



## Falls Creek Alpine Resort Management Board



2009/10

# Falls Creek Alpine Resort Management Board Water Supply Annual Report

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## Legislative Background

Section 26 of the *Safe Drinking Water Act 2003* (SDWA) requires water suppliers and water storage managers to provide to the Secretary of the Department of Health an annual report each financial year. This report is for the 2009-10 reporting period and covers issues relating to the quality of drinking water.

The Board's obligations under this Act include:

- A requirement to prepare and implement plans to manage risks in relation to drinking water;
- A requirement to have the risk management plan audited by approved auditors;
- To ensure that the drinking water meets quality standards specified by the regulations;
- To disclose to the public information concerning the quality of drinking water; and
- To report known or suspected contamination of drinking water to the Secretary to the Department of Health.

The information to be included in the annual report is specified by Section 15 of the *Safe Drinking Water Regulations 2005* (SDWR) and includes information evidencing compliance or non-compliance (as the case requires) with the regulations; namely:

- a) information evidencing compliance or non-compliance (as the case requires) with regulations 10, 11 and Schedule 2;
- b) information about actions taken by the water supplier when a drinking water quality standard set out in regulation 10 and Schedule 2 has not been met;
- c) information about actions taken by the water supplier in respect of each emergency, incident or event that has arisen that has affected:
  - (i) the quality of drinking water supplied generally; and
  - (ii) the quality of drinking water supplied where that supply posed a risk to human health;
- d) any issues that may have arisen out of the actions referred to in paragraph (c);
- e) an analysis of water sample information, data and results relating to the quality of drinking water supplied and a comparison of that information and data, and those results, with water sample information, data and results from the previous 2 financial years;
- f) a summary of every:
  - (i) variation in aesthetic standards approved under section 19 of the Act in respect of drinking water supplied by the water supplier and any conditions imposed under section 21 of the Act;
  - (ii) exemption from a water quality standard approved under section 20 of the Act in respect of drinking water supplied by the water supplier and any conditions imposed under section 21 of the Act; and
  - (iii) written undertaking by the water supplier accepted by the Secretary under section 30 of the Act;
- g) a summary of complaints received by the water supplier relating to the quality of drinking water supplied, a summary of the responses and any analysis of the issues arising from the complaints;
- h) a summary of the process by which the drinking water supplied by the water supplier is disinfected or treated and any other processes applied to the water by the water supplier, and any issues arising out of the application of those processes;
- i) a list of all the chemicals and other substances, and any processes, used by the water supplier to disinfect or treat the drinking water supplied by it;
- j) a summary of steps taken by the water supplier to manage the aesthetic characteristics of the drinking water supplied by it, including steps taken to manage the taste, odour, clarity and pH of the drinking water supplied;

- k) details of any regulated water supplied by the water supplier and the declaration under section 6 of the Act in respect of that regulated water;
- l) details of the steps taken in accordance with section 25 of the Act; and
- m) a summary of the findings of the most recent risk management plan audit and any issues that the approved auditor raised during the risk management plan audit.

Section 23 of the SDWA requires that Falls Creek Resort Management make available for inspection by the public the results of any water quality monitoring program that is conducted on any drinking water supplied by us. Customers and members of the public may access drinking water quality data by contacting FCRM on (03) 5758 1200 during business hours.

## 1 Introduction and System Overview

The Falls Creek Alpine Resort Management Board is responsible for the development and management of the Falls Creek Alpine Resort which is located 120 kilometres south of the Albury/Wodonga area is situated at an altitude of 1210-1830 metres, and bounded on all sides by the Alpine National Park.

The entire resort area of 1535 hectares is Crown land, which is deemed to be permanently reserved under the Crown Land (Reserves) Act 1978. The Resort area is not part of any municipal district for the purposes of the Local Government Act, 1970 and the Board acts on behalf of the Crown under the direction and guidance of the Minister for Environment ("the Minister").

The Board is established by the *Alpine Resorts (Management) Act 1997* which sets out the objectives for the management of Victoria's alpine resorts and provides alignment of the planning and management provisions governing the resorts with the Government's Alpine Resorts 2020 Strategy. Resort use is to be for alpine recreation and tourism, in all seasons of the year; and accessible to persons from varied cultural and economic groups. The management of the resort is to be undertaken in a manner which is compatible with the alpine environment having regard to economic, environmental and cultural considerations.

The Board operates under the business name of Falls Creek Resort Management (FCRM). FCRM provides a range of services to the community and resort visitors determined by clearly defined functions under the Act. These include the provision of a range of utility services in the nature of:

- (i) garbage disposal;
- (ii) water supply;
- (iii) gas;
- (iv) drainage;
- (v) sewerage;
- (vi) electricity;
- (vii) roads;
- (viii) fire protection;
- (ix) snowmaking; and
- (x) transport.

FRCM recognises that it has an obligation to provide quality drinking water services for our customers and has in place a risk management framework that sets out the process and approach for the protection of public health by proactively managing water quality from the source through to the customer points of supply.

This report outlines drinking water quality achieved for the 2009-10 financial year and has been prepared to provide our customers with information relating to the quality of water supplied and to comply with the annual reporting requirements under Section 26 of the SDWA. The report covers issues relating to the quality of drinking water and is structured in accordance with the Drinking Water Regulation Guidance Note issued by the Department of Health in June 2010.

The report is divided into 9 sections:

1. Introduction and overview of the system operated by FCRM.
2. Details of the water treatment and water quality management systems.
3. Quality of drinking water for 2009-10.
4. Emergency and incident management.
5. Complaints relating to water quality
6. Findings of the most recent risk management audit
7. Undertakings, exemptions or variations under the Act.
8. Regulated water.
9. Glossary of terms and further information.

For further information, please contact FCRM's General Manager Operations, Chris Derrick on Ph: (03) 5758 1246 during business hours.

## 1.1 Characterisation of the System

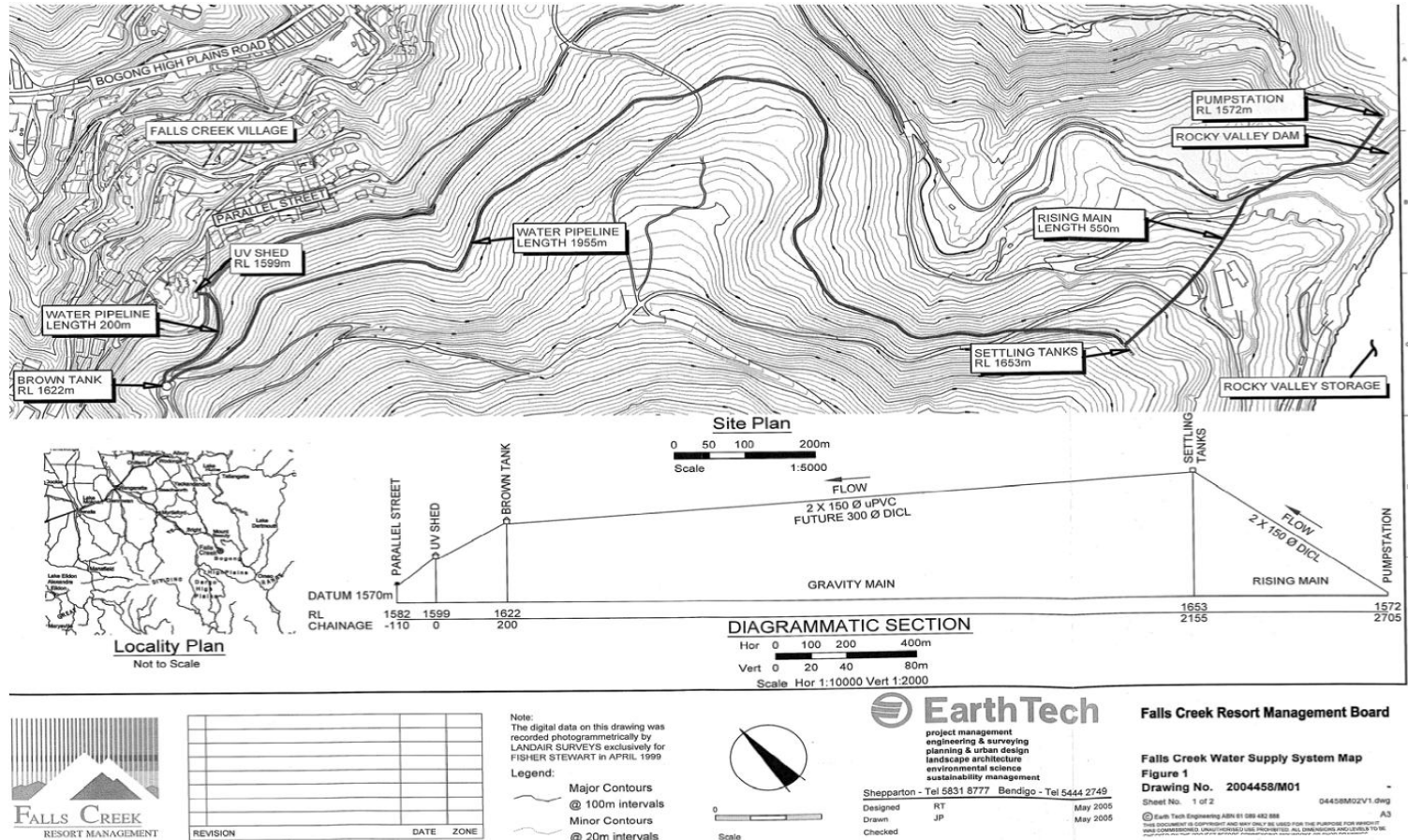
### 1.1.1 Overview

The drinking water supply system that services the Falls Creek Alpine Resort is comprised of the following elements:

