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*in the matter of:* the Resource Management Act 1991

*and*

*in the matter of:* applications for resource consent by applicants in the lower Waitaki River Catchment under the Waitaki Catchment Water Allocation Regional Plan

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Brief of evidence of Nicholas Charles Eldred

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Dated: 28 August 2008

## EVIDENCE OF NICHOLAS CHARLES ELDRED

### Introduction

- 1 My full name is Nicholas Charles Eldred. I am the Water Infrastructure Development Manager with Meridian Energy Limited (Meridian). I have worked in the Growth and Development Directorate of Meridian for 4 years and my team and I are responsible for identifying, securing and developing new hydro electric power schemes, irrigation projects and other water related infrastructure including marine energy opportunities that may become available in the future. I am authorised to give this evidence on behalf of Meridian.
  
- 2 I have the following qualifications:
  - 2.1 Bachelor of Science (1987, University of London, Queen Mary College, Engineering Geomorphology (Hons));
  - 2.2 Master of Science (1988, University of London, Queen Mary College, Geomaterials).
  
- 3 I have the following experience relevant to my role:
  - 3.1 The majority of my 20 years of professional experience has been involved in the design and construction of major infrastructure projects including several tunnels and hydro electric power schemes. Prior to joining Meridian in 2004 I worked as a consultant engineering geologist in the UK, New Zealand and many other countries. My experience also includes the investigation of groundwater issues for both engineering and environmental projects and I have been involved with numerous resource consent applications since moving to New Zealand in 1992.
  
  - 3.2 Other roles I have fulfilled at Meridian include responsibility for investigating and identifying hydro and geothermal development opportunities and as the Project Manager for the North Bank Tunnel Project.
  
- 4 Immediately prior to joining Meridian I was involved as a Project Manager at URS Ltd in both the engineering geology and

groundwater aspects of Project Aqua and was responsible for preparing technical reports on the effects associated with groundwater. I was also responsible for the design and supervision of the geotechnical investigations for Project Aqua.

- 5 In preparing my evidence I have reviewed:
  - 5.1 Submissions and evidence provided by the Mid River New Applicant Group and the Lower Waitaki Irrigation Company Limited and Waihao Downs Irrigation Limited at these hearings.

#### **SCOPE OF EVIDENCE**

- 6 In my evidence I will provide some discussion on issues for Meridian associated with the "Alternative Flow Regime" proposed by MRNAG and supported by LWIC and other irrigators.

#### **MRNAG ALTERNATIVE FLOW REGIME**

- 7 MRNAG have provided the Commissioners with two flow regime options. These are referred to in Ms Borthwick's legal submissions as Option A and Option B. I will discuss some of the issues associated with both options in my evidence.
- 8 By way of an opening comment I confirm that Meridian is committed to ongoing discussions in an attempt to reach some form of arrangement with the Lower Waitaki irrigation community on river flow issues. We have always recognised that it would be preferable to reach an arrangement with the community. However, the present terms suggested by MRNAG present some difficulties to Meridian.
- 9 In addition I make the comment that any negotiation is necessarily going to take some time and will involve all abstractors below Waitaki Dam, not just the MRNAG group. I therefore believe that the negotiations are unlikely to be completed in a timeframe which will assist the Commissioners in determining these applications.

## HISTORY OF DISCUSSIONS

- 10 As has already been mentioned by a number of submitters, discussions have occurred on and off over the last 4 years regarding potential arrangements between Meridian and downstream abstractors for Meridian to provide some level of certainty as to the volume and rate of discharge from Waitaki Dam.
- 11 The first set of negotiations occurred in the lead up to the Waitaki Allocation Board hearings but no resolution was reached. Last year, prior to beginning the NBTC hearing, detailed discussions took place between Meridian and downstream abstractors but again final resolution was not able to be reached. Those negotiations ceased in September last year.
- 12 More recently, Meridian was approached by representatives of MRNAG on 28<sup>th</sup> July 2008 immediately prior to the reconvened NBTC hearings to discuss a proposal on a without prejudice basis. During that hearing we were presented with a letter setting out a proposal that involves Meridian supplying sufficient water to existing and new users to ensure 100% reliability. The only relevance of my reference to the reconvened NBTC hearing is that the proposal was put to us while we were dealing with that matter and we had therefore not had a chance to properly consider the proposal before this hearing began the following Monday.
- 13 As the discussions had been without prejudice we were not aware that an outline of the discussions to date was going to be put before the Commissioners here until the morning the case opened, although from the discussions in the week prior we understood that MRNAG applicants were going to be changing their actual applications to seek an option A or option B.
- 14 Given our involvement in these hearings since they commenced, all we have been able to do to date is to reply to MRNAG setting out some issues we have in relation to their proposal and whilst we believe that an agreement can be reached with MRNAG and the rest

of the irrigation community given time, this is highly unlikely to occur before these hearings are complete.

