Environmental Compliance Monitoring Report **2009-10**

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Report by –
Environment Southland
Compliance Division

Environment Southland Publication No 2010/5

Foreword

This year has been an extremely busy one for all those involved in the Compliance team.

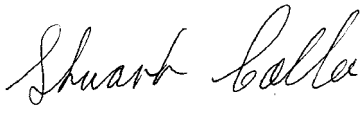
Through the Council's recent Long Term Council Community Plan consultative process, we received some valuable feedback, in particular from dairy discharge consent holders. As a result, the entire process of monitoring dairy resource consents was reviewed and a modified programme of inspections has been implemented this year, to great success. This is a more cost effective approach, as staff work to combine different inspections in the one visit. Consent conditions for new consents have also been simplified and modified. One key difference is that best practice guidelines are now not part of consent conditions and are therefore not monitored as part of an inspection.

Southlanders are more aware of pollution issues, and continue to become more intolerant of environmental pollution. This is clearly demonstrated in the increase in calls to the pollution response hotline, despite this service not being advertised. During the past year 981 incidents have been responded to, 130 more than last year. Complaints are categorised depending on where the environmental effect is, Air, Land, Water or Coast. Each category received more complaints than the previous year, but of note is the significant increase in land and coast complaints. These increases can mainly be attributed to an increase in active compliance, with staff being more vigilant particularly of coastal, industrial and stormwater discharges.

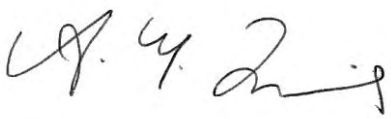
Looking to the future, staff can expect a large spike in the number of consent renewals from the dairy industry over the next three years, which may result in an increase in monitoring. Also, more work will be needed if the new National Environmental Standards for Assessing and Managing Contaminants in Soil are implemented.

Staff continue to consult with key stakeholders in the dairy industry through the dairy effluent reference group. This group is currently assisting in consultation on the discharge plan and has been an invaluable resource to this process.

Once again, the Council congratulates Mark Hunter and his team of dedicated staff for continuing to respond and adapt to the high standards of environmental compliance being required by this Council and Southland as a whole. Their job is often difficult and requires unique skills.



D S Collie
Chairman
Environment Southland



A M Timms
Chairman
Environmental Management Committee

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1.0 Pollution Prevention

The pollution prevention programme had a successful second year, helped significantly by the appointment of a 'summer student'. Ongoing resourcing constraints have, however, been identified as an issue for the programme continuing to meet all of its planned objectives.

1.1 Prestonville Industrial Area Study

Building on areas identified within the 2008/09 report, work was carried out in the current year to identify existing industrial land uses within the Prestonville industrial area. Areas for field sampling of stormwater have been identified, to attempt to trace potential pollution sources from the Waihopai River to the originating sites. This work will continue in the 2010/11 year, as resources permit. As there are more than 100 properties in the industrial area, this represents a significant portion of staff time.

Work has also been carried out in Prestonville investigating a potentially contaminated site. Funding was obtained from the Ministry for the Environment to contribute to the costs of the investigation, with the remainder of external costs being paid for by the site owner. Work is scheduled for completion by the end of October 2010.

1.2 Pollution Prevention Guide

The Pollution Prevention Guide (Figure 1) was published and released to users from January 2010. Since that time more than 20 companies have received copies of the guide, in association with initial site visits, and are progressing through the programme. Other businesses were assisted through ad hoc approaches, via their industry groups and through media releases, articles and other educational tools.

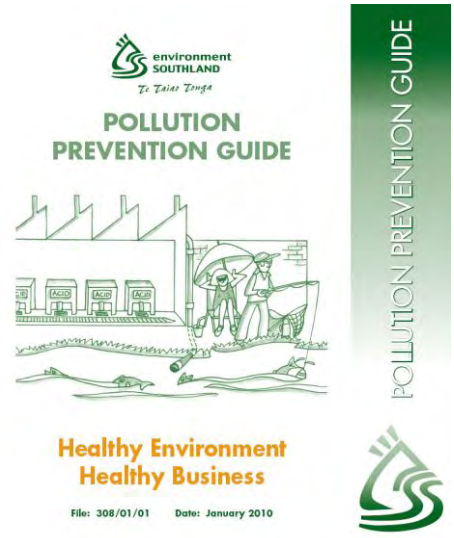

Figure 1 – Pollution Prevention Guide.

The guide's focus is identifying areas for action in plain terms, leading to action plans which can be implemented to ensure ongoing compliance. A series of underlying activity-specific information sheets has also been prepared.

1.3 Challenges/Looking Ahead

Stormwater

Rules governing the control of hazardous substances and stormwater discharges were implemented in the Regional Water Plan for Southland in March 2009. While information regarding these rules was sent to identified parties, such as large industry and service stations, awareness of the rules and their implications remains low.

Several sites visited over the year were identified as needing some form of stormwater discharge control due to the site uses and/or substances on hand. Solutions to these issues have ranged from purchasing spill kits where minimal risk exists, to installing compliant interceptor systems for service station forecourts and the like.

Moving forward, this area of compliance constitutes a significant gap in Southland's response to industrial discharges and will require further assessment via permitted activity monitoring and ongoing educational work. No widespread activity monitoring occurred in the current year due to resourcing gaps. This area will continue to be identified as a priority.

Vehicle and Equipment Washwater

This is an issue for which there is little recognition among either commercial or residential stakeholders. Washwater can be a contributing factor in the deposition of sediments into waterways, which was identified as a concern in the previous Compliance Monitoring Report. Fourteen documented incidents involving vehicle or equipment washwater were recorded over the year. However, the general response to date has been educational and the approach has been not to record personal details in these cases; consequently the actual number of incidents is probably much higher.

It should be noted that a common response from offenders was that they were using biodegradable detergents. Marketing for these detergents often indicates that they are MAF approved, or meet overseas standards. Biodegradable detergent use and washwater discharges remain issues when entering waterways via the stormwater system as:

- they carry other contaminants such as metal residues, oil and grease, and sediment;
- biodegradable detergent breaks down more rapidly than conventional detergents, but still results in oxygen depletion within the waterway and may result in other adverse impacts on aquatic life.

As part of Environment Southland's response to washwater issues, an action sheet (Figure 2) has been produced to inform businesses of their responsibilities and options.

Vehicle & Equipment Washing - Pollution Prevention - actionSHEET 2

Washdown Areas

Washdown water is the result of cleaning equipment such as vehicles, machinery or containers on your site. It can contain oil, grit, dirt, concrete dust or chemicals. Contaminated washwater must not get into stormwater.

Unless you are disposing of **ALL** washwater from your site either via trade waste permits or resource consents, or in a way that presents no risk of stormwater contamination, consider one of the management options below:

Option 1

Use a dry wash method – anti-static brushes, wet rag / dry rag, bucket and rag – on vehicles, containers and equipment.

Option 2

Take vehicles, containers or equipment to a compliant commercial washing facility with a sewer connection or recirculating system.

Option 3

Dispose of 100% of your wash water to the sewer via an approved connection. Fully bund and roof the wash bay to contain wash water and eliminate stormwater. You may need a trade waste consent or a building permit to do this, so call the city/district council to find out.

Option 4

Recycle 100% of your washwater. Fully bund the washbay to contain washwater and either roof it to eliminate stormwater, or put stormwater into the treatment and storage facility as top-up, with an overflow to direct excess clean runoff into the stormwater system.

Option 5

Recycle most of your washwater and dispose of excess to the sewer via an approved sewer connection or to a holding tank for removal by a certified waste disposal operator. You will still need to fully bund the washbay and either roof it to eliminate stormwater, or use a demand-driven first flush diversion valve to divert the first 10mm of rain to the washwater treatment facility.

Option 6

Collect and treat washwater for disposal to the stormwater system, to natural water, or via irrigation to land in rural areas. You will need a resource consent from Environment Southland and use of detergents, degreasers or chemical additives is unlikely to be allowed.

At Home

If you must wash your car, concrete mixer, mower, wheelbarrow etc, then do so on the lawn so that runoff soaks into the ground, or take it to a commercial wash facility so that all wastes go to the sewer.

Never use solvents or degreasing agents when waste water flows or drips straight onto the ground.

Further information

For a copy of the **Pollution Prevention Guide** or more information **on any of these matters**, contact Environment Southland 03 211 5115 or 0800 76 88 45 or visit our website at www.es.govt.nz.

Figure 2 – Vehicle and equipment washing action sheet.

Bouquet

Over the year, Environment Southland became significantly involved with the Invercargill Branch of the Motor Trade Association (MTA), through its executive committee. Since an initial meeting at which we presented our programme, a number of site visits and discussions have been held. All the committee member businesses have been visited and have commenced the pollution prevention programme. This has resulted in a much greater awareness for Environment Southland staff of the particular issues that sites face, especially when constrained by space or existing lease arrangements.

Working with the MTA provides Environment Southland with multiple benefits, including access to the membership of a dedicated industry organisation which can act as a sounding board for ideas and solutions. It also provides us with the ability to feed information to more than 120 Southland businesses. For their part, MTA members have demonstrated their dedication to progressive improvement and have accepted, in some cases, that there is a requirement for behavioural change in the industry.

As a result of this partnership, the MTA has the assurance that it has access to Environment Southland's regulatory requirements and dedicated assistance to engaging with onsite issues. This has been especially useful with MTA's development of its own membership environmental standards and auditing system.

In the future, there are plans for ongoing training opportunities, including spill response training. These have been led by the MTA members themselves.

1.4 Listed Land Use Register

Environment Southland has moved away from using the terms "hazardous" and/or "contaminated" when discussing its register of sites which are *potentially* contaminated. This is due to the negative connotations which these descriptors can hold and because some sites have been registered due to historical activities, rather than actual identified contamination. In the future, the register will be referred to as the Listed Land Use Register.

Work has continued on building up the register in accordance with Environment Southland's functions under the Resource Management Act 1991 and the Ministry for the Environment's Guidelines for Assessing and Managing Contaminated Land. As at 1 July 2010, registered sites were classified as shown in Figure 3.

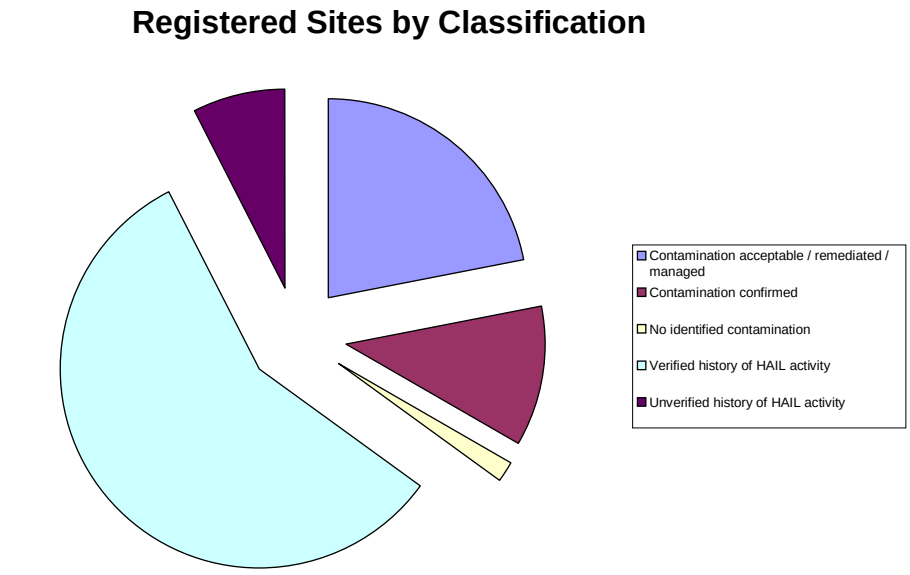

Figure 3 – Registered sites by classification.

Sites are also classified as belonging to one of 53 listed activities contained within the Ministry for the Environment's Guidelines. Current site registrations and their listed land use are displayed in Figure 4.

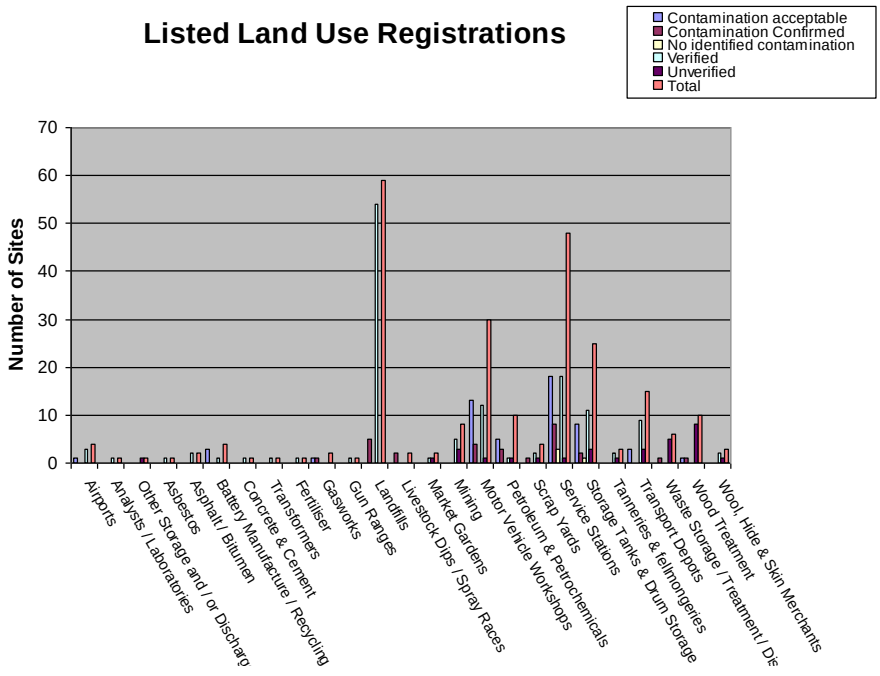

Figure 4 – Listed land use registrations.

As some sites are subject to more than one land use, this chart displays more than the 242 records on the register. The activity captions have been simplified to broadly delineate the activities contained on the Hazardous Activities and Industries List. The majority of unverified records are awaiting landowner input, or were recorded prior to the current database being

activated. Further research will be carried out in the future to ensure that these sites are verified and more fully documented.

Contaminated Sites Remediation Fund Project

The Contaminated Sites Remediation Fund is a public fund administered by the Ministry for the Environment. It is a contestable fund which is designed to subsidise the investigation and remediation of contaminated sites where the landowners have not been responsible for the polluting activity, or the activity which led to the pollution was lawful prior to the Resource Management Act 1991. Regional Councils are responsible for making application on behalf of landowners to ensure that sites are prioritised within regions.

In October 2009, Environment Southland made its first application to the fund, to allow for onsite investigations on a property where it was believed that transformers containing polychlorinated biphenyls (PCBs) had been drained and disposed. The funding application was successful and site work began in April 2010. At the time of writing, the investigation findings had not been formalised, but will be reported to the Ministry for the Environment and Council. The site's owner will also be eligible to apply for further funding to cover the cost of advice and remediation work, should this be required, ensuring that any risk is managed or removed from the environment.

Figure 5 - Suspected PCB sludge on site.

Figure 6 – Removing soil for sampling.

Emerging Issues - Off Site Soil Disposal

The movement of contaminants from sites is controlled under Section 15 of the Resource Management Act 1991, combined with Southland's regional plans. Although the land-based disposal of hazardous waste is controlled by rules in the Regional Solid Waste Plan, there is a substantial lack of awareness that soil from contaminated sites, or potentially contaminated sites, may be hazardous waste and subject to these controls.

This issue has manifested itself on several occasions over the last year, most notably when Environment Southland staff discovered contaminated soil had been disposed of in a gravel pit. In most circumstances, there are several reasons for inappropriate disposal to occur. These include:

- lack of awareness of a site's history and potential problems;
- lack of consultation regarding disposal and/or remediation options;
- contact with councils, but failing to ask questions which highlight the historical land use.

Environment Southland is currently involved in attempts to raise awareness of this issue by:

- providing information to territorial authorities when sites are registered;
- facilitating further training/information on contaminated land issues to the property industry and territorial authorities;
- providing free advice on how to deal with contaminated land.

1.5 Underground Tank Removals

After discussions with fuel company representatives, reports for the majority of tank removals carried out during the year were supplied without Environment Southland having to request them. A large number of tank removal reports were received during the year, however the majority of these related to historical works and were due to ongoing investigations required by the Listed Land Use Register project.

Two tank removals were attended by Environment Southland staff and these are reported in further detail below.

BP Dundee site closure

BP Dundee was fully decommissioned in July and August 2009, after the discovery of a significant fuel loss from one of the underground fuel storage tanks. Environment Southland was immediately informed of this issue and the station was closed.

During the tank removals, extensive sampling was carried out and all known local groundwater users were notified. It was noted that the underlying clay bound soils played a part in controlling the spread of the spilled fuel and were able to prevent it from entering the Otepuni Stream. BP representatives also

monitored the Otepuni Stream to ensure that no fuel was entering it. The site continues to be managed, pending redevelopment in the future.

Figure 7 - Excavator at work removing tank from pit.

Figure 8 – Tank being loaded onto truck for assessment and recycling.

Riverton Boat Stop

The Riverton Boat Stop was formerly operated by Chevron New Zealand. The site was scheduled for closure and decommissioning, which occurred in May 2010. Environment Southland staff attended the sampling of this site immediately after the tank was removed, due to its location immediately next to the sensitive Jacobs River Estuary. Minimal contamination was discovered when the tank was removed and the site complied with all relevant guidelines, including those for the protection of water quality.

As this was the last remaining on-wharf dispenser system in Riverton, there may be an increased environmental risk from the refuelling of vessels berthed in the area, as boat owners will have to obtain fuel from local service stations and then decant it onto vessels at the wharf.

Figure 9 – Using excavator bucket to collect soil from pit for sampling.

2.0 National Environmental Standards

2.1 National Developments in the Measurement of Water Takes

In April 2010, Central Government agreed that the previously proposed National Environmental Standard for Measurement of Water Takes will now be drafted as regulations under Section 360(1)(d) of the Resource Management Act 1991.

The regulations will achieve the following objectives:

- ensure consistent measuring and reporting of actual water taken at national, regional and catchment levels;
- enable water users and regulators to easily determine compliance with water take consents;
- provide accurate information about actual (consented) water taken in any catchment (including the catchments of groundwater resources);
- improve allocative efficiency through accurate measurement of water abstraction for consumptive users;
- ensure the comprehensive uptake of water measuring in a cost effective and timely way.

The regulations will achieve these objectives by requiring qualifying consent holders to meet minimum requirements to measure their water takes. The regulations will also require water use data to be reported to regional councils.

It is not the intent of the standard to make water users manually measure their water use every day. The proposal encourages the installation of meters with electronic data logging capacity, which means that as water is used the information is stored automatically.

Water users can, in effect, install a meter (with a data logger) and retrieve the data to transfer it to the council, when required. In the proposal this is once a year, although councils may require the data transfer more often for water management reasons. If this is the case, it will be required as a specific consent condition. Under the proposal, all measuring devices should have data storage capacity, which will require a data logger to be installed where meters do not have this function built in.

Information from water measuring devices is useful for users to manage inputs to their business, to identify energy savings and leakages in their systems, and to make water efficiency gains. It is important for regional councils to help manage water more sustainably and assess compliance – this is particularly important in drier regions, or in water short times.

Water managers will be able to see the difference between what is allocated on paper and when and how the resource is actually used. Nationally, this data will be collated for natural resource accounting and to meet international sustainability reporting requirements.

2.2 Proposed National Environmental Standard for Assessing and Managing Contaminants in Soil

Under the Resource Management Act, the government has the ability to implement legally binding National Environment Standards (NES). The Ministry for the Environment released the proposed NES for Assessing and Managing Contaminants in Soil in February 2010. The proposed NES provides direction for territorial authorities to give effect to their land management functions under the Resource Management Act 1991.

While the NES in its present form does not affect the role or responsibilities of regional councils in the management of listed land use sites, Environment Southland believed that there were flaws in the original drafting and provided a submission on the standards to the Ministry for the Environment. In particular, there were concerns about some of the contaminant thresholds suggested by the standard and that environmental impacts were not being adequately considered. If released, the standard will only govern human health effects and significant toxicological work may be required to determine whether sites are safe in ecological and broader environmental terms.

Work on the NES consumed a significant portion of available resourcing and is likely to continue to do so in the near future. This is because:

- awareness of land issues will be raised and territorial authorities will be required to consider potential contamination at the time of development, land use consent, or subdivision of sites;
- this will lead to further enquiries of regional councils, coupled with more time required for onsite investigation and/or analysis of information provided under the NES;
- there may not be existing capacity to deal with some of this workload in the private sector in Southland.

Environment Southland's response to these issues is to continue to give effect to its functions under Section 30 of the Resource Management Act 1991 – to investigate, identify and monitor potentially contaminated land. At the same time, we will encourage territorial authorities to continue to use their abilities to manage and control inappropriate development of contaminated land and encourage remediation of significantly impacted land, in accordance with the provisions of the Southland Regional Policy Statement. We also hope to facilitate more education to sectors within the property industry, to heighten awareness of requirements and responsibilities.

Wider awareness of these issues is evident in the number of enquiries received relating to potentially contaminated land in the 2009/10 year. In the current reporting period, 69 requests were received from various sources, compared with 16 in the 2008/09 year (Figure 10).

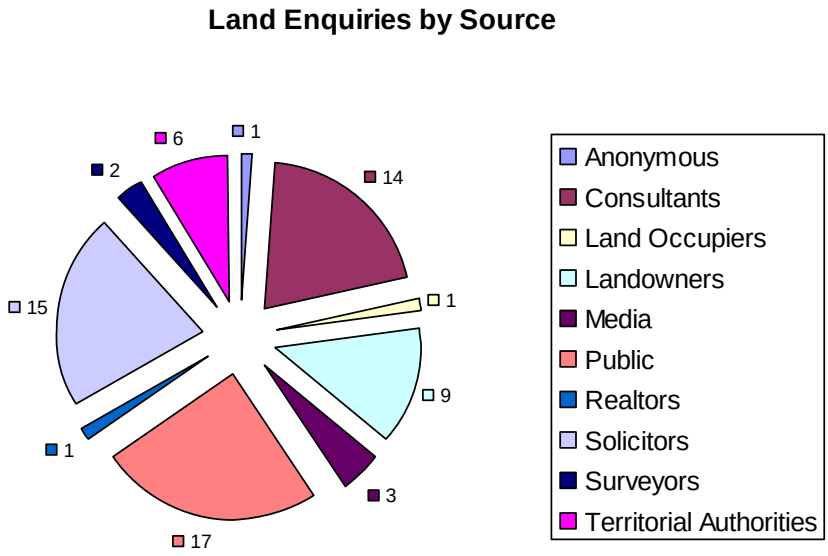

Figure 10 - Land enquiries by source.

3.0 Compliance Monitoring

3.1 Irrigation water takes

Under the Regional Water Plan for Southland, a consent is required for the abstraction and use of surface water over 10,000 litres per landholding per day, and over 20,000 litres per landholding per day for groundwater. Over the 2009/10 season there were 73 groundwater and 13 surface water consents to take water for irrigation purposes.

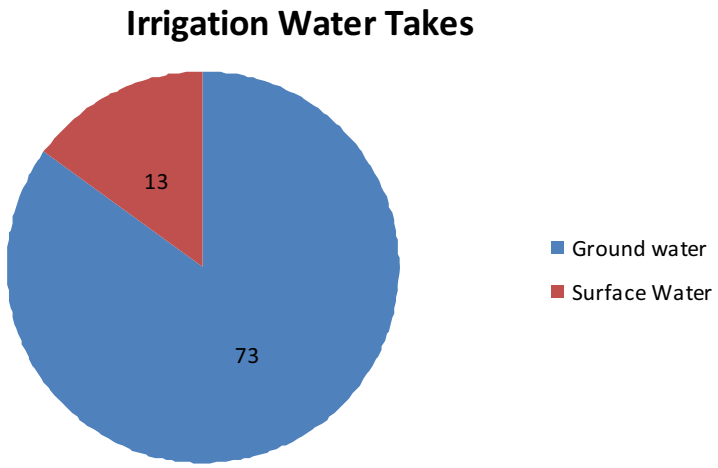

Figure 11 – Ground and surface water takes.

Water is used for a variety of irrigation purposes. The most common use is for pasture irrigation, followed by crop irrigation. There are three consents which provide for irrigation takes for horticultural purposes and one consent provides for recreational purposes. Some consents have multiple uses.

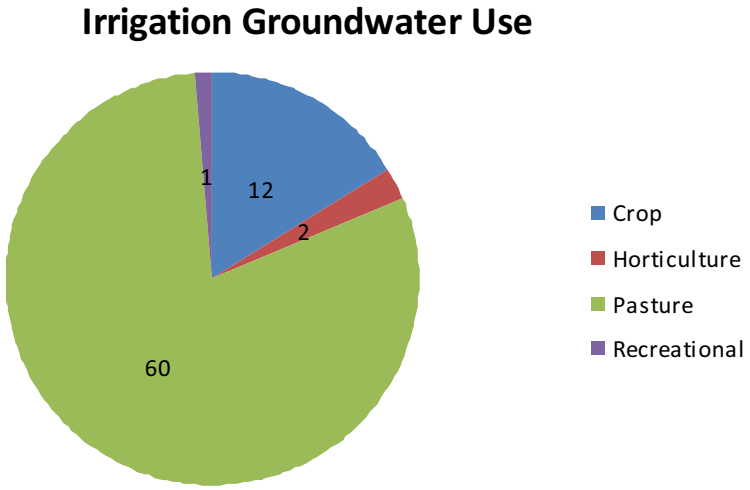

Figure 12 – Uses of groundwater irrigation.

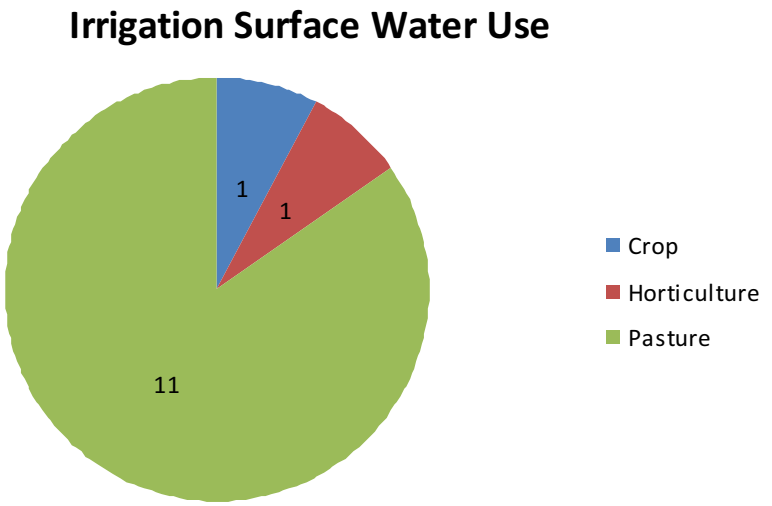

Figure 13 – Uses of surface water irrigation.

Common consent conditions which are assessed for compliance are:

- ***notification of commencement*** - consent holders are required to notify Environment Southland at least 24 hours before commencing irrigation, at the start of each irrigation season;

- ***the supply of abstraction data*** - for most irrigation water take consents, abstraction data is required to be submitted by 30 June each year;

- ***the supply of groundwater level data*** - consent holders are required to record the depth to groundwater in production and/or monitoring bores, at specified frequencies;

- ***telemetry*** - many consents now require abstraction data to be sent to Environment Southland electronically, at specified frequencies;

- ***abstraction limits*** - daily and annual consented limits apply to all consents.

Irrigation reporting compliance

Environment Southland received notification of commencement from 62% of consent holders, a significant improvement from the 2008/09 season, when only 37% of consent holders notified the Council.

A total of 72% of consent holders supplied abstraction records, however almost 10% of the records did not meet the requirements of the consent and a small proportion of these were supplied late. Abstraction records that did not meet the requirements of the consent did not contain sufficient information to assess compliance with annual and daily abstraction limits. Often the only data supplied were start and end of season meter readings, or

estimates of monthly usage. Most consents require the volume of water taken each day to be recorded.

There were 46 consents requiring consent holders to record the depth to groundwater in production and/or monitoring bores. As with previous years, the supply of this data was poor. Only 47% of consent holders who have this requirement supplied the data. Groundwater level monitoring provides useful information about how the aquifer responds to pumping. This information can be used to calculate rough estimates of aquifer properties and is analysed by the Council's groundwater scientists. It is not used for interpreting groundwater level trends in a particular aquifer, as this data is collected by Council staff in monthly monitoring at specific bores.

Almost half of all irrigation consents now require abstraction data to be supplied electronically, using an automated system (telemetry). The electronic abstraction recording provides the consent holder with a tool to enable sustainable management of their water resource. It provides up-to-the-minute information on water usage and, when used in conjunction with soil moisture data, ensures irrigation takes place only when conditions are ideal.

Consent holders who have their telemetry set up through providers such as Waterforce and Harvest Alarms, have access to their data through the provider's website. Although not a requirement on all consents, some consent holders are taking advantage of their telemetry system by also providing groundwater level and soil moisture data via telemetry. This ensures complete compliance with data provision requirements for those holders and eliminates the need to fill in paperwork.

Consent holders who have a telemetry requirement on their consent, and who have not yet filled this requirement by the date specified, will receive abatement notices requiring that their system be installed before irrigation commences for the next season. Consent holders who did not supply abstraction records as required by their consent have received invoices for the time spent following up the non provision of data.

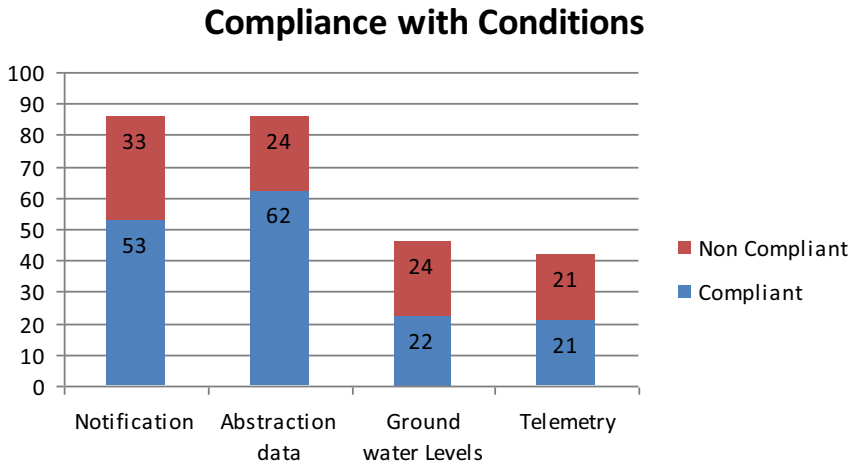

Figure 14 – Compliance with consent conditions.

All consent holders who submitted abstraction returns either manually or via telemetry were compliant with their annual abstraction limits. In addition, 90% were compliant with their daily abstraction limits. Most of those who exceeded their daily abstraction limits were abstracting from more than one bore. These consent holders, in particular, need to be familiar with their consent conditions with respect to abstraction limits. Unless otherwise specified, abstraction limits apply to the total take from all bores associated with the consent.

Almost 10% of consent holders provided insufficient data to assess compliance with their abstraction limits. Consent holders need to be familiar with the frequency with which their abstraction needs to be recorded. For most consents, the date and time abstraction commences each day and the volume of water taken each day needs to be recorded.

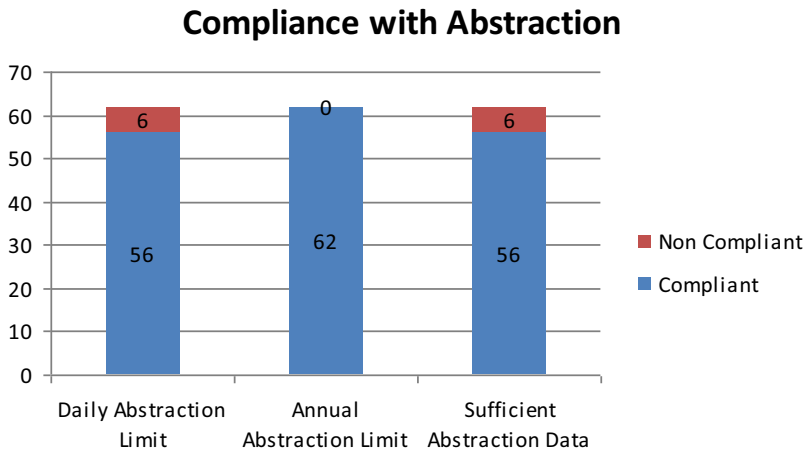

Figure 15 – Compliance with abstraction.