Table 1: Falls Creek Water Supply System Elements

Element	Description	Location and key information about infrastructure
Catchment	Falls Creek Alpine Resort and Alpine National Park	Catchment is upstream of village area with no dwellings.
Storage Reservoir	Rocky Valley Dam	Operated by AGL Hydro
Headworks	Pump Station and Rising Main	Water is pumped from the reservoir through duplicate 150mm diameter rising mains. Pump capacity is 30 L/s.
Distribution System	Settling Tanks, Distribution Main and Brown Tank	Pumped water passed through settling tanks and it is gravity fed by two No. 150mm diameter PVC mains to the service tank (Brown Tank) above the village. From the Brown Tank water is fed by gravity through the UV treatment and into the reticulation system serving the resort.
Treatment System	UV	Two units installed in parallel: (a) UViFLO 400 (400 kL/h) stainless steel UV disinfection system which includes a single standard 5 kW medium pressure lamp. (b) ProMinent Dulcodes M-UV System Model No: 1*4ML/27/DN200 which has a 4 kW medium pressure lamp.
Reticulation	Network of pipelines delivering to consumers within the village	Total of almost 4 km reticulation system of predominantly 100mm to 150mm diameter DICL pipe.
Water Sample Locations	Falls Creek	
Populations Supplied	120 (Summer) to 5000 (Winter)	
Substances Added	Nil	

Figure 1 – System Diagram



### **1.1.2 Catchment**

The water supply catchment for Falls Creek Alpine Resort is upstream of the township of Falls Creek. Runoff in the catchment is from snow melt and rain runoff which is collected in a series of aqueducts and small mountain streams before flowing into the Rocky Valley Dam which has a full supply capacity of 28,000 megalitres.

Despite the close proximity of the catchment to the town of Falls Creek, there is minimal public access. Only one main road passes through the catchment, which is well vegetated and remains in close to pristine condition. As a result there are no significant point sources of faecal pollution entering the water source – Rocky Valley Dam. There are no intensive livestock operations, dairies, grazing properties, hobby farms, sewage treatment plant discharges, manure spreading applications, aggregations of septic tanks or sewer overflow structures. Recently, access to the catchment to grazing cattle was closed by Parks Victoria, further reducing faecal inputs.

The water source is at no immediate risk of gross contamination with faecal-oral pathogens and there is a need to maintain that position through protecting the source. There is recreational access within the catchment with skiing and related activities in winter and hiking and boating activities in summer. Some water reaching the dam flows through the resort area and may pick up material leaching or being spilt within the resort. Therefore, the source is at some risk from trace levels of contamination from occasional open human defecation, occasional water entry acts by persons, some runoff or exfiltration seepage and some wildlife faecal material. Therefore, like any surface water, there is sufficient risk present to justify disinfecting the source.

The long-term results of raw water monitoring typically show no detectable E. coli in 100 ml samples and what detections there are typically show single digit concentrations per 100 ml. Therefore, the level of risk is adequately mitigated by the current level of disinfection in place involving sedimentation and UV disinfection with the option to draw from one of two quite distinct points in the Rocky Valley Dam source (discussed in more detail later).

It is possible that the levels of activity in and around the dam may increase in future. Planned improvements in treatment automation and reliability should help to offset some of the risks of additional contamination that may arise from these increased activities. However, there is a need for FCRM to work with Parks Victoria and AGL Hydro to maintain a good understanding of the level of risk associated with this source. At some point it may be judged necessary to introduce an additional treatment barrier beyond the sedimentation tanks and UV systems currently in place. The logical next step would be to introduce a package membrane filtration system or ozone disinfection system if levels of activity on the lake increase beyond low levels.

### **1.1.3 Headworks System**

Water is drawn from the Rocky Valley Dam which is owned and operated by AGL Hydro and principally used for the commercial generation of electricity.

There is an aerator in the dam itself and a compressor line into the dam. The operation of the aeration system is checked daily in winter and in summer on Monday, Wednesday and Friday. The checks confirm that the system is running and has adequate oil. Pump hours are logged. The aerator is important to help reduce the risk of iron or manganese causing problems with UV disinfection system performance or causing problems with aesthetic water quality.

The resort supply is pumped from an off-take point on the dam low level outlet and scour pipe to a pair of settling tanks through 550m of duplicate 150mm diameter PVC rising main. There is a level control pressure switch in the settling tanks which is hard wired back to the control panel in the pump station.

There are three (3) pumps in total, two (2) of which operate on a duty/standby arrangement while the third is a stand-alone backup pump. The pumps deliver approximately 30L/s at 70 metres head.

There is no telemetry at the pumping station requiring that the pumps be inspected daily. Access to the pump station in the winter months is usually by oversnow vehicle.

### 1.1.4 Distribution System - Settling Tanks, Gravity Main and Brown Tank

The settling tanks (0.6ML – constructed in 2004) are located on the hillside above the dam. After a nominal settling period in the tanks, the water flows for just under 2km by gravity through initially 20m of 300mm diameter DI pipe and then two PVC pipes to the header tank ('Brown Tank' – 1.7 ML). One main is older and is six-inch while the newer main is 150mm Class 18. The water then flows by gravity for 200m to the UV disinfection plant before entering the reticulation that services the village. The capacity of the Brown Tank is about 15% greater than the current maximum daily demand.

A detailed investigation of the village water reticulation network carried out in 2004/05 highlighted that the twin gravity feed trunk mains which convey water from the high level settling tanks to the 'Brown Tank' above the village needed replacement and plans were made to install a single 300mm main in lieu of the old twin mains. The lower section of 600 metres was replaced in 2005 and it is ultimately planned to complete the remaining 1320 metres to the settling tanks.

Both tanks are inspected regularly (daily in winter) but there is no telemetry at either the settling tanks or the Brown Tank.

### 1.1.5 Reticulation System

The majority of the 3.86km reticulation system is constructed from rubber ring jointed cement lined ductile iron pipe (DICL), 5.5m in length which was installed progressively since 1988. There is a short section of AC pipeline remaining, which is still in use and the remaining uPVC pipes that are still in service are located between the Snow Ski Apartments and the top of Falls Creek Road, and from the Waste Water Treatment Plant to Bogong High Plains Road.

Because of the limited space in many instances most of the utility services have been laid in a common trench.

## 1.2 Consumption

System demand varies with seasonal visitation and the average daily flow fluctuates from around 0.25 megalitres per day (ML/d) up to 1.5 ML/d during the peak of winter (population approx. 5000). Consumptive use (Total diverted less the amount returned to Rocky Valley Creek) for the last five years is as per Table 2 below.

**Table 2: Consumptive Water Usage**

Year	Volume Consumed (ML)
2009/10	143 <sup>1</sup>
2008/09	178 <sup>2</sup>
2007/08	199 <sup>3</sup>
2006/07	109
2005/06	168
2004/05	107