- 15 I concur with Ms Stevens' legal submissions for LWIC where she states that agreement is desirable for all parties involved. This also serves to highlight the fact that Meridian needs to deal with all irrigators from the Waitaki Dam to the sea. In addition, agreement will require input from a number of personnel in Meridian.

### **KEY ISSUES FROM PROPOSAL**

- 16 A key issue for Meridian arising out of the MRNAG proposal is the requirement by MRNAG to achieve 100% reliability for all abstractors (existing and new) regardless of the prevailing hydrological conditions. I will explain Meridian's position with respect to this issue further below.
- 17 I do note that in the event that NBTC becomes operational then MRNAG applicants and all other existing and future abstractors (up to a agreed abstraction total) from the main stem between Waitaki Dam and the discharge point for NBTC will have sufficient water available to achieve 100% reliability. Therefore, my following evidence relates only to main stem applicants from Waitaki Dam to Black Point in the absence of NBTC being commissioned and abstractors below Black Point regardless of NBTC. Therefore, the issues about reliability for abstractors downstream of the NBTC outfall are not associated with NBTC. They are issues associated with the operation of the existing Waitaki Power System.

#### **Reliability**

- 18 To date reliability of supply has never been a major issue for existing abstractors. This is for two principal reasons:
- 18.1 The existing abstraction consents from the lower Waitaki River have minimum cut off conditions which typically range from 80 cumecs to 152 cumecs; and

18.2 Waitaki Dam has traditionally been operated with a 30 cumec buffer above the required minimum discharge of 120 cumecs.

- 19 Therefore, with a current peak abstraction total of approximately 53 cumecs for existing irrigators and an effective minimum flow of 80 cumecs irrigators have rarely, if ever, had to curtail or cease abstraction to date.
- 20 In the absence of the WRP, new applicants for further abstraction for irrigation from the lower Waitaki River would be unlikely to have the same levels of reliability as existing abstractors. As the Regional Council has issued new consents they have placed higher and higher minimum cut-off conditions on the issued consents. However, under the WRP bands are largely not contemplated for the main stem of the lower Waitaki River
- 21 The pre WRP approach is reflected in the NOICL scheme's 'part' of Lower Waitaki Irrigation Company consent (CRC950649.1). This was granted more recently than other consents and has a condition which includes the requirement to commence ramping down the abstraction rate at a river flow of 152 cumecs. The flow of the Waitaki river has been below this flow on occasion, but because stage 2 of NOICL has not been built, NOICL are yet to experience restrictions. Therefore, these more recent consents with higher minimum flows could not have been consented with an expectation of 100% reliability.
- 22 In addition, for the past few years Meridian has stated that it should not be assumed that Meridian will continue to operate Waitaki Dam with a buffer flow of 30 cumecs. Meridian has stated at previous hearings that with improved technology there may be times in the future when it will not operate as conservatively as it has in the past with regards to the provision of a buffer although those events could be expected to be uncommon.
- 23 However, on the assumption that Waitaki Dam continues to be operated generally in a similar manner to the past, the approximate 53 cumecs of existing abstraction with cut-off conditions between 80

cumecs and 152 cumecs may continue to have a reliability of close to 100% (depending on the outcome of any review).

- 24 Therefore, prior to any review the greatest issues of reliability are principally associated with the remaining 37 cumecs of abstraction (out of a total of 90 cumecs provided for in the WRP) and how this abstraction and existing abstractors manage the distribution of water when the river flow is between 150 cumecs and 190 cumecs.
- 25 The MRNAG applicants and submitters such as LWIC have stated that it is essential that all irrigators (existing, proposed and future) achieve 100% reliability (reference Para 55, Chris Dennison). Meridian disagrees that this was ever the intention of the Waitaki Regional Plan either in the short term before 2025 or even after 2025. Rule 7 only provides for up to 80 cumecs of the 90 cumecs of abstraction during October through March in any year.
- 26 Option A presented to the Commissioners by MRNAG and supported by the other irrigators is based on the proviso that Meridian guarantees 100% reliability for all irrigators and that Meridian assumes all dry year risk. While Meridian supports the 100 cumec minimum, I will outline why the reliability aspect is a major stumbling block to concluding an agreement.

