

MCS90501

4 March 1999

Mt Cook Salmon Ltd  
PO Box 67  
TWIZEL

Attention: Mr. Rick Ramsay

Dear Rick

**ASSESSMENT OF DISCHARGE PLUME FROM PROPOSED MT COOK FARM SITE,  
OHAU B CANAL****Introduction**

NIWA was asked to assess the effects of the Mt Cook Salmon farm discharge upstream of the bridge SH8 on another salmon farm site which is downstream of the bridge, on the Wairepo Arm (Logan site). The distance between farms is 166 m. Neither farm exists yet, but their construction is under consideration. The assessment considered the potential effects of the Mt Cook Salmon farm discharge on the downstream farm. The main contaminants will be remains of fish food, and fish wastes which may be either soluble or insoluble (organic particles with near-neutral or even positive buoyancy).

The assessment has considered whether the discharge plume from the upstream farm can reach the downstream farm. An accurate solution of this problem requires reasonably sophisticated 3-D modelling and a large data set on channel morphometry, velocity field, turbulence, and concentration and other properties of contaminants from the upstream farm. However, a high degree of confidence can be obtained from an approximate solution based on simplified methods. To apply them, we have: (1) collected field data related to flow velocities, water surface slope, and canal cross-section at 450 m<sup>3</sup>/s, and flow rate records; (2) performed simplified dispersion calculations to evaluate the spread of the discharge plume within 160-200 m; and, to verify calculations, (3) conducted four tracer experiments (instantaneous injection) on the site which are well documented with photos and video-movie (tracer releases at 20, 40 and 60 m from the left bank).

**Data and site characteristics**

Figure 1 shows summary of data collected in the field. Figure 2 shows flow rate fluctuations, 3 hr averaged, for the last ten years. Photos and video from tracer experiments are available upon request. The hydraulic and morphometric conditions on the site are complex as the reach presents superposition of several distinct flow sections. These are: (1) the interface between the canal and the Lake; (2) the three-piers bridge between the proposed farms; and (3) the interface between the canal and the Wairepo Arm.

The interface between the canal and the Lake is characterised by a distinct flow pattern, clearly seen on photos and video, adjusted to the left bank, and most probably being a superposition of large horizontal eddies (15-20 m) and the near-bank helical secondary current. A deep minimum in the transverse distribution of velocity at 23 m (for both near-surface and near-bed velocities; Figure 1)

**National Institute of Water & Atmospheric Research Ltd**

*Kyle Street, Riccarton, Christchurch*  
*P.O. Box 8602, Christchurch, New Zealand*  
*Telephone +64-3-348 8987, Facsimile +64-3-348 5548*



supports this, as such a minimum is usually observed on the boundary between the near-bank secondary current and the transit flow. There is some evidence in the literature that the narrow zones between the near-bank helical secondary current and the predominant channel flow may serve as barriers to transverse mixing. The bridge influence is presented by well developed wake zones behind the bridge piers. These zones are likely to intensify the mixing, but not substantially.

The hydrodynamics at the interface between the canal and the Wairepo Arm may be assessed by the shape of the catch rope across the mouth of the Wairepo Arm (it is clearly seen on photos and video). This rope has a distinct S-shape showing the existence of some water exchange between the Arm and the canal: water flows into the Arm via the downstream part of the mouth, and out of the Arm via the upper part. The above patterns may potentially influence mixing processes which otherwise are due to turbulence.

### **Approximate estimates of the contaminant dispersion**

For our simplified calculations we have used nomographs for transverse mixing developed by J.C. Rutherford (Rutherford, 1981). To define the transverse dispersion coefficient we applied several formulas presented in dispersion literature. From the obtained values we have selected the largest value ( $D_y = 450 \text{ cm}^2/\text{s}$ ) which represents the worst case for the downstream farm. However, the calculations show that even for this, the worst case it is very unlikely that the discharge plume from the upstream farm would reach the site of the downstream farm. For all considered scenarios the plume does not reach even the centre-line of the canal at the Logan site. The calculations show that the plume reaches the right bank of the canal at 5.0 to 6.0 km downstream from the Mt Cook farm.

The above conclusion is based on the calculations which assume the potential influence of the canal entrance conditions, the bridge piers, and water exchange between the canal and the Wairepo Arm can be ignored. To clarify this assumption the photos and video from the tracer experiments were used. Both releases at approximately 20 m from the left bank (which corresponds to the edge of the upstream farm) showed excellent agreement with calculations, i.e., the tracer did not reach the canal centre-line at the distance 166 m. This means that, for the conditions of the dye tracer experiments, the contribution from the canal entrance conditions, the bridge piers, and water exchange between the canal and the Wairepo Arm are negligible and can be ignored.

### **Effect of flow rate fluctuations**

The above calculations and field experiments relate to the flow rate of  $450 \text{ m}^3/\text{s}$ . This flow rate represents nearly the maximum flow rate that can be achieved in the canal (Figure 2). In terms of dispersion processes this flow rate corresponds to conditions when the mixing processes are the most intensive. Therefore, we are confident that conclusions presented above will also be valid at any lower flow rates.

### **Potential wind effect**

There remains the potential for high winds to affect the discharge plume. If contaminants were concentrated in the near-surface region it is possible that during reasonably long periods of high winds, oriented from the left bank to the right bank, near-surface wind-driven currents may force the discharge plume from the upstream farm to the downstream farm.

### **Conclusion**

The simplified calculations of the transverse dispersion of the discharge plume from the upstream salmon farm (Mt Cook site) show that it should not reach the downstream salmon farm (Logan site).



The field tracer experiments support the calculations. However, there is the potential for the plume to reach the downstream farm during strong winds oriented from the left bank to the right bank.

Derek Goring provided helpful comments on this project, Mike Butler and Rick Ramsay made field measurements.

**Reference**

Rutherford, J.C. 1981. Handbook on Mixing in Rivers. Water and Soil Miscellaneous Publication no. 26, National Water and Soil Conservation Organisation, Wellington.

Yours sincerely



Vladimir Nikora  
Scientist



Ton Snelder  
Project Leader



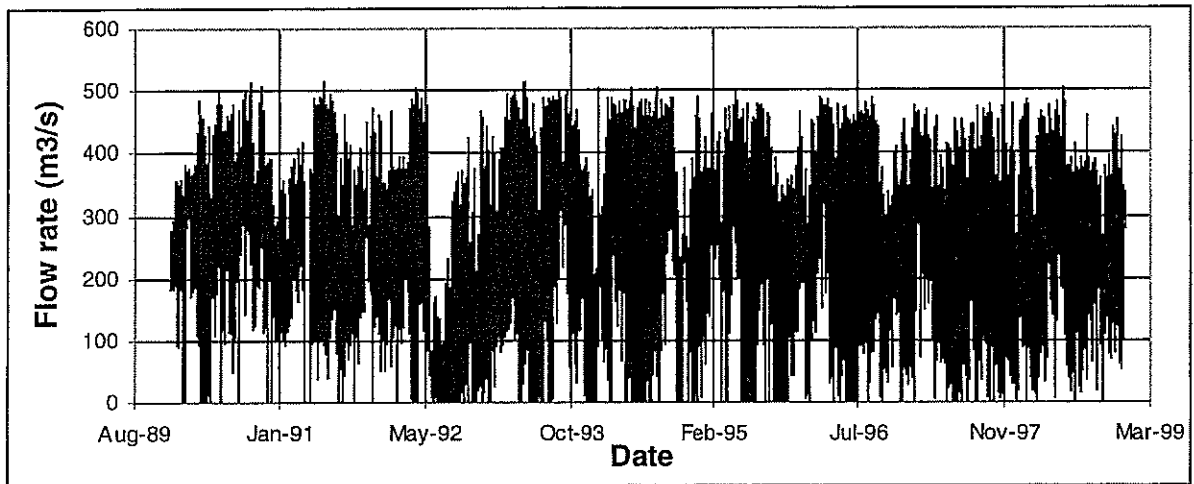


Figure 2. Flow rate fluctuations. Ohau B Canal.