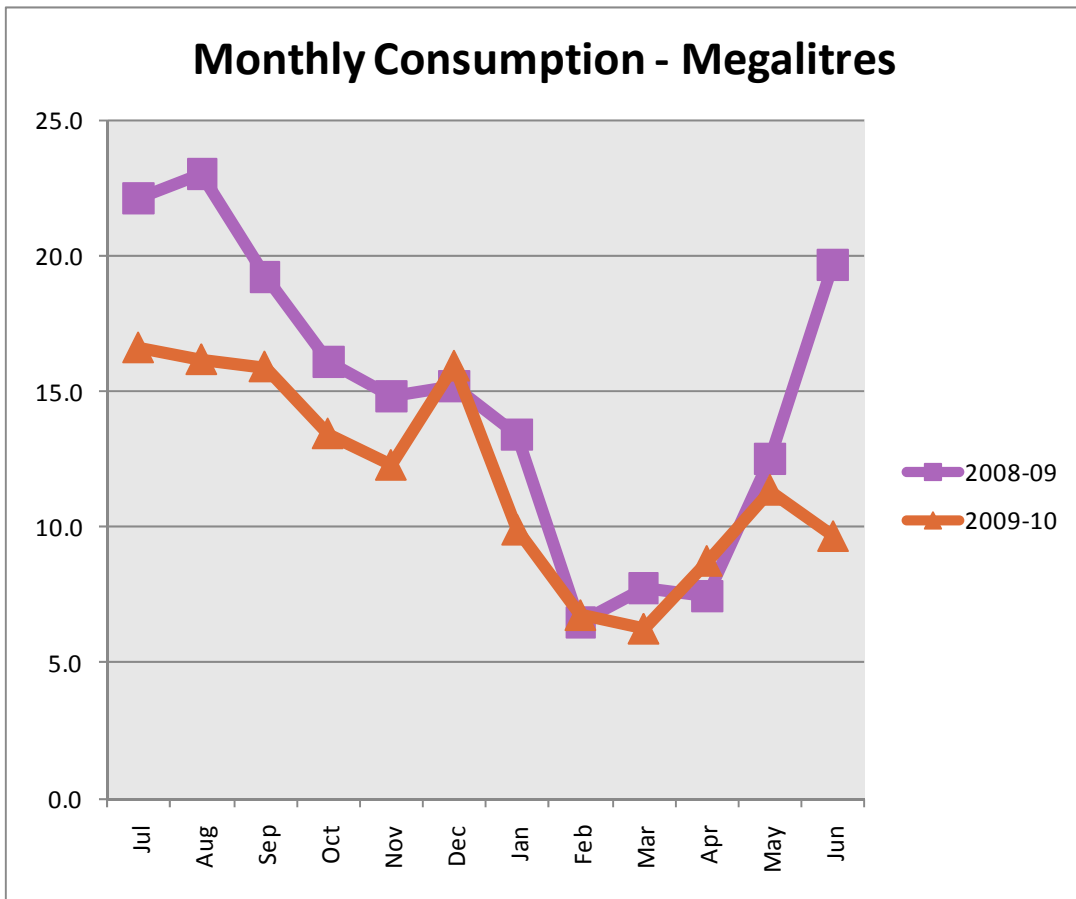
The winter seasonal nature of highest consumptive use is demonstrated in the following graph.

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<sup>1</sup> Includes estimate of diversions from snow making system (Jan – May)

<sup>2</sup> Includes estimate of diversions from snow making system (Feb – Apr)

<sup>3</sup> Includes estimate of diversions from snow making system (Feb – Mar)



## 2 Quality Management System

### 2.1 Water Treatment

#### 2.1.1 Disinfection Process

Water entering the reticulation from the storage tank is disinfected using UV treatment. The UV disinfection plant installed at Falls Creek is adequate to safely disinfect the raw water under normal circumstances and under higher demand than at present.

Up until this 2009, disinfection has been achieved by a single UV unit. This unit is a UViFLO 400 (400 kL/h) stainless steel UV disinfection system which includes a single standard 5 kW medium pressure WEDECO lamp. The unit is the 'basic' model with analogue UV intensity sensor and no automated cleaning. Because *E. coli* has a similar sensitivity to protozoan parasites, and because the unit is a medium pressure unit which is much more effective on viruses than low pressure units, the unit is sufficiently effective on all relevant pathogens to treat water from the Rocky Valley Reservoir which is only likely to contain relatively low concentrations of pathogens.

Whilst the manufacturer recommends that lamps are replaced every 6000 hours they are replaced every six months, which is at around 4,380 hours. Lamps may be changed more often than this in practice, e.g. if the lamps appear dirty or if there is any doubt about the lamps.

The risk management plan had identified that one of the important risks to drinking water safety arises during UV disinfection system down time, whether due to checking, maintenance or repair. This presents two risks. Firstly, if the unit fails untreated water will pass by gravity into the reticulation system presenting an increased risk of pathogen transfer. Second, if the unit is switched off for maintenance, water flow into the reticulation system ceases and the reticulation system starts to drain, leading to possible risk of reduced pressure in the reticulation system.

This was resolved early in 2009 by the installation of a second UV unit. The second unit is a ProMinent Dulcodes M-UV System Model No: 1\*4ML/27/DN200 which has a 4 kW medium pressure lamp with an operating life of 14,000 hours. This unit has been set up as a stand by unit should the main unit fail to operate in accordance with specification. The units have been installed in parallel with automatic switching should a failure occur.

Locality	Treatment Process	Added Substances	Comments
Falls Creek	UV Disinfection	Nil	Nil

There are no chemicals used for both water treatment and disinfection.

### 2.2 Issues

The effectiveness of UV disinfection diminishes with increasing turbidity, colour, iron and organic content in the raw water and at times the source water is outside the accepted desirable values for reliable performance. It is also known that the water in the lake at the off-take becomes stagnant in mid-summer due to thermal stratification. This in turn gives rise to increases in dissolved iron and manganese which affects the aesthetic quality of the water and poses a risk of inadequate disinfection with the UV treatment process.

The measures taken to mitigate this risk are discussed in detail in section 4.3 of this report.

### 3 Quality of Drinking Water for 2009-10

The water quality is compliant with Regulations 10 and 11 and Schedule 2 of the regulations. For regulatory compliance, the parameters tested on a weekly basis are *Escherichia coli* and turbidity. Iron at four locations is also tested on a weekly basis and other health and aesthetic characteristics are also tested less frequently throughout the year. *E. coli* and turbidity test results are submitted to DH monthly throughout the year in accordance with Regulation 13. The following table presents the Schedule 2 reporting summary results.

#### Falls Creek Schedule 2 Details

Parameter	Sampling Frequency	Water Quality Standard	Results	Outcome
<i>Escherichia coli</i>	Weekly	At least 98% of all samples of drinking water collected in any 12 months period to contain no <i>Escherichia coli</i> per 100mL.	99% of all samples.	Compliant
Turbidity	Weekly	95% upper confidence limit of the mean of drinking water samples collected in the preceding 12 months must be less than or equal to 5.0 NTU	1.3 NTU	Compliant

#### 3.1 E. coli

##### 3.1.1 Test Results

Year	Sampling Frequency	No. of samples <sup>4</sup>	No. of samples containing <i>E.coli</i>	Max Result (orgs/100mL)	% Samples with no <i>E. coli</i>	Complying
2009-10	Weekly	103	1	1	99.0%	Yes
2008-09	Weekly	106	0	0	100.0%	Yes
2007-08	Weekly	102	2	1	98.0%	Yes
2006-07	Weekly	104	2	1	98.0%	Yes
2005-06	Weekly	108	0	0	100.0%	Yes
2004-05	Weekly	96	0	0	100.0%	Yes

##### 3.1.2 Actions undertaken in relation to non-compliance

Refer to comments in section 4.1 (Section 22 Reports).

#### 3.2 Turbidity

##### 3.2.1 Test Results

Year	Sampling Frequency	No. of samples	Max NTU	Min NTU	95% UCL of mean	Complying
2009-10	Weekly	52	3.1	0.3	1.3	Yes
2008-09	Weekly	55	3.1	0.3	1.3	Yes
2007-08	Weekly	54	3.4	0.2	1.5	Yes
2006-07	Weekly	57	5	0.5	1.7	Yes
2005-06	Weekly	54	31	0.2	2.7	Yes
2004-05	Weekly	49	5.4	0.3	1.6	Yes

<sup>4</sup> Two (2) sampling sites monitored weekly

### 3.3 Chlorine based disinfection by-product chemicals

#### 3.3.1 Test Results

Falls Creek does not use chlorine based disinfection products and this parameter is not tested.

#### 3.3.2 Actions undertaken in relation to non-compliance

None required.

### 3.4 Ozone based disinfection by-product chemicals

#### 3.4.1 Test Results

Falls Creek does not use ozone based disinfection products and this parameter is not tested.

#### 3.4.2 Actions undertaken in relation to non-compliance

None required.

### 3.5 Aluminium

#### 3.5.1 Test Results

Falls Creek does not use aluminium based treatment products and this parameter is not tested.

#### 3.5.2 Actions undertaken in relation to non-compliance

None required.

### 3.6 Fluoride

#### 3.6.1 Test Results

Falls Creek does not use fluoride based treatment products and this parameter is not tested.

#### 3.6.2 Actions undertaken in relation to non-compliance

None required.

### 3.7 Other algae, pathogen, chemical or substance not specified above that may pose a risk to human health

#### 3.7.1 Test Results

Results for the reporting period and the previous four (4) years are as shown below. All tested parameters were compliant.

