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Stockton revisited: The mine and the regulatory minefield

October 2009



Parliamentary Commissioner
for the **Environment**

Te Kaitiaki Taiao a Te Whare Pāremata

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Photography

Cover: Coal seam at Strongman mine. Parliamentary Commissioner for the Environment archives.

Part A: Stockton mine circa 2000. Solid Energy.

Part B: Denniston. Brian Greenwood.

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Commissioner's overview

Mining on the West Coast of the South Island has long played a major role in New Zealand history. My great-great-grandfather was a gold miner on the coast, although he rather self-importantly called himself a mining engineer. In 1879, the Denniston Incline began operating, carrying coal from the Mount Rochfort Plateau down to the railhead in a bucket suspended on a wire cable. It is said that some wives, having travelled up this terrifying incline, never left the plateau again. In 1908, the strike by the Blackball miners led to the birth of the Labour Party in a pub two years later.

I feel a sense of history, albeit much more recent, in releasing this investigation.

In 1988, the first Parliamentary Commissioner for the Environment, Helen Hughes, became concerned about the environmental conditions in the coal mining licences being transferred to the Coal Corporation, a new state-owned enterprise. In 1992, she expressed her concerns more fully in a report on the environmental management of coal mining. Four years later, the Coal Corporation became Solid Energy NZ Ltd.

In 2005, the second Parliamentary Commissioner for the Environment, Dr Morgan Williams undertook a scoping study on Solid Energy's environmental management systems and performance. In the resulting report in 2006, he made a commitment to investigate the environmental management of Solid Energy's mine at Stockton on the West Coast of the South Island.

In 2008, as the third Parliamentary Commissioner for the Environment, I followed up on that commitment. However, this investigation has turned out to be rather more than just a review of the environmental management of one large coal mine. In traversing the 'minefield' of the old regulatory regime that still governs many of the mines in this country, I found myself echoing some of Helen Hughes' concerns seventeen years later.

Stockton mine is the largest coal mine in New Zealand and it is located in an area which presents huge challenges to any environmental manager. The discovery of the endangered giant snail, *Powelliphanta augusta*, and the subsequent relocation programme, have dominated media coverage about the impact of the mine on the environment. That issue is not recanvassed in this report; rather the focus is on the physical environment as the cradle of the ecosystem.

Average rainfall on the Stockton Plateau exceeds six metres per year. The streams in the area are naturally acidic, and mining exacerbates this because sulfide minerals exposed through mining are oxidised and sulfuric acid is formed. This 'acid mine drainage' is one of the most significant environmental effects of coal mining in general, and for Stockton mine in particular. And it is of special interest, since water quality is a major environmental issue in New Zealand.

Given the great concern about climate change and the carbon dioxide emitted through burning coal, I cannot be enthusiastic about coal mining. However, putting these concerns to one side, I am pleased to report that Solid Energy now has a well-established and comprehensive Environmental Management System at Stockton mine to manage the impacts of its mining operations on the surrounding

environment. This conclusion is supported by some improved outcomes. Regular monitoring of the Mangatini Stream over two recent years shows a dramatic reduction in the concentration of total suspended solids in the water. Over the same period, the Ngakawau River has become much less acidic, with the average pH rising from 4.4 to 6.2.

Nevertheless, this investigation has drawn my attention to the persistence of the old regulatory regime for mining. Over a hundred mining licences granted prior to the 1991 enactment of the Resource Management Act and the Crown Minerals Act continue to apply until they expire. In one case, this is not until 2062.

There are two sets of issues associated with these old mining licences. The first is that the environmental conditions in, and associated with, the licences were written decades ago and many will be outdated. The second is that enforcement of these conditions is fraught with difficulties and inconsistencies. Stockton mine operates under one of the old mining licences, but just because the environmental management of this one mine has improved markedly, it does not follow that other mines with old licences will be.

In September this year, just as this report was being finalised, the possibility of a more permissive approach to mining on land managed by the Department of Conservation (DoC) was raised by the Minister of Energy and Resources. Anticipating questions about this, we found that of the 111 mining licences granted under the old regime, at least 55 include DoC land, although none of it is land on Schedule 4 of the Crown Minerals Act. However, some of this conservation land may be inadequately protected.


The extent of the environmental damage caused by mining is, of course, dependent on many factors. In general, opencast or strip mines, like Stockton, are more damaging than underground mines. Mines that lead to exposure of sulfide minerals to the air acidify streams and groundwater, and thus environmental damage can extend far beyond mine boundaries. A gold mine that leaves cyanide residues in streams is worse than a quarry that leaves sediment in streams.

Another issue is 'orphan' sites, where mines cease operation and are abandoned, leaving remediation costs to be borne by taxpayers and ratepayers. For example, Tui mine on Mount Te Aroha was abandoned in 1975 by Norpac Mining Ltd. Part of its legacy is a large tailings pile; in 1980 the Hauraki Catchment Board had to build a gravel embankment to prevent it slipping down the mountainside. The Ministry for the Environment is now spending nearly ten million dollars on further remediation of Tui mine. Environment Waikato and Matamata-Piako District Council are also contributing resources to dealing with this 'orphan' site.

This is a major reason why the greatly improved environmental management of Stockton mine by Solid Energy is not a basis for assuming that there is no problem. Solid Energy may well be acting as a 'good citizen' and going beyond the environmental requirements associated with 'old' mining licences, but it is a state-owned enterprise in New Zealand for the long haul. Private companies are in a different position, and face different incentives and options such as liquidation. Solid Energy can sell 'old' mining licences to private companies and indeed may itself one day be privatised, although the Government has indicated no plans in the short term.

The writing of this report has confirmed for me the complexity of issues that surround mining. Mining of some minerals and other resources will continue to be a part of New Zealand's future, but we must ensure that it is done with far more sensitivity, discrimination, and good environmental management than it has been done in the past.

As always, I would like to thank the staff who worked on this investigation, especially the tenacious Shaun Killerby. His long memory and interest in history have been particularly valuable.

A handwritten signature in black ink, appearing to read 'J. C. Wright'. The signature is written in a cursive style with a large initial 'J' and 'W'.

Dr Jan Wright
Parliamentary Commissioner for the Environment



1

Introduction

Mining has played an important part in New Zealand's history. From Māori use of pounamu for tools, weapons and ornaments to the European pursuit of gold and coal, people have sought to use the mineral resource that the land has provided.

In the 1860s, gold rushes enticed thousands of men into remote areas in Otago, the West Coast, and the Coromandel. By 1870, gold, silver, copper, lead and iron had all been discovered, and the main goldfields and coalfields had been identified.¹

In the 1870s, a thriving coal industry was seen as the basis for New Zealand's industrial future. Coal was essential to Julius Vogel's expansionist immigration and transport policies.² It seems that the domestic production of energy and security of supply, then as now, was considered a priority.

While the production of gold varied, peaking around the turn of the century, the amount of coal produced continued to grow. One million tonnes of coal in 1900 doubled to 2 million tonnes by 1910, climbing to 4 million tonnes by 1980.³

The total value of mining output (excluding oil and gas) increased steadily after the Second World War, and exceeded a billion dollars for the first time in 2004.⁴

Recently, in August 2009, a public debate began on the environmental impacts of mining after the Minister for Energy and Resources stated his interest in "unlocking New Zealand's mineral potential", and initiated a stocktake of minerals on some of the land managed by the Department of Conservation.⁵

1.1 Purpose and structure of this report

This is a report to the House of Representatives pursuant to sections 16(1)(a-c) of the Environment Act 1986.

The report is structured into two parts, because it deals with aspects of mining on two very different levels. Some readers will be more interested in the detail about one particular mine which is the subject of Part A: Stockton revisited. Others will be more interested in Part B: The regulatory minefield. Part B deals with national legislative and policy issues that have the potential to affect the environmental management of many mines for years to come.

Part A deals with the original purpose of the investigation – an assessment of the progress toward improved environmental management and performance at Stockton mine. It is divided into three chapters.

Chapter 2 provides a description of the physical environment under which the Stockton mine operates.

Chapter 3 describes the steps taken by Solid Energy to improve the environmental management of Stockton mine.

Chapter 4 examines the environmental results being achieved at Stockton mine with a particular focus on water quality.

Part B contains an examination of the regulatory regime continuing to have effect under the transitional provisions of the Crown Minerals Act 1991 and the transitional provisions of the Resource Management Act 1991. It is divided into two chapters.

Chapter 5 describes the detail of the old regulatory regime. Although this regime predates both the Resource Management Act and the Crown Minerals Act, it still persists in the form of over a hundred mining licences. Various issues are discussed, such as the difficulty of updating and enforcing environmental conditions associated with the licences.

Chapter 6 contains conclusions and recommendations for change from the Commissioner. It begins with a commendation for Solid Energy's improved management of Stockton mine. All the recommendations focus on the issues discussed in Chapter 5.

1.2 Background - how this report came to be

Between 2001 and 2005, Dr Morgan Williams, the second Parliamentary Commissioner for the Environment, received several complaints regarding coal mining in New Zealand. In particular, these concerned potential environmental impacts from mines operated by the state owned enterprise, Solid Energy NZ Ltd.⁶

In a scoping report,⁷ Dr Williams resolved that the environmental management at the Stockton opencast coal mine required closer scrutiny. Environmental issues at other mines were also seen as important, but Stockton mine was chosen as the focus of further investigation for various reasons including its size, location, and the level of public concern.

Since Solid Energy and the West Coast Regional Council were putting measures in place to try and resolve the issues that had been raised, Dr Williams put further investigation on hold. In 2008, the current Parliamentary Commissioner for the Environment, Dr Jan Wright, decided to complete the investigation.⁸

While writing up the results of the investigation it became clear that other matters beyond the management of this one mine needed addressing. The wider regulatory framework within which mining operates could not be ignored, and so the investigation was extended to a national level.

Seventeen years ago, the first Parliamentary Commissioner for the Environment, Helen Hughes published a report on coal mining,⁹ and identified a number of issues and problems associated with the regulatory system for the environmental management of coal mining. To a large extent her concerns are reflected in this report.

What this report does not cover

Historical environmental performance at Stockton mine has not been evaluated.

The implications of possible future activities within the Stockton coal mining licence, such as a proposal to construct a hydroelectricity generation system from the Stockton Plateau, have not been evaluated.

Regulatory issues associated with petroleum mining and seabed mining have not been addressed as part of this report.

The wider issue of the carbon dioxide generated from the combustion of coal is being addressed through other work on energy and climate change being undertaken by the Commissioner.



Part A: Stockton revisited





2

Stockton mine: Where, what and how

2.1 Location of Stockton mine

Stockton mine is on a plateau between 400 and 1100 metres above sea level, and is located around 30 kilometres north of Westport in the South Island (Figure 2.1). Access is by way of a public road from the small seaside settlement of Granity. It is an historic mining landscape, with miners digging out coal for well over a century, and Stockton has operated as an open-cast mine since the 1950s.¹⁰

About 500 people are employed at the mine and up to another 200 consultants and short-term contractors work there at times. Other local and national businesses derive substantial income from work relating to the mine.

The area covered by Stockton's coal mining licences is over 2,500 hectares¹¹ – about three thousand times the size of the rugby field at Eden Park. The licence does not expire until March 2027.