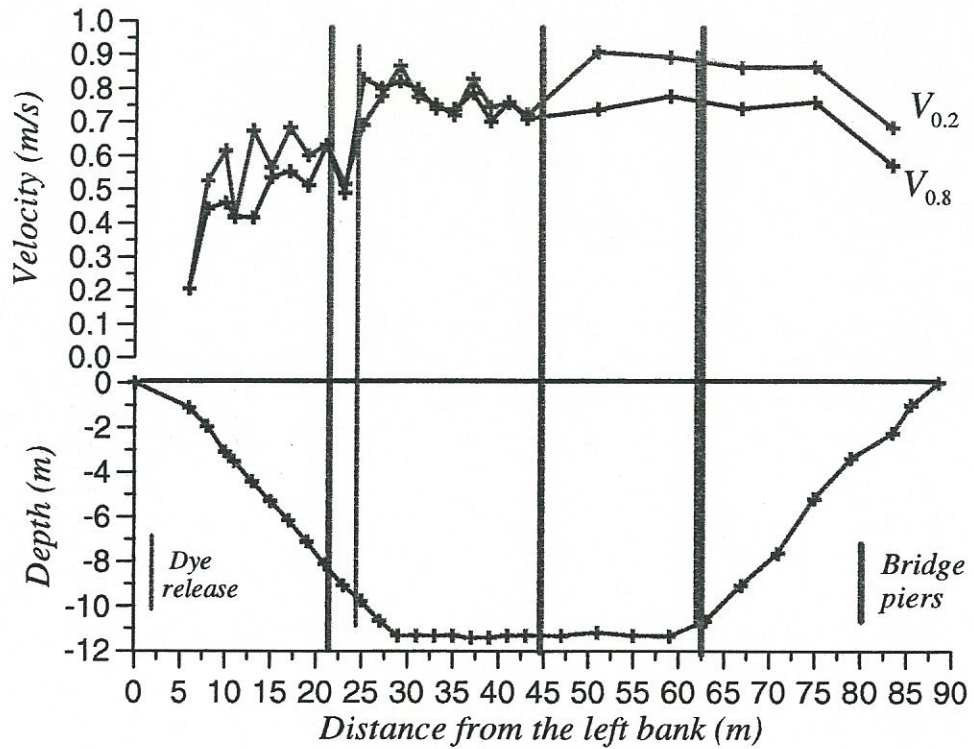


Figure 1. Channel cross-section and transverse distribution of mean longitudinal velocities. Ohau B Canal, Bridge SH8, Flow rate  $450 \text{ m}^3/\text{s}$ , 26 February 1999.  $V_{0.8}$  and  $V_{0.2}$  are mean velocities measured at two distances from the bed:  $0.8H$  and  $0.2H$  ( $H$  is the flow depth).



INVESTIGATING OFFICERS REPORT

Applicant: MT COOK SALMON LIMITED  
Client No: MTC13001  
Address: P O Box 67  
TWIZEL

Location: WAITAKI

Date To IO: 11-DEC-1998

Consent Number: CRC991371 File: CO6C-15311

Previous Consent: CRC916004 Change Y/N:

Consent Type: DISCHARGE PERMIT

Activity Type: INNOMINATE

Other CRC consents required Applied ?

Runanga: Waihao, Arowhenua

City/District Council: Waitaki District Council

Other Statutory Parties:

Report Due: 18-DEC-1998

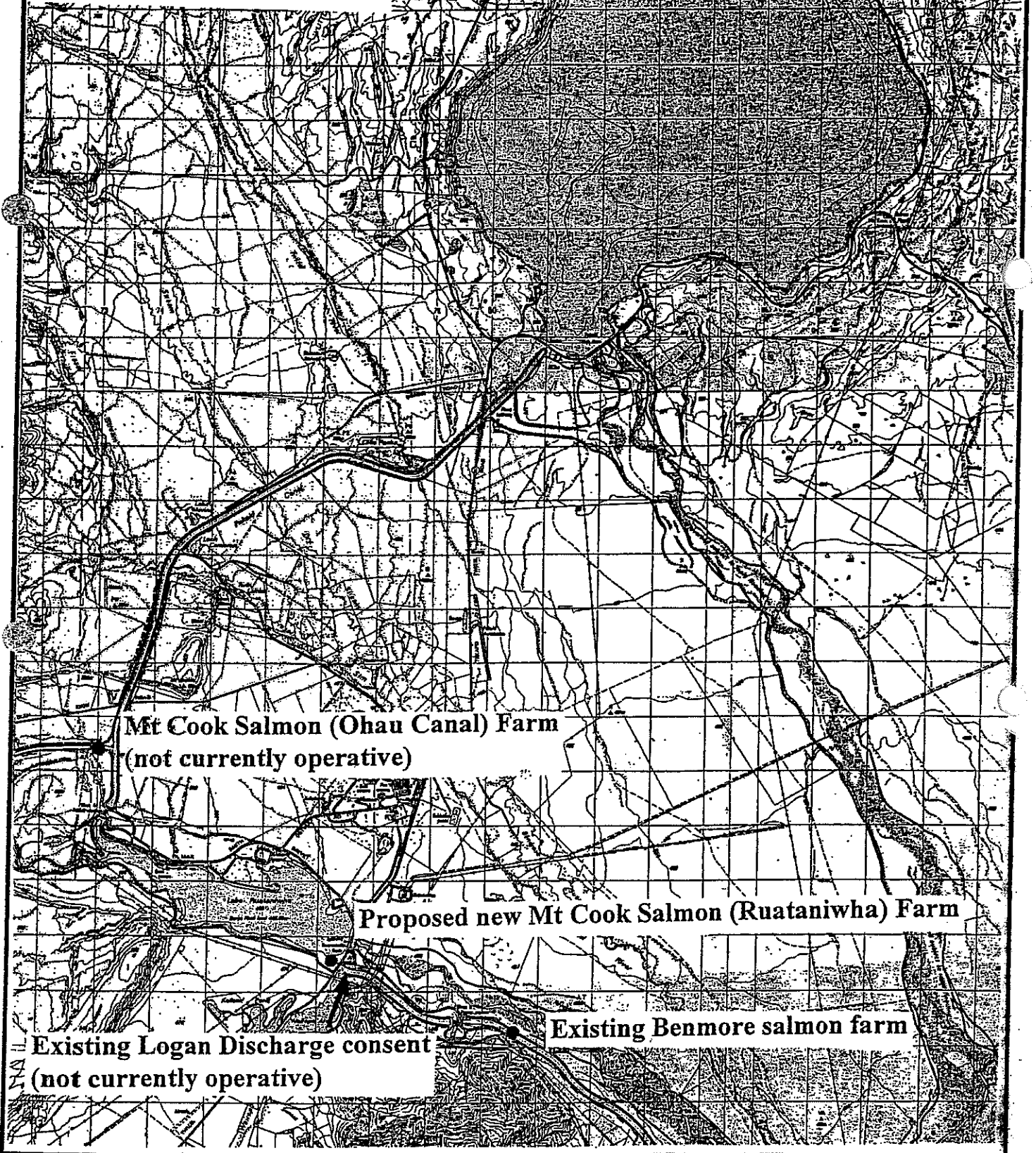
Application Details

Grid Reference: H38:773-536

Property Map

Key:

● Discharge Points



Mt Cook Salmon (Ohau Canal) Farm  
(not currently operative)



Proposed new Mt Cook Salmon (Ruataniwha) Farm

Existing Benmore salmon farm

Existing Logan Discharge consent  
(not currently operative)

