

The Resort Municipality of Whistler

Infrastructure Services

Annual Drinking Water report

2013

The following is the Resort Municipality of Whistler's (RMOW) 2013 Annual Water System Monitoring Report.

This report summarizes the water system's performance for 2013 and was prepared for the Vancouver Coastal Health Authority, as required by our Permit to Operate a Water Supply System.

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1. Overview

1.1 The Municipality

The RMOW supplies potable drinking water to 10,185 permanent residents and approximately two million annual visitors giving a population equivalent or an average number of people in Whistler for 2013 of 25,989. In 2013, the RMOW water system distributed 5,308,459 m³ of water, including 52,011 m³ of potable water sold to the private water system (Van West) in Function Junction.

Whistler's drinking water begins as rainfall and snowmelt in the surrounding mountains, the water has neutral pH, low turbidity (cloudiness), and excellent flavor and odour. Whistler's source water is of such high quality it only requires disinfection

1.2 Water System Management

In addition to dramatic weekend & seasonal population fluctuations, Whistler has a number of other factors that affect the way the water distribution system functions, including the following:

- The water system has been designed to provide for the maximum population at 100% build out; however, that population density is rarely achieved during the off seasons and Whistler is not yet fully built out
- Approximately 31% of the total bed units are allocated to tourist accommodation and hotels
- A large but indeterminate percentage of the residences in Whistler are second homes for families which are only used on weekends or for holidays and remain vacant for the remainder of the year

1.3 Key Accomplishments

Key accomplishments of the RMOW in respect to the Water Distribution System for Whistler include:

- Uni-Directional Flushing (UDF) program part of ongoing efforts to maintain the infrastructure, and an integral part of a multi-barrier approach to protecting and enhancing the quality and safety of Whistlers drinking water
- Annual Maintenance program reviews structural integrity, checks for leaks, equipment service checks and preventative maintenance
- Hydrant Maintenance Program External contractor completes an annual maintenance and inspection of Whistler Hydrants; utilities department completes weekly checks and inspections
- Annual Reservoir cleaning cleaning and inspection of reservoirs
- Comprehensive Water Conservation and Supply Plan working towards reducing water consumption with water conservation actions and water infrastructure additions
- Groundwater Resource Protection Plan enhanced protection of the quantity and quality of groundwater used within the Resort Community including identification of wellhead protection areas and groundwater pollution areas of concern; management options; contingency and spill response plans and water quality monitoring
- Groundwater Monitoring Program annual monitoring by a geotechnical & hydrogeological consultant to check water quality, water levels, well capture zones, aquifer capacity and groundwater extraction levels as part of the Groundwater Resource Protection Plan
- No boil water advisories were issued during 2013

1.4 Water Sources

The RMOW uses both surface water intakes and ground water wells to provide its residents and visitors with water for fire protection and domestic use. The 21 Mile Creek intake supplied 53% of the consumed water in 2013 and is the primary source of water. Table 1 below details the RMOW water sources:

Table 1- Water Sources

Surface Water	Ground Water			
21-Mile Creek	Emerald Estates Wells (3)	Community Wells (4)		
*Blackcomb Creek	Alpine Wells (3)	21 Mile Creek Well		
	Function Wells (2)	Cheakamus Crossing Well		

* Blackcomb Creek has been disconnected from the supply system since 2012

1.5 Water Distribution System

The water system provided by the RMOW is a Class IV Water Distribution Facility, as classified by the Environmental Operators Certification Program (EOCP). Class IV Water Distribution Facilities are the highest level of complexity within the EOCP classification system. The system includes the following components:

- Two separate water distribution systems operated under two separate Permits to Operate (Whistler Main and Emerald Estates)
- One operating surface water intake, 14 ground water wells
- 15 storage reservoirs
- 24 individual pressure zones
- 9 Pump stations
- 27 pressure reducing valve stations
- 5 altitude valve stations
- Real-time Supervisory Control and Data Acquisition (SCADA) monitoring with process control
- Approximately 168 km of water main
- Approximately 4059 water service connections
- 529 Fire Hydrants
- 1932 mainline valves

1.6 **Disinfection Methods**

RMOW source water quality is high and a treatment plant is not necessary to achieve the required levels of disinfection. Surface and ground water is disinfected at source by the following methods.

- Chlorination using controlled additions of dilute solutions of calcium hypochlorite
- Chlorination using on-site generation of chlorine from salt pucks
- Ultraviolet germicidal irradiation (UVGI) a disinfection method that uses ultraviolet (UV) light at sufficiently short wavelength to kill microorganisms, followed by the addition of residual chlorine

1.7 **Operating Staff Qualifications**

Further to the *Drinking Water Protection Act*, the Drinking Water Protection Regulation (DWPR) came into effect May 16, 2003. The regulation includes the classification of distribution and treatment systems and qualification standards for employees operating these systems through the Environmental Operators Certification Program (EOCP).

The RMOWs water distribution system is classified as Level 4 and the Utilities Department is fully qualified to operate this class of Water Distribution Facility. The following summarizes the certification levels of each of the RMOW utility department E.O.C. certified water operators on December 31, 2013:

Operating Staff Qualifications 2013							
# of Employees	Title	Certification					
1	Utilities Supervisor	WD - III					
1	Chief Utilities Operator	WD - IV					
1	Utilities Operator 3	WD - IV					
2	Utilities Operator 2	WD - IV					
1	Utilities Operator 2	WD - III					
1	Utilities Operator 1	WD - III					
2	Utilities Operator 1	WD - II					
1	Utilities Operator 1	WD - I					
1	Equipment Operator/Lead Hand	WD - III					
1	Heavy Equipment Operator 3	WD - II					

Table 2- EOCP Certification

2. Water Quantity Monitoring

In 2013, the RMOW water system distributed 5,308,459 cubic meters of water. The 2013 usage was down by 39,636 cubic meters, 0.74% less than 2012.

53% of the water supplied came from surface water source 21 Mile Creek, 2% more than 2012.

Detailed water consumption reports and breakdowns can be found in Appendix A of this report.

Year	Total Volume Produced (m³)	Total Surface Water Volume Produced (m³)	% Surface Water	Total Ground Water Volume Produced (m³)	% Ground Water
2013	5,308,459	2,794,284	53%	2.514,175	47%
2012	5,348,095	2,753,839	51%	2,594,256	49%
2011	5,275,147	2,210,879	42%	3,064,670	58%
2010	5,699,320	2,210,194	39%	3,492,126	61%
2009	5,176,989	2,712,933	52%	2,464,056	48%
2008	5,161,300	2,733,382	53%	2,427,918	47%
2007	4,903,640	3,057,270	62%	1,846,370	38%
2006	4,903,640	3,057,270	62%	1,846,370	38%

Table 3- Water Distribution



Figure 1- Water Consumption Breakdown

3. Water Quality Monitoring

3.1. Sampling and Testing Program

The Drinking Water Protection Regulation (DWPR) sets a schedule for the frequency of monitoring samples for water systems and for populations of between 5,000 and 90,000 the requirement is 1 sample per 1000 residents.

The RMOW has an established water quality sampling and testing program which continually monitors the quality of potable water being delivered to Whistler's residents and visitors. The testing program involves taking water samples from 35 different sample points located throughout the municipality, from both source locations and from within the distribution system.

In 2013 Whistler population count was 10,185 (Stats Canada Census), and the utilities department tested 1031 samples throughout the year comprised of bi-weekly samples from 35 sites, quarterly samples from 38 sites and annual samples from 17 sites.

These samples are tested for various water quality parameters as detailed below:

Sample Period	Testing Parameter			
	рН			
	Temperature			
Every Two Weeks	Turbidity			
	Free CL2 (residual chlorine)			
	Coliforms (total and E-coli)			
	Total Organic Carbon (TOC)			
	Heterotrophic Plate Count (HPC)			
Quartarly	Trihalomethane (THM)			
Quarterly	Polycyclic Aromatic Hydrocarbons (PAH)			
	Total and Dissolved Iron			
	Total Manganese			
Annually Water chemistry				

Table 4 - Water Testing Program

All samples required for the testing listed above are collected by the RMOW Utilities Department. Biweekly water testing parameter analysis is carried out by the RMOW Utilities Department apart from the Coliform tests which require regulatory reporting. Testing for E-coli and total coliforms is carried out by the "British Columbia Centre for Disease Control"; HPC, TOC, THM's and water chemistry testing is carried out by 3rd party testing facilities, during 2013 Maxxam, in Burnaby, BC and Caro Analytical Services were used. All sample data is uploaded and stored in an online data repository provided by WaterTrax.

3.2. Sample Stations

Table 5 outlines the stations that are sampled on a bi-weekly basis; Figure 1 below identifies the distribution system sampling locations.

	WEEK 1	WEEK 2		
Municipal Address		Municipal Reference*	Address	
W201-1	9225 Highway 99	W202	8801 Highway 99	
W201-2	9225 Highway 99	W210	8010 Highway 99	
W201-3	W201-3 9225 Highway 99		8107 Camino Dr	
W212-1	W212-1 1005 Lynham Rd		4490 Blackcomb Way	
Sample Port	Sample Port 1300 Mount Fee Rd		4490 Blackcomb Way	
W217	Cheakamus Crossing	W205-3	4490 Blackcomb Way	
Sample Port	Sample Port 1300 Block Alta Lake Rd		4330 Blackcomb Way	
R231	R231 5801 Alta Lake Rd		21 Mile Well	
R232	R232 4700 Lost Lake Rd		5438 Stonebridge Dr	
P270	2400 Taluswood Pl	S131	9225 Lakeshore Dr	

Table 5 – Sample Stations

P245 8319 Mountainview Dr		S101	8330 Rainbow Dr
P266\S123	8407 Golden Bear Pl	P267/S126	7314 Blackcomb Way
Sample Port 6295 Palmer Dr		S121	2773 Cheakamus Way
P256 4700 Glacier Dr		Sample Port	4335 Main St
Sample Port 4297 Mountain Sq		P265	3840 Sunridge Dr
S104 3333 Carlton Way		S106	2149 Lake Placid Rd
P273\S132 1559 Spring Creek Rd		R238	9525 Emerald Dr
		S137	8925 Hwy. 99

* Sample Site references:-

W – Well

R – Reservoir

S – Siphon Site

P – Pump Station

Sample Port – Sample port within the distribution system



Figure 1 – Water Sampling Locations

3.3. <u>Test Parameters</u>

The Guidelines for Canadian Drinking Water Quality (GCDWQ) are established by the Federal-Provincial-Territorial Committee on Drinking Water (CDW) and are published by Health Canada. Health based guidelines and summary tables can be found on Health Canada's website. The following describes the parameters that the RMOW tests. Where applicable, parameter fail limits are set using the GCDWQ.

The GCDWQ are set according to contaminants meeting the following criteria:

- 1. Exposure to the contaminant could lead to adverse health effects in humans
- 2. The contaminant is frequently detected / could be expected to be found in drinking water supplies
- 3. The contaminant is detected / expected to be detected in drinking water at a level that is of possible human health significance

If a contaminant of interest does not meet these criteria, the CDW may choose not to establish a numerical guideline.

Chemical and physical parameters guidelines are set based on the following:

- 1. Health based listed as a maximum acceptable concentration (MAC)
- 2. Based on aesthetic considerations listed as an aesthetic objective (AO)
- 3. Established based on operational considerations listed as an operational guidance value (OG)

Any measures taken to reduce concentrations of chemical contaminants should not compromise the effectiveness of disinfection.

3.3.1 Microbiological Parameters

The GCDWQ state that the highest priority guidelines are those dealing with microbiological contaminants. The guidelines focus on indicators and treatment goals and recommends source water protection, adequate treatment, disinfection and regular maintenance of the distribution system to reduce the microorganisms to levels not associated with illness.

The following table details the microbiological parameters that are tested by the RMOW:

Parameter	Guideline	Tested	Health Considerations	Use
Escherichia coli (E. coli)	MAC = None detectable per 100mL	Bi- weekly	E-coli is a fecal coliform bacteria that is an indication of sewage or animal waste contamination	Used as an indicator of the microbiological safety of drinking water
Heterotrophic Plate Count (HPC)	None required (GCDWQ 2012)	Quarterly	Naturally occurring and not an indicator of water safety	HPC level is used to monitor the general bacteriological water quality

Table 6 – Microbiological Parameters

Total coliforms	At exit of Municipal treatment plant: MAC = None detectable/100mL; In Municipal distribution systems: Guideline = No consecutive samples or no more than 10% of samples should contain total coliforms (<10CFU\100mL)	Bi- weekly	Total coliforms are a group of closely related bacteria that are generally free-living in the environment. Coliform bacteria are not generally harmful; however, the total coliform test can indicate the presence of other pathogenic bacteria.	At treatment site total coliform presence in water indicates that the water has been inadequately treated and may contain pathogenic microorganisms; presence of total coliforms within the distribution system can indicate a regrowth of bacteria or intrusion of untreated water.
Turbidity	*Depends on water source. Guideline for treated water <0.1 NTU at all times; where not achievable ≤ 0.3 NTU in 95% of measurements and not to exceed 1.0 NTU	Bi- weekly	Naturally occurring inorganic and organic particles which can trap microorganisms protecting them from disinfection	High turbidity in surface water sources can impede the disinfection process thereby lowering the quality of water entering the water distribution system. Increases in distribution system turbidity can be indicative of deteriorating water quality

* RMOW permit stipulates a Turbidity NTU requirement of < 1 in source water and < 5 within the distribution system

3.3.2 Physical Parameters

The following table details the physical parameters that are tested by the RMOW:

Table 7 – Physical Parameters

Parameter	Units	GCDWQ MAC Standard	AO	OG	Tested	Source	Comments
Conductivity	uS/cm				Annually		Conductivity in water is affected by the presence of inorganic dissolved solids, organic compounds and temperature

рН	pH Units	6.5 - 8.5			Bi-weekly		The pH of a water sample is an indicator of the acidity of the water. pH has no direct impact on consumers, however, it is important for operational aspects of water quality including corrosion or incrustation of the water distribution system.
Temperature	°C		≤ 15°C		Bi-weekly		High water temperatures can promote growth of microorganisms. This can cause problems with taste, odour, colour, and corrosion.
Total Dissolved Solids	mg/L		≤ 500		Quarterly	Naturally occurring	TDS above 500 mg/L results in excessive scaling in pipes and appliances
True Colour	Col. Unit		≤ 15		Annually	Naturally occurring	Organic substances / metals; industrial waste which may interfere with disinfection
Total Hardness ² (CaCO3)	mg/L	None required			Annually	Naturally occurring	Hardness levels between 80 and 100mg/L provide an acceptable balance between corrosion and incrustation
Total Organic Carbon (TOC)				RMOW Operational Guideline ≤ 1 mg/L	Quarterly	Naturally occurring	 decaying natural organic matter (NOM). When raw water is chlorinated, active chlorine compounds react with NOM to produce chlorinated disinfection byproducts (DBPs). Used to measure water quality during the purification process.

3.3.3 Chemical Parameters

Chemical parameter guidelines are set using the MAC, AO and OG described above.

Detailed summary reports of the weekly, quarterly and annual distribution and source water sample results can be found in Appendix B of this report.

3.3.3.1 Free Chlorine

The amount of residual chlorine in the water distribution system is an indicator of the effectiveness of the disinfection process therefore chlorine residual is measured at all sampling sites when bacteriological samples are collected.

Source water (ground and surface) is treated with higher amounts of chlorine to provide adequate levels of residual chlorine at the extremities of the system.

Parameter	Units	GCDWQ MAC Standard	AO Standard	OG Standard	Tested	Source	Comments
Free Chlorine	mg/L	None required			Bi- weekly	Disinfectant additive	The amount of residual chlorine in the water distribution system is an indicator of the effectiveness of the disinfection process. Ideally the residual chlorine at any point in the system would be between 0.2mg\L – 0.6mg\L.

Table 8 – Inorganic Chemical Parameters

There is no GCDWQ level set for chlorine due to the low toxicity at concentrations found in drinking water, free chlorine concentrations in most Canadian drinking water distribution systems range from 0.04 to 2.0 mg/L. The RMOW sets its range for residual chlorine at any point in the system to be between 0.2 mg/L - 0.6 mg/L.

Real-time online monitoring and SCADA alarming is used to monitor chlorine injection and residual levels at surface water intakes, groundwater wells, reservoirs and strategic points throughout the distribution system.

3.3.3.2 Polycyclic Aromatic Hydrocarbons (PAHs)

Tested on a quarterly basis PAHs are a group of organic compounds that are present in the environment mainly as a result of incomplete combustion of forest fires, internal combustion engines and wood stoves etc.