2009-10

Parameter	Frequency of Sampling	Number Samples	Units	Mean Value	Maximum test value	Minimum test value	ADG Guideline	Complies (Y/N)
Arsenic	4 Monthly	3	mg/L	<0.001	<0.001	<0.001	0.007	Yes
Cadmium	4 Monthly	3	mg/L	<0.0002	<0.0002	<0.0002	0.002	Yes
Chromium	4 Monthly	3	mg/L	<0.001	<0.001	<0.001	0.05	Yes
Copper	4 Monthly	3	mg/L	0.045	0.11	0.01	2	Yes
Fluoride	4 Monthly	3	mg/L	<0.05	<0.05	<0.05	1.5	Yes
Lead	4 Monthly	3	mg/L	<0.001	0.001	<0.001	0.01	Yes
Manganese	4 Monthly	3	mg/L	0.069	0.2	0.001	0.5	Yes
Mercury	4 Monthly	3	mg/L	<0.0001	<0.0001	<0.0001	0.001	Yes
Nickel	4 Monthly	3	mg/L	<0.001	<0.001	<0.001	0.02	Yes
Selenium	4 Monthly	3	mg/L	<0.001	<0.001	<0.001	0.01	Yes
Sulphur	4 Monthly	3	mg/L	<0.5	<0.5	<0.5	500	Yes

Other Parameters

Parameter	Frequency of Sampling	Number of Samples	Max mg/L	Min mg/L	Average mg/L	Complying
Aldrin	4 per year	4	<0.00001	<0.00001	<0.00001	Yes
BHC (Alpha Isomer)	4 per year	4	<0.00005	<0.00005	<0.00005	Yes
BHC (Beta Isomer)	4 per year	4	<0.00005	<0.00005	<0.00005	Yes
BHC (Delta Isomer)	4 per year	4	<0.00005	<0.00005	<0.00005	Yes
cis-Chlordane	4 per year	4	<0.00001	<0.00001	<0.00001	Yes
trans-Chlordane	4 per year	4	<0.00001	<0.00001	<0.00001	Yes
4,4'-DDD mg/L	4 per year	4	<0.00006	<0.00006	<0.00006	Yes
4,4'-DDE	4 per year	4	<0.00006	<0.00006	<0.00006	Yes
4,4'-DDT	4 per year	4	<0.00006	<0.00006	<0.00006	Yes
Dieldrin	4 per year	4	<0.00001	<0.00001	<0.00001	Yes
Endosulfan I	4 per year	4	<0.00005	<0.00005	<0.00005	Yes
Endosulfan li	4 per year	4	<0.00005	<0.00005	<0.00005	Yes
Endosulphan Sulphate	4 per year	4	<0.00005	<0.00005	<0.00005	Yes
Endrin	4 per year	4	<0.0001	<0.0001	<0.0001	Yes
Endrin Aldehyde	4 per year	4	<0.0001	<0.0001	<0.0001	Yes
Hexachlorobenzene	4 per year	4	<0.000002	<0.000002	<0.000002	Yes
Heptachlor	4 per year	4	<0.00005	<0.00005	<0.00005	Yes
Heptachlor Epoxide	4 per year	4	<0.00005	<0.00005	<0.00005	Yes
Lindane (BHC Gamma Isomer)	4 per year	4	<0.00005	<0.00005	<0.00005	Yes
Methoxychlor	4 per year	4	<0.0002	<0.0002	<0.0002	Yes
Endrin Ketone	4 per year	4	<0.00005	<0.00005	<0.00005	Yes

2008-09

Parameter	Frequency of Sampling	Number Samples	Units	Mean Value	Maximum test value	Minimum test value	ADG Guideline	Complies (Y/N)
Arsenic	6 Monthly	2	mg/L	<0.001	<0.001	<0.001	0.007	Yes
Cadmium	6 Monthly	2	mg/L	<0.0002	<0.0002	<0.0002	0.002	Yes
Chromium	6 Monthly	2	mg/L	<0.001	<0.001	<0.001	0.05	Yes
Copper	6 Monthly	2	mg/L	0.151	0.25	0.052	2	Yes
Fluoride	6 Monthly	2	mg/L	<0.05	<0.05	<0.05	1.5	Yes
Lead	6 Monthly	2	mg/L	<0.001	0.001	<0.001	0.01	Yes
Manganese	6 Monthly	2	mg/L	0.003	0.004	0.004	0.5	Yes
Mercury	6 Monthly	2	mg/L	<0.0001	<0.0001	<0.0001	0.001	Yes
Nickel	6 Monthly	2	mg/L	<0.001	<0.001	<0.001	0.02	Yes
Selenium	6 Monthly	2	mg/L	<0.001	<0.001	<0.001	0.01	Yes
Sulphur	6 Monthly	2	mg/L	<0.5	<0.5	<0.5	500	Yes

2007-08

Parameter	Frequency of Sampling	No. of Samples	Units	Mean Value	Maximum test value	Minimum test value	ADG Guideline	Complies (Y/N)
Pesticides	Annual	1	mg/L	NDET	NDET	NDET		YES
Sulphur	Annual	1	mg/L	<1	<1	<1	500	YES

*2006-07*

Parameter	Frequency of Sampling	No. of Samples	Units	Mean Value	Maximum test value	Minimum test value	ADG Guideline	Complies (Y/N)
Arsenic	Annual	1	mg/L	<0.001	<0.001	<0.001	0.007	YES
Cadmium	Annual	1	mg/L	<0.0002	<0.0002	<0.0002	0.002	YES
Chromium	Annual	1	mg/L	<0.001	<0.001	<0.001	0.05	YES
Copper	Annual	1	mg/L	0.21	0.21	0.21	2	YES
Fluoride	Annual	1	mg/L	<0.05	<0.05	<0.05	1.5	YES
Lead	Annual	1	mg/L	<0.001	<0.001	<0.001	0.01	YES
Manganese	6 Monthly	2	mg/L	0.001	0.001	0.001	0.5	YES
Mercury	Annual	1	mg/L	<0.0001	<0.0001	<0.0001	0.001	YES
Nickel	Annual	1	mg/L	<0.001	<0.001	<0.001	0.02	YES
Pesticides	4 Monthly	3	mg/L	ND	ND	ND		YES
Selenium	Annual	1	mg/L	<0.001	<0.001	<0.001	0.01	YES
Sulphur	6 Monthly	2	mg/L	<1	<1	<1	500	YES

*2005-06*

Parameter	Frequency of Sampling	No. of Samples	Units	Mean Value	Maximum test value	Minimum test value	ADG Guideline	Complies (Y/N)
Arsenic	Annual	1	mg/L	<0.001	<0.001	<0.001	0.007	YES
Cadmium	Annual	1	mg/L	0.0003	0.0003	0.0003	0.002	YES
Chromium	Annual	1	mg/L	<0.001	<0.001	<0.001	0.05	YES
Copper	Annual	1	mg/L	0.025	0.025	0.025	2	YES
Fluoride	Annual	1	mg/L	<0.05	<0.05	<0.05	1.5	YES
Lead	Annual	1	mg/L	<0.001	<0.001	<0.001	0.01	YES
Manganese	6 Monthly	2	mg/L	0.002	0.002	0.002	0.5	YES
Mercury	Annual	1	mg/L	<0.0001	<0.0001	<0.0001	0.001	YES
Nickel	Annual	1	mg/L	<0.001	<0.001	<0.001	0.02	YES
Pesticides	Annual	1	mg/L	ND	ND	ND		YES
Selenium	Annual	1	mg/L	<0.001	<0.001	<0.001	0.01	YES
Sulphur	6 Monthly	2	mg/L	<1	<1	<1	500	YES

**3.7.2 Actions undertaken in relation to non-compliance**

None required.

**3.8 Aesthetics**

Results for the reporting period and the previous four (4) years are as shown below. All tested parameters were compliant except for Iron. There were three samples out of 55 that had iron values above the ADG guideline of 0.3 mg/L. The maximum recorded test value was 1.4 mg/L. Refer also to section 4.3 for further details.