Location Plan CRC991371

**KEY:**

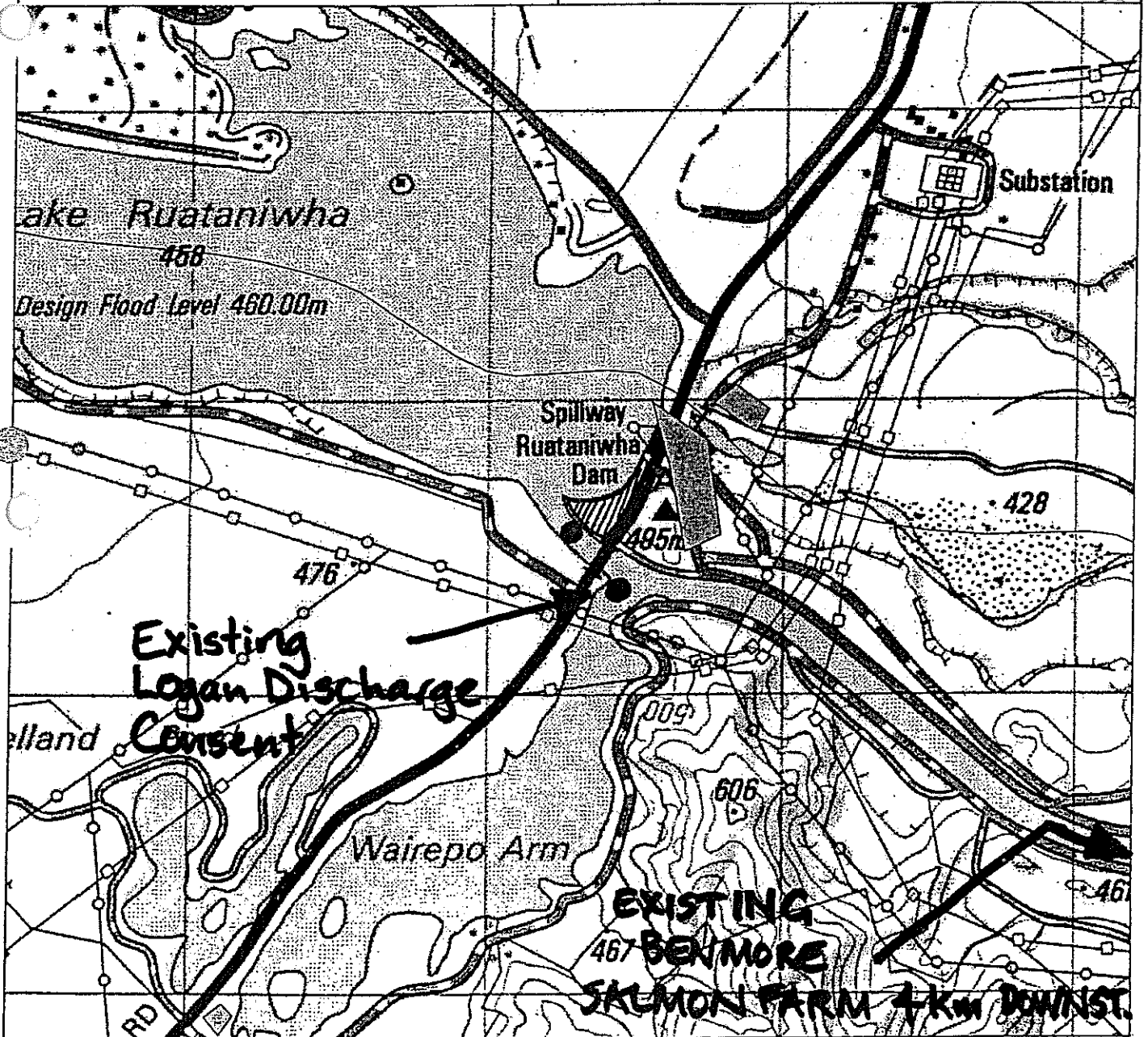
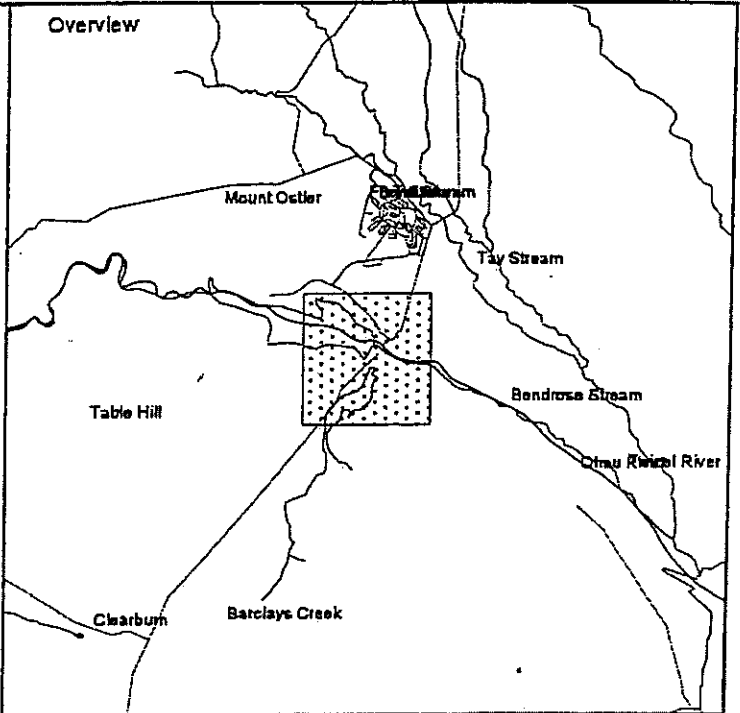
-  - PROPOSED NEW FARM & VISITOR BUILDING SITE
-  - PROPOSED NEW DISCHARGE SITE

 Reserve  
 Access strip  
 District boundaries

0 200 400 600 800 Meters



Overview



# Canterbury Regional Council

## Investigating Officers Report: Discharge Permit CRC991371

### EXECUTIVE SUMMARY

#### **Mt Cook Salmon Ltd: Permit to discharge contaminants CRC991371.**

It is recommended that Mt Cook Salmon Ltd be granted a resource consent to discharge contaminants consisting of uneaten fish food and fish faeces, at three sites on the Tekapo, Ohau, and Ohau B Canals in Waitaki.

It is considered that the adverse effects of the activities are likely to be minor given the conditions recommended. It is considered that all persons likely to be adversely affected have been consulted and have given written approval of the application.

It is therefore recommended that the consent be granted non-notified for a period of 35 years, subject to conditions.

### 1. INTRODUCTION

Mt Cook Salmon Ltd (hereafter referred to as the applicant) currently operates salmon rearing operations on the Tekapo Canal and the Ohau Canal and is the holder of Freshwater Fish Farm Licence FW/47 granted by the Ministry of Fisheries (MAF). The applicant holds Resource Consents CRC916003 (Tekapo) and CRC916004 (Ohau) to discharge up to 822 kilograms per day (300 tonnes per year) of waste containing uneaten fish food and fish faeces from each of these operations into the Tekapo and Ohau Canals respectively. These existing consents expire on 30 April 2000.

The applicant proposes to build an additional new salmon rearing facility capable of farming up to 200 tonnes of salmon per year at the Ohau B Canal outlet from Lake Ruataniwha (refer Location Plan CRC991371). This proposed facility would involve the discharge of a further 205 kilograms per day (75 tonnes per year) of waste containing uneaten fish food and fish faeces to the Ohau B Canal.

The applicant wishes to apply for a new consent to cover the replacement of the two existing discharge consents and to cover the proposed new discharge.

The Discharge Permit applied for is therefore as follows:

- **CRC991371:** To discharge contaminants consisting of uneaten fish food and fish faeces at three sites. The discharge mass would be up to 822 kilograms per day (300 tonnes per year) at each of two sites on the Tekapo and Ohau Canals (at or about map references NZMS 260 H38:850-767 and H38:732-580), and up to 205 kilograms per day (75 tonnes per year), at a site on Ohau B Canal (at or about map reference NZMS 260 H38:773-536).

This report is written to advise the Canterbury Regional Council (CRC) on matters that it must consider when making a decision on the application. The applicant has provided an 'Assessment of Effects on the Environment'.

A site visit was not carried out by the Investigating Officer (IO) as part of the audit investigation. The IO has discussed the application with Mr Lindsay Anderson (CRC Consents Monitoring Officer) who has carried out site visits to check compliance with conditions on the existing consents, most recently in February 1997.