The management of water resources relies heavily on the supply of data. Consequently, if the quality of data provided is not sufficient, it makes the management of the resource less effective. Additionally, irrigation records are referred to when consents are reviewed, or when new consents are applied for. If there is a lack of sufficient historical abstraction data from a consent holder or property, it is likely to impact on the Council's ability to make effective decisions when renewing or granting new consents.

Figure 16 – Irrigator at work in Southland.

3.2 Aerial Monitoring

Three aerial monitoring flights were undertaken between the winter of 2009 and start of the winter 2010. A fixed wing aircraft was used on each occasion, with Southland being split into three areas for the flights. The areas were Central Southland (14 July 2009), Eastern Southland (12 August 2009) and North/Western Southland (9 June 2010). On the flight around Eastern Southland, local Federated Farmers dairy representative Vaughan Templeton was in attendance.

The issues identified included:

- ***14 July 2009***

  - sheep, unrestricted access to waterway - 6 sites
  - beef cattle, unrestricted access to waterway - 3 sites
  - dairy cows, unrestricted access to waterway - 4 sites
  - unauthorised offal/rubbish hole - 1 site
  - nuisance smoke - 1 site

- ***12 August 2009***

  - sheep, unrestricted access to waterway - 13 sites
  - beef cattle, unrestricted access to waterway - 3 sites
  - dairy cows, unrestricted access to waterway - 9 sites
  - unauthorised wetland drainage - 1 site

- ***9 June 2010***

  - Sheep, unrestricted access to waterway - 2 sites
  - beef cattle, unrestricted access to waterway - 1 sites
  - dairy cows, unrestricted access to waterway - 2 sites
  - sediment runoff to a waterway from forestry operations - 1 site
  - fodder crop planted through waterway - 1 site
  - unauthorised drainage of a wetland - 1 site

The main focus of the flights was to monitor compliance with the three metre mob stocking rule and note any other possible plan, or rule breaches. All sites where a breach may have been occurring were logged with a GPS and photographed. The high priority matters were passed over to the enforcement team for further investigation, while the rest were passed on to Environment Southland's Land Sustainability Officers and dealt with through educational means.

Figure 17 - Animals being mob stocked and fed along the free draining river margins.

3.3 Freshwater Structures

As a part of a routine three yearly programme, inspections were undertaken on the freshwater structures located on the Waiau River and Lakes Manapouri, Te Anau, Hauroko and Monawai.

The freshwater structure inspections for 2010 included 42 consents, which consisted of smaller moorings/jetties, boat ramps, larger concrete slipways and commercial jetties. Some consents cover a large number of structures, such as the Manapouri Boating Club (two consents for 52 structures).

Figure 18 - Concrete ramp with a large barge.

There were three significant non-compliances noted. One jetty had been broken off and was in need of major repairs. The other two issues were for weak structures. A significant number of wharfs/jetties were noted as being slippery when we entered the structure and consent holders were advised to install wire mesh.

3.4 Truckwashes

A total of 20 truckwash sites were inspected throughout Southland during the 2009/10 year, as part of routine consent monitoring.

Most consent holders were compliant with consent requirements, but two sites failed their routine inspections. One consent holder failed to provide adequate storage requirements, as detailed in the consent, and it was noted during the inspection that wastewater from the truckwash was overflowing to land. Issues at the other site included over application of washwater to land from an irrigation system in circumstances where it was likely to enter water. The irrigation system did not appear to have been regularly checked and had not been moved when necessary. Both sites are currently facing enforcement action. Other issues noted were of a more technical nature, such as failure to provide or submit information on the disposal of sludges to land.

In addition, another site does not have an adequate amount of satisfactory area to apply wastewater to land and, consequently, has had to cart its effluent offsite during wetter periods to avoid potential runoff. The consent holder is considering future land disposal options for that site.

One consent holder, in Mossburn, has recently upgraded an old soak hole system to a new state of the art fleet-wash system. This new system is a vast improvement on the old system and ensures compliance with the consent.

Figure 19 – Containment facility – washwater.

Figure 20 – Containment facility – sludges.

These photos show an excellent sealed containment facility for the washing and storage of washwater (Figure 19) and sludges (Figure 20). The washwater is applied at the consented depth/rate via a land disposal system, while the sludges from the water storage facility are placed in a sealed containment pad (Figure 20). The sludges are able to be dried out, with any liquid material draining back to the storage facility. Sludges are applied to land at a depth not exceeding 7 mm. This site has also been used as an effluent dumping station, with the owners allowing other operators access during busier stock carting times.

4.0 Dairy Monitoring

4.1 Dairy Inspections – Annual Report

Environment Southland's database showed a total of 838 active discharge consents, over 785 dairy farms throughout Southland, during the 2009/10 dairy season. Properties milking less than 50 cows are not required to have resource consents for the disposal of effluent to land and did not form part of the 2009/10 dairy inspections.

Changes to inspection programme

The dairy inspection programme for 2009/10 was significantly different from previous years. Councillors and those involved in the dairy industry wanted staff to work more closely with the industry and to be more efficient in the way the inspection process was undertaken. Initial planning for the inspection process was worked through, with input from representatives of Federated Farmers, DairyNZ and Environment Southland staff. Agreed changes made to the inspection programme included:

- combining surface water sampling and inspections of effluent systems wherever possible;
- targeting historically poor performing farms first, during spring conditions;
- instigating a national compliance group and nationally agreed criteria for inspections on dairy farms.
- more extensive consent requirements/follow-up for new consents, such as the submission of Environmental Management Plans, new pond construction details and effluent application testing.

The decision to combine surface water sampling with the dairy inspection presented a number of challenges that had to be worked through. The key issue was the time this would take.

In previous seasons, the surface water sampling was undertaken by a contractor whose sole focus was collecting samples during the spring, mid summer and late autumn periods. The contractor could get through an average of 7-9 sites per day, meaning there were around 480 sites that needed sampling three times per year, combined with a dairy inspection that is generally only undertaken once or twice a year (dependent on cow numbers, or previous compliance history).

On average, dairy inspections can take around 40 minutes to complete, with sometimes over an hour of travel time on top. The Compliance Officer must complete the inspections before 2.30 pm, to allow the farm staff time for milking.

An agreement was reached to combine surface water sampling with dairy inspections during the first sampling period (September through to the end of December). Surface water sampling would only be undertaken if the officer

identified ponding on the irrigator run, or discoloration of the waterway related to farm dairy effluent. This meant that a total of 480 farms were to be visited between September and December, with a significant number due during September and October, due to specified sampling periods in their consents. From the end of December to the beginning of June, a further 358 farms required a ground inspection.

During the mid summer period it was agreed with representatives of the dairy industry to sample only if there had been issues with water sampling results within the last 18 months, or there had been a poor compliance history related to effluent management. There were 50 farms listed for this second surface water sampling inspection.

Farms with 600 cows or more are generally inspected twice during the season (one aerial and one ground inspection). A total of 330 farms were selected for aerial inspections, based on farms with multiple inspection requirements. Farms with less than 600 cows are usually only inspected once during each year.

Farms that received a Grade 10 rating (significant non-compliance) from any inspection were re-inspected as soon as was practical, depending on what the issue was. For example, significant ponding could be cleared up and re-inspected reasonably quickly, whereas issues such as leaking ponds may take additional time before the re-inspection could take place.

A grading system/inspection sheets were used to accommodate national criteria.

Table 1 – Grading system

National Grading	***Environment Southland Grades***	
Category 1: Compliant	1	Pass: no non-compliance detected
Category 2: Minor non-compliance Marginally non-compliant	2	Pass with minor issues with potential for adverse effects, system short comings
	5	Marginal Pass: issues with minor adverse effects but problem cleared up on site
Category 3: Significantly non-compliant	7	Fail: Over consented cow numbers
	10	Fail: Adverse effects and re-inspection required

Inspections - September to December 2009

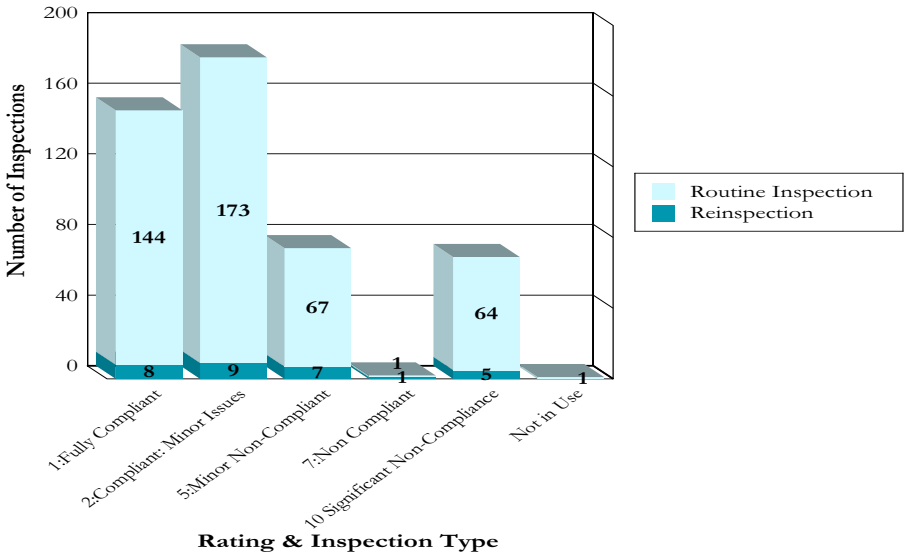

Figure 21 - Grades for farm dairy effluent inspections undertaken between September and December 2009.

A total of 480 dairy inspections were undertaken between September and December 2009 (Figure 21). During this period, a total of 144 farms received a grade 1 on their first visit. A total of 173 farms received a grade 2 and 67 a grade 5 on their first visit. Of the significantly non-compliant farms, 64 were graded 10 on their first visit and, of these, a further five were given a Grade 10 when re-inspected.

Just over 14% of farms were noted as being significantly non-compliant (Grade 10) on their first visit. Including re-inspections, a total of 14.4% significant non-compliance was noted during this period. This period is traditionally wetter and has caused significant problems when effluent has been applied to saturated soils and then escaped, either via tile drains or overland flow, to waterways. A significant number of farms now have 60 or 90 days storage available to help consent holders manage this aspect of effluent application.

Although 14.4% is high in terms of significant non-compliance, it could have been a lot worse if large storage ponds were not available. Those with failsafe devices on their irrigation systems have also helped prevent issues becoming more significant.

Inspections - January to March 2010

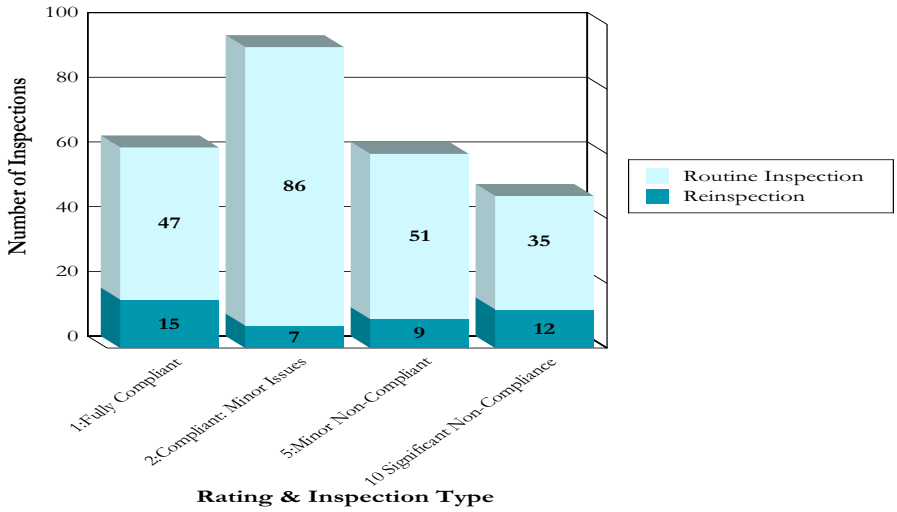

Figure 22 - Grades for Farm Dairy Effluent inspections undertaken between January and March 2010.

The period between 1 January 2010 and 31 March 2010 (Figure 22) showed that 262 inspections were completed, resulting in 47 farms receiving Grade 1, 86 receiving Grade 2, 51 Grade 5 and 35 Grade 10 on the first inspection. A total of 12 farms had to be re-inspected for a second time.

Of note, significant non-compliance for this period was 18%. Staff feel that this is an unusual result for this time of year and exceptionally high. It is thought that a lot of operators believe they can slow their irrigator down during the warmer months, but if conditions are dry, effluent can still runoff or escape through cracked soils.

Inspections - April to June 2010

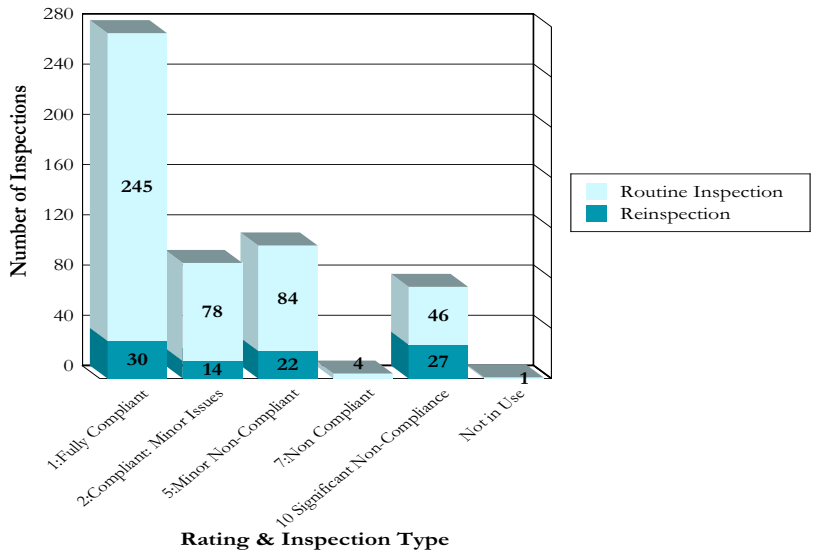

Figure 23 - Grades for farm dairy effluent inspections undertaken between April and June 2010.

A total of 551 inspections were undertaken between 1 April 2010 and 30 June 2010 (Figure 23). During this period, 245 (44%) farms were fully compliant with all consent requirements on their first inspection and 30 upon re-inspection. A total of 78 (14%) farms received a Grade 2 (minor issues) on their first inspection and a further 14 upon re-inspection. A total of 84 farms (15%) received a marginal pass (Grade 5) on their first inspection and a further 22 on re-inspection. There were 73 farms with significant non-compliance (13%).

Of the 551 inspections undertaken during this period, 330 were undertaken by helicopter. Detecting certain types of significant non-compliance from the helicopter is difficult. For example, an irrigator may look all right from the air, but effluent could still be finding its way through tiles and into waterways. Unless there is a significant mess around the irrigator, some discharges to water will not be picked up from the air. This could explain why significant non-compliance from aerial inspections has been at 6% for the last two years, compared to at least twice that from ground inspections.

Inspections - whole season September 2009 to June 2010

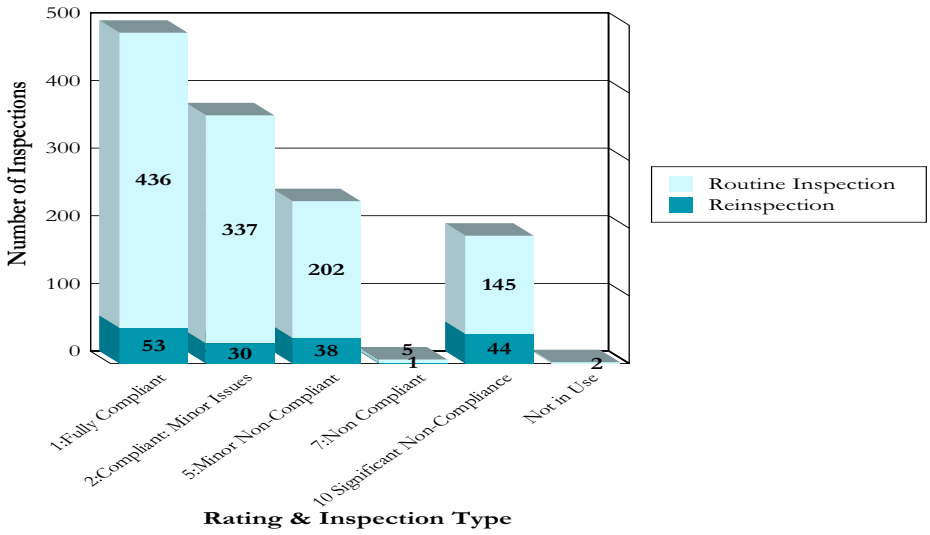

Figure 24 - Grades for all farm dairy effluent inspections undertaken between September 2009 and June 2010.

During the period 1 September 2009 and 30 June 2010 (Figure 24), 1293 inspections were undertaken. This resulted in 436 (33%) farms receiving a Grade 1, or pass, on their first inspection. A total of 53 received a Grade 1 when the farm was re-inspected, while 337 farms had minor issues on their first inspection and 30 upon re-inspection. In addition, 202 farms received Grade 5 (marginal) on their first inspection, with a further 38 receiving Grade 5 on the re-inspection. A Grade 5 (marginal grade) is considered a pass, but is not the level that we would expect farmers to perform at.

Six farms were over their consented number of cows.

The overall significant non-compliance for 2009/10 (14.6%) was high, compared to previous years. There were 44 sites that were significantly non-complaint upon re-inspection. As a general rule, when a consent holder has been given more than one grade 10 in a season for the same issues, the enforcement team will be alerted to the ongoing problem and will work with monitoring staff and the consent holder to achieve compliance. If this cannot be achieved, enforcement action will be taken. One reason for some of the non-compliance seen this season could be due to staff being instructed to be more vigilant on the storage/application of effluent sludges to land. There is also an expectation to do this under the national grading system.

At the end of the financial year (June 30) there were 23 farms still to be re-inspected, due to various issues that were being worked through with the consent holder.

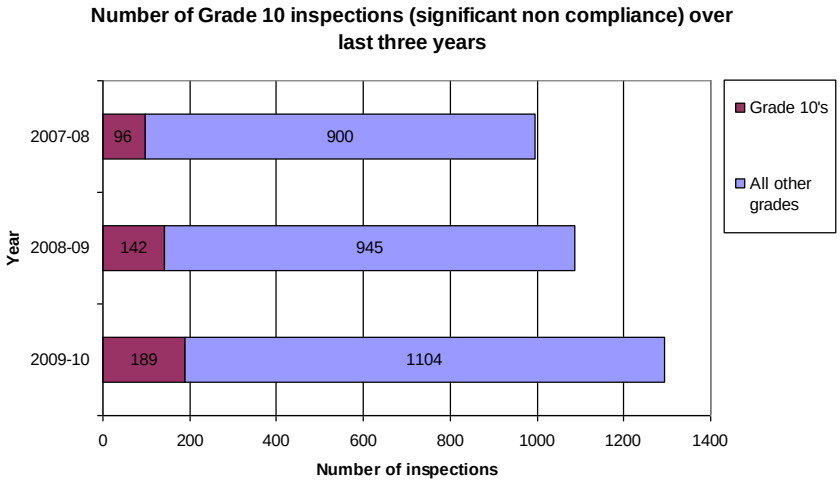

Figure 25 – Number of grade 10 inspections over the last three years.

Figure 25 shows a comparison of significant non-compliance over the previous three years, starting from 96 (9.6%) of inspections in 2007/08, 142 (13%) in 2008/09 and 189 (14.6%) in 2009/10.

Please note that any non-compliance from permitted activities detected during inspections was not graded against the dairy farm. Therefore, they are not part of these statistics as they are not related to the consent requirements.

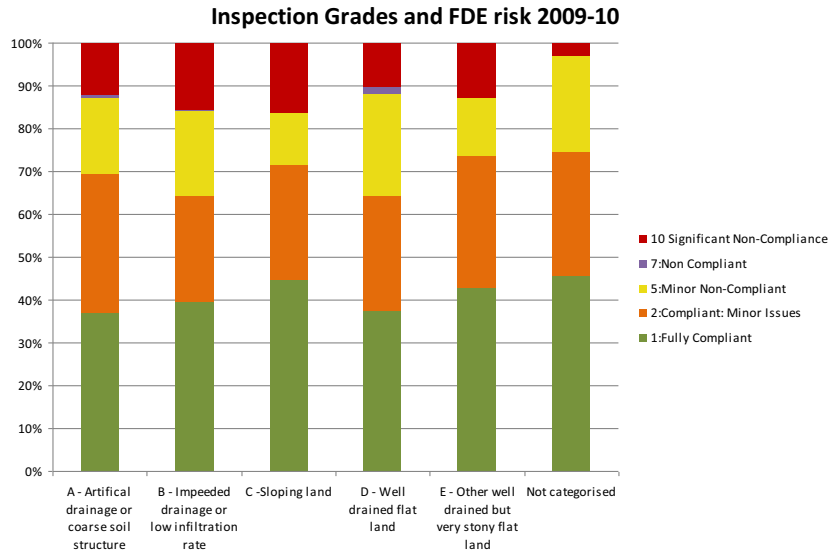

Figure 26 – Inspection grades and FDE risk zones.

Figure 26 shows the inspection grades across the different classification of soil types (also called Farm Dairy Effluent (FDE) Risk Zones). For a farm to get a grade 10 (significant non-compliance) there are usually issues relating to discharge to land (such as over-application, pond overflows) and/or discharge to water (such as tile discharges, overland flow), usually as a result of over-application and ponding issues.

The map overleaf (Figure 27) shows all Grade 10 inspections in the different risk zones. As farms receive Grade 10s for different reasons, it is difficult to see if this is as a result of the type of land they are on.

More work is being done to assess whether this is any correlation between inspection grades and the risk zones in which the dairy farms are situated.

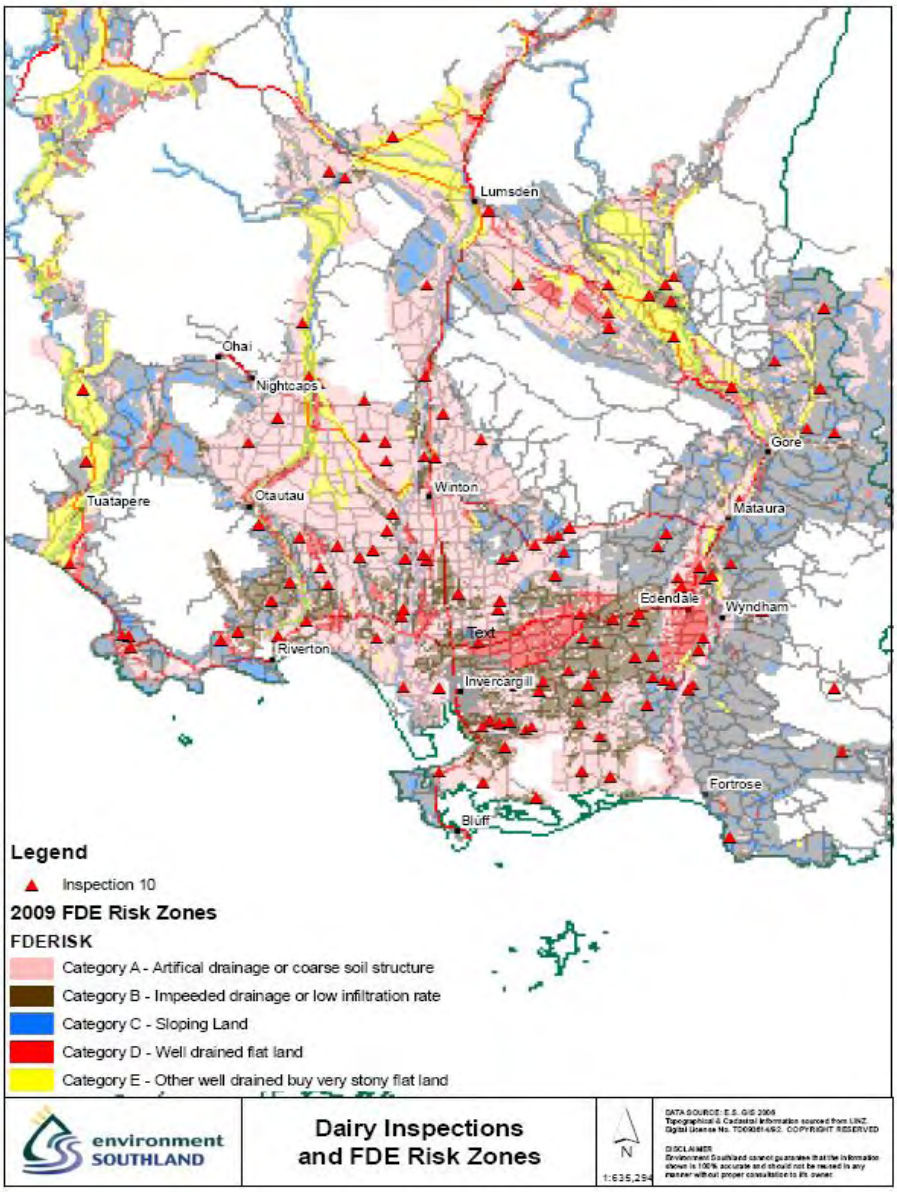

Figure 27 - Grade 10 inspections in the different risk zones.

4.2 Dairy Water Take Monitoring

Under the Regional Water Plan for Southland, the taking of more than 20,000L of groundwater or 10,000L of surface water per landholding per day requires a water permit. Over the 2009/10 monitoring period, 686 dairy farms held current water take permits, the remainder of farms acted under existing rights and will be required to obtain a water permit upon renewal of their discharge permit. For the purposes of this report, there is no distinction made between groundwater takes and surface water takes.

All but the earliest water permits require consent holders to install a suitable water meter to adequately record water usage and all permit holders are required to submit periodic reports to Council of water taken. Reporting requirements can vary, but will fit into three categories:

- daily readings for a continuous two week period once a season;
- once a month readings for the entire season;
- once a week readings for the entire season.

Historically, compliance with dairy water take reporting has been poor, with approximately 25% failing to supply data on an annual basis. Figure 28 compares the dairy water take reporting performance with the previous three seasons. The 2007/08 season was exceptionally bad, with 45% failing to report water takes for the season. This makes managing the resource difficult and can affect future renewals and applications. There was virtually no change in the provision of water data for the 2009/10 season, compared with the same period last year, with 28% of consent holders non compliant with the supply of abstraction data.

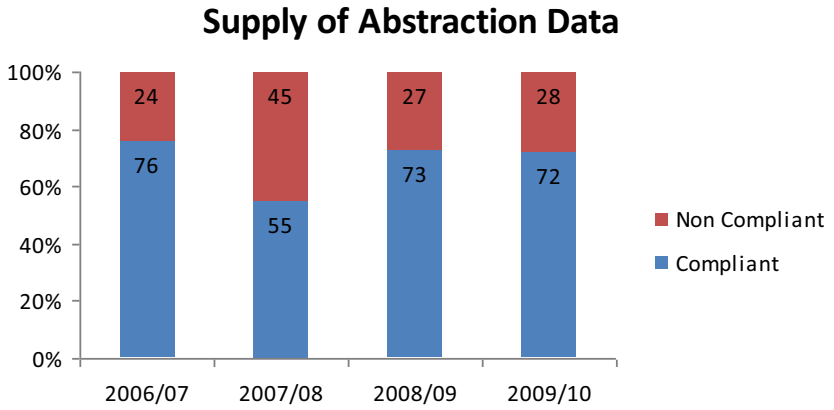

Figure 28 - Compliance with supply of abstraction data 2006-2010

Failure to report water takes for the season usually results in a charge per occasion for following up the non-supply of data. Those who persistently fail to report may also be issued with an Abatement Notice requiring that the data be continually recorded. A small proportion of dairy water permits now require that data be recorded and supplied electronically to the Council.

Environment Southland recommends the use of 50L of water per cow per day as a maximum for wash down of the dairy shed. Reducing the amount of water used will reduce the pump running costs, reduce the quantity of effluent and water that needs to be disposed of and increase the efficiency of storage. Water take information is converted into average volume used per cow per day, based on the maximum numbers of cows reported on farm during the season. This is to normalise the data between the different report types, and generally results in a representative figure for the property, if water take volumes are slightly underestimated by the consent holder. Historical data, as illustrated in Figure 29, shows the overall average water usage per cow per day as being close to double the recommended usage. It is important to note that these figures reflect water use for both dairy shed purposes and stock drinking water combined (e.g. 120L per cow per day, allowing for 70L per cow per day for drinking water).

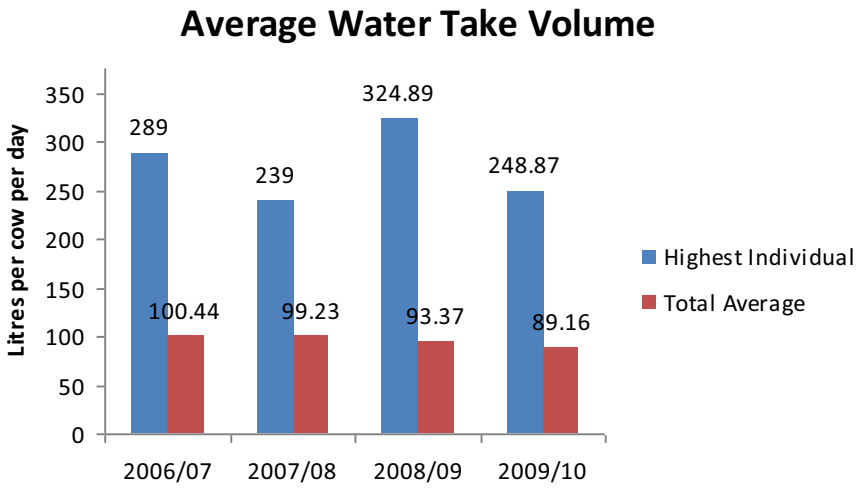

Figure 29 - Average water take volume per cow per day 2006-2010

This highlights the need for accurate data for both the consent holder and Environment Southland. Many abstraction returns received did not specify the units the water volume was recorded in, i.e. litres or cubic metres. Some flow meters have a multiplier (x 10, x 100) that is specified on the meter which needs to be used to convert to litres or cubic metres. Additionally, this season there were a substantial number of incomplete or inaccurate water take returns. Many consents specify a number of bores that can be used for abstraction. A separate water take return is required for each bore specified on a consent if it is used over the season. Accurate data collection, including the breakdown of water use, is a useful tool for resource budgeting. As all consents have an allocated water allowance it is important to know where water is being used to ensure allocation thresholds are not exceeded. Additionally, an analysis of water use is helpful in identifying where problems may lie when equipment failure goes unnoticed.

Of those who supplied data to Environment Southland, compliance with consented water take limits has been relatively consistent over the past two seasons, despite the increase in the number of dairy water take permits issued. The 2009/10 season saw an increase of 112 water permit returns on 2008/09

(Figure 30). Consent holders exceeding their abstraction limit appear to be using extra water for use other than at the dairy shed, such as for stock drinking water or irrigation purposes. Some consent holders hold consents to take water for dairy shed use and irrigation from the same source. To address some of these issues Council proposes to approach consent holders exceeding their abstraction limit. In this situation consent holders may need to apply for a consent amendment to increase their water take allowance, apply for an additional consent (depending on the volume of the additional water required), or arrange for a separate meter to be installed for each use to demonstrate compliance with their respective consents.

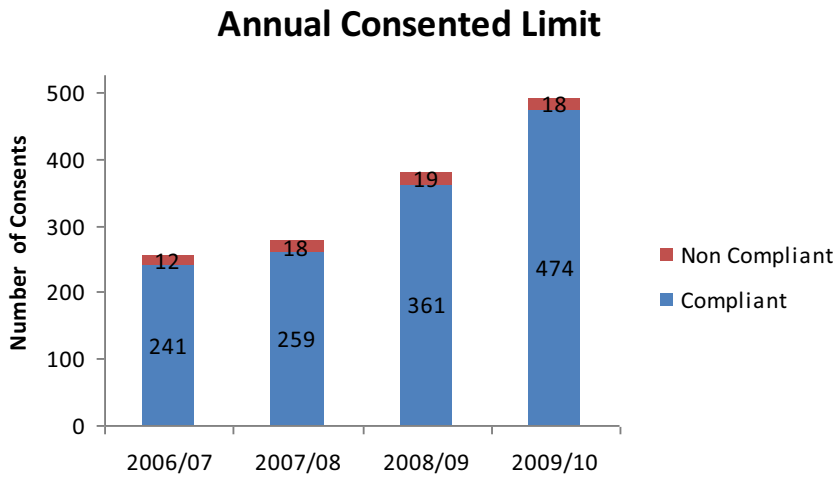

Figure 30 - Compliance with Annual Consent Limits 2006-2010.

4.3 Dairy – Groundwater Quality Inspection

The primary source of recharge for most aquifer systems is from water infiltration through soil into underlying aquifers. Groundwater quality can be impacted by contaminants carried by the infiltrating water and has the potential to impact the suitability of the water supply for certain uses.