**3.8.1 Test Results**

*2009-10*

Parameter	Frequency of Sampling	Number Samples	Units	Mean Value	Maximum test value	Minimum test value	ADG Guideline
pH	3 Monthly	5	units	6.9	6.7	7.1	6.5-8.5
Total Dissolved Solids	3 Monthly	5	mg/L	13	35	7	500
Colour	3 Monthly	4	HU	9	12	6	15
Total Alkalinity	4 Monthly	3	mg/L	4.7	6.0	4.0	N/A
Calcium	4 Monthly	3	mg/L	0.8	1.4	0.5	N/A
Chloride	4 Monthly	3	mg/L	<1	<1	<1	250
Hardness	4 Monthly	3	mg/L	2.7	4.0	2.0	200
Iron	Weekly	52	mg/L	0.11	1.4	0.04	0.3
Magnesium	4 Monthly	3	mg/L	0.17	0.2	0.1	N/A
Potassium	4 Monthly	3	mg/L	0.67	1.6	0.2	N/A
Silica	Annually	1	mg/L	1.5	1.5	1.5	N/A
Sodium	4 Monthly	3	mg/L	0.5	0.6	0.5	180
Zinc	4 Monthly	3	mg/L	0.014	0.034	0.003	3

2008-09

Parameter	Frequency of Sampling	Number Samples	Units	Mean Value	Maximum test value	Minimum test value	ADG Guideline
pH	6 Monthly	2	units	6.7	6.8	6.6	6.5-8.5
Total Dissolved Solids	6 Monthly	2	mg/L	17.9	18.6	17.1	500
Colour	6 Monthly	2	HU	8.0	12.0	4.0	15
Total Alkalinity	6 Monthly	2	mg/L	6.0	7.0	5.0	N/A
Calcium	6 Monthly	2	mg/L	1.0	1.0	0.9	N/A
Chloride	6 Monthly	2	mg/L	<1	<1	<1	250
Hardness	6 Monthly	2	mg/L	3.0	3.0	3.0	200
Iron	Weekly	55	mg/L	0.13	0.40	0.04	0.3
Magnesium	6 Monthly	2	mg/L	0.2	0.2	0.2	N/A
Potassium	6 Monthly	2	mg/L	0.2	0.2	0.2	N/A
Silica	6 Monthly	2	mg/L	3.7	5.5	5.5	N/A
Sodium	6 Monthly	2	mg/L	0.6	0.6	0.6	180
Zinc	Not Tested	0	mg/L	0.025	0.043	0.006	3

2007-08

Parameter	Frequency of Sampling	Number Samples	Units	Mean Value	Maximum test value	Minimum test value	ADG Guideline
pH	6 Monthly	2	units	6.8	7.0	6.5	6.5-8.5
Total Dissolved Solids	6 Monthly	2	mg/L	28.6	30.0	27.1	500
Colour	6 Monthly	2	HU	13.0	14.0	12.0	15
Total Alkalinity	6 Monthly	2	mg/L	9.0	9.0	9.0	N/A
Calcium	Annual	1	mg/L	1.2	1.2	1.2	N/A
Chloride	Annual	1	mg/L	2.0	2.0	2.0	250
Hardness	Annual	1	mg/L	<5	<5	<5	200
Iron	Weekly	52	mg/L	0.17	1.20	0.05	0.3
Magnesium	Annual	1	mg/L	0.3	0.3	0.3	N/A
Potassium	Annual	1	mg/L	0.3	0.3	0.3	N/A
Silica	Annual	1	mg/L	2.6	2.6	2.6	N/A
Sodium	Annual	1	mg/L	0.7	0.7	0.7	180
Zinc	Not Tested	0	mg/L				3

2006-07

Parameter	Frequency of Sampling	Number Samples	Units	Mean Value	Maximum test value	Minimum test value	ADG Guideline
pH	4 Monthly	5	units	6.9	7.1	6.5	6.5-8.5
Total Dissolved Solids	6 Monthly	4	mg/L	21.4	27.1	15.7	500
Colour	4 Monthly	5	HU	9.2	12.0	6.0	15
Total Alkalinity	6 Monthly	2	mg/L	7.0	7.0	7.0	N/A
Calcium	6 Monthly	2	mg/L	1.6	1.6	1.5	N/A
Chloride	6 Monthly	2	mg/L	<1.0	<1.0	<1.0	250
Hardness	6 Monthly	2	mg/L	5.5	6.0	5.0	200
Iron	Weekly	52	mg/L	0.15	0.74	0.05	0.3
Magnesium	6 Monthly	2	mg/L	0.3	0.3	0.3	N/A
Potassium	6 Monthly	2	mg/L	0.3	0.3	0.3	N/A
Silica	6 Monthly	2	mg/L	2.4	2.5	2.5	N/A
Sodium	6 Monthly	2	mg/L	0.7	0.8	0.8	180
Zinc	Annual	1	mg/L	0.01	0.01	0.01	3

2005-06

Parameter	Frequency of Sampling	Number Samples	Units	Mean Value	Maximum test value	Minimum test value	ADG Guideline
pH	4 Monthly	4	units	6.6	7.2	6.2	6.5-8.5
Total Dissolved Solids	6 Monthly	4	mg/L	15.4	17.1	12.9	500
Colour	4 Monthly	4	HU	9.0	10.0	6.0	15
Total Alkalinity	6 Monthly	2	mg/L	6.0	6.0	6.0	N/A
Calcium	6 Monthly	2	mg/L	0.9	0.9	0.9	N/A
Chloride	6 Monthly	2	mg/L	<1.0	<1.0	<1.0	250
Hardness	Annual	1	mg/L	<5	<5	<5	200
Iron (see note)	Annual	28	mg/L	1.0	7.5	0.1	0.3
Magnesium	6 Monthly	2	mg/L	0.2	0.2	0.2	N/A
Potassium	6 Monthly	2	mg/L	0.2	0.2	0.2	N/A
Silica	6 Monthly	2	mg/L	1.8	2.0	1.6	N/A
Sodium	6 Monthly	2	mg/L	0.6	0.6	0.6	180
Zinc	Annual	1	mg/L	0.006	0.006	0.006	3

(Note – weekly testing for Iron commenced in March 2006)

### 3.8.2 Actions undertaken where aesthetic guideline value is not satisfied.

Refer to section 4.3.

## 3.9 Analysis of Results

### 3.9.1 Overview

The quality of the delivered water is very good. Bacteriological testing results in 2009-10 were fully compliant and the 95% upper confidence limit of the mean for turbidity of 1.3 NTU is comfortably within the ADWG guideline target of 5.0 NTU. All other health based parameters tested were well within the guideline values.

### 3.9.2 Discussion and Trends

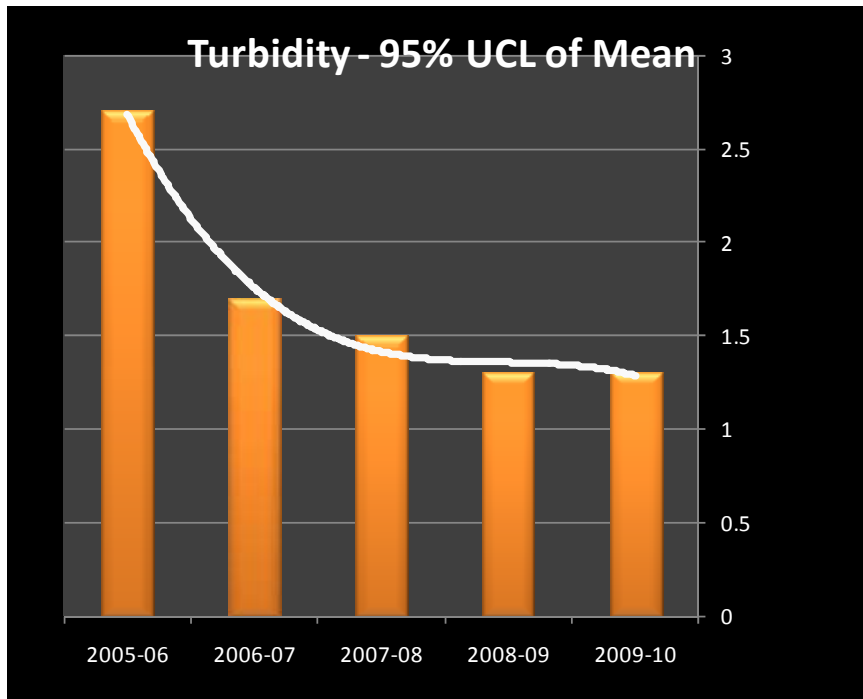
#### *E. coli*

There was one recorded instances of *E.coli* in the reticulation system at the UV in 2009-10.

