was issued with a letter of non-compliance relating to storm water discharge where monitoring of down gradient bores was not consistent with the wording of the 2009 resource consent. Ravensdown is working with Environment Canterbury to respond and resolve.

Lime Quarries

No reported consent non-compliances for any Ravensdown quarries

1: Masterton store before asbestos replacement
 2: Masterton store after asbestos has been removed
 3: Winton community garden chairman Mark Taylor and volunteer Graham Beggs.
 Photo by Mary Witsey, Invercargill Eye.

Environmental performance indicators

2016-2017	Air*		Water*		
	kg SO ₂ /t ssp	kg F/t ssp	kg F/t ssp	kg P/t ssp	kg SS/t ssp
Napier	0.58	0.004	0.002	0.003	0.003
Christchurch	2.46	0.009	na	na	na
Dunedin	1.79	0.003	0.057	0.002	0.060
Average	1.25	0.006	-	-	-

Note: Christchurch does not measure water discharge from site. The majority is returned to the green water system and re-used.

*Based on the quantity of superphosphate (ssp) despatched from each site.

Christchurch and Dunedin operate single absorption acid plants, the Napier plant with double absorption provides superior conversion levels which in turn give very low discharge levels of SO₂ to air.

Environmental performance and compliance

All environmental comments/complaints are logged as part of our Environmental Management System. This applies to all aspects of our operations. All complaints are treated seriously and handled through our corrective action system. This ensures complaints are documented, investigated and where improvement opportunities are identified, appropriate actions are taken and communicated back to the complainant. A summary of complaints relating to the three superphosphate plants is provided below.

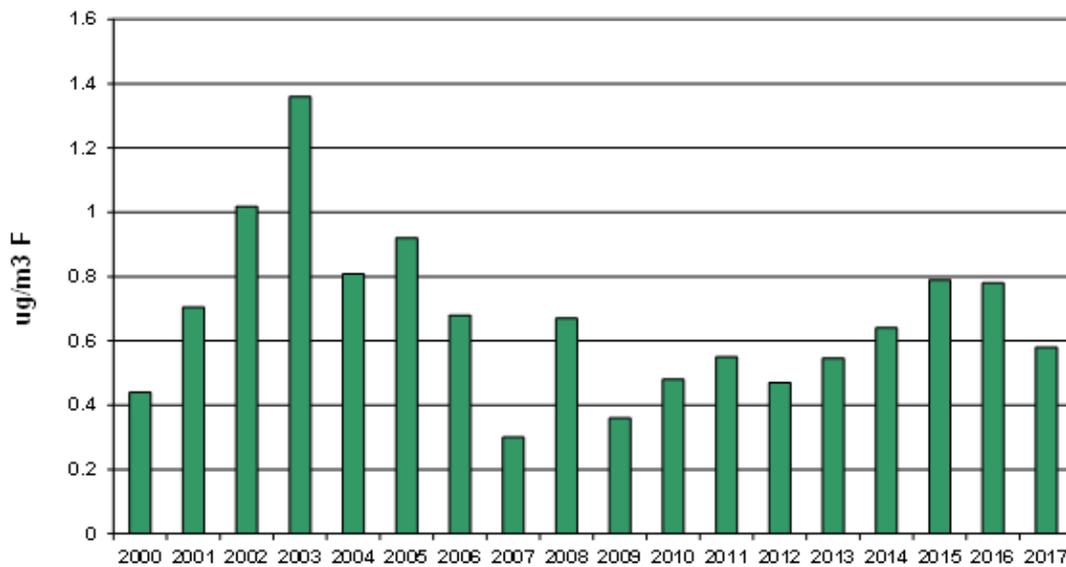
2016-2017 Environmental Complaints	Napier	Christchurch	Dunedin	Total by Type
Odour	0	6	3	9
Noise	0	0	5	5
Dust	0	0	0	0
Other	0	3	0	3
Total	0	9	8	17