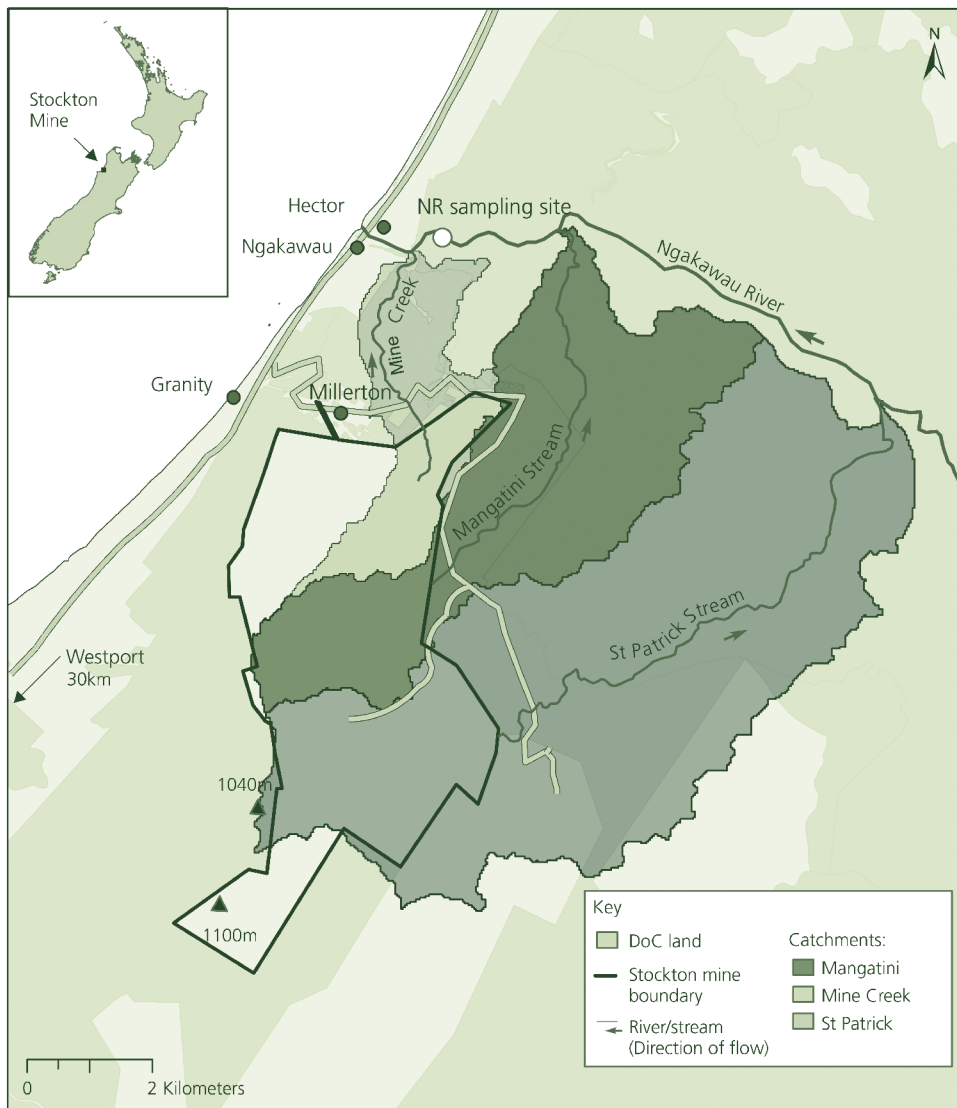
2.2 The physical environment

The West Coast of the South Island is known for its rain. The region around Stockton mine itself experiences particularly high rainfall compared to other parts of the country, with over six meters of rain falling each year. As a result, streams draining from the plateau have high flow rates, and frequently flood.

There are three major stream catchments within the area covered by the Stockton coal mining licences – the Mine Creek, Mangatini Stream and St Patrick Stream (Figure 2.1).^{12,13} These streams all flow northward into the Ngakawau River, which flows westward to the Tasman Sea.

Vegetation on the plateau is sparse. The soil is of poor quality, as well as being shallow over the basement rock.

Figure 2.1 Map of the Stockton mine area



Source: Parliamentary Commissioner for the Environment¹⁴

2.3 Mining coal at Stockton

The qualities of coal

Coal is the world's most plentiful fossil fuel, and while the term 'coal' is used to describe a variety of fossilised plant materials, no two coals are exactly alike. There are four main classifications of coal. Anthracite is the most valuable, followed by bituminous coal, then sub-bituminous coal, and finally, the least valuable – lignite (or 'brown coal'). Characteristics such as energy content, levels of sulfur and impurities, mechanical strength, and other chemical and physical properties vary.

The coal from Stockton mine

The coal found at Stockton mine is bituminous coal. The seam from which the coal is extracted produces bituminous coal of varying qualities. It generally has high ash and high sulfur content in the top and bottom layers, with low ash and low sulfur content sandwiched in the middle.¹⁵

More than half of the annual production is sold for export, with the coal being used as a specialist product for steel-making. Because it is of high quality, it is used in the manufacture of carbon fibre, filters and catalysts.¹⁶

How is coal mined at Stockton?

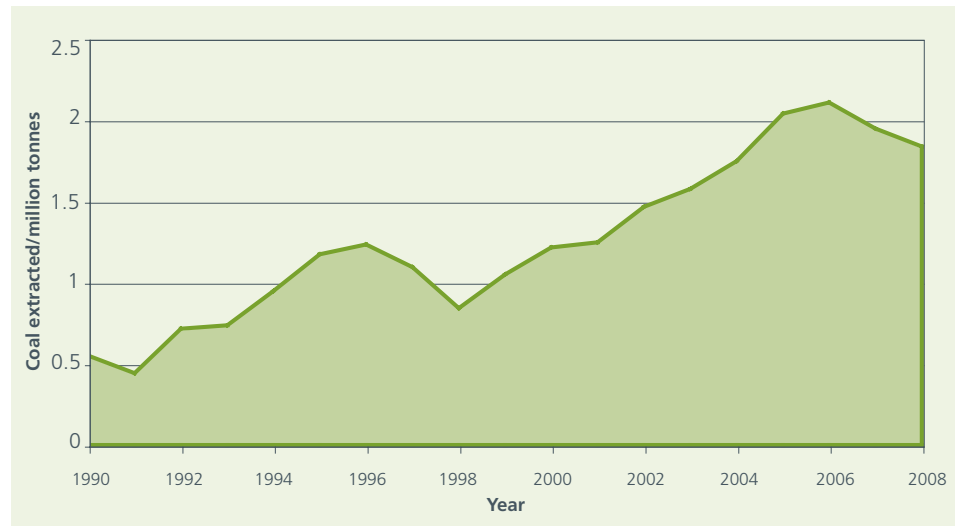
Within the mine coal is taken from various locations to meet various specifications. The coal generally sits within one mineable seam that is 4 to 15 metres thick, with a layer (up to 35 metres) of quartzose sandstones and grits above. This material also has a high concentration of sulfur minerals, which when exposed to air and water release acid.

The coal is extracted using opencast mining. Topsoil and vegetation are removed and placed in specific rehabilitation areas. The overlying sandstone is then blasted away using explosives, removed by excavator and truck, and placed in nearby already mined areas ready for rehabilitation. An excavator then extracts the coal, which is blended to required qualities and specifications. The coal is transported by truck and aerial ropeway down to the Ngakawau coal handling facility and rail terminal. Coal to be exported is then shipped to either Westport or Lyttleton.¹⁷

2.4 Trends in the amount of coal removed

Coal has been mined at Stockton for over a century. By 1985, it is estimated that about one million tonnes of coal had been excavated from the mine,¹⁸ and by 1990, half a million tonnes of coal were being mined each year from Stockton.¹⁹ Since the early 1990s, Solid Energy has greatly increased the rate of coal removal, and over the last five years has taken about two million tonnes per year²⁰ from the mine (Figure 2.2).

Figure 2.2 Annual coal extractions from Stockton mine 1990-2008²¹



Data source: Solid Energy

About five million tonnes of low quality coal from Stockton mine have been stockpiled and could be processed,²² and about ten million tonnes of economic reserves of coal remain in the mine. In addition, there is more than a hundred million tons of proved or likely reserves.²³

At the current price of coal and rates of extraction, mining activity at Stockton may continue for another ten or so years. There are other existing or planned mines in the immediate area that are likely to ensure that local coal production occurs into the foreseeable future.

2.5 Acid mine drainage

While the changed landscape appears to be the main environmental impact of the mining at Stockton, the effect on local water quality is extremely significant.

Even in the absence of mining, the region is inclined to an acidic state. Streams draining from the undisturbed areas containing coal are naturally acidic, with pH ranging from 3.5 to 4.5.²⁴ However, the exposure of coal and the associated material removed through mining increases acidity, by adding to the acid mine drainage from underground workings, open pits and waste rock dumps.

There are many stream channels on the Stockton plateau, and the combination of sparse vegetation and shallow soil means that there is little to help buffer pH levels in the streams, especially when runoff is high. The water becomes even more acidic and contains more sulfate.²⁵

In addition, acid mine drainage increases the amount and number of metals leached from the surrounding rock (such as iron, aluminium, manganese, nickel and zinc), increasing the dissolved metal concentrations.

The effects of acid mine drainage on freshwater systems can be severe. These effects include a lower count or complete absence of stream invertebrates, fish, crayfish and eels in affected waterways.²⁶

Run-off from the Stockton Plateau has been modified for some time by acid drainage from the historic mine workings. However, the escalation of mining activity at Stockton from the early 1990s has exacerbated the environmental problems.



3

Environmental management and processes

When the previous Commissioner, Dr Morgan Williams, undertook his scoping study he identified a number of aspects of the operation at Stockton mine which would be part of an audit process to examine “how well the company’s environmental management plans are working.” The aspects which he planned to pursue were: water quality, site rehabilitation, compliance monitoring and enforcement, Solid Energy’s community consultation and any other issues identified during the investigation. They form the basis for this evaluation.²⁷

3.1 Solid Energy’s environmental management solution

In 2004, Solid Energy stated in its annual report that: “In the past, some of our mining activities have fallen well short of environmental best practices,” and followed this with a public commitment to improve its environmental management and performance. As a result, an Environmental Management System (EMS) was implemented, along with the development of various engineering solutions.

How does the Environmental Management System work?

The EMS is a set of management procedures and tools that gives a structured approach to identifying and managing the significant environmental effects of mining.²⁸

In order to determine whether there was “continuous and demonstrable improvement in environmental performance,”²⁹ centralised databases for all of Solid Energy’s mines were created. All licence, consent and permit details are now listed on site databases to provide more clarity around the environmental compliance requirements at each mine. Dedicated monitoring databases were also set up to record environmental monitoring results relating to each licence, consent or permit.

These databases are a key tool for identifying and rectifying any poor environmental performance. If information is added to the database indicating a poor result, management are automatically notified. Any required actions and completed tasks are also recorded.

Regular management reviews and audits are an integral part of the system. The EMS was reviewed by an external consultant in August 2007 and internal reviews are being undertaken by Solid Energy staff every other year.³⁰

Site plans: Managing local environments

Under the EMS, each site is required to develop its own Site Environmental Management Plan (SEMP). These plans identify various environmental risks and the processes in place to manage and reduce these risks. SEMPs also identify responsibilities in the context of the peculiarities of the site, the method of work, and the resource consents, permits and licences that control that work. These site plans encompass both day-to-day operational issues, such as noise and air quality controls, as well as life-of-mine issues such as site rehabilitation.³¹ Each SEMP is reviewed annually and amended as necessary to reflect any changes in the site's operation.³²

The site management plan for Stockton mine was written in 2005, and consisted of 13 sections. These have been progressively reviewed, allowing for recent developments in a number of areas of environmental management to be incorporated into the plan. There has also been a shift from one all-encompassing SEMP to 18 separate but integrated plans based on individual environmental factors (see Figure 3.1), so there are site plans for issues such as water, rehabilitation and erosion control. Over time, the SEMPs have been amended to ensure compliance with legislation where requirements have changed. For example, the requirements of permits held under the Wildlife Act 1953 are recorded on the mine's flora and fauna database.³³

Figure 3.1 Stockton mine's Site Environmental Management Plans

The new SEMPs cover the following areas:

- licences, consents and agreements
- earthworks and landform management
- disturbance avoidance and minimisation
- escarpment mining
- erosion control
- rehabilitation
- acid drainage
- water
- dust
- noise and vibration
- air quality
- waste
- hazardous substances
- weed control
- predator control
- flora and fauna
- cultural and natural heritage
- environmental protection.

To help encourage the use of the SEMPs, a Site Environmental Taskforce has been created at Stockton mine. The taskforce communicates any SEMP requirements to the various teams in the mine workforce.

Independent assessment: Environmental performance audits

The environmental performance of Stockton mine has been audited by an independent mine auditor four times in the last six years.³⁴ These independent audits are a useful tool in determining whether standards and processes are being implemented.

The approach taken by the auditor has been to use photographs to document any operational details requiring improvement. Each audit generally results in between 50 and 80 recommendations on operational matters. The recommendations are entered into the mine's compliance database as a formal incident. Action taken in response to each incident is subsequently recorded, with approximately 80-90 percent of the recommendations in each audit being accepted and acted upon.³⁵ From examples sighted, it appears that for those instances where the auditor's recommendations have not been taken up, the mining operations had changed in the meantime, so the recommendations were no longer applicable.

Ensuring staff are well informed

Staff turnover and the large numbers of contractors on the site are challenges to any site management system. This is because systems like the EMS require consistent behaviours by people on the ground. This is particularly difficult for those who do not report directly to a Solid Energy employee or have only been on the site for a short time. With the increasing scale of operations at Stockton mine, the workforce on the site has grown from about two hundred in 2003 to more than seven hundred in 2008.

Many initiatives are being used by Solid Energy to improve environmental awareness among the mine workforce. These initiatives include the creation of the Site Environment Taskforce, staff induction materials, environmental training, an Environment Week at the mine, and environmental training for supervisors following external audits. From July 2008, Stockton mine managers and supervisors were required to complete specific qualifications in environmental management.³⁶ Those who are members of the Site Environmental Taskforce must also undertake continued education and professional development.³⁷

Is the Environmental Management System working?