Land use activities that have the potential to impact on groundwater quality are typically described as either point, or non-point source discharges. The Regional Water Plan for Southland 2010 defines point source discharges as '*discharges from specific and identifiable sources (such as pipes or drains) concentrated at a given point*', whereas non-point source discharges are described as '*water contamination derived from diffuse sources where there is no single identifiable discharge point*'[1].

Point source discharges can include septic tanks, offal holes, silage pits, landfills, leaking effluent ponds, underground storage tanks and wastewater application systems. The effects of point source discharges on groundwater quality are typically localised, but may be of significant magnitude and can involve a range of potential contaminants depending on the nature of the specific discharge.

[1] Environment Southland State of the Environment: Groundwater Quality Technical Report May 2010

Non-point source discharges relate to the infiltration of water over a widespread area and are often associated with agricultural or horticultural land use. Contaminants applied to land, such as animal wastes and fertilisers, can leach through the soil profile to groundwater. The potential magnitude of non-point source discharges can also be exacerbated by land management practices, such as the timing of soil cultivation. In a primarily agricultural-based region such as Southland, the potential cumulative effects of non-point source discharges present a major challenge for the management of groundwater quality.

Groundwater monitoring is a requirement on 170 dairy discharge consents. Groundwater samples are collected from shallow bores near the effluent disposal field and are intended to detect possible contamination resulting from land use activities.

Sampling typically occurs twice a year, in November and April, as buffering (time lag) in the soil and aquifer means that groundwater quality does not change as frequently, or as rapidly as surface water quality, so does not need to be sampled as often. Common tests conducted on samples include, but are not limited to the following:

- **Electrical Conductivity (EC)** - is a measure of the ability that water has to carry an electrical current. This is dependant on the concentration and characteristics of the ions present in the water. Consequently, the higher the EC value, the higher the concentration of ions present. EC is commonly used as a conservative measure of contamination in a sample. EC, along with other test results, needs to be taken into account when considering the overall contamination level.

- **Nitrate Nitrogen** - is an oxidised form of Nitrogen. It is soluble and therefore readily available to plant life to sustain growth. Most of the nitrogen taken up by plant growth is recycled through the soil by the breakdown of organic material from plants and animals, however it can also be lost through the soil profile, leaching into groundwater supplies. Nitrogen occurs naturally and is also introduced into the environment by artificial fertilisers, added to increase soil fertility, or by discharges containing elevated nitrogen concentrations (such as effluent discharges).

- ***E. coli*** - bacteria are associated with excrement of warm blooded animals and their presence is indicative of faecal pollution and the presence of pathogenic organisms.

Sample results are assessed using the Drinking Water Standards for New Zealand 2005 (DWSNZ), and the Australian and New Zealand Environment and Conservation Council (ANZECC 2000) Stock Drinking Water Guidelines. These standards have health based maximums and taste/smell/appearance aesthetic guidelines.

The DWSNZ for groundwater set the maximum acceptable values for Nitrate Nitrogen at 11 g/m^3, and *E. coli* <1. The Fonterra *E. coli* standard for water supply to a dairy shed is 3 *E. coli* per 100 mL.

The number of consents requiring groundwater monitoring has decreased slightly by 9%, compared with the same period last year. This can be attributed to a number of consents being reviewed over this monitoring period which no longer include a groundwater monitoring condition. Many of these consents, along with several renewed consents, now have a surface water monitoring condition, due to the potential risk of effluent having an impact on local waterways.

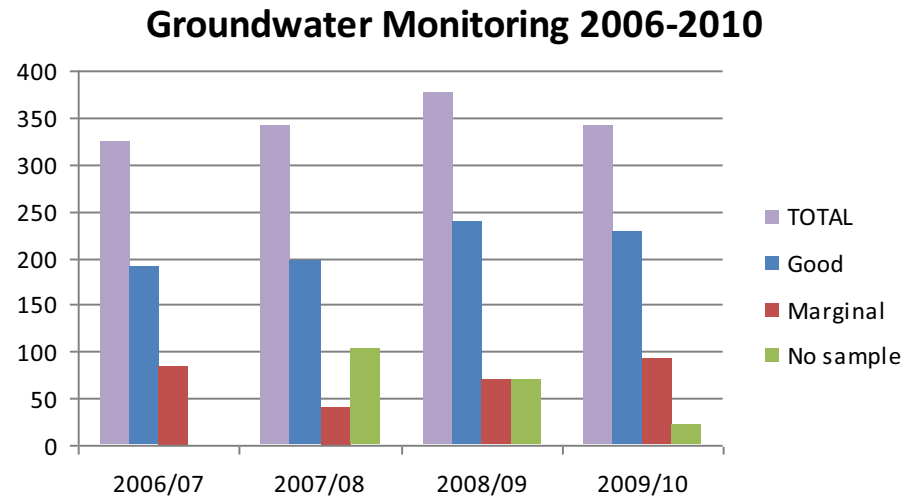

Figure 31 - Total number of consents requiring groundwater monitoring 2006-2010.

A total of 170 sites were visited during each monitoring period (November and April each year) as part of the groundwater consent monitoring programme. Of the sites visited, several were unable to be sampled as a suitable groundwater monitoring bore had not been established (12% in November, 8% in April). These sites are for consents which have recently had groundwater sampling added, sites where the previous bore has been identified as being too deep, or inappropriate for monitoring the effects of on farm activities on groundwater, or were yet to install a tap for sampling purposes. The consent holders for these sites were requested to establish a dedicated monitoring bore for this purpose before the November 2010 round of sampling.

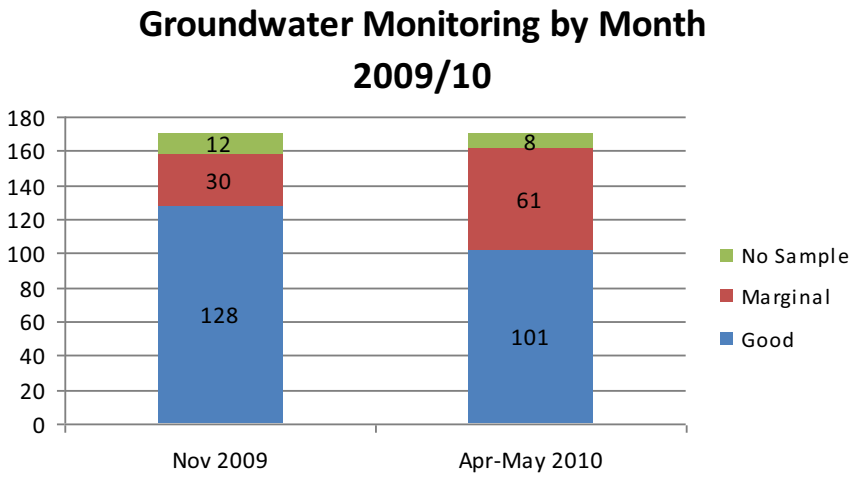

Figure 32 - Groundwater monitoring grades by month 2009/10.

Samples which received a 'marginal' rating are those which returned positive results for *E coli* and Nitrate results >11. High nitrate results are forwarded to Environment Southland's Groundwater Scientists to assess whether high results are consistent with background aquifer levels. Consent holders who had bores which returned elevated levels of Nitrate have been notified that Environment Southland are monitoring the changes in Nitrate levels in groundwater. They have been advised that nitrogen inputs on their property (e.g. fertiliser) need to be carefully managed to avoid losses to groundwater.

As insufficient well head protection is a common source of elevated *E. coli* levels, all consent holders with poor *E. coli* results from their bores have been requested to investigate this as a possible source of contamination. Should future groundwater results return elevated levels of *E. coli* from the same bore, staff will consider what enforcement action to take to ensure compliance with consent conditions. If well head protection appears sufficient and future samples continue to return unsatisfactory results, the source of contamination will need to be investigated further.

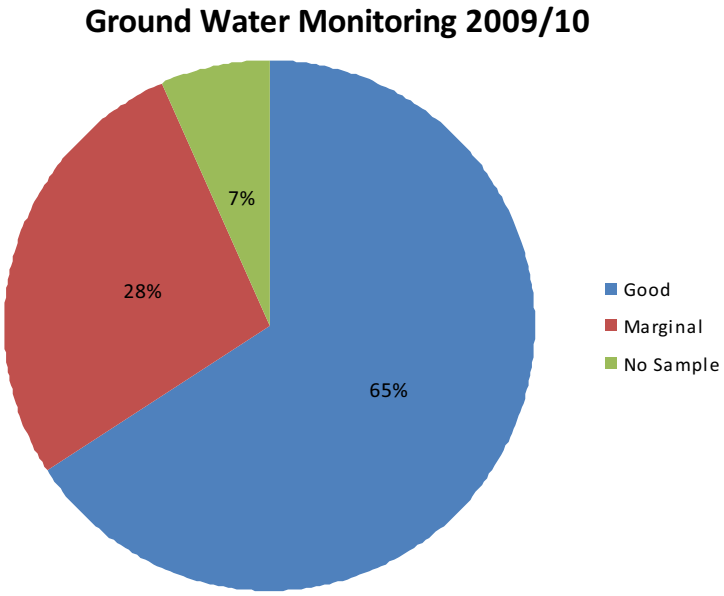

Figure 33 - Groundwater monitoring 2009/10 summary.

As the April 2010 sampling was interrupted by flooding, some groundwater sample results may have been affected. A more in-depth analysis of whether or not this affected the results is yet to be completed.

High nitrate results (greater than 11 g/m^3) were mapped to see the relationship between the results and areas previously known to have elevated nitrate levels in groundwater (see Figure 34, below). Most of the sites fall into known areas of high nitrate, however there are a few sites that fall outside these known areas. The higher nitrate concentrations at these locations may reflect the nature of soil types in these areas, which may enable relatively rapid leaching of nutrients to groundwater. Again, this reflects the need for careful management of nitrogen inputs on a property.

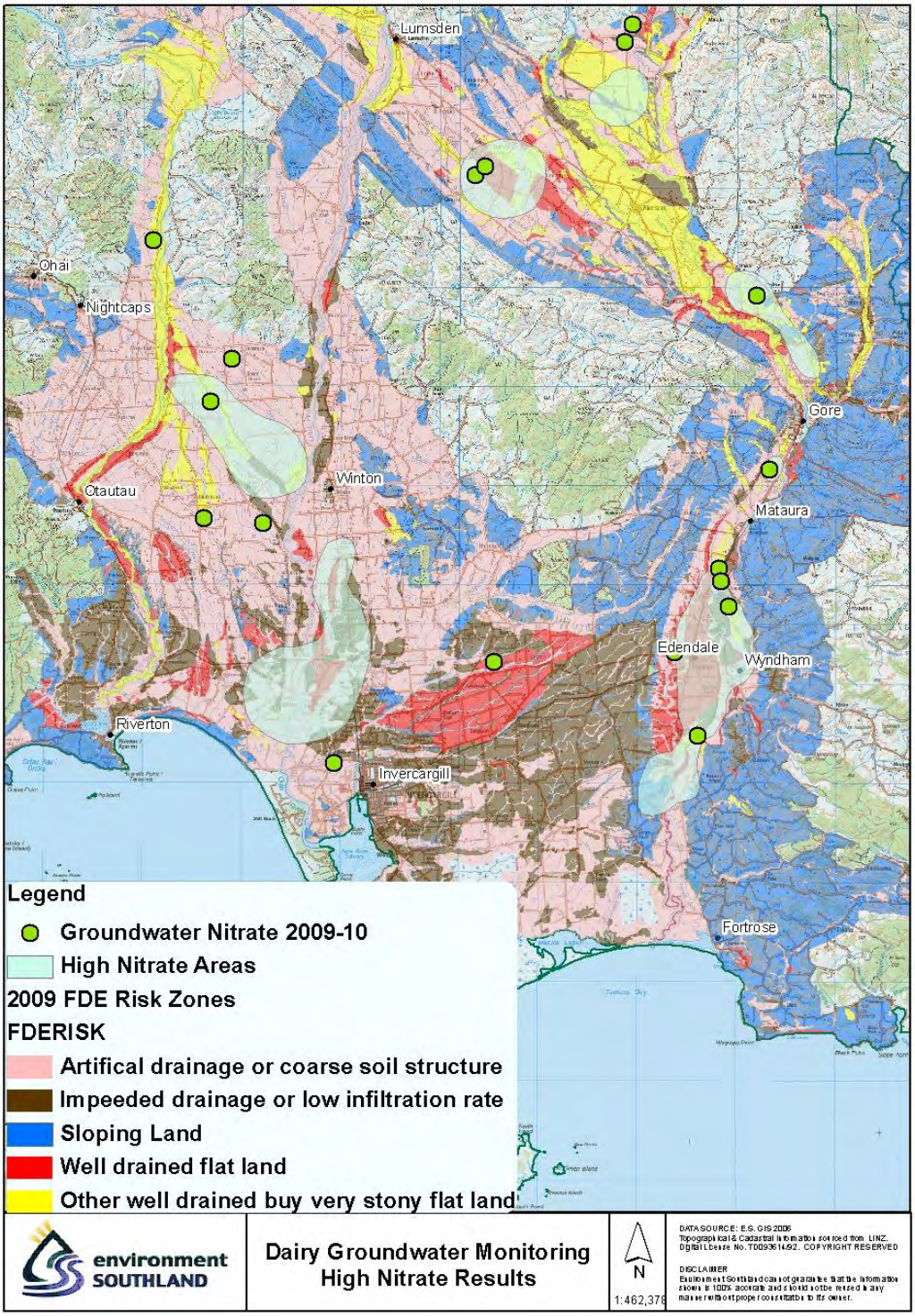

Figure 34 - High nitrate results and known high nitrate areas.

4.4 Surface Water Quality Monitoring

Surface water monitoring is a requirement of 483 dairy discharge consents. Surface water samples are collected from waterways identified as being most likely to be affected by the location of the discharge on the day the samples are taken, usually upstream and downstream of the discharge area. Sampling typically occurs up to three times per year.

During the 2009/10 monitoring season, where possible, surface water monitoring was amalgamated with on-farm inspections and a good performance-reward system was introduced:

- all consents requiring surface water monitoring were visited in the September to November period, as this was the period when the soils were likely to be at capacity and there was the greatest risk of a discharge to water;

- for the consents requiring monitoring during January/February, previous performance was reviewed and it was decided that where the previous two sets of samples were rated as 'good', no sample would be collected;

- for consents requiring monitoring in the April/May period the same principle was applied, but the inspection history was included. So, if a sample had been collected in the previous two years at this time of year and the performance was rated as 'good', or the on-farm inspection history showed that a 1 or a 2 had been awarded, then no sample would be taken.

Common tests conducted on samples include, but are not limited to:

- ***E. coli* concentration** - *E. coli* bacteria are associated with excrement of warm blooded mammals and their presence is indicative of faecal pollution and the presence of pathogenic organisms;

- **Ammoniacal Nitrogen**, or ionised ammonia, is a reduced form of nitrogen. Ammonia is rarely found at high levels in natural waters and is a major component in the urine excreted by a dairy cow. Its presence is an excellent means of detecting contamination. Consistent elevated levels of ammoniacal nitrogen can accelerate the growth of nuisance weed (periphyton) in waterways;

- **Dissolved Reactive Phosphorous** - phosphorous is a vital element for plant growth. When high levels of phosphorous and nitrogen are present in a receiving waterway, they can promote the growth of nuisance weed (periphyton);

- **Electrical Conductivity** (EC) is a measure of the ability that water has to carry an electrical current. This is dependant on the concentration and characteristics of the ions present in the water. Consequently the

higher the EC value, the higher the concentration of ions present. EC is commonly used as a conservative measure of contamination in a sample. EC, along with other test results, need to be taken into account when considering the overall contamination level.

Figure 35 - Discharge of dairy shed effluent to a waterway from a tile drain.

Monitoring Results

The end of the 2009/10 season saw a total of 980 potential surface water samples. This includes the total number of samples that could be taken for each consent. The total number of consents requiring samples for the 2009/10 season was 483, an 8% increase on the same period last year.

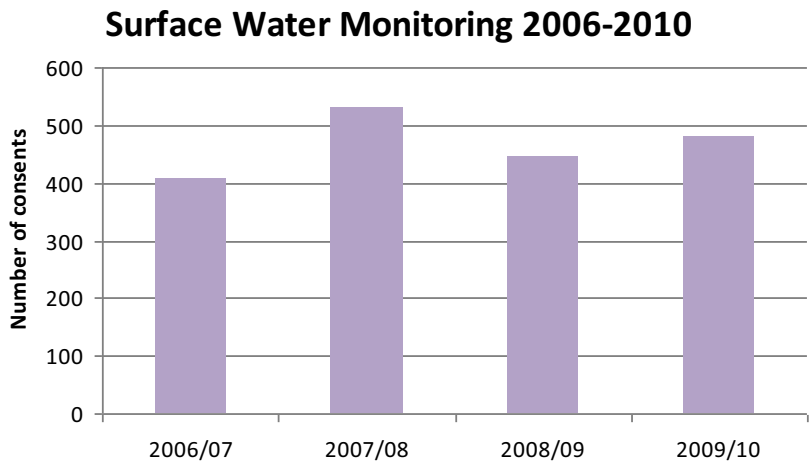

Figure 36 - Number of consents requiring surface water monitoring 2006-2010.

Surface water sampling results for this monitoring period vary significantly when compared to previous years. The reason for this is the substantial decrease in the number of samples taken. This decrease can be attributed to the "good performance-reward system" introduced this season. It is important to note, however, that the time spent by the Council planning and

administering sampling monitoring conditions has increased proportionally to the number of consents requiring surface water monitoring. If anything, the time spent over this season has increased, due to the complexities of co-ordinating consents which require monitoring in differing months with the timing of farm inspections, combined with analysing the compliance history for each consent with respect to farm inspections and previous surface water monitoring results.

This year, the majority of samples were taken as a result of an issue that was identified at the time of the farm inspection. As such, there was a decrease in the proportion of 'good' grades compared with previous years, and an increase in the number of results receiving 'marginal' and 'unsatisfactory' grades.

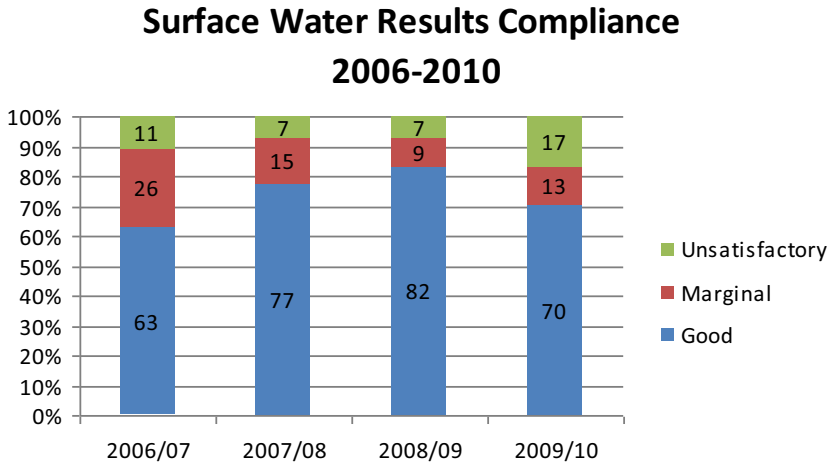

Figure 37 - Compliance with surface water results 2006-2010.

Of the 231 samples taken, 70% of those received a 'good' grade, indicating no or minimal impact on surface water quality, 13% received a 'marginal' grade, indicating there were some issues on the property, and 17% received an 'unsatisfactory' grade, indicating that activities on the farm appeared to be having an impact on surface water quality.

The majority of farms which received 'unsatisfactory' grades for their surface water results had issues identified during their on-farm inspection which are likely to have caused the poor quality of the sample. The incident process was followed for each of these farms, with a Compliance Officer conducting any follow up work and re-inspections as required.

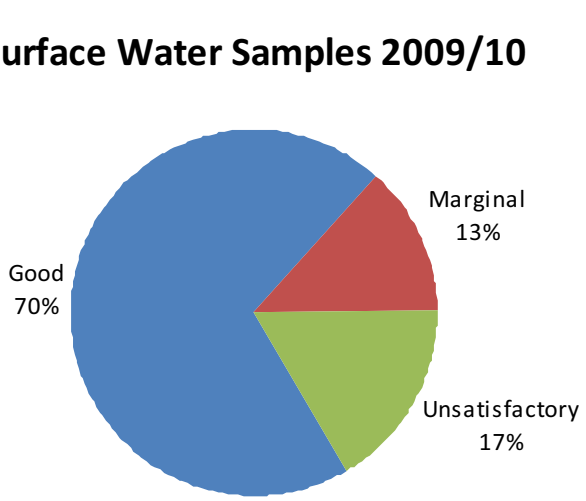

Figure 38 - Surface water samples 2009/10.

Surface water results were graphed by month. From the samples taken, there were more unsatisfactory results in the September-October 2009 period and in May 2010 (Figure 39). When compared with samples taken the previous season, there were more unsatisfactory results in October 2008 and in April 2009 (Figure 40).

These results may be due to a number of changes that take place at these times of the year, such as new staff on farms who are not familiar with drainage systems on the property, as well as climatic influences, with periods of high intense rainfall, such as the flooding at the end of April 2010. The introduction of minimum storage capacity for effluent will enable the discharge of effluent to land to be conducted when soil moisture conditions are appropriate and there is less risk for effluent to enter a water way. If effluent is applied when conditions are appropriate, the risk of nutrients leaching out of the root zone is less, thus providing a good source of nutrients for crop growth.

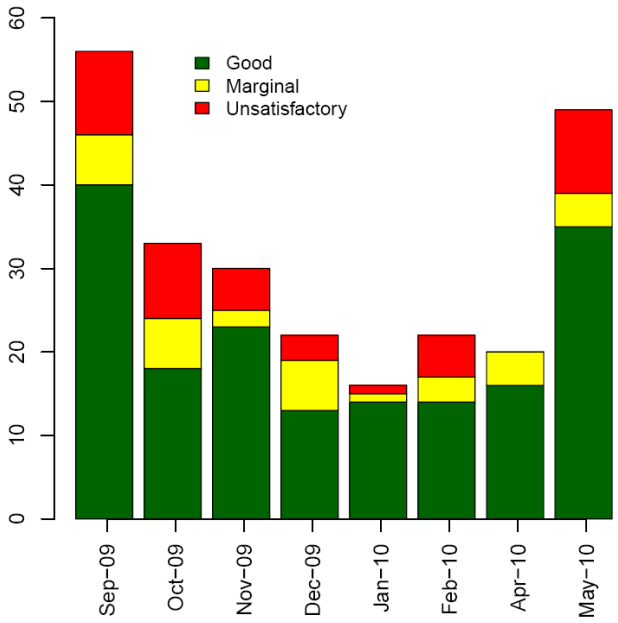

Figure 39 – Surface water grades by month 2009/10.

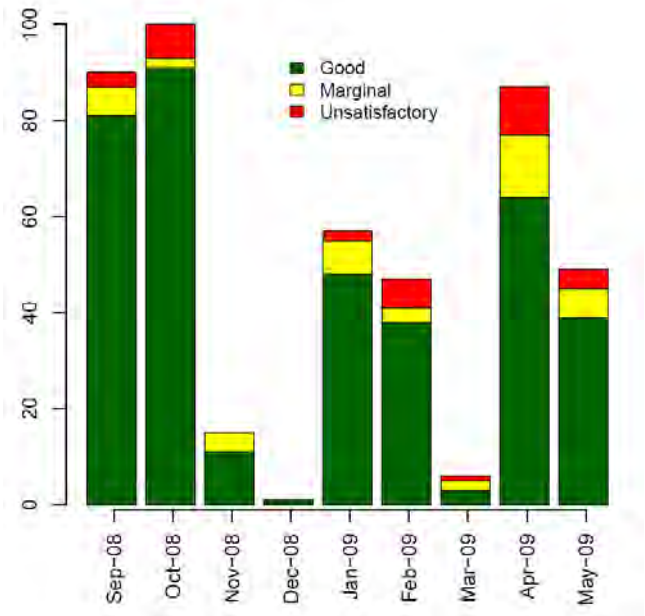

Figure 40 – Surface water grades by month 2008/09.

Recent research by AgResearch has identified that poorly performing farm dairy effluent systems, including the management of these systems, can have adverse effects on water quality, particularly when there are direct losses of farm dairy effluent (FDE) to a waterway. Southland soils have been assessed according to the risk/effects different soil and landscape types may possess, to provide a tool for effective best management practice of farm dairy effluent.

Sample results were compared with the Farm Dairy Effluent (FDE) Risk Zones across Southland. Figure 41 and the map below (Figure 42) describe the spatial distribution of the surface water grades in relation to the FDE risk zones. It shows that this season, a greater proportion of samples taken from sites in areas identified as 'sloping land', and 'artificial drainage or coarse soil structure' were of unacceptable quality. This suggests that there is a need for greater care when irrigating effluent in these areas, as there may be a greater risk of contaminants entering a waterway either through subterranean drainage or as overland flow, particularly on sloping land.

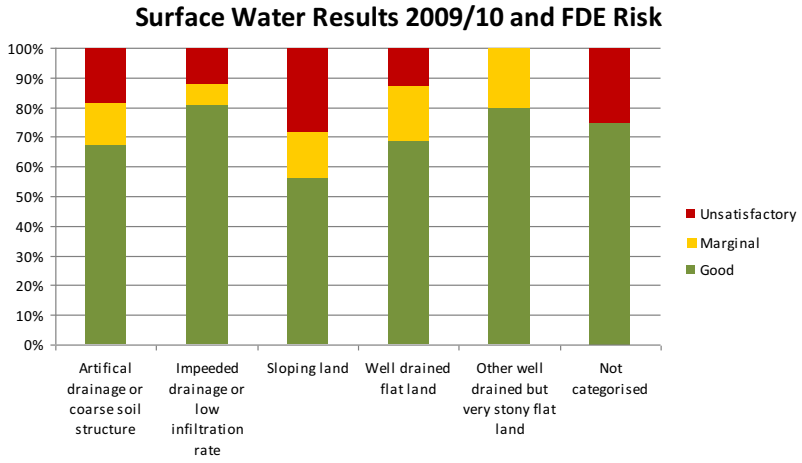

Figure 41 - Surface water grades and FDE risk 2009/10.

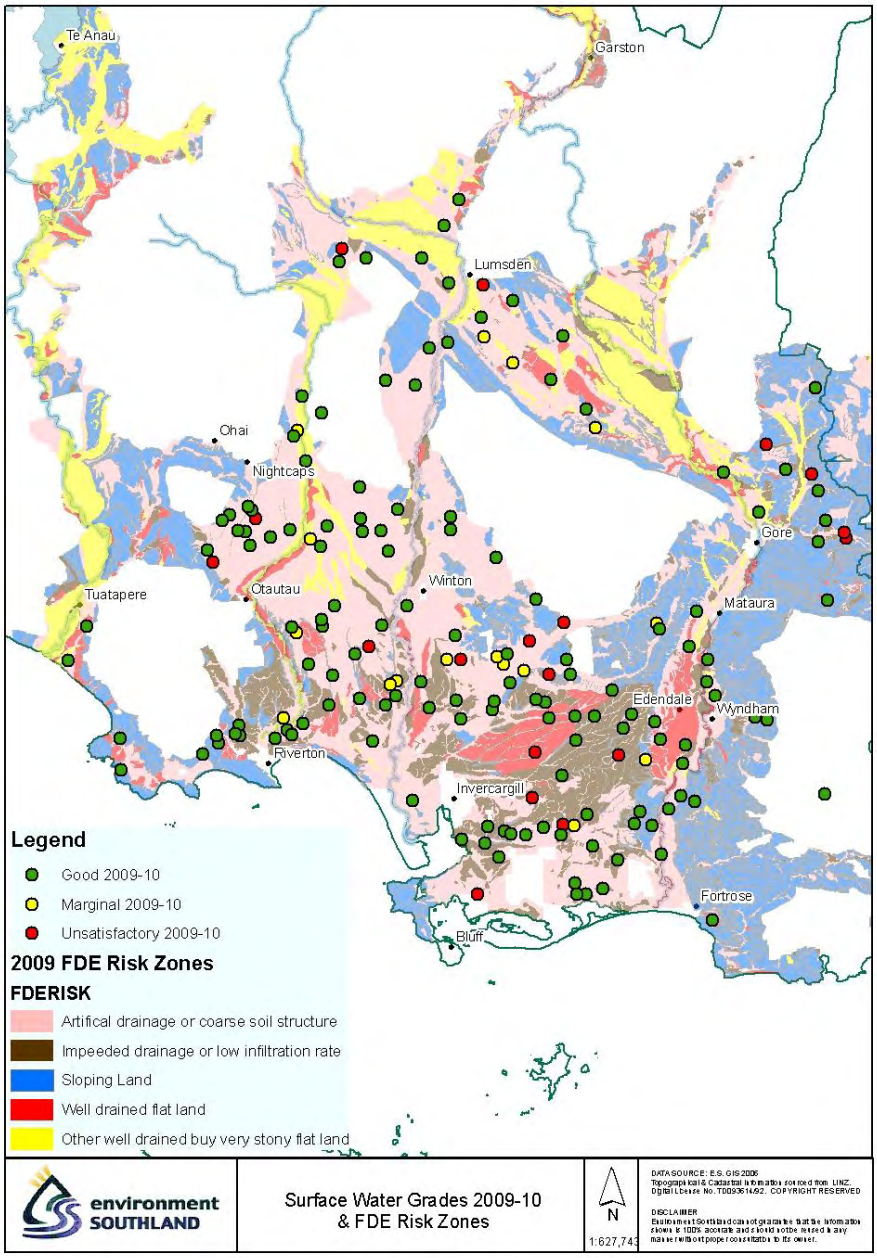

Figure 42 - Distribution of surface water grades in relation to the FDE risk zones.

4.5 Effluent Application Testing

Current consent conditions require the consent holder to measure the application rate and/or depth of an irrigator.

Effluent application testing has primarily been undertaken by a contractor employed by Environment Southland, or by a consultant on behalf of the consent holder.

Test conditions are optimised to avoid extreme wind events, to ensure the test is not compromised. The field officer is required to undertake the test in the furthest away paddock from the effluent pond, as some pumps can lose pressure the further away they get.

The test methodology includes laying rectangular containers on the ground at two metre spacing across the path of a travelling, or alongside a stationary, irrigator. The field results are forwarded to Environment Southland for analysis and the consent holder is advised whether the equipment passed, or failed. If the results show the system is not capable of meeting consent conditions, the consent holder's system is re-tested when system improvements have been made.

At present, travelling irrigators need to be able to apply effluent at an average depth of 8 mm an hour (which is one pass of the irrigator across the pasture). There is no rate requirement for travelling irrigators.

During the period 1 July 2009 to 30 June 2010, Environment Southland received a total of 159 effluent application test results. Of these, 88 were low rate, or stationary, irrigator results, 8 were slurry tanker results and 63 were travelling irrigator results.

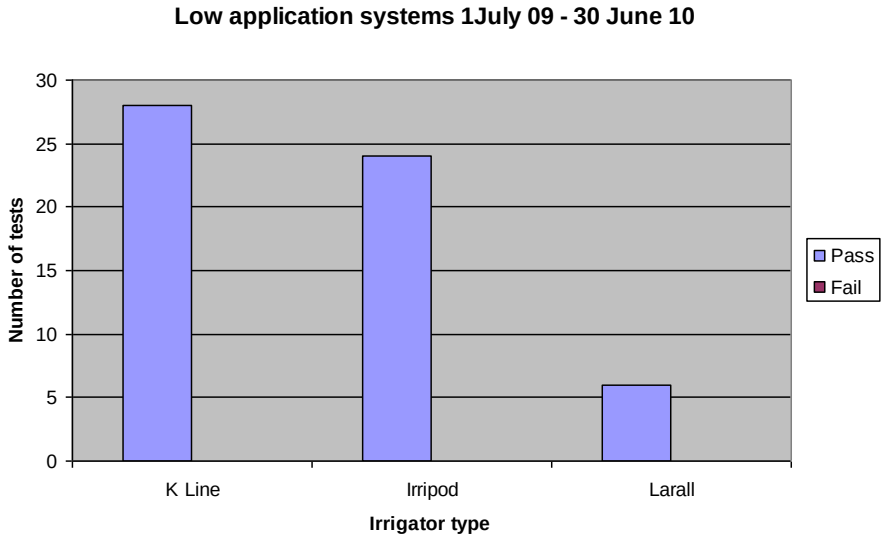

Figure 43 – Low application systems 1 July 2009-30 June 2010.

A breakdown of the low application rate tests showed that 28 KLines passed the test. A total of 24 Irripod systems passed. All six Larall smart systems tested have passed their consent requirements. Due to the amount of low rate stationary systems complying with their consent, a decision was made prior to December 2009 that low rate systems would not be tested. Some consent holders have chosen to test regardless.