There are two other existing consents to discharge contaminants from salmon farms in the area. There has been considerable consultation and discussion between both of these parties, the applicant and the IO during the audit of this application. These discussions were mostly focussed on the issue of whether the downstream parties are likely to be adversely affected by the proposed discharge. The applicant formally requested that the application audit be placed on hold (Fax dated 5 February 1999), while these discussions took place. On 11 March 1999 the applicant requested that the audit process re-commence based on new information provided by the applicant.

## 2. DESCRIPTION OF PROPOSED ACTIVITY

The species of salmon farmed will be Chinook and Sockeye and these will generally be raised from smolt through to approximately 2.5kg fish. Salmon will be raised in a succession of pens contained on rafts which float on the canals and are connected to the shore by steel cable, accessways or a combination of both. As the fish grow they are progressed from steel or plastic raceways through smolt mesh pens to large mesh pens. This is the existing system practiced on the Tekapo farm.

Fish will be fed on various regimes (daily, twice daily or on demand) with food purchased to specification from Reliance Stockfeeds in Dunedin. Feeding techniques have been perfected over time to minimise waste from the pens. This has involved trialing various feeding techniques while observing the discharge by sitting under rafts in the Ohau Canal with Scuba equipment. It has also involved the development of an optimal mesh diameter on the floor of the pens to minimise food wastage by fallout and allow bottom feeding by the salmon. Feeding rates will be strictly controlled dependent on fish size (assessed monthly), water temperature and flow rates, in order to minimise waste and consequently the level of contaminant discharge.

The salmon excrete biological wastes into the canal water and this is carried downstream out of the pens. This waste constitutes the major contaminant discharged from the fish farm.

Fish are killed and harvested on a purpose-built killing table whereby blood product is collected from the table and piped into a storage container. This container is either emptied into the harvest tote (1200L container used for transporting fish, ice and blood-water) for transport to the processing factory, or discharged into the farm grey waste-toilet holding tanks for transport to the Twizel campervan dump station. Fish mortality (other than harvest kills) has typically been less than one percent annually and any mortalities are logged and disposed of according to the MAF Farm License, usually at the Twizel Offal Pit. Offal resulting from farm processing (eg gilling, gutting and filleting) will also be disposed of according to the MAF Licence.

### 2.1 Nature of Discharge

The applicant has stated that the discharge will contain wastes from salmon feed and fish excreta. The fish are fed salmon feed pellets which are made up of ordinary salmon feed comprising fish meal, vitamins, grains and oils. Such wastes generally give rise to a variety of substances either directly, or indirectly through decomposition. The most environmentally important of these are;

- suspended solids which can increase water turbidity,
- nitrogenous compounds (mainly ammonium and urea) and phosphates which may result in an increased rate of plant and algal growth, and,
- organic material which can increase the biological oxygen demand of the water.

There is also the possibility that fish disease organisms and any chemicals used to treat these could be discharged in association with the above wastes. The IO is aware that the National Institute of Water and Atmospheric Research Ltd (NIWA) has conducted several studies on the potential for fish diseases to occur and spread from salmon farms in the Waitaki canals into wild fish populations (Field-Dodgeson and Boustead, 1991).

### 3. LEGAL AND PLANNING MATTERS

#### 3.1 Resource Management Act 1991

Section 15(1)(a) of the RMA states that "no person may discharge any contaminant or water into water, unless the discharge is expressly allowed by a rule in a regional plan and in any relevant proposed regional plan, a resource consent, or regulations".

The discharge is not expressly allowed in any regional plan or proposed regional plan and a resource consent is therefore required.

Section 107 of the RMA restricts the consent authority from granting applications for discharges if, after reasonable mixing, the contaminant or water discharged, is likely to give rise to all or any of the following effects in the receiving waters:

- (c) The production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials:
- (d) Any conspicuous change in the colour or visual clarity:
- (e) Any emission of objectionable odour:
- (g) Any significant adverse effects on aquatic life.

These effects considered relevant will be discussed later in section six of this report.

#### 3.2 Transitional Regional Plan (TRP)

There is no regional rule pertaining to the discharge of contaminants from fish farms. In Te Aroha Air Quality Protection Appeal Group v Waikato Regional Council, the Tribunal (now Environment Court) recognised the existence of a new class of activity not specified in the RMA, called the 'innominate' category. Decisions on this category of activities were held by the Tribunal to be purely discretionary and decided in accordance with section 105(1)(b).

Given this precedent, the discharge in this application will be classed as innominate and will be treated as discretionary.

#### 3.3 Conservation Management Plans and Conservation Orders

The IO is not aware of any conservation management plans relevant to this application.

### 4. CONSULTATION UNDERTAKEN

#### 4.1 General consultation

The applicant has consulted with the following identified interested parties regarding the proposed extension to Mt Cook Salmon's activities in building a new farming facility at the Ruataniwha site:

- Fish and Game NZ
- Ngai Tahu (Resource Management Committee - Te Runaka O Arowhenua)
- Department of Conservation (DoC)
- Electricity Corporation NZ (ECNZ), (Owner of the farm sites)
- Transit NZ

The applicant has advised the IO that all the above parties were provided with the complete application information for the land use consent application to Waitaki District Council. This information included reference to the construction and operation of the new farm at the Ruataniwha site and the environmental issues of the consequent discharge. All the above parties have given written approvals of the application and these were provided to the IO with the application.



In addition the IO has consulted with the following parties during the audit of this application:

***Ministry of Fisheries***

Pursuant to section 93(1)(d) of the Act, notification must be served on the Ministry of Fisheries if a resource consent application relates to a fish farm. Mr Tony Brett (Policy Analyst) has advised the Investigating Officer that the Ministry sets criteria for these farms which need to be met. Concerns relate to the transmission of diseases and the possession of unauthorised fish. Mr Brett has advised that "*the applicant appears to have adequately discharged the responsibilities of the existing consents and there appears to be no implications for fisheries. Accordingly, the Ministry does not wish to raise any matters in regard to this resource consent application*".

***Te Runaka O Arowhenua***

The IO has discussed the application with Elizabeth Stevenson and she indicated that Te Runaka O Arowhenua have considered the application and the effects of the proposed discharge. She confirmed that Te Runaka O Arowhenua have no concerns with the application and gave written approval of the proposal.

The IO has also been contacted by Wiki Baker who advised that she had no concerns with the proposal except for the following: "*Runanga do not agree to more than 10 years for this consent. This is because there is no evidence presented to us that the long term effects of the discharge into the lake of fish matter is not detrimental to mahinga kai water quality*". The IO acknowledges this concern and has arranged for a copy of this report and a copy of a Technical Report by Mr M. Main (CRC) discussing the effects of a similar discharge from a similar farm on the Tekapo Canal.

**4.2 Consultation with downstream permit-holders**

Following an initial audit of the application and discussion with Emma Christmas (Team Leader, Consents Investigations, CRC ), the IO considered there was insufficient information to determine whether two downstream water permit holders were likely to be adversely affected by the proposal. The IO therefore requested that these permit holders be consulted regarding any concerns they might have. There followed a period of consultation between the applicant, the two downstream permit holders and the IO. The following is a summary of this consultation:

***Mr K. Gray – Benmore Salmon Farm***

Mr K. Gray holds consent No. CRC916003 to discharge contaminants from a fish farm operated immediately below Ohau B Power Station, approximately four kilometres downstream from the proposed new Mt Cook Salmon site (labelled as Existing Benmore Salmon Farm on the Location Plan).

Mr Gray had several concerns about the Mt Cook Salmon proposal including the following:

- Concern over whether Mt Cook Salmon would operate the proposed farm effectively.
- Concern at the effect that discharged contaminants might have on the Benmore Salmon operation if they ever needed to move their salmon above the Power Station. He indicated that such a need might arise if flow levels below the Power Station were ever reduced to allow maintenance of the Canal.

The IO is aware that Benmore Salmon does not have resource consent with CRC to operate above the Power Station and so the latter concern was disregarded. Mr Gray's first concern is considered by the IO to be unwarranted because Mt Cook Salmon has had considerable experience operating salmon farms in the Tekapo and Ohau Canals. Compliance monitoring carried out by the CRC on the discharges from these existing farms would suggest that these farms were being managed effectively.