Stockton mine's EMS appears to be working effectively. There is evidence of increased understanding of roles and responsibilities. There appear to have been no major incidents involving miscommunication or reporting failures since 2005, with only minor timing discrepancies since then.³⁸

There is evidence that Solid Energy has come to grips with managing various environmental impacts at Stockton mine. Solid Energy has actively developed processes and plans that have been embedded in the EMS.

3.2 Community liaison

One of the goals of this investigation was to assess whether community liaison is now operating effectively.

Solid Energy established the Stockton Community Consultative Group in 2004. The consultative group acts as a forum for the community to raise concerns about mine operations. Participants include local residents, iwi, non-government organisations, government departments and regulators, and local schools. Meetings are "well

attended”³⁹ and a review of meeting minutes shows there is regular attendance by representatives of Solid Energy, the West Coast Regional Council, Department of Conservation (DoC), the West Coast Tai Poutini Conservation Board, Ngakawau River Watch and the Buller Conservation Group.

In 2005, when concerns were raised regarding proposed mining along the Mt. Augustus ridgeline (Figure 3.2), Solid Energy agreed to talk to the consultative group before mining began. However, after material slid from the ridge down the hill, there was confusion as to whether mining had been started ahead of consultation. Better communication with the consultative group would have helped avoid confusion about their activities in the area at the time.⁴⁰

Figure 3.2 Stockton Plateau, Mt. Augustus ridgeline, with Granity township in the foreground



Photo: A. Sherwood. Source: Crown Minerals Group, Ministry of Economic Development.

Since then, Solid Energy has kept up its commitment to facilitate the consultative group. The group continues to meet at regular intervals (at least four times a year) at convenient times and locations for members of the community. Solid Energy provides financial support for the meetings, and the agenda and Chair are agreed on by all participants. Regular attendees report that Solid Energy welcomes all questions and is forthcoming with answers.

Is the community liaison working?

A number of performance targets for water quality in the Ngakawau River have been agreed between Solid Energy and the Stockton Community Consultative Group. Solid Energy regularly reports back to the group about progress on the construction of remedial works and progress against the agreed performance targets. Clearly, liaison with the community has improved.

3.3 Compliance monitoring and reporting

Solid Energy monitors water quality, air quality, ecology, noise and vibrations at all of its mine sites (under the site environmental management plans). The data is then supplied to relevant regulatory authorities – the Buller District Council, the West Coast Regional Council, DoC or the Ministry of Economic Development – as required by licences, permits and consents. This monitoring is in addition to that done by West Coast Regional Council and DoC staff.

With regard to water quality, Solid Energy has a number of monitoring sites specified in its coal mining licence and various resource consents. Recently, a number of additional monitoring points were established to provide a more comprehensive picture of water quality on Stockton Plateau. Solid Energy has also developed a system for continuous monitoring of water quality at various sites in real-time – both for sites specified in the licence and resource consents and for additional monitoring sites. This system means automated alerts can be sent, if non-compliant readings are observed.⁴¹ Monitoring results are routinely shared with interest groups associated with the site.⁴²

Solid Energy is required to notify the relevant authorities if non-compliance is revealed by the monitoring programme. Several instances where non-compliance has occurred since 2005 are documented on Solid Energy's databases. Solid Energy Incident Reports describe the time, location and nature of events, plus immediate and corrective action taken.

Working with local authorities

Three authorities intersect with environmental management at Stockton mine – DoC, the West Coast Regional Council and the Buller District Council, each with different responsibilities. The regional council has some responsibility for water quality and air quality. With regard to indigenous wildlife, the regional council's responsibility is mainly in relation to the setting of policy. The district council has responsibility for monitoring of air quality, vegetation disturbance, indigenous wildlife, noise and erosion. DoC has responsibility for monitoring of vegetation disturbance and indigenous wildlife.

A good working relationship apparently exists between DoC and Solid Energy, with the organisation's respective staff liaising and talking regularly. A DoC representative regularly attends the Stockton Community Consultative Group meetings.⁴³

The Buller District Council

Due to earlier confusion about roles and responsibilities, compliance monitoring and reporting by the Buller District Council only began around 2005. Since then, an annual site inspection has been undertaken with a brief report to the council.

Monitoring against coal mining licence conditions is conducted by Solid Energy, with an expectation that Buller District Council planners will be alerted if any conditions are breached. Such an alert would result in an additional site visit by council planning staff. Monitoring data is reviewed by the council's consultant on the annual site inspection. Some data and information is also supplied by Solid Energy via the minutes of the quarterly Stockton Community Consultative Group meetings.

Solid Energy has been setting its own performance targets and discussing these with the council. The annual site inspection in November 2008 did identify that Solid Energy had not carried out any monthly noise monitoring in 2008, although this is a requirement of the coal mining licence. Noise monitoring in previous years had established one occasion where noise limits had been exceeded. This was attributable to a blasting event, but no noise complaints were received by the Buller District Council or Solid Energy. This is probably due to the remoteness of the mine from residents. Subsequent monitoring had established no issues, leading to a suspension of monitoring by Solid Energy. After the November 2008 annual site inspection, Solid Energy agreed to resume noise monitoring.⁴⁴

Given the moves toward better communication between Solid Energy and Buller District Council it is surprising that no representatives from the Buller District Council appear to have attended meetings of the Stockton Community Consultative Group since 2006.

The West Coast Regional Council

In 2003, the West Coast Regional Council recognised it needed to increase its water monitoring of mine sites, and from 2004, increased the frequency of its monitoring inspections of Stockton mine. Typically, the council's water sampling involves pH, suspended solids and turbidity (or cloudiness) readings at two sites. Additional samplings are made periodically.⁴⁵ The regional council send the water quality samples they collect to an independent laboratory for analysis.

The cost of monitoring and site inspections by council staff is met by Solid Energy. There are, however, several factors which make regulation of Stockton mine challenging for the regional council:

- The West Coast Regional Council is relatively small and has responsibilities for many mines.
- The Stockton mine site is very large.
- There is a large number of monitoring sites at the mine, some of which are now being monitored by Solid Energy on a real-time basis. Consequently, Stockton mine may be regarded as 'data rich,' potentially providing 'information overload' for council staff.

- Developments at Stockton mine – such as active water treatment systems, techniques for minimising acid mine drainage through different forms of capping, and techniques for relocation of swathes of vegetation – are often experimental and highly technical. This means that the West Coast Regional Council needs to call upon external specialists to analyse the data and information provided by Solid Energy.

The West Coast Regional Council receives monitoring data from Solid Energy on a regular basis. There is an intention for this council to eventually be able to access monitoring results at any time, via a link to Solid Energy's intranet. This "represents a significant advance in monitoring", and will provide an opportunity for council compliance staff to cross-check the effectiveness of Solid Energy's data management and non-compliance alert systems.⁴⁶

The West Coast Regional Council regularly writes summary reports on compliance issues relating to Solid Energy's mining operations on the West Coast. Standards have improved since the initial reports of 2005. For example, the annual compliance report for the year ended 30 June 2008 now includes acidity, suspended solids and turbidity monitoring results for both Mangatini Stream and St Patrick's Stream. The data is at regular and short time intervals, generally fortnightly, rather than quarterly as at the beginning of 2005.

Overall, is the monitoring and reporting effective?

Overall, the monitoring and reporting of compliance by Solid Energy in terms of the environment has improved since initial investigations. There has been an increase in the frequency and scope of monitoring by the West Coast Regional Council with more clarity of responsibilities and ability to enforce resource consents. The relationship and communication between the Buller District Council and Solid Energy has also improved since 2007. The district council is more aware of its role, which could be strengthened by regular attendance at the Stockton Community Consultative Group. DoC reports a good working relationship and "close compliance with all conditions"⁴⁷ by Solid Energy.

Solid Energy appear to have taken the initiative in terms of monitoring and reporting compliance with, for example, the agreed performance targets for water quality in the lower reaches of the Ngakawau River.

3.4 Difficulties of enforcement

Since 1991, the Resource Management Act (RMA) has provided the framework for managing the environmental impacts of mining, and it is the legislation that council staff work with on a daily basis. Stockton mine, along with many others as discussed in Chapter 5, is subject to an environmental management regime that predates the RMA. This makes enforcement particularly difficult.

Both the Buller District Council and the West Coast Regional Council staff expressed concern about the difficulties of enforcing 'out of date' coal mining licences and resource consent conditions.⁴⁸ Despite the progress in environmental management at Stockton, enforcement is still an outstanding issue for both councils, although some environmental conditions have been enforced successfully (Figure 3.3).

Figure 3.3 Enforcement actions at Stockton mine 2006-2008

Since the second Parliamentary Commissioner's scoping report in 2006, there has been some successful enforcement action by the West Coast Regional Council in relation to water quality management at Stockton mine.

The regional council identified visible build-ups of coal fines and poor water quality in the Mangatini Stream during a monthly site inspection. Subsequent monitoring results in the Mangatini catchment revealed excess suspended solids and contamination.

In December 2006, an abatement notice was issued specifying a timeline for compliance with 34 remedial actions.⁴⁹ Solid Energy progressively implemented the remedial action plan for Mangatini Stream over a period of several months. All actions were completed within an agreed timeframe and subsequent monitoring of the water quality has satisfied all parties that the matter has been resolved.

Infringement notices were also issued to Solid Energy in March and September 2007. The first was the result of excess sediment and contamination in the discharge from the coal handling facility located at Ngakawau. Investigation revealed the cause to be a technical failure in the treatment of water discharged from the site.

The second notice related to discharge of impounded waste water from the mine site into Mine Creek. Insufficient sediment controls had been put in place to reduce the effects of the discharge. In each case, Solid Energy provided relevant information to regulators and took remedial action as required.⁵⁰

One additional outcome of the December 2006 abatement notice was agreed 'informal' trigger levels being identified for suspended solids in the Mangatini Stream. The West Coast Regional Council and Solid Energy agreed to an adaptive management approach where the company monitors water quality in the Mangatini Stream on (at least) a daily basis and the results are checked against suspended solid trigger levels. Where the trigger level is exceeded, Solid Energy investigates and reports to the council. Remedial action is taken if problems are identified through this process.



4

Environmental results

It is essential to have good reporting systems and other processes to manage the environmental issues associated with a mine, and these have been discussed thoroughly in Chapter 3. But unless things are done differently 'on the ground' through changing mining technology and investing in engineering works, no real improvement will occur. And ultimately, it is physical evidence, not management processes, that is the 'proof of the pudding'.

This chapter begins by describing the plans for rehabilitating the area stripped bare by the mining process at Stockton. The remainder of the chapter is focused on water quality, and it is here that there is evidence of real physical improvement.

4.1 Restoration of soils and vegetation at Stockton mine

Opencast mining is a messy business. Soils and vegetation are stripped away and underlying rock is blasted out before the coal is extracted. At Stockton mine, the result, with the exposed acid forming rocks, has been described as a "moonscape".⁵¹

Left to itself, regeneration of soil and vegetation would be very slow, probably taking many centuries. The aim of rehabilitation is to assist that regeneration to be over a few decades at most. Solid Energy has put much work into identifying exactly how such a process might work. It has developed a four stage system which involves:

1. Bulk reshaping of removed material dumps using heavy equipment.
2. Resurfacing removed material into engineered landforms to reduce sulfur oxidation and acid formation.
3. Resurfacing the engineered landforms to promote revegetation, adding soil and planting from adjacent areas/nurseries and/or slurry hydroseeding, and/or vegetation direct transfer (VDT) and topsoil in situ from adjacent areas.
4. Civil works, construction of roads and water channels.

To date, this system appears to resolve many of the problems associated with reclaiming mine-spoils and is being used overseas as an example of good practice.⁵² Solid Energy is using this system to progressively rehabilitate the area of Stockton mine. As of July 2008, of the 137 hectares that can currently be permanently rehabilitated,⁵³ about 10 hectares have been rehabilitated with VDT, and the rest is in the various stages of rehabilitation using mixtures of the techniques in 3 above.

Solid Energy is not seeking to replace the original detailed topography of the Stockton mine area, but rather to create a landscape that is consistent with that present before mining began. The method relies on an available source of limestone and topsoil with vegetation. Fifteen percent of the surface material removed from the new Cypress mine will be diverted to Stockton mine,⁵⁴ but this will then not be available for the rehabilitation of the Cypress mine.

4.2 Improving water quality in the Ngakawau River

The Ngakawau River is picturesque, but has been polluted by run-off from Stockton mine. Conservation land adjacent to the river includes the Ngakawau-Hector Recreation Reserve (22ha) and the vast Ngakawau Ecological Area (13,871ha). The 10 km long Charming Creek Walkway winds its way along the side of the river, through gorges and old rail tunnels associated with mining. The walk is regarded as one of the top five day walks in the South Island, with the Mangatini Falls (Figure 4.1) being one of the scenic attractions. The Ngakawau Gorge Daisy (*Celmisia morganii*) is almost exclusively found in the Ngakawau Gorge, while the upper reaches of the Ngakawau Ecological Area specifically reserves coal plateau vegetation such as the North Westland Snow Tussock (*Chionochoa juncea*).^{55,56}

Figure 4.1 The Mangatini Falls on the Ngakawau River



Photo: J. Farquhar, 2008.