Environmental Complaints	Napier	Christchurch	Dunedin	Total
1998-1999	2	9	33	44
1999-2000	6	31	7	44
2000-2001	6	35	8	49
2001-2002	3	17	13	33
2002-2003	3	13	33	49
2003-2004	6	15	16	35
2004-2005	12	16	19	47
2005-2006	17	126	7	150
2006-2007	5	35	4	44
2007-2008	4	68	7	79
2008-2009	0	23	19	42
2009-2010	0	12	25	37
2010-2011	2	8	30	40
2011-2012	4	12	34	50
2012-2013	2	14	29	45
2013-2014	0	17	22	39
2014-2015	4	21	14	39
2015-2016	1	13	30	44
2016-2017	0	9	8	17

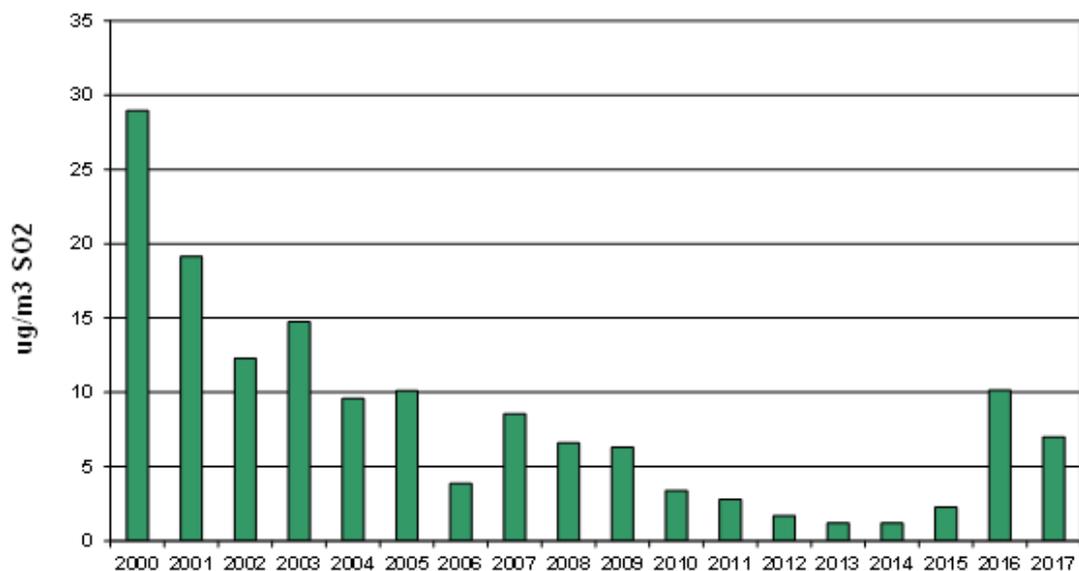
Average ambient air levels

It is important to note that because ambient monitors are at varying distances from source, comparisons between the three works are not relative.