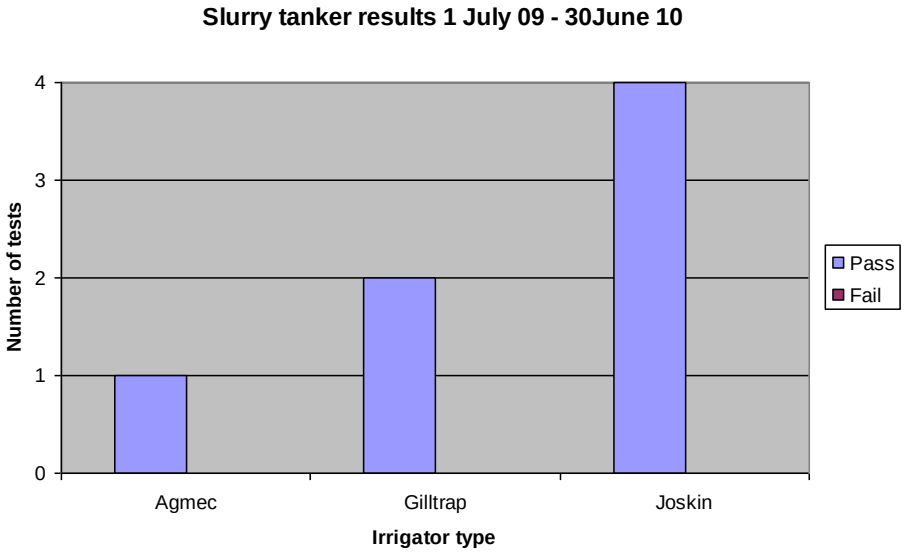

Figure 44 – Slurry tanker results 1 July 2009-30 June 2010.

All slurry tankers tested to date have met their consent requirements.

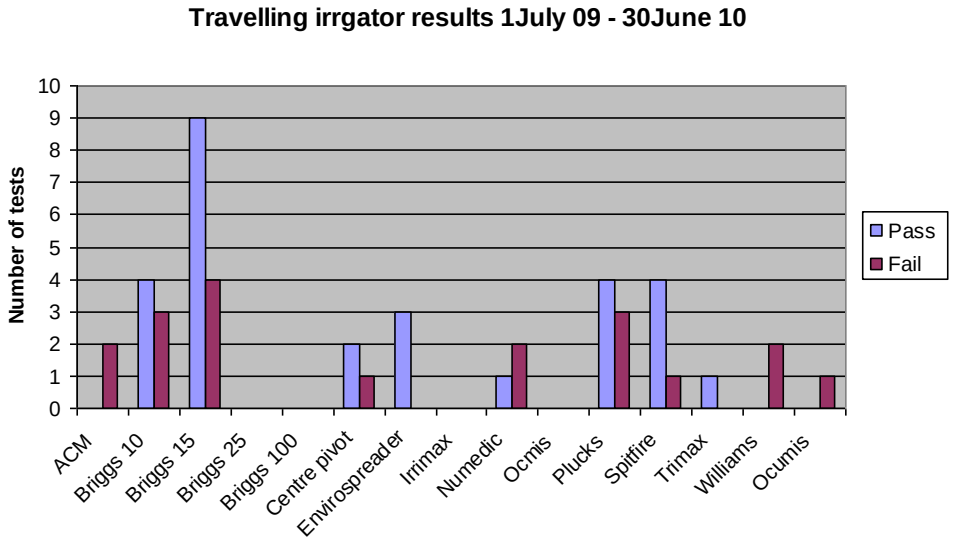

Figure 45 - Type of travelling irrigator tested and the number of pass/fail results

Figure 45 shows the type of travelling irrigator tested and the number of pass/fail results. It is important to note that there are a number of variables that can contribute to failure and the irrigator may not necessarily be at fault. These can include inadequate pumps, different hose sizes, worn or split nozzles, etc.

5.0 Major Industries

To assess the impact of a discharge to water, all major industries have conditions in their consents that require regular monitoring. This monitoring is tailored to suit the nature of the industry and the main contaminants that are likely to be discharged to a receiving water. This brief introduction aims to assist with the understanding of some of the technical, or chemical terms used in this section:

- ***Total Suspended Solids (TSS)*** - this is a measure of the solid material in a water sample. If a sample contains high concentrations of solids this increases the risk of the receiving water looking discoloured, the solid material settling out onto and into the streambed, reducing the suitable habitat for macroinvertibrates and reducing the amount of light that is available for algae and aquatic plants.

- ***Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)*** - in simple terms this is a measure of the amount of oxygen removed from a waterway/consumed in the process of biodegradation of organic material. If an effluent has a high $cBOD_5$ the amount of oxygen removed from the water may stress other aquatic organisms that naturally live in that waterway.

Nutrients

Phosphorus is a vital element for plant growth. When high levels of phosphorus and nitrogen are present in receiving waters they can promote the growth of nuisance weed and periphyton on the bed of downstream receiving waters.

Both phosphorus and nitrogen are vital elements for the growth of algae and plants in water. When maintained at low levels and in balance, a healthy ecosystem is maintained. If either one, or both, increase as a result of a discharge, the nutrients will stimulate the growth of weed or algae in the aquatic system.

These nutrients can be present in a number of forms. The most common are:

- *total nitrogen (TN)* - this is a measure of nitrogen in both the water and solid components of a water sample;

- *total ammoniacal nitrogen, or ammonia nitrogen* - this will increase the concentration of nitrogen in a waterway, but above certain levels can also be potentially toxic to aquatic organisms;

- *nitrate nitrogen* - this will increase the concentration of nitrogen in a waterway;

- *total phosphorus (TP)* - this is a measure of phosphorus in both the water and solid components of a water sample;

- *dissolved reactive phosphorus (DRP)* - this is a measure of the dissolved[2] component in a water sample.

Microbiological

- *faecal coliforms (FC)* - faecal coliforms are indicator organisms that are present in the gut and faeces of warm blooded animals and are used to indicate the presence of faecal pollution. While faecal coliforms may not, in themselves, cause disease, their presence is indicative of faecal pollution and, hence, the presence of other harmful pathogenic organisms;

- *Escherichia coli* (*E.coli*) - *E.coli* is a sub group of faecal coliform, which is a more specific indicator of faecal pollution being present. *E. coli* bacteria are associated with excrement of warm blooded animals and their presence is indicative of faecal pollution and the presence of pathogenic organisms.

5.1 Meat Industry

5.1.1 Alliance Group - Lorneville

Monitoring

Alliance Group Lorneville required monitoring for the following resource consents:

- to discharge wastewater to the Makarewa River;
- to discharge wastewater to land;
- to discharge contaminants to air from the meat plant;
- to discharge leachate from two closed landfills;
- to discharge to land via a contingency short term storage pond; and
- to discharge sheep yard slurry onto land, and the associated emission of contaminants to air.

The company use approximately 34 hectares of ponds to treat the effluent generated from the activities at the plant and sewage from Wallacetown township. This extensive pond system provides a significant buffer to ensure that a consistent effluent is produced and discharged to the river. The 2009/10 monitoring results show that the quality of the effluent continued to be of a consistent quality and fully compliant with consent conditions. Figure 46 demonstrates the consistency of the Nitrogen and Phosphorus concentration in the effluent.

[2] DRP is measured after a sample is filtered through a 0.45micometre filter to arbitrarily separate dissolved from undissolved phosphorus

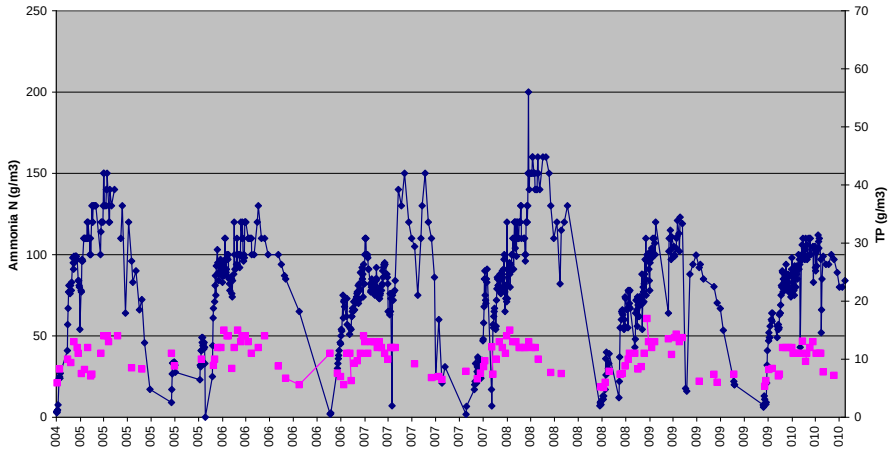

Figure 46 - Concentration of ammonia nitrogen and total phosphorus in the Alliance Group Lorneville discharge over the last seven seasons.

The quality of the effluent has been reasonably consistent, with all results fully compliant with consent requirements. This consistency can be clearly demonstrated in the concentration of carbonaceous Biochemical Oxygen Demand in the effluent.

Improvements in the effluent management have allowed the company to eliminate some of the higher results, which has resulted in an improving overall trend in the results.

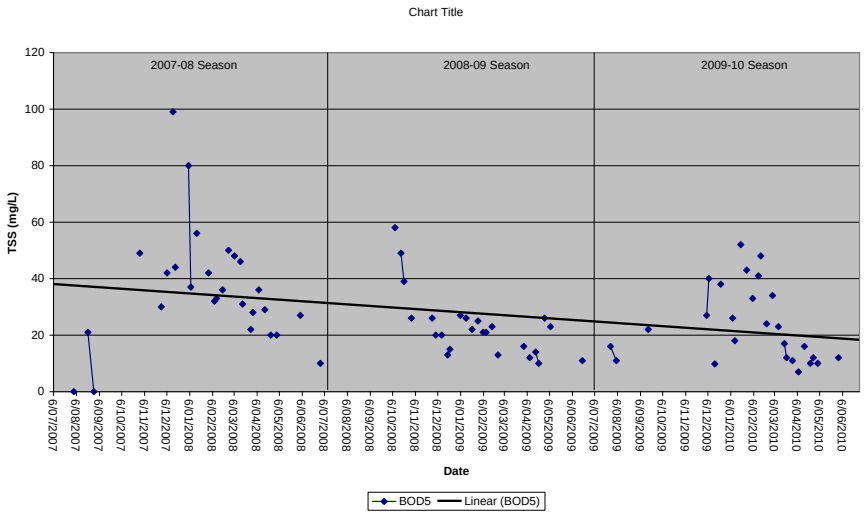

Figure 47 - Concentration of carbonaceous Biochemical Oxygen Demand in the Alliance Group Lorneville discharge over the last three seasons.

To reduce the reliance on the consent to discharge to the Makarewa River, Alliance also has consent to discharge treated effluent to land. Before discharging to land soil moisture levels need to be low, to accommodate the addition of effluent and enable the nutrients to be captured and absorbed in the root zone. Unfortunately no wastewater was discharged to land this season due to the mainly high, but variable, moisture levels in the soil.

The 2009 odour assessment report identified some variable results. The level of odour measured at the pond was slightly higher than recorded last year, but was lower than recorded in the previous two years. Environment Southland received no odour complaints relating to this site for the 2009/10 year. Very few complaints were received by the company from the surrounding community, indicating that there have been few issues with odour from the Lorneville plant.

Complaints and self-reported incidents

No complaints were received about the operation of the Alliance Group Lorneville plant by Environment Southland during the 2009/10 year.

Issues

The main challenge for the Alliance Group Lorneville plant will be to prepare for the renewal of the current consent to discharge treated wastewater to the Makarewa River. While the company continues to be fully compliant with current consent conditions, there are a number of issues that need to be considered and are currently being investigated before a new consent can be considered. The existing consent expires in August 2016.

Table 2 - Alliance Group Limited Lorneville Plant – Consent Performance Summary

Issue	*Score*	*Comments*
Provision of data/results	Excellent	Data was reported on time and was complete as required by the consent.
Compliance with consent conditions	Very Good	Good management of the treatment system has resulted in only a few issues.
Responsiveness to issues	Excellent	Alliance management responded promptly and personally to all issues that arose during the year.
Keeping Environment Southland informed of intentions, changes etc.	Excellent	Alliance management responded promptly and personally to all issues that arose during the year.

5.1.2 Alliance Group - Makarewa Plant

Monitoring

Alliance Group Makarewa currently holds the following resource consents that require monitoring:

- to discharge wastewater to the Makarewa River;
- to discharge wastewater to land;
- to discharge contaminants to air discharge from the meat plant;
- to discharge leachate from two closed landfills to land and;
- to discharge cooling water to the Makarewa River.

The Alliance Group Makarewa meat processing plant was originally designed to process sheep and beef, but now concentrates on the processing and cold storage of venison and the rendering of by-product. Effluent is treated and stored in a number of large treatment ponds and discharged to land, or to the Makarewa River during wet periods. Compliance with the discharge consent has been good, with no non-compliance recorded.

The effluent quality of the discharge was fully compliant with the consent conditions.

The monitoring results for the groundwater in the area of the two historical landfills continues to be somewhat variable, with some parameters increasing and others decreasing. There does not appear to be any trend with the changes and the results remain compliant with the consent.

The cooling water discharge was fully compliant with the consent conditions.

The main changes of note are the demolition of the redundant buildings and a general tidy up of the site. This process has been ongoing for some time and has progressed very well, with little disruption to surrounding neighbours. The company had received one noise complaint, but this was addressed and no further complaints have been received.

Complaints and self-reported incidents

Environment Southland received only one odour complaint during the 2009/10 year. The complaint was confirmed, but was not considered to be offensive or objectionable at the time it was investigated by Council staff.

General

Alliance has a tradition of investigating improvements to its waste management processes. Recently it undertook a small scale experiment using vermiculture to treat organic matter generated at the site. Initial indications were very positive, however problems were experienced getting the worms to function effectively. It is suspected that the temperature of the waste may be a factor. Further trials are to be conducted and, if successful, will be considered for use at this and other company plants.

Table 3 – Alliance Group Limited Makarewa Plant – Consent Performance Summary

Issue	*Score*	*Comments*
Provision of data/results	Excellent	Data was reported on time and was completed as required by the consent.
Compliance with consent conditions	Excellent	Good management of the treatment system has resulted in no compliance issues.
Responsiveness to issues	Excellent	Alliance management responded promptly and personally to all issues that arose during the year.
Keeping Environment Southland informed of intentions, changes etc.	Excellent	Alliance staff were very good at communicating their intentions.

5.1.3 Alliance Group – Mataura Plant

Monitoring

Alliance Group, Mataura holds a number of discharge, water use and land use consents. Listed below are the discharge consents that require regular monitoring;

- to discharge wastewater to the Mataura River;
- to discharge cooling water to the Mataura River;
- to discharge contaminants to air from the meat plant; and
- to discharge sludge to land on selected properties.

Liquid waste generated in the processing of the animals is treated in a reasonably complex physio-chemical treatment system. The treated liquid waste is discharged to the Mataura River, while the sludge removed from the treatment system is discharged to land in the Northern Southland area.

This season, the effluent being discharged to the Mataura River has been of a reasonably consistent quality. While not 100% compliant with the limits required in the consent, the number of breaches were noticeably fewer than in previous years and typically of a more random nature, indicating that the company was beginning to solve a number of the systematic issues experienced over recent years.

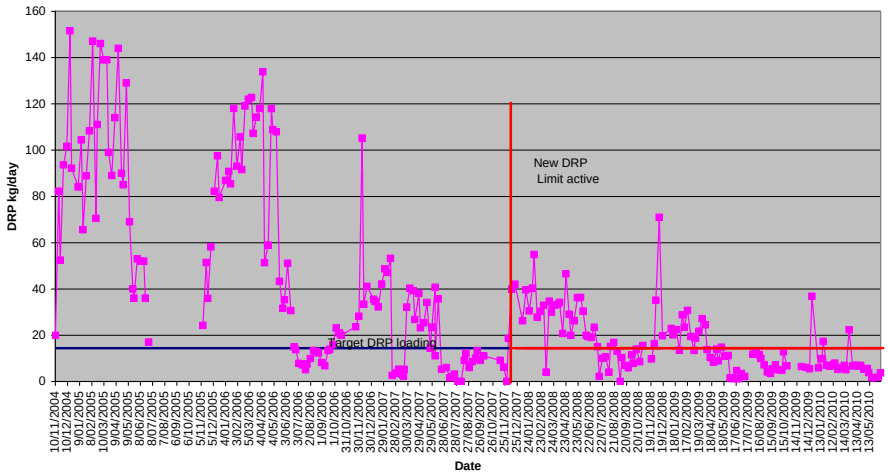

Figure 48 - Dissolved reactive phosphorus loading discharged to the Mataura River from the Alliance Group Mataura in relation to previous seasons monitoring.

Figure 48 shows that the dissolved reactive phosphorus (DRP) quality in the effluent appeared to be more consistent in the 2009/10 season, however it was still concerning to note the three occasions when the DRP loading exceeded the consent limit. All three of these incidents were investigated by the company. Unfortunately, the cause of one of these breaches was not identified, however a cause was found on the other two occasions, with system changes able to be made to address these.

On one occasion the concentration of the carbonaceous Biochemical Oxygen Demand ($cBOD_5$) appeared to have exceeded the consent limit. It was found that this was not, in fact, the case, as the volume of effluent being discharged was low, resulting in the flow corrected $cBOD_5$ (or BOD loading) being compliant with the consent.

The consent monitoring indicated that the chemical quality in the river was good and fully compliant with the consent. Some work has been done to identify the presence/absence of sewage fungus (an indicator of contaminants in the waterway), however this work is ongoing.

One of the main elements of the water treatment system is the removal of solid material from the water before it can be discharged to the river. This material is removed as a 'semi-solid' sludge. This material is transported to consented properties in the Northern Southland area to be spread onto land. This practise not only disposes of the sludge, it provides the landowner with a form of fertiliser by returning the nutrient rich by-product to the soil. This year, the company had to renew some of its consents to enable this means of disposal to occur. During the re-consenting process, company staff identified that the spray units on the trucks were not spreading the effluent at the correct rates. Company staff notified Environment Southland, explaining what they had discovered and how they proposed to address the issue.

Based on this information, past applications have exceeded consent requirements. The company and staff involved in this process are to be

commended for drawing this to Environment Southland's attention. The company has reviewed how the sludge is applied to land and is now fully compliant with this consent.

The over application was not significant and evaluation by Environment Southland staff has indicated that the effects, if any, will be minor.

Complaints and self-reported incidents

Environment Southland received notification of two incidents, one of which was not confirmed and the other was not a breach of consent conditions.

General

Table 4 – Alliance Group Limited Mataura Plant – Consent Performance Summary

Issue	*Score*	*Comments*
Provision of data/results	Excellent	Data was reported on time and was completed as required by the consent.
Compliance with consent conditions	Good	Overall compliance was very good. Monitoring is conducted weekly with only five incidents of non-compliance being detected: three breaches of DRP loading, one for cBOD5 and one for total sulphide and a period when the volume of sludge being discharged exceeded the consented limit due to flawed methodology.
Responsiveness to issues	Excellent	Alliance management responded promptly and personally to all issue that arose during the year.
Keeping Environment Southland informed of intentions, changes etc.	Excellent	Alliance staff were very good at communicating their intentions.

Bouquet

The management and staff at the Alliance Group Mataura plant deserve a bouquet for their company ethos to draw Environment Southland's attention to a period where the company was non-compliant in its application of semi-solid waste onto land in the Northern Southland area.

The issue was identified by Alliance Group Mataura staff, during the process of preparing technical information to support a consent renewal application. Staff discovered that the volume of semi-solid material (sludge) being applied to land exceeded the consented application limits.

During a thorough investigation of the procedure used to apply the sludge to land, company representatives discovered that the historically accepted best practice for applying the sludge to the land was flawed. This practice was modified, all contractors informed and the new, fully compliant, process implemented as standard procedure.

A review of all historical soil assessments was undertaken and it was found that the application of the sludge had not had any adverse effects on the environment.

A full report of the Alliance findings was supplied to Environment Southland staff and presented to the Council's Environmental Management Committee.

5.1.4 Blue Sky Meats

Blue Sky Meats processing plant has four current resource consents which require monitoring to:

- discharge meat processing and rendering plant wastewater to land via a spray irrigator:
  - monthly sampling of waterways;
  - annual sampling of soil;
  - annual report summarising monitoring results;
- discharge offal and wool wastes to ground via an offal pit:
  - records of offal pit usage;
- discharge contaminants to the air from a meat processing plant, rendering and blood drying plant and associated boilers:
  - boiler service & maintenance records to be kept;
  - Site Management Plan;
  - record of odour complaints;
- discharge wastewater to land via soakage:
  - groundwater sampling.

Blue Sky Meats (NZ) Limited operates an export meat processing plat at Morton Mains, Southland. The plant is capable of processing up to 30,000 stock units a week and includes specialised boning and cutting rooms that, during the peak season, operate 20 hours a day, seven days a week.

Monitoring compliance

Class D water quality standards are used in conjunction with the Australian and New Zealand Environment and Conservation Council (ANZECC 2000) lowland river values, as specified in the Regional Water Plan for Southland, when assessing the quality of surface water samples. This year, monthly surface water sampling showed seven occasions where the concentration of ammoniacal nitrogen and *E. coli* exceeded the maximum acceptable values for water quality. Annual soil sampling was conducted by Soil Works. Figures 49 and 50 show the monthly surface water monitoring results, using the difference between upstream and downstream sampling sites.

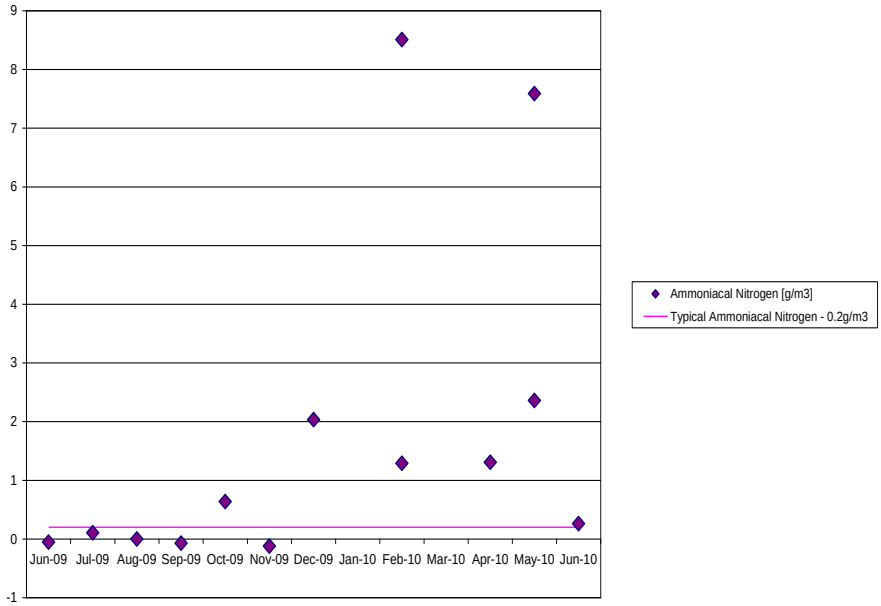

Figure 49 – Difference in ammoniacal nitrogen between the up and downstream sites for 2009/10.

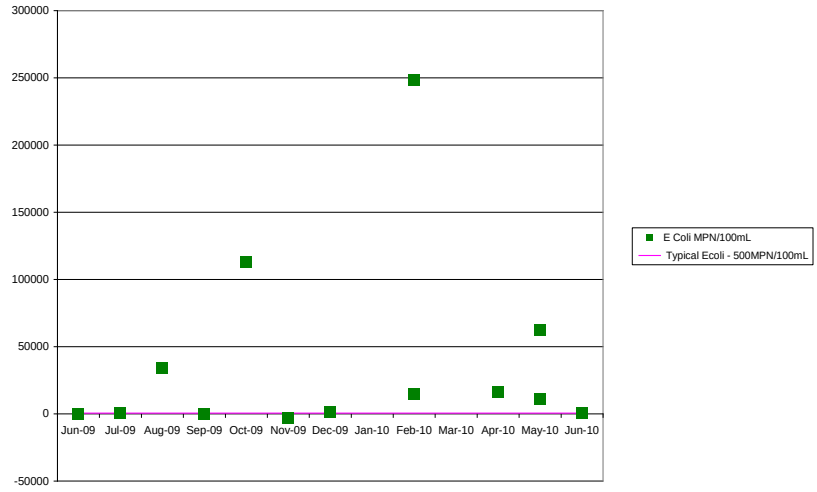

Figure 50 – Difference in *E. coli* results between the up and downstream sites for 2009/10.

Complaints and self-reported incidents

Environment Southland confirmed two notifications from the public relating to discharges to water. Blue Sky Meats notified Environment Southland on one occasion when a discharge was discovered. Steps were taken by Blue Sky Meats immediately to stop the discharge.

Issues

In February 2010, Environment Southland staff investigated an incident at a property adjacent to Blue Sky Meats. Investigating officers found a discharge from a tile drain which originated on the property of Blue Sky Meats. Analysis of the samples taken at the time indicated that, with the level of contaminants contained in the samples, the discharge was likely to have a detrimental effect on a tributary of the Waihopai River. Staff at Blue Sky Meats were advised of the situation at the time of the incident and took immediate action to stop and mitigate the effects of the discharge. The incident was referred to the Council for enforcement consideration.

Blue Sky Meats was issued with an infringement notice as a result of the discharge. Additionally, the Council sought a review of the discharge permit in relation to the effluent disposal area and effluent application rates.

As a result of this incident, and subsequent poor sample results, an independent consultant was engaged by the company to provide advice. Blue Sky Meats has initiated a 'Resource Management Compliance Task List' aimed at improving its effluent management, reducing issues with contaminants reaching water, and improving compliance with their consents.

Table 5 – Blue Sky Meats – Consent Performance Summary

Issue	*Score*	*Comments*
Provision of data/results	Marginal	Sample results were supplied within an acceptable time frame. The supply of other data is being addressed.
Compliance with consent conditions	Poor	Poor sample results with several breaches of water quality standards and discharges to water.
Responsiveness to issues	Good	Improved responsiveness, identified issues to be addressed in Management Plan & Compliance Task List. Independent consultant engaged to provide advice.
Keeping Environment Southland informed of intentions, changes etc.	Good	Communication with Environment Southland has improved over the last year.

5.1.5 Prime Range Meats Limited

Prime Range Meats Limited is a meat processing and rendering plant located on the banks of the Waikiwi Stream. The plant processes livestock for the local and export markets, as well as rendering the by-products generated at this and other meat processing companies. The receipt of by-product from other companies was gradually phased out in the middle of 2009 and stopped altogether in October 2009.

The last year has seen a significant reduction in odours emitted from the site. This is mainly due to the measures put in place by Prime Range Meats, such as connecting a second bio-filter and no longer having raw product from other plants sitting outside the rendering plant waiting to be processed.

Communication between Prime Range Meats and Environment Southland has continued to improve. Prime Range Meats staff have been proactive in ensuring that their procedures are sufficient to meet with consent requirements and they are now identifying issues with monitoring results as they are received and initiating investigations into the cause of the issues.

Air Discharge Permit

Prime Range Meats processing plant currently holds a discharge resource consent to discharge contaminants to the air from a meat works and rendering plant, including a wastewater treatment system.

Prime Range Meats was fully complaint during this reporting period with the conditions of the consent, except on one occasion when an objectionable odour was detected beyond the property boundary.

Water Discharge Permit

Prime Range Meats is currently operating under Rights of Continuance under Section 124 of the Resource Management Act 1991 and holds an expired consent to discharge up to 1500 m^3/day of treated wastewater to the Waikiwi Stream, approximately 500 metres downstream of the West Plains Road Bridge.

Overall, the quality of the effluent has continued to be acceptable over the last year, with the effluent breaching the consented limits on only two occasions. The carbonaceous biochemical oxygen demand ($cBOD_5$) concentration exceeded consent limits during September 2009. This was believed to be due to an imbalance in the sludges. The $cBOD_5$ concentration and loading and the total suspended solids concentration and loading results also exceeded consent limits during March 2010. This was investigated, but no identifiable cause was found and the results returned to below consent limits during the next round of monitoring.

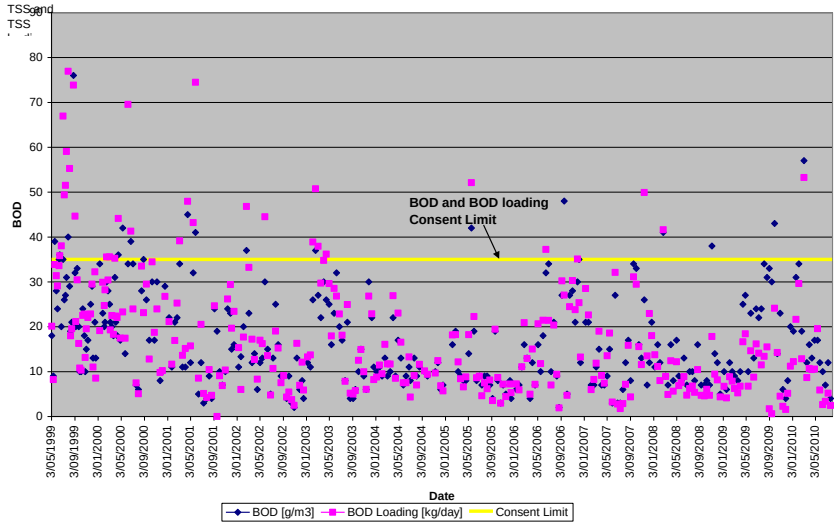

Figure 51 - Concentrations of $cBOD_5$ and BOD loading in the Prime Range Meats effluent (1999 – 2009) and the current consent conditions.

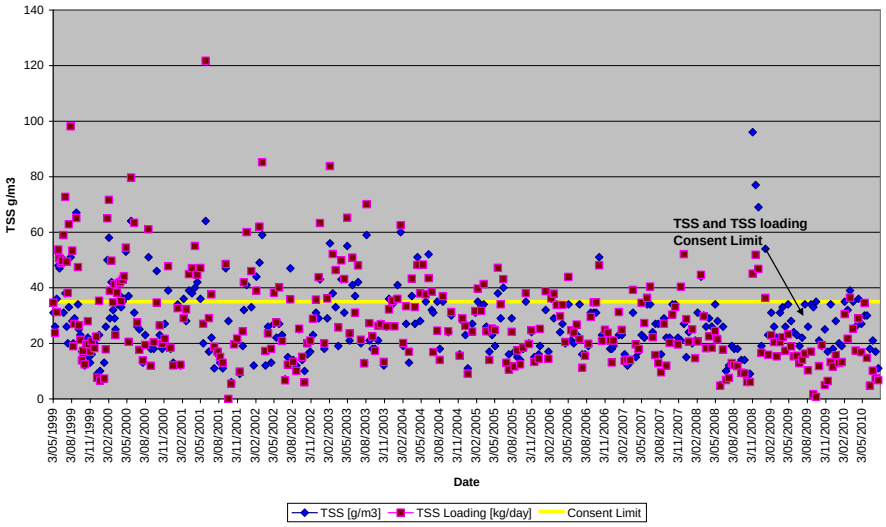

Figure 52 - Concentrations of TSS and TSS loading in the Prime Range Meats effluent (1999-2009) and the current consent conditions.

Limits are imposed on the discharge to minimise the adverse effects that the discharge may have on the receiving environment. Total suspended solids have the potential to smother aquatic life and reduce suitable habitat for macroinvertebrates, as well as reducing the ability of light to penetrate water. The $cBOD_5$ measures the amount of organic material in a waterway which may consume oxygen. A high $cBOD_5$ means that there is potentially less oxygen available for aquatic life, which can lead to the stress or, in extreme situations, suffocation of aquatic life.

The monitoring conditions in the Waikiwi Stream were largely met in terms of the water chemistry monitoring. The concentrations of ammonia nitrogen present downstream of the effluent discharge meet the current, expired, consent limits. However, the current national trigger guidelines (ANZECC) for in-stream ammonia nitrogen are significantly lower than those on the current consent, therefore Prime Range Meats is currently looking at options to reduce the levels of ammonia nitrogen in the discharge. Ammonia Nitrogen present in waterways, over the ANZECC guidelines, has the potential to be toxic to aquatic life.