Parameter	Units	GCDWQ MAC Standard	AO Standard	OG Standard	Tested	Source	Comments
Benzo[a] pyrene	micro g/L	<0.05			Quarterly	Incomplete combustion	A HMW-PAH known to be a carcinogen
Total HMW-PAH	micro g/L	No level set			Quarterly	Incomplete combustion	Low molecular weight (LMW) PAHs acutely toxic to aquatic organisms
Total LMW-PAH	micro g/L	No level set			Quarterly	Incomplete combustion	High Molecular Weight (HMW) PAHs, not toxic to aquatic organisms but several are known carcinogens

Table 9 – Organic Chemical Parameters

3.3.3.3 Disinfection By-Products

By- products of disinfection are tested on the quarterly schedule along with the Total Organic Carbon (TOC). TOC provides an estimate of the amount of natural organic matter (NOM)in the water source.

In water treatment facilities, source water is subject to reaction with chloride containing disinfectants. When the raw water is chlorinated, active chlorine compounds react with NOM to produce chlorinated disinfection by-products (DBPs).

Table 10 – Disinfection By-Products

Parameter	Units	GCDWQ MAC Standard	AO Standard	OG Standard	Source	Comments
Trihalomethanes (THMs)	mg/L	0.1			By-product of disinfection with chlorine and NOM	MAC based on health effects
Haloacetic Acids (HAAs)	mg/L	0.08			By-product of disinfection with chlorine and NOM	MAC is based on ability to achieve HAA levels in distribution system without compromising disinfection

3.3.3.4 Metals

The RMOW's water sampling and monitoring program includes an annual testing for a variety of metals, this is done at 17 sampling locations (14 source water sample and 3 distribution samples). MACs are set for metals based on health considerations, taste, analytical achievability and treatment achievability.

Detailed summary reports of the weekly, quarterly and annual sample station results can be found in Appendix B of this report.

3.3.3.5 Additional Testing

In 2013, additional testing was done on the Cheakamus Crossing Well (W217). This additional testing was carried out due to water complaints regarding staining of plumbing fixtures. The Total Carbon dioxide was tested over a six month period as part of a corrosion potential evaluation, high Carbon dioxide levels cause the water pH to be more acidic, this affects taste and can cause staining of plumbing fixtures.

There is no GCDWQ standard set for Total Carbon dioxide.

Refer to Appendix B for the results from the 2013 additional Total Carbon dioxide testing.

3.4 Source Water Protection Plan

The RMOW is required to complete a Source Water Protection Plan for the 21 Mile Creek source under the Provincial Drinking Water Protection Act to meet the terms and conditions of the Permit to Operate a community water system.

21 Mile Creek is an excellent and abundant source of water, however the ability to use 21 Mile Creek is limited by periods of high turbidity when the creek water has too many particles to be acceptable for our drinking water system. Recent concerns have also been raised over the potential for increased turbidity or risk of contamination of the creek due to recreational activity in the watershed.

The purpose of the Plan is to identify conditions and activities that could affect the quality, quantity and timing of flow of 21 Mile Creek. By identifying critical areas and activities and understanding the impacts of climate change, the RMOW can influence planning and measure impacts on the system to create a more resilient water supply.

The scope of the plan will be:

- Confirm the long-term sustainability of 21 Mile Creek as a water supply for the RMOW to year 2030 and beyond. The consultant will review the existing water quality of 21 Mile Creek and recommend, if required, water treatment infrastructure requirements and the treatment implementation schedule, to year 2030 and beyond
- Complete Modules 1, 2, 7 and 8 of the BC Comprehensive Drinking Water Source to Tap Assessment Guide for the 21 Mile Creek source
- Liaise with regulatory authorities including Vancouver Coastal Health to solicit input on the Plan
- Plan and undertake a public consultation process to assess the public's position regarding the qualitative consequences of identified hazards

3.5 Groundwater Resource Protection Plan

As part of the Permit to Operate requirements, the RMOW has a Groundwater Resource Protection Plan which was implemented in 2008. The plan is comprised of a program of measures which will lead to enhanced protection of the quantity and quality of groundwater used within the Resort Community.

The primary objectives are:

- 1. Ensure that exposure to unacceptable concentrations of contaminants in drinking water are minimized
- 2. To implement procedures and policies that will support long-term sustainability of the groundwater resource
- 3. To maintain public confidence in Whistler's drinking water

The plan framework includes:

- Wellhead Protection Areas identifying areas to be managed and protected from potential contamination to ensure protection of water quality and long term sustainability of the groundwater supply
- Groundwater Pollution Areas of Concern identification and assessment of risk factors
- Management Options public awareness; well decommission procedure; legislative considerations; Provincial regulations; Bylaws and Municipal Policies and Community Plans
- Contingency and Spill Response Plans Spill response; aquifer contamination response; well monitoring plan (detailed below)
- Water Quality Monitoring schedule; sampling procedures; review and reporting

3.5.1 Groundwater Monitoring Program

Groundwater resources are monitored as per the RMOW's Groundwater Resource Protection Plan requirements. The groundwater sources at Function Junction, Rainbow Park and the Village are monitored annually by a geotechnical & hydrogeological consultant (Piteau Associates).

The background and objectives for each of the locations is summarized below:

Function Junction

The RMOWs Groundwater Resource Protection Plan requires annual analysis of groundwater from W212-1, W217, and monitoring wells (MW) throughout Function Junction, for potable water quality parameters and Potential Contaminants of Concern (PCOCs).

The operating permit for W217 requires implementation of a Long Term Monitoring Plan that includes monitoring of water quality at W217 and MW09-1, and water levels throughout Function Junction to further validate the interpreted extent of the well capture zone.

During 2012, monitoring well MW06-2S was irreparably damaged and decommissioned and replaced in July 2013 with MW13-1.

Rainbow Park (21 Mile Aquifer Wells)

A groundwater and surface water monitoring program has been underway to quantify the response of the aquifer and surface water to groundwater extraction by well W218. This has involved continuous monitoring of turbidity, temperature, and pumping rate at W218 (via RMOW's SCADA system), and continuous monitoring of water level and temperature at a nearby test well (TW-1), a shallow monitoring well (MW-1) and a surface water station (SW-1).

During 2013, extra water level monitoring was carried out at MW-1, SW-1 and TW-1 after new production well W219 was installed.

Whistler Village

W205-1, W205-2, W205-3, and W211 located in the day skier parking lots off Blackcomb Way are screened in channel fill sediments deposited by Fitzsimmons Creek. The capacity of this aquifer is limited by a near constant rate of recharge from the creek. A data logger installed at TW04-2 has been continuously recording water levels since June 2004.

4 <u>Results</u>

4.1 Microbiological Parameters

- Of 468 E-coli samples taken bi-weekly from within the water distribution system (potable water), none tested positive for the bacteria (1CFU\100ml)
- Of 468 total coliforms samples taken bi-weekly from within the water distribution system (potable water), two samples tested positive for total coliforms but results were less than 10CFU\100mL and so not classed as failures as per Section 3.3.1 (Microbiological Parameters)
- The results above indicate that the RMOW disinfection systems are working and are effectively designed, operated and maintained to achieve the required level of water quality
- Quarterly testing detected no heterotrophic plate counts (HPC) in excess of the RMOW objective of <200 colonies per mL, a significantly lower limit that the GCDWQ standard of <500 colonies per mL

4.2 Physical Parameters

рΗ

Of the 819 pH samples taken, the majority were within the recommended range of 6.5–8.5. 193 samples (24%) were found to be outside of the desired range, the minimum value was 6.0 and the maximum value recorded was 8.82. As pH itself does not usually represent any hazard to human health, the few times the water samples have been outside of the desired range are considered to be acceptable.

Temperature

The temperature of the water within the water distribution system consistently met the GCDWQ aesthetic objective of 15°C or less. Of 814 total temperature samples, only four samples exceeded 15°C, with the highest temperature recorded at 15.7 °C.

Turbidity

 The current GCDWQ states that the Guideline for Treated Water is < 1.0 NTU at all times, this guideline is for a filtration systems, there is currently no filtration in the RMOW Distribution Systems, and as such the RMOW permit allows a Turbidity NTU requirement of < 1 in source water and < 5 within the distribution system based on the following excerpt from the GCDWQ (1996):

"Certain water supplies, such as groundwater, may contain non-organic based turbidity, which may not seriously hinder disinfection. Therefore, a less stringent value for turbidity in water entering a distribution system may be permitted if it is demonstrated that the system has a history of acceptable microbiological quality and that a higher turbidity value will not compromise disinfection."

- 820 turbidity bi-weekly samples were taken (329 samples from source water sampling stations; 491 from distribution sample sites). All results from the distribution samples indicated a turbidity of less than the 5 NTU guideline for water in the distribution system.
- 17 samples from the intake/well samples indicated a turbidity of >1NTU. RMOW surface water intakes (21-Mile Creek and Blackcomb Creek) are programmed to automatically shut down when turbidity values exceed 1NTU.
- Alpine ground water wells W210 and W213 often display high turbidity upon startup; turbidity generally drops below 1NTU after +/-20 minutes of runtime. This start up turbidity has had no effect on disinfection outcomes.

тос

Quarterly testing detected only one total organic carbon result in excess of the RMOW objective of <2.5mg\L. It is noted that the GCDWQ does not discuss TOC nor does it establish a maximum acceptable concentration (MAC) for TOC levels in drinking water. Total organic carbon in the water does not itself represent a hazard to human health, however large quantities of TOC can contribute to an increase in disinfection byproducts of epidemiological interest, including trihalomethane (THM). As indicated in section 4.3, there were no exceedances in the THM or HAA results from the quarterly samples.

4.3 Chemical Parameters

Free Chlorine

- There is no GCDWQ level set for chlorine due to the low toxicity at concentrations found in drinking water. The RMOW has set a desired residual chlorine level objective of between 0.2mg\L – 0.6mg\L throughout the water distribution system.
- Testing results from several of the sample stations show residual chlorine levels below the desired lower limit of 0.2mg\L. This is due to a number of factors including, off-season/occupancy, fire storage vs. domestic demand (turnover), source water quality, area build-out/number of residences being serviced, dead-end watermains, etc. As demonstrated by the lack of total and fecal coliform exceedances (section 4.1) within the water distribution system, our disinfection procedures and practices appear to be effectively destroying the bacteria.
- Testing also identified instances when residual chlorine levels were above the desired upper limit of 0.6mg\L. Generally this is a result of the higher chlorine injection levels required to provide adequate levels of residual chlorine at the extremities of the system. The Guidelines for Canadian Drinking Water Quality (GCDWQ) do not identify a maximum acceptable concentration (MAC) for residual chlorine levels in drinking water.

Polycyclic Aromatic Hydrocarbons (PAHs)

• Quarterly testing detected no PAH results in excess of the guidelines.

Disinfection Bi-Products

• Quarterly testing detected no trihalomethane (THM) or Haloacetic Acid (HAA) results in excess of the GCDWQ interim maximum acceptable concentration of 100 ug/L.

Total Iron

- Quarterly testing for Total Iron was completed at several sampling stations; results are shown in Appendix B.
- Seven out of thirty-six samples taken had results greater than the aesthetic objective of 300 ug/L, five were from Alpine Meadows and two from W212 at Function Junction.
- As this is an aesthetic objective, the high results are not a public health concern, with higher levels of Iron affecting taste and staining of plumbing fixtures.
- The RMOW continues to monitor results for Alpine Meadows and Function Junction.

Total Manganese

- Quarterly testing for Total Manganese was completed at the Function Junction Wells W212-1 and W212-2, results were above the Aesthetic Objective levels of 50 ug\L.
- Well W212-2 was off line for all of 2013 due to the high levels, results for W212-1 are slightly above the aesthetic objective and the well remains online as these are not considered a risk to public health, high manganese levels results affect taste and cause staining of plumbing fixtures.
- The RMOW continues to monitor results for Total Manganese in these wells.

Additional testing - Total Carbon dioxide

- Total carbon dioxide was tested over a six month period at W217 (Cheakamus Crossing) as part of an evaluation on the corrosive potential of the water. High carbon dioxide levels can cause the water to be more acidic. Acidity affects taste and can cause staining of plumbing fixtures.
- There is no GCDWQ standard set for Total Carbon dioxide but surface water generally contains around 10 mg/L of carbon dioxide.
- Results from W217 ranged from 9 mg/L to 23 mg/L.

Refer to Appendix B for the bi-weekly, quarterly, annual and additional 2013 water quality test results.

4.4 Source Water Protection Plan

In 2013, a project was set up to commission an external party to implement a Source Water Resource Protection Plan. The request for proposal was submitted and the commission will start during 2014.

4.5 Groundwater Resource Protection Plan

In 2013, the RMOW was incompliance with the Groundwater Resource Protection Plan and continued to review and update the plan framework items. The groundwater supplies were monitored using Piteau Associates geotechnical & hydrogeological consultants, the results from the 2013 Groundwater Resource Monitoring Update (April 14, 2014) are summarized below:

4.5.1 Groundwater Monitoring Program

Function Junction

Ground water and surface water elevations at TW06-02 are generally lowest in September and rise during the fall, water temperatures remained stable within a 2.5°C seasonal range. W217 water temperatures are slightly higher and have a smaller fluctuation range.

W217 was operated at an average weekly groundwater pumping rate of between 5.5 and 12.7 L/s during 2013 with an overall average rate of 8.4L/s. Average flows in previous years were 8.8 and 7.4 L/s in 2011 and 2012 respectively.

Turbidity has been consistently less that the CDWQ guideline of 1 NTU.

Groundwater samples analyzed indicate that with the exception of pH, iron and manganese, concentrations of all chemical and physical parameters analyzed have remained within GCDWQ guidelines. The pH values are lower than the recommended range and iron and manganese exceed the aesthetic objectives. These non-compliances are not suspected to be due to human impact on the environment.

With the exception of toluene, all hydrocarbon concentrations in sample collected were below laboratory detection limits, concentrations of toluene were less than 2% of the maximum allowable concentration for drinking water. This trace of toluene has not been identified and the RMOW will continue with semi-annual monitoring.

Rainbow Park (21 Mile Aquifer Wells)

Monthly average groundwater pumping rates during 2013 ranged between 12 and 52 L/s, averaging 27 L/s. Average annual groundwater pumping rates in 2010, 2011 and 2012 were 44, 40 and 28 L/s respectively.

Turbidity has been consistently less that the CDWQ guideline of 1 NTU, with only 5 out of 8,760 samples having readings of above 1 NTU, these were isolated anomalies and attributed to fine particulates dislodging from aquifer sediments, or incorrect readings and did not raise any suspicion of the groundwater to be under direct influence of surface water.

Water levels at the test well TW-1 fluctuate over a seasonal range of about 1.5m, with the highest levels in the spring and the lowest levels in the fall. During 2013, water levels remained stable within the seasonal range indicating that there is sufficient recharge to the aquifer to meet the current demand.

Water levels measured at the shallow monitoring well (MW-1) have dropped 0.5m since 2009 due to reduced surface water flows during drier years.

Groundwater temperature at W218 ranged between 5°C and 10°C; temperatures at TW-1 and MW-1 averaged 5°C and 6°C respectively - a slight cooling trend is apparent (-0.2-0.3°C/year). SW-1 temperatures fluctuate between 2°C in winter and 12°C in summer and do not exhibit a cooling trend as with TW-1 and MW-1.

Whistler Village

For 2010 and prior, water levels in TW04-02 repeatedly dropped by about 3m to 4m between the spring and fall. In 2011, 2012 and 2013 the water level dropped by 2m. The difference is a result of changes in operational procedures targeted at reducing the overall amount of groundwater extracted from this aquifer.

5 <u>Performance</u>

5.1 Complaints

During 2013, 23 water quality complaints were received. The complaints are detailed in Table 11 below. After the initial response to the complaint, the RMOW follows up by completing maintenance work or engineering reviews and implementing capital upgrades if required.

Table 11 – 2013 Water Quality Complaints

Log ID	Date	Water Quality	Corrective Action Taken
		Complaint	
WS13- 000265	31-Jan-13	Dirty water	Hydrant 8111 had a turbidity result of >25NTU. Hydrant flushed.
WS13- 000428	7-Mar-13	Dirty water	Low flow flushing was being carried out at Buckhorn and Drifter Way. No follow up required.
WS13- 000829	24-Apr-13	Low CL2 residual	Chlorine set points raised at R233 and P280 and monitored to ensure the chlorine residual increased to within spec.
WS13- 000867	2-May-13	Low pressure	Completed No issues with distribution system - issue could be with homeowner's PRV
WS13- 000871	30-Apr-13	Dirty water	Flushing carried out in Emerald due to five dirty water complaints
WS13- 000976	30-May- 13	Taste	Surrounding sites and the residence were tested for pH, temp, Cl2 residual, and turbidity. All results where normal other than turbidity from the unit itself whish were high at 13.2 NTU.
WS13- 000977	30-May- 13	Blocked filter	Water tested at site but no anomalies found. Turbidity 0.12 NTU.
WS13- 000982	4-Jun-13	Dirty water	Most likely caused by a contractor that has been working in the area putting in a new water main section for a private building lot. They have been using a private fire hydrant and turning valves for the installation. Customer has been informed and instructed to run his water till clear. No other complaints have come from this area.
WS13- 000983	4-Jun-13	Taste	Chlorine residuals 0.33. Tastes of manganese not chlorine. 21 mile is down at the moment and they are on W212 water which has some manganese, explained that is an aesthetic objective and not a health concern.
WS13- 001170	29-Jul-13	Dirty water	Limited to the piping in the complex and not a distribution system issue
WS13- 001218	12-Aug-13	Dirty water	Dead end was flushed, first flush was dirty but then dropped to a turbidity of 1.18 NTU
WS13- 001420	17-Sep-13	Dirty water	Crews working in the area to isolate a section of water main for a service repair. Customer told to flush her cold water for 15 - 20 minutes to clear out the turbid water.
WS13- 001425	17-Sep-13	Low pressure	UDF is going on in the area and caused this low pressure
WS13- 001730	12-Dec-13	Dirty water	Leak detection program going on in the area may have caused this minor disruption. No other calls from the area, no further follow up.