Dunedin Average Ambient Fluoride

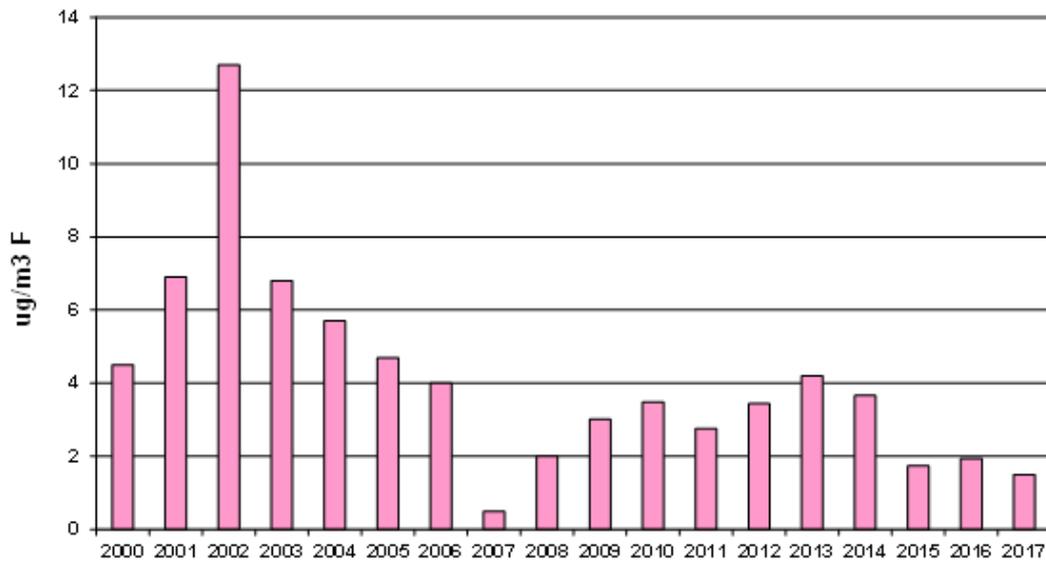


Dunedin Average Ambient Sulphur Dioxide

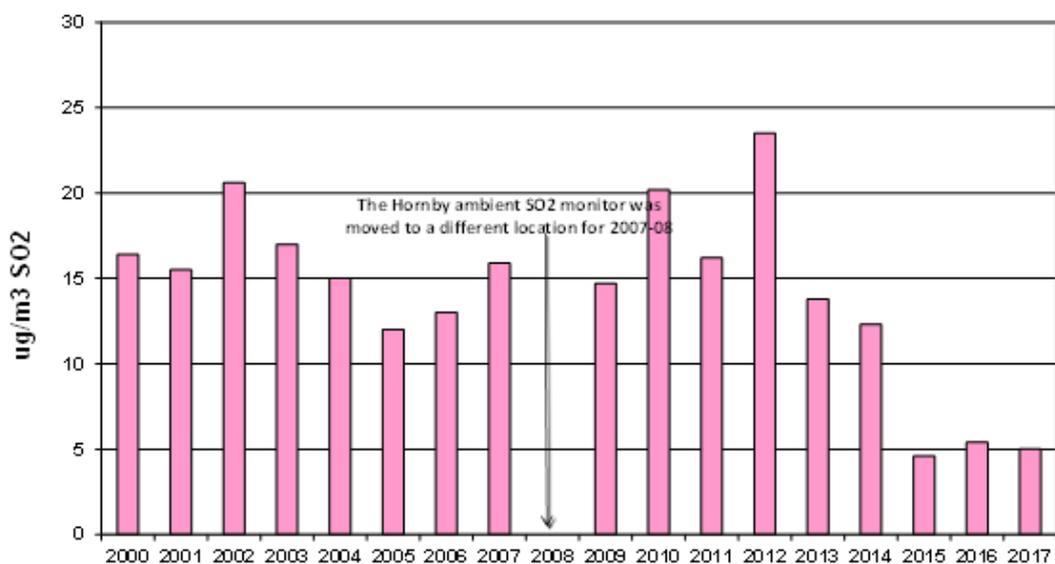


In 2015-2016, some recalibration of the data being received at the SO₂ monitoring site occurred, resulting in an apparent increase in levels.