Water is often regarded as one of the most sensitive indicators of the ongoing environmental health of an area. Logically water is the place to look for signs of the improvements taking place at Stockton mine.

The topography, in combination with the climate, the scale and the historic nature of Stockton mine mean that water run-off from the plateau has been affected by acid drainage for some time. When the amount of coal being extracted during the 1990s increased dramatically, it had an immediate and significant impact on the water quality in the streams flowing off the plateau into the Ngakawau River.

The Ngakawau River became significantly contaminated and inhospitable to many species of aquatic life, including whitebait.⁵⁷ Concern about the state of the river prompted local people to form a community action group named Ngakawau Riverwatch.

Therefore, one of the major environmental management challenges for Solid Energy at Stockton mine has been improving the water quality in the streams flowing into the Ngakawau River. Management of this issue involves reducing acid mine drainage at its source, minimising sediment flowing into the streams from mine operations, and actively treating water flowing off the Stockton plateau. These techniques are described in the next three sections.

4.3 Reducing acid mine drainage

The long-term management of acid mine drainage at Stockton mine involves a combination of techniques aimed at minimising acid generation (Figure 4.2), and actively treating residual acidity.⁵⁸ Given the scale of mine operations, Solid Energy's first action was to prioritise areas to be treated to reduce acid drainage. This involves categorising the top layer of soil/rock (overburden) according to its potential to generate acid. Areas identified with significant potential to form acid are given priority over those with low or no potential. Since 2005, there have been thousands of samples taken to aid this classification.⁵⁹

Figure 4.2 Reducing the amount of acid formation

In order to reduce acid mine drainage, overburden is disposed of in engineered landforms in five-metre thick layers, each of which is compacted and spread with agricultural limestone. Limestone acts to generate a lag in acid discharge, neutralising the oxidation products for a time. This process has been used since 2006 and it is hoped that this treatment will allow sufficient time to install capping that will exclude oxygen.⁶⁰ Alternatives to agricultural limestone (such as mussel shell waste, which would otherwise go to a landfill) are also being trialled.⁶¹

The landforms created are subsequently capped using approximately 500 mm of compacted weathered granite, followed by approximately 300 mm of top soil. This serves to create a saturated seal to reduce oxygen entering the waste rock.⁶² However, this process may be limited through availability of suitable capping materials.⁶³ In addition, tests show that granite treated with kiln dust and nodulated stack dust (a waste product) is more resistant to erosion than weathered granite alone.⁶⁴ As a consequence, Solid Energy has been undertaking trials with cement kiln dust, plus other materials available locally.⁶⁵

Laboratory and field tests on covering acid-generating rocks (capping) indicated⁶⁶ acid discharges from disturbed areas could be substantially reduced. At Stockton mine approximately 25 to 30 hectares of land per year is currently being rehabilitated.⁶⁷ As of November 2008, around 68 hectares of overburden had been capped with weathered granite. Another 390 hectares is planned to be capped with a mixture of granite, coal ash and stack dust over the next five years.⁶⁸

If the capping is effective, it should reduce the amount of oxygen entering the heaps of acid-forming rocks, and hence the amount of acid formed. To measure the effectiveness of the capping, Solid Energy routinely undertakes monthly oxygen probe monitoring of capped areas. Uncapped dumps have approximately 20 percent atmospheric levels of oxygen, while capped dumps generally have oxygen levels between one and ten percent. Solid Energy also monitors water seepage trends from the overburden dumps.

Water that flows across dumped overburden and the disturbed area in the Mangatini catchment eventually flows to one point in the Mangatini Stream. There the water is actively treated using limestone dosing. Acid loads at this point are monitored on a 15 minute basis. The coal measures classified as potentially acid forming are predominantly in the Mangatini catchment. As a consequence, Solid Energy estimates that greater than 95% of the potentially acid forming area in Stockton mine is currently actively treated.⁶⁹

4.4 Reducing sediment

Since 2006, several engineering works have been commissioned to reduce sediment flows from Stockton Plateau. Mine water and storm water are now being separated and treated using settling ponds. Water is diverted away from working areas to reduce the volume of water passing through areas of high activity. Culverts are also being used, wherever possible, to prevent heavy vehicles driving through water flows. Dedicated work crews regularly remove accumulated sediment from sumps and sediment traps.⁷⁰

Erosion of soil and overburden is a concern during the years leading up to the effective establishment of vegetative cover. DoC has observed that it takes about five years for the slow growing sub-alpine plants to become established on the Stockton Plateau after rehabilitation begins.⁷¹ For this reason, Solid Energy is trialling various forms of soil stabilisation on the contoured slopes undergoing rehabilitation.

The erosion control trials have focused on the use of mechanically blown mulches applied to the surface prior to, or immediately after, planting. The mulches trialled to date include newspaper, straw and wood bark. All of the methods tested have been found to reduce the erosion of rehabilitated and disturbed surfaces, thereby reducing the amount of sediment in the streams draining the plateau. These techniques will continue to be used and further research is ongoing.⁷²

4.5 Active water treatment

In 2005, Solid Energy, in consultation with the Stockton Community Consultative Group, agreed on a number of performance targets for water quality in the lower reaches of the Ngakawau River, including improved levels of acidity and greater water clarity (Figure 4.3). These performance targets relate to data from the Ngakawau River monitoring point (NR) shown on Figure 2.1.

Figure 4.3 Performance targets for water quality in the Ngakawau River

- pH greater than 4.7 for 99% of the time
- dissolved aluminium less than 1 mg/l for 99% of the time
- turbidity less than 20 NTU for 80% of the time 'during base flow'
- clarity greater than 54 cm for 90% of the time 'during base flow'

The objectives of these agreed targets are to improve the river to a level where whitebait would re-establish in the river, and aesthetically and recreationally it would be returned to an acceptable state.⁷³

In order to meet these performance targets, Solid Energy chose to combine efforts to reduce sediment and acid mine drainage with an engineering solution. This solution is known as the Stockton Water Management Project (SWaMP).

The SWaMP was initially split into two stages. Stage 1 aims to improve water quality in the Mangatini catchment, while Stage 2 addresses water quality in the Fly and Plover catchments (which feed into the St Patrick's stream).

Under the SWaMP, clean water is isolated from water affected by mining operations. Clean water is diverted around mine workings and released into the Mangatini Stream. There are two types of contaminated water which are kept separate from each other. Brown water is water that contains mineral sediment. Black water is water that contains coal sediment due to current mining operations.⁷⁴

Treatment of brown and black water

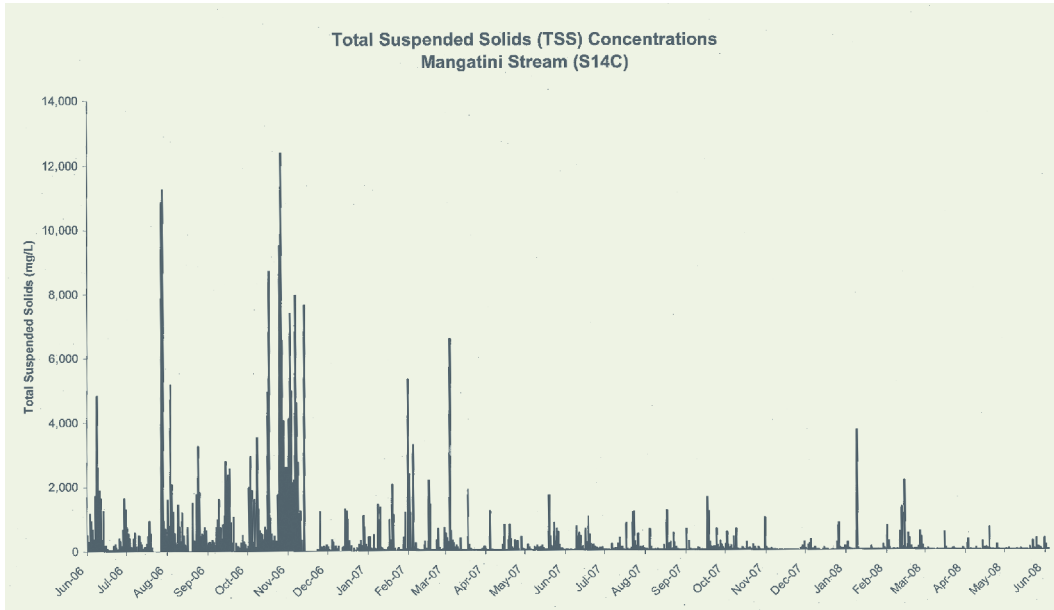
The brown water is treated with the use of settling dams which are designed for treatment of all but peak flows. These dams allow natural settlement of the solids suspended in the water. The black water is captured and directed to a dedicated water treatment facility where coal is settled using chemical flocculants. All flows from the brown and black water systems are further treated with limestone to raise pH and reduce metal concentrations prior to release from the mine site. This limestone dosing began in April 2007.⁷⁵

Stage 1 of the SWaMP was completed in July 2009, when the Mangatini Sump began operating. This sump will increase the effectiveness of the system, capturing suspended solids and hydroxide precipitates from the main branch of the stream. In addition, the limestone dosing plant will be contained within the water treatment facility by the end of 2009. When asked during a Stockton Community Consultative Group meeting how long Solid Energy is going to be treating the water this way, the Stockton Site Manager stated that the liability is for 100 years.⁷⁶

4.6 Environmental results: are these techniques working?

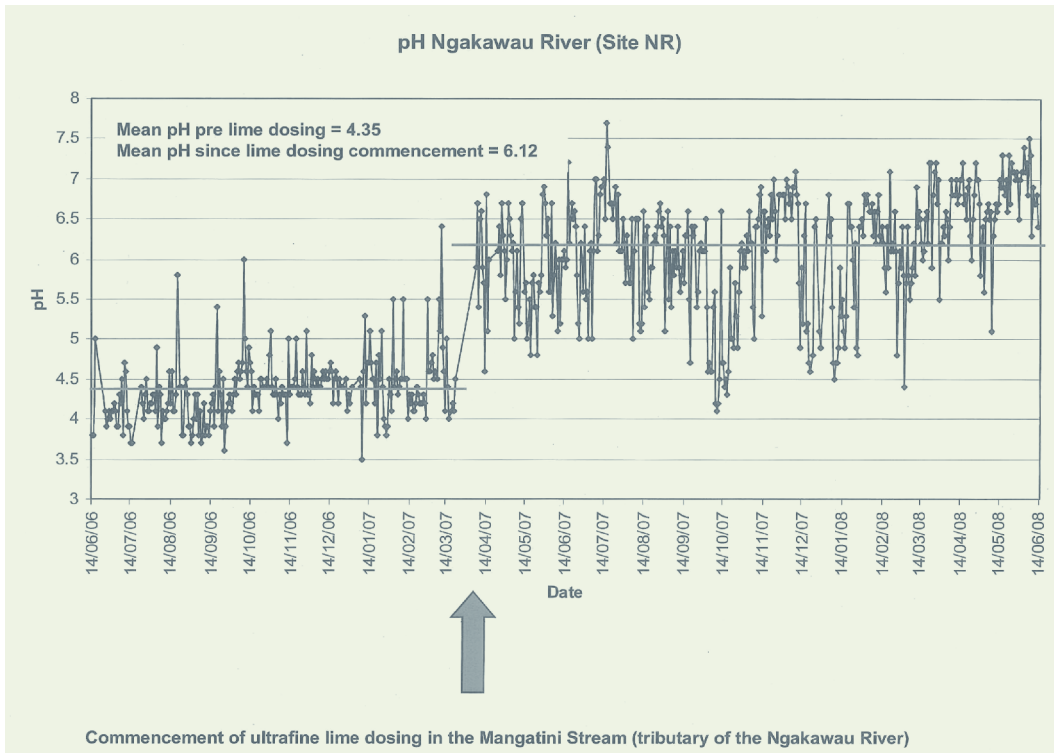
The immediate impact of works to date has been a marked reduction in the level of suspended solids in the Mangatini Stream since 2006 (Figure 4.4). There has also been an increase in the pH of the Ngakawau River downstream of the confluence with the Mangatini. This is the result of the lime dosing of Mangatini Stream since April 2007 (Figure 4.5).