WS13- 001731	13-Dec-13	Low pressure	Problem with water meter, Turbo Plumbing called for further troubleshooting/repairs
WS13- 001732	13-Dec-13	Blue staining	Provided results of copper, manganese, and pH analysis data at well and distribution sampling sites from WaterTrax, and did some further testing from clients samples
WS13- 001738	13-Dec-13	Dirty water	Zone boundaries were changed at 7:30 in morning to isolate a break at Mons. This resulted in increased velocity through the mains causing in the dirty water
WS13- 001739	13-Dec-13	Dirty water	Zone boundaries were changed at 7:30 in morning to isolate a break at Mons. This resulted in increased velocity through the mains causing in the dirty water
WS13- 001741	13-Dec-13	Taste	The chlorine residuals at this address were 0.47mg/L and 0.51mg/L at approx. 10:30am on Sept. 25 2013, within spec, no follow up required.

5.2 **Operational Incidents**

During 2013, the RMOW recorded three one main leak and three emergency service connection leaks. The response time for leaks is one hour and Utilities staff work to quickly make the necessary repairs and restore the water service.

Log ID	Date	Type of Operational Problem	Corrective Action Taken
WS13-000839	20-Mar-13	Main Leak	Excavated and repaired w/repair clamp -Removed 3/4" direct tap corp stop and installed new saddle and corp stop
WS13-000835	11-Apr-13	Service repair - emergency	Excavated to expose 3/4" service, finished excavation with backhoe. Installed new curb stop and pigtail to empty lot (6821) and backfilled
WS13-001182	8-Aug-13	Service repair - emergency	Excavated and repaired 3/4" copper line with approx. 1 meter of poly pipe and 2 compression fittings and backfilled
WS13-001752	16-Dec-13	Service repair - emergency	The 2" water service that feeds the washrooms at the park. Shut off the service and the leak stopped. Repaired.
WS13-000040	17-Dec-12	Service repair - scheduled	Water daigle was not fully opened. Opened it up & stopped leakage
WS13-000267	9-Apr-13	Service repair - scheduled	Repaired daigle
WS13-001346	23-Aug-13	Service repair - scheduled	Locate and repair Daigles
WS13-001358	8-Aug-13	Service repair - scheduled	potable water standpipe at Nesters sani station, Replaced inner flex hose
WS13-001367	25-Jul-13	Service repair - scheduled	Improved cover over exposed water main - Removed headwall and re-bed water main with 3"- to prevent erosion - Roads will repair headwall
WS14-000032	17-Dec-13	Service repair - scheduled	Repaired
WS13-000738	15-Feb-13	Well head leak	Excavated around well head to locate and determine cause of break, repaired
WS13-001223	2-Aug-13	Hydrant Leak	Repaired leak

Table 12 – 2013 Operational Incidents

6 **Operations**

6.1 Capital Improvements

Each year the RMOW budgets for new capital investments and capital repairs or replacements. Table 13 details the improvements made to the water supply and distribution systems during 2013:

Table 13–2013 Capital Improvements

Additions/Changes	Details
Water main replacement	Abandoned old Alpha Creek Water Works main along Cheakamus Way in Bayshores/Millars Pond neighbourhood, and tied in newer parallel main at key locations. This was done to improve water quality in the service area, and eliminate the need to perform repairs of leaks that had become a frequent occurrence on the old ACWW main
WWTP Additions	Constructed a duplex pressure reducing valve, backflow preventer, and metering installation at the water service entrance to the Waste Water Treatment Plant site. This was done to: a. Protect the greater municipal water distribution system from the possibility of contamination from WWTP systems
	b. Reduce the water supply operating pressure at the plant to a more manageable level, in order to decrease the chance of a piping system failure within the site. There has been at least two instances of piping failures within the plant causing significant damage
	c. More accurately monitor WWTP water consumption and improve leak detection abilities
PAX mixing device installation	Install PAX mixing devices in three reservoirs in order to improve water quality by ensuring in- reservoir stratification is eliminated and chlorine residuals are more evenly distributed. These reservoir sites are:
	a. R238 – Emerald Estates reservoir
	b. R226 – Mountain View reservoir
	c. R235 – Taluswood I reservoir
Inspection	Perform video inspection, leak detection and water main location at two sites:
	a. Cheakamus Lake Road water main from Interpretive Forest parking lot area to Cheakamus River bridge to confirm integrity of main due to inability of contractor to perform a successful pressure test on this section after original construction
	b. Base II water main from the area near the Excalibur Gondola mid-station to the branch at the W/BC employee housing complex. This was done to confirm water main location in order to plan realignment of this section of main away from the gondola load/down-load facility Several water main leaks in recent years in this area have caused service disruptions in the area; and highlighted the risk of the possibility that a major leak on the prematurely deteriorating main could cause significant disruption to the gondola operation

6.2 Quarterly Vibration Survey

A vibration analysis survey was conducted quarterly by Wallace Technical Ltd. for all Utilities nonsubmersible pumps. No major problems were found. The minor concerns raised by the survey were addressed.

6.3 Unidirectional Flushing Program (UDF)

Flushing is one of the most effective tools available to maintain and improve water quality. The RMOW has implemented a Unidirectional Flushing Program which is a procedure that removes more sediment, mineral and biological deposits in the water distribution lines than traditional flushing methods.

This annual flushing program begins in May each year and all subdivisions are completed by the end of September.

The total length of pipes flushed was 133.74 km out of a total of 168.8 km of water mains, representing 79% of the total RMOW water distribution system. Several pipe lines are not flushed because they meet minimum flushing velocity several times a year and are considered self-cleaning. Some other small sections of pipes do not have the necessary connections/equipment to be flushed.

In past years, the Alpine area of Whistler had logged several water quality complaints regarding turbidity issues, for this reason the RMOW has implemented an extra round of flushing in the Alpine section each year to ensure the quality of the water.

6.4 <u>Hydrant Servicing</u>

In 2013, 529 RMOW hydrants were fully serviced and checked for operation. Three hydrants failed during inspections and were repaired. This is an annual program which was subcontracted to "Fraser Valley Hydrant Services" and was completed by the end of October.

6.5 Asset Management System

An Asset Management system was implemented in 2007. It is comprised of an "Asset Manager" tool, which is used to catalog and document all of the water system assets within the municipality, and a "Service Manager" tool which is used to create repair/emergency service work orders and keep track of all the work done to water system. This asset management system has improved the efficiency of the RMOW's maintenance and operation of the water system.

Approximately 50% of all maintainable assets have asset manager tasks scheduled in the system – the remaining assets are scheduled manually. The RMOW has a plan to make some improvements to the system during 2013-2014.

6.6 GPS Location Program

The Utilities department initiated a GPS location program in the spring of 2007 and continued with it through 2013. RMOW staff continued to determine the GPS location of various elements of the water distribution infrastructure. The GPS data will subsequently be used to improve our GIS and record drawing information, enabling us to better locate any asset, even when it is buried, reduce our response and work completion times, and thereby improve the overall quality of our service delivery.

6.7 <u>Reservoir Inspection</u>

The RMOW contracts out for reservoir inspection, cleaning and repair and currently uses the services of Phoenix Marine Services Inc. This company uses divers and cameras to clean and inspect reservoirs, contact tanks and water wells so that they do not have to be drained therefore fire protection is maintained during cleaning.

In 2013, the P279 pump station at Cheakamus Crossing had its contact tank and water well inspected, and the reservoirs R235 (Taluswood Reservoir), R237 (Mountain View Drive Reservoir) and R238 (Emerald Estates Reservoir) were cleaned by divers.

During the 2012 Olympic Reservoir inspection, it was found that areas of the internal wall indicated signs of spalling (flaking and pitting). OPUS DaytonKnight Consultants Ltd carried out a detailed investigation in 2013 and recommendations in their 2013 Olympic Reservoir Condition Assessment Report included replacement of the Reservoir.

The RMOW is currently researching options for a new reservoir location.

7 Emergency Response Plan

The RMOW has a Water System Emergency Response Plan (ERP) which details the required procedures during a water emergency situation. Included in the ERP are the roles and responsibilities of RMOW staff, supervisors, managers and the Drinking Water Officer; a basic action plan for an emergency situation; the public notification advisory notices and an emergency contact list.

The Water Emergency Response Plan will be updated for 2014 to ensure current procedural and contact information. The document is supplied to Utilities Staff and quality personnel who will be required to act in the case of a water emergency.

If contamination enters the water supply, or is suspected to have entered the water supply, and poses a possible significant threat to public health, the manager must immediately notify the Drinking Water Officer and the public to take the appropriate action.

If there is a suspicion of a potential modest threat, the Drinking Water Officer will advise on the appropriate public notification advisory to be issued.

7.1 Public Notification

In different emergency situations the operators actions may vary however the managers' response will be similar. For example, public notification of a Boil Water Advisory will be the same whether the cause is flooding of a well, a significant backflow incident, or reservoir contamination. In some cases, boiling the water may render it safe; in other cases, the public may be advised not to drink the water at all. Some events may not constitute a health threat but will require that the public restrict their water use to essential uses only. The water advisory notices and when they are used is discussed below.

The Drinking Water Officer is contacted and consulted regardless of the type of emergency affecting the water system and can provide valuable advice and assistance, to help staff with monitoring water quality. The DWO also has authority to order persons to take action to protect the water quality or prevent them from doing anything that causes a threat to the water quality. Risk assessment and management decisions should be facilitated in a collaborative approach between the RMOW and the Drinking Water Officer/Environmental Health Officer.

NOTE: These are guidelines only. The Drinking Water Officer has authority to instruct staff to undertake actions at variance with the guidelines below where necessary.

7.1.1 Boil Water Advisory

Used in situations in which the public health threat posed by the water supply system is significant and the nature of the threat is one that can be effectively addressed through boiling the water.

If the water supply is suspected to be contaminated with micro-organisms pathogenic to humans, or volatile chemicals which may be safely evaporated, the manager shall notify or consult with the Drinking Water Officer, and issue a Boil Water Advisory. Contamination by micro-organisms may be caused by high turbidity, a water main break, backflow, contamination of a reservoir, flooding of a well, or any event which allows untreated surface water or sewage to enter the distribution system, including deliberate application of a biological substance.

Water contaminated by microbiological contaminants can be made safe by boiling for at least two minutes at a rolling boil. Water that must be boiled before drinking may be used for laundry, and for bathing or showering if the water is not swallowed. However, it should not be used for cooking, washing foods that will be eaten raw or brushing teeth without first being boiled.

Precautionary Boil Water Advisories are issued routinely to buildings affected by any water system maintenance work which has the potential to contaminate the water.

Community wide or system level Boil Water notices issued by the RMOW in 2013: NONE

7.1.2 Do Not Drink Water Advisory

Used in situations in which the public health threat posed by ingestion of drinking water provided by the distribution water supply system is significant, and the nature of the threat is one that cannot be effectively addressed through boiling of the water. The manager should notify the Drinking Water Officer, and issue a Do Not Drink Water Advisory.

Residents are instructed not to drink water or use it for cooking, washing food, brushing teeth or bathing. In this situation bottled/trucked water is provided to residents.

Do Not Drink Water Advisories issued by the RMOW in 2013: NONE

7.1.3 Do Not Use Water Advisory

Used in situations where a significant public health threat exists in relation to the water supply system and the threat cannot be adequately addressed through a Do Not Drink Advisory or Boil Water Advisory. The manager should notify the Drinking Water Officer, and issue a Do Not Use Water Advisory to notify the public to avoid drinking the water or using it for domestic purposes.

In this situation bottled/trucked water is provided to residents by the RMOW.

If the contaminant is unknown or is confirmed or suspected to be a toxic chemical or mineral, boiling may have the effect of concentrating these substances rather than rendering the water safe. The water should

not be used for drinking, cooking, washing food, or tooth brushing. Chemical contaminants may have various negative health effects including skin irritation or respiratory problems, so the public will be advised not to use this water.

Disposal of such contaminated water in storm or wastewater sewers could have negative impacts on the environment and waste water treatment process. Instructions for the correct disposal of such water will be given in the event of any incident which causes the issuing of a Do Not Use Water Advisory.

Chemical contaminants may enter the water system via backflow; flooding; improper application of compounds during construction, maintenance, or repair; or a spill near a well or surface intake. Deliberate application of chemicals in a reservoir or to the distribution system must also be considered a potential threat.

Do Not Use Water Advisories issued by the RMOW in 2013: NONE

7.1.4 Water Use Restriction Order

In some emergencies there is no threat to drinking water quality; however, circumstances may dictate that water use be restricted until reservoirs can be refilled and the system is once again able to operate at normal capacity. The General Manager has authority to issue a Water Use Restriction Order.

Water use restrictions may be necessary if a water source or reservoir must be isolated for cleaning or maintenance, a pump or water source has failed, or demands are being placed on the system that exceed its capacity (for example, firefighting).

7.1.5 Public Premises Notice

Due to its unique nature as a resort municipality, the RMOW has numerous restaurants, hotels, and other public establishments. The locations of these public facilities are documented and as part of the Drinking Water Protection Regulation it is the responsibility of the owner of the public premises to notify the public if the water is not potable water either verbally or by posting a sign at every sink or drinking water fountain accessible to the public.

Therefore, public premises such as hotels, inns, restaurants, bars, convention centres and sports facilities must be made aware of situations that impact the water quality so that they can post signs and take appropriate action as required by regulations. The RMOW is responsible for putting signs up on public water fountains located within municipal owned public facilities.

7.2 Emergency Situations

The emergency situations discussed below are those that may require additional resources and response from the manager. The manager will consult with the supervisor and ensure that operators have the equipment, resources, and training to effectively respond to emergencies.

7.2.1 Spills or chemical / biological contamination

When Utility staff identify a contamination that may threaten drinking water quality:

- 1. Utility personnel immediately inform all supervisory personnel to GM level
- 2. Contact the Drinking Water Officer and Environmental Health Officer.
- 3. Contact Spill Reporting Centre as necessary
- 4. Issue a Do Not Drink Water Advisory for the affected part of the system. Arrange for trucked/bottled water if necessary
- 5. Activate the Emergency Operations Centre (EOC) if required
- 6. Isolate the contaminated zone area
- 7. Identify the contaminant and determine the level of contamination through water testing and sampling
- 8. If the spill enters or is near a fish-bearing stream, contact the Department of Fisheries and Oceans
- 9. If spill is near well, have monitoring wells installed to monitor contaminant plume and take action to mitigate impacts of spill on aquifer. Contact a hydro-geologist for assistance. Review well head protection plan.
- 10. Confirm water quality is acceptable to Drinking Water Officer before removing public notices

7.2.2 <u>E. coli Positive Response</u>

When a sample analyzed by the British Columbia Centre for Disease Control is tested positive for E. coli:

- 1. The municipality's water quality personnel and the Drinking Water Officer will be notified via an alert from the laboratory
- 2. Results of samples taken after the positive sample will be examined
- 3. Arrangements will be made for the immediate collection of repeat samples
- 4. The chlorine residual for the sample will be reviewed to determine if a localized loss of disinfectant residual has occurred
- 5. Utilities staff will determine if an interruption of source water disinfection had occurred in the period before the positive E.coli sample was taken
- 6. Utilities staff will determine if localized flushing and/or temporary increase in disinfectant residual dosage is warranted
- 7. Turbidity, pH, and temperature values for the affected sample will be reviewed to determine other possible factors which may have contributed to the event
- 8. The need for a boil water advisory will be evaluated and if deemed necessary the municipality will carry out various means to inform the public
- 9. The municipality will coordinate with the Drinking Water Officer on the extent of the boil water advisory

7.2.3 <u>Turbidity Response</u>

In general, turbidity is not a persistent problem in the RMOW's water supply although on occasion elevated levels can be experienced.

The Drinking Water Officer has set a Turbidity NTU guideline of < 1 in source water and < 5 within the distribution system.