Christchurch Average Ambient Fluoride



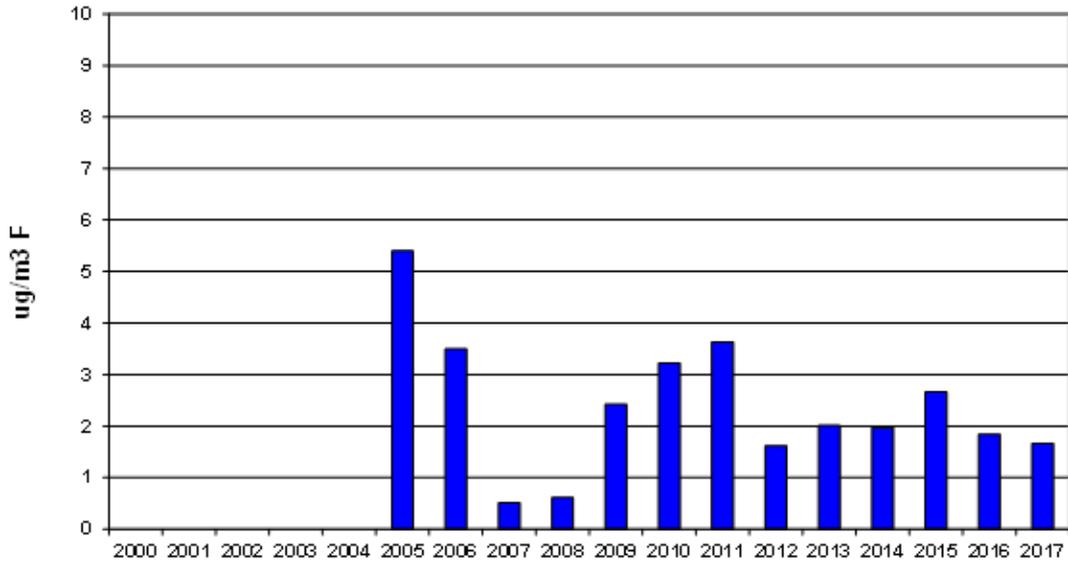
Christchurch Average Ambient Sulphur Dioxide



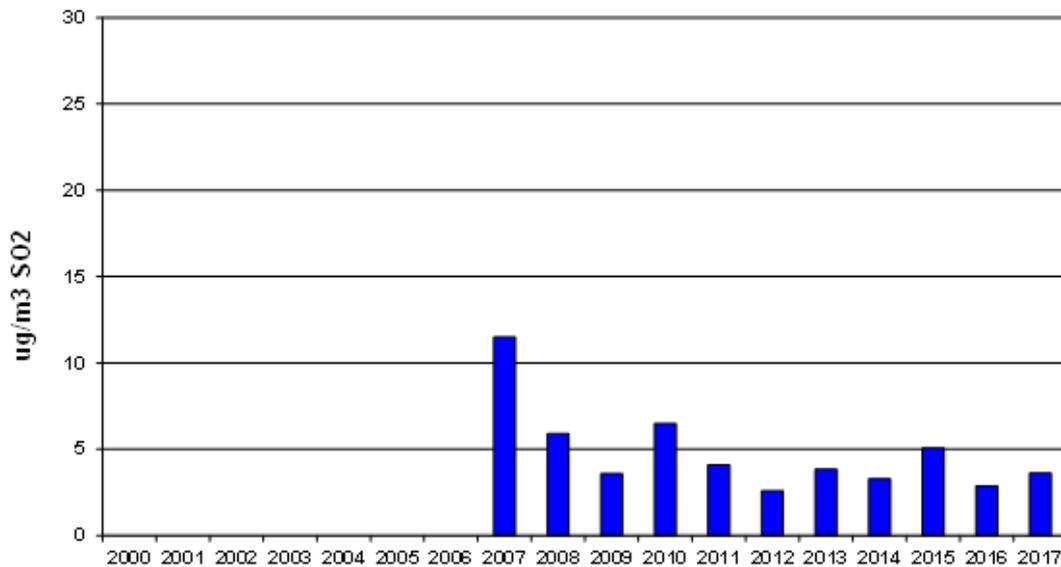
In mid 2014 the sulphuric acid stack height was increased to 67 metres, which has lowered the ambient SO₂ from the Christchurch plant.