Figure 4.4 Change in total suspended solids in the Mangatini Stream 2006-2008



Source: Solid Energy

Figure 4.5 Change in the acidity (pH) of the Ngakawau River 2006-2008



Source: Solid Energy

Progress towards the performance targets has been significant and is summarised in Table 4.1

Table 4.1 Progress toward the performance targets for the Ngakawau River from April 2007 – April 2008⁷⁷

Target	Result
pH greater than 4.7 for 99% of the time	pH greater than 4.7 for 95% of the time
Dissolved aluminium less than 1 mg/l for 99% of the time	Dissolved aluminium less than 1mg/l for 97% of the time
Turbidity less than 20 NTU for 80% of the time during base flow	The 30 day rolling median for turbidity less than 25 NTU
Clarity greater than 54 cm for 90% of the time during base flow	Median clarity and median turbidity were slightly worse since lime dosing began. ⁷⁸

Aesthetically, the river is not what it once was. For example, there is discoloration as a result of the lime dosing. Some whitebait, however, were reportedly seen in the Ngakawau River during 2008.⁷⁹ Positive changes have been recognised by the local community and the regional council.⁸⁰

The principal element of the Mangatini water treatment system is the Mangatini Sump. Solid Energy is confident that, following the completion of this sump in mid-2009, all steps required to control sediment levels in water leaving the site via the Mangatini Stream will have been taken. Turbidity, clarity and total suspended solids levels are expected to improve within several months since the sump began operating.⁸¹

The Mangatini Sump is part of Stage 1 of the Stockton Water Management Project. Stage 2 deals with water quality in the Plover and Fly Creek catchments, which feed into St Patrick's Stream. Work has begun on this stage, with lime dosing planned to begin in mid-2010. A third stage is planned for Mine Creek.^{82,83}



Part B: The regulatory minefield



5

The regulatory regime for mining

Significant improvements in the environmental management and performance of the mine at Stockton have been made since 2006 through voluntary initiatives, inter-agency cooperation, and several court cases. Yet the regulatory regime that governs activities at Stockton mine is complex, obscure, and out of date.⁸⁴ Indeed it is possible that improvements have been made *in spite* of the regulatory regime, rather than *because of* it.

The questions relating to the regulatory regime around mining are not new. In 1992, the first Parliamentary Commissioner for the Environment, Helen Hughes, published a report on coal mining.⁸⁵ In that report, she identified a number of issues and problems associated with the regulatory regime for the environmental management of coal mining. Some of her recommendations were accepted in principle, but not implemented.

Seventeen years later, the regulatory regime for coal mining that so concerned Helen Hughes remains unchanged, and sits almost entirely outside the environmental management regime created under the Resource Management Act 1991 (RMA). Moreover, the problem is not limited to coal mining.

5.1 Overview

Nearly two decades ago, the regulatory regime governing mining in New Zealand was significantly changed by the enactment of the RMA and the Crown Minerals Act in 1991.

Under the Mining Act 1971 and the Coal Mines Act 1979, the Minister of Energy granted prospecting, mining and ancillary⁸⁶ licences over defined areas. These licences included extraction, safety, and some environmental conditions. The environmental conditions included both water management as well as what would be described in the RMA as land use conditions. Rights to use water were granted by Catchment Boards under the Water and Soil Conservation Act 1967, while licences for discharges to air were granted under the Clean Air Act by local authorities.

The passing of the Crown Minerals Act 1991 changed the regulatory regime for mining. Unlike the old mining licences, the new mining permits issued under the Crown Minerals Act only give a right to mine. The environmental impacts of the mining operation are subject to the RMA.

However, the transitional provisions of the Crown Minerals Act mean that mining licences granted under the old regime continue to apply until they expire (called existing privileges under the Crown Minerals Act). In other words, these licences continue to operate as if the Crown Minerals Act and the RMA had not been passed.⁸⁷

The other key change brought about by the passing of the Crown Minerals Act in 1991 was to alter responsibilities for the administration of the regulatory regime. Previously, the Mines Inspectorate in the Ministry of Energy monitored mines to ensure compliance with the conditions of licences. The Crown Minerals Act split these responsibilities between the Minister of Energy, the Department of Labour (occupational health and safety) and local authorities (environment). Water rights⁸⁸ granted under statutes repealed by the RMA⁸⁹ were deemed to be resource consents under that Act, and are now administered by regional councils.

In summary, the environmental impacts of mining operations were subject to a 'package' of regulations. The introduction of the Crown Minerals Act was intended to place environmental regulation under the umbrella of the RMA. However, the transitional provisions of the Crown Minerals Act mean that the former regime applies to the significant number of mines licenced under the old regime.

5.2 Outdated environmental conditions in coal mining licences

Stockton mine provides a good illustration of the complexity of environmental regulations under the 'transitional' regime. The Stockton coal mining licence was issued in 1987. Like other mining licences granted under the old legislation, it contains references to statutes, legal entities and standards that either no longer exist or have been superseded. This in itself makes it difficult to enforce licence conditions.

The 'package' of environmental regulations for Stockton mine comprises:

- conditions in a coal mining licence and several ancillary licences, issued under the Coal Mines Act 1979
- water rights and clean air licences from earlier legislation that are now 'deemed resource consents' under the RMA
- more than 20 resource consents issued under the RMA
- wildlife permits issued under the Wildlife Act 1953.

A resource consent issued under the RMA today is almost certainly to be more detailed and site-specific than the environmental conditions placed on many of Solid Energy's coal mining licences. This is because the licence conditions for all of Solid Energy's initial coal mines were based on the same general template, and more site-specific conditions were added under urgency.

There was a standard template for coal mining licence conditions granted to the Coal Corporation of New Zealand Limited (which became Solid Energy). The licence conditions were stipulated in Schedule 5 of the State Owned Enterprises Act 1986.⁹⁰ This means that the wording of the Stockton coal mining licence is similar to Solid Energy's other coal mining licences. A few licence conditions specific to the Stockton mine were added through a variation⁹¹ in late 1989.

The change between the old and new regulatory regimes is evident if the old regulatory 'package' for Stockton mine is compared with the resource consent for the new Cypress mine.⁹² The resource consent for the Cypress mine has at least 74 consent conditions for water management. In contrast, the old regulatory package for the Stockton mine grew ad hoc as time went on, and has over 250 conditions relating to water management, with many specific to certain areas and streams. A greater number of conditions does not imply better conditions, as the example in Figure 5.1 shows.

Figure 5.1 Comparing the old and new regimes – an example

Stockton mine regulatory package

For Stockton mine, a condition of the coal mining licence (condition A7(3)) states:

... "there should be no noticeable change in the colour or clarity of any lake, river or stream as a result of mining" ...⁹³

This is not realistic, operationally possible, or enforceable given the scale and type of operation occurring at Stockton mine. Technically, even after Solid Energy's huge investment in water quality, this condition would be likely to be breached somewhere on or off the site.

A key condition in the deemed consent for the Stockton mine (Water Right 89/38 condition (k)) then states that, if there is a confirmed degradation of water quality below baseline values resulting from mining activities, then the matter should be discussed with the regional council and a remedial plan developed.⁹⁴ However, implementation of the remedial plan is not specifically required. Solid Energy would comply with the condition if it prepared a remedial plan and did no more.

Cypress mine resource consent

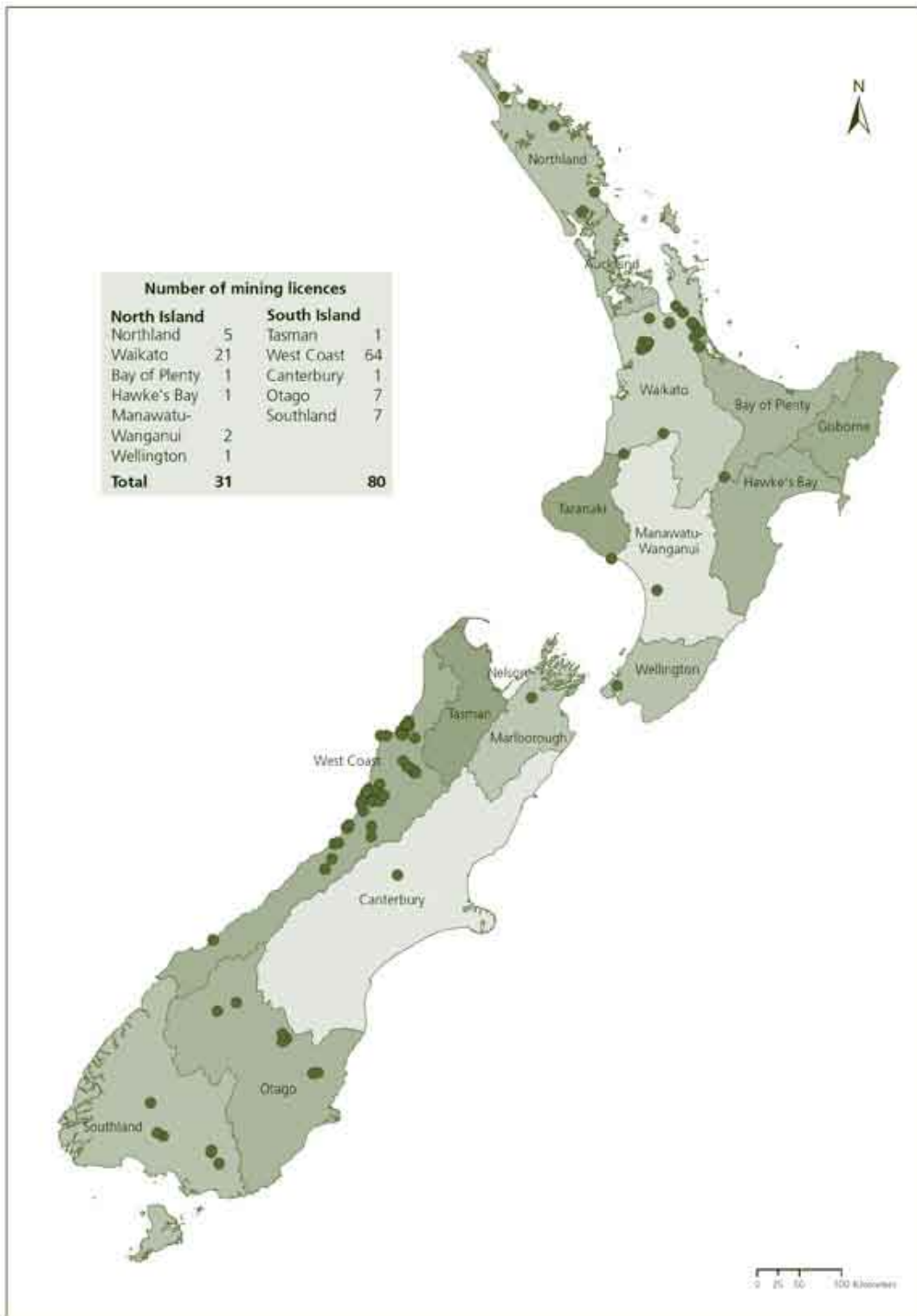
In contrast to Stockton mine's old regulatory package, the resource consent granted for Cypress mine (RC03175) includes clear thresholds at which intervention should occur. For example, two conditions stipulate actions that should occur if concentrations of total suspended solids in water samples exceed (a) 20 g m⁻³ and (b) 50 g m⁻³. The conditions require both a remedial plan and prompt action.⁹⁵

This report shows that Solid Energy has been very effective in its environmental management of Stockton mine over the last few years. The complexity and inadequacy of the environmental regulations is not currently a concern with regard to this particular mine.

There is a much larger question that needs addressing at a national level. What will be the impact on the environment of outdated conditions in other mining licences that will remain operative for many more years into the future?

Across the country, there are currently 111 such licences granted under the old mining legislation⁹⁶ – 58 under the Coal Mines Act 1979 and 53 (for gold and other minerals) under the Mining Act 1971 (Figure 5.2).