The IO concluded that Benmore Salmon was very unlikely to be adversely affected by the proposed discharge. Mr Gray was informed by the IO in writing that Benmore Salmon was not considered to be an adversely affected party. There was no response from Mr Gray.

**Mr R. Logan – Existing discharge consent**

Mr R. Logan holds consent no. CRC960344 to discharge contaminants from a proposed fish farm at the mouth of the Wairepo Arm, located approximately 166m downstream from the proposed new Mt Cook Salmon site (labelled as Existing Logan Discharge Consent on the Location Plan).

Mr Logan had several concerns about the Mt Cook Salmon proposal including the following:

- Concern at the commercial conflict of interest presented by the new proposal. Mr Logan feels there is room for only one operation in this area for commercial reasons.
- Concern at the potential effect of the proposed discharge of contaminants from Mt Cook Salmon's new site on his proposed operation.

The IO informed Mr Logan that commercial conflict of interest would not be considered during the audit of this application under the terms of the RMA, 1991. The IO explained that the effect of the discharge would definitely be considered. The IO subsequently requested further information from the applicant regarding Mr Logan's concern.

The applicant then contracted Mr T. Snelder (NIWA) to conduct a scientific investigation into the likely effect of the proposed discharge on Mr Logan's proposed farm. This study investigated flow and dispersion characteristics in the Ohau B Canal. A dye tracer study was conducted and NIWA holds photos and video footage of the results. A report was written by NIWA and it was concluded that the discharge plume from the proposed Mt Cook Salmon site is unlikely to reach Mr Logan's proposed site. The study also noted that there was the potential for the plume to reach the downstream farm during prolonged periods of wind oriented from the left bank to the right bank of Ohau B Canal.

The applicant provided evidence to indicate that there is unlikely to be any adverse effect caused by a wind mechanism. In addition the applicant suggested a sampling programme (paid for by Mt Cook Salmon) designed to monitor the proposed discharge including monitoring the effects at Wairepo Arm.

The IO was satisfied with this evidence and consequently concluded that Mr Logan is not considered an adversely affected party. The IO informed Mr Logan of this decision and sent him a copy of the NIWA Report and covering letter from Mt Cook Salmon. Mr Logan was not surprised by the results of the study and did not dispute the conclusion.

## 5. DESCRIPTION OF THE RECEIVING ENVIRONMENT

The proposed receiving waters for these discharges are the Tekapo Canal, the Ohau Canal and the Ohau B Canal. The three canals are all artificial channels which take water from storage lakes and deliver it to power stations. The canals also support an abundance of trout and are popular trout fisheries.

The Tekapo Canal receives its water from Lake Tekapo and discharges into Lake Pukaki via the Tekapo B power station. Its mean annual flow is  $79 \text{ m}^3\text{s}^{-1}$ .

The source of water for the Ohau Canal is Lake Ohau. It flows for about eight km before it joins the Pukaki Canal, and the combined flow enters Lake Ruataniwha via the Ohau A power station. The mean annual flow in the Ohau Canal is  $80 \text{ m}^3\text{s}^{-1}$ .

The sources of water for the Ohau B Canal are Lakes Pukaki and Ohau (effectively a combination of the above two Canal sources) via the intermediary Lake Ruataniwha. Monthly mean flows down the canal range from  $229 - 300 \text{ m}^3\text{s}^{-1}$  with a mean annual flow of  $248 \text{ m}^3\text{s}^{-1}$  (Hopkins and Boustead, 1993).

The IO is aware from information on other salmon farm files that a description of the Ohau B Canal receiving environment was provided in a NIWA report for the Benmore Salmon Company (Hopkins and Boustead, 1993). A summary of this description is as follows. The depth of water in the canal is about 12 m and varies by no more than 0.5 m. Even at zero flow deep water is still present and when excess water is spilled from Lake Ruataniwha this is passed down the Ohau River which does not effect the canal. Water velocity at the highest design flow ( $550 \text{ m}^3\text{s}^{-1}$ ) is quoted to be  $1.05 \text{ ms}^{-1}$  and is expected to

be proportional to flow. For about 70% of the time, the velocity will be in excess of  $0.4 \text{ ms}^{-1}$ . Only for about 10% of the time is it likely to fall below  $0.2 \text{ ms}^{-1}$  (Hopkins and Boustead, 1993).

All the lakes are oligotrophic but they differ in the amount of suspended sediment contributed to downstream regions. Lake Ohau is the clearest with Lakes Tekapo and Pukaki being turbid as a result of glacial till from melt waters. Little settling occurs in Lake Ruataniwha although this lake does appear to be clearer in summer (Hopkins and Boustead, 1993).

The IO has conducted a search of the Canterbury Regional Council's GIS database and notes that the whole region including these lakes and canals is identified as of Regional and Natural Significance in the database. Lake Ruataniwha is noted as an artificial lake with shallow margins planted with shrubs and is subject to heavy recreational use. The lake is important for cross-fostering of Black Stilt chicks and provides habitat for waterfowl, Australasian Bittern and Wrybills. The Canterbury Water Resources Overview document (U94/59) states that Lakes Tekapo, Ohau and Pukaki provide relatively undisturbed wildlife habitat and have several sites identified as of special wildlife interest because of their value as habitat for waders including the Black Stilt and the Southern Crested Grebe.

In addition, the proposed new Mt Cook Salmon site is near to the Wairepo Arm Crown Reserve administered by DoC and there is also a site nearby (500 m) identified by DoC as of archaeological interest as a pre-historic maori site.

## 6. ASSESSMENT OF EFFECTS ON THE ENVIRONMENT

The applicant has provided an Assessment of Environmental Effects (AEE) based largely on the application for Land Use Consent from Waitaki District Council to construct the proposed new facility at the Ohau B outlet of Lake Ruataniwha.

The applicant has stated that the potential effects on the environment are the same as those associated with a consent to discharge contaminants from a salmon farm granted to Mr R. Logan at a similar location in October 1995 (CRC960344). The application for this consent included an assessment of environmental effects (AEE) carried out by that applicant's consultants (C. Hopkins and N. Boustead - "Environmental and disease considerations for a proposed salmon farm on the Ohau B Canal, May 1993, Freshwater Miscellaneous Report No. 54, NIWA).

In addition a technical review of data from a salmon farm in the Tekapo Canal has been carried out by Mr M. Main (CRC Surface Water Quality Scientist). As a result of this information, the audit of Mr Logan's consent CRC960344 concluded the potential adverse effects of the activity on the environment to be minor and the consent was granted non-notified.

The applicant has stated that the above documents are relevant to the present application and that this application should be granted non-notified also. The IO has consequently read these documents and audited these statements.

In auditing these statements the IO agrees that the above documents are relevant to the present application. This is because the salmon farming activities described in those documents are largely similar to that proposed here and the potential adverse effects on the environment are very likely to be the same. However there are two main differences between the present application and those described in the documents for consent CRC960344 above:

- The present application is for three discharges (two replacements of existing consents and one new proposal) for discharge of 822, 822 and 205 kg per day of fish farm waste. This is compared to the above consent CRC960344 for discharge of 89 kg per day fish farm waste.
- The present application is for sites which are upstream of existing salmon farm discharge consent holders and consideration must therefore be given to potential effects of the discharges on these downstream users. This has been done and the resulting consultation has been discussed in section four.

Potential effects of the present application are discussed below in relation to the applicants statements, the AEE documents mentioned above, and the outlined differences between existing consent CRC960344 and this application. Potential effects are considered by the IO to fall under the following categories:

- Potential effects on surface water quality

Effects on surface water quality then relate to the following potential effects:

- Potential effects on ecosystems
- Potential effects on people and communities
- Potential effects on natural and physical resources
- Potential effects on amenity values

### 6.1 Potential effects on surface water quality

The applicant has stated that the effect of the existing farms on water quality has been proven to be minor by the results of a rigorous monitoring programme carried out on existing salmon farm facilities on the Ohau and Tekapo Canals. The applicant states that the discharges were initially monitored every two weeks for a variety of parameters including suspended solids, a range of nitrogen parameters, phosphorus and mercury.