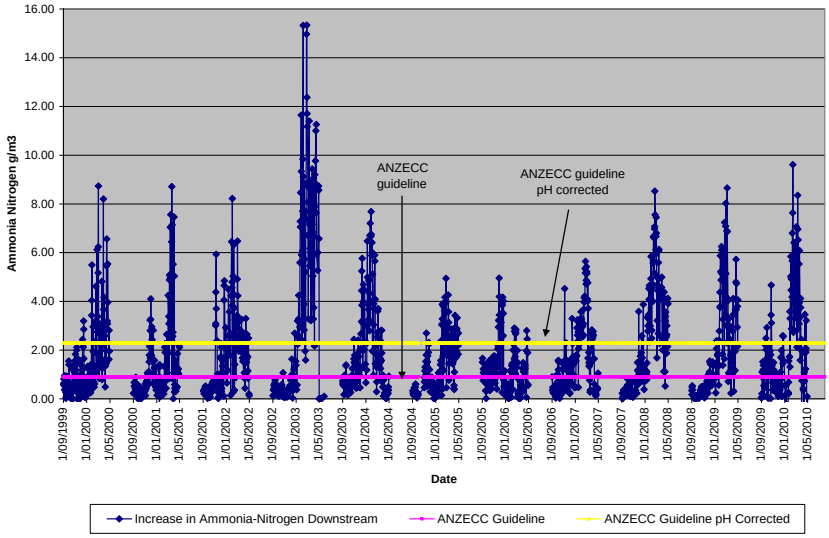

Figure 53 - In-stream ammonia nitrogen from PRM discharge with respect to previous seasons and ANZECC guidelines.

The macroinvertebrate monitoring report, like last year, noted that there was poor diversity of invertebrates and dominant populations of pollution-tolerant species at both the upstream and downstream sites. This has the effect of limiting the sensitivity of the programme to detect significant changes downstream of the discharge. Consequently, the report found that the discharge was having no significant impact on the benthic invertebrate communities.

Complaints and self-reported incidents

Seven charges of non-compliance during January and April 2009 were considered by the Court this year. Prime Range Meats pleaded guilty to four of the charges and was fined $54,000.

Odour complaints have significantly reduced over the 2009/10 reporting period. Environment Southland received nine odour complaints between December 2009 and March 2010. However, only one odour was confirmed to be present and objectionable, while eight complaints were unconfirmed as no odour was detected by investigating Environment Southland staff.

Consent issues

Prime Range Meats expect to have the additional information required for the consent application to Environment Southland by October 2010. A consent hearing for the new consent is expected to take place in December 2010.

Table 6 – Prime Range Meats – Consent Performance Summary

Issue	*Score*	*Comments*
Provision of data/results	Very Good	Overall data has been supplied in a timely manner for the discharge to water permit, however there was some delay in the receipt of some of the air discharge permit monitoring results.
Compliance with consent conditions	Good	The discharge appears to be having less of an impact on the water quality downstream. Only two breaches were recorded for the water permit. Only one breach of the air permit was recorded.
Responsiveness to issues	Very Good	Staff have responded to notifications of odour complaints, have been very responsive when dealing with written correspondence and have become proactive at checking results for consent breaches.
Keeping Environment Southland informed of intentions, changes etc.	Excellent	Information has been shared regarding improvements to reduce odour and improve water monitoring processes. Information has also been shared regarding issues that have arisen that may create odour or cause the discharge to exceed consent limits

5.1.6 South Pacific Meats

South Pacific Meats currently holds the following resource discharge consents that require monitoring:

- to discharge stormwater containing contaminants into the New River Estuary:
  - stormwater discharge quality monitoring.

- to discharge contaminants to the air from a rendering plant, wastewater treatment plant, boiler and associated processes:
  - boiler service reports;
  - odour complaint records.

Monitoring compliance

The coastal permit held by South Pacific Meats requires monitoring of stormwater discharges during, and after, periods of rainfall. Samples are to be taken no more than 12 hours after significant rainfall, i.e. accumulated rainfall greater than 25 mm in a 48 hour period. No water samples were collected for the 2009/10 period, as this condition was not met.

Complaints and self-reported incidents

Environment Southland received three complaints relating to odour over the 2009/10 monitoring period. All three complaints were attended to within one hour of receiving the complaint, however none could be confirmed as being objectionable or offensive. South Pacific Meats was contacted and advised of the complaint.

5.2 Dairy Industry

5.2.1 Fonterra, Edendale

Fonterra Edendale currently holds the following resource discharge consents that require monitoring:

- to discharge dairy factory wastewater on to land at four farm locations;
  - groundwater monitoring;
  - soil monitoring;

- to discharge treated dairy processing wastewater, cleaning water, condensate, stormwater and denitrification and demineralisation water to the Mataura River;
  - surface water monitoring;
  - macroinvertebrate study;
  - discharge quality monitoring;

- to discharge contaminants and odour to the air from a dairy factory and ancillary operations;
  - air discharge monitoring.

Fonterra's Edendale site is one of 26 dairy manufacturing sites in New Zealand owned and operated by the Fonterra Co-operative Group Limited. Despite a notable increase in the quantity of milk processed at the site, there has been a marginal decrease in water abstraction and an increase in wastewater irrigation volumes. This increase in quantity of milk processed and, therefore, wastewater volumes can largely be attributed to the increased milk processing capacity presented by the completion of Drier 4 in September 2009.

Monitoring Compliance

Over the 2009/10 reporting year, Fonterra has provided all monitoring data in full and timely manor. It has set up processes to automatically provide Environment Southland with results as they become available. All groundwater and surface water monitoring results were within the expected ranges, with no evidence of activities having an impact on water quality.

Soil monitoring at Fonterra farms where discharge to land occurs found that management improvements in recent years are resulting in reduced

concentrations of nitrate in the leachate and a more uniform concentration across the irrigated areas. These, in turn, result in an overall reduction in nitrate leaching. Individual wastewater applications now occur over several days instead of a single daily application. The improved uniformity of application has also resulted in the availability of nitrate for plant growth, improving pasture yield. The reduction of nitrate leachate means that these sites are reducing their contribution to already high levels of nitrate in groundwater in this area.

Once every three years Fonterra is required to conduct a benthic survey of the Mataura River during periods of low flow. The survey, conducted by independent consultants, measures the effects associated with discharges on benthic periphyton and macroinvertebrate communities in the Mataura River and found no evidence of long term effects.

There have been several areas of concentrated environmental improvement this season. In particular, emissions from the three coal fired site boilers have been maintained at low levels for a third season due to a focused improvement around operational and maintenance procedures.

Complaints and self-reported incidents

Environment Southland received two complaints from members of the public over the 2009/10 monitoring period relating to odour at the Fonterra plant in Edendale, one of which was able to be confirmed as objectionable by a compliance officer. There were also two incidents involving milk tanker spills which Environment Southland staff attended.

All issues regarding elevated total phosphorous concentrations were reported to Environment Southland within days of Fonterra receiving the results. Other activities and maintenance were also reported to Environment Southland when there was the potential for an incident to occur.

Issues

In late 2008 and early 2009, elevated total phosphorus concentration in excess of consent conditions was detected in the wastewater discharge to the Mataura River. Concern with this non-compliance was shared by Fonterra and Environment Southland, with Fonterra reporting to the Environmental Management Committee in October 2009. Fonterra initiated a detailed system review to identify the source of the elevated phosphorus.

Numerous sources were identified as possibly contributing to the issue, however the discharge of phosphorous was intermittent and did not appear to be linked with any single process on the site. This initial review did not specifically identify a particular source. There were no further incidents of this nature between January 2009 and October 2009. Between July 2009 and June 2010 there were several other occasions where elevated total phosphorous concentrations were detected in the wastewater discharge to the Mataura River. A dedicated staff member was made available by Fonterra to

further review potential contamination sources and to provide options for treatment of some or all of the discharge.

Table 7 – Fonterra, Edendale – Consent Performance Summary

Issue	*Score*	*Comments*
Provision of data/results	Excellent	Good processes set up to ensure data is provided on time and in full.
Compliance with consent conditions	Good	Fully compliant with all consent conditions, with the exception of the total phosphorous issue.
Responsiveness to issues	Excellent	Fonterra provided timely reports and action plans for issues. In depth presentations were also provided to Council.
Keeping Environment Southland informed of intentions, changes etc.	Excellent	Environment Southland was kept informed of any activities or maintenance undertaken, when there was the potential for an incident to occur.

5.2.2 Open Country Dairy Limited - Awarua

Open Country Dairy Limited (Open Country) holds the following resource discharge consents which required monitoring this year:

- to discharge condensate from a milk powder plant to a farm drain:
  - discharge quality monitoring;
  - surface water monitoring;
- to discharge contaminants to the air from a milk processing plant and boiler.

Monitoring compliance

Open Country discharges cow water condensate to a farm pond, then to a drain. Cow water is water that is extracted from the milk during the evaporation process. The condensate is hot water and is used in the evaporation process. The condensate quality is continuously monitored by inline sensors before it is discharged. If the condensate complies with required conditions, it is discharged to the farm pond. If it fails to meet the required conditions, it is diverted into the main waste water system and treated in a neighbouring businesses' pond and recycled.

Discharge quality monitoring showed several instances where total nitrogen levels exceeded consent limits. This was notified to Environment Southland and addressed by Open Country by making some significant amendments to the evaporator. The result during the peak of the season was a clearer condensate and a drop in average nitrogen levels, closer to that of off season monitoring. In addition to this, a turbidity meter was replaced with a more sensitive instrument to ensure tighter controls over the switching point between the pond and effluent tank. Although total nitrogen levels in the

discharge exceeded consent limits, the levels were not too dissimilar to that of monitoring conducted before the commencement of production.

Air discharge monitoring results, conducted by independent consultants, were reported in full. The results show that the boiler operates very cleanly, with particulate emissions at 25% of the maximum acceptable value, and complies with consent conditions.

Complaints and self-reported incidents

No complaints have been received by Open Country, or Environment Southland over this monitoring period. On occasions where consent limits were exceeded, Open Country advised Environment Southland. On one occasion, a batch of poor quality coal resulted in issues with fouling of the boiler bag house, forcing a brief partial bypass. Environment Southland was informed of the situation, and the matter was resolved with the arrival of better quality coal within 10 hours.

Table 8 – Open Country Dairy Limited – Consent Performance Summary

Issue	*Score*	*Comments*
Provision of data/results	Excellent	All data and results were provided in full
Compliance with consent conditions	Good	Breaches were addressed by Open Country, with steps taken to reduce likelihood of further occurrences
Responsiveness to issues	Excellent	Issues were addressed in a timely fashion
Keeping Environment Southland informed of intentions, changes etc.	Excellent	Open Country have kept Environment Southland informed of intentions

5.3 Fertiliser Industry

5.3.1 Ballance Agri-Nutrients - Awarua

Ballance Agri-Nutrients fertiliser manufacturing plant at Awarua currently holds the following resource consents that require monitoring to:

- discharge stormwater from a fertiliser manufacturing facility to water;
- monitoring of stormwater discharge quality;
- monitoring of Mokotua Stream;
- discharge contaminants to air from a process for manufacturing phosphatic based fertilisers;
- grazing pasture monitoring.

Monitoring Compliance

Over the 2009/10 monitoring season, Ballance Agri-Nutrients was fully compliant with its stormwater discharge limits. Since the upgrade of the stormwater system and the removal of historical silica sludge from the wastewater dam, there has been a significant reduction in the overall fluoride

levels in the wastewater discharge. Samples collected for the 2008/09 monitoring period averaged 42 kg/day and just 24 kg/day for the 2009/10 monitoring period. This is well below the consented limit of 166 kg/day.

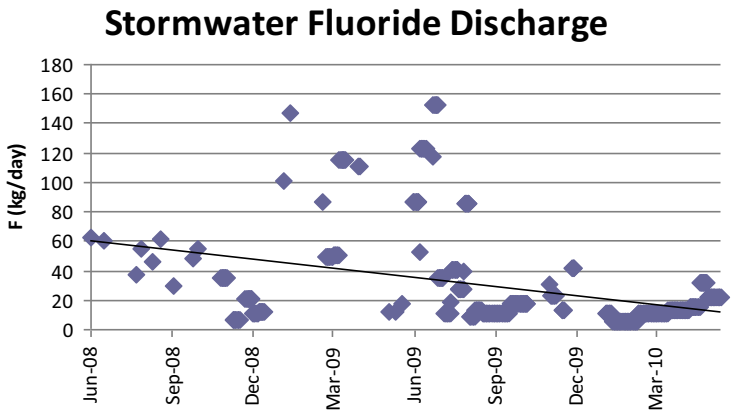

Figure 54 - Fluoride concentration in stormwater discharge 2008-2010.

Air discharge monitoring continues to remain well below consented limits with no breaches of plant operating emission limits.

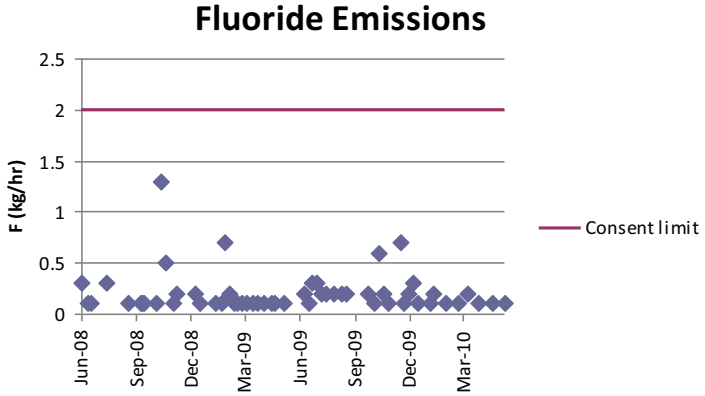

Figure 55 - Sulphur dioxide air emission monitoring 2008-2010.

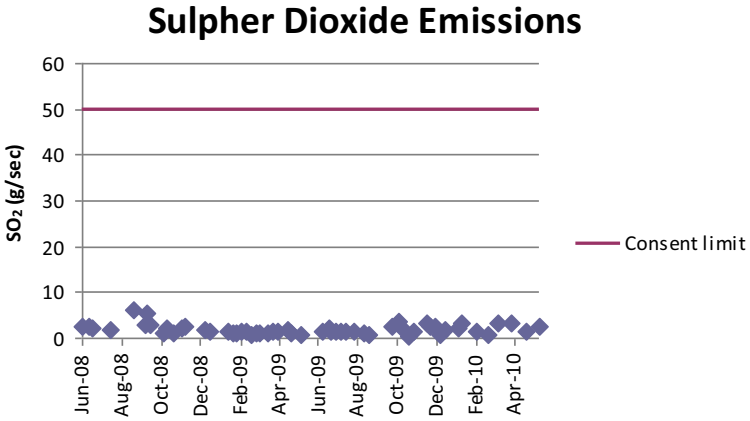

Figure 56 - Sulphur dioxide air emission monitoring 2008-2010.

Quarterly pasture monitoring for this reporting period showed results at some sites which were higher than the fluoride guidelines specified in the consent. A full investigation was conducted by Ballance. Wind direction and plant operating emissions showed no correlation to the high results. After contacting the farmer on whose land the samples were collected, it was discovered that animals had been grazing on the paddocks prior to the collection of samples. It is unlikely that this would have contributed to the high results, however Ballance has adjusted its sampling procedure so that samples are not collected within two weeks of animals grazing the paddocks. The sites were re-sampled the following month with significantly improved results.

Complaints and self-reported incidents

Environment Southland has not received any complaints relating to the Ballance site.

General

In April 2010, Ballance undertook an environmental capital project to help manage the site's wastewater discharge. This was to ensure that an early detection method was in place to stop low pH liquid getting into the sample point. It allows appropriate treatment options and minimises the risk of resource consent breaches. It also provides a mechanism to stop discharges of an unacceptable quality from entering the environment during periods when the site is not occupied. A number of treatment options are available, depending on the pH level of the substandard liquid. The system has been working well since the commissioning in April 2010, with pH levels now being maintained above pH 5. This is a good initiative by Ballance, demonstrating its commitment in maintaining standards as best practice, rather than simply complying with consent conditions.

Table 9 – Balance Agri-Nutrients– Consent Performance Summary

Issue	*Score*	*Comments*
Provision of data/results	Excellent	Data is reported in full, within the required time frame.
Compliance with consent conditions	Very Good	Best practice initiatives resulting in emissions/discharges well below consent limits, however herbage results at some sites were higher than the guidelines specified in the consent.
Responsiveness to issues	Excellent	Ballance has fully investigated issues as they arise.
Keeping Environment Southland informed of intentions, changes etc.	Excellent	Excellent communication regarding compliance and consent conditions.

5.3.2 Ravensdown Fertiliser Co-Operative Limited

Ravensdown Fertiliser Co-operative Limited is the largest supplier of fertiliser in New Zealand and the company shareholders are primarily farmers. The company supply more than half of all fertiliser used in agriculture in New Zealand.

At present, the company operates two limestone quarries in the Southland region, one at Dipton and the other at Balfour. It holds two discharge resource consents, which are:

- to discharge stormwater from a limestone quarry at Balfour;
- to discharge treated stormwater to water at Dipton.

Annual inspections at each site, as well as the routine monitoring required by the consents, are undertaken by Environment Southland staff.

The Dipton limestone quarry was inspected and, following the receipt of water analysis results collected during consent monitoring activities, was found to be fully compliant.

The Balfour limestone quarry was fully compliant with inspection and monitoring activities on all but one occasion, in September 2009. These samples showed an increase in the suspended solids and, therefore, a decrease in water clarity downstream of the discharge. No impact was observed on the receiving waters during the 2010 sampling.

Complaints

Environment Southland has received no public complaints relating directly to the consents or operations at the limestone quarries. However, Environment Southland has received three public complaints relating to the receipt and distribution of fertiliser at Bluff between August 2009 and March 2010. The first complaint was about odour and the second two were dust related. The trucks were all transporting fertiliser to the Ravensdown fertiliser store at Winton. Ravensdown management has recognised the issue and is in the process of standardising procedures to minimise the risk of fertiliser losses to the environment.

5.4 Manufacturing Industry

5.4.1 New Zealand Aluminium Smelters Limited

New Zealand Aluminium Smelter (NZAS) is located on the Tiwai Peninsular and runs four pot-lines that produce some of the world's purest aluminium. During May 2009 the process of bringing cells into production on line one was commenced (line one was shut down in September 2008 due to the loss of a transformer). NZAS developed and preformed the world's first "live blast starting" of a cell on the line. A live cell blast starting involves restarting a cell that is on the line, while power is still running through the line. Normal

procedure for bringing a cell back into production was to shut the whole line down so that a cell could then be connected back up. Live cell restarts mean that cells can gradually be brought back onto lines as needed and line stoppages are not required each time. This allows for much more effective production and management of discharges. This process was completed in May 2010, when all cells on line one were operational.

Monitoring

NZAS currently holds the following resource discharge consents that require monitoring:

- discharge and coastal permit for discharges from the north, south and west drains;
- discharge permit for treated sewage to land;
- coastal permit for the discharge of treated effluent;
- air discharge consent from the aluminium smelter and related activities;
- discharge consent to land at the smelter's landfill site.

A wide range of monitoring is undertaken to measure the environmental impact the smelter has on the environment. This includes monitoring of:

- the air being discharged from the main stack;
- the air being discharged from the main smelting buildings;
- the ambient air quality at several sites in the Awarua and Bluff areas;
- the vegetation and pine needle quality, with respect to fallout from the air;
- water quality in Awarua Bay and Foveaux Strait;
- groundwater quality;
- gaseous emissions.

In addition to the resource consents held by the company, the Regional Coastal Plan for Southland contains a section that allows the company to operate the Tiwai wharf

Various monitoring is conducted routinely by NZAS, as required by its different resource consents. Environment Southland also regularly undertakes audit monitoring to confirm the validity of the results. This year all monitoring results were fully compliant with the respective resource consents.

In May 2010, the five yearly vegetation health assessment was undertaken. This assessment was unaffected by the October 2009 fire on the peninsular, as the fire did not destroy any of the routine monitoring sites. The report concluded that the general condition of vegetation on the Tiwai Peninsular and in the Awarua, Waituna, Bluff and Greenhill districts was satisfactory in May 2010. Therefore, the fluoride emissions were not believed to be adversely effecting vegetation in those areas.

Despite line one not being fully operational for the majority of the year, NZAS successfully kept all fluoride emissions below consented levels. It was

encouraging to note that the fluoride emissions returned to pre-line one shut down levels by April 2010. The fluoride emissions then continued to decrease and June 2010 recorded the second lowest level ever achieved.

NZAS' commitment to complying with consent limits and having no environmental impact on the receiving environment is to be commended.

Complaints and self-reported incidents

No incidents were reported from the public, however NZAS was very active in self-reporting minor incidents. Two incident reports were received by Environment Southland, however none of the incidents received related directly to any of NZAS' consents, or resulted in a significant environmental impact.

The incidents reported were:

- 10 litres of heavy fuel oil (HFO) was released onto the Tiwai wharf during the changes being implemented to the delivery system in December 2009. Some of this HFO was also released into the sea. The impact was assessed as minor and resulted from planned improvements that have reduced the risk of a HFO leak occurring and discharging directly to the sea.

- During February 2010, approximately 60 m^3 of liquid pitch was lost into the coastal marine area off the Tiwai wharf. The spill was due to a blockage in the liquid pitch manifold, which was undetected prior to the discharge of the pitch from the ship starting. The impact was assessed as minor. Procedures have now been implemented to prevent a reoccurrence of this incident.

General

Every five years, NZAS hires contractors to conduct a survey of the wharf and surrounding seabed. The latest survey, undertaken in December 2009, showed that the concentrations of contaminants in sediment samples collected in Bluff Harbour are all well below guideline values indicative of adverse environmental effects. There was also no sediment accumulation or accretion evident at the markers installed in 2004 on either end of the NZAS wharf.

In October 2009 a fire, believed to be started by a contractor's tractor, destroyed or damaged 930 hectares of vegetation on the Tiwai Peninsular (which is approximately 2000 hectares in size). By May 2010, just 18 weeks later, flax, tussock and bracken had regenerated well in most areas, leaving very little evidence that a fire had occurred. One positive outcome of the fire has been better planned access for fire trucks for the peninsular, as well as a large firebreak at the eastern end. Another beneficial side effect of the fire was a reduction in the quantity of the gorse present in the areas of the peninsular that were affected by fire.

Table 10 – New Zealand Aluminium Smelters – Consent Performance Summary

Issue	Score	Comments
Provision of data/results	Excellent	Data is provided on time at monthly, quarterly, annually and five yearly intervals.
Compliance with consent conditions	Excellent	There were no significant non-compliance issues.
Responsiveness to issues e.g. incidents	Excellent	Responses to incidents or other issues are well thought through, implemented and results are reported back to Council.
Keeping Environment Southland informed of intentions, changes etc	Excellent	NZAS staff are very pro-active in communicating with Environment Southland when there is potential for smelter operations to impact on the environment.

Bouquet

The heavy fuel oil (HFO) pipeline which transports HFO from the ships at the wharf to the holding tanks on site used to run underneath the wharf for approximately 150 metres. This meant that the only way any checks or maintenance could be performed on this section of the pipe line was from a small boat. The HFO pipe is pressure tested using water before every HFO delivery to ensure there are no leaks at least at commencement of offloading. However, the NZAS health and safety procedures prevent the use of small boats around the vicinity of the wharf when ships are docked. Therefore inspections of the HFO pipeline under the wharf could not occur when HFO was actually flowing through this section of the pipeline, so there was always the chance of a leak going undetected.

In September 2008, NZAS undertook a project to remove 180 metres of old and redundant pipeline, as well as repositioning the pipeline currently running underneath the wharf to alongside the wharf. The purpose of this project was to:

- prevent HFO spills to the water occurring by allowing any leaks to be easily spotted;
- allow for ease of access to the pipeline;
- make maintenance work on the pipeline easier.

The actual installation of the HFO pipeline along the wharf started in August 2009 and was completed in December 2009. The whole of the pipeline is now visible to operators from the road and NZAS is now able to have patrols along the length of the pipeline during HFO deliveries. This allows for any potential leaks to be quickly detected.

Figure 57 – Before - HFO pipeline running underneath the wharf.

Figure 58 - After: HFO pipe line repositioned alongside the wharf.

5.4.2 Dongwha Patinna New Zealand Limited

Monitoring

Dongwha Patinna New Zealand Limited (Dongwha) required monitoring of the following resource discharge consents:

- to discharge contaminants to the air from fibreboard processing, including the treatment of wastewater;
- to discharge effluent and treatment pond seepage to land from a fibreboard factory;
- to discharge untreated stormwater and treated wastewater to water;
- to discharge stormwater to land;
- to discharge from a tile drain to a watercourse.

Since the establishment of the MDF plant, Dongwha has held a resource consent to discharge wastewater to the river when it is not practical to irrigate to land. Poor weather conditions, or water logging of irrigation area soils are some of the reasons why irrigation to land may not be practical. To date, Dongwha has not discharged wastewater to the river. The irrigation of wastewater to land was fully compliant with consent limits.

The formaldehyde emissions from the drier cyclone, the press and the energy centre are monitored twice per year by an external International Accreditation New Zealand (IANZ) accredited consultant. The emissions from both sets of monitoring were well within consented limits.

Table 11 – Formaldehyde concentrations at the drier cyclone and press

	Drier Cyclone		Press	
	West (kg/hr)	East (kg/hr)	Total (kg/hr)	Capture (%)
October 2009	3.0	3.2	0.09	90
April 2010	4.2	4.8	0.23	93
24 Month Average	4.3	4.8	0.20	87
Consent Limit*	**8.25**	**8.25**	**0.5**	**>75**

*** The consent limit is a 24 month moving average**

Air quality monitoring is conducted at six sites surrounding the manufacturing plant using an 'aerolaser'. The aerolaser is a real time monitoring instrument that draws in air continuously and measures the formaldehyde concentration. Only results that are obtained when the wind is blowing from the plant towards the aerolaser (i.e. wind positive) are included in the monitoring reports. The aerolaser is mounted on a trailer for easy relocation to the six different monitoring sites. IANZ accreditation for the aerolaser was obtained by Dongwha staff in November 2009, following a comprehensive and rigorous assessment process.

IANZ accreditation is an internationally recognised standard that, once obtained, means that other parties can have confidence in the competence of

the staff performing the test and that the technical and management systems are in place to provide high quality results. To achieve IANZ accreditation an independent assessment of aspects of the testing method, such as the technical competence of staff, effective quality processes of the method, integrity and traceability of equipment and materials and validity and suitability of results, is undertaken.

Table 12 – Summary of the annual air quality results recorded by the aerolaser

Wind Positive (30 minute Average Period)			
		Formaldehyde Concentration	
	Number of results	Average (µg/m³)	Maximum (µg/m³)
Perkin's Hill	355	1.0	10.5
Perkin's Deer Shed	208	0.9	9.5
Weatherburn Road	889	0.8	20.4
Johnstone's property	529	1.1	24.5
Duncan's property	176	0.4	5.4
Solid Energy's property	294	1.2	8.7
Resource Consent Requirements (30 minute average)		**60**	**100**

Dongwha was fully compliant with all consent monitoring conditions, with the exception of recording and capturing weather data. The consent requires that at least 90% recovery of valid data over a 12 month period is obtained from the meteorological station which monitors wind direction and speed. At the end of March 2010, the capture of weather data was 87% for the 12 month period and was 86% at the end of May 2010.

The failure to collect weather data was due to the wind speed sensor on the old weather station being damaged, which resulted in all suspect data being discarded. The weather station was replaced, however further data was not collected during the intervening period.

Assuming that there are no further issues with the weather station, the 12 monthly capture is expected to stay below 90% until the fourth quarter (October to December 2010).

Dongwha's commitment to complying with consent limits and ensuring no impact on the receiving environment is to be commended.

Complaints and self-reported incidents

One smoke complaint was received by Environment Southland from the public in March 2010. Dongwha conducted an investigation into the smoke, however nothing unusual was noticed on site.

A second smoke complaint was received directly by Dogwha in April 2010.

Sander dust from phenolic resin was being burnt on both occasions that the smoke complaints were received. To remedy this Dongwha has further

reduced the amount of sander dust that can be burnt at any one time for any future burning of the dust. Environment Southland has investigated similar smoke complaints in the past and has determined that they do not breach the consent condition.

Although they do not relate to any consent held by Dongwha, two odour complaints were also received by Dongwha.

The first complaint was regarding a strong glue type smell in November 2009. Specialty product was being burnt at the time. The amount that could be burnt has been reduced by half and the situation closely monitored.

The second odour complaint was regarding a chemical type odour in March 2010. This complaint was received the same day as one of the smoke complaints. The sander dust from phenol formaldehyde resin was being burnt at the time and believed to be the cause. The amount of sander dust being burnt was reduced in conjunction with the smoke complaint on the same day.

General

The current travelling irrigation system (Figures 59 and 60, below) is over 12 years old and has been used all year round. Dongwha investigated a new irrigation system and is currently in the process of changing to an Irripod irrigation system (see Figures 61 and 62, below). Comprehensive testing on the new system has shown improvements in irrigation in terms of:

- lower application rate over a greater period of time which reduces the risks of ponding;
- no nozzle blockages during testing;
- considerably less maintenance is required on the new system;
- eliminates the possibility of irrigator reel failing, which could cause the boom to stop moving while still applying effluent.

The plan is to install sufficient Irripods (over 400) so that they cover the entire Dongwha farm and will only be moved when the farmer shuts up blocks for balege. The farm is split up into six blocks and only one block will be irrigated at a time.

Three of the farm blocks have already been installed with the Irripods and the fourth block is scheduled to be installed in the 2010/11 year. The last two blocks will then be changed over during 2012. The existing travelling irrigators will still be used on the blocks without pods while the changeover occurs, but will be phased out.

Figures 59 & 60 - Old/current irrigation system.

Figures 61 & 62 - New irripod irrigation system.

Table 13 – Dongwha Patinna – Consent Performance Summary

Issue	*Score*	*Comments*
Provision of data/results	Excellent	Data is provided within the monitoring report framework and within time requirements.
Compliance with consent conditions	Very good	There was one technical non-compliance reported due to the weather data capture being below consent limits.
Responsiveness to issues	Excellent	Issues raised with the company have been addressed promptly.
Keeping Environment Southland informed of intentions, changes etc	Excellent	Environment Southland is kept well informed.

5.5 Miscellaneous

5.5.1 Bluff Harbour

The main shipping port into Southland is the port in Bluff Harbour. Shipping traffic services two main areas - the New Zealand Aluminium Smelters (NZAS) and South Port.

When the region's Coastal Plan was developed, it allowed for the two port operators to function under individual agreements, similar in nature to a consent. The agreements are supposed to set out the operating and discharge limits that each party is to abide by and ensures the management of the port activities are compliant with the Resource Management Act (1991). Individual agreements were established between Environment Southland and NZAS (2004) and Environment Southland and South Port (2006).

A review of both agreements is underway at present and is being facilitated by Environment Southland's Planning Division.

The NZAS agreement is close to being finalised, while the South Port agreement is still being addressed. The range of activities carried out around the South Port facilities is significantly more varied than at the wharf NZAS uses.

A variety of different parties operate under the South Port agreement and they all need to be fully conversant with the agreement before it is finalised.

5.6 Mining Industry

There are a number of mining operations with consent to operate, in the Southland area. Each site is inspected, with staff going on site to assess compliance with consent conditions, as well as other monitoring of air, water and soil.

Overall inspections

This year, a total of 16 consented sites were inspected, throughout Southland.

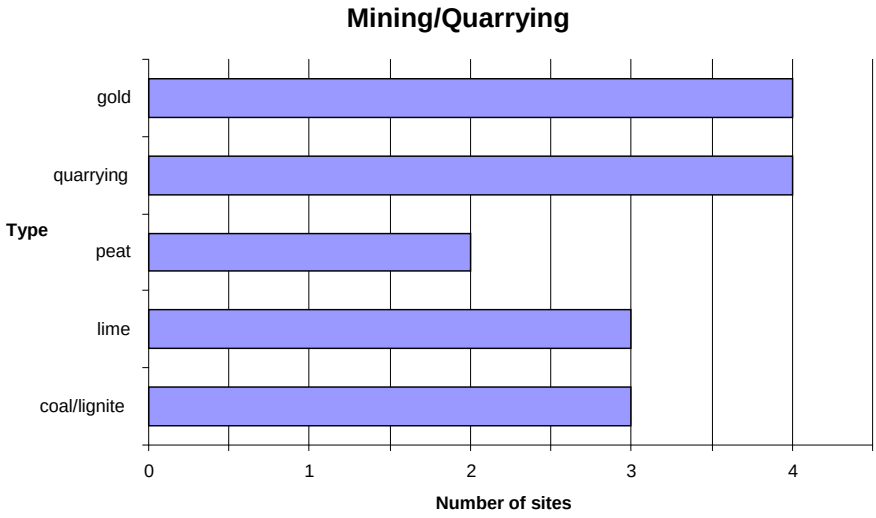

Figure 63 – Type of mining activity and number of sites.

Figure 63 shows the type of mining activity and number of sites. These figures do not include gravel extractions, or permits for activities such as suction dredging for gold.

Some consented sites have water sampling requirements that occur throughout the year. Samples may be collected by Council staff, or consultants employed by the company. No significant non compliance was identified during the year.