Figure 5.2 Locations of the 111 mining licences still operative, granted under the Coal Mining Act 1979 or Mining Act 1971

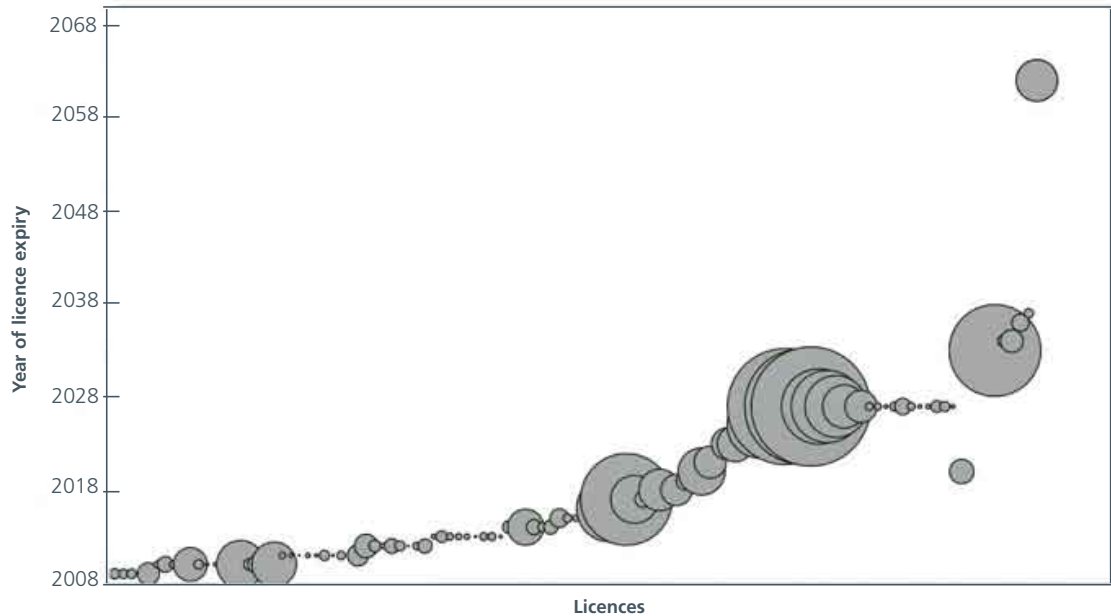


Data source: Crown Minerals Group, Ministry of Economic Development; Statistics New Zealand; Land Information New Zealand

Ten of these licenses will not expire for more than 20 years.⁹⁷ The last to expire will be Solid Energy's Goodwin licence, for an opencast lignite pit at New Vale in Southland, which will remain operative until 2062 (Figure 5.3). This is an exceptional situation, because this licence is the only one operating under both the transitional provisions of the Crown Minerals Act 1991 and the transitional provisions of the Coal Mines Act 1979.

The next long-lived licence for a coal mine is that for the opencast Roa mine on the West Coast; it expires in 2034. The last licence to expire which was granted under the Mining Act 1971 is the Wanganui River Quarry.

Figure 5.3 Comparative size and expiry dates of mining licences granted under the Coal Mining Act 1979 or Mining Act 1971



Data source: Crown Minerals Group, Ministry of Economic Development

5.3 Mining on Department of Conservation land

The August 2009 announcement by the Minister of Energy and Resources of the possible opening of Department of Conservation (DoC) land for mining, by amending Schedule 4 of the Crown Minerals Act, has attracted considerable media coverage and commentary.⁹⁸ Schedule 4 identifies lands which, due to their high conservation values, should generally be excluded from mining. Such land includes National Parks, nature reserves and scientific reserves.

Of the 111 mining and coal mining licences still operative under the old mining legislation, at least 38 contain Crown land which came under DoC management when DoC was created.⁹⁹ As time has moved on, some licences have lost DoC land, and others have gained some. At least 55 currently contain DoC land. None of this land falls within the Schedule 4 classification and presumably can be mined.

In 1987, mining and coal mining licences that included DoC land required written consent from the Minister of Conservation, and the Minister was also able to add an extra set of conditions to the licence to enhance its protection.¹⁰⁰ However, the coal mining licences including DoC land that were granted directly to the newly created state-owned-enterprise, the Coal Corporation, do not contain written consent from the Minister of Conservation. Moreover, the Minister of Conservation did not take the opportunity to add conservation conditions to these licences.

Instead, the Minister of Energy consulted DoC about what conservation conditions should be added to the Coal Corporation coal mining licences to protect the DoC land. DoC's proposed conditions were of two types. The first type dealt with the state in which the conservation areas were to be left in after mining has ceased; these were largely included in the licences. The second type were conditions to be adhered to during mining (for example, to protect wetlands). These were only partially adopted.

There are seven¹⁰¹ coal mining operations with licences granted to the Coal Corporation that contained DoC land in 1987. In the meantime, the Coal Corporation has been renamed Solid Energy and still holds those licences which all remain operative until 2027.

Although there was concern about the adequacy of conservation conditions for these mines in 1988, the situation is now quite different. Two of these seven mines now include virtually no DoC land. Almost all of the DoC land is included in the Stockton licence and in the Sullivan licence at Denniston. Mining has ceased at Denniston and the land is being restored. However, were Solid Energy to sell the Sullivan licence to a private entity, mining could recommence and continue under the 'old' licence until 2027.

A potentially greater concern is that any land which is part of a mining or coal mining licence and has been transferred to DoC since the licence was granted is not protected by written consent and conditions from the Minister of Conservation. About 1,400 hectares of land covered by 'old' mining licences has been transferred to DoC since the licences were granted.

5.4 Regulatory responsibilities and powers

The regulatory regime governing mines operating under licences granted under the old mining legislation is fragmented and unclear.¹⁰² Consequently, the different authorities are confused about the responsibilities they have and the powers available to them.

Since 1991, the Parliamentary Commissioner for the Environment has received at least 15 complaints regarding nine mines operating under licences granted under the old mining legislation. These complaints have raised questions directly related to this regulatory tangle. The regulatory agencies themselves have experienced difficulties in knowing who is responsible for what, and what the limits of those responsibilities involve. These include:

- uncertainty about council roles and responsibilities in relation to mining licences
- uncertainty about the range of enforcement powers available to councils, expressed by both councils and the Ministry for Economic Development
- uncertainty about capacity to improve licence conditions via variations
- confusion between regional councils and DoC over responsibilities for monitoring certain conditions on conservation land.

Three major issues are discussed in this section:

- the difficulty of updating existing conditions
- the difficulty of supplementing existing conditions
- the extent of enforcement powers.

The difficulty of updating existing conditions

As discussed in Chapter 5.1, there are two different types of consents or permits for mines operating under now repealed legislation. The mechanism for updating an existing condition depends on which type of consent or permit is involved.

The first types of consents are those that were issued under legislation that has now been superseded (for example, the former Clean Air Act and the Water and Soil Conservation Act). These consents are deemed to be resource consents under the RMA and are administered by regional councils. Water rights granted by catchment boards fall into this category. These deemed resource consents can be varied in two ways.

The first way is under s127 of the RMA, but this action needs to be instigated by the consent holder. For example, if monitoring reveals an issue with a deemed resource consent, a council can try to persuade the consent holder to initiate a review. The second way is under s128 of the RMA. This action can be instigated by the consent authority. However, the consent itself must specify that the council may review the conditions of the consent and the purpose of any such review. It is unlikely that the deemed resource consents will provide for such matters.

The second types of consents that can be varied are those issued under the Coal Mines Act and the Mining Act and are provided for as existing privileges under the Crown Minerals Act . These existing privileges can be varied in two ways.

The first way is by the Minister of Energy under s70, s51 and s52 of the Coal Mines Act 1979.¹⁰³ During this investigation, it emerged that the West Coast Regional Council and the Buller District Council staff believe they can only ask the Minister to correct 'clerical' mistakes and omissions under s70, but again that 'existing use privileges' preclude requesting the more substantive variations apparently allowed under s51 and s52.

The second way is under s108 of the Crown Minerals Act. A consent authority can vary a condition, but must notify the Minister of Energy and Resources and provide the rationale. The Minister of Energy and Resources can also vary a condition, but must first notify the consent authority and provide the rationale.

The West Coast Regional Council's view is that 'existing use privileges' limit the changes that could be made to the consents. Environment Waikato, another regional council with significant mining responsibilities, holds the same view.

The different legislation that can be used to vary conditions and the different types of consents that can be varied make for a high degree of complexity and confusion. At a minimum, clarification is required to assist councils.

The difficulty of supplementing existing conditions

If *new* activities are begun on a site, councils may issue additional resource consents in relation to their functions under the RMA. For example, consents were issued for the construction of the new water treatment facilities at Stockton mine in 2006. The difficulty is that the general nature of conditions established under the old mining regime makes it difficult to identify activities that are not permitted under the mining licences or the deemed resource consents.

The extent of enforcement powers

Options for enforcing compliance with conditions in mining licences and deemed resource consents are different for regional and district councils. But both are constrained by the limited and uncertain nature of their enforcement powers.

In relation to deemed consents under s385, s386 and s413 of the RMA, *regional* councils have the full range of enforcement powers available under Part 12 of the RMA. A Minister of the Crown can also seek an enforcement order under s413. In contrast, *district* councils are prohibited from seeking enforcement orders under s386(4) and s413 of the RMA in respect of some licences issued under the Water and Soil Conservation Act. However, the other provisions under Part 12 of the RMA are available to district councils including the power to issue abatement notices and the ability to seek declarations. In respect of some licences issued under the Water and Soil Conservation Act, all provisions under Part 12 of the RMA are available.

In relation to existing privileges under the Crown Minerals Act, local authorities have the power of entry for inspection under s332 of the RMA. This power is available to both regional and district councils. If monitoring or inspection reveals non-compliance with the conditions of a mining licence and the company does not voluntarily comply, there is only one enforcement route open to district and regional councils. This involves serving a notice requiring the licence holder to comply with the conditions otherwise the licence may be forfeited. If the licence holder fails to comply with the notice then the licence may be forfeited at the discretion of the Minister of Energy and Resources.

The extreme nature of forfeiture implies the need for a serious breach. What is lacking is enforcement mechanisms that are practical and suited to the level of non-compliance. Typically, an incident may need urgent remedial action through enhancement of existing management systems.

In relation to existing privileges it is not clear what RMA enforcement powers councils have in addition to the power of entry for inspection under s332 of the RMA. This is due to the complexity of the Crown Minerals Act transitional provisions and limited case law. In 2003, the West Coast Regional Council received a legal opinion indicating that some enforcement provisions of the RMA may be able to be used to enforce coal mining licence conditions. This opinion came with a caveat that the case law is very limited, and must be viewed and interpreted in the context of specific cases. Such uncertainty does not help councils.

This issue has attracted the attention of both the first and second Parliamentary Commissioners for the Environment. In 1992, Helen Hughes recommended that s107 of the Crown Minerals Act 1991 be amended to empower local authorities to use the provisions of Part 12 of the RMA.¹⁰⁴

5.5 Does the regulatory regime need fixing?

One aspect of the regulatory regime that certainly needs fixing is the confusion over roles and responsibilities. There seems to be a number of local authorities having difficulty understanding their responsibilities and/or administering the transitional provisions of the Crown Minerals Act and associated regulations, as well as the transitional provisions of the RMA.¹⁰⁵

This investigation began as a review of the environmental performance of Stockton mine. In terms of environmental performance, Solid Energy has designed a world leading system. However, the improvements at the Stockton mine seem to have occurred *in spite of* the regulatory framework rather than *because of* it. The success at Stockton mine does not resolve the issues with the regulatory regime described above, because that success is specific to Stockton mine and Solid Energy. There are several reasons for this.

Solid Energy is a state-owned enterprise, and as such is required to exhibit a sense of social responsibility. Public image is important, and at times Stockton mine has attracted significant adverse media attention. Moreover, the solution implemented at Stockton has involved significant investment. Solid Energy has spent in excess of \$45 million on Stage 1 of the Stockton Water Management Project, with Stage 2 underway.¹⁰⁶ The running costs of the system are expected to be about \$8 million annually. Are private companies willing and able to spend such sums?

Solid Energy will be able to use the water treatment system designed for Stockton mine for the adjacent Cypress mine. Cypress mine is consented under the RMA regime, not the old mining regime, and must comply with 'modern' consent conditions. Would Solid Energy have invested so much in this expensive system were it not for the need to get Cypress mine consented under the RMA?

Most critically, unlike private companies, Solid Energy cannot abandon old mines leaving expensive remediation to be borne by taxpayers and ratepayers. For the foreseeable future, Solid Energy is in New Zealand 'for the long haul'.

New Zealand has seen the demise of many mining companies. Occasionally, especially for those dating from the 19th century, the abandoned workings have historical interest and a certain charm. Regrettably, this is not likely to be true for modern abandoned mines, especially opencast mines. Where giant machinery has passed by, excavating and processing millions of tonnes of rock, the environment cannot fail to be disturbed.

Tui mine in the Kaimai Ranges of the Waikato was abandoned when the operator Norpac Mining Ltd went into liquidation in 1967. Left behind was a large pile of ore and sand-sized crushed ore (tailings), dammed to prevent it slipping down the mountainside. Over the years, this tailings dam fell into disrepair and became unstable. In 1980, the Hauraki Catchment Board built a gravel embankment to stop the tailings slipping on to property further down the mountain.¹⁰⁷ Environment Waikato has recently received \$9.8 million from the Ministry for the Environment to bring the Tui mine site under control.

In the nearby Hauraki Goldfields, Ohinemuri mine at Maratoto closed down in the early 1970s. The site is now owned by DoC who annually makes environmental provisions of more than \$2.4 million. First on the list of obligations to remedy, is that “the tailings and tunnels at the Maratoto mine may excrete contaminants in the water.” Other obligations relate to abandoned coal mines in the Benneydale, Mahoenui, Piraongia, Waitewhenua and Ohura coalfields, also now on DoC land.¹⁰⁸

That an ‘old’ mining licence is held by Solid Energy does not guarantee that the impact of the mine on the environment will be managed well. Solid Energy can sell mining licences to private companies and could someday be privatised itself, although the Government has indicated no plans in the short term. Part of the monetary value of an ‘old’ mining licence may be that the associated environmental conditions are weak, outdated, contradictory, unenforceable, or absent altogether.