The applicant further states that condition number three of the existing consents for discharges in the Tekapo and Ohau Canals, allows the Canterbury Regional Council to; *"vary the sampling regime if there has been no significant alteration in water quality by the results of the above sampling as a consequence of the operation of this water right."* The Canterbury Regional Council has in fact reduced the sampling to an annual programme. The applicant states that this reinforces the view that the activities (renewal of existing activities and proposed new activities) will have a very minor effect on the environment.

In addition the applicant has stated that the Technical Report by Mr Main (CRC) for a salmon farm in the Tekapo Canal concluded the effects of this farm on water quality and ecosystems to be minor. This Technical Report considered the following potential effects of that salmon farm discharge on water quality:

1. Effects of discharge resulting in increased nutrient (total nitrogen) levels.
2. Effects of discharge resulting in increased suspended sediments
3. Effects of discharge resulting in increased ammonia toxicity.
4. Effects of discharging fish food waste which contains low levels of mercury.
5. Effects of fish disease organisms present in discharge.
6. Effects of discharging fish disease treatment chemicals.

The IO agrees with the above statements by the applicant and considers the effect of the existing farms on water quality is likely to be minor. The IO has further considered the potential for cumulative adverse effect of the existing farms and the proposed new farm on water quality. The IO has considered each of the six effects listed above and these are discussed as follows.

#### 6.1.1 Potential effect of increased nutrients, suspended sediments, ammonia toxicity and mercury

The IO has considered the effects numbered 1-4 above by calculating the cumulative total concentrations of these parameters from all fish farms in the Tekapo, Ohau, and Ohau B Canals. Calculations were the same as those used in the Technical Report by Mr Main but include cumulative totals based on the maximum discharge mass from each farm. The effect of dilution by flows in the Canals was also included in the calculations. The dilution effect is very large and this resulted in the cumulative total concentration of parameters for all salmon farms in the Tekapo, Ohau and Ohau B Canals being not significantly different from those calculated for the Tekapo farm alone.

The cumulative totals for the toxic unionised form of ammonia and for mercury after mixing therefore do not exceed the guidelines discussed in the Technical Report. The cumulative totals for total nitrogen and for suspended sediments were also not significantly different. The cumulative results therefore do not conflict with the conclusions made in the Technical Report by Malcolm Main.

Given that a new farm is to be established, the IO recommends a condition requiring that a monitoring programme be carried out to ensure that the discharge quality does not exceed the guidelines discussed in the Technical Report. A condition is also recommended allowing the consent holder to apply for alteration to the monitoring programme and/or water quality standards if this is appropriate in the future. It is also recommended that the General Review Condition be modified in this case to allow CRC to make these same alterations if appropriate in the future.

In conclusion the IO considers the adverse effect of the potential for the discharge to increase nutrients, suspended sediments, ammonia toxicity and mercury is likely to be minor given the recommended conditions.

#### **6.1.2 Effects of fish disease organisms present in discharge**

The IO considers that the conclusions drawn in the Technical Report by Mr Main are directly relevant to this application. These conclusions were as follows:

"Evidence shows that there is a negligible risk to wild fish of disease spreading from the farm that is the subject of these water right applications. Neither is there a risk of disease being transmitted from the fish to humans drinking the canal water."

The IO concurs with these conclusions and considers the adverse effects of fish disease organisms on surface water quality are likely to be minor.

#### **6.1.3 Effects of discharging fish disease treatment chemicals.**

The applicant has stated that hazardous substances (which might end up in the discharge) are not routinely used at the Mt Cook Salmon farms because disease has not been a problem.

The IO is aware that Chloramine-T can be used when an outbreak of disease is diagnosed in a fish farm. This has seldom occurred in NZ. The applicant has stated that their fry is bought from NIWA and NIWA state their young fish are disease-free. When chloramine-T is used in NZ farms, it must be added to the waters at levels that are not toxic to fish and this includes native fish (N. Boustead, NIWA, pers. comm.). The chemical is not contained during the treatment procedure and is diluted by flow through the farm.

The IO is aware that it is not practical to contain this chemical and the discharge is likely to have negligible effect on the environment due to its low toxicity, the very low concentration discharged and the small duration (one hour) of the discharge (N. Boustead, NIWA, pers. comm.). The IO recommends a condition be attached to the discharge consent requiring that the applicant keep records if they ever need to use and discharge chloramine-T. These records are to be made available to the CRC on request. This will allow the CRC to be kept up to date with the frequency of use of this chemical and make informed management decisions in the future, including review of consent conditions if considered necessary.

The IO is also aware that malachite green is sometimes used in salmon hatcheries, usually as an anti-fungal agent to treat fish eggs. It is unlikely the chemical would ever be required at the applicant's salmon farms because they buy their salmon as fry rather than raising them from eggs. However the IO recommends the condition defining the nature of the discharge does not include malachite green because this chemical has been shown to have some adverse effects on fish under extended periods of exposure. The recommendation of this condition is consistent with consents to discharge from salmon farms recently granted by the CRC.

#### **6.1.4 Summary of potential effects of the discharge on surface water quality**

Overall the IO agrees with the applicant's assessment and considers the effect of the existing farms on surface water quality has been minor in the past. The conditions recommended will limit the rate of discharge, and will limit contaminants in the discharge to fish food wastes, fish excreta and chloramine-T. The conditions further place limitations on the discharge of chloramine-T, and restrict the levels of ammonia nitrogen and biological oxygen demand allowable in the discharge. If these conditions are adhered to, the IO considers the adverse effects of the discharge on surface water quality in the future are likely to be minor.

#### **6.2 Potential effects on ecosystems**

The applicant has stated there will not be more than minor effect of the discharges on ecosystems.

It was concluded by Mr Main (CRC) in the Technical Report for CRC960344 that there was no concern for aquatic life associated with that discharge.

The IO has concluded in section 6.1 that the cumulative effects of the Mt Cook Salmon discharge on water quality are likely to be minor. The discharge involves only water quality-influencing contaminants and no physical addition of extra flow. It follows that the IO considers there is unlikely to be more than minor effect of the discharge on ecosystems.

The applicant has stated that there is a positive effect of the discharge on the canal trout fishery because trout can feed on the discharge of food waste. The IO agrees with this statement.

#### **6.3 Potential effects on people and communities**

The applicant has consulted with a wide range of people and community groups regarding this application (refer section four). A list of parties who have given written approval of the application is provided in section four.

In addition, the potential effect on downstream water permit holders has been discussed extensively during consultation. The potential effect on the existing downstream permit holders has been concluded to be minor (refer section four). In addition the applicant has stated that the proposed new salmon farm and associated tourism facility will provide benefits for the local economy, and will therefore have positive effects on the local community. The IO agrees with this statement.

The IO considers that the consultation carried out has been sufficient to conclude that the adverse effect of the discharge activity on people and communities is likely to be minor.

#### **6.4 Potential effects on Natural and Physical Resources**

The applicant has stated that the fish farms improve the recreational trout fishery. The applicant has also stated that the farms improve the farmed salmon fishery resource.

The IO considers physical resources of the canals and their waters are unlikely to be adversely affected for the reasons described in 6.1-6.3 above. The IO considers there are no other natural or physical resources likely to be adversely affected by these activities.

#### **6.5 Potential effects on amenity values**

The RMA defines "amenity values" as: "*Natural and physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence and cultural and recreational attributes.*"

The Tekapo, Ohau and Ohau B Canals comprise completely modified environments.

The IO has considered the potential effect of the discharge activities on peoples appreciation of the region's pleasantness and aesthetic coherence, particularly with respect to the region's definition as an area of Regional and Natural Significance. The IO acknowledges that this is a subjective consideration to make, but considers the adverse effects of the activities in this regard are likely to be minor for the following reasons.

- The fish farms have a tidy appearance and the proposed new facility has been designed (drawings included with application) to create a visually pleasant environment to attract tourists.
- A number of interested parties have been made aware of these applications and none have raised concern over this issue (refer section 4.).