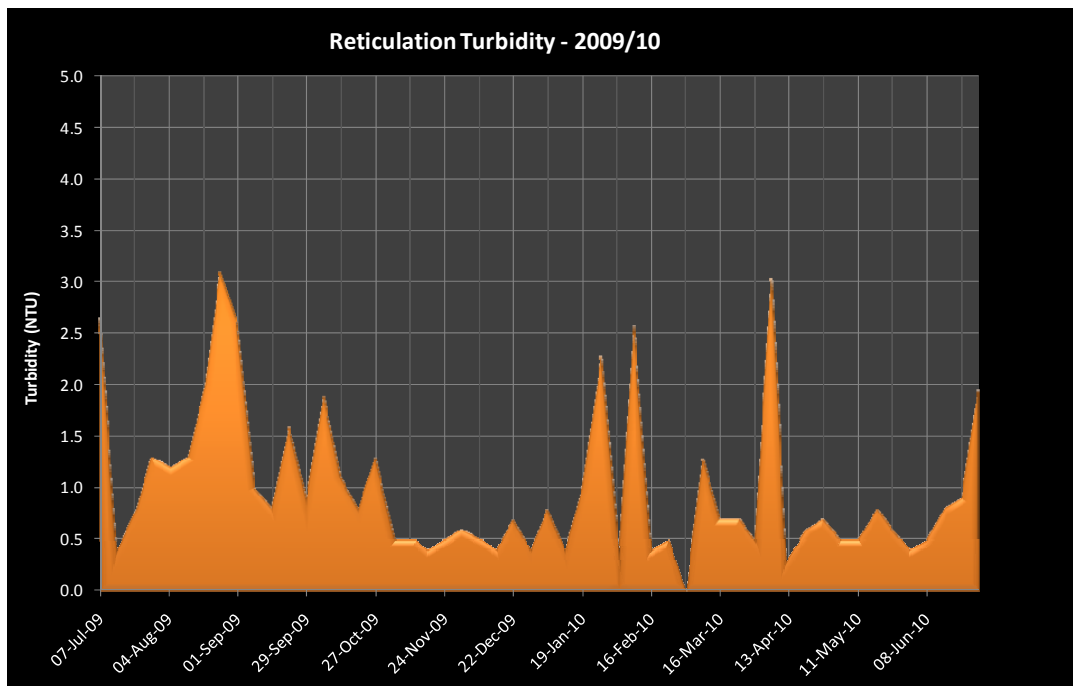
Since 1993 there have been 13 recorded instances when the indicator organism *E. coli* had been detected. The maximum recorded was 3 orgs/100mL during the 2003 bushfires. In all other instances the value was 1 org/100mL. The most recent occurrence was on 9<sup>th</sup> December 2009.

#### Turbidity

The sedimentation basins are effective in reducing turbidity levels of the raw water from the dam before UV treatment. During the reporting period the turbidity range was 0.3 to 3.1 NTU and the 95% upper confidence limit of the mean of 1.3 NTU is well below the ADWG guideline value of 5.0 NTU. Improved operational procedures in relation to the source water in the last 3 years (refer also to section 4.3) has seen a gradual improvement in the 95% upper confidence limit of the mean as demonstrated in the graph below.



Weekly turbidity readings for the year are show graphically below.



Since the commencement of weekly turbidity and bacteriological testing in August 2004, 38 of 309 or less than 13% of samples have produced a turbidity reading higher than 2.0 NTU.

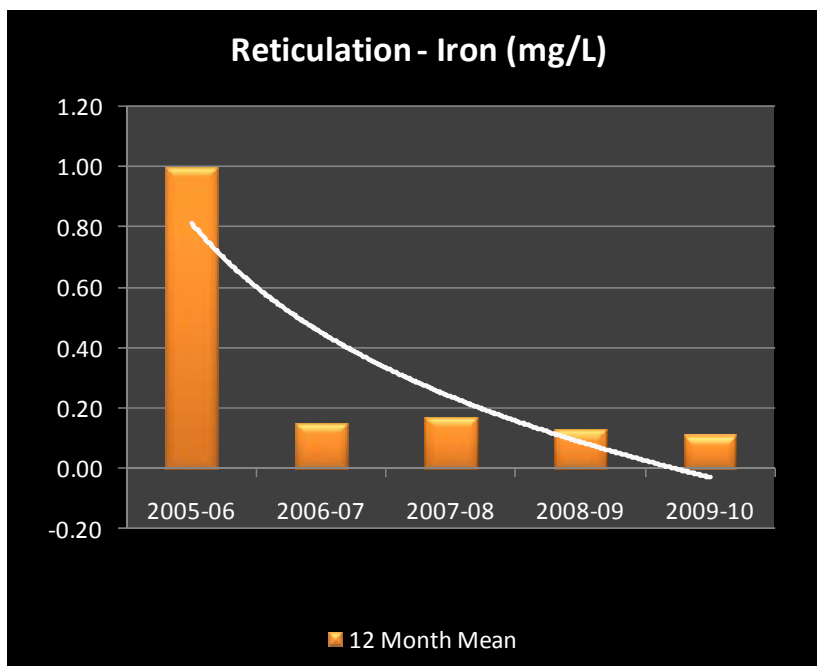
### Health Parameters

All health based parameters are well within the guideline values and there is no trend evident with these.

### Aesthetics

The water quality test results show that the source water supply suffers from dirty water problems in late summer and mid-winter. This is due primarily to elevated levels of dissolved iron and manganese which causes a characteristic brown tinge to the water. Improved operational responsiveness to the change in quality of the source water by taking supply from the snow making system during periods of stagnation in summer started in

2006-07. This has produced a marked improvement in the iron levels in the reticulated supply. The trend in dealing with this issue is demonstrated in the graph of mean levels shown below. For further detail refer also to section 4.3 below.



Colour levels are generally satisfactory, although these can be adversely affected by elevated iron levels. All other aesthetic parameters are well below the guideline limits and there is no trend evident with these.

### Summary

In summary, the bacteriological water quality delivered to customers continues to be safe, largely due to the fact that under most circumstances the raw water is of high bacteriological quality and the UV plant has a capacity for significantly higher demand. The long-term results of raw water monitoring typically show no detectable *E. coli* in 100 ml samples and the current level of risk is adequately mitigated by the treatment processes in place involving sedimentation and UV disinfection. UV treatment has been effective since the new plant was installed in 1997.

Turbidity levels are also fully compliant.

From time to time the water quality delivered is outside of the ADWG aesthetic guidelines in relation to iron content. The ability to take supply from the snowmaking system is a demonstrated effective risk mitigation measure against this behaviour in summer. In the longer term an alternative off-take and possibly additional treatment is required to further enhance the provision of a safe, palatable supply to consumers. This is also under review.

## 4 Emergency/Incident Management

Although preventive strategies are intended to prevent incidents and emergency situations from occurring, some events cannot be anticipated or controlled, or have such a low probability of occurring that providing preventive measures would be too costly. For such incidents, there must be the ability to respond promptly, constructively and efficiently.

There are a number of hazards or events that can lead to emergency situations, including:

- Failing to meet guideline values and other requirements;
- Accidents that increase levels of contaminants (e.g. spills in catchments, incorrect dosing of chemicals);
- Equipment breakdown and mechanical failure;
- Prolonged power outages;
- Extreme weather events (e.g. flash flooding, cyclones);
- Natural disasters (e.g. fire, earthquakes, lightning damage to electrical equipment); and
- Human actions (e.g. serious error, sabotage, strikes).

FCRM has an Emergency Management Plan under the *Emergency Management Act 1986* and this plan is regularly updated and audited.

### 4.1 Section 22 Reports

The presence of *E. coli* in one sample was detected on 9<sup>th</sup> December, 2009. A Section 22 report was prepared and sent on 14<sup>th</sup> December and the Department of Health was contacted immediately in accordance with the Incident Reporting Guidelines. The response was in accordance with DH directions and was confirmed as an isolated incident and/or possible sampling error. This was corroborated by testing of secondary samples which returned a zero count. The operational response initiated as a precautionary measure involved immediate mains flushing, cleaning and replacement of the UV globe and thimble. No boil water notices were issued.

### 4.2 Incidents

At approximately 5am on Monday 8 March, 2010 the village water supply ran out as the result of a misunderstanding between FCRM and the ski lift company (FCSL) personnel.

During January, 2010 the water supply off-take point was switched to the snow-making system following the annual spike in iron levels at the usual off-take point as a result of the inversion event in Rocky Valley Dam. Filling the Brown Tank through the snow-making system is a manual process, whereby FCSL staff monitor the level of water remaining in the Tank and physically turn on the snow-making pumps when the Tank requires filling. The level from which water is drawn through the snow-making system is different to that of the usual off-take point (bottom of the Dam) and so has lower iron levels during the inversion event. This process has worked effectively for a number of years.

On Friday 5 March, 2010 FCRM staff recorded iron levels at the usual off-take point as still being well above the Safe Drinking Water Act guidelines and sent an SMS text message to the FCSL supervisor to continue filling the Brown Tank with water through the snow-making system. This message was misinterpreted and FCSL ceased monitoring the water level in the Brown Tank as of that day. FCRM were unaware that FCSL had ceased filling the Brown Tank, instead believing that the text message had been interpreted correctly. Throughout the weekend the level of water in the Brown Tank became progressively less.

The level of water in the Brown Tank is usually monitored through a digital level display in the UV filtration room. However, this system was damaged by a lightning strike during February, 2010 and was repaired on the weekend of 6/7 March, 2010. During this repair period the level of water in the Brown Tank was being monitored via a pressure display gauge, also located in the UV filtration room.

On the night of Sunday 7 March, 2010 the pressure gauge was checked by a FCRM staff member. The pressure gauge indicated approximately 'half' pressure' which was misinterpreted as indicating the Tank was half full. In fact, half pressure would mean the Tank is very close to being empty.

From approximately 5am Monday 8 March, 2010 the village water reticulation system progressively ran down from the head of the system. FCRM staff were contacted at approximately 7am Monday 8 March by which time the water had drained from nearly the entire reticulated system. FCSL were alerted to the issue and immediately commenced refilling the Brown Tank. By approximately 10.30am water supply had returned to the entire village.