#### **Dry Year Risk**

- 27 In order for Meridian to meet the existing minimum discharge requirements in the lower Waitaki River during the summer months it must retain a volume of water in the main storage lakes during the winter and spring months. This issue was described by Andrew Robertson at the Hunter Downs hearing and I have reproduced here the graph from his evidence that demonstrates how this water must be held in storage over the winter months (Figure 1).

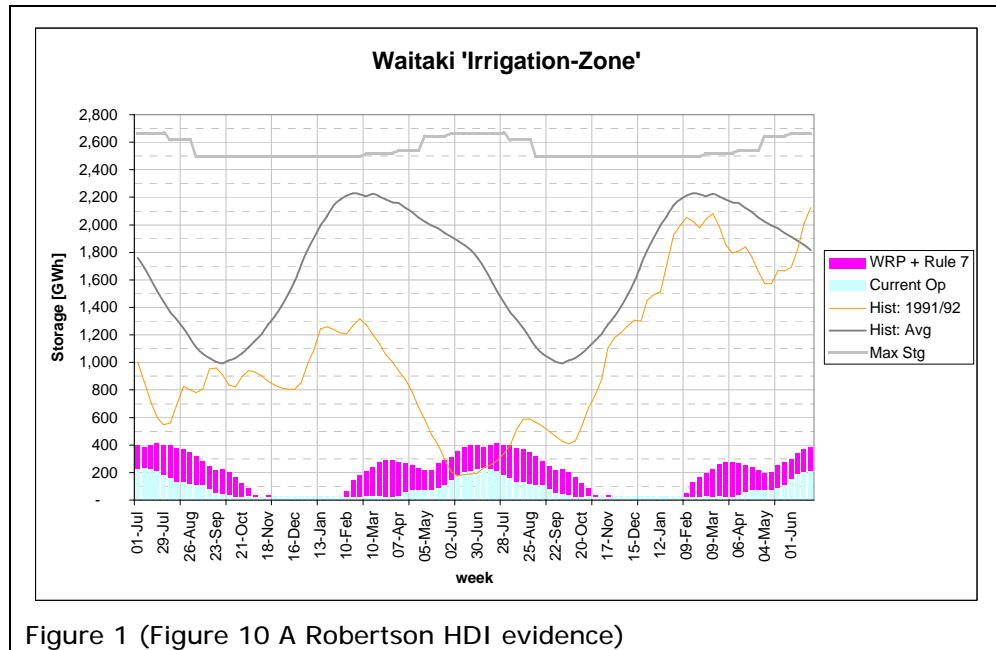


Figure 1 (Figure 10 A Robertson HDI evidence)

28 The graph shows:

28.1 The current storage requirements to meet current minimum discharge obligations (light blue shading) which have delivered the current levels of ecological and irrigation reliability values. This is up to 209GWh of electricity and the status quo situation allows considerable and important flexibility in operation of the WPS.

28.2 The storage requirements for the WRP minimum flow of 150 cumecs with Rule 7 are also shown (pink shading). The implications of this being implemented is that a total of 409 GWh of storage (i.e. an additional 200 GWh) has to be “reserved” to meet this minimum flow scenario. This amount of storage is equal to 24% of the available storage in Lake Pukaki.

28.3 The MRNAG proposal has not yet been modelled given that we have only become aware of it recently but it will increase the reserve from the current situation (although it will be less than the pink shading area).

29 This requirement to retain water that is not available for discretionary hydro generation during the winter months is one of the issues taken into consideration by the Electricity Commission in establishing the “min zone” and “emergency zone” for hydro storage

in New Zealand. I have included a copy of the Electricity Commission graph (Figure 2) for 25 August 2008 which shows how the two zones currently vary throughout the year.

- 30 I have also attached notes from the Electricity Commission's web site to my evidence (Attachment A)<sup>1</sup> which describe the actions that the Electricity Commission will put in place as storage levels fall into these two zones. As storage levels fall into the "min zone" these include:
- All thermal generation plant needs to be running; and
  - Hydro storage managers need to conserve water to the maximum extent possible.
- 31 As storage levels fall into the "emergency zone" the Electricity Commission will commence an emergency electricity conservation campaign and possible other means to induce a reduction in electricity use.
- 32 This information demonstrates the importance of national hydro storage to the integrity of the New Zealand electricity supply. The Waitaki system represents approximately 60% of this national hydro storage.
- 33 In order to meet the 100% irrigation reliability sought by MRNAG and others in all years Meridian would need to increase the amount of water held in storage in Lakes Pukaki and Tekapo during the winter and spring months. This will result in an effective increase in both the "min zone" and "emergency zone" levels on Figure 1 .
- 34 During many years this requirement to increase the "min zone" storage has a relatively small effect on the inter-seasonal operation of the system, although it does impact on Meridian revenue, as discussed by Andrew Robertson in his HDI evidence.