There has been a noticeable increase in the number of private individuals expressing an interest in prospecting for gold. This will be due to the current high price of the metal, both nationally and internationally.

Two major mining companies operate in Southland: Solid Energy and Takitimu Coal Limited.

5.6.1 Solid Energy

Solid Energy is a New Zealand company that produces high quality coal for both the export and domestic markets.

Solid Energy currently holds 16 discharge permits for operations, at four sites within Southland:

- the New Vale mine at Waimumu;
- the Goodwin mine at Waimumu;
- the Ohai Mine; and
- the Mataura mine.

Performance against the following consents has been good this year:

- to discharge ash to land at the New Vale and Goodwin mine sites:
  - inspections found the consent holder was fully compliant with consent conditions.
- to discharge treated mine water and stormwater to an unnamed tributary of the Hedgehope Stream:
  - monitoring was compliant on all except two occasions:
    - in July 2009 the total suspended solids (TSS) concentration in the discharge exceed consent limits, due to heavy rain;
    - in July 2009 the water clarity in the tributary exceeded the consent limit, but this was significantly influenced by the heavy rain impacting on the tributary up and downstream of the discharge;
    - in November 2009 and May 2010 the clarity in the receiving waters downstream of the discharge had decreased, resulting in minor exceedances of the consent limits. These were investigated, but the degree of non-compliance was not considered to be significant on these occasions.
- to discharge treated surface and groundwater from Goodwin mine to the Hedgehope Stream at Waimumu:
  - inspections showed the consent holder was compliant with consent conditions on all but two occasions. The exceptions were a report on water clarity results in the receiving waters and a discharge TSS result in August 2009 which exceeded the consented limit. The cause was found to be a blocked drain. No non-compliance was found during the site inspection.
- to discharge stormwater from No 16 Opencast Pit, Ohai:
  - monitoring is only required when discharge occurs. No discharge occurred during 2009 or 2010.
- to discharge treated mine water and stormwater to Morley Stream at Ohai:
  - Solid Energy only discharged to the Morley Stream on one occasion, in August 2009. On this occasion no water clarity monitoring was conducted. This was the result of the equipment not being available at that time (all other results were compliant). An additional clarity tube has been purchased, to ensure that monitoring is complete in future.

- to discharge contaminants to air from the mining, screening and stockpiling of coal at Ohai:
    - monitoring was fully compliant with consent conditions during the period July 2009–December 2009. The monitoring results for 2010 are not required until the end of 2010.
- to discharge up to 4,320 cubic metres of water per day from the No. 3 opencast mine pit at Ohai, to the Morley Stream:
    - this consent was granted in July 2010, no inspections or monitoring were required during the period this report relates to.
- to discharge treated mine water and stormwater to water at Mataura:
    - monitoring showed compliance with consent conditions on all but one occasion. The exception was a discharge of total suspended solid result that exceeded the limit, in February 2010. The exceedance was due to an algae bloom, rather than the nature of the discharge itself.

Complaints

Environment Southland received one public complaint, regarding smoke from the burning of green waste. Solid Energy staff were advised that material needs to be allowed to dry out before burning.

Solid Energy self-reported a discharge of untreated coal fine wash water to a stream. The discharge was due to a pipe outlet being blocked by coal fines.

5.6.2 Takitimu Coal Limited - Nightcaps

Mining at the Nightcaps mine site has been carried out for more than 100 years. Takitimu Coal Limited took over the site in 2006 and developed it to increase the production from 10,000 tonnes, to something in the order of 170,000 tonnes.

Takitimu Coal Limited holds four consents to discharge:

- to discharge ash to land:
    - monitoring was compliant with this consent;
- to discharge to land and to stormwater:
    - monitoring was compliant with these consents;
- to discharge contaminants to air:
    - monitoring was compliant with the consent conditions for most of 2009/10. The company experienced some difficulty installing the dust suppression system in 2009. It was installed and fully operational in 2010.

Complaints

Environment Southland received 10 complaints from the public about dust in the area. These were investigated and, in many cases, dust was located on the complainant's property, but the source was not able to be confirmed. Many local businesses and homes burn coal for other purposes, so identifying dust to any one source is almost impossible.

6.0 Quarrying

6.1 Gravel Extraction Report

The Compliance Division is responsible for auditing the inspections on land use gravel extraction consents. The Catchment Division is responsible for the onsite introduction to the consent, with the consent holder, and conducting field inspections.

Following on from last year's review, the Compliance and Catchment Divisions have continued working together to improve internal processes. A new site visit sheet has been designed that enables Catchment Officers to accurately record all relevant information when holding the preliminary meeting with consent holders.

A revised letter has been prepared and is sent to all new consent holders, asking them to read and understand their consent conditions and advising which Catchment Officer to contact prior to commencing the extraction, to arrange an onsite visit.

Penalties (as per Schedule 4.1.8 of the Council's Annual Plan) were sent to 62 consent holders who had failed to respond to earlier correspondence advising them of the consequences of not complying with their consent conditions.

Due to this following-up with non compliant consent holders, there has been a marked increase in submission of monthly gravel returns. There has also been a 58% increase in monitoring fees received between February and April 2010, when the Compliance Division were actively pursuing non compliance.

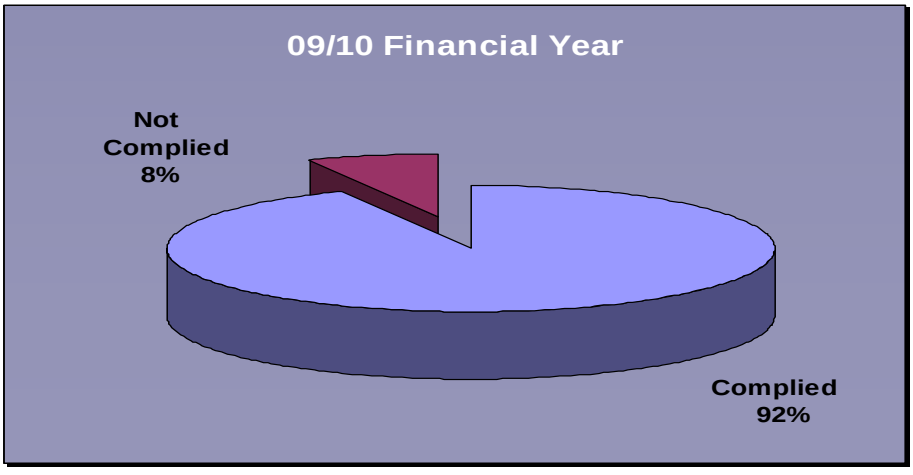

Figure 64 – Compliance rates for gravel consent holders -2009/10.

Compliance rates (shown in Figure 64) have increased from 87% compliance and 13% not compliant in the 2008/09 year, to 92% compliance and 8% not compliant for the 2009/10 financial year.

The Compliance and Catchment Divisions continue to provide gravel consent holders with education and advice and will regularly follow up with consent holders to increase compliance rates.

7.0 Sewage Treatment Plants

7.1 Invercargill City Council

Table 14 - Compliance summary for the Invercargill City Council community sewage treatment systems in 2009/10

Community Sewage Treatment Schemes	Consent compliance		
	Fully compliant	Partial non compliance	Significant non compliance
Invercargill sewage (Clifton)	✓		
Bluff sewage	✓		
Omaui Sewage			✓

7.1.1 Invercargill City Council – Omaui

The Invercargill City Council currently holds a resource consent at Omaui to discharge oxidation pond treated sewage to land, via irrigation.

Monitoring Compliance

Monitoring of the quality of the treated wastewater is conducted at five yearly intervals, between 1 December and 31 March. Monitoring was not conducted in 2009/10, as required by the consent, and Invercargill City Council is, therefore, non-compliant with its consent. Invercargill City Council has advised that monitoring will be done in 2010/11.

7.1.2 Invercargill City Council – Clifton

The Invercargill City Council currently holds the following resource consents/coastal permits that require monitoring:

- to discharge treated wastewater to water;
- to discharge contaminants to land via seepage
- to sporadically discharge screened wastewater to the New River Estuary, when compliance with the above consents cannot be achieved due to plant mechanical failure or extreme weather;
- to discharge contaminants (including odour) to the air;
- to discharge a deodorising agent to the air to mask odours from the sludge ponds at the sewage treatment plant.

In December 2009, the Invercargill City Council's consent to discharge treated wastewater from the Clifton treatment plant to water was amended. The application was lodged at a time when there were significant issues with the treatment plant performance in regard to the production of odours and compliance with consent discharge limits. It was difficult at that time to know if the compliance problems were more a factor of overloading at the plant, or whether the original limits specified were inappropriate.

Monitoring Compliance

From May 2009, the quality of effluent being discharged from the Clifton plant noticeably improved. The level of improvement was shown with the carbonaceous biochemical oxygen demand ($CBOD_{5)}$ and total suspended solids (TSS) results, but more significantly with the bacteria monitoring results (Figure 65). This improvement appeared to coincide with the closure of the Clifton Wool Scour. The September 2009 monitoring continued to show an improving trend, indicating that the bacteria quality of the effluent was noticeably better than the same period in previous years.

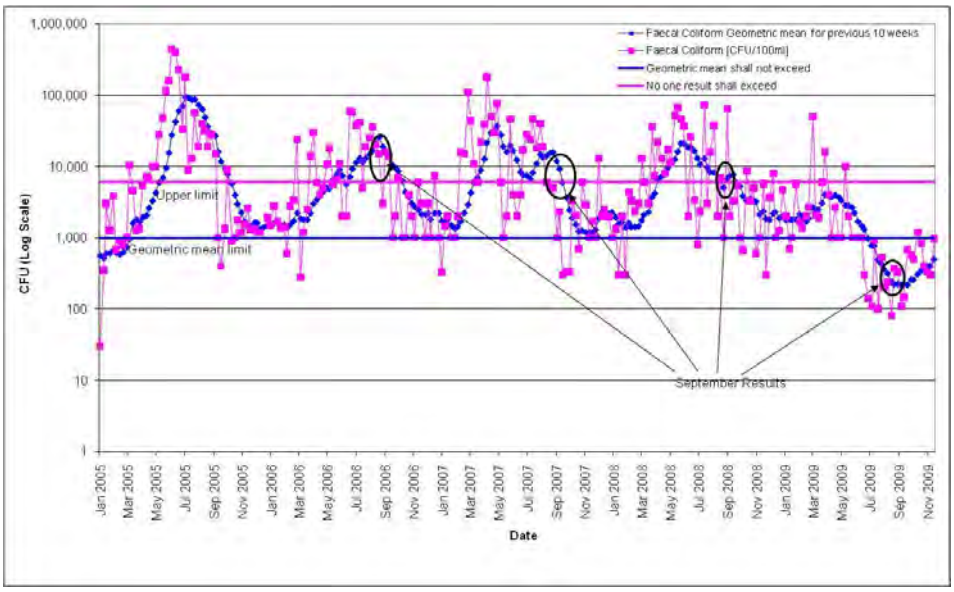

Figure 65 - Bacteria monitoring results.

Monitoring compliance

The continued improvement in the quality of effluent was evident over the 2009/10 monitoring period. For the period July-December 2009, results were assessed using consent conditions prior to the amendments, using monthly limits and 10 weekly limits. Monthly results were good, with breaches of suspended solids in October and November only. All other monthly results were within consented limits. $CBOD_5$ limits assessed using the 10 weekly limits showed exceedances two months in six and suspended solid levels exceeded the limit in three out of six months. All faecal coliform results were compliant with 10 weekly limits.

From January 2010 results were assessed using limits specified on the consent amended in December 2009. The limits are now based around rolling means (over 10 weeks) and rolling geometric means (for faecal coliform concentration, over 12 months). The main difference in the changes is that a single high result that has little overall impact is no longer a breach of the consent. However, sustained breaches will cause the median to rise and those high results stay in the rolling geometric mean calculation for 12 months.

Rolling mean values enable fluctuations in the plant performance to occur without causing compliance issues for the ICC but still requires a high standard of overall compliance to avoid the rolling mean limit to be exceeded. In practice, a lower level of compliance with their discharge quality is necessary as it takes 12 months for high values to be removed from the rolling mean values. This provides the ICC with an incentive to maintain a high standard of plant performance.

The figure below shows the $CBOD_5$ results for the period Jan-June 2010. The rolling 12 month geometric mean is less than half that of the limit, and appears to be decreasing steadily.

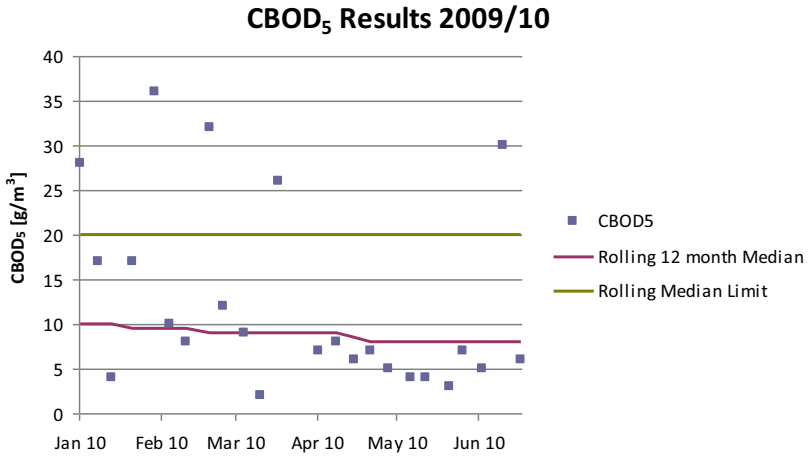

Figure 66 - Carbonaceous biological oxygen demand results 2009/10.

Figure 67 shows the TSS results for the period January-June 2010. As with the $CBOD_5$ results, the rolling 12 month mean is less than half that of the consent requirements. Although there are some fluctuations, the levels appear to be relatively static.

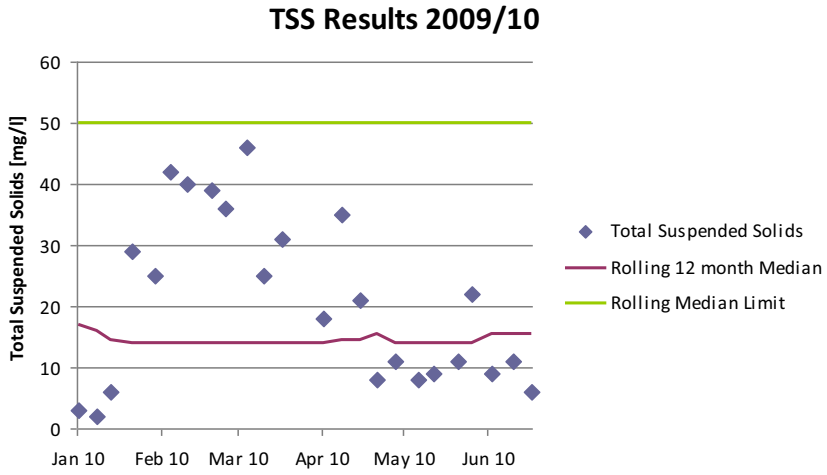

Figure 67 - Total suspended solids results 2009/10.

The faecal coliform results are beginning to show a slight decreasing trend, as the 12 month rolling mean begins to drop off the high faecal coliform results that occurred while the Clifton Wool Scour was sending effluent to the Clifton wastewater plant.

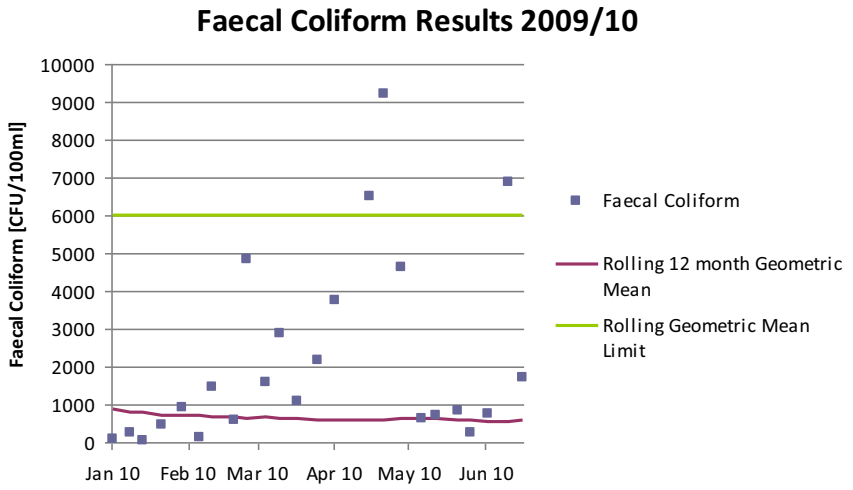

Figure 68 - Faecal coliform results 2009/10.

Complaints and self-reported incidents

There have been no complaints received by Environment Southland or Invercargill City Council over this monitoring period.

7.2 Gore District Council

Table 15 – Compliance summary for the Gore District Council community sewage treatment systems in 2009/10

Community Sewage Treatment Schemes	Consent compliance		
	Fully compliant	Partial non compliance	Significant non compliance
Gore sewage			✓
Mataura sewage	✓		
Waikaka Sewage		✓	

7.2.1 Gore District Council – Gore Wastewater Treatment

The Gore township has a population of 8,000 and is currently served by a two pond oxidation system, located on the town's southern boundary. The oxidation ponds were constructed in 1971 and were designed to service a population of 12,000.

The Gore District Council holds a consent to discharge treated wastewater to the Mataura River. During dry weather 1,000 to 7,000 m^3/day of treated wastewater is discharged from the oxidation ponds to the Mataura River.

However, as stormwater in some parts of Gore also flows into the oxidation ponds, the amount of treated wastewater discharged to the river can rise to over 20,000 m3/day during wet weather.

Up until August 2009, Environment Southland staff undertook the sampling for both the Gore and Mataura oxidation ponds. From August 2009 onwards Gore District Council staff have been sampling both the Gore and Mataura oxidation ponds. The frequency of sampling is dependant on the river flow, the lower the river flow the more frequent sampling is required. During extended periods of very low flow, sampling may be required at both the Gore and Mataura sites every two weeks.

The increased monitoring at low flows is required to ensure the nutrients in the discharge do not have an effect on the river, as there will be less dilution once it is in the river. Nutrient enrichment in the Mataura River can cause nuisance weed and periphyton growth on the riverbed. These growths can impact on the naturally occurring macroinvertibrate communities in the river and affect biodiversity within the river system.

Dissolved reactive phosphorus (DRP), nitrate nitrogen and ammoniacal nitrogen in the river are the main nutrients most likely to cause the nuisance weed and algae growths. If nitrogen levels in the river upstream of the discharge are elevated, the controlled input of phosphorus can reduce the risk of nuisance growth on the riverbed. The Actiflo plant was specifically built at the Gore oxidation pond to reduce DRP levels in the discharge. The installation of this plant has resulted in a significant reduction in the level of DRP in the discharge and the opportunity for the discharge to produce nuisance algae growths during low flows in the river.

The Actiflo plant is run when the river flow is less than 25 m^3/s and on occasions when the flow is between 25 – 60 m^3/s, if the DRP in the discharge is greater than 1 mg/L. This has lead to a significant improvement in DRP levels recorded downstream of the discharge.

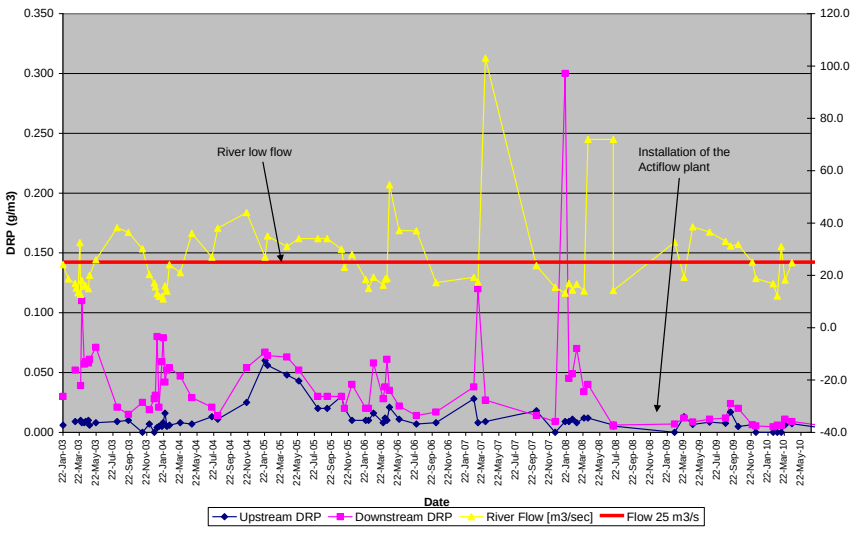

Figure 69 - Dissolved reactive phosphorus concentration at upstream and downstream sites with the river flow.

The addition of the Actiflo plant has also continued to improve the quality of the discharge, not only in terms of the DRP but also the BOD_5 and total suspended solids (TSS) levels.

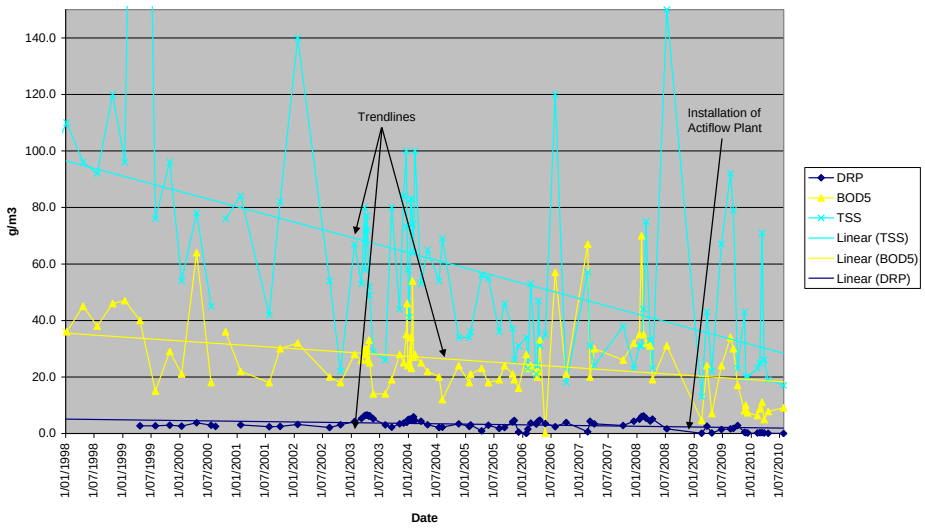

Figure 70 - Discharge quality in terms of DRP, TSS and BOD_5

Monitoring

The discharge has to conform to two sets of consent limits. Firstly, the discharge must not cause detrimental effects on the River, including increase in temperature, clarity, a significant change in pH or sedimentation. The second set of limits is a rolling 80 percentile, which states that 80% of the time the wastewater discharge must not exceed the specified limits for BOD_5, suspended solids, dissolved reactive phosphorus, ammoniacal nitrogen and *E. coli*.

The meter for daily measurements of the DRP levels in the discharge failed during the period August–September 2009, resulting in higher than expected DRP levels. Although the maximum levels for the DRP were not exceeded, this resulted in the rolling 80 percentile limits being exceeded seven times during the period August 2009–February 2010.

The meter was sent away for repair and calibration as soon as the problem was identified and a regular maintenance and calibration schedule has been set up for the DRP meter. The Actiflo plant was also run each time the river flow dropped below 60 m^3/s, while the meter was away to ensure that the DRP levels stayed lower than consented limits.

The total suspended solids (TSS) results exceeded the maximum allowed limits twice, in August and September 2009. This resulted in the rolling 80 percentile limits being exceeded six times during the period August-December 2009. These breaches correlated with the DRP exceeding the 80 percentile limit. The TSS results were brought back under consented

limits by the operating of the Actiflo plant. The TSS result also exceeded the maximum allowed limit once, during March 2010.

The maximum limits for *E. coli* were not exceeded during the period August 2009–April 2010, however, due to the results remaining consistently high, the rolling 80 percentile limits were exceeded nine times during this period. Some elements of sample collection are being reviewed as possible contributors to this issue.

The Mataura River samples were fully compliant with the consent limits, which indicates that the discharge was having no significant impact on the receiving environment. The Benthic Macro Invertebrate Survey this year assessed the health of the sites upstream and downstream of the discharge to indicate 'good' water quality. The survey also found that the discharge was not adversely impacting on the local benthic macro-invertebrate communities. This is an improvement from the survey last year, which found that the discharge was causing subtle changes to the local benthic macro-invertebrate communities immediately downstream of the discharge. It appears that the Actiflo plant is starting to have long term benefits for the discharge quality and the Mataura River.

7.2.2 Gore District Council – Mataura Oxidation Pond

During December 2008, Gore District Council planted a series of wetlands to further filter effluent from the oxidation pond before it was discharged to the river. The constructed wetlands were designed to reduce the total suspended solids, *E. coli*, bacteria concentrations and the $cBOD_5$ concentration of the discharge. A number of issues contributed to preventing the plants being fully established within the excepted time frame. These issues included strong winds in July 2009 that uprooted the plants, which were only lightly established in the gravel. The wetlands are now fully established. There are 7,000 plants in six cells forming the wetlands.

The Mataura oxidation pond discharge permit required that the discharge comply with stricter limits from 30 June 2009. However, due to the delay in the wetlands being established, Gore District Council was granted an extension by Environment Southland to when the new limits were to apply. The stricter limits in the consent were to be enforced from 30 June 2010.

While the wetlands were being established, overall the discharge would not have complied with the stricter limits in the consent for the period July 2009-June 2010. However, the discharge was fully compliant with the original conditions in the consent.

The benthic macroinvertebrate survey concluded that the discharge from the Mataura oxidation pond outfall is not adversely affecting the marcoinvertebrate communities of the Mataura River.

7.3 Southland District Council

Table 16 - Compliance summary for the Southland District Council community sewage treatment systems in 2009/10

Community Sewage Treatment Schemes	*Consent Compliance*		
	Fully compliant	*Partial non compliance*	*Significant non compliance*
Balfour sewage			✓
Browns sewage			✓
Gorge Road Sewage	✓		
Lumsden sewage		✓	
Manapouri Sewage	✓		
Monowai sewage		✓	
Nightcaps sewage		✓	
Ohai sewage			✓
Otautau sewage	✓		
Te Anau sewage		✓	
Tokonui sewage		✓	
Tuatapere sewage	✓		
Riverton sewage at Havelock Street	✓		
Riverton sewage at Foveaux Strait	✓		
Riversdale sewage			✓
Stewart Island sewage		✓	
Winton sewage			✓
Wyndham sewage			✓

7.3.1 Southland District Council – Edendale-Wyndham Wastewater Treatment System

At the beginning of 2010 the newly established Edendale-Wyndham sewage treatment system became operational. The system was designed to service approximately 1,500 residents and will provide a significantly improved level of treatment, when compared to the septic tank systems used by individual dwellings in the two small communities.

The treatment system is one that is new for New Zealand, but employs processes that have been extensively trialled and successfully employed in Chile. Sewage from the two communities is piped on to the site, pre filtered, then sprayed onto a bed of sawdust. The bacteria in the sawdust provide the main mechanism to treat the wastewater, but the sawdust also contains Tiger worms to help aerate the sawdust, which provides ideal conditions for them to operate in while consuming the organic material and keeping the bacteria populations in balance. The resulting liquid is then further disinfected using Ultraviolet (UV) light, before being discharged to the river.

The system has been designed to accommodate 500 homes, but until a large proportion of connections were made, the hydraulic loading was not sufficient to allow for continuous treatment of the effluent and, consequently,

some of the early monitoring was non-compliant with resource consent limits. The most notable exceedance was the concentration of *E.coli* bacteria in the discharge to the river. As the number of connections has increased, the performance of the UV system has improved and the system is now capable of achieving the limits set in the discharge consent.

The quality of the effluent being discharged is very good, when compared to past technology, and is likely to provide small communities with another tool for effluent treatment.

While the overall performance of the plant is encouraging, there remains an issue with the level of phosphorus in the discharge to the river. While the treatment system is able to effectively reduce organic material and bacteria, it is having some difficulty reducing the phosphorus concentration to the levels required in the consent. The level of phosphorus set in the consent is considerably lower than the target that was originally applied for by the Southland District Council. The Southland District Council is currently investigating options to achieve the limits set in the consent.

8.0 Coastal Marine Area

8.1 Stewart Island Structures

In March 2010, staff inspected a total of 52 coastal structures on Stewart Island. The structures were predominantly privately owned boatsheds, or attached slipways, but also included boat ramps, wharves, access steps and protection walls. Coastal structures are generally inspected at three yearly intervals, but had not been inspected since 2005.

Of the 52 structures, 17 were found to be in good condition and fully compliant with their consent requirements. A total of 27 were found to have minor non-compliance, with issues such as no structure number being displayed, damage to cladding, slipways or the erosion of piles.

Eight structures were found to be significantly non-compliant, with four of these being passed to the enforcement team for further follow-up. The more serious non–compliant structures suffered ongoing poor structure condition:

- one site had contaminants entering the Coastal Marine Area (CMA) in the form of oil based paint, in an area used for boat maintenance;
- two structures were identified as significantly non-compliant, as there were additional structures which were not on the consented structure plan. Staff have been working with these consent holders, and the Consents Division, to get their plans amended to include the extensions, or have the structures removed; and
- one consented structure had been non-compliant for some time and, consequently, an abatement notice was served. The improvements are progressing and are now due for completion on 1 October 2010.

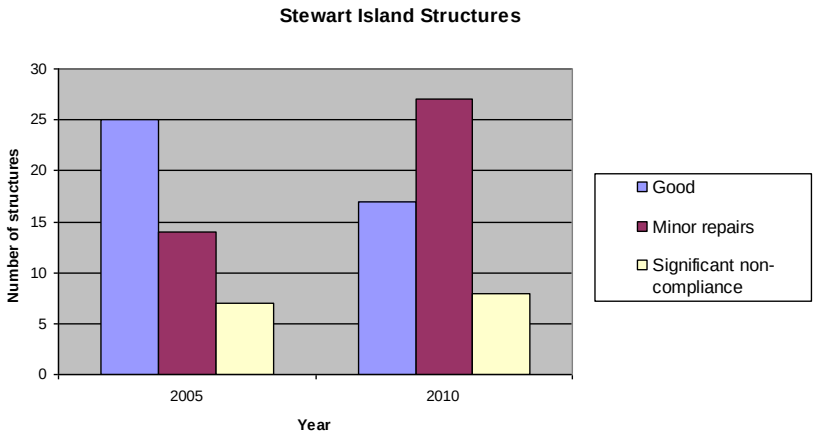

Figure 71 – 2010 inspections compared to 2005 results.

There has been an increase in the number of structures identified as being in need of minor repairs in 2010, compared to those inspected in 2005. This suggests that consent holders are failing to maintain their structures, as required by their consent.

8.2 Whitebait Stands

During the whitebait season, in August and September 2009, 658 consented whitebait stands located on the banks of the Aparima, Mataura, Waikawa, Titiroa, Pourakino, Awarua and Hollyford Rivers were inspected.

Whitebait stands require a consent, as they fall under the Coastal Marine Area (CMA). Environment Southland is responsible for monitoring structures under the coastal plan, up to the mean high water spring mark, and structures that span over a waterway. There are also 10 consented whitebait structures outside of the coastal marine area, these are consented as land use structures. These structures are situated upstream of the Pourakino River bridge, at Centre Road and upstream of the Aparima bridge, at Gummies Bush.

The compliance inspection grading criteria has been based on the following:

Unsatisfactory

- old structures that haven't been removed;
- additional, unauthorised structures;
- stands that were unsafe due to boards being missing, or not being sufficiently braced;
- unauthorised bank protection work;
- illegal deposition of tyres, white ware, iron, sandbags, metals, etc, within the CMA.

Minor issues

- loose/broken boards, rotten timber, or flood damage with debris;
- weak handrails, or other part of structure.

No name or number and exceeding length

- structure number was not displayed/missing;
- number was barely legible and needed highlighting;
- structures exceeded consented length and/or width, or did not match the plan on file.

A considerable amount of effort and work was undertaken on updating photographic records for each structure. Photographs were then used to update each individual file and the field folders held by the Compliance Division.

Figure 72 - 2009 inspections compared with the 2008 results.

In addition to the above:

- minor repairs were needed by 40 consent holders during 2009 compared, to 59 during 2008;
- eight structures were found to be exceeding their consented length in 2009, compared to three in 2008;
- in 2009, 96 structures were not clearly displaying the name or number, compared to 85 in 2008;
- four structures and their sites have been surrendered. The structures have since been removed;
- a total of 153 structures were noted as being significantly non-compliant (unsatisfactory) with their resource consents, or plan rules, compared to 65 in 2008.

The eight stands found to be exceeding their consented length, or that did not match the plan on file, were required to remove, or apply to alter their consents in order to comply. Some of these stands had exceeded their consented length due to inward bank erosion around the bottom half of the Mataura River.