This event coincided with the first Three Peaks cycle event and the village contained approximately 2000 guests. While no formal complaints were received from guests, FCRM was notified that the quality of water following the refilling of the Brown Tank was poor and had damaged linen and towels (through washing) at two business establishments. These complaints were responded to verbally and claims for compensation of damaged goods were processed.

The Department of Health was verbally notified of the incident some days later. A review of the circumstances in the context of whether a Section 22 notification should be made was carried out. It was deemed that the incident was not a situation that:

- (a) may be the cause of an illness; or
- (b) may be the means by which an illness is being, has been or will be, transmitted; or
- (c) may contain any pathogen, substance, chemical or blue-green algae toxin, whether alone or in combination, at levels that may pose a risk to human health; or
- (d) may cause widespread public complaint.

On this basis no formal notification was made.

FCRM recognises the critical importance of maintaining a permanent water supply to the village, both in terms of amenity and emergency response. Since 8 March, 2010 a digital timer has been installed on the snow-making system to ensure the supply is regularly filled, and the damaged gauge has been repaired.

### **4.3 Lake Stratification**

Stratification occurs in deep reservoirs and is a common cause of poor water quality, especially where the water supply is taken from the bottom of the reservoir. The source water for the Falls Creek water supply coming from the Rocky Valley reservoir is of a poorer quality during two periods of the year which correspond with a stratified condition of the reservoir. This in turn has the potential to impact on the quality of the drinking water within the village.

There is a marked fall off in dissolved oxygen during the period of stratification. The dissolved oxygen in the hypolimnion (deeper) waters is reduced due to normal biological activity and as this oxygen is not being replenished the water eventually becomes stagnant and anoxic with consequent increase in dissolved iron and manganese and other detrimental changes in the water supply. As the stratification persists obnoxious smelly gases are also generated.

When this water is drawn off and comes in contact with oxygen, the iron dissolved as ferrous carbonate is precipitated as red ferric oxide and the dissolved manganese comes out of solution and causes a build up of black slime, and there is often a smell of hydrogen sulphide in the water.

The bushfires in December 2006 and January 2003 have exacerbated the effects of lake stratification by increasing chemical levels in the lake. Immediately after the fires, iron and turbidity levels in the lake were extremely high caused by ash being washed into the reservoir.

The two periods in the year when water quality in Rocky Valley falls off are late summer to early autumn and late winter to early spring.

#### ***4.3.1 Late-Summer to Early-Autumn***

Stratification occurs during the summer from solar heating of the surface water. The depth of this heating depends on the depth to which the wind induced circulating currents penetrate. The warmer, less dense water in the upper waters of the reservoir offer little resistance to the circulating currents and this water is well mixed and

aerated. However, where this warmer water meets the colder, lower water, there is a sudden increase in density which forms a physical barrier and prevents further penetration by the wind induced circulating currents. This barrier is known as the thermocline, the warmer, well mixed water above it is the epilimnion and the colder, unmixed water below it is the hypolimnion.

At Rocky Valley the epilimnion temperature starts to rise sharply in summer about mid-January while the hypolimnion temperature stabilises at around 12° C at the bottom of the reservoir. A thermocline is established by late-January to early-February with the epilimnion water being about 5° C higher than the hypolimnion water.

There is a progressive fall off in dissolved oxygen after the circulation of the epilimnion and hypolimnion is cut off. The summer stratification remains quite stable with little or no change in the temperature of the hypolimnion and this persists until the atmospheric temperatures and the influent water temperatures become cooler. The cooler water is mixed throughout the epilimnion and the upper part of the thermocline by convection and wind action. Cooling then continues until the temperature and density of the epilimnion and the thermocline approach those of the hypolimnion. When this is accomplished resistance to mixing diminishes and the autumn "turnover" occurs with the development of a uniform profile.

At Rocky Valley the surface temperature starts to drop about mid-February to early-March and by about mid-March the mixing of the epilimnion and hypolimnion is restored with a total period of stratification of about two (2) months.

#### ***4.3.2 Late-Winter to Early-Spring***

As surface cooling progresses and the water cools to 4°C and below, the colder upper layer becomes less dense. Stratification usually occurs in the winter as soon as ice starts to form. It takes place immediately below the ice layer because water at 0° C is lighter than water at 4° C. However, in winter the colder water is near the surface rather than at the bottom. Occasionally, when there is no or little ice present, strong winds may break up winter stratification for a few days. Little mixing occurs once the layer of ice forms, sealing the lake surface and preserving the stratification until the ice thaws.

In Rocky Valley, winter stratification is less pronounced and is more dependent on the climatic conditions. Usually about early July the water temperature lowers uniformly over the full depth. Ice usually then covers the reservoir about early August. The ice cuts off the mixing effect of the wind and any temperature change, except by conduction through the ice. As a consequence, the water temperature establishes itself such that the temperature immediately below the ice is 0° C and it sharply increases to about 2° C and remains fairly constant until near the bottom where the warmer, denser water remains.

In turn, during August and September there is a progressive fall off in dissolved oxygen towards the bottom as the ice cover persists. However, there is little information available regarding the temperature and dissolved oxygen profile during the late winter period and it is uncertain as to the effect of aeration on the ice cover during this time.

#### ***4.3.3 Mitigation Measures***

Since the 2006 bushfires the impact of summer stratification on water quality has been dramatic. Weekly monitoring of iron levels in the lake show that levels of 2.5 mg/L are exceeded reaching as high as almost twenty times greater than the aesthetic guideline value. Options to relocate the off-take and to provide further treatment of the water are still being explored.

As an alternative improvement in the short term, a connection to the snowmaking system which draws water from the upper reaches of the lake is employed.

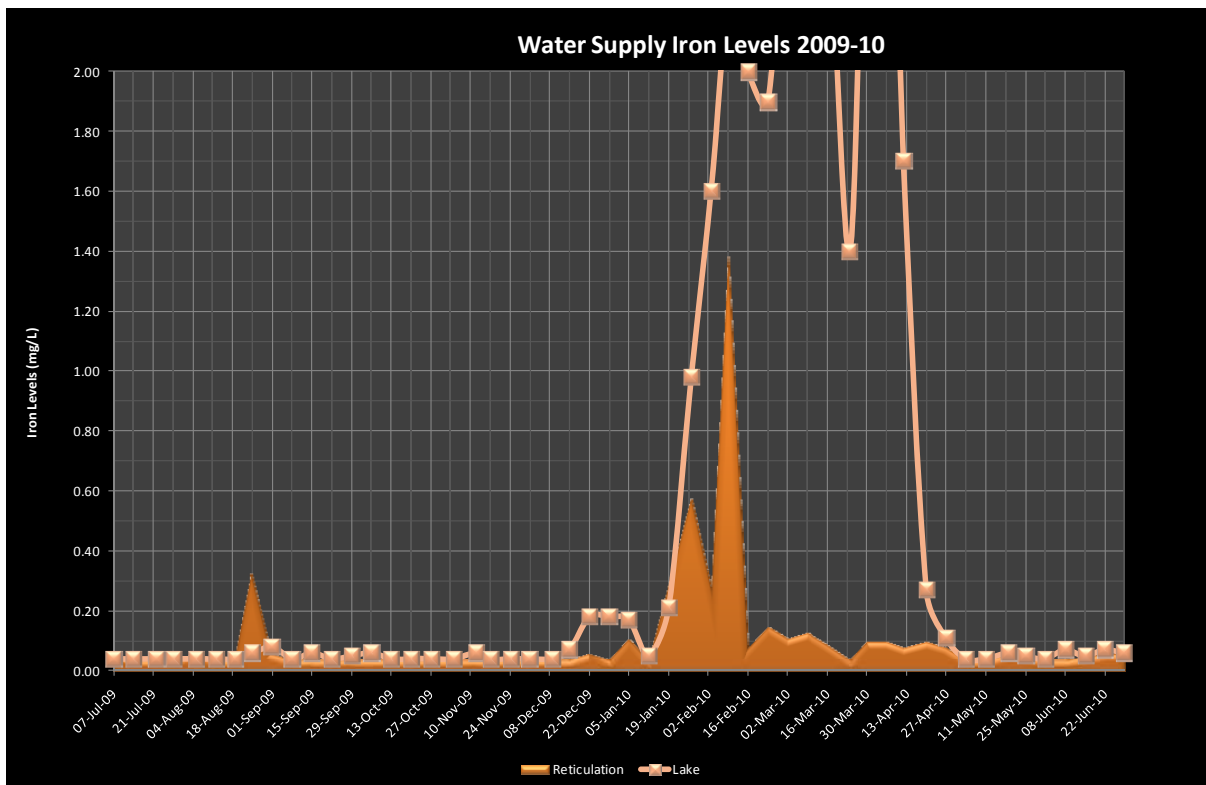
Experience shows that the timing of the changeover to the snowmaking system is critical. Good records are kept of water quality data which are reviewed regularly and trends for iron and turbidity are monitored. The water source is now switched over to the snow making water source if the trend shows a rise in turbidity or iron prior to concentrations reaching aesthetically problematic levels or levels which could affect the UV disinfection system.