The following actions will be taken regarding increased turbidity in distribution and source waters:-

- 1. During turbidity events of > 1 NTU at surface water sites, the intakes automatically shut down and alternative source waters are drawn on
- During turbidity events of > 1 NTU at groundwater sites, the chlorine residual for the high turbidity sample will be reviewed to determine if elevated turbidity has caused a localized loss of disinfectant residual; as well historical raw water microbiological and turbidity data for the groundwater source in question will be reviewed to determine if further action is warranted
- 3. The RMOW will take into consideration the effectiveness of increased chlorine dosage, chlorine contact time and the source of the turbidity in its response to minimizing the amount of turbidity entering the distribution system
- 4. During turbidity levels of > 5 NTU within the distribution system, the utilities staff will carry out an examination of other events that may have taken place to cause the increased turbidity, for example water main or service repairs, construction activity, unidirectional flushing program, etc. Further sampling for chlorine residual and/or microbiological activity will be conducted, to assist in determining the extent of the response required
- 5. During turbidity levels of >5 NTU within the distribution system, a public notification may be issued in consultations with the Drinking Water Officer
- 6. Two consecutive days of turbidity <1 NTU shall pass before lowering chlorine dosage to preevent levels

7.2.4 <u>Response to Interruption of Disinfection</u>

The RMOW's SCADA system constantly monitors chlorination and UV disinfection within the distribution system and automatically alerts personnel of any disinfection failures.

The following actions will be taken regarding interruption of disinfection within the distribution system:

- 1. Utility personnel immediately carry out any repairs to equipment and if necessary manual disinfection is established
- 2. Chlorine residual samples are taken at various points in the distribution system to ensure adequate free chlorine residual is present
- 3. In cases where chlorine residual level is <0.2 mg/mL or not present, utility crews will flush the affected area until an acceptable level is achieved
- 4. Monitoring will continue until disinfection is resumed and adequate levels have been reached in the distribution system

7.2.5 <u>Response to Water Main Breaks</u>

In the event of a reported water main break:

- 1. Staff inspect the area to determine the extent and scope of the break, the response time for leaks is one hour
- 2. The leak/break will be isolated to prevent any safety hazards and mitigate further property or infrastructure damage
- 3. If possible a small flow will be maintained to ensure a positive pressure is sustained in the water line, this prevents backflow or back siphoning which could allow contaminated water back into the main
- 4. The area affected by the leak/break will be assessed, repair requirements are determined and critical customers are notified (i.e. Health Clinic, businesses, residents etc.)
- 5. The need for an alternate water supply to critical customers or residents will be determined

- 6. Repairs are planned taking the following into consideration:
 - The excavation safety requirements and traffic safety plan
 - Equipment requirements
 - Operator labour requirements
 - Parts availability
- 7. Repairs are performed ensuring that the water contact surface of all replacement parts and adjacent existing piping are disinfected by spraying or swabbing with a strong chlorine solution
- 8. If any contamination is suspected, flushing and sampling is carried out and, if necessary, a water main disinfection procedure would be initiated.

7.2.6 Vandalism / Security Issues

Vandalism may occur and security concerns may be raised at any facility. When there are reports of vandalism to a structure or facilities or if deliberate contamination is suspected:

- 1. Contact the Facility
- 2. Contact RCMP
- 3. Contact the Utilities Manager and advise the Drinking Water Officer/Environmental Health Officer
- 4. When there is a threat to drinking water quality, issue Boil Water Advisory for suspected microbiological contamination or Do Not Drink the Water Advisory suspected chemical or unknown contamination
- 5. Ensure that staff is implementing appropriate measures for cleaning/ decontaminating facilities
- 6. Do not remove the public advisories until instructed by the Drinking Water Officer

NOTE: Notify the Drinking Water Officer or environmental health officer of any vandalism or deliberate acts of contamination to any part of the water system. The new Drinking Water Protection Act prohibits any person from introducing anything into a domestic water source, a well recharge zone, or an area adjacent to a drinking water source that will or is likely to result in a health hazard related to drinking water or destroying, damaging, or tampering with any part of a domestic water system if that would limit the use of the water system on the basis that there may be a risk of a health hazard.

7.2.7 <u>Floods</u>

Floods may affect water sources by depositing debris and silt in the water or by contaminating wells with surface water. In addition, facilities and equipment may be damaged or rendered inoperable by flood waters. Staff may not be able to gain access to some facilities due to high water.

In the event of a major flood:

- 1. Confirm with supervisor which facilities are functional and accessible
- 2. When the supervisor reports a well is flooded, assume it has been contaminated by untreated surface water and issue a Boil Water Advisory. If chemical storage or application occurred in the vicinity, issue a Do Not Drink Water Advisory.
- 3. When the supervisor reports damaged facilities and lack of water, issue a Water Restriction Notice
- 4. Once flood waters have receded, have affected facilities checked for structural integrity. Contact a structural engineer for assistance

- 5. Have water quality in affected wells tested and do not remove public notices until instructed by the drinking water officer
- 6. Consider flood proofing affected facilities and ensure wells are sealed and flood proofed
- 7. Contact Provincial Emergency Program to apply for funding

7.2.8 Forest Fires

During a forest fire reservoirs, pump stations or other facilities may be damaged or destroyed by fire. Increased demands may be placed on the system, disrupting normal operations. Chemicals used in fire suppression may enter water courses and the distribution system. The hydrology of a watershed changes after a forest fire, so source waters may become more turbid or coloured; streamflow may be altered, too.

In the event of a forest fire:

- 1. Contact the Fire Department and BC Forest Service
- 2. Contact staff and determine if any facilities are endangered
- 3. If possible, isolate threatened facilities and switch to backup sources to maintain system pressure and supply
- 4. If fire suppression activities occur, contact BC Forest Service and Fire Department to determine nature of suppressants used
- 5. If surface waters are affected by fire suppressants, issue a Do Not Drink the Water Advisory or apply appropriate treatment approved by the drinking water officer to render the water safe to drink
- 6. Once danger of fire has passed, have facilities checked and ensure that repairs are made.
- 7. Do not remove any public notices until instructed by the drinking water officer
- 8. Contact Provincial Emergency Program to apply for funding
- 9. If long-term impacts to surface waters occur, consider finding alternate sources or installing treatment

7.2.9 Earthquakes

Earthquakes can be particularly destructive to both above ground and underground infrastructure. Pipes and well casings can be bent, twisted, or sheared off completely. Reservoirs or storage tanks can be damaged by water sloshing back and forth or by weakening of their foundations or structure. Soils with high water content can liquefy and damage buildings and underground pipes; other types of soils tend to compact, causing similar damage. Unstable slopes may slide, sending debris into a water course or across an access road. Earthquakes often cause ruptured gas mains and fires, so increased demand can be placed on a water system that is under stress.

In the event of an earthquake:

- 1. Consult with supervisor to determine which facilities are accessible, which may be damaged, and whether water quality is affected
- 2. If necessary, issue public alerts and provide bottled/trucked water if possible
- 3. Contact a structural engineer for assistance in assessing significant damage to facilities
- 4. If surface sources are degraded by landslides, switch to alternate sources.
- 5. If wells are destroyed, switch to backup sources and investigate locations for new wells
- 6. Have damaged equipment and facilities replaced or repaired. Contact the Provincial Emergency Program for funding

8 Summary

Throughout 2013, the Resort Municipality of Whistler has continued to provide good quality potable water to its residents and visitors. This is reflected by the results achieved through the water sampling program.

The RMOW continues to employ best management practices in the operation and maintenance of the water distributions systems to maintain high water quality.

Appendix A

Water Consumption Reports

- 1. 2013 Annual Water Consumption report
- 2. 2013 Ground Water vs. Surface Water
- 3. 2013 Monthly Water Consumption Reports (January December)

2013 ANNUAL WAT	TER CONSUMPTI	ON REPORT	
Resort Mu	nicipality of Whistl	er	WHISTLER
Month	water Con		% Change
Month	2012 (m ³)	2015 (m ³)	% Change
	(m)	(m)	-20%
February	391 284	375 922	-2370
March	387 746	370.025	-5%
April	454 608	433 719	-5%
May	356.142	409.926	15%
June	542.575	440.513	-19%
July	512.739	689.137	34%
August	534.703	620.797	16%
September	576,355	532,246	-8%
October	312,427	321,795	3%
November	393,939	305,969	-22%
December	408,016	470,157	15%
Total Water Consumption	5,348,095	5,308,459	-1%
2013 Annual Water	Consumption	by Month	© 2012 © 2013



Resort M	unicipality of Whistler	JANUAR	Y 2013 WAT	ER CONSUM	PTION REPOR	£1	WHISTLER
		This	Year	Last	Year	% increase (decrease)
		This Month (cu.m.)	Year to Date (cu.m.)	This Month (cu.m.)	Year to Date (cu.m.)	This Month (cu.m.)	Year to Date (cu.m.)
RMOW Cor	nmunity W ater System (M inistry of Health	Facility # 1110299	16				
Surfae	ce Water Sources						
R-231	21-Mile Creek	218,471	218,471	278,608	278,608	-22%	-22%
R-232	Blackcomb Creek	0	0	31,277	31,277	-100%	-100%
R-222	Agnew Creek	0	0	0	0	%0	%0
	Sub-total Surface Water	218,471	218,471	309,885	309,885	-29%	-29%
Groun	id Water Sources						
W-202	Alpine South	8,388	8,388	22,883	22,883	-63%	-63%
W-210	Alpine South	17,021	17,021	12,701	12,701	34%	34%
W-213	Alpine - Meadow Park	14,446	14,446	10,678	10,678	35%	35%
W-218	21 Mile Well	29,630	29,630	48,429	48,429	-39%	-39%
W-205	-1,2,3 Community (Including W-211)	6,377	6,377	21,866	21,866	-71%	-71%
W-217	Cheakamus Crossing Well	17,683	17,683	7 100	18,611	-5%	-5%
W-212		2,895	2,895	7,460	7,460	-61%	-61%
717-M	-2 Function	D	0	0	Ð		
	Sub-total Ground Water	96,440	96,440	142,628	142,628	- <u>32</u> %	<u>-32</u> %
Sub-tc	otal Community Water System	314,911	314,911	452,513	452,513	-30%	-30%
RMOW Em	erald Estates Water System (Ministry of H	ealth Facility # 110	76)				
W-201	-1 Emerald	19,605	19,605	6,578	6,578	198%	198%
W-201	-2 Emerald	3,737	3,737	6,874	6,874	-46%	-46%
W-201	-3 Emerald	0	0	11,596	11,596	-100%	-100%
Sub-to	otal Emerald Water System	23,342	23,342	25,048	25,048	- 7 %	% <mark>-</mark> -
Total RMO	W Water System Consumption	338,253	338,253	477,561	477,561	-29%	-29%
	M onthly Water Consumption . Resort M unicipality of W h	January <mark>a</mark> L istler	ast Year his Year		Year to Date Water (Resort Munici	Consumption - January pality of Whistler	Last YearThis Year
600,000				600,000			
500.000		477,561		500,000	0		477,561
	51c/2c+				CIC		
c meters 400,000	314,911	m	38,253 38,253 3	300,000	314,911		338,253
cubi 200,000			capi	200,000			
100.000				100,000			
	25,048 23,34	~				25,048 23,342	
	Community Emerald	Tot		þ	Community	Emerald	Total

Resort Muni	cipality of Whistler	FEBRUAI	RY 2013 W/	ATER CONSUM	PTION REPO	RT	WHISTLER
		This	: Year	Last	Year	% increas	e (decrease)
		This Month (cu.m.)	Year to Date (cu.m.)	This Month (cu.m.)	Year to Date (cu.m.)	This Month (cu.m.)	Year to Date (cu.m.)
RMOW Commu	nity Water System (Ministry of Healt)	h Facility # 1110299	6				
Surface W	ater Sources						
R-231	21-Mile Creek	251,446	469,917	259,942	538,550	-3%	-13%
R-232	Blackcomb Creek	0	0	32,284	63,561	-100%	-100%
R-222	Agnew Creek	0	0	0	0	%0	%0
	Sub-total Surface Water	251,446	469,917	292,226	602,111	-14%	-22%
Ground W	ater Sources						
W-202	Alpine South	18,203	26,591	18,132	41,015	%0	-35%
W-210	Alpine South	14,300	31,321	8,000	20,701	%62	51%
W-213	Alpine - Meadow Park	9,930	24,376	6,834	17,512	45%	39%
W-218	21 Mile Well	36,482	66,112	17,547	65,976	108%	%0
W-205-1,2,	Community (Including W-211)	3,516	9,893 25 11 0	7,423	29,289 22 EOE	-53%	-66%
W-212-1	Cheakanus Crossing wen Function	1.378	33,440 4 273	3.321	10 781	-59%	-60%
W-212-2	Function	0	0	0	0	200	200
	Sub-total Ground Water	101,574	198,014	76,241	218,869	33%	% <mark>-10</mark> %
Suh-total (Community Water System	353.020	667.931	368.467	820.980	4%	-19%
		2				2	
RMOW Emeral	d Estates Water System (Ministry of I	<u>Health Facility # 110</u>	176)				
W-201-1	Emerald	22,823	42,428	5,470	12,048	317%	252%
W-201-2	Emerald	79	3,816	5,701	12,575	~66-	-70%
W-201-3	Emerald	0	0	11,646	23,242	-100%	-100%
Sub-total)	Emerald Water System	22,902	46,244	22,817	47,865	% 0	%ا
Total RM OW W	ater System Consumption	375,922	714,175	391,284	868,845	-4%	-18%
					_		
	M onthly Water Consumption Resort M unicipality of W	1 - February	ast Year his Year	Υ¢	ar to Date Water Co Resort Municipa	ısumption - Februar lity of Whistler	:y 🛛 Last Year This Year
450,000				1,000,000			
400,000	368,467_353,020	391,284	75,922	900,000 820,	980		868,845
350,000				800,000	667,931		714,175
metei 250,000				500,000			
 200,000				1 bic			
6 150,000				3 00,000			
50,000	22.817 22.90	02		200,000	+	2 865 46 944	
0				000,001			
	Community Emerald	d Tot		Col	nmu nity	Emerald	Total

							WHISIL
		This	Year	Last	Year	% increase	e (decrease)
		This Month (cu.m.)	Year to Date (cu.m.)	This Month (cu.m.)	Year to Date (cu.m.)	This Month (cu.m.)	Year to Date (cu.m.)
IOW Community Water System (Mi	 nistry of Health Facil	ity # 1110299)					
Surface Water Sources							
R-231 21-Mile Creek		208 007	677 924	215 132	753 682	-3%	-10%
R-232 Blackcomb Creek		0	0	40,495	104,056	-100%	-100%
R-222 Agnew Creek		0	0	0	0	%0	%0
Sub-total Surface	Water	208,007	677,924	255,627	857,738	-19%	-21%
Ground Water Sources							
W-202 Alpine South		40,062	66,653	16,680	57,695	140%	16%
W-210 Alpine South		456	31,777	7,446	28,147	-94%	13%
W-213 Alpine - Meadow Pa	urk	0	24,376	6,052	23,564	-100%	3%
W-218 21 Mile Well		52,593	118,705	35,707	101,683	47%	17%
W-205-1,2,3 Community (Includ	ling W-211)	16,201	26,094	16,084	45,373	1%	-42%
W-217 Cheakamus Crossi	ing Well	16,509	51,957	16,307	49,902	1%	4%
W-212-1 Function		13,508	17,781	12,389	23,170	9%	-23%
W-212-2 Function		0	0	0	0		
Sub-total Ground V	Water	139,329	337,343	110,665	329,534	2 6 %	2 %
Sub-total Community Water Syst	em	347,336	1,015,267	366,292	1,187,272	-5%	-14%
OW Emerald Estates Water System	n (Ministry of Health	Facility # 11076)					
W-201-1 Emerald		22,611	65,039	7,610	19,658	197%	231%
W-201-2 Emerald		78	3,894	8,098	20,673	%66-	-81%
W-201-3 Emerald		0	0	5,746	28,988	-100%	-100%
Sub-total Emerald Water System		22,689	68,933	21,454	69,319		- <mark>1</mark> %
al RM OW Water System Consumpt	ion	370,025	1,084,200	387,746	1,256,591	-5%	-14%
M onthly W at Resort M u	er Consumption - Ma ınicipality of Whistle	rth allowed and a second secon	t Year s Year	λ	ar to Date Water Co. Resort Municipal	nsumption - March ity of Whistler	Last YearThis Year
450,000				1,400,000			1.256.591
400,000 <u>366,292</u> 347,336		387.746),025	1,200,000	272		1,084,200
300,000			eters	1,000,000 800,000			
200,000			u bic m	600,000			
100,000			o	400,000			
50,000	21,454 22,689			200,000	59	, 319 68,933	