The number of stands not clearly displaying the owner's name and number has shown a slight increase over the previous year. Those with minor issues have decreased slightly to 40, while those classified as unsatisfactory have more than doubled from 65 in 2008, to 153 in 2009.

Compliance work continues on those stands not complying with their consents.

9.0 Landfills

9.1 AB Lime Landfill

AB Lime operates an agricultural lime and landfill operation in Winton. Lime is mined in a particular area and leaves a large open pit which is then lined and prepared to accept domestic and some industrial waste. Once the pit has been filled to the level of the surrounding land, the area is capped and a new pit is filled.

Area 10 is almost full and capping has occurred over most of the area. A second pit, Area 11, is ready to receive waste and filling has commenced. AB Lime has been accepting waste from the Southland region since 2004.

Figure 73 – View from edge of Area 10 towards Area 11, which was being prepared to accept waste.

AB Lime's landfill operation requires regular monitoring of its resource discharge consents, which are:

- to discharge stormwater to a tributary of the Lochiel Stream;
- to discharge solid waste onto or into land; and
- to discharge contaminants to air discharge from a landfill.

Monitoring

Overall the consent monitoring reports have been received on time, the data has been complete and, with a few exceptions, the data meets all the requirements of the various consents.

Any breaches of the consent conditions identified have mainly been of a technical nature.

The dissolved oxygen (DO) readings of the leachate, which are required twice weekly by the consent, were not meausred for three weeks in October 2009 as the primary sampler was away. This issue has been addressed and a backup sampler trained.

The hand held gas monitoring equipment (GEM) failed in February 2010 and was unable to be repaired until May that year. All spare GEM machines in the country were being used, so a temporary replacement was unable to be sourced. This resulted in three months of landfill gas monitoring such as methane, carbon dioxide, oxygen, carbon monoxide and hydrogen sulphide not being undertaken. This monitoring is required on a monthly basis. The GEM machine was repaired and received by AB Lime in May 2010, allowing monitoring to resume.

The methane level at one of the monitoring probes outside of the landfill diposal area exceeded the consented limit in January and May 2010. On both occasions the methane level was retested after a couple of days using the hand held GEM and methane results had fallen back to normal limits. It is unknown why the spikes in the methane level had occured.

General

A specialist in the field of landfill management conducted an annual audit on the operation of AB lime landfill, on behalf of Environment Southland. The landfill was a generally tidy and well run operation and no rodent, bird or fly activity was noticed on site.

The main issues from the peer review report were:

- the lack of landfill gas monitoring data required to determine whether the permanent gas flare was compliant with consent conditions;
- the oversteep fill slope of Area 10;
- no remedial action has occurred on the capping that was put in place early 2009.

Since the review, AB Lime has undertaken the non-methane organic carbon (NMOC) monitoring. The monitoring has shown that the flare effectively burns off 99.5% of NMOC and 99.9% of methane. The consent requires 98% of NMOC to be burnt off so the flare easily meets this condition.

AB Lime are still in the process of deciding what remedial action (if any) is required on the capping.

Complaints and self-reported incidents

Environment Southland received four odour complaints about the landfill, from members of the public, during the July–September 2009 period. No odour was detected by Environment Southland staff when they investigated the odour complaints.

AB Lime received three odour complaints between July-October 2009, and one odour complaint in April 2010. Only the odour complaint in July was able to be confirmed. This was believed to have been caused by a hole having been dug into the waste to bury polystyrene releasing odour. AB Lime no longer accepts waste after 4 pm, to avoid early evening odour issues when burying wastes.

Another odour complaint was due to a power cut which had turned off the flare. The permanent gas flare has a built in contingency to ensure that whenever there is an issue with the operation of the flare, such as a power cut, an alarm goes off and staff are informed by pager of the problem. This allows for immediate remedial action of any issues in these instances.

It is more common to receive odour complaints relating to AB lime in the winter months due to the formation of inversion layers. The cool evening air descends down the hill, picking up the gas or odour from the landfill site and carrying it down to the valley where the houses are located. The installation of the permanent flare in July 2009 appears to have significantly reduced the odour produced onsite, with Environment Southland receiving no odour complaints over the 2010 winter period.

Table 17 - AB Lime – Consent Performance Summary

Issue	*Score*	*Comments*
Provision of data/results	Very Good	Overall on time and complete, however some odour reports and data was delayed.
Compliance with consent conditions	Good	Three of the monthly methane results exceeded the consented limit. Three weeks of DO data and three months of gas monitoring data were not supplied as required by consent conditions. However the lack of gas monitoring data was due to equipment failure.
Responsiveness to issues	Excellent	Management has been very helpful in assisting with unforeseen circumstances.
Keeping Environment Southland informed of intentions, changes etc	Excellent	Management has actively engaged Council staff in proposals that could affect the operation of the landfill.

9.2 Closed Landfills in Southland

Prior to the establishment of the regional landfill at the AB Lime site, every locality or township had a site where domestic waste was buried. These were established many years ago, when the potential impacts were not as well understood as they are today. Consents were established to monitor and control their operation, but now all of these sites have been closed and the sites have been capped and re-vegetated.

This year, only a small amount of monitoring on the closed landfills was conducted. Key findings include:

- at the Gore landfill site, groundwater in the immediate area contained some elevated levels of contaminants. These did not appear to be having a significant impact on other local groundwater takes, or on the river;

- at the Pukerau landfill site there continued to be signs of iron leaching from the area of the old landfill, however, this did not appear to be having an impact on water quality;

- at the Mataura landfill there were some signs of leaf burn on a couple of trees (leaf burn can be caused by landfill gas), but the level of impact appeared to be minor.

The ongoing management of closed landfills is seen as a priority issue for listed land use management. The current review of the discharge plan contains proposed rules which would govern the regulation and monitoring of closed landfills and provide clearer guidance as to what is required.

9.3 Cleanfills

This year, 24 sites held consents for the deposition of cleanfill to land which were inspected by Compliance staff. A consent is required to deposit cleanfill materials exceeding 500 cubic metres in volume onto, or into land. Inert materials deemed suitable to be classified as cleanfill are soil, rocks, sand, clay and concrete. Each consent holder receives a list of acceptable materials and non-acceptable materials.

Of the 24 sites inspected, 10 were found to be fully compliant with their consent conditions, 12 were identified as having some form of technical non-compliance and two were found to be significantly non-compliant.

All 12 cleanfill sites found to have technical non-compliance had failed to supply data, as required by the consent. Letters were sent to the consent holders and some of the missing reports are now being received.

Of the two sites that had significant non–compliance, one has been an ongoing problem. This site was considered for prosecution, but on review an infringement notice was served. The reason for the enforcement action being taken was the continual deposition of materials into the site that did not constitute cleanfill. The unauthorised waste included assorted timber, paint, household waste, metals and tyres.

The second site with significant non-compliance was a result of unacceptable material being stockpiled too close to an open waterway.

Generally, the physical on-site inspections showed that the majority of consent holders were operating within their consent requirements.

10.0 Investigations

10.1 Bluff Bathing Beach Investigation

Elevated levels of faecal bacteria at Morrison's Beach in Bluff were identified as a cause for concern in the 2008/09 report.

In July 2009, samples were sent to the Cawthron Institute to identify the source of the faecal contamination. Results for two of the three samples analysed indicated that there was likely to be a human source involved. The results may be a sign of cross connections between the stormwater and sewer networks in this area.

In October 2009, Environment Southland staff carried out further evidential sampling in the stormwater system draining onto Morrison's Beach. The results of this sampling revealed faecal coliform and *E. coli* concentrations in the stormwater system ranging from 900 to 21,000 cfu/100 mls. Faecal coliforms and *enterococci* levels found in seawater at the edge of a 50 metre mixing zone ranged from 0 to 1,500 cfe/100 mls.

Invercargill City Council also commenced evidential sampling in August 2009 under the direction of Dr Marion Poore, Medical Officer of Health. This sampling identified several streets of interest.

Further faecal source discrimination sampling occurred in two separate rounds (27 September 2009 and 19 February 2010). Faecal sterol analysis and microbial source tracking were used and identified that human source faecal bacteria dominated the samples recorded in several locations. These were Onslow Street, Burrows Street, at the Morrison's beach outfall and at the edge of the mixing zone.

Figure 74 - Bluff Township layout and reticulated foul sewers (green lines), stormwater line (blue lines), manholes (green circles) and flow paths (pink lines).

Results from Invercargill City Council Sampling

Invercargill City Council sampling occurred at the Morrison's Beach outfall, at the edge of the mixing zone and at Onslow and Henderson Streets. Sample results are summarised in the table and figures below.

Table 18 - Summary of sampling results from Invercargill City Council

Site	Indicator	Flow	Max	Median	95th Hazen
Morrison's Beach Outfall	E.coli Enterococci	High	3700 5200	460 85	Not enough data
	E.coli Enterococci	Base	5300 4400	125 110	1422.5
Morrison's Beach Edge of mixing Zone	E.coli Enterococci	High	1150 107	3 9	Not enough data
	E.coli Enterococci	Base	1930 1500	6 4	118.5
Onslow Street Stormwater	E.coli Enterococci	High	490000 3000	200 145	Not enough data
	E.coli Enterococci	Base	15500 70	2800 65.5	1455

Note: The 95th Hazen calculates the 95th percentile of all the data point using a formula developed by the Mfe (2008), this is typically undertaken for Microbiological data where recreational bathing occurs.

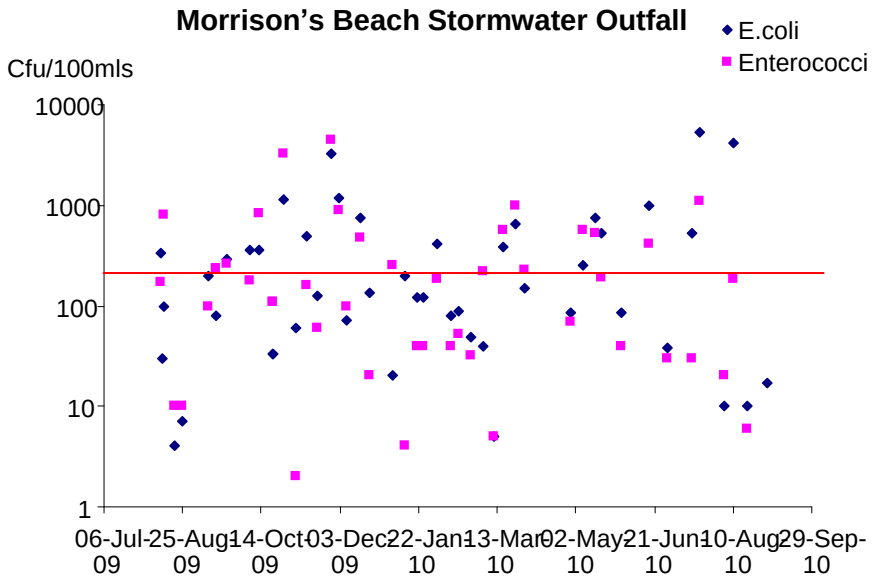

Figure 75 - Morrison's Beach stormwater outfall into Bluff Harbour. Red line denotes Mfe(2003) marine bathing guideline.

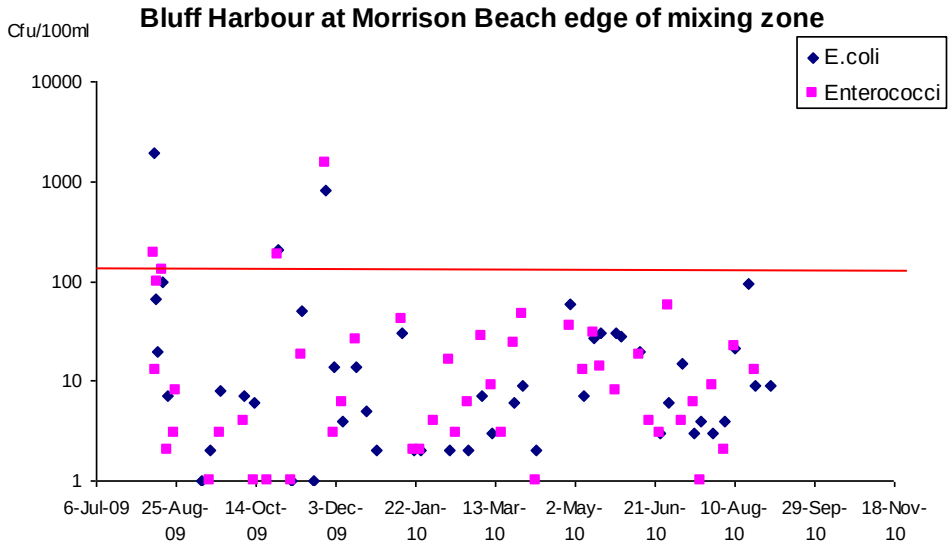

Figure 76 - Morrison's Beach at the edge of the 50 metre mixing zone faecal bacteria levels. Red line denotes Mfe (2003) marine bathing guideline.

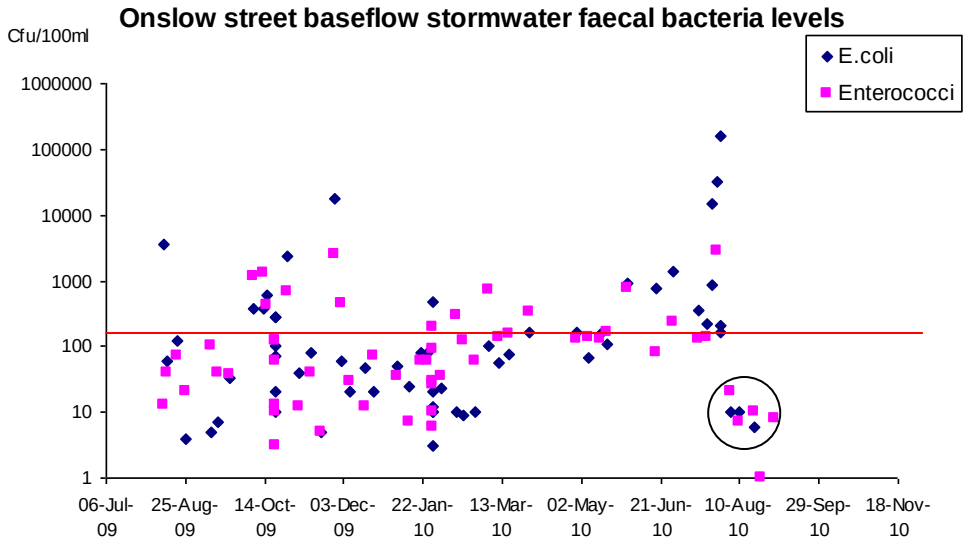

Figure 77 - Onslow Street Stormwater system faecal bacteria levels. Red line denotes Mfe (2003) marine bathing guideline. The circle denotes samples taken after two houses on Onslow Street had their sewerage system reconfigured and the Onslow Street contamination problem was resolved.

Invercargill City Council continues to sample the Bluff stormwater system to identify further points at which human waste may be entering the network. Households will be approached as they are identified to rectify any cross connections on site. Environment Southland does not currently consider the issue of faecal contamination in the Morrison's Beach outfall to be completely removed and will continue to monitor the situation, in conjunction with the Invercargill City Council, particularly during the summer bathing beaches sampling programme.

Summary points about ICC testing:

- the faecal counts at the Morrison's beach outfall are still highly variable and dependent on weather conditions such as recent rainfall, time since rainfall and time of sampling;

- since December 2009 there has been no breaches of the marine bathing guidelines, however, this may be a function of sampling times, combined with rainfall and tidal phase. For example, the Environment Southland historical data suggests breaches occur after 10 mm of rainfall and a slack high or low tide. Very little of the Invercargill City Council sampling (n=12) was undertaken in high flow events;

- the elevated faecal counts from Onslow Street on 27-29 July 2010 have been the highest since this sampling began and the cross-connection issues with the two houses has been rectified, as evident in Figure 77;

- the Invercargill City Council is to continue sampling through the coming summer of 2010/11 and the Bluff Harbour-Awarua Bay Sanitary Survey is also continuing.

10.2 Effluent Pond Seepage Investigation

Initial Project

Seepage losses below ponds could lead to significant nitrogen contamination of the ground and groundwater over the lifetime of a storage pond. Seepage from ponds is only permitted if it is low enough to avoid environmental contamination. There is little information available on the effectiveness or durability of different linings when climate, geology and hydrology are considered.

Rule 49 of the Regional Water Plan for Southland requires resource consent for the construction of effluent ponds and requires that certain requirements are met. Some resource consents are more stringent on the requirements than others, however if a pond has significant seepage it is a breach of Section 15 (1) (b) of the Resource Management Act 1991 and could result in the contamination of groundwater. The monitoring of, or confirmation of, suspected pond leakage needs to be addressed.

Following a literature survey, a research project was undertaken between November 2009 and December 2009 on a dairy farm located near Wreys Bush. The objective of the research was to determine if a float-based recorder housed in a tower (effectively a stilling well) was capable of monitoring the change in effluent level in a pond accurately and adequately. Movement of the float was translated proportionally to the change in effluent level recorded at a data logger. Effluent could enter the tower near its base via holes that were covered in gauze mesh. The second objective was to determine the relationship that the float movement recordings had with the pond inputs and outputs.

In addition to the continuous monitoring, the site was visited on three occasions. During these visits, all inputs and outputs were precluded (except evaporation). This enabled the visible depth of the effluent pond to be recorded over a couple of hours during these visits.

Assessment of the data showed that the range of effluent levels recorded by the float recorder decreased over time. It was found that during the site visits when the pond was at a low level there was no visual change in depth, however when the pond effluent level was high, it dropped over a two hour period by approximately 7 cm. During these same periods the float recorder indicated that the pond level was increasing.

Two conclusions were drawn from the study. Firstly, concrete ponds are susceptible to leakage and may not provide ideal containment for effluent. Secondly, the float recorder did not provide reliable data. It is suspected that this was as a result of the gauze over the inlet to the tower clogging up and preventing the immediate entry of effluent.

A second study site was secured in the Waituna area and further research was undertaken using a radar sensor. This proved to be much more reliable, although it is less sensitive than the float based recorder as it is not housed and therefore wind movements over the surface of the pond may affect recordings.

Further research in this area would be beneficial to either monitor ponds for compliance with consent requirements (effectiveness of seal), or to inform planners and consents on the risks associated with large effluent storage. However, from the studies thus far the following needs to be considered:

- monitoring is expensive in time and equipment (radar sensors cost in the range of $5,000);
- inputs and outputs to and from the pond need to be excluded for a prolonged period. This is difficult because it will interfere with effluent management on the property;
- monitoring equipment is not sufficiently sensitive to show low levels of seepage and (from literature studies) equipment needs to be extremely sensitive in order to ensure that the error from evaporation, wind and rain can be allowed for, while still generating data that is useful.

Decommissioning of ponds and rules around the remediation of these sites needs to be given attention. It is also suggested that, by studying effluent movement through soils and groundwater around ponds, Council may gain a better understanding of the effect and extent of seepage through different containment structures.

Small Ponds

The results from the initial study were extremely concerning, as it is possible that numerous old ponds in Southland would have similar seepage. In response to this finding, Environment Southland monitored a number of

small and old ponds. Contact was made with various consent holders and a request was made to monitor their ponds for level changes over a couple of hours while inputs and outputs were excluded. Consent holders were asked to keep their pond full to ensure that the pressure of the effluent on any weak areas would be at its highest and this should indicate maximum seepage. This monitoring was used to establish if the seepage seen on the initial property would occur in other ponds of similar age and structure. It was a rudimentary method and would not account for minor seepage that may still be significant over an extended period. Ponds were selected around the Edendale area, as it was known that a number of old dairy sheds were still operating in this area and the area has a history of high nitrate levels in groundwater.

Table 19 - Seepage observations of small effluent ponds

File Number	*Consent*	*Pond Lining*	*Approx Storage*	*Changes in Effluent Level*	*Well Drained Browns Soil?*
C190-001	203289	Concrete (new)	6 days	None	Yes
M070-001	202412	Earth (14 yrs old)	2 days	None	Yes
S014-001	201612	Earth (30 yrs old)	60 days	None	Yes
B109-001	203822	Concrete/ earth (old)	7-14 days	None	No
L157-001	202669	Concrete (4 yrs old)	6 days	None	Yes
M033-001	202842	Concrete	Less than 1 day	Couldn't stop inflow	Yes
D208-001	32227	Earth/clay (14 yrs old)	Less than 50 days	None	Yes
A149-001	202571	Concrete	2 days	Couldn't stop inflow	Yes
I020-001	200872	Concrete	Less than 1 day	Couldn't stop inflow	Yes
R110-001	202229	Earth	14 days	None	Yes
R189-001	203852	Earth (10+ yrs old)	4 days	None	Yes

The sample set is not nearly sufficient to accurately determine the risk of high levels of seepage from small effluent containment facilities, but it would indicate that it is of a lower likelihood than initially thought possible. One consideration following this study was that the initial pond had tile drainage below it which would have enhanced the movement of effluent through the soil. The owners of the ponds that were subsequently assessed should have been asked similar questions about drainage below the structures. It may be of benefit to encourage farmers to monitor their own sumps/ponds for high levels of seepage as it is a relatively simple test.

Figure 78 - Radar sensor, Waituna.

Figure 79 - Float based sensor, Wreys Bush.

11.0 Incidents

Incidents are identified in three ways:

- issues found by Environment Southland staff during inspection activities;
- incidents reported by any third party; and
- self-reported issues by the responsible party.

In the financial year 1 July 2009 to 30 June 2010, there were 981 reported incidents. This is an increase on the previous year. Most of these are reported to Environment Southland by members of the public, or staff at Environment Southland, however, seven self-reports were received from consent holders. Of the 981 incidents, 582 incidents required an inspection to measure environmental effects.

Forty nine percent of complaints were responded to within the specified timeframe. This is a slight decrease in performance from the previous year (50%) and reflects the change in documentation required when recording the facts related to an event.

The number of incidents dealt with by staff was 955 in 2007/08, 851 in 2008/09 and increased to the highest level of 981 in 2009/10. The average cost per complaint has been approximately $885. The previous year, this cost was around $770 and $501 in 2007/08. The increase in cost is attributed to a change in the quality of the response, through improvements in procedures when dealing with incidents.

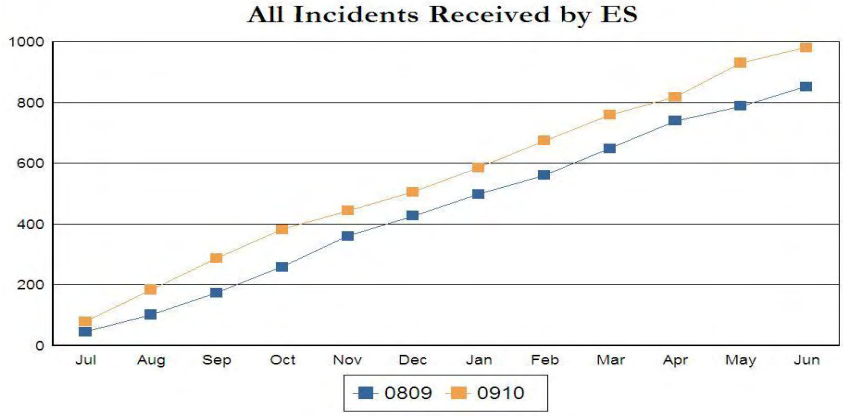

Figure 80 -All incidents - 2008/09 and 2009/10 years.

When members of the public report an incident to Environment Southland they have the option of remaining anonymous, or their contact details being recorded. Generally, those that report an incident wish to know whether the action they have reported was confirmed and that the incident has been dealt with.

Table 20 - All incidents are categorised as being related to air, coast, land, or water

	2007/08	*2008/09*	*2009/10*
Air	353	214	255
Land	138	262	286
Water	272	344	375
Coast	22	27	65

Seasons play a major role in the type and frequency of incidents reported by members of the public, for example, odour and water related incidents increase in September/October. This is due to the onset of extended daylight hours, allowing easier access to outdoor pursuits and recreational activities.

The past year has seen a significant increase in all types of complaints received, particularly considering the lack of advertising of the pollution response service.

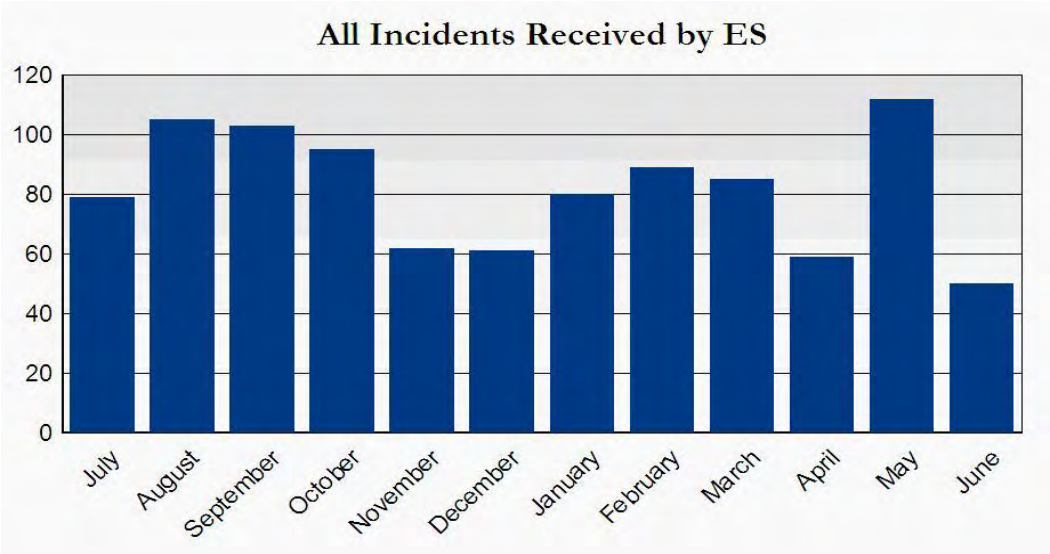

Figure 81 - Monthly incident totals for 2009/10 year

The Environmental Compliance Division operates a 24/7 pollution response service. All incidents received after normal business hours are forwarded to the duty officer by an answering service. The response type and time depends on the nature of the call.

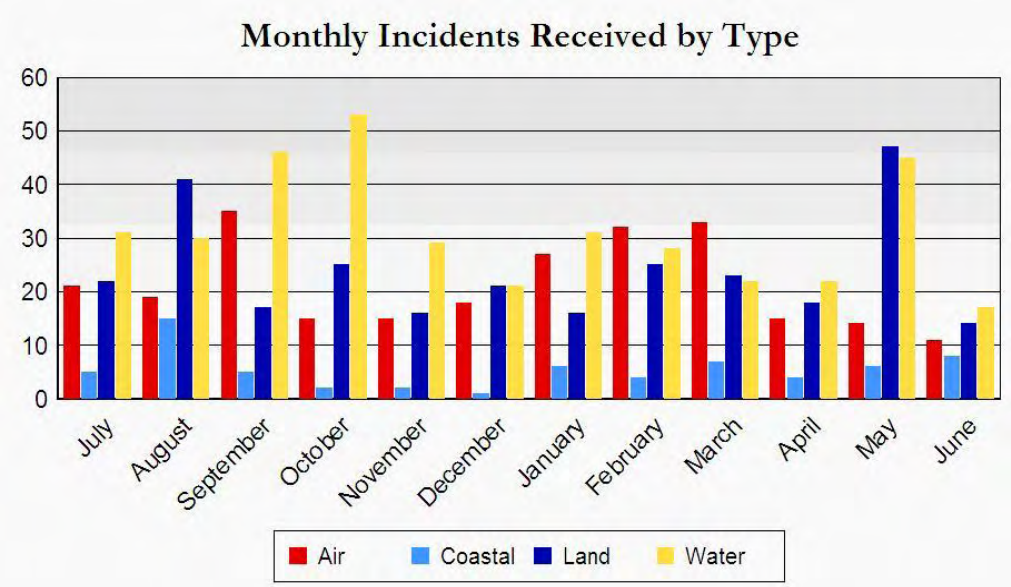

Figure 82 - Monthly incidents received by type.

11.1 Cost Recovery

Cost recovery is used to recover the costs associated with investigating a confirmed breach of a consent, plan rules or legislation. The Council has set a target of 50% recovery of costs for the Compliance Division and to recover costs for the investigation of minor non-compliance.

For the year 1 July 2009 to 30 June 2010, $314,644 was recovered, an approximate 44.1% increase on the year before. The budgeted cost recovery during this period was $312,000.

The result is encouraging, as offenders are paying for staff time spent investigating public reports of non-compliance, rather than this cost being covered by the general ratepayer.

11.2 Search Warrants

No search warrants were executed, pursuant to Section 334 of the Resource Management Act 1991, for the 2009/10 year.

Table 21 – Comparison with previous years

Year	*Abatement Notices*	*Infringement Notices*	*Search Warrants*	*Prosecutions*
2001/02	38	15	0	13
2002/03	15	14	0	9
2003/04	17	6	0	5
2004/05	32	21	0	2
2005/06	40	32	0	8
2006/07	25	33	2	5
2007/08	53	13	2	6
2008/09	43	11	0	10
2009/10	33	23	0	9

12.0 Infringement Notices

Infringement notices are a punitive measure, suitable for situations where an offence requires a penalty but is not considered serious enough to warrant prosecution.

The decision to issue an infringement notice is delegated to Environment Southland's Director of Environmental Management, supported by an infringement panel made up of two senior managers.

Penalties are prescribed by the Resource Management (Infringement Offences) Act 1999 and vary, depending on the section of the Resource Management Act 1991 contravened.

There were 29 infringement notices issued in the 2009/10 financial year. Of these, 28 were for discharges of farm dairy effluent to land and/or water and one for an unauthorised discharge to air.