There is an apparent opportunity to update conditions when a mining licence is transferred, because the Minister of Energy and Resources may impose conditions when consenting to the transfer of a mining licence.¹⁰⁹ However, the Minister is only able to impose conditions which would have been permitted when the licence was issued.¹¹⁰ Consequently, any permissible updating of conditions would be able to achieve little, if any, real change.

This leaves a very big question about the balance between environmental quality and existing use privileges. Is this ‘orphan’ regulatory mining regime allowing damage to the environment which is not acceptable for a modern New Zealand which trades on its green credentials? And should existing use privileges include the right to transfer the cost of cleaning up environmental damage on to taxpayers?



6

Conclusions and recommendations

This final chapter begins with a commendation for Solid Energy for the improvement made to the environmental management of Stockton mine. This acts as a conclusion to Part A of this report – the ‘revisiting’ of this large opencast strip mine – which was the initial focus of this investigation.

The remainder of this chapter is concerned with the ‘regulatory minefield’ discussed in Chapter 5. Four sections contain six recommendations to Ministers to address the issues that arise from the persistence of the pre-RMA regime governing mining.

6.1 Commendation

I commend Solid Energy for its commitment to improving environmental management and performance at Stockton mine. Of particular note are the:

- establishment, maintenance and continuous improvement of a company-wide Environmental Management System
- initiatives to improve water quality of the streams affected. Such initiatives include:
 - additional monitoring of water quality on the Stockton Plateau
 - informal ‘trigger levels’ agreed with the West Coast Regional Council for the Mangatini Stream
 - performance targets for water quality in the Ngakawau River agreed with the Stockton Community Consultative Group
- establishment of improved information exchange systems with regulators and the community
- work put in to improving environmental awareness and performance among mine supervisors and workers.

These have resulted in tangible environmental improvements including reduced total suspended solids in Mangatini Stream and reduced acidity in the Ngakawau River.

Further improvements in water quality in the Ngakawau River are anticipated, and water quality targets agreed between Solid Energy and the Stockton Community Consultative Group should be achieved by the end of 2009.

Solid Energy is progressively rehabilitating the soils at Stockton mine. To date about 140 hectares are at various stages of remediation. Solid Energy has ambitious plans for rehabilitation over the next five years. The methodology has been developed by Solid Energy and is being used as an exemplar overseas. These methods do rely, however, on new sources of overburden, soil, and soil with *in-situ* vegetation to transplant into the areas being rehabilitated.

There is evidence of a more focused monitoring regime by the West Coast Regional Council since 2005. The Buller District Council is doing some compliance reporting via a consultant, and Solid Energy is working with the Department of Conservation in relation to complying with Wildlife Permit conditions.

6.2 Environmental conditions in mining licences

This investigation has highlighted a general problem with mining rights and related licences issued prior to the commencement of the Crown Minerals Act and the RMA. Before 1991, the right to mine was given in the form of mining licences granted under the Mining Act 1971 or the Coal Mines Act 1979. These mining licences are essentially land use rights and many remain operative despite the repeal of both these Acts.

Since 1991, the right to mine has been given in the form of a land access permit under the Crown Minerals Act 1991 and the associated discharge and land use consents granted under the RMA.

The mining licences issued prior to the commencement of the Crown Minerals Act and the RMA contain references to many statutes and legal entities that no longer exist or have been superseded. This causes confusion and inefficiency, may lead to poorer environmental outcomes, and ought to be easily dealt with by updating texts in these licences.

However, there are more substantive problems with the environmental conditions imposed under the old mining regulatory regime mining licences. The power to vary licences issued under the previous regime is limited, and in some instances councils can only ask the Minister of Energy and Resources to correct 'clerical' mistakes and omissions.

Over a hundred mining licences granted under the old regime remain operative, despite it being 18 years since the passage of the Crown Minerals Act and the RMA. Ten of these do not expire for more than 20 years, and one of these does not expire until 2062.

It can be argued on the one hand that substantive changes to the conditions in mining licences compromise the existing use privileges of the licence holders. On the other hand, these licences were granted for very long periods of time and public opinion on what is environmentally acceptable has changed significantly.

Over two decades ago, the first Parliamentary Commissioner for the Environment, Helen Hughes, recommended that all conditions relating to environmental effects in existing coal licences expire in 2001, and thereafter licence holders would be required to apply for consents under the RMA.¹¹¹ This recommendation was not adopted because existing use rights were considered to be dominant. Governments are understandably wary of taking away existing entitlements because of exposure to compensation claims.

The improvement in the environmental management of Stockton mine may be seen by some as evidence that updating conditions in mining licences is not needed. But this is a single case undertaken by a very large company with significant resources. Aristotle said it best: “One swallow does not make a summer”. Because Solid Energy is owned by the state, it cannot abandon old mines and shift the remediation costs to taxpayers and ratepayers.

In 2009, further major change to environmental law has begun with a first round of amendments to the RMA and the creation of an Environmental Protection Authority. Vague, uncertain, and unenforceable conditions in, or associated with, mining licences may well survive further major changes in the regulatory regime.

Since Helen Hughes’ recommendation in 1992, many mining licences have expired, and 50 more will expire within the next five years. But to require the conditions in all the remaining mining licences to expire by a certain date and replace them with updated conditions would take a great deal of work by a few councils. Both the passage of the necessary legislation and the development of new conditions would take years.

Nevertheless, it may well be that some of the mines licensed to operate under the old regime are causing, or could cause, significant environmental damage for many years to come.

I recommend that:

1. The Minister for the Environment investigates which environmental conditions in, and associated with, mining and coal mining licences which are existing privileges under the Crown Minerals Act, require updating because significantly better environmental outcomes would follow, and that the Minister of Energy and Resources updates these conditions accordingly.
2. The Minister for the Environment investigates which environmental conditions in, and associated with, mining and coal mining licences, which are deemed resource consents under the Resource Management Act, require updating because significantly better environmental outcomes would follow, and initiates the necessary legislative amendments to empower local authorities to vary the conditions.

6.3 Enforcement of mining licence conditions

Not all of the environmental conditions in the mining licences have enforcement mechanisms which could be regarded as practicable, timely or commensurate with the degree of non-compliance. Regional councils have access to the range of enforcement mechanisms available in the RMA, whereas district councils do not have access to the same range of mechanisms. District councils lack the power to enforce licence conditions associated with land use effects under the RMA because those licences are covered by the Crown Minerals Act. The enforcement powers under the transitional provisions of the Crown Minerals Act are unclear and uncertain, with some of the powers being heavy-handed (e.g. forfeiture) and not appropriate in all circumstances.

In her 1992 report on coal mining, the first Parliamentary Commissioner for the Environment, Helen Hughes, recommended that the Crown Minerals Act be amended to empower all local authorities to use the enforcement provisions of Part 12 of the RMA, in exercising their functions under s108 of the Crown Minerals Act.

This recommendation was responded to positively by both the Minister of Energy and the Minister for the Environment, although it has not been implemented.

The Minister of Energy, Hon John Luxton, wrote:

*"I concur with your recommendation that the transitional provisions of the Crown Minerals Act 1991 be amended in order to grant local authorities the use of the provisions of Part XII of the Resource Management Act 1991."*¹¹²

The Minister for the Environment, Hon Rob Storey, wrote:

*"I support recommendation 13, addressed to the Minister of Energy and me 'that s107 of the Crown Minerals Act 1991 be amended' in part. As I have already noted the transitional provisions of the Crown Minerals Act continue the same statutory rights for existing mining privileges. I do not believe that this gives them the right to expect deficient enforcement provisions to apply for all time. The transitional provisions as enacted mean that only the enforcement procedures of the old Act can be used on existing privileges. These procedures are not very effective and are not easy for local authorities to use."*¹¹³

The current work programme on amendments to the RMA provides an opportunity for this long overdue change to take place.

I recommend that:

3. The Minister for the Environment initiates the necessary legislative amendments to empower local authorities to use the full range of enforcement provisions in Part 12 of the Resource Management Act when exercising their functions under s107 and s108 of the Crown Minerals Act.
4. The Minister for the Environment initiates the necessary legislative amendments to empower local authorities to use the full range of enforcement provisions in Part 12 of the Resource Management Act in respect of deemed resource consents under the Resource Management Act.

6.4 'Old' mining licences including DoC land

The stock-take of minerals on Schedule 4 conservation land initiated by the Minister of Energy and Resources in August 2009 has generated considerable public interest. The issue raised in section 5.3 of this report is different.

Of the 111 mining and coal mining licences granted under the old mining legislation and still operative, at least 55 include some DoC land. None of this land is protected under Schedule 4 of the Crown Minerals Act and presumably can be mined.

About 1,400 hectares of the land covered by 'old' mining licences has been transferred to DoC over the last twenty odd years. The conservation values on these new additions to DoC land may be inadequately protected.

I recommend that:

5. The Minister of Conservation review the mining and coal mining licences which are existing privileges under the Crown Minerals Act and are for sites that include land managed by the Department of Conservation, to ensure that the existing conservation protection is adequate.

6.5 Balancing existing privileges against public liability

When in 1992 the first Parliamentary Commissioner for the Environment, Helen Hughes, recommended that all conditions relating to environmental effects in existing coal licences expire in 2001, the Minister of Energy, Hon John Luxton, responded as follows:

*"I cannot support your recommendation that all environmental conditions on coal mining licences terminate on 1 October 2001... To adopt your proposal would send out negative signals to investors and may result in compensation claims against the Crown."*¹⁴

However, the fiscal impact of updating the environmental conditions associated with mining licences can go in both directions.

Updating environmental conditions could reduce the monetary value of a mining licence, especially when significant investment has already been made in equipment on the site. On the other hand, *not* updating environmental conditions in a mining licence may expose the Crown to the risk of the site being abandoned in a poor state, and the ensuing clean-up being done at taxpayer and ratepayer expense.

In its improved environmental management of Stockton mine, Solid Energy, to its credit, has gone far beyond what the law required it to do. But it is incentivised to do so because it is a state-owned enterprise, not a private mining company, and is in New Zealand for the long haul. However, Solid Energy can sell mining licences to private companies with the approval of the Minister of Energy and Resources. Such transfers increase the risk of mining sites being abandoned with future remediation costs falling on the Crown.

Solid Energy holds a significant number of 'old' mining licences. These include some beside Stockton mine, that are for very large areas, and which all remain valid until 2027. Sale of these licences and others could expose the Crown to both environmental risk and fiscal risk.

Posting bonds is one approach to dealing with such risks. However, the effectiveness of a bond depends entirely on the terms and structure of the bond.

The recommendation that ends this section is focused on fiscal risk. Reducing fiscal risk in this context would help reduce environmental risk, although remediation of an abandoned site is seldom likely to restore the environment to its pre-mining state.

I recommend that:

6. If and when approving the sale by Solid Energy of any coal mining licence which is an existing privilege under the Crown Minerals Act to a private entity, the Minister of Energy and Resources consult the Minister of Finance and the Minister for State-Owned Enterprises, as to how to ensure the Crown is not exposed to fiscal risk due to outdated and inadequately enforced environmental conditions associated with the licence.