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<sup>1</sup> <http://www.electricitycommission.govt.nz/opdev/secsupply/sos/status/minzone/index.html>

- 35 However, the issue is that during dry years a requirement to maintain 100% reliability for irrigation will mean that the New Zealand and South Island “min zone” and “emergency zone” could be entered earlier than what would have occurred without this additional storage requirement. In addition to the range of measures that the Electricity Commission and the electricity industry put in place when this occurs it also typically results in an increase in the spot price of electricity. This year spot prices in the South Island were in the order of \$400/MW compared to usual range of \$60 to \$90/MW.
- 36 The establishment of “min zone” and “emergency zone” levels is a significant issue for both Meridian and New Zealand. Meridian does not believe it can, or should, enter into commitments such as is being proposed with downstream irrigators that impact on the security of the electricity supply to the South Island and New Zealand.
- 37 MRNAG and LWIC have stated in evidence that they do not have the ability to manage dry year risk while Meridian does across an ever increasing generation network. This is currently not the case for Meridian and with the recent limitations on the HVDC inter island link, South Island storage has become even more vital to maintaining electricity supplies. Looking into the future, the targeted 90% renewable energy supply by 2025 will be made up largely from wind energy, geothermal and hydro. It is unlikely that further large scale hydro storage will be developed. This means that the existing New Zealand hydro storage will become more important rather than less to the management of the New Zealand electricity system.
- 38 While Meridian recognises that a cost is involved for irrigators, they do have the ability to manage dry year risk through options such as on farm irrigation water storage, hay, grain and/or silage supplementary feed to cover shortages in pasture production.

## **A Way Forward**

- 39 In summary, I do not believe that that the Waitaki Regional Plan provides support for an argument that Meridian is obliged to provide 100% reliability for all irrigators (new and existing) either now or in 2025. In addition, for Meridian to deliver 100% reliability would have an impact on both Meridian and the New Zealand electricity supply system during dry years such as the one we are currently in the midst of.
- 40 Nonetheless, Meridian does acknowledge that the WRP recognises that flows in the lower Waitaki River are subject to the management of the upper lakes and power system. As described by Mr Stewart in his evidence, unlike rivers such as the Rakaia where irrigators can predict with some confidence what the flows over the next few days are likely to be, the circumstances with regard to the lower Waitaki requires collaboration between the irrigators and Meridian as the upstream scheme operator. In my view, this is likely to have been the intent of Rule 7 which provides a level of reliability to the irrigators (up to 80 cumecs out of 90 during October to March) and certainty that these flows will arrive in the lower river.
- 41 Meridian is willing to continue to discuss this issue with the irrigators with the intention of reaching an arrangement which is beneficial to both the irrigators and Meridian - but the time frame for completing this is not likely to coincide with these hearings.

## **FLOW MEASUREMENT**

- 42 At the NBTC hearings Meridian proposed a methodology for a one hour rolling average measurement system. MRNAG have proposed a system for irrigators where a 24, 48 or 72 hour average value is used. This is calculated for the proceeding day or days. Meridian recognise the benefits and simplicity of this methodology for the irrigators in having a single number that they can rely on. However, as described by Mr Stewart in his evidence, flows in the lower Waitaki are unlike most rivers and do not necessarily have any relationship to flows that have occurred during the proceeding days.

Therefore, under any average system, periods of one day or more could occur when flows at some locations in the river were below the proposed minimum flows due to the abstractions based on a calculation of mean flows over the proceeding days. The ecological significance of this will be discussed in evidence by Mr Jowett.

- 43 If the Commissioners do not accept the MRNAG evidence on this issue and resort to a more short term form of compliance with the Kurow recorder then we believe options may exist for Meridian and the irrigators to collaborate over some other form of notification and compliance system. This is a potential future topic of discussion between Meridian and irrigators.
- 44 Any system would probably require a coordinated abstractor group with systems in place that would be able to react in a timely and appropriate way to low flow events. Meridian recognises that not all irrigation systems can react quickly or easily to restrictions. How restrictions are implemented would need to be agreed within the group. I note that Mr Dennison contemplated the formation of such a group in response to questioning by the Commissioners at these hearings.
- 45 Discussions would also need to include Meridian's generation controllers to address the practicalities of any such system and the details that could be worked out between the abstractors, Meridian and ECan over time.