Average ambient air levels

Napier Average Ambient Fluoride



Napier Average Ambient Sulphur Dioxide

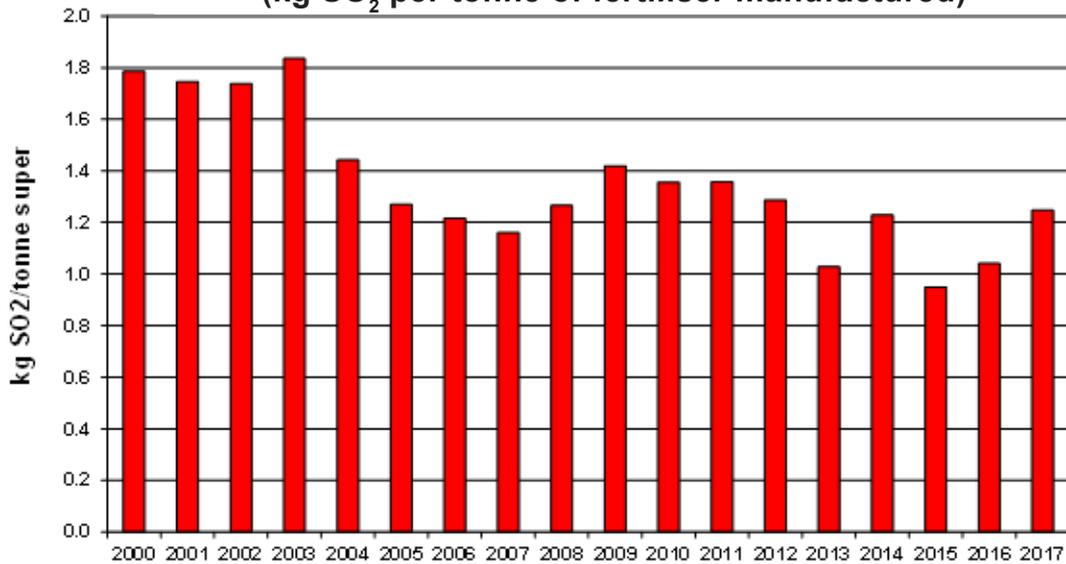


The ambient fluoride monitoring sites at Napier were modified due to the Resource Consent renewal processes; therefore it does not have the continuity of recording from any one monitoring site compared to Christchurch and Dunedin. Ambient monitoring of sulphur dioxide was introduced at the Napier site in the 2006-07 year.

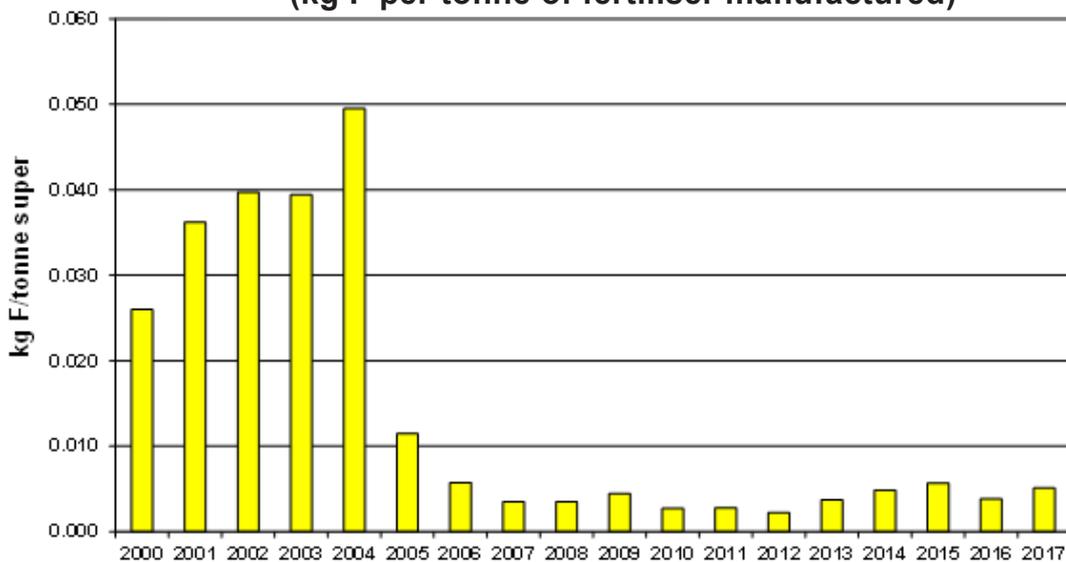
$\mu\text{g}/\text{m}^3$ = micrograms per cubic metre of air