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		TIUM CTOZ		ION NELON		
	This	s Year	Last	Year	% increas	se (decrease)
	This Month (cu.m.)	Year to Date (cu.m.)	This Month (cu.m.)	Year to Date (cu.m.)	This Month (cu.m.)	Year to Dat (cu.m.)
OW Community Water System (Ministry of	Health Facility # 1110299					
Surface Water Sources						
R-231 21-Mile Creek	211.072	888.996	136.171	889.853	55%	%0
R-232 Blackcomb Creek	0	0	14,491	118,547	-100%	-100%
R-222 Agnew Creek	0	0	0	0	%0	%0
Sub-total Surface Water	211,072	888,996	150,662	1,008,400	40%	-12%
Ground Water Sources						
W-202 Alpine South	48,927	115,580	25,662	83,357	91%	39%
W-210 Alpine South	2,292	34,069	7,892	36,039	-71%	-5%
W-213 Alpine - Meadow Park	0	24,376	8,846	32,410	100%	-25%
W-218 21 Mile Well	71,715	190,420	124,266	225,949	-42%	-16%
W-205-1,2,3 Community (Including W-211	27,904	53,998	44,770	90,143	-38%	-40%
W-217 Cheakamus Crossing Well	18,758	70,715	21,769	71,671	100%	-1%
W-212-1 Function	22,122	39,903	44,340	67,510	-50%	-41%
W-212-2 Function	0	0	0	0		
Sub-total Ground Water	191,718	529,061	277,545	607,079	- <u>31</u> %	-13%
Sub-total Community Water System	402,790	1,418,057	428,207	1,615,479	-6%	-12%
OW Emerald Estates Water System (Minist	ry of Health Facility # 1107	0				
W-201-1 Emerald	30,153	95,192	12,720	32,378	137%	194%
W-201-2 Emerald	776	4,670	13,548	34,221	-94%	-86%
W-201-3 Emerald	0	0	133	29,121	-100%	-100%
Sub-total Emerald Water System	30,929	99,862	26,401	95,720	<u>17</u> %	4 %
al RM OW Water System Consumption	433,719	1,517,919	454,608	1,711,199	-5%	-11%
M onthly W ater Cons Resort M unicipalit	umption - April La y of W histler	ast Year his Year		rear to Date Water Co Resort Municipal	onsumption - April ity of Whistler	 Last Year This Year
500,000 450,000 428,207	454,608	33.719	1,800,000 1,600,000	,479		1,711,199
400,000 350,000 300,000			1,200,000	1,418,057		
250,000			800,000			
50,000	01 30,929		200,000	ř L	5,720 99,862	

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						WHIST
	This	s Year	Last	Year	% increase	(decrease)
	This Month (cu.m.)	Year to Date (cu.m.)	This Month (cu.m.)	Year to Date (cu.m.)	This Month (cu.m.)	Year to Date (cu.m.)
OW Community Water System (Ministry of	 Health Facility # 1110299	9				
Surface Water Sources						
R-231 21-Mile Creek	141,534	1,030,530	57,449	947,302		
R-232 Blackcomb Creek	0	0	0	118,547	%0	-100%
R-222 Agnew Creek	0	0	0	0	%0	%0
Sub-total Surface Water	141,534	1,030,530	57,449	1,065,849	146%	-3%
Ground Water Sources						
W-202 Alpine South	47,788	163,368	27,115	110,472	76%	48%
W-210 Alpine South	3,889	37,958	9,483	45,522	-59%	-17%
W-213 Alpine - Meadow Park	0	24,376	7,631	40,041	100%	-39%
W-218 21 Mile Well	95,682	286,102	111,688	337,637	-14%	-15%
W-205-1,2,3 Community (Including W-211)	36,925	90,923	58,100	148,243	-36%	-39%
W-217 Cheakamus Crossing Well	18,832	89,547	16,951	88,622	100%	1%
W-212-1 Function	36,511	76,414	45,704	113,214	-20%	-33%
W-212-2 Function	0	0	0	0		
Sub-total Ground Water	239,627	768,688	276,672	883,751	- <u>13</u> %	-13%
Sub-total Community Water System	381,161	1,799,218	334,121	1,949,600	14%	-8 %
OW Emerald Estates Water System (Minist	 :ry of Health Facility # 110	<u>076)</u>				
W-201-1 Emerald	28,659	123,851	10,781	43,159	166%	187%
W-201-2 Emerald	106	4,776	11,240	45,461	%66-	-89%
W-201-3 Emerald	0	0	0	29,121	%0	-100%
Sub-total Emerald Water System	28,765	128,627	22,021	117,741	<u>31</u> %	% <mark>-</mark>
al RMOW Water System Consumption	409,926	1,927,845	356,142	2,067,341	15%	%2-
M onthly W ater Consu Resort M unicipality	mption - May	ast Year his Year		ear to Date Water Co Resort Municipal	onsumption - May ity of Whistler	Last YearThis Year
450,000	4	109,926	2,500,000			
400,000 <u>334,121</u> 350,000 <u>334,121</u>	356,142		2,000,000	,600 1,799,218		,067,341
300,000			1,500,000			
100,000	1 28,765		500,000		7,741128,627	
			0			

		JUNE	2013 WATEF	CONSUMPT	ION REPORT		WHIST
		This	: Year	Last	Year	% increase	(decrease)
		This Month	Year to Date	This Month	Year to Date	This Month	Year to Date
		(cu.m.)	(cu.m.)	(cu.m.)	(cu.m.)	(cu.m.)	(cu.m.)
W Community Wat	er System (Ministry of Healt	h Facility # 111029	6				
Surface Water Sou	rces						,
R-231 21-Mil	e Creek	259,134	1,289,664	226,741	1,174,043	14%	10%
R-232 Blackc	omb Creek	0	0	0	118,547	%0	-100%
R-222 Agnew	Creek	0	0	0	0	0%	%0
Sub-to	tal Surface Water	259,134	1,289,664	226,741	1,292,590	14%	%0
Ground Water Sou	rces						
W-202 Alpine	South	48,923	212,291	33,350	143,822	47%	48%
W-210 Alpine	South	3,233	41,191	10,527	56,049	-69%	-27%
W-213 Alpine	- Meadow Park	373	24,749	8,383	48,424	100%	-49%
W-218 21 Mil	e Well	56,758	342,860	103,406	441,043	-45%	-22%
W-205-1,2,3 Comm	unity (Including W-211)	13,369	104,292	72,921	221,164	-82%	-53%
W-217 Cheak	amus Crossing Well	22,201	111,748	24,258	112,880	-8%	-1%
W-212-1 Functi	on	8,815	85,229	34,083	147,297	-74%	-42%
W-212-2 Functi	on	0	0	0	0		
Sub-to	tal Ground Water	153,672	922,360	286,928	1,170,679	-4 6 %	-21%
Sub-total Commun	ity Water System	412,806	2,212,024	513,669	2,463,269	-20%	-10%
W Emerald Estates	s Water System (Ministry of I	Health Facility # 110	176)				
W-201-1 Emera	Id	27,707	151,558	13,979	57,138	98%	165%
W-201-2 Emera	ld	0	4,776	14,927	60,388	-100%	-92%
W-201-3 Emera	ld	0	0	0	29,121	%0	-100%
Sub-total Emerald	W ater System	27,707	156,334	28,906	146,647	4 %	7 %
RM OW Water Sys	tem Consumption	440,513	2,368,358	542,575	2,609,916	-19%	%6-
_	Monthly Water Consumptio Resort Municipality of W	n - June EL	ast Year his Year		ear to Date WaterCo Resort Municipali	nsumption - June ity of Whistler	■ Last Year ■ This Year
00,000 5 13,66	0	542,575		3,000,000	020	0	,609,916
00,000	412,806	4	40,513	2,500,000	2,212,024		2 ,368,358
000,00			cubic meters	2,000,000			
00,000	28,906 27,77	20		500,000	14	6,647156,334	
0							

		This	Year	Last	Year	% increas	ie (decrease)
		This Month (cu.m.)	Year to Date (cu.m.)	This Month (cu.m.)	Year to Date (cu.m.)	This Month (cu.m.)	Year to Date (cu.m.)
IOW Communit	ty Water System (Ministry of Health	Facility # 1110299)					
Surface Wate	er Sources						
R-231	21-Mile Creek	348,414	1.638.078	250.742	1.424.785	39%	15%
R-232	Blackcomb Creek	0	0	0	118,547	%0	-100%
R-222	Agnew Creek	0	0	0	0	%0	%0
	Sub-total Surface Water	348,414	1,638,078	250,742	1,543,332	39%	6%
Ground Wate	st Sources						
W-202	Alpine South	48,904	261,195	27,307	171,129	%62	53%
W-210	Alpine South	21,479	62,670	13,878	69,927	55%	-10%
W-213	Alpine - Meadow Park	16,811	41,560	11,802	60,226	42%	-31%
W-218	21 Mile Well	121,066	463,926	78,130	519,173	55%	-11%
W-205-1,2,3	Community (Including W-211)	44,741	149,033	62,399	283,563	-28%	-47%
W-217	Cheakamus Crossing Well	37,494	149,242	22,533	135,413	66%	10%
W-212-1	Function	10,631	95,860	18,391	105,088	-42%	-4.2%
Z-21Z-M	Function	D	D	D	D		
	Sub-total Ground Water	301,126	1,223,486	234,440	1,405,119	28%	- <u>13</u> %
Sub-total Co	mmunity Water System	649,540	2,861,564	485,182	2,948,451	34%	-3%
I OW Emerald E	states Water System (Ministry of H	 ealth Facility # 11076					
W-201-1	Emerald	36,176	187,734	13,325	70,463	171%	166%
W-201-2	Emerald	3,421	8,197	14,232	74,620	-76%	-89%
W-201-3	Emerald	0	0	0	29,121	%0	-100%
Sub-total Em	ierald Water System	39,597	195,931	27,557	174,204	44 %	<u>12</u> %
tal RMOW Wate	er System Consumption	689,137	3,057,495	512,739	3,122,655	34%	-2%
-	M onthly W ater Consumptio Resort M unicipality of W I	n - July ELa	st Year is Year		fear to Date Water C Resort Municipal	onsumption - July ity of Whistler	Last YearThis Year
800,000		9	39.137	3,500,000	, ,		3,122,655057,495
700,000	649,540			3,000,000	,4 <u>3</u> ,861,564		
500,000 400,000 400,000	485,182	512,739		2,500,000 2,000,000 1,500,000			
200,000				1,000,000			
100,000	27,557 39,5	97		500,000	17	4,204195,931	
0	Community	I o + o H		0		i i i i i i i i i i i i i i i i i i i	

		This	Year	Last	Year	% increa	se (decrease)
		This Month (cu.m.)	Year to Date (cu.m.)	This Month (cu.m.)	Year to Date (cu.m.)	This Month (cu.m.)	Year to Date (cu.m.)
OW Commun	ity Water System (Ministry of Healt	h Facility # 1110299)					
Surface Wat	ter Sources						
R-231	21-Mile Creek	300.190	1.938.268	247.296	1.672.081	21%	16%
R-232	Blackcomb Creek	0	0	0	118,547	%0	-100%
R-222	Agnew Creek	0	0	0	0	%0	%0
	Sub-total Surface Water	300,190	1,938,268	247,296	1,790,628	21%	8%
Ground Wat	ter Sources						
W-202	Alpine South	41,270	302,465	23,904	195,033	73%	55%
W-210	Alpine South	12,508	75,178	14,675	84,602	-15%	-11%
W-213	Alpine - Meadow Park	10,670	52,230	11,143	71,369	-4%	-27%
W-218	21 Mile Well	129,082	593,008	137,306	656,479	-6%	-10%
W-205-1,2,3	Community (Including W-211)	61,188 20 005	210,221	37,035	320,598	65% 5%	-34%
W-212-1	Function	3.161	99.021	8.385	174.073	-62%	-43%
W-212-2	Function	0	0	0	0		
	Sub-total Ground Water	285,974	1,509,460	259,122	1,664,241	<u>10</u> %	% 6
Sub-total Co	ommunity Water System	586,164	3,447,728	506,418	3,454,869	16%	%0
OW Emerald	Estates Water System (Ministry of I	 Health Facility # 1107	0				
W-201-1	Emerald	19,309	207,043	13,682	84,145	41%	146%
W-201-2	Emerald	15,324	23,521	14,603	89,223	5%	-74%
W-201-3	Emerald	0	0	0	29,121	%0	-100%
Sub-total Er	merald Water System	34,633	230,564	28,285	202,489	22%	<u>14</u> %
al RM OW Wa	ter System Consumption	620,797	3,678,292	534,703	3,657,358	16%	1%
	M onthly W ater Consumptio Resort Municipality of W	n - August ∎La /histler ∎Th	st Year uis Year	Ā	sar to Date Water Co Resort Municipal	nsumption - August lity of Whistler	 Last Year This Year
700,000		62	20,797	4,000,000	860117 708		3,657,358678,292
600,000	586,164 506,418	534,703		3,500,000			
400,000			19190	2,500,000			
300,000			u piquo	2,000,000			
200,000				1,000,000			
100,000	28,285 34,	633		500,000	Ĭ	12,489230,564	
2	Community Emeral	d Total		Cor	nmunity	Emerald	Total

					1	
	This	s Year	Las	t Year	% increas	e (decrease)
	This Month (cu.m.)	Year to Date (cu.m.)	This Month (cu.m.)	Year to Date	This Month (cu.m.)	Year to Date (cu.m.)
OW Community Water System (Ministr	v of Health Facility # 1110290	16				
Curfoos Water Courses		1				
D 021 01 Mile Creek	046.074	0 185 040	385 750	0 057 833	360/	
R-232 Blackcomb Creek	0	4, 100, 14 0	0	118,547	%0	-100%
R-222 Agnew Creek	0	0	0	0	%0	%0
Sub-total Surface Water	246,974	2,185,242	385,752	2,176,380	-36%	%0
Ground Water Sources						
W-202 Alpine South	35,021	337,486	48,556	243,589	-28%	39%
W-210 Alpine South	13,793	88,971	9,218	93,820	50%	-5%
W-213 Alpine - Meadow Park	11,131	63,361	7,721	79,090	44%	-20%
W-218 21 Mile Well	106,772	699,780	54,517	710,996	96%	-2%
W-205-1,2,3 Community (Including W-	211) 43,342	253,563	19,085	339,683	127%	-25%
W-217 Cheakamus Crossing Wel	10,731	200,008	15,144	176 020	03%0 25200	270/
W-212-1 Function W-212-2 Function	0	0	0	0	0/000	0/ 10-
Sub-total Ground Water	250,469	1,759,929	157,007	1,821,248	% 09	- 3 %
Sub-total Community Water System	497,443	3,945,171	542,759	3,997,628	-8%	-1%
OW Emerald Estates Water System (M i	 nistry of Health Facility # 110	176)				
W-201-1 Emerald	24,196	231,239	16,241	100,386	49%	130%
W-201-2 Emerald	10,607	34,128	17,355	106,578	-39%	-68%
W-201-3 Emerald	0	0	0	29,121	%0	-100%
Sub-total Emerald Water System	34,803	265,367	33,596	236,085	4 %	<u>12</u> %
al RM OW Water System Consumption	532,246	4,210,538	576,355	4,233,713	-8%	-1%
Monthly Water Cons Resort Municip	umption - September	ast Year his Year	Yee	ar to Date Water Cons Resort Municipal	sumption - Septembo lity of Whistler	er Elast Year This Year
700,000	5.76.355		4,500,000 3,99 4,000,000	7,688945,171		4,233,743210,538
500,000 542,759 500,000 642,743 400,000		532,246	3,500,000 3,500,000 3,000,000			
300,000			cubic me 2,000,000 1,500,000 			
100,000	33,596 34,803		500,000	N L	36,085265,367	
			0			