Table 22 - Infringement notices issued 2009/10

Issued to	*Offence*	*RMA Section*	*Fine*
Nui Dairies Limited	**Location:** Duthie Road, Section 24 Blk VIII Wyndham SD **Offence:** Allowed a contaminant, namely effluent, to be discharged into or onto land in circumstances which may have resulted in it entering water when it was not expressly allowed by a rule in a regional plan or in any relevant proposed regional plan, a resource consent, or regulations.	Section 15(1)(b)	$750
Nui Dairies Limited (second incident)	**Location:** Duthie Road, Section 24 Blk VIII Wyndham SD **Offence:** Allowed a contaminant, namely effluent, to be discharged into or onto land in circumstances which may have resulted in it entering water when it was not expressly allowed by a rule in a regional plan or in any relevant proposed regional plan, a resource consent, or regulations.	Section 15(1)(b)	$750
Richard Clark	**Location:** Duthie Road, Section 24 Blk VIII Wyndham SD **Offence:** Allowed a contaminant, namely effluent, to be discharged into or onto land in circumstances which may have resulted in it entering water when it was not expressly allowed by a rule in a regional plan or in any relevant proposed regional plan, a resource consent, or regulations.	Section 15(1)(b)	$750
Richard Clark (second incident)	**Location:** Duthie Road, Section 24 Blk VIII Wyndham SD **Offence:** Allowed a contaminant, namely effluent, to be discharged into or onto land in circumstances which may have resulted in it entering water when it was not expressly allowed by a rule in a regional plan or in any relevant proposed regional plan, a resource consent, or regulations.	Section 15(1)(b)	$750

Issued to	*Offence*	*RMA Section*	*Fine*
S J & Y V Dennis	**Location:** Teviotdale Road, Isla Bank, Pt Secs 12 and 13 and Lot 1 DP 5320 Blk XIV Jacobs River HD **Offence:** Allowed a contaminant, namely effluent, to be discharged into or onto land in circumstances which may have resulted in it entering water when it was not expressly allowed by a rule in a regional plan or in any relevant proposed regional plan, a resource consent, or regulations.	Section 15(1)(b)	$750
William Affleck	**Location:** State Highway 96 at the intersection of Brydone and Glencoe Roads **Offence:** Allowed a contaminant, namely effluent, to be discharged into or onto land in circumstances which may have resulted in it entering water when it was not expressly allowed by a rule in a regional plan or in any relevant proposed regional plan, a resource consent, or regulations.	Section 15(1)(b)	$750
F W McDowall Limited	**Location:** State Highway 96 at the intersection of Brydone and Glencoe Roads **Offence:** Allowed a contaminant, namely effluent, to be discharged into or onto land in circumstances which may have resulted in it entering water when it was not expressly allowed by a rule in a regional plan or in any relevant proposed regional plan, a resource consent, or regulations.	Section 15(1)(b)	$750
Stuart Telfer	**Location:** 433 Benio Road, RD 1, Gore 9700 **Offence:** Allowed a contaminant, namely farm dairy shed effluent, to be discharged into or onto land in circumstances which resulted in it entering water when it was not expressly allowed by a rule in a regional plan or in any relevant proposed regional plan, a resource consent, or regulations.	Section 15(1)(b)	$750
Donald Kirk Moore	**Location:** 433 Benio Road, RD 1, Gore 9700 **Offence:** Allowed a contaminant, namely farm dairy shed effluent, to be discharged into or onto land in circumstances which resulted in it entering water, when it was not expressly allowed by a rule in a regional plan or in any relevant proposed regional plan, a resource consent, or regulations.	Section 15(1)(b)	$750
Leandro Pekar	**Location:** Waimea Valley Road, Balfour (Lots 18, 19, 20 DP 205 Null) **Offence:** Allowed a contaminant, namely effluent, to be discharged into or onto land in circumstances which may have resulted in it entering water when it was not expressly allowed by a rule in a regional plan or in any relevant proposed regional plan, a resource consent, or regulations.	Section 15(1)(b)	$750
Rex Robert Crosswell	**Location:** 522 Rimu Road, Kennington, Invercargill **Offence:** Allowed a contaminant, namely effluent, to be discharged into or onto land in circumstances which may have resulted in it entering water when it was not expressly allowed by a rule in a regional plan or in any relevant proposed regional plan, a resource consent, or regulations.	Section 15(1)(b)	$750
Slinkskins Limited	**Location:** Factory Road, Thornbury **Offence:** Allowed a contaminant, namely wastewater odour, to be discharged into air from an	Section 15(1)(c)	$1000

Issued to	*Offence*	*RMA Section*	*Fine*
	industrial or trade premise in a manner that contravened a rule in a regional plan or proposed regional plan, or that was not expressly allowed by resource consent or regulations.		
Lee James Apiti	**Location:** Channel Road, Hedgehope **Offence:** Allowed a contaminant, namely effluent, to be discharged into or onto land in circumstances which may have resulted in it entering water when it was not expressly allowed by a rule in a regional plan or in any relevant proposed regional plan, a resource consent, or regulations.	Section 15(1)(b)	$750
Warren David MacPherson	**Location:** Channel Road, Hedgehope **Offence:** Allowed a contaminant, namely effluent, to be discharged into or onto land in circumstances which may have resulted in it entering water when it was not expressly allowed by a rule in a regional plan or in any relevant proposed regional plan, a resource consent, or regulations.	Section 15(1)(b)	$750
Peter James Hughes	**Location:** Murray Road East, Thornbury **Offence:** Allowed a contaminant, namely effluent, to be discharged into or onto land in circumstances which may have resulted in it entering water when it was not expressly allowed by a national environmental standard or other regulations, a rule in a regional plan, as well as a rule in a proposed regional plan for the same region (if there is one), or a resource consent.	Section 15(1)(b)	$750
Wilma Zeestraten	**Location:** Nelson Road, Hedgehope **Offence:** Allowed a contaminant, namely effluent, to be discharged into or onto land in circumstances which may have resulted in it entering water when it was not expressly allowed for by a national environmental standard or other regulations, a rule in a regional plan as well as a rule in a proposed regional plan for the same region (if there is one), or a resource consent.	Section 15(1)(b)	$750
Ramon Zeestraten	**Location:** Nelson Road, Hedgehope **Offence:** Allowed a contaminant, namely effluent, to be discharged into or onto land in circumstances which may have resulted in it entering water when it was not expressly allowed for by a national environmental standard or other regulations, a rule in a regional plan as well as a rule in a proposed regional plan for the same region (if there is one), or a resource consent.	Section 15(1)(b)	$750
Warren David MacPherson	**Location:** Channel Road, Hedgehope **Offence:** Allowed a contaminant, namely effluent, to be discharged into or onto land in circumstances which may have resulted in it entering water when it was not expressly allowed for by a national environmental standard or other regulations, a rule in a regional plan as well as a rule in a proposed regional plan for the same region (if there is one), or a resource consent.	Section 15(1)(b)	$750
Brendan John Payne	**Location:** Waituna-Gorge Road, Gorge Road **Offence:** Allowed a contaminant, namely dairy shed effluent, to be discharged into or onto land in	Section 15(1)(b)	$750

Issued to	*Offence*	*RMA Section*	*Fine*
	circumstances which may have resulted in it entering water when it was not expressly allowed for by a national environmental standard or other regulations, a rule in a regional plan as well as a rule in a proposed regional plan for the same region (if there is one), or a resource consent.		
Danny Higgins	**Location:** Winton Hedgehope Road, Hedgehope **Offence:** Allowed a contaminant, namely effluent, to be discharged into or onto land in circumstances which may have resulted in it entering water when it was not expressly allowed for by a national environmental standard or other regulations, a rule in a regional plan as well as a rule in a proposed regional plan for the same region (if there is one), or a resource consent.	Section 15(1)(b)	$750
Douglas Martin Sixtus	**Location:** Winton Hedgehope Road **Offence:** Allowed a contaminant, namely effluent, to be discharged into or onto land in circumstances which may have resulted in it entering water when it was not expressly allowed for by a national environmental standard or other regulations, a rule in a regional plan as well as a rule in a proposed regional plan for the same region (if there is one), or a resource consent.	Section 15(1)(b)	$750
Lee James Apiti	**Location:** Channel Road, Hedgehope **Offence:** Allowed a contaminant, namely effluent, to be discharged into or onto land in circumstances which may have resulted in it entering water when it was not expressly allowed for by a national environmental standard or other regulations, a rule in a regional plan as well as a rule in a proposed regional plan for the same region (if there is one), or a resource consent.	Section 15(1)(b)	$750
Feather Holdings Limited	**Location:** 351 Orr Road, Balfour **Offence:** Allowed a contaminant, namely effluent, to be discharged into or onto land in circumstances which may have resulted in it entering water when it was not expressly allowed for by a national environmental standard or other regulations, a rule in a regional plan as well as a rule in a proposed regional plan for the same region (if there is one), or a resource consent.	Section 15(1)(b)	$750
Mr Todd Feather	**Location:** 351 Orr Road, Balfour **Offence:** Allowed a contaminant, namely effluent, to be discharged into or onto land in circumstances which may have resulted in it entering water when it was not expressly allowed for by a national environmental standard or other regulations, a rule in a regional plan as well as a rule in a proposed regional plan for the same region (if there is one), or a resource consent.	Section 15(1)(b)	$750
Foveaux Investments	**Location**: Hanson Road, Kapuka South, Invercargill **Offence**: Allowed a contaminant, namely effluent, to be discharged into or onto land in circumstances	Section 15(1)(b)	$750

Issued to	*Offence*	*RMA Section*	*Fine*
	which may have resulted in it entering water when it was not expressly allowed for by a national environmental standard or other regulations, a rule in a regional plan as well as a rule in a proposed regional plan for the same region (if there is one), or a resource consent.		
Craig Williams	**Location**: Hanson Road, Kapuka South, Invercargill **Offence**: Allowed a contaminant, namely effluent, to be discharged into or onto land in circumstances which may have resulted in it entering water when it was not expressly allowed for by a national environmental standard or other regulations, a rule in a regional plan as well as a rule in a proposed regional plan for the same region (if there is one), or a resource consent.	Section 15(1)(b)	$750
Blue Sky Meats	**Location**: 729 Woodlands Morton Mains Road, Morton Mains, Invercargill **Offence**: Allowed a contaminant, namely effluent, to be discharged into or onto land in circumstances which may have resulted in it entering water when it was not expressly allowed for by a national environmental standard or other regulations, a rule in a regional plan as well as a rule in a proposed regional plan for the same region (if there is one), or a resource consent.	Section 15(1)(b)	$750
John Adamson Jnr	**Location**: 408 Oporo Flat Road, Waianiwa **Offence**: Allowed a contaminant, namely effluent, to be discharged into or onto land in circumstances which may have resulted in it entering water when it was not expressly allowed for by a national environmental standard or other regulations, a rule in a regional plan as well as a rule in a proposed regional plan for the same region (if there is one), or a resource consent.	Section 15(1)(b)	$750
Michael Crooks	**Location**: 1103 Woodlands-Invercargill Highway, Woodlands, Invercargill **Offence**: Allowed a contaminant, namely effluent, to be discharged into or onto land in circumstances which may have resulted in it entering water when it was not expressly allowed for by a national environmental standard or other regulations, a rule in a regional plan as well as a rule in a proposed regional plan for the same region (if there is one), or a resource consent.	Section 15(1)(b)	$750

13.0 Abatement Notices

An abatement notice is the only formal directive prescribed by regulation requiring an individual or company to:

- cease an activity; or
- prohibit them from commencing an activity; or
- take an action.

Where non-compliance has been detected, the use of an abatement notice provides a clear warning that they need to stop what they are doing and/or take definitive steps to avoid, remedy or mitigate any actual or likely effect on the environment.

The timeframe set out in the abatement notice must be reasonable, to allow the parties to whom the abatement notice is issued to comply with the content of the notice.

A party that is the subject of an abatement notice must comply with the contents of the notice, but has the right to appeal to the Environment Court against the whole or any part of the notice. However, an appeal does not automatically stay the notice.

To obtain a stay, both an appeal and an application for a stay must be lodged with the Environment Court.

Abatement notices for the 2009/10 year were issued for the following activities:

Coastal issues	1
Air quality issues	4
Unauthorised discharges to land/water (dairy shed effluent)	15
Unauthorised discharges to land/water (sileage leachate)	3
Unauthorised discharges to land/water (other liquid effluent)	4
Unauthorised discharges to land/water (solid waste)	9
Non-provision of data	1
Over consented cow numbers	3
Installation of equipment as per consent	5
Total issues	**45**

Table 23 - Coastal compliance

Issued to	*Summary of Incident*
Brett Hamilton	**Location:** Boatshed A5044, located at Golden Bay, Stewart Island **Incident:** The ongoing state of disrepair of a boatshed and associated non-compliance with coastal permit had resulted in numerous letters and other communication between Environment Southland and the consent holder. Despite this the shed had not been repaired.

Table 24 - Air quality: unauthorised discharges

Issued to	*Summary of Incident*
Graham McDonald and Esmae Turvey	**Location:** 242 Pomona Street, Strathern; Lot 13 DP2341 **Offence:** It was confirmed that hedge trimming material was being burnt on this property and the associated smoke was confirmed to have gone beyond the boundary.
Takitimu Coal Limited	**Location:** Takitimu Coal Mine, situated at legal description Pt Section 7, Wairio SD **Incident:** A complaint was investigated relating to the deposition of dust and particulate matter from an industrial site occupied by Takitimu Coal Mine. The samples supported this. This was causing an adverse effect and was in breach of the conditions of the discharge permit.
David Alexander Hartman	**Location:** Part Lot 23 Deeds 123 **Incident:** Scrap automobile components containing plastic were being burnt for the purposes of recovering the metal, in a manner that contravened regional plan rules.
Rodney Clark	**Location:** 10 Margery Street, Riverton **Incident:** The odour from a carcass was reported and confirmed at this property. In the opinion of the enforcement officer, it had the potential to cause an objectionable and offensive odour beyond the boundary of the property in a manner that would impact on neighbouring property owners, or passers by.

Table 25 - Water quality: unauthorised discharges to land and to water (dairy shed effluent)

Issued to	*Summary of Incident*
Gowan Lea Holdings Limited	**Location:** The property situated at Pt Section 8 Blk XV Jacobs River HUN **Incident:** It was identified that the storage ponds did not hold the expected amount of effluent and that the floors had not been compacted to seal the pond. It was the inspecting officers' opinions that as a result effluent was escaping through the floor of the storage ponds and into the ground and associated water table.
Wairau Agribusiness Investment Ltd	**Location:** The property situated at 174 Tramway Road East, RD 3, Wyndham

Issued to	*Summary of Incident*
	Incident: An enforcement officer detected the contamination of a waterway as a result of effluent overflowing from a stone trap. Since then modifications have been made to the stone trap, however this is not sufficient to prevent effluent making its way to water in an overflow situation. A couple of months later, an enforcement officer inspected the stone trap and effluent pond area again. It was noted that the effluent pond was full and had again overflowed to the adjoining ground and had the potential to make its way to water.
I D & J D Dodds	**Location:** Pt Lot 59 DP 135 and Pt Sect 29 Waimumu Hundred **Incident:** An inspection of the effluent management systems was completed on this property. A significant over-application of effluent to land, which originated from the emergency effluent pond, was noted, as well as evidence that effluent from a cattle race was making its way to water.
Brendan John Payne	**Location:** Sections 4 & 5 Blk IX Oteramika HD, Sections 49, 50, 51, 54, 56, 93, 94 Blk VII Oteramika HD, Pt Section 54 Blk IX Oteramika HD, Pt Section 23 Blk IV Oteramika HD, Lots 1 & 2 DP 10466 and Sec 53 Blk IX Oteramika HD **Incident:** During an inspection of the property, a black plastic exposed tile was noted at the end of a pond of water, which was allowing water from that location to be discharged into an adjacent stream.
Jaesea Farms Limited	**Location:** 316 Ryan Road, Oreti Plains, Winton legally described as Lots 16- DP274 **Incident:** An inspection was carried out of the property and it was noted that there was effluent ponding outside the confines of the permitted containment system.
Feather Holdings Limited	**Location:** 351 Orr Road, RD 6, Gore **Incident:** During inspections it was recorded that the pond was at risk and had overflowed. It was noted that the pond needed to be kept at a lower level to avoid risk of overflowing to the adjoining paddock.
Tara-Rimu Farms Ltd	**Location:** School Road, Awarua, legally described as Block VIII, Campbelltown Hundred **Incident:** Numerous routine dairy inspections have identified heavy and/or over application of effluent to land with related ponding, which is indicative of an effluent system pressure problem causing the incorrect operation of the irrigator.
Rhonda K Raymond-Williams	**Location:** 153 Caesar Road, Invercargill **Incident:** During routine inspections of the property it was noted that there were various events of effluent over application to land, including over application of sludge and overflowing effluent containment.
Roger Whyte	**Location:** Dacre, legal description Sections 66-68 Block III Mabel Hundred Woodstock Farm Settlement – Gazette 58/697 **Incident:** During an inspection of the property the entrance of an exposed tile in a sump was identified. This was located at the effluent pond, as a stormwater diversion. This tile entrance had previously facilitated the discharge of farm dairy effluent to a nearby stream. The location and set-up of this system are considered to be of high risk of further farm dairy effluent discharges.
Kelvin Reed for Falcon Partnership Balfour Two	**Location:** Glenure Road Balfour, legally described as Part Section 351 353 BLK XX Hokonui Survey District **Incident:** During two inspections of the effluent disposal system it was noted that the concrete lining of the small pond was cracked. Loss of nutrients through the containment system falls

Issued to	*Summary of Incident*
	outside of the permitted activities of the discharge permit.
Mark V Harris	**Location:** 330 Otaramika Road, Invercargill **Incident:** Following a report, the property was inspected and it was confirmed that farm dairy effluent was discharged to land by a pipe, as the irrigator required repair. This had resulted in significant over application of farm dairy effluent to land that had a high risk of contaminants reaching water.
Valley View Holdings Limited	**Location:** Howe Road, Gore, legally described as Lot 1 **Incident:** During an inspection it was established that there was a direct discharge of effluent to land due to the effluent hose being removed from the containment tanks when the pump was not in operation. There was also evidence of effluent ponding around the area of the containment tanks. Effluent was being disposed of by means of a stationary irrigator, a method not specified in the consent application.
D A & C J Raymond for Kilmulhane Pastoral Trust	**Location:** Jaffray Road Otama, legally described as Sections 2 and 5 Block II Otama Survey District **Incident:** During an inspection it was established that the effluent pond had leaked, or overflowed, resulting in a saturated area around a corner of the pond. These concerns were also raised during previous inspections carried out by Environment Southland staff.
B D & N J Clark & Hokonui Trustees Ltd for the B D & N J Trust	**Location:** Island Edendale Road, legally described as Lot 2 DP 1164 and Section 2 Block XVI Oteramika HD **Incident:** During an inspection it was established that the effluent pond had overflowed and effluent had accumulated in an area to the south east of the dairy yards. These concerns were also raised during previous inspections carried out by Environment Southland staff.
Stevenson Farm Company Ltd	**Location:** Section 34, Part Section 100 Block II Oteramika Hundred **Incident:** Since surrendering the consent there have been two noted incidents where dairy effluent has overflowed from the sump to land in circumstances where it may get to water. Samples taken have supported that the discharge contained dairy shed effluent.

Table 26 - Water quality: unauthorised discharges to land and to water (silage leachate)

Issued to	*Summary of Incident*
JWM Adamson (Jnr)	**Location:** Part Sections 24 and 25 Block XIV New River Hundred **Incident:** During an inspection, the silage stack was noted to be emitting leachate which was not contained and was making its way across land to a drain going to a road side ditch.
Southern Friesians Limited	**Location:** That land by legal description being Pt Sections 58, 67,68,70,73, Sections 69,71B,72A,72 B, 73 B Block IX New River Hundred and Part section 56 , section 57 & 58 Block XIII New River Hundred and Part lot 2 DP 2050, Lot 1 DP 14505 **Incident:** Silage leachate was discharging to ground at the end of a silage stack on Nelson Road. An abatement notice had been issued and a verbal agreement reached, but no action was taken.
A D Gunn	**Location:** Lots 105 and 106 DP 115, Lot 1 DP 9434 Section 73 Block VI Oteramika Hundred **Incident:** Silage leachate originating from a silage stack was

Issued to	*Summary of Incident*
	contaminating a nearby waterway. A second issue of contaminants, such as mud, was being created by movement of tractors to and from the stack which, when mixed with surface water and rain, ran into the nearby waterway.

Table 27 - Water quality: unauthorised discharges to land and to water (other liquid effluent)

Issued to	*Summary of Incident*
Lowe Corporation Limited	**Location:** That area of the Mataura Industrial Estate occupied by Lowe Corporation **Incident:** A complaint was reported, and confirmed, relating to a red coloured discharge from a skins processing plant.
Jaesea Farms Limited	**Location:** Lots 16- DP274, Ryan Road, Winton **Incident:** An inspection was carried out of the property and it was noted that sewage/grey water was leaking from a pipe close to the house. This was leaking down the bank and ponding alongside the dairy track/lane.
Central Sale Yards Limited	**Location:** Lots 2 and 3 DP 6488 Hokonui District CT B3/400 **Incident:** Central Sale Yards Limited was issued with a resource consent (namely Discharge Permit 98172) to discharge wash water to land via a settling pond from 28 April 1999; expiring on 21 May 2009. After this date, an officer inspected the property and found that wash water/effluent was flowing out of the settling pond, onto land and making its way to water.
A G Hoffman Limited	**Location:** 27 Basstian Street, Prestonville, Invercargill **Incident:** The wash down area at A G Hoffman Limited was inspected and found to contain a large pile of dirt within the bunded wash down area. The silt trap was completely full of sediment, to the point where it no longer was capable of effectively performing its intended function. As a result, sediment was being carried away to eventually be discharged to water.

Table 28 - Unauthorised discharges to land and to water (solid waste)

Issued to	*Summary of Incident*
RSJ, P J and M J Hargest trading as RSJ Hargest & Sons	**Location:** The property described as Lot 62 DP 135 **Incident:** It was noted during a routine inspection that RSJ Hargest & Sons and/or its contractors had allowed unauthorised materials to be placed into the cleanfill site, in breach of the conditions of its resource consent (number 203180).
R & M Hishon	**Location:** 733 Drummond – Otautau Road **Incident:** The site was used as an unlawful landfill site that contravened Rule 4.5.3 in the Solid Waste Management Plan for Southland and the Resource Management Act 1991. Industrial waste, other than waste produced as part of the farming operation, had been dumped in a gully head.
J A & V A Gorton	**Location:** 250 Orion Road East **Incident:** A report of offal and solid waste being disposed of in a manner that contravened Regional Plan rules was confirmed.

Issued to	*Summary of Incident*
J W McDougall	**Location:** 1028 Dipton Winton Highway, Winton **Incident:** A report was received and confirmed that offal and solid waste were being disposed of in a manner that contravened Regional Plan rules.
Fertiliser New Zealand Limited	**Location:** 1028 Dipton Winton Highway, Winton **Incident:** A report was received and confirmed that offal and solid waste were being disposed of in a manner that contravened Regional Plan rules.
RSJ, P J and M J Hargest	**Location:** The property described as Lot 62 DP 135 **Incident:** The information required by the conditions of the solid waste discharge permit has not been provided for the periods ending December 2008 and December 2009.
RSJ, P J and M J Hargest	**Location:** Charlton, Gore and legally described as Lot 62 DP 135 **Incident:** Non-compliance with solid waste discharge permit conditions, specifically that the consent holder shall restrict access to the land filling area to prevent discharges of unauthorised materials.
Oreti Plains Agriculture Limited	**Location:** Proctor Road, Drummond legally described as Sections 113 Blk V, Section 106 Blk VI, Oreti HD **Incident:** Following a report from an aerial inspection, this property was inspected for the unauthorised disposal of refuse and offal to water. This was confirmed.
Oporo Farm Limited	**Location:** The property situated at the junction of Lincoln and Oporo Flat Road, Oporo legally described as PT LOT 1 DP 6427 BLK XIV New River HD **Incident:** Following a report received by the pollution hotline, this property was inspected and it was confirmed that there was an unauthorised disposal of refuse, sludge, hedge clippings and offal to water.

Table 29 – Non provision of data

Issued to	*Summary of Incident*
The Manager AJ Crooks and Co Ltd	**Location:** 1103 Woodlands Invercargill Highway, Long Bush **Incident:** Farm Management Plan had not been prepared, or presented to this council by the required date, as per the conditions of the discharge permit.

Table 30 – Over consented cow numbers

Issued to	*Summary of Incident*
AJ Crooks and Co Ltd	**Location:** 1103 Woodlands Invercargill Highway, Long Bush **Incident:** It was reported that effluent from 240 cows, in excess of that allowed per the conditions of the resource consent, was being disposed of.
HKT Holdings Limited	**Location:** 850 Ohai-Clifden Highway **Incident:** Believed to exceed the 280 cow numbers allowed by the resource consent for the disposal of effluent to pasture.
The Manager A J Crooks and Co Limited	**Location:** 1103 Woodlands Invercargill Highway, Long Bush **Incident:** The conditions of the discharge permit and an advisory letter stated that, by 1 May 2010, the consent holder

Issued to	*Summary of Incident*
	should provide at least 4,800 m3 of effluent storage, to accommodate the increase in volume of dairy shed effluent due to the increase in cow numbers. During an inspection it was established that the dairy shed effluent from 1470 cows was being disposed of.

Table 31 – Installation of equipment, per consent conditions

Issued to	*Summary of Incident*
A J Crooks and Co Limited	**Location:** 1103 Woodlands Invercargill Highway, Long Bush **Incident:** It was a requirement of the discharge permit that 3600 m3 of effluent storage be provided and that an alarm and automatic switch off system be installed; neither of these issues had been addressed.
AJ Crooks and Co Limited	**Location:** 1103 Woodlands Invercargill Highway, Long Bush **Incident:** During a routine inspection it was established that effluent storage and a fail safe system has not been installed, as required by the discharge permit.
Gilbert Andrew Watt	**Location:** 433 Dunn & Cody Road, Riversdale **Incident:** The effluent pond at this property was inspected and it was established that the pond was not constructed in accordance with conditions of the relevant discharge permit.
B C & F M Wallace	**Location:** 307 Okapua Road, Knapdale **Incident:** The effluent pond at this property was inspected by Environment Southland staff and it was established that the pond was not constructed in accordance with the conditions of the discharge permit.
Southern Friesians Limited	**Location:** Nelson Road Winton, legally described as Part Sections 59 60 71B-73B Block IX New River Hundred **Incident:** The disused bore E46/0383 needed to be purged, flushed and capped in order to make it suitable for groundwater testing.

14.0 Prosecutions

Table 32 – Prosecutions

Defendant	*Case*	*Decision*
Richburn Dairies	**Charge:** Dairy effluent discharge - pleaded guilty to breaching Section 15(1)(b) of the Resource Management Act 1991.	Fined $14,000
Hishon	**Charge:** Court documents were filed for unconsented drainage of a wetland. This matter has been resolved through the Court, with the prosecution withdrawn and an enforcement order has been granted by the Court, requiring the defendant to fulfil their consent obligations.	Prosecution withdrawn and attained enforcement orders.
B M Adams	**Charge:** Plead guilty to a dairy effluent discharge.	Fined $12,000 and costs of $264.
Glenkylie Dairy Farm Limited	**Charge:** Mr Pieper (farm worker) sought leave to withdraw his earlier guilty plea, which was granted by the Court. The charge against him was withdrawn. The defendants, Glenkylie Dairy Farm and Mr Craig Stevenson, pled guilty to two charges that they discharged contaminants namely dairy effluent, on to land in circumstances where the contaminants may have entered water.	Fined $17,000 (company) and $13,500 (Craig Stevenson).
N & Y Jefcoate	**Charge:** Mr Jefcoate pleaded guilty and was sentenced on a charge of contravention of an Abatement Notice that required him to remove concrete rubble and related materials from the Coastal Marine Area.	Fined $5,500 and enforcement ordered.
P Pullar and Summit Earth Moving Limited	**Charge:** Mr Pullar pleaded guilty to the charge of bed disturbance of a river. Upon entering the guilty plea, Environment Southland withdrew the charge against Summit Earthmoving Limited. In addition to the fine, an enforcement order was sought from the Court requiring Mr Pullar to submit a complete consent application for the damming of the waterway and to investigate the use of the dammed water and submit a consent application, if required.	Fined $8,000, plus costs $1,160. Charge against Summit Earthmoving Limited was withdrawn.
McNeill's Poultry	**Charge:** Court documents were filed alleging an unauthorised discharge to air, namely odour, on a number of occasions.	It was found there was no case to answer and the charges were dismissed.
Union Station	**Charge:** Court documents were filed alleging an unauthorised discharge to water.	Fined $50,000 and $11,000
Sommers-Edgar	**Charge:** Sommers-Edgar was found guilty on a charge relating to deer having access to a waterway that resulted in severe	Fine $6,000 and charged $130 Court costs, $173

Defendant	*Case*	*Decision*
	disturbance of the banks and discharges to the waterway. The defendant pleaded guilty to the charge. Simultaneously, a hearing was held to address three charges that were laid by the Department of Conservation under the Conservation Act.	solicitors fee and $936.02 Council investigative costs.
Colin Christie	**Charge:** A prosecution against Mr Christie was considered, for the discharge of sediment to a waterway after he cultivated a significant portion of his property. Further consideration of the matter resulted in staff withdrawing the proceedings, when it was determined that Land Sustainability staff may be able to achieve a better outcome.	Withdrawn
Prime Range Meats	**Charge:** The company pled guilty and was sentenced on four charges of unlawful discharge of a contaminant, namely odour.	Fined $54,000
Ocean Beach Properties	**Charge:** Court documents were filed alleging an illegal discharge into the Coastal Marine Area, however these have subsequently been withdrawn. Information received by Council suggested that further court action was unlikely to result in Council recovering costs.	Withdrawn
Navillus Farms Limited and Mark Sullivan	**Charge:** Navillus Farms Limited and Mark Sullivan pled guilty and were sentenced on charges relating to a discharge of a contaminant, namely dairy shed effluent, on to land where it may have resulted in entering water.	Fined $40,000 (company) and Mark Sullivan received 100 hrs community work.

Three incidents during the year were withdrawn. In one case an enforcement order was sought instead. In the two other cases legal advice was sought by Council, however it was recommended that there would be no financial benefit likely to result from proceeding with these charges.

The Summary Proceedings Act Argument

Court proceedings were delayed this year due to a legal argument relating to the Summary Proceedings Act (Wallace Corporation Limited vs. Waikato Regional Council).

Three appellants (including Wallace Corporation Limited) had previously been found guilty and convicted, but now argued that the prosecution was invalid. They argued that the Regional Council had not obtained leave of a District Court Judge or Registrar pursuant to Section 21(1)(a) Summary Proceedings Act 1957 (SP Act). They therefore claimed that the previous convictions were not permitted under Section 78A SP Act.

The Court found that the prosecution brought by the Waikato Regional Council against each of the three appellants was not invalid and that leave, pursuant to Section 21 SP Act, was not required.

The court further found that Section 78A SP Act does not apply to the prosecutions brought by the Waikato Regional Council against each of the appellants and, therefore, the conviction entered against each does not contravene Section 78A.

Previously, on 13 November 2009, the District Court in Bay of Plenty RC v PF Olsen Limited reached similar findings.

Following the decisions in the District Court and High Court, Environment Southland was able to proceed with prosecutions. However, an appeal has since been made against the decision of the High Court and is presently being heard. Although other councils have been seeking leave under Section 21 (leave of a District Court Judge or Registrar to commence proceeding by way of prosecution, rather than infringement notice), Environment Southland has not. Environment Southland's legal advisor has determined that the High Court cases (which is the law until, or if, the Court of Appeal overturns the decisions) makes it unnecessary.

Glossary

AFDW	Ash free dry weight - used for periphyton monitoring to remove any sediment included in the sample.
ANZECC	The Australia New Zealand Environmental Conservation Council. This organisation is developing guidelines similar to the USEPA but applicable to the Australian and New Zealand situations.
BOD_5	Biochemical Oxygen Demand - this is a measure of the ability the waste has to remove Dissolved Oxygen from a receiving water or waterway by decomposition.
CFU	Colony Farming Units.
Chl *a*	Chlorophyll *a* - the pigment in plant cells which captures light energy for photosynthesis.
DAF Unit	Dissolved Air Flotation unit where air is pumped into the effluent under pressure. When it discharges into the unit under atmospheric pressure the dissolved air comes out of suspension and forms bubbles on any particulate matter. This then floats and is removed as a sludge.
DRP	Dissolved Reactive Phosphorus - DRP is a subgroup of the Total Phosphorus and is an arbitrary measure of the phosphorus that is readily available to the plants to sustain growth.
dsm^3	Dry standard cubic metre - this is used for determining the contaminant levels in exhaust gases by standardising temperature and pressure, and removing the effect of variable water contents.
E. coli	Escherichia coli - these are a subset of the Faecal Coliform group and are regarded as a more specific indicator of faecal contamination and hence the presence of pathogenic bacteria.
EC	Electrical Conductivity - the ability of a water to conduct electricity. This gives a conservative measure of the mineral content of a water. Generally, the greater the conductivity of the water the greater the mineral content of the water.
Faecal Coliforms (FC)	Faecal Coiforms - these are organisms that are present in the gut and faeces of warm blooded animals and are used as indicators of the presence of pathogenic organisms.
g/m^3	A measure of concentration in a liquid or gas. Grams of material in 1 cubic metre of water.

HFA	Hydrofluoric Acid.
IANZ	International Accreditation New Zealand.
ISO	International Organisation of Standardisation.
ISO 1400 1	A standard produced by ISO defining the requirements for an environmental management system.
LTCCP	Long-term Council Community Plan. This is a document projecting Council activities, as required by the Local Government Act 2002.
mg/kg	Unit to measure concentration in a solid (equivalent to ppm (parts per million) or g/m^3 the unit used to measure concentrations in liquids).
MLTR	Makarewa Low Temperature Rendering plant.
MPN	Most Probable Number – a statistical estimate of the mean density of bacteria in a water sample.
N	Nitrogen - Nitrogen is an important element in the growth of plant material. It is required for protein formation and consequently animals have a significant N content.
NH4-N	Ammonical Nitrogen, ionised ammonia - a reduced form of nitrogen. Ammonia is rarely found at high levels in natural waters. Its presence is an excellent means of detecting pollution.
NH_3	Unionised ammonia, ammonia - this form of ammonia is significantly more toxic that the ionised form as above. The relationship between the ionised and unionised forms is dependant on temperature and pH of the water.
Nitrate-N	An oxidised form of Nitrogen - Nitrate Nitrogen is soluble and is therefore readily available to plant life to sustain growth.
Odour Units (OU)	This is the unit for measuring odour. This unit does not refer to weight or volume as with g/m^3 etc, it is essentially based on the group of people being used, to establish the number of dilutions required before an odour cannot be detected.
PAH	Polycyclic Aromatic Hydrocarbons - a class of over 100 different organic molecules composed of only carbon and hydrogen. PAHs are flat molecules with each carbon having three adjacent carbon atoms similar to the structure of graphite. The USEPA has listed 16 of these as priority chemicals due to their potential health effects.
PM_{10}	Particulate Matter with the aerodynamic particle size of 10 Micrometers or less.
TP	Total Phosphorus - Phosphorus is an important element in the growth of plant material. Total Phosphorus is a measure of all phosphorus present, including all forms of

	phosphorous whether it is tightly bound to particulate matter or potentially available to plant life.
TSS	Total suspended solids.
µg/m^3	A measure of concentration in a liquid or gas. Micrograms of material in 1 cubic metre of water. 1 gram = 1,000,000 micrograms.
USEPA	United States Environmental Protection Agency. The USEPA provides the environmental regulation within the United States. Its data and standards are frequently used as the internal standards by other countries such as New Zealand.