Combined manufacturing discharges

**Sulphur Dioxide Discharged to Air
(kg SO₂ per tonne of fertiliser manufactured)**



**Fluoride Discharged to Air
(kg F per tonne of fertiliser manufactured)**

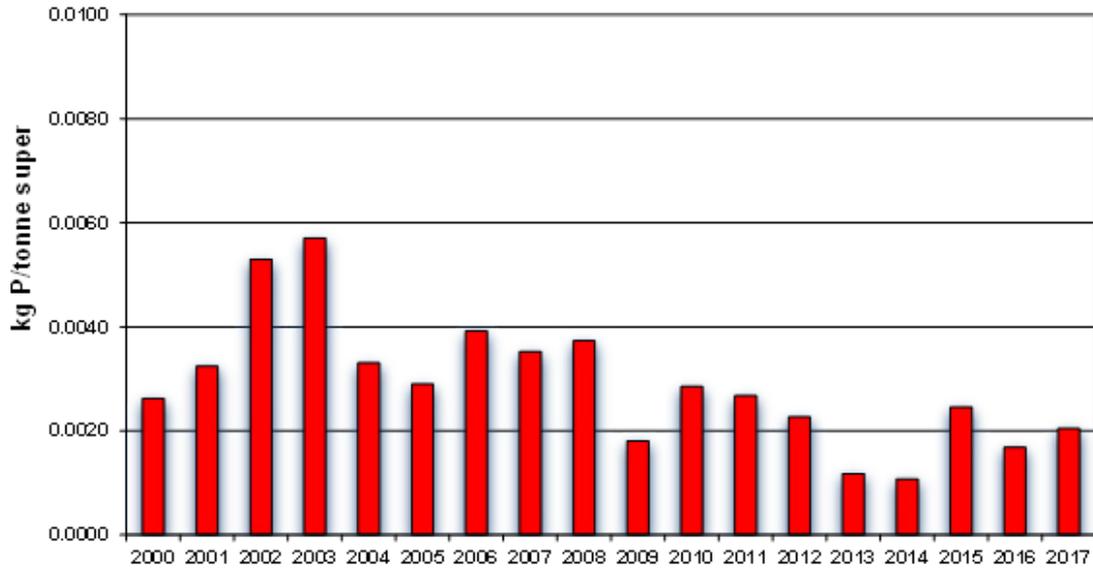


SO₂ discharges were slightly elevated in the latest year. The main factor was catalyst degradation in the second pass of the Napier acid plant. Catalyst has a finite lifetime and catalyst in the second pass was replaced at the end of the year. Other catalyst was also upgraded at Napier and this should see a return to the benchmark levels of recent years.