		OCTOBE	R 2013 WA	TER CONSUM	PTION REPO	RT	WHISTLI
		This	: Year	Last	: Year	% increase	: (decrease)
		This Month	Year to Date	This Month	Year to Date	This Month	Year to Date
		(cu.m.)	(cu.m.)	(cu.m.)	(cu.m.)	(cu.m.)	(cu.m.)
OW Community	Water System (Ministry of Health	Facility # 1110299					
Surface Water	Sources						
R-231 2.	1-Mile Creek	135.819	2.321.061	139.399	2.197.232	-3%	6%
R-232 Bi	ackcomb Creek	0	0	0	118,547	%0	-100%
R-222 A _i	gnew Creek	0 -	0	0	0	%0	%0
Ó	ub-total Surface Water	135,819	2,321,061	139,399	2,315,779	-3%	%0
Ground Water	Sources						
W-202 A1	pine South	20,500	357,986	25,582	269,171	-20%	33%
W-210 Aì	pine South	9,077	98,048	7,623	101,443	19%	-3%
W-213 Ai	pine - Meadow Park	6,543	69,904	6,822	85,912	-4%	-19%
W-218 2.	l Mile Well	69,607	769,387	68,118	779,114	2%	-1%
W-205-1,2,3 C	ommunity (Including W-211)	15,914	269,477	12,225	351,908	30%	-23%
W-217 C.	heakamus Crossing Well	18,540	223,608	13,820	191,051	34%	17%
W-212-1 F1	unction	22,829	134,529	16,258	193,097	40%	-30%
W-212-2 F1	unction	0	0	0	0	%0	
Ø	ub-total Ground Water	163,010	1,922,939	150,448	1,971,696	8%	- <mark>-</mark> %
Sub-total Com	nunity Water System	298,829	4,244,000	289,847	4,287,475	3%	-1%
W Emerald Est	ates Water System (Ministry of He	alth Facility # 1107	76)				
W-201-1 E	nerald	22,162	253,401	10,913	111,299	103%	128%
W-201-2 Ei	merald	804	34,932	11,667	118,245	-93%	-70%
W-201-3 Ei	nerald	0	0	0	29,121	%0	-100%
Sub-total Emei	ald Water System	22,966	288,333	22,580	258,665	<mark>-</mark> 3%	11%
IRMOW Water	System Consumption	321,795	4,532,333	312,427	4,546,140	3%	%0
	M onthly W ater Consumption	• October	ast Year	Ye	ear to Date Water Co.	nsumption - October	Last Year
	Resort Municipality of Wh	istler	nis Year	i	Resort Municipal	ity of Whistler	This Year
50,000	<u>39,847</u> 298,829	312,427	21,795	5,000,000 4,500,000 4,287	,4745244,000	4	,546,140532,333
50,000				, 4, 000, 000 3,500, 000 2,500, 000			
50,000 00,000				cubic 1,500,000 1,000,000			
0,000,000	22,580 22,96			500,000	25	18,665288,333	
þ	Community Emerald	Tota		Co	mmunity	Emerald	Total

Resort Munic	cipality of Whistler	NOVEMB	ER 2013 W	ATER CONSUN	IPTION REPC)RT	WHISTLE
		This	s Year	Last	: Year	% increa	se (decrease)
		This Month (cu.m.)	Year to Date (cu.m.)	This Month (cu.m.)	Year to Date (cu.m.)	This Month (cu.m.)	Year to Date (cu.m.)
RM OW Commu	nity Water System (Ministry of Healt)	h Facility # 1110299	<u>e</u>				
Surface W	ater Sources						
R-231	21-Mile Creek	178,276	2,499,337	133,035	2,330,267	34%	
R-232	Blackcomb Creek	0	0	0	118,547	100%	-100%
R-222	Agnew Creek	0	0	0	0	%0	%0
	Sub-total Surface Water	178,276	2,499,337	133,035	2,448,814	34%	2%
Ground Wa	ter Sources						
W-202	Alpine South	21,357	379,343	30,832	300,003	-31%	26%
W-210	Alpine South	8,364	106,412	8,244	109,687	1%	-3%
W-213	Alpine - Meadow Park	4,143	74,047	6,808	92,720	-39%	-20%
W-218	21 Mile Well	37,728	807,115	110,490	889,604	-66%	%6-
W-205-1,2,5	3 Community (Including W-211)	11,751	281,228	15,775	367,683	100%	-24%
W-212-1	Cneakamus Crossing well Function	3 446	137 975	17,988	209,039	-02% -02%	42%
w-212-2	Function	0	0	0	0		1
	Sub-total Ground Water	105,679	2,028,618	233,768	2,205,464	- <mark>55</mark> %	% =
Sub-total C	ommunity Water System	283,955	4,527,955	366,803	4,654,278	-23%	-3%
RM OW Emerald	Estates Water System (Ministry of E	 Health Facility # 110	176)				
W-201-1	Emerald	21,943	275,344	13.091	124,390	68%	121%
W-201-2	Emerald	71	35,003	14,045	132,290	%66-	-74%
W-201-3	Emerald	0	0	0	29,121	%0	-100%
Sub-total E	merald Water System	22,014	310,347	27,136	285,801	- <mark>19</mark> %	% 6
Total RM OW W	ater System Consumption	305,969	4,838,302	393,939	4,940,079	-22%	-2%
	M onthly W ater Consumption · Resort M unicipality of W	- November IL histler	ast Year his Year	Yei	ar to Date Water Con Resort Municipal	sumption - Novemb lity of Whistler	er ELast Year This Year
450,000				6,000,000			
400,000	366,803	393,939		5.000.000	.268-0		4,940,049838,302
350,000	283,955		305,969	8 4,000,000	cc6/17c/+		
250,000				3,000,000			
cubic 200,000				cubic 2,000,000			
100,000				1,000,000		210 217	
0		14		0	Ń	29,801210,347	
	Community Emerald	d Tot		Co	mmunity	Emerald	Total

		SK 2013 WA	I EK CONSUN	IPTION REPO	RT	WHIST
	This	Year	Last	: Year	% increase	(decrease)
	This Month (cu.m.)	Year to Date (cu.m.)	This Month (cu.m.)	Year to Date (cu.m.)	This Month (cu.m.)	Year to Date (cu.m.)
W Community Water System (Ministry of F	 ealth Facility # 1110299	6				
Surface Water Sources						
R-231 21-Mile Creek	294,947	2,794,284	302,098	2.632.365	-2%	6%
R-232 Blackcomb Creek	0	0	2,927	121,474	-100%	-100%
R-222 Agnew Creek	0	0	0	0	%0	%0
Sub-total Surface Water	294,947	2,794,284	305,025	2,753,839	-3%	1%
Ground Water Sources						
W-202 Alpine South	8,338	387,681	23,300	323,303	-64%	20%
W-210 Alpine South	20,780	127,192	8,310	117,997	150%	8%
N-213 Alpine - Meadow Park	16,610	90,657	6,909	99,629	140%	-9%
W-218 21 Mile Well	49,572	856,687	23,379	912,983	112%	-6%
W-205-1,2,3 Community (Including W-211)	19,181	300,409	2,690	370,373	613%	-19%
W-217 Cheakamus Crossing Well	25,797	268,295	15,022	224,061	72%	20%
N-212-1 Function	5,703	143,678	65	236,793	8674%	-39%
W-212-2 Function	0	0	0	0		
Sub-total Ground Water	145,981	2,174,599	79,675	2,285,139	83%	-2%
Sub-total Community Water System	440,928	4,968,883	384,700	5,038,978	15%	-1%
W Emerald Estates Water System (Ministr	of Health Facility # 110	176)				
V-201-1 Emerald	28,670	304,014	11,227	135,617	155%	124%
V-201-2 Emerald	559	35,562	12,089	144,379	-95%	-75%
V-201-3 Emerald	0	0	0	29,121	%0	-100%
Sub-total Emerald Water System	29,229	339,576	23,316	309,117	25%	10%
RMOW Water System Consumption	470,157	5,308,459	408,016	5,348,095	15%	-1%
M onthly W ater Consump Resort M unicipality.	ion - December IL of Whistler	ast Year his Year	Ye	ar to Date Water Con Resort Municipal	sumption - December ity of Whistler	Last YearThis Year
000'00	4	70,157	6,000,000			
50,000 440,928 00,000 <u>384,700</u>	408,016		5,000,000	3, 9748968, 883	ŵ.	348,095308,459
		meters	4,000,000			
000'00		cubic	2,000,000			
0,000 23,316	29,229		1,000,000	30	9,117339,576	

Appendix B

Water Quality Results

- 1. 2013 Weekly Sample Station Results
- 2. 2013 Quarterly Sample Station Results
- 3. 2013 Annual Water Testing
- 4. 2013 Additional Testing Results

elinbodra Crhodula 2012		Water	Gualit	Hu Hu	20 20		- 440	Tempe	tatura (°C)	רוווים		*Tur	hidity (NTU)			Eree C	, lms/ml			*Total C	oliforms	/ INDIVI -	100ml \		ت *	oli (MP	M/100m	=	
			(Guide	eline ph	6.5-8.5)			A A	= <15°C		Guide	line ⊲1	NTU (Source);	<5 NTU		uideline	0.2-0.6 m	g/mL		MA	C <10 cot	unts/100			MAC	= 0 coun	ts/100n	님님	ï
SAMPLESITE	Source	Samples	s Max	Min	vg. Fai	II % Fail	Samples	s Max N	Vin Avg. F	iil % Fai	Sample	s Max	Min Avg. Fa	ail % Fail	Samples	Max M	in Avg.	Fail % F	ail Samp	bles Ma	k Min	Avg. Fa	ail % F	ail Sam	iples Ma	Min	Avg. Fa	ail %F	u
W201-1: 9225 Highway 99	Well	22	6.82	6.16 6	54 9	41%	22	11.70 6	20 8.51	%0 (22	0.70	0.05 0.17 (%О С					22	0	0	0	6	% 2	1	0	0	8	or s
W201-2: 9225 Highway 99	Well	22	8.82	6.48 6	:90 2	%6	22	12.80 5	.70 8.16 (%0 (22	3.83	0.14 0.49	1 5%					21	0	0	0	0	% 2	1	0	0	8	s (†) (
W201-3: 9225 Highway 99	Well	21	7.09	6.14 6	5.86 1	5%	21	11.40 4	.90 7.23	8	21	0.66	0.12 0.27 (%0				+	2(-	0	0.05 (0	2	0	0	0	8	tion tion
W212-1: 1005 Lynham Rd. W212-2: 1005 Lynham Bd	Well	22	6.31	0ffline	0.16 22	100%	22	10.70	.80 8.68 F	8	53	1.12	0.04 0.26 .	1 4%				-	z :		0	0	6	2	-	0	0	8	Sec Sec
W 217-Cheak Crsne Well	Well	26	7 13	6 07 6	30 25	%96	24	9 00 5	70 8 06 0	30 1	24	0.45	0 1 0 14 0	%U (20	0	0	0	0	~	0	-		8) sil
R222:8350 Alpine Way	Intake	2	2	Offline	2		1	, 0	ffline	2	-	2	Offline	20				-	1	2	offli	, e	5	2	2	offlin	, e	5	nsə
R231: 5801 Alta Lake Rd.	Intake	23	7.96	6.75 7	.31 0	%0	23	12.70 0	.20 5.39 (%0 (25	7.54	0.07 0.67	3 12%				-	23	3 241:	9 3.1	207 1	16 70	3% 2	1 24.	3 0	1.74 6	29	RIQ 7 9
R232: 4700 Lost Lake Rd.	Intake	20	7.78	6.50 7	.47 0	%0	20	9.70 0	.00 3.96	%0 (20	40.30	0.33 5.05 1	1 55%					21	1 276	1	71.70 1	17 81	2	0 29.	2	2.00 5	25	Ixə IəS
P270: 2400 Taluswood PI.	Distribution	25	7.59	6.40 6	.95 3	12%	25	15.20 4	.10 9.59	8%	25	1.15	0.10 0.36 0	%0 6	24	0.49 0.0	13 0.23	10 42	% 23	0	0	0	0	% 2	3	0	0	8	
P245:8319 Mountainview Dr.	Distribution	25	7.38	6.71 7	.02 0	%0	25	12.10 4	.00 7.38	%0 (25	1.41	0.19 0.56 (%0 G	25	0.42 0.0	35 0.22	12 46	% 25	0	0	0	0	% 2	5 0	0	0	6) ()	
S123: 8407 Golden Bear Pl.	Distribution	26	7.79	6.38 7	7.16 2	8%	26	14.10 4	.60 8.59 (%0 C	26	0.76	0.08 0.35 (0% 0	26	0.65 0.0	38 0.33	5 15	1% 24	1	0	0.04 (0	% 2	6 0	0	0	6) 0	
Snowflake Park: 6295 Palmer Dr.	Distribution	26	7.71	6.44 7	7.04 2	8%	26	15.70 3	.70 8.25	1 4%	26	0.66	0.08 0.29 (%0	26	0.53 0.0	03 0.32	3 12	% 24		0	0.04 (0	%	4 0	•	•	8	
P256:4700 Glacier Dr.	Distribution	24	7.47	6.50 6	5.77 0	%0	24	14.60 4	.10 8.30	%0	24	1.88	0.09 0.46 (%0	24	0.49 0.	16 0.27	3	% 25	0	0	0	0	%	0	•	•	8	
Whistler Village: 4297 Mountain Sq.	Distribution	25	7.76	6.38 7	7.00 2	8%	25	14.90	1.10 8.25	%0	25	1.22	0.12 0.32 (%0	25	0.72 0.0	03 0.37	4 16	3% 23	0	0	0	8	2	-	0	0	8	
S104: 3333 Carleton Way	Distribution	25	7.38	6.71 7	7.02 0	%0	25	14.20 5	1.30 8.18	%0 ×	25	0.77	0.09 0.27	%0 ×	25	0.56 0.1	07 0.40	00 0 00 0	× 2.	0	0	0		× ×	0 0	0	0	88	
P2/3/S132: 1559 Spring Creek Ur.	Distribution	2 2	15.1	6.0/ E	70 11	44% %	27 27	2 00.71	FO 0 20 /	88	77 7	0.70	97.0 01.0	%) %	77 72	0.67 0.0	12 0.39	2 1 2 2 2 2 2	۲ «		-		58	~ ~ % %		-		58	
Cheak Crsne : 1300 Mount Fee Rd	Distribution	55	6.57	6.27 6	41 19	73%	96	13.60 5	50 843	8	26	01.11	07.0 01.0	80	56	0.45 0.5	01.0 20		2 2 V					e %				è é	
CIERAN CIDIR: TOO MONIFELEE IN.		70	10.0	0.44	TT T1	2/01	70	1 00001		80	707	00.0	0T'0 00'0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	70	o nto	70.07	>	7	•	>	>	6	2	Þ t	>	>	ò	
Week 2 Sample Schedule				H				Tempe	rature (°C)			*Tur	bidity (NTU)			Free C	2 (mg/ml			*Total C	oliforms	(MPN/)	100mL)	┝	т. С	oli (MPI	N/100m	2	
			Guide	eline ph	6.5-8.5			AO	= <15°C		Guide	line <1	NTU (Source):	<5 NTU		uideline	0.2-0.6 m	lm/a		MM	C <10 m	unts/100	Ē		MAC		ts/100n		i
SAMPLESITE	Source	Samples	Max	Min A	ve. Fai	l % Fai	Samples	A Max	Min Ave. F	il % Fai	Sample	Nax Xax		ail % Fail	Samples	Max M	in Ave.	Eail % P	ail Samr	bles Ma	Min	Ave. F	ail %	ail Sam	inles Ma	Min	Ave. Fa	ail %E	
W202-0001 Highway 00	II	20	5	6 4 7 G	20 C	/00/	2	11 40 4	00 6 77	No.	20	100		780					5		c		č	~		-	, c	8	
W 202: 8001 III 811 W 202 W	Well	24	1.7.7	6.84 7	90 90	8	23	8.90.3	50 5.92	8	24	19 E	0.11 0.48	1 4%				+	22					* *				e e	
W213:8107 Camino Dr.	Well	15	7.37	6.57 6	.82 0	%	14	9.30 5	80 7.21 (%0	15	0.61	0.05 0.25 (%0 C					14	0	0	0	0	-i -i - %	4	0	0	8	
W205-1: 4490 Blackcomb Way	Well	21	6.50	6.26 6	36 20	95%	21	11.20 5	.90 7.74 (%0 (21	0.34	0.06 0.16 (360 C					20	0	0	0	0	% 2	0 0	0	0	6 0	
W205-2: 4490 Blackcomb Way	Well	23	6.69	6.44 6	355 5	22%	23	9.70 5	70 7.20 (%0 (23	0.87	0.06 0.19 (0% 0				_	21	1	0	0	0	% 2	1 0	0	0	6) 0	
W205-3: 4490 Blackcomb Way	Well	22	6.74	6.45 6	i.55 6	27%	22	3 06.8	60 7.26 1	%0 (22	0.39	0.05 0.15 (%0 0					2(0	0	0	0	% 2	0	0	0	8	
W211: 4330 Blackcomb Way	Well	21	6.67	6.34 6	5.46 15	71%	21	8.70 f	10 7.48	%0	21	0.38	0.06 0.15	%				+	11	0	0	0	0	×	0	0	0	8	
W218: Valley trail Rainbow Pk.	Well	22	6.69	6.34 6	5.50 13	29%	52	10.00 4	1.70 6.85	8	52	0.59	0.04 0.20	8	:			-	2		0	0	0	× :	4	0	0	8	
P275: 5438 Stonebridge Dr.	Distribution	24	7.32	6.37 6	3.81 6	25%	24	14.20 2	20 8.13	86 200	24	0.57	0.08 0.27	80 200	24	0.59 0.	01 0.23	11 4 2	% Z:		0	0	6 6	× ×	0	•	0	88	
S131: 9225 Lakeshore Dr. S101: 8330 Painhow Dr	Distribution	24	6.78 6.00	6.52 t	77 0	88	24	10.70 3	10 7.43	88	24	0.37	0.11 0.21	%) ×	24	0.40 0.	20 0.32	0 1	% 2:		-			× ×	0 0	-		58	
P267/S126:7314 Blackcomb Wav	Distribution	24	7.74	6.45 7	26 3	13%	24	14.10 2	40 6.80 0	%0	24	0.69	0.09 0.28	%0 0%	24	0.58 0.2	21 0.46	0	% 24	0	0			· ~	4	, o		8	
S121: 2773 Cheakamus Way	Distribution	24	7.50	6.06 6	.76 8	33%	24	13.50 4	.00 7.94	%0 (24	0.57	0.09 0.25 1	30 C	24	0.66 0.0	38 0.33	7 29	% 24	0	0	0	0	% 2	3	0	0	8 0	
Whistler VIIIage: 4335 Main St.	Distribution	24	7.81	6.37 7	7.22 4	17%	24	15.20 3	10 7.62	1. 4%	24	0.83	0.10 0.31 (%0 0	24	0.63 0.2	20 0.42	1 4	% 25	0	0	0	0 0	% 2	3	0	0	8 0	
P265: 3840 Sunridge Dr.	Distribution	24	7.53	6.50 7	7.13 0	%0	24	14.20	1.70 7.80	%0	24	0.98	0.08 0.33	%0	24	0.60 0.0	00 0.19	15 65	% 24	•	0	0	0	×	4	0	0	8	
2105: 2149 Lake Placiu Ku.	Distribution	24	C/-/	9 07 9	0 02.0	%C7	24	C 01 C1	CT:/ 07:	80	24 24	10/T	02 0 V 1 0	%n 0	47 74	0.25 U.	0.00	0 0	27 VC					2 2				58	
R238: 9525 Emerald Dr.	Distribution	23	6.74	6.48 6	65 1	4%	23	10.80 5	71.8 02.	80	23	0.36	0.05 0.13 (%0 %0	23	0.49 0.5	7 0.41		× 23					~ ~				è é	
		i				-					1				ì							,			•	•	•		1
		*Comme	ints:																Numb	er of Sar	nples								
		i.	Resu	Its are bu	no past	limited.	manual si	amples a	nd are not i	ndicative	of the tr	ue durat	tion of failure.			Š	ample So	urce p	H Ten	np Tur	þ. Free	Cl ₂ T. 6	coli E.c	ilo					
		2.	Thev	water qui	ality rep	orts re,	flect all ex	сеедалс	es from sam	ple resul.	ts, regan	tless of t	the			5,	Source Wa	tter 32	8 32.	3 325	0 6		11 30	80					
			statu	is of the:	station	(online,	or offline)										Distributiv	2h 45	1 49.	1 49	i 49,	0 46	68 46	88					
		'n	Agne	sw Creek	water	'ntake (I	9222) was	s not sam	pled and wu	ts offline	the who	le year 2	2013.				Total	8	9 81	4 82((49	0 73	77 77	76					
		4	Func	tion Junc	Tion We	ell 2 (WZ	12-2) was	s not san.	pled and w	as offline	the who	le year ż	2013.											1					
		S	Sam	ole static	on locat	ions R2.	31 and R2	32 are su	rface water	intakes	where th	e water :	sample being	tested															
			is tal	ken from	theraw	v water,	prior to p	passing t	hrough the	disinfect.	ion syste	Ë																	
		9	RMG	W surfa	ce wate.	r intake.	s automa	rtically sh	ut down wh	en turbic	lity excet	ds INTL	1																
		7.	Blue	highlight	ted sam	nples are	Distribut	tion (Pota	ble water) s	amples,	un-highli	ighted su	amples are tal	ken from v	vells and	intakes p	rior to dis	infection	treatmer.	nt									
		ø	Seef	Results (5	Section	4) for aı.	ı explana,	tion of fu	vilures																				