#### 6.6 Overall conclusion of the Assessment of Effects on the Environment

In auditing the applicant's assessment, the IO concludes that the overall potential for adverse effects of the discharge activity on the environment is likely to be minor and far outweighed by the positive effects of the activities on people, communities and economic investment.

### 7. MITIGATION MEASURES

The applicant has recommended the following conditions be attached to the consent as precautionary mitigation measures:

- A monitoring program to be carried out at the new farm site in the Ohau B Canal. Samples are to be taken of water in the Canal above the new farm, below the new farm and at the mouth of the Wairepo Arm about 150m downstream. These samples are to be analysed for water quality parameters; suspended sediment, ammonia nitrogen, nitrate nitrogen, total phosphorus and total mercury. The purpose of this is to monitor the influence of the new operation on water quality and ensure that the discharge does not cause water quality guidelines to be exceeded.
- The applicant also proposes that the water quality monitoring program currently required by the consents attached to the existing salmon farms be continued but carried out with a larger time interval between sampling runs.
- The applicant proposes that condition two of the existing consents be continued. This requires the consent holder to supply water of sufficient quantity and quality for domestic use at Ohau A and Tekapo B power stations if water quality at the draw off points for these power stations ever falls below the standard for human consumption (as long as this can be shown to be due to the discharge from the consent holder's salmon farms).

The IO considers the above conditions are appropriate and useful. The IO has incorporated these monitoring programmes in the following recommended conditions:

- The rates of discharge shall be limited to that which the assessment and audit of effects are based on.
- The nature of the discharge shall be limited to fish food wastes, fish excreta and chloramine-T.
- A record shall be maintained of every occasion that chloramine-T is used at the farm and this record shall be provided to the Canterbury Regional Council on request.
- The consent holder shall undertake a discharge monitoring programme with sampling and analyses to be performed as described in the conditions. This monitoring programme has been discussed with Mr M. Main (CRC), Mrs Faye Collins (Legal Advisor, CRC) and the applicant.

- The discharge shall not result in water quality standards defined in the conditions being exceeded in the Tekapo, Ohau and Ohau B Canals. These water quality standards have been discussed with Mr M. Main (CRC), Mrs Faye Collins (Legal Advisor, CRC) and the applicant.
- The consent holder may, during December each year, apply for a change or cancellation of consent conditions under section 127 of the Resource Management Act 1991, for the purpose of altering the monitoring programme and/or water quality standards provided for in the conditions.
- The Canterbury Regional Council's General Review Condition, modified to allow review of the monitoring programme and/or water quality standard conditions.
- The Canterbury Regional Council's general recovery of monitoring charges clause.

## 8. POLICY STATEMENTS

### 8.1 Regional Policy Statement

#### **CHAPTER 9**

Chapter 9 of the Regional Policy Statement (RPS) sets out objectives and policies relating to the management of the region's water resources and in particular, water quality. Of relevance to this proposal are:

Issue 3 states that discharges of contaminants into water can adversely affect water bodies including their ecological value, their use by present and future generations, and their recreational, cultural, social, economic, health and other values to the Canterbury community. Point source discharges can also compromise the cultural relationship of Tangata Whenua who value water for its wahi tapu, wahi taonga and mahinga kai.

Objective 3 seeks to enable present and future generations to gain cultural, social, recreational, economic, health and other benefits from the water quality in Canterbury's water bodies, while safeguarding other specified values of the environment.

#### **Policy 9**

To manage discharges and set water quality standards and terms in plans and as conditions on resource consents to achieve Objective 3. Adverse effects of discharges on existing water quality should be avoided, remedied or mitigated.

Should this consent be granted, it is recommended that the nature and rate of discharge be restricted to maintain the existing water quality of the Tekapo, Ohau and Ohau B Canals.

#### **Policy 13**

Where numerical or narrative water quality standards for a contaminant have not been specified for a water body, the granting of a consent for point source discharges of the contaminant into the water body should not preclude existing reasonable uses of the water body. Discharges should only be allowed, where after reasonable mixing they do not prevent existing uses of the water body.

The concentration of the discharge contaminants and their dilution in the canals has been discussed in section 6.1. Overall the IO considers that contaminants will be effectively diluted and dispersed to a level which does not adversely effect any existing or immediately foreseeable use of the water body.

#### **CHAPTER 6**

Policy 3 states that: "Specific aspects of the relationship of Tangata Whenua, their culture and their traditions with their ancestral lands, water, sites wahi tapu and other taonga should be recognised and provided for through resource management and planning including provisions in plans, decisions on resource consents and monitoring the state of the environment."



Te Runaka O Arowhenua has had the opportunity to comment on this application. This is addressed in section 9.4 of this report.

## **9. PART II MATTERS**

### **9.1 Purpose of the RMA**

The purpose of the RMA (section five) is to promote the sustainable management of natural and physical resources.

Based on the information available it is considered that the adverse effects of the discharge of contaminants will be minor and is consistent with the sustainable management of the environment. The IO considers that the granting of this application will not compromise the purpose of the RMA, provided the recommended conditions are adhered to.

### **9.2 Matters of National Importance**

Section six of the RMA requires that the consent authority recognise and provide for a number of matters of national importance. The IO considers that the granting of this resource consent with the recommended conditions will not compromise any of the matters in section six.

### **9.3 Other Matters**

Section seven of the RMA requires that the consent authority shall have particular regard to a number of "other matters". The IO considers that the granting of this resource consent with the recommended conditions will not compromise any of the matters in section seven.

### **9.4 Principles of the Treaty of Waitangi**

Section eight of the RMA requires the Council to take into account the principles of the Treaty of Waitangi when making a decision on an application.

The principles of the Treaty have been taken into account during the audit of this application. "Te Whakatau Kaupapa" (Tau et al. 1992) has been referred to in the first instance. The activity does not occur in a silent file area nor in an area of historical significance.

The applicant has consulted with Te Runaka O Arowhenua Resource Management Sub-committee and they have given written approval of the application. The IO has consulted with Wiki Baker (Te Runanga O Arowhenua) and she has given conditional approval of the application (see section four).

## **10. OTHER RELEVANT MATTERS**

As far as the IO is aware there are no case law or Environment Court decisions of relevance to this application.

The Council has previously granted permits for the discharge of contaminants from crayfish holding tanks, and paua and fish farms sited in the coastal marine area. There have been recent consents granted for discharges of contaminants from fish farms in the Rakaiia River (CRC991078 and CRC990293), the Kaiapoi River (CRC991081), and a fish farm next to the Tentburn River (CRC990594). The IO considers this audit report has been carried out in a manner consistent with those previously carried out by the CRC.

## 11. RECOMMENDATIONS

### 11.1 Recommendation to Notify or Non-Notify

Pursuant to section 94(2) of the RMA, a resource consent for discretionary activities need not be notified provided the consent authority is satisfied that:

- (a) adverse effects on the environment will be minor; and
- (b) written approval has been obtained from every person whom the consent authority is satisfied may be adversely affected by the granting of this consent.

The IO considers that adverse effects on the environment arising from the proposal will be minor. Fish and Game NZ, DoC, Te Runanga O Arowhenua, ECNZ and Transit NZ have all given written approval of the applications. The IO has considered the two downstream permit holders and does not consider either to be an adversely affected party (see section four for consultation and discussion). There are no other persons whom the IO considers to be adversely affected by the granting of this consent.

Therefore, the IO finds that the application meets the requirements of s94(2) of the RMA and recommends this application for non-notification.

### 11.2 Recommendation to Grant or Decline

Under section 107(1) of the RMA, a consent authority shall not grant a discharge permit where it would result in specified adverse effects. All relevant adverse effects of the discharge were considered in this report. The recommended conditions will ensure any adverse effects will be minor.

Under section 105(1)(b) of the RMA, a consent authority may grant or refuse a consent for a discretionary activity, and (if granted) may impose conditions under s108.