#### **MRNAG OPTION B FLOW REGIME**

- 46 MRNAG have indicated that in the event agreement is not reached with Meridian they propose to adopt the Option B flow regime presented in legal submissions by Ms Borthwick.
- 47 If the Commissioners accept Mr Stewart and Mr Ward's evidence regarding the availability of tributary flows in the river then this appears to provide an option with nearly 100% reliability for the MRNAG applicants whatever the minimum flow. However, with the current minimum discharge conditions at Waitaki dam of 120

cumecs, flows could occasionally be below the varying monthly flow regime proposed by MRNAG during the irrigation season - albeit rarely. Abstractors will therefore need to prepare for processes and periods of time when restrictions apply to their abstractions.

- 48 I note that if a minimum cut off of 100 cumecs was proposed for Option B complete restrictions would never occur because the minimum discharge from Waitaki Dam would be 120 cumecs.

Dated: 28 August 2008

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Nicholas Charles Eldred

### Minzone and Actual Controlled Storage November 2007 - December 2008

Note: Operational minzone defined by minimum storage requirement in the New Zealand

24 August 2008

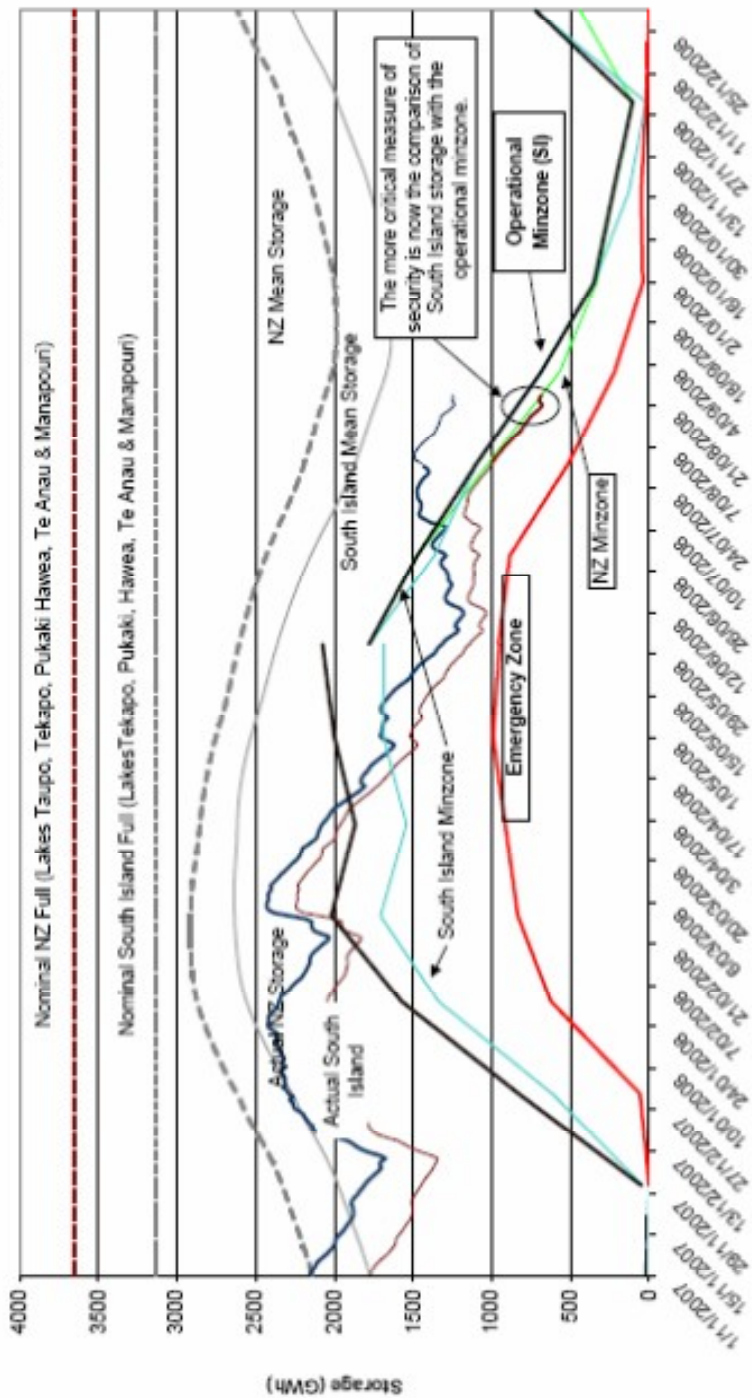


Figure 2 <http://www.electricitycommission.govt.nz/pdfs/opdev/secsupply/sos/actual-24Aug08.pdf>