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2013 Quarterly Water Quality Sampling - TOC and HPC

Water System	Facility	Sampling Point	Collection	Heterotrophic Plate	Total Organic
			Date	Count (HPC)	Carbon (TOC)
				CFU/mL	mg/L
Emerald Estates	Emerald Estates	9225 Lakeshore Drive - \$131 - \$\$#403	03/18/2013	3	
Emerald Estates	Emerald Estates	9225 Lakeshore Drive - S131 - SS#403	07/24/2013	<1	
Emerald Estates	Emerald Estates	9225 Lakeshore Drive - S131 - SS#403	11/14/2013	<1	
Emerald Estates	Emerald Estates	9525 Emerald Drive - R238 - SS#406	03/18/2013	< 1.0	
Emerald Estates	Emerald Estates	9525 Emerald Drive - R238 - SS#406	07/24/2013	<1	
Emerald Estates	Emerald Estates	9525 Emerald Drive - R238 - SS#406	11/14/2013	<1	
Emerald Estates	Well No. W201-1 SS#409	W-201-1	04/09/2013	10	< 0.50
Emerald Estates	Well No. W201-1 SS#409	W-201-1	08/28/2013	1	1.6
Emerald Estates	Well No. W201-1 SS#409	W-201-1	12/02/2013	<1	1.1
Emerald Estates	Well No. W201-2 SS#410	W-201-2	04/09/2013	< 1.0	< 0.50
Emerald Estates	Well No. W201-2 SS#410	W-201-2	08/28/2013	<1	1.5
Emerald Estates	Well No. W201-2 SS#410	W-201-2	12/02/2013	3	0.9
Emerald Estates	Well No. W201-3 SS#411	W-201-3	04/09/2013	3	< 0.50
Emerald Estates	Well No. W201-3 SS#411	W-201-3	08/28/2013	<1	1.3
Emerald Estates	Well No. W201-3 SS#411	W-201-3	12/02/2013	<1	1.4
Water System	Facility	Sampling Point	Collection	Heterotrophic Plate	Total Organic
			Date	Count (HPC)	Carbon (TOC)
				CFU/mL	mg/L
Whistler Main	Alpine Meadows	8319 Mountianview Dr P245 - SS#412	04/05/2013	5	
Whistler Main	Alpine Meadows	8319 Mountianview Dr P245 - SS#412	08/28/2013	<1	
Whistler Main	Alpine Meadows	8319 Mountianview Dr P245 - SS#412	11/27/2013	<1	
Whistler Main	Alpine Meadows	8330 Rainbow Dr S101 - SS#421	03/20/2013	< 1.0	
Whistler Main	Alpine Meadows	8330 Rainbow Dr S101 - SS#421	07/24/2013	<1	
Whistler Main	Alpine Meadows	8330 Rainbow Dr S101 - SS#421	09/04/2013	<1	
Whistler Main	Alpine Meadows	8330 Rainbow Dr S101 - SS#421	11/14/2013	<1	
Whistler Main	Alta Vista	3333 Carleton Way - S104 - SS#459	08/27/2013	<1	
Whistler Main	Alta Vista	3333 Carleton Way - S104 - SS#459	11/13/2013	<1	
Whistler Main	Athlete's Village	1300 Mount Fee Rd	03/20/2013	< 1.0	
Whistler Main	Athlete's Village	1300 Mount Fee Rd	07/25/2013	<1	
Whistler Main	Athlete's Village	1300 Mount Fee Rd	10/24/2013	<1	
Whistler Main	Blackcomb Benchlands	4700 Glacier Dr P256 - SS#441	03/21/2013	< 1.0	
Whistler Main	Blackcomb Benchlands	4700 Glacier Dr P256 - SS#441	07/26/2013	<1	
Whistler Main	Blackcomb Benchlands	4700 Glacier Dr P256 - SS#441	11/21/2013	<1	
Whistler Main	Millar's Pond	2773 Cheakamus Way - S121- SS#477	03/19/2013	< 1.0	
Whistler Main	Millar's Pond	2773 Cheakamus Way - S121- SS#477	07/23/2013	<1	
Whistler Main	Millar's Pond	2773 Cheakamus Way - S121- SS#477	11/14/2013	<1	
Whistler Main	Nicklaus North	8407 Golden Bear Pl P266/S123 - SS#424	04/05/2013	12	
Whistler Main	Nicklaus North	8407 Golden Bear Pl P266/S123 - SS#424	08/28/2013	<1	
Whistler Main	Nicklaus North	8407 Golden Bear Pl P266/S123 - SS#424	10/24/2013	<1	
Whistler Main	Nordic Estates	2642 Whistler Road - P264 - SS#462	03/21/2013	< 1.0	
Whistler Main	Nordic Estates	2642 Whistler Road - P264 - SS#462	07/25/2013	<1	
Whistler Main	Nordic Estates	2642 Whistler Road - P264 - SS#462	10/21/2013	<1	
Whistler Main	Rainbow	8925 Hwy. 99 - \$137	03/20/2013	< 1.0	
Whistler Main	Rainbow	8925 Hwy. 99 - S137	09/04/2013	<1	
Whistler Main	Rainbow	8925 Hwy. 99 - 5137	11/14/2013	<1	
Whistler Main	Spring Creek	1559 Spring Creek Rd - P273/S132 - SS#480	04/10/2013	< 1.0	
Whistler Main	Spring Creek	1559 Spring Creek Rd - P273/S132 - SS#480	08/28/2013	1	
Whistler Main	Spring Creek	1559 Spring Creek Rd - P273/S132 - SS#480	11/0//2013	<1	
whistier Main	Spring Creek	1559 Spring Creeк ка - Р2/3/S132 - SS#480	12/12/2013	<1	
Criteria					
HPC CFU/mL	TOC mg/L				
<200 *	<2.5 *				
No GCDWQ standard	I set, this number is an RMOW i	nternal guideline			

2013 Qua	rterly Water Qu	ality Sampling - TOC and H	IPC (Co	ontinued)	
Water System	Facility	Sampling Point	Collection	Heterotrophic Plate	Total Organic
			Date	Count (HPC)	Carbon (TOC)
				CFU/mL	mg/L
Whistler Main	Spruce Grove	7314 Blackcomb Way - P267/S126 - SS#427	03/20/2013	< 1.0	
Whistler Main	Spruce Grove	7314 Blackcomb Way - P267/S126 - SS#427	04/10/2013	2	
Whistler Main	Spruce Grove	7314 Blackcomb Way - P267/S126 - SS#427	07/25/2013	<1	
Whistler Main	Spruce Grove	7314 Blackcomb Way - P267/S126 - SS#427	11/25/2013	<1	
Whistler Main	Stonebridge	5438 Stonebridge drive - P275	03/18/2013	4	
Whistler Main	Stonebridge	5438 Stonebridge drive - P275	07/23/2013	<1	
Whistler Main	Stonebridge	5438 Stonebridge drive - P275	10/21/2013	<1	
Whistler Main	Sunridge Plateau	3840 Sunridge Drive - P265 - SS#456	03/19/2013	< 1.0	
Whistler Main	Sunridge Plateau	3840 Sunridge Drive - P265 - SS#456	07/23/2013	<1	
Whistler Main	Taplov's Farm	6671 Crahappio Dr. \$102 \$\$#430	02/14/2013	<10	
Whistler Main	Tapley's Farm	6671 Crabapple Dr 5103 - 55#435	09/05/2013	< 1.0	
Whistler Main	Tapley's Farm	6671 Crabapple Dr 5103 - 55#433	10/23/2013	<1	
Whistler Main	Twin Lakes/Tamarisk	1300 Block Alta Lake Bd - SS#482	04/10/2013	<10	
Whistler Main	Twin Lakes/Tamarisk	1300 Block Alta Lake Rd - SS#482	08/27/2013	<1.0	
Whistler Main	Twin Lakes/Tamarisk	1300 Block Alta Lake Rd - SS#482	11/07/2013	<1	
Whistler Main	Upper Taluswood	2400 Taluswood Pl P270 - SS#465	03/14/2013	< 1.0	
Whistler Main	Upper Taluswood	2400 Taluswood Pl P270 - SS#465	07/23/2013	<1	
Whistler Main	Upper Taluswood	2400 Taluswood Pl P270 - SS#465	10/23/2013	<1	
Whistler Main	Upper Taluswood	2400 Taluswood Pl P270 - SS#465	12/16/2013	<1	
Whistler Main	Whistler Cay Heights	6295 Palmer Dr Snowflake Park - SS#430	03/21/2013	1	
Whistler Main	Whistler Cay Heights	6295 Palmer Dr Snowflake Park - SS#430	08/28/2013	<1	
Whistler Main	Whistler Cay Heights	6295 Palmer Dr Snowflake Park - SS#430	11/25/2013	<1	
Whistler Main	Whistler Creek	2149 Lake Placid Rd - S106 - SS#471	03/19/2013	< 1.0	
Whistler Main	Whistler Creek	2149 Lake Placid Rd - S106 - SS#471	07/23/2013	<1	
Whistler Main	Whistler Creek	2149 Lake Placid Rd - S106 - SS#471	10/22/2013	<1	
Whistler Main	Whistler Creek	2601 Gondola Way - R228 - SS#474	04/10/2013	< 1.0	
Whistler Main	Whistler Creek	2601 Gondola Way - R228 - SS#474	09/05/2013	<1	
Whistler Main	Whistler Creek	2601 Gondola Way - R228 - SS#474	11/07/2013	<1	
Whistler Main	Whistler Village	4297 Mountain Square - Mountain Ln - SS#453	04/05/2013	12	
Whistler Main	Whistler Village	4297 Mountain Square - Mountain Ln - SS#453	08/28/2013	<1	
Whistler Main	Whistler Village	4297 Mountain Square - Mountain Lh - SS#453	02/10/2012	<10	
Whistler Main	Whistler Village	4335 Main Street - Main St 55#450	07/22/2013	< 1.0	
Whistler Main	Whistler Village	4335 Main Street - Main St 55#450	08/27/2013	<1	
Whistler Main	Whistler Village	4335 Main Street - Main St SS#450	10/24/2013	<1	
Whistler Main	Well No. W202 SS#418	W-202	03/19/2013	< 1.0	0.5
Whistler Main	Well No. W202 SS#418	W-202	09/04/2013	<1	< 0.5
Whistler Main	Well No. W202 SS#418	W-202	11/25/2013	<1	< 0.5
Whistler Main	Well No. W210 SS#419	W-210	03/19/2013	< 1.0	< 0.50
Whistler Main	Well No. W210 SS#419	W-210	07/24/2013	<1	< 0.5
Whistler Main	Well No. W210 SS#419	W-210	11/25/2013	<1	< 0.5
Whistler Main	Well No. W213 SS#420	W-213 SS#420	09/04/2013	<1	< 0.5
Whistler Main	Well No. W213 SS#420	W-213 SS#420	11/25/2013	< 1	< 0.5
Whistler Main	R-231 SS#436	R-231/SS#436	01/14/2013	1	0.55
Whistler Main	R-231 SS#436	R-231/SS#436	04/09/2013	< 1.0	1.02
Whistler Main	R-231 SS#436	R-231/SS#436	08/28/2013	88	2.1
Whistler Main	R-231 SS#436	R-231/SS#430	10/24/2013	<1	1.2
Whistler Main	P_222/ \$\$#430	P_222/53#430	04/25/2013	<10	1.01
Whistler Main	R-222/ SS#415	R-222/ SS#415	09/05/2013	<1.0	< 0.5
Whistler Main	Well No. W218	W218	03/18/2013	1	< 0.50
Whistler Main	Well No. W218	W218	07/23/2013	<1	< 0.5
Whistler Main	Well No. W218	W218	10/22/2013	<1	< 0.5
Whistler Main	Athlete's Village wellhead	W217	03/14/2013	< 1.0	0.64
Whistler Main	Athlete's Village wellhead	W217	08/26/2013	<1	0.9
Whistler Main	Athlete's Village wellhead	W217	10/24/2013	<1	0.5
Whistler Main	Athlete's Village wellhead	W217	12/16/2013	<1	0.8
Criteria					
HPC CFU/mL	TOC mg/L				
<200 *	<2.5 *				
No GCDWQ standard	I set, this number is an RMOW in	nternal guideline			