As discussed above the IO considers that adverse effects on the environment arising from the proposal will be minor. The IO therefore recommends that the discharge permit be granted, subject to the recommended conditions. The IO acknowledges the concern expressed by Wiki Baker of Te Runaka O Arowhenua regarding a 10 year duration (refer section four) and has addressed this by sending Wiki Baker the information discussed in section 4. The IO considers this information and the conditions recommended to be attached to this consent are adequate to ensure that adverse effects of the activity on mahinga kai water quality are likely to be minor. The Investigating Officer considers this addresses Wiki Baker's concern. The recommended term of the permits is therefore 35 years as applied for in the application. The applicant agrees to the proposed conditions and duration of the consents.

## 12. REFERENCES

Canterbury Regional Council. *Canterbury Resources Overview*, Resource Document U94/59.

Tau, T. M., Goodall, A., Palmer, D., and Tau, R., 1990. *Te Whakatau Kaupapa, Ngai Tahu Resource Management Strategy for the Canterbury Region*, Wellington.

Field-Dodgeson, MS and Boustead, NC. 1991. The feasibility of rearing salmon in hydrocanals. *New Zealand Freshwater Fisheries Miscellaneous Report No. 83*.

Hopkins, CL and Boustead, NC. 1993. Environmental and disease considerations for a proposed salmon farm on the Ohau B/C Canal. *New Zealand Freshwater Fisheries Miscellaneous Report No. 54*

Investigating Officers Report

Report Prepared By PP Ned Norton  
(Montgomery Watson)

Date: 29-MAR-1999

Is additional information required? :

RECOMMENDATION: NON-NOTIFY

DECISION TO NON-NOTIFY MADE UNDER DELEGATED AUTHORITY F. C. D. DATE 31.3.99

To grant MT COOK SALMON LIMITED a DISCHARGE PERMIT to discharge contaminants into the Tekapo Canal at or about map reference NZMS 260 H38:850-767, the Ohau Canal at or about map reference H38:732-580, and the Ohau B Canal at or about map reference H38:773-536.

Reasons for Recommendation to Grant

<1>

Any adverse effects on the environment as a result of the proposed activity will be minor.

<2>

The proposed activity does not conflict with the purpose of the Resource Management Act given the recommended conditions.

Recommended Conditions:

<1>

The rate at which contaminants are discharged into the Tekapo Canal shall not exceed 822 kilograms per day.

<2>

The rate at which contaminants are discharged into the Ohau Canal shall not exceed 822 kilograms per day.

<3>

The rate at which contaminants are discharged into the Ohau B Canal shall not exceed 205 kilograms per day.

<4>

The contaminants in the discharge to the Tekapo, Ohau, and Ohau B Canals shall be only fish food, fish excreta and chloramine-T.

<5>

A record shall be maintained of every occasion that chloramine-T is used in the farms and this record shall be provided to the Canterbury Regional Council on request.

<6>

At times when there is a discharge to the Tekapo Canal, a monitoring programme shall be carried out as follows:

(a) Samples of canal water shall be taken on two occasions each year, once during November and once during May.

(b) Samples shall be taken on both occasions at the following sites in the

Tekapo Canal:

- (i) at 100 metres upstream of the discharge point, and
  - (ii) at 200 metres downstream of the discharge point, and
  - (iii) at 50 metres upstream of the water supply abstraction points for the Tekapo B power station.
- (c) Analyses of all samples taken shall be carried out for the following parameters by a laboratory accredited to ISO Guide 25 for those analyses.
- (i) suspended solids
  - (ii) ammonia nitrogen
  - (iii) five day biochemical oxygen demand
  - (iv) nitrate nitrogen
  - (v) nitrite nitrogen
  - (vi) total Kjeldahl nitrogen
  - (vii) total phosphorus
  - (viii) total mercury
- (d) Results of the above analyses shall be provided to the Canterbury Regional Council within 10 working days of completion of the analyses.

<7>

At times when there is a discharge to the Ohau Canal, a monitoring programme shall be undertaken as follows:

- (a) Samples of canal water shall be taken on two occasions each year, once during November and once during May.
- (b) Samples shall be taken on both occasions at the following sites in the Ohau Canal:
- (i) at 100 metres upstream of the discharge point, and
  - (ii) at a point immediately above the confluence of the Ohau and Pukaki Canals
  - (iii) at 50 metres upstream of the water supply abstraction points for the Ohau A power station.
- (c) Analyses of all samples taken shall be carried out for the following parameters by a laboratory accredited to ISO Guide 25 for those analyses.
- (i) suspended solids
  - (ii) ammonia nitrogen
  - (iii) five day biochemical oxygen demand
  - (iv) nitrate nitrogen
  - (v) nitrite nitrogen
  - (vi) total Kjeldahl nitrogen
  - (vii) total phosphorus
  - (viii) total mercury
- (d) Results of the above analyses shall be provided to the Canterbury Regional Council within 10 working days of completion of the analyses.

<8>

At times when there is a discharge to the Ohau B Canal, a monitoring programme shall be undertaken as follows:

- (a) Samples of canal water shall be taken at three monthly intervals.
- (b) Samples shall be taken on each occasion at the following sites in the Ohau B Canal:
- (i) at 20 metres upstream of the discharge point,
  - (ii) at the State Highway Bridge 20 metres from the true left bank,
  - (iii) at the State Highway Bridge 60 metres from the true left bank,
  - (iv) at the mouth of the Wairepo Arm on the West Bank,
  - (v) at 50 metres upstream of the water supply abstraction points for the Ohau B power station.
- (c) Analyses of all samples taken shall be carried out for the following parameters by a laboratory accredited to ISO Guide 25 for those analyses.
- (i) suspended solids
  - (ii) ammonia nitrogen
  - (iii) five day biochemical oxygen demand
  - (iv) nitrate nitrogen
  - (v) nitrite nitrogen
  - (vi) total Kjeldahl nitrogen
  - (vii) total phosphorus

(viii) total mercury

(d) Results of the above analyses shall be provided to the Canterbury Regional Council within 10 working days of completion of the analyses.

<9>

The discharge shall not result in the following water quality standards being exceeded in any of the Tekapo, Ohau and Ohau B Canals:

- (a) 0.1 grams per cubic metre ammonia nitrogen,
- (b) two grams per cubic metre for five day biochemical oxygen demand.

<10>

The discharge shall not result in the following water quality standards being exceeded in the Ohau, Tekapo and Ohau B Canals at points 50 metres upstream of the water supply abstraction points for the Ohau A, Tekapo B, and Ohau B power stations:

- (a) 11.3 grams per cubic metre nitrate nitrogen
- (b) 0.002 grams per cubic metre total mercury

<11>

The consent holder may, during December each year after and including December 2001, apply for a change or cancellation of consent conditions under section 127 of the Resource Management Act 1991, for the purpose of altering the monitoring programme and/or water quality standards provided for in conditions (6), (7), (8), (9) and (10).

<12>

The Canterbury Regional Council may, on the last working day of March each year, serve notice of its intention to review the conditions of this consent for the purposes of:

- (a) dealing with any adverse effect on the environment which may arise from the exercise of this consent and which it is appropriate to deal with at a later stage; or
- (b) requiring the adoption of the best practicable option to remove or reduce any adverse effect on the environment; or
- (c) complying with the requirements of a relevant rule in an operative regional plan.
- (d) altering the monitoring programme and/or water quality standards provided for in conditions (6), (7), (8), (9) and (10).

<13>

Charges, set in accordance with section 36 of the Resource Management Act 1991, shall be paid to the Regional Council for the carrying out of its functions in relation to the administration, monitoring and supervision of resource consents and for the carrying out of its functions under section 35 of the Act.

---

Recommended Duration: 35 Years      Months      Recommended Expiry Date:  
Recommended Monitoring Code: DS

---

Specify non-standard programme:

---

Bring-up Date: 01-MAR-2000

Monitoring Officer: Neil MacDonald

Reviewed \_\_\_\_\_

Consent granted under delegated authority.

\_\_\_\_\_  
signed

1/4/99  
\_\_\_\_\_  
dated

Please send copy of consent granted to following parties:

|  |  |  |
|--|--|--|
| Rick Ramsey<br>Mt Cook Salmon<br>PO BOX 67<br>Twizel |  |  |
|--|--|--|