Last year, the threshold value for the lake water of 0.3 mg/L (iron) was again used to switch to the snowmaking system. This procedure worked perfectly, and the iron levels in the reticulation were well contained despite the lake reaching a peak of 3.4 mg/L on 6<sup>th</sup> April.

Operational improvements to the aeration equipment adopted in last year continued. Aeration has the following beneficial effects on the reservoir.

- (a) Preventing anaerobic conditions arising at the bottom of the reservoir in the vicinity of the water supply off-take.
- (b) Reducing algae in the deep water.
- (c) Slightly increasing the quantity of blue and green algae. These are most desirable to small water animal life.
- (d) Reducing discolouration in the water producing clearer and brighter water.
- (e) Making the surface water colder in the summer and therefore reducing evaporation losses during the period of natural stratification.

The effectiveness of the aeration is evidenced by the consistently low iron levels in both the lake and the water supply from early-May onwards as indicated in the graph below. The effectiveness of switching the supply source is also clearly evident in the period from late-January to early-May. Of interest this year is that the period of summer stratification was again quite prolonged, being about three (3) months instead of the usual two (2). The slight effect of winter stratification from mid-July to early-September is also clearly evident.



## 5 Complaints

Two complaints of discoloured water were received during the reporting period.

Type of Complaint	No of Complaints	No. of complaints per 100 customers supplied.
Discoloured water	2	2
Taste/Odour	0	0
Blue water	0	0
Air in water	0	0
Suspected illness	0	0
Other	0	0

The circumstances, details of the response and corrective action to the complaints received are more fully described in section 4.2 (Incidents) of this report.

## 6 Risk Management Plan Audit

The Safe Drinking Water Act 2003 requires water suppliers and water storage managers to prepare, implement and review risk management plans for their supply of drinking water and regulated water. Under section 11 of the Act, the Secretary to the Department of Health, or their delegate, is empowered to request that a water supplier or water storage manager have their risk management plan audited.

The Victorian safe drinking water audit is a systematic and independent examination of a water quality risk management plan, to determine:

- Whether the plan has been prepared in accordance with the requirements of the Act and the Safe Drinking Water Regulations 2005 (the Regulations).
- Whether the plan has been implemented and complied with.
- Whether the plan has been reviewed and, where appropriate, revised.
- Whether the risk management plan adequately identifies the nature and level of hazards and risks for each of the water supply systems covered in the scope of the audit.
- Whether the control measures identified in the risk management plans are in place operationally and are adequate to reliably control water safety risks.

FCRM was informed that its second risk management plan audit was to be undertaken during the 2009-10 financial year.

FCRM's approved auditor was Dr. Dan Deere of Water Futures. The audit was conducted on 9<sup>th</sup> December, 2009 and the audit report was submitted to DH on 31<sup>st</sup> December. The cover letter to the report states:

*"On 9<sup>th</sup> December 2009 a Risk Management Plan audit was conducted pursuant to the Safe Drinking Water Act 2003 for Falls Creek Alpine Resort Management Board for the audit period 1<sup>st</sup> January 2009 to 7<sup>th</sup> December 2009. The audit was carried out under Auditor Approval Notice Number 48 dated 2<sup>nd</sup> November 2009.*

*Please find following two items:*

- *An Audit Certificate issued under section 12(1) of the Safe Drinking Water Act 2003; and*
- *An Audit Report summarising the detailed findings of the audit against the Drinking Water Regulatory Audit Guidance Note, 2009.*

*The audit certificate stands alone since there were no non-compliances, however, a number of opportunities for improvement were identified in accordance with the compliance grade in the Drinking Water Regulatory Audit Guidance Note, 2009, and are summarised in the Audit Report.*

*A common opportunity for improvement identified across the alpine resort management boards, and highlighted in this covering letter, is a need to establish more formalised operational procedures for the UV systems, including calibration, servicing and critical limit monitoring."*

FCRM is compliant with the obligations of the Act and a copy of the audit certificate is attached as appendix 1. A description of improvement opportunities and actions to address these is provided in the following section.

## 6.1 Opportunities for Improvement

Auditable Element	Improvement Opportunities	Action to Address
Development and implementation of preventative strategies (including appropriate control and monitoring measures).	Consider signage of the raw water storage and catchment.	Under consideration. Extensive catchment area within the National Park and area managed by AGL Hydro require consultation and agreement.
Implementation and compliance with the requirements of the risk management plan	Continue as a high priority activity the plans to implement telemetry and continuous alarms for the UV systems.	Ongoing program of improvements.
	Continue as a high priority activity the plans to implement systematic maintenance and calibration for the UV systems	Ongoing program.
	Continue as a high priority activity the plans to finalize commissioning of the backup UV system.	Completed.
	Develop improved recordkeeping for the manual checks on the UV system.	Immediate implementation.
	Review cleaner and more sanitary storage facilities for drinking water system tools, equipment and assets.	Immediate implementation.
Continuous review, update and improvement of risk management plan.	Implement the internal review and audit process for the RMP, as planned.	Internal review to be conducted after the 2010 snow season.
Revision of Risk Management Plan.	Consider formalising the revision timeframes and process for updating of the RMP.	Immediate implementation. Next review by April 2011.
Details of emergency management arrangements and procedures for dealing with an incident, event or emergency that may adversely affect the quality or safety of drinking water, or result in water being supplied that poses a risk to human health, including— (i) the names and contact details of, and the positions held by, the persons responsible for dealing with such an incident, event or emergency; and (ii) methods for communicating or disseminating information to the public in relation to any such incident, event or emergency.	In updating its general site emergency management plan it is recommended that FCRM develop water quality incident contingency plans for the general case of possible water quality contamination incidents and a small number of reasonably foreseeable specific cases.	Immediate implementation at next review of emergency management plan.
Any document or operating manual, procedure or protocol created pursuant to the risk management plan or containing material relating to the content of the risk management plan	Formalise and document the approach to be used to prevent contamination of the potable water supply by tools, equipment and assets and by ingress during new works or repair works.	Immediate implementation following the 2010 snow season.

**7 Undertakings under Section 30 of the Act**

Falls Creek do not have any undertakings with DH.

**8 Regulated Water**

FCRM does not manage any regulated water supplies.

## 9 Glossary of Terms and Further Information

Act.....	See SDWA
ADWG.....	Australian Drinking Water Guidelines 2004
AWA.....	Australian Water Association
Class A water.....	Recycled water that has been treated to a standard that enables unrestricted public use
CMA.....	Catchment Management Authority
DH.....	Department of Health
DSE .....	Department of Sustainability and Environment
DWQMS.....	Drinking Water Quality Management System
E. coli .....	Escherichia coli – organism that indicates faecal contamination. Used as an indicator of safe drinking water
EMP .....	Emergency Management Plan
EPA.....	Environment Protection Authority
FCRM .....	Falls Creek Resort Management
kL.....	Kilolitre – 1,000 litres
ML.....	Megalitres – 1,000,000 litres
MOU .....	Memorandum of Understanding
NTU .....	Nephelometric Turbidity Units (see Turbidity)
OHS.....	Occupational Health and Safety
pH.....	Measure of the acidity or basicity of water e.g.: pH = 7 is neutral; pH < 7 is acidic; pH > 7 is basic
Potable.....	Drinkable, suitable for human consumption
Regulations.....	Safe Drinking Water Regulations 2005
SDWA.....	Safe Drinking Water Act 2003
Turbidity.....	A measure of the muddiness of water which may be caused by suspended fine clay particles, silts, algae, organic plant and animal debris
UV.....	Ultra Violet

Appendix 1 – Audit Certificate

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**Schedule 1**

Regulation 8

Safe Drinking Water Regulations 2005

**RISK MANAGEMENT PLAN AUDIT CERTIFICATE**

**Certificate Number:** 48

**Audit period:** 1<sup>st</sup> January 2009 to 9<sup>th</sup> December 2009

**To:** Mr Ross Passalacqua, Chief Executive Officer, Falls Creek Alpine Resort Management Board, PO Box 50, Falls Creek, VIC 3699

**Australian Business Number (ABN):** 21 789 770 569

I, Dr Daniel Deere, after conducting a risk management plan audit of the water supplied by Falls Creek Alpine Resort Management Board, am of the opinion that Falls Creek Alpine Resort Management Board has complied with the obligations imposed by section 7(1) of the **Safe Drinking Water Act 2003** during the audit period.



**Signature of approved auditor:** \_\_\_\_\_

**Date:** 31<sup>st</sup> December 2009