2013 Quarterly Water Quality Sampling - TOC and HPC (Continued)												
Water System	Facility	Heterotrophic Plate	Total Organic									
			Date	Count (HPC)	Carbon (TOC)							
				CFU/mL	mg/L							
Whistler Main	R-232/ SS#439	R-232/ SS#439	04/09/2013	1	1.76							
Whistler Main	R-232/ SS#439	R-232/ SS#439	08/27/2013	<1	0.6							
Whistler Main	R-232/ SS#439	R-232/ SS#439	10/07/2013	8	1.5							
Whistler Main	R-232/ SS#439	R-232/ SS#439	12/16/2013	<1	0.9							
Whistler Main	Well No. W205-1 SS#444	W205-1 SS#444	01/09/2013	< 1.0								
Whistler Main	Well No. W205-1 SS#444	W205-1 SS#444	03/20/2013	< 1.0	0.5							
Whistler Main	Well No. W205-1 SS#444	W205-1 SS#444	09/04/2013	<1	< 0.5							
Whistler Main	Well No. W205-1 SS#444	W205-1 SS#444	11/13/2013	<1	< 0.5							
Whistler Main	Well No. W205-2 SS#445	W205-2 SS#445	01/08/2013	< 1.0								
Whistler Main	Well No. W205-2 SS#445	W205-2 SS#445	03/20/2013	< 1.0	< 0.50							
Whistler Main	Well No. W205-2 SS#445	W205-2 SS#445	09/04/2013	<1	< 0.5							
Whistler Main	Well No. W205-2 SS#445	W205-2 SS#445	11/13/2013	<1	< 0.5							
Whistler Main	Well No. W205-3 SS#446	W205-3 SS#446	01/08/2013	< 1.0								
Whistler Main	Well No. W205-3 SS#446	W205-3 SS#446	03/20/2013	2	< 0.50							
Whistler Main	Well No. W205-3 SS#446	W205-3 SS#446	09/04/2013	<1	< 0.5							
Whistler Main	Well No. W205-3 SS#446	W205-3 SS#446	11/13/2013	<1	< 0.5							
Whistler Main	Well No. W211 SS#447	W211 SS#447	01/08/2013	2								
Whistler Main	Well No. W211 SS#447	W211 SS#447	03/20/2013	< 1.0	< 0.50							
Whistler Main	Well No. W211 SS#447	W211 SS#447	09/04/2013	<1	< 0.5							
Whistler Main	Well No. W211 SS#447	W211 SS#447	11/13/2013	<1	< 0.5							
Whistler Main	W212-2	W212-2	04/25/2013	2	1.03							
Whistler Main	W212-2	W212-2	09/05/2013	<1	< 0.5							
Whistler Main	W212-2	W212-2	11/15/2013		4.4							
Whistler Main	Well No. W212 SS#483	W-212 SS#483	04/09/2013	< 1.0	< 0.50							
Whistler Main	Well No. W212 SS#483	W-212 SS#483	08/26/2013	<1	0.9							
Whistler Main	Well No. W212 SS#483	W-212 SS#483	10/07/2013	<1	< 0.5							
Criteria												
HPC CFU/mL	TOC mg/L											
<200 *	<2.5 *											
No GCDWQ standard set, this number is an RMOW internal guideline												

2013 Quarterly Water Quality Sampling - Total Iron, Total Manganese											
Water System	Facility	Sampling Point	Collection Date	Iron (total)	Manganese (total)						
				mg/L	mg/L						
Whistler Main	Alpine Meadows	8319 Mountianview Dr P245 - SS#412	02/04/2013	0.16							
Whistler Main	Alpine Meadows	8319 Mountianview Dr P245 - SS#412	05/09/2013	0.20							
Whistler Main	Alpine Meadows	8319 Mountianview Dr P245 - SS#412	09/06/2013	0.20							
Whistler Main	Alpine Meadows	8319 Mountianview Dr P245 - SS#412	11/15/2013	0.36*							
Whistler Main	Alpine Meadows	8330 Rainbow Dr S101 - SS#421	02/04/2013	0.08							
Whistler Main	Alpine Meadows	8330 Rainbow Dr S101 - SS#421	05/09/2013	0.70							
Whistler Main	Alpine Meadows	8330 Rainbow Dr S101 - SS#421	09/06/2013	0.10							
Whistler Main	Alpine Meadows	8330 Rainbow Dr S101 - SS#421	11/15/2013	0.32*							
Whistler Main	Alpine Meadows	Hyd # 8110 - 8550 Buckhorn Place	01/18/2013	0.17							
Whistler Main	Alpine Meadows	Hyd # 8110 - 8550 Buckhorn Place	02/04/2013	0.19							
Whistler Main	Alpine Meadows	Hyd # 8110 - 8550 Buckhorn Place	05/17/2013	0.40*							
Whistler Main	Alpine Meadows	Hyd # 8110 - 8550 Buckhorn Place	09/06/2013	0.80*							
Whistler Main	Alpine Meadows	Hyd # 8110 - 8550 Buckhorn Place	11/15/2013	1.06*							
Whistler Main	Rainbow	8925 Hwy. 99 - S137	05/09/2013	0.20							
Whistler Main	Rainbow	8925 Hwy. 99 - S137	09/06/2013	0.10							
Whistler Main	Rainbow	8925 Hwy. 99 - S137	11/15/2013	0.23							
Whistler Main	Well No. W202 SS#418	W-202	05/09/2013	<0.1							
Whistler Main	Well No. W202 SS#418	W-202	09/06/2013	<0.1							
Whistler Main	Well No. W202 SS#418	W-202	11/15/2013	<0.1							
Whistler Main	Well No. W202 SS#418	W-202	12/13/2013	<0.1	<0.002						
Whistler Main	Well No. W210 SS#419	W-210	05/09/2013	<0.1							
Whistler Main	Well No. W210 SS#419	W-210	09/06/2013	<0.1							
Whistler Main	Well No. W210 SS#419	W-210	11/15/2013	<0.1							
Whistler Main	Well No. W210 SS#419	W-210	12/13/2013	<0.1	<0.002						
Whistler Main	Well No. W213 SS#420	W-213 SS#420	09/06/2013	<0.1							
Whistler Main	Well No. W213 SS#420	W-213 SS#420	11/15/2013	0.15							
Whistler Main	Well No. W213 SS#420	W-213 SS#420	12/13/2013	<0.1	<0.002						
Whistler Main	W212-2	W212-2	04/25/2013	0.20							
Whistler Main	W212-2	W212-2	05/05/2013	0.00	1.15*						
Whistler Main	W212-2	W212-2	09/05/2013	0.20	1.37*						
Whistler Main	W212-2	W212-2	11/15/2013	<0.1	1.44*						
Whistler Main	Well No. W212 SS#483	W-212 SS#483	01/14/2013	0.14	0.060*						
Whistler Main	Well No. W212 SS#483	W-212 SS#483	04/25/2013	2.87*							
Whistler Main	Well No. W212 SS#483	W-212 SS#483	05/05/2013	0.10	0.063*						
Whistler Main	Well No. W212 SS#483	W-212 SS#483	07/22/2013	0.8*	0.068*						
Whistler Main	Well No. W212 SS#483	W-212 SS#483	11/15/2013	0.25	0.074*						

*Comments

W212-2 was off-line for all of 2013 due to the high Total Manganese results.

W212 results are slightly higher than the criteria for Total Manganese, however this is an Aesthetic Objective and is not a concern for public health. High Total Manganese and Total Iron level results affect taste and cause staining of plumbing fixtures

 Criteria

 Iron (total)
 Manganese (total)

 mg/L
 mg/L

 Aesthetic
 Aesthetic Objective

 Objective
 <=0.05</td>

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	W-210	12/13/2013		< 0.10		< 0.010	10.4	0.25		29.6	0.022		<5				65	7.1	34.3	2.0	-	<05	5	10 OF	50.0 V	< 0.05	< 0.04	11.1	< 0.005	< 0.0005	< 0.002	< 0.10	0.5	< 0.002	0.8	1.1	< 0.04		< 0.001	< 0.005	< 0.0001	< 0.001	< 0.005	< 0.0002
	W-213	12/13/2013		< 0.10		< 0.010	44.1	9.26		8	0.143		<5				196	7.37	111	<0.1	10,	<05	,	.001	c0:0 >	< 0.05	< 0.04	31.6	< 0.005	< 0.0005	0.004	< 0.10	1	< 0.002	1.2	4	< 0.04		< 0.001	< 0.005	< 0.0001	< 0.001	< 0.005	< 0.0002
	W205-3	01/08/2014		< 0.10		< 0.010	128	41		188	0.068		<5				529	7.05	308	0.1	10	<0.7	4	, o or	c0.0>	<0.05	\$0.0 ⁵	/3	< 0.005	< 0.0005	0.019	< 0.10	1.3	< 0.002	1.2	23.7	< 0.04		< 0.001	< 0.005	< 0.0001	< 0.001	< 0.005	< 0.0002
	W205-2	01/08/2014		< 0.10		< 0.010	109	34.9		201	0.142		<5				455	7.05	276	< 0.1	10,	<0.2	4	, o o.	c0.0>	<0:05	<0:04 	/8./	< 0.005	< 0.0005	0.004	< 0.10	1.2	< 0.002	1.1	16.3	<0.04		< 0.001	< 0.005	< 0.0001	0.001	< 0.005	< 0.0002
	W205-1	01/08/2014		< 0.10		< 0.010	82.7	40.2		138	0.148		<5				400	6.87	226	< 0.1	1	<0.2	4.57	, o or	sn:n >	< 0.05	<pre>< 0.04</pre>	53.1	< 0.005	< 0.0005	0.012	< 0.10	1.3	< 0.002	1.3	18	< 0.04		< 0.001	< 0.005	< 0.0001	< 0.001	< 0.005	< 0.0002
	W-201-3	01/29/2014		< 0.10		< 0.010	15	3.84		47.9	0.041		<5				139	7.28	71.9	0.2	4.5	<0.2	4.0,	, 0 Or	c0.0 >	< 0.05	<0:04	18	< 0.005	< 0.0005	0.017	< 0.10	0.7	< 0.002	0.2	7	< 0.04		< 0.001	< 0.005	< 0.0001	< 0.001	< 0.005	< 0.0002
	W-201-2	01/29/2014		< 0.10		< 0.010	14.8	1.96		54.1	0.051		<5				131	7.23	69.2	0.3	222	<0.7	4.57	, o or	50.0 v	<0.05	 0.04 2 	20.4	< 0.005	< 0.0005	0.02	< 0.10	0.8	< 0.002	0.2	3.5	< 0.04		< 0.001	< 0.005	< 0.0001	< 0.001	< 0.005	< 0.0002
	W-201-1	01/29/2014 (< 0.10		< 0.010	16.8	24.2		54.2	0.233		<5				210	7.07	110	<0.1	10,	<0.2	40,	, 0 OF	c0.0 >	< 0.05	0.04	20.1	< 0.005	< 0.0005	0.024	< 0.10	1	< 0.002	0.7	20.4	< 0.04		< 0.001	< 0.005	< 0.0001	< 0.001	< 0.005	< 0.0002
	R-232	01/02/2014		< 0.10		< 0.010	4.6	0.17		33	0.049		<5				73	7.53	38.7	0.2	4	<0.2	40,	, 0 Or	s0.0 ×	< 0.05	<0.04	12.6	< 0.005	< 0.0005	0.002	< 0.10	0.4	< 0.002	0.3	1.4	< 0.04		< 0.001	< 0.005	< 0.0001	< 0.001	< 0.005	< 0.0002
	W212-2	01/29/2014 (< 0.10		< 0.010	9.8	50.7		46	0.054		<5				259	6.85	129	0.4	5	<0.2	40,	, 0 OF	c0.0 >	< 0.05	 0.04 2.04 	13.9	< 0.005	< 0.0005	0.003	< 0.10	2.8	1.02 *	2.9	29.3	< 0.04		<0.001	< 0.005	0.0001	< 0.001	< 0.005	< 0.0002
	W-212	01/09/2014		ND		QN	15	25.8		40.4	0.121		DN				193	6.7	97.8	8.0	25			4		Q :	QN S	13.1	Q	QN	0.003	0.21	1.9	• 90.0	2	18.1	QN		QN	QN	QN	QN	QN	ND
	W218	01/02/2014		< 0.10		< 0.010	16.8	1.52		32.2	0.028		<5				83	6.96	42.1	<0.1	10,	<0.7	410,	, 0 Or	s0.0 ×	< 0.05	~0.04	11./	< 0.005	< 0.0005	< 0.002	< 0.10	0.8	< 0.002	0.7	2.2	< 0.04		< 0.001	< 0.005	< 0.0001	< 0.001	< 0.005	< 0.0002
	W211	01/08/2014		< 0.10		< 0.010	78.8	33.9		136	0.266		<5				390	7.07	219	9.1	1	<0.7	4.07	.005	cu:u >	< 0.05	< 0.04	52.5	< 0.005	< 0.0005	0.006	< 0.10	1.3	< 0.002	1.2	16.6	< 0.04		< 0.001	< 0.005	< 0.0001	0.001	< 0.005	< 0.0002
	R228	01/09/2014		QN		QN	8.2	8.14		21.4	0.06		QN				88	7.12	42.7	0.1	4			4		9	9	7.5	Q	QN	0.007	Q	0.6	0.006	1	6.1	QN		QN	QN	QN	QN	QN	ND
	W217	01/02/2014 (< 0.10		< 0.010	11	5.86		36	0.077		<5				66	6.76	49.9	< 0.1	10,	<0.7	4.0,	, 0.0r	c0:0 >	< 0.05	×0.04	13	< 0.005	< 0.0005	< 0.002	< 0.10	0.9	< 0.002	0.6	4.6	< 0.04		< 0.001	< 0.005	<0.0001	< 0.001	< 0.005	< 0.0002
Results	R-231	12/12/2013 (< 0.10		< 0.010	4.9	0.34		16.2	0.035		<5				40	7.35	20.1	1.02	15	<05	2007	, 0 OF	c0.0 >	<0.05	¢0:04	6.1	< 0.005	< 0.0005	< 0.002	< 0.10	0.2	< 0.002	0.4	0.8	<0.04		< 0.001	< 0.005	< 0.0001	< 0.001	< 0.005	< 0.0002
ampling	W-202	12/13/2013		< 0.10		< 0.010	12	26.3		45	0.156		<5				159	6.79	81.6	0.2	-	<05	2007	, 0 OF	c0.0 >	<0.05	40:04	16.9	< 0.005	< 0.0005	0:007	< 0.10	0.7	< 0.002	0.8	12	<0.04		< 0.001	< 0.005	< 0.0001	< 0.001	< 0.005	< 0.0002
iistry S	ple Site:	le Date:	Units	mg/L		mg/L	mg/L	mg/L		mg/L	mg/L		ol. Unit		mg/L		uS/cm	H Units	mø/L	NTU		1/211	1		, "	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ter Chem	Sam	Samp	GCDWQ Standard* ¹	1.5		1	500	250			10		15 C		10			6.5-8.5	200	- ²	,	-	4				ъ	-	0.05		1	0.3		0.05		200	ŝ		0.006	0.01	0.005	0.01	0.01	0.02
2013 Annual Wa	Testing Parameter	I	Misc. Inorganics	Fluoride	ANIONS	Nitrite	Dissolved Sulphate	Dissolve d Chloride	Calculated Parameters	Total Hardness*2	Nitrate	Miscellaneous	True Colour	Nutrients	Nitrate + Nitrite	Physical Properties	Conductivity	На	Total Dissolved Solids	Turbidity*3	Marcunic by CVAA	Total Mercury	Total Matale by ICD	T-+ Alimitatis by ICP		Total Barium	Total Boron	Total Calcium	Total Chromium	Total Cobalt	Total Copper	Total Iron	Total Magnesium	Total Manganese	Total Potassium	Total Sodium	Total Zinc	Total Metals by ICPMS	Total Antimony	Total Arsenic	Total Cadmium	Total Lead	Total Selenium	Total Uranium

*Comments: 1. E 2. 7 3. f 4. 1 5. "

Blanks under the GCDWQ Standard heading indicates that a MAC (maximum acceptable concentration) or IMAC (interim maximum acceptable concentration) has not been established for that parameter. Total Handness: Although a MAC has not been established for hardness, levels up to 200mg/L is considered to be acceptable Loterable; levels in excess of 500mg/L are unacceptable for most domestic purposes. MAON surface water inteles automatically shown when tunding receded NTUL. V2.22: assolution for all of 2013 due to the high Total Manganese, revues. W2 12 results are stightly higher than the criteria for Total Manganese, however this is an Aesthetic Objective and is not a concern for public health.

Water System	Facility	Sampling Point	Collection Date	Carbon dioxide (total)
				mg/L
Whistler Main	Athlete's Village wellhead	W217	02/18/2013	18
Whistler Main	Athlete's Village wellhead	W217	02/19/2013	21
Whistler Main	Athlete's Village wellhead	W217	02/20/2013	22
Whistler Main	Athlete's Village wellhead	W217	02/21/2013	23
Whistler Main	Athlete's Village wellhead	W217	02/22/2013	21
Whistler Main	Athlete's Village wellhead	W217	02/25/2013	21
Whistler Main	Athlete's Village wellhead	W217	03/14/2013	23
Whistler Main	Athlete's Village wellhead	W217	04/17/2013	15
Whistler Main	Athlete's Village wellhead	W217	05/06/2013	9
Whistler Main	Athlete's Village wellhead	W217	05/23/2013	12
Whistler Main	Athlete's Village wellhead	W217	06/03/2013	15
Whistler Main	Athlete's Village wellhead	W217	06/17/2013	16
Whistler Main	Athlete's Village wellhead	W217	07/10/2013	19

2013 Additional Testing – Carbon dioxide

<u>Comments</u>

No GCDWQ standard criteria set for Total Carbon dioxide, not a concern for public health.

High Total Carbon dioxide levels cause the water pH to be more acidic, this affects taste and can cause staining of plumbing fixtures Total Carbon dioxide testing was carried out as part of a corrosion potential evaluation

Refer to section 3.3.3.5 for information on the additional testing for 2013