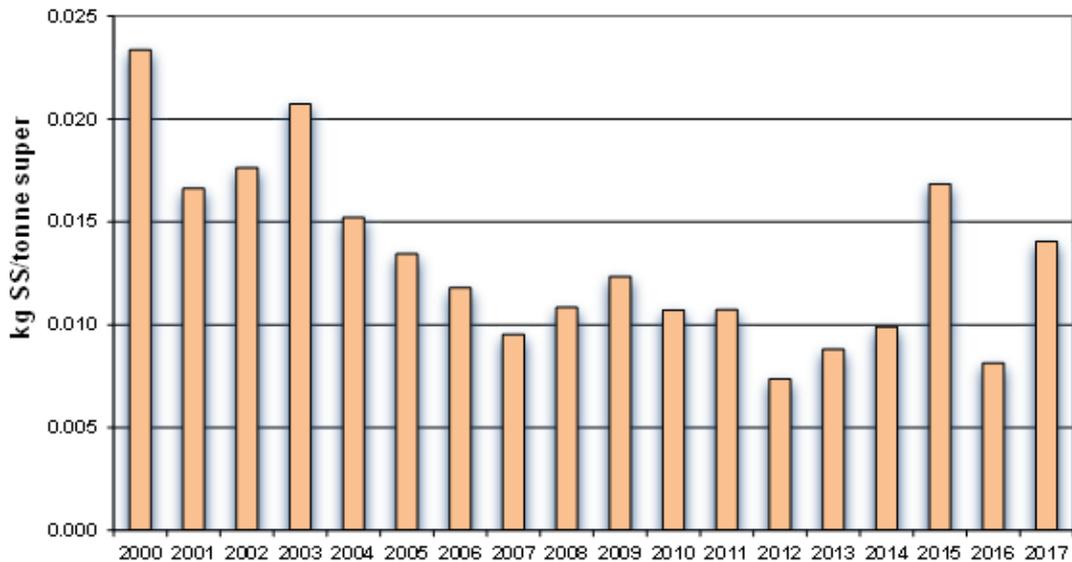
The mass emission of fluoride per tonne of superphosphate is at a low level, reflecting the good performance of the scrubbers at all three sites. Phosphate rock blend changes can influence the discharge.

Combined manufacturing discharges

Phosphorus Liquid Discharge



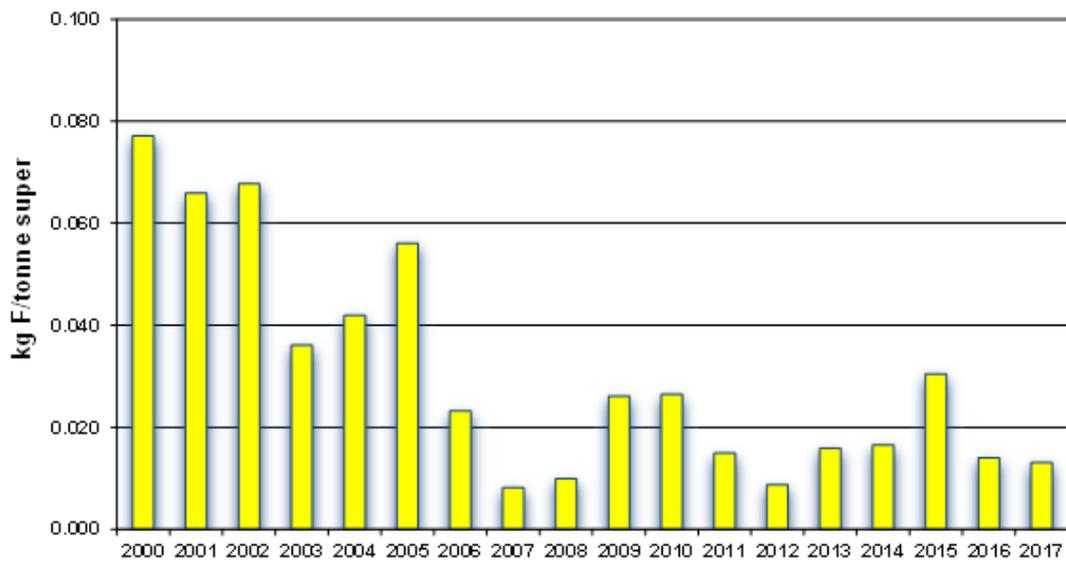
Suspended Solids Liquid Discharges



Suspended solids to water

Suspended solids discharges were elevated from the previous year at Dunedin but remain in a low range. The maximum discharge recorded was 39% of the Resource Consent 95% limit and average discharges were less than 22% of the Resource Consent 95% limit.

Fluoride Liquid Discharges



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2016 / 2017 Edition