Endnotes

1. Nathan, S. Mining and underground resources – History of mining, in *Te Ara – the Encyclopedia of New Zealand*, updated 2 March 2009.
2. Sherwood, A and Phillips, J. Coal and coal mining – The 19th century, in *Te Ara – the Encyclopedia of New Zealand*, updated 2 March 2009.
3. Nathan, S. Mining and underground resources – History of mining, in *Te Ara – the Encyclopedia of New Zealand*, updated 2 March 2009.
4. Nathan, S. Mining and underground resources – History of mining, in *Te Ara – the Encyclopedia of New Zealand*, updated 2 March 2009.
5. Hon Gerry Brownlee, 26 August 2009. *Australasian Institute of Mining and Metallurgy*, opening address, Queenstown, New Zealand.
6. Complaints were received regarding degraded water quality in Ngakawau River and the potential visual impact of ridgeline mining. A subsequent complaint was also received regarding the planned relocation of a protected Powelliphanta land snail population from the Stockton ridgeline. Dr Williams recommended to the complainant that the matter regarding the relocation of the snails be referred to the High Court. The Court ruled that a Wildlife Permit was needed to move the snails (Royal Forest and Bird Protection Society of New Zealand Inc v Minister of Conservation [2006] NZAR 265).
7. Parliamentary Commissioner for the Environment. 2006. *Solid Energy's environmental management systems and performance*. Wellington.
8. This investigation involved scrutiny of all the licences and consents relating to Stockton mine, sighting of independent audits, viewing current databases, a tour of operations at the mine, and interviews with scientists, managers and consultants. At the request of the Commissioner, Solid Energy and the West Coast Regional Council each prepared brief progress reports in mid-2008. Written feedback on progress at Stockton mine was also obtained from a selection of other interested parties. These were: the independent mine auditor, a consultant employed by Buller District Council, the Department of Conservation (DOC) West Coast Conservancy Office, the Department of Conservation Buller Area Office, the Buller Conservation Group, the Royal Forest and Bird Protection Society, Fish and Game New Zealand. Clarification of facts and opinions was obtained where necessary.
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10. http://www.doughood.co.nz/mining_case_studies.asp. Accessed 29 January 2009.
11. The main coal mining licence area for Stockton is 2310.3 hectares and there are three ancillary coal mining licences for processing facilities covering an area of 224.3 hectares.
12. URS New Zealand Limited for Hydro Developments Limited. *Ngakawau Restoration Project: Hydrology and Water Quality Review*. 2008. Christchurch: URS.
13. The Ngakawau Catchment extends over 197km². The combined catchments of Mine Creek, Mangatini Stream and St Patrick Stream represent around 36% of this area.
14. Produced from data sourced from: Land Information New Zealand, the Department of Conservation, Crown Mineral Groups, Ministry of Economic Development and the National Institute of Water & Atmospheric Research (NIWA).
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17. Solid Energy New Zealand Limited. 2004. *Solid Energy 2004: Stockton Mine*. Christchurch.
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19. http://www.doughood.co.nz/mining_case_studies.asp. Accessed 29 January 2009.
20. These figures have been taken from Solid Energy which states that production averaged approximately 1.3 million tonnes per annum 1996-2001.
21. Annual data with June year end, 1990-2001. Supplied by Solid Energy. 2002-2008 data sourced from Solid Energy, various Solid Energy annual reports and media releases dating back to 2002, archived on the <http://www.coalnz.com> website.
22. Coal Association of New Zealand, 2008: *Coal e-Newsletter*. Issue No. 35 December 2008. Lower Hutt: Coal Association of New Zealand and CRL Energy Limited.
23. Solid Energy, 2008. *Energy in Transition: Annual Report 08*. Christchurch. Solid Energy New Zealand Limited.
24. GHD Limited, 2008. *Assessment of Effects Aquatic Ecology*. Report for Proposed Hydro Power Scheme – Stockton Plateau. Christchurch. GHD Limited for Hydro Developments Limited.

25. GHD Limited, 2008. *Assessment of Effects Aquatic Ecology*. Report for Proposed Hydro Power Scheme – Stockton Plateau. Christchurch. GHD Limited for Hydro Developments Limited.
26. Cawthron Institute, 2008. *Assessment of Offshore Acid Mine Drainage Effluent Disposal*. Cawthron Report No. 1537. Nelson. Cawthron Institute for Hydro Developments Limited.
27. Parliamentary Commissioner for the Environment, 2006. *Solid Energy's environmental management systems and performance*. Wellington.
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30. Solid Energy, June 2008. *Solid Energy's Environmental Management Systems and Performance*. An update report to the Parliamentary Commissioner for the Environment. Unpublished.
31. Solid Energy, 2004. *Annual Report 2004*. Christchurch. Solid Energy New Zealand Limited.
32. Solid Energy, June 2008. *Solid Energy's Environmental Management Systems and Performance*. An update report to the Parliamentary Commissioner for the Environment. Unpublished.
33. Solid Energy, June 2008. *Solid Energy's Environmental Management Systems and Performance*. An update report to the Parliamentary Commissioner for the Environment. Unpublished.
34. The four audits were done in November 2004, December 2005, March 2007 and January 2009. *Solid Energy, Solid Energy's Environmental Management Systems and Performance*. Presentation to the Parliamentary Commissioner for the Environment Project Team, Stockton Mine, 17 October 2008. Unpublished Powerpoint presentation.
35. Pers. comm., Dr Rob Savory, independent mine auditor, 18 December 2008.
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38. Interviews with community interest group representatives and the Stockton mine Site Manager, October 2008.
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63. Capping material, in the form of alkaline Kaiata mudstone and weathered granite, is available from Cypress mine.
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67. Minutes of Stockton Community Consultative Group Meeting, 30 April 2008.
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73. Minutes of Stockton Community Consultative Group Meeting, 16 May 2007.
74. 'Black water' relates to water containing coal fines, flowing from areas being actively mined. 'Brown water' relates to a mix of water from both current operations and historic operations such as underground shafts. The Crown is paying for a proportion of the brown water being treated by the SWaMP, given that this water forms part of historic Crown liabilities.
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83. Pers. Comm. Phil Lindsay, Solid Energy, National Environmental Operations Manager, 15 September 2009.
84. That they are out of date is supported not only by the contents of the Stockton coal mining licence, but also the wording of Water Right 89/38.
85. Parliamentary Commissioner for the Environment, 1992. *Environmental management of coal mining*. Wellington.
86. An ancillary licence could be issued for activities associated with coal mining operations, such as access, buildings, and processing activities.
87. In this report, 'old regime' and 'old mining legislation' refers only to the Mining Act 1971 and the Coal Mining Act 1979. The transitional provisions of the Crown Minerals Act also apply to the Petroleum Act 1937. That is, licences for recovery of oil and gas are also 'existing privileges' and continue to operate under the (repealed) Petroleum Act 1937.
88. The Water Right became an "existing right" under s386 of the RMA, and the contents were deemed a series of "water permits" and "discharge permits" under the same section.
89. For example the Water and Soil Conservation Act 1967.
90. Schedule 4 of the Coal Mines Act (now repealed) was brought into being by Schedule 5 of the State Owned Enterprises Act.
91. As part of the process of forming the State Owned Enterprises, consultations were undertaken on what conditions might be required additional to those in Schedule 4 of the Coal Mines Act 1979. Variations to licences were made under sections 51 and 52 of the Coal Mines Act 1979.
92. A comparison of the regulatory package for Stockton mine with the resource consent for Cypress mine can be found at www.pce.parliament.nz.
93. Coal Mining Licence 37-150 (Stockton).
94. Water Right 89/38 Condition (k): *"Should monitoring of invertebrates and water chemistry confirm a degradation below existing values as established during the baseline survey as defined in section 4 of the water right application support document and condition (i) which are attributable to the grantee's operation, a meeting shall be convened between the grantee and the Regional Council to determine the cause of this degradation and if attributable to the grantee's operation, to arrange for remedial work to prevent a recurrence of the event which lead (sic) to the degradation and to establish a regime whereby the original quality of the receiving water as determined by the baseline surveys prescribed in this water right will be restored."*
95. RC03175 (Cypress): Conditions B12.12 and B12.13.
96. As of 1 July 2009, there were 111 mining licences covering approximately 20,700 ha issued under the old regime, and 480 mining permits covering approximately 51,200 ha issued under the current regime.
97. These ten licences expire in March 2027. However, associated deemed resource consents are under the transitional provisions of the RMA expire 35 years after 1991, that is, 2026. Air permits under the transitional provisions of the RMA expire 1 year after they would have expired if the RMA had not been passed. However, if a mining licence expires and is replaced by a mining permit granted under the Crown Minerals Act, a resource consent may be required under the RMA.
98. Hon Gerry Brownlee, 26 August 2009. Australasian Institute of Mining and Metallurgy, opening address, Queenstown, New Zealand.
99. DoC was created on 1 April 1987.
100. Coal Mines Act 1979, s21(3), (5); Mining Act 1971, s26(4).
101. There are seven mines – Stockton, Huntly East, Sullivan, Rotowaro, Island Block, Ohai, and Strongman – but more than seven licences because of ancillary licences.
102. For example, before 1991, monitoring was undertaken by mining inspectors, who would report to the Secretary of Energy. Under the new regime, the responsibilities of the mining inspectors have been devolved to several authorities. These include: Crown Minerals (fees, royalties, liabilities), Department of Labour (health and safety), Regional Councils (some environmental conditions), District Councils (some environmental conditions) and Department of Conservation (some environmental conditions).
103. S103D in the Mining Act 1971 contains similar provisions.
104. "...That s107 of the Crown Minerals Act (1991) be amended to: (a) empower local authorities, exercising functions under s108 of the Crown Minerals Act (1991), to use the provisions of Part XII of the Resource Management Act (1991); (sections 5.4.2, 5.5). (b) Provide for existing coal mine licences (including licences held by the Coal Corporation of New Zealand Ltd.) to contain a condition to the effect that all conditions in licences relating to environmental effects expire on 1 October 2001 and thereafter holders of licences shall be required to apply for resource consents under the Resource Management Act (1991). (section 5.4.2)...". Recommendation 13 to the Minister of Energy and the Minister for the Environment, Parliamentary Commissioner for the Environment 1992: *Environmental management of coal mining*. Wellington.

105. Investigation of complaints to the Parliamentary Commissioner for the Environment about various mines over many years has revealed that confusion within authorities about regulatory roles and responsibilities is common. These include Environment Bay of Plenty, and DoC (Te Puke Stone quarry complaint), Grey District Council and West Coast Regional Council (Roa coal mine complaint), Buller District Council and West Coast Regional Council (Stockton mine complaints). Even Crown Minerals were unclear about responsibilities with regard to the Te Puke Stone quarry complaint, seeking legal opinion.
106. *Reservoir at Stockton Mine a milestone*. Press Release: Solid Energy NZ. Wednesday, 8 July 2009.
107. Ministry for the Environment : A new beginning for Tui mine site. *Environz* July 2007, p11.
108. DoC, 2008. *Annual report for year ended 30 June 2008*. Department of Conservation, Wellington.
109. Crown Minerals Act, 1991, s41; Coal Mines Act, 1979, s89; Mining Act, 1971, s145.
110. For example, the Minister could not impose conditions relating to land use that would not have been allowed under the Coal Mines Act and the Mining Act, or conditions relating to matters already covered by another consent such as a deemed consent under the RMA.
111. Parliamentary Commissioner for the Environment, Environmental management of coal mining, December 1992. "To the Minister of Energy and the Minister for the Environment:...That s.107 of the Crown Minerals Act 1991 be amended to:... (b) Provide for existing *coal mining licences (including licences held by the Coal Corporation of New Zealand Ltd)* to contain a condition to the effect that all conditions in licences relating to environmental effects expire on 1 October 2001 and thereafter holders of licences shall be required to apply for resource consents under the Resource Management Act 1991."
112. Letter to Parliamentary Commissioner for the Environment from the Hon. John Luxton, 8 June 1993.
113. Letter to Parliamentary Commissioner for the Environment from the Hon. Rob Storey, 20 May 1993.
114. Letter to Parliamentary Commissioner for the Environment from the Hon. John Luxton, 8 June 1993.

Glossary

Acid mine drainage	The seepage of sulfuric acid into waterways. It forms under natural conditions when certain sulfide minerals in rock are exposed to oxidising conditions. This gives acidic water, laden with various (toxic) metals, e.g. Aluminium. Acid mine drainage usually forms from coal mining, both opencast and underground.
Activated carbon	A type of very pure processed carbon with high porosity, making it very adsorbent. Laboratory, medical and industrial applications include air and water filtration and monitoring.
Base flow	The summer or dry season flow of a river, maintained generally from groundwater seepage into the stream.
Basement rock	The underlying rock of an area.
Bituminous coal	A black coal, containing a high percentage of volatile matter, which burns with a smoky yellow flame.
Coking coal	A bituminous coal suitable for coking. When heated in the absence of air, it transforms into a solid product (coke) with properties suitable for using in a blast furnace.
DoC	Department of Conservation
Economic reserves	Proved reserves for which extraction is economically viable under current market conditions.
EMS	Environmental Management System
NTU	Nephelometric turbidity unit; see Turbidity of water.
Likely reserves	Mineral reserves likely to be present. There must be corroborating evidence of presence.
Overburden	Material overlying a useful mineral deposit, removed to get to the deposit; waste rock.
pH	The representation of acidity or alkalinity on a logarithmic scale between 14 (alkaline) and 0 (acid). The typical pH of unpolluted surface freshwaters is about 5.6, that of seawater about 8.2.
Proved reserves	Mineral reserves of known and confirmed extent.
RMA	Resource Management Act 1991
SEMP	Site Environmental Management Plan
SWaMP	Stockton Water Management Project
TSS	Total suspended solids
Turbidity of water	The cloudiness of water caused by the scattering of light by individual particles (suspended solids) that are often invisible to the naked eye. Turbidity is a key test of water quality and is measured by the extent of light scattering in an instrument called a Nephelometer. The units of turbidity are called Nephelometric Turbidity Units (NTU). A correlation between turbidity and total suspended solids (TSS) is somewhat unique for each location or situation.

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