



REPORT

Eagle Plains Baseline Water and Sediment Quality Report

Submitted to:

Government of Yukon

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Executive Summary

The Eagle Plains region is in the central part of the northern Yukon Territory within the Yukon River and Mackenzie River watersheds, approximately 600 km north of Whitehorse. The Eagle Plains Ecoregion faces several existing and potential pressures including the Dempster Highway use for residents and tourists, highway maintenance, past and future oil and gas exploration including seismic activity, hunting, future mineral exploration and climate change. This report documents the existing conditions of streams in the Eagle Plains area based on the surface water, sediment, and groundwater quality data collected from 2012 to date. Six watersheds were sampled: Chance Creek, Eagle River, McParlon Creek, Miner River, Whitestone River and Dalglish Creek. The report was structured to address three key questions.

Key Question 1: What is surface water, groundwater, and sediment quality at baseline?

Surface Water

Surface water in the study area was generally slightly acidic to circumneutral, with some samples from Chance Creek being outside of the CCME recommended pH range for the protection of aquatic life, and with some of the samples from the 2016 freshet season being outside the CCME recommended pH range for the protection of aquatic life in other areas. Surface water was generally well oxygenated during freshet and open-water season but had dissolved oxygen concentrations below CCME aquatic life guidelines during ice-cover season.

Specific conductivity in surface water samples was widely variable. Concentrations of TSS, TDS and TOC in surface water was variable within and between watersheds.

Bicarbonate, calcium and sulphate are the dominant ions found in surface water in the study area.

Concentrations of TKN ranged from moderate to high and concentrations of total phosphorus indicate surface waters are oligotrophic to meso-eutrophic, depending on the location and season.

Several total metals had concentrations above surface water quality guidelines in samples taken from Chance Creek, Dalglish Creek, Eagle River, McParlon Creek and Whitestone Creek. These parameters were total aluminium, chromium, copper, iron, and zinc. Isolated guideline exceedances were also observed for total arsenic, beryllium, cadmium, cobalt, lead, manganese, mercury, selenium, and silver. Concentrations of dissolved aluminium and iron were above the applicable surface water guidelines in most of the samples, with isolated guideline exceedances also occurring for dissolved cadmium. In Miner River, concentrations of total and dissolved iron were occasionally above guidelines and all other metals were below guidelines.

Surface water in Miner and Whitestone rivers has low sensitivity to acid deposition, while surface water in the other watersheds has moderate to high sensitivity to acid deposition depending upon season and position in the watershed, as indicated by total alkalinity concentrations.

Groundwater

Groundwater in the study area was slightly acidic to circumneutral. Streambed groundwater had low specific conductivity compared to the deeper groundwater from YOWN-1401, which was brackish in quality (average TDS of 8,984 mg/L) with very high sulphate (average 5,504 mg/L), hardness (average of 1,868 mg CaCO₃/L) and alkalinity (average of 999 mg/L as CaCO₃). Calcium, bicarbonate and sulphate were the dominant ions found in streambed groundwater in the study area, while the brackish groundwater from YOWN-1401 was dominated by sodium and sulphate. Calcium bicarbonate typically dominates shallow groundwater, especially in areas of carbonate bedrock which are observed throughout the study area (Osadetz et al. 2005; Yukon Geological Survey, 2017), while sulphate may be derived from shale units (Yukon Geological Survey, 2017; van Everdingen et al. 1985).

Ammonia concentrations in groundwater (well YOWN-1401 and interpreted from baseflow streambed sampling) were higher than concentrations in surface waters collected during the freshet and open-water seasons. High TSS concentration, up to 504 mg/L, in many of the groundwater samples resulted in total metals concentrations, which exceeded one or more of the CCME, BC MOE or Yukon-CSR guidelines. Dissolved metals concentrations were generally below the CCME, BC MOE or Yukon-CSR guideline values except for dissolved iron.

Sediment

Metals concentrations were analyzed from full and 2 mm fractions of sediments collected across the study area. Concentrations of copper, lead, and mercury were below guidelines in all samples. Metal concentrations that exceeded the guidelines included arsenic (Chance Creek, Dalglish Creek, Eagle River, and McParlon Creek), cadmium (Chance Creek, Dalglish Creek, Eagle River, and McParlon Creek) chromium (Chance and McParlon creeks), and zinc (Chance Creek, Dalglish Creek, Eagle River, and McParlon Creek). There is general alignment of the sediment exceedances with exceedances in surface water and full alignment with exceedances in groundwater.

Key Question 2: Do season, streamflow, geology and watershed influence surface water or groundwater quality?

Seasonality, geology, watershed and flow were both found to influence surface water quality. The following is a summary of surface water parameters which showed the strongest seasonal and/or flow related influence.

Hardness, alkalinity, total and dissolved organic carbon, and total and dissolved inorganic carbon were strongly influenced by season. Hardness, alkalinity, and total and dissolved inorganic carbon concentrations peaked under-ice, whereas total and dissolved organic carbon concentrations had higher concentrations during the open-water period in September and lower concentrations during the under-ice period. The variations of concentrations of conventional parameters in Dalglish Creek and McParlon Creek were compared against the stage records for these two creeks. Total suspended solids and total organic carbon at one or more stations on Dalglish Creek and McParlon Creek mirrored stage data, indicating that the concentrations of these parameters are influenced by flow.

Bicarbonate and calcium showed strong seasonal variation, with higher concentrations in the under-ice samples as compared to samples collected during the other seasons, and no parameters at stations on Dalglish Creek or McParlon Creek mirrored stage data.

Ammonia showed strong season variation, with higher concentrations in the under-ice samples as compared to samples collected during freshet or open-water. Total nitrogen and phosphorus at one or more stations on Dalglish Creek and McParlon Creek mirrored stage data, indicating that the concentrations of these parameters are influenced by flow.

Total and dissolved barium, manganese, molybdenum, strontium, sulphur, and uranium showed strong seasonal variation, with higher concentrations being observed during the under-ice period at most stations. Total and dissolved aluminium, total arsenic, total barium, total and dissolved cadmium, total chromium, total and dissolved cobalt, total copper, total and dissolved iron, total lead, total and dissolved manganese, total potassium, total and dissolved silicon, total thallium, total titanium, total uranium, total vanadium, and total and dissolved zinc concentrations at one or more stations on Dalglish Creek and McParlon Creek mirrored stage data, indicating that the concentrations of these parameters are influenced by flow.

Groundwater discharge to surface water was most evident in baseflow samples acquired during under-ice conditions in late winter.

Water quality, as well as the impact of season, geology and flow varied between watersheds and between watershed size. Major ion composition varied between watersheds and may also be impacted by watershed size, with larger watersheds showing higher proportions of anions as bicarbonate than their tributaries, which had a greater proportion of anions as sulphate. The Whitestone and Miner River tended to show a greater dilution effect on metals concentrations than the Eagle River.

The impact of geology on groundwater and surface water quality was less clear, but some differences in major ion chemistry may be related to differences in bedrock geology while metals concentrations did not show clear trends related to geology.

Key Question 3: What is the interaction between groundwater quality and surface water quality?

In general, groundwater and surface water samples from the same watershed had similar pH. While the proportions of major ions, namely calcium and bicarbonate or sulphate, were similar in surface water and groundwater, concentrations of many constituents in groundwater were higher than in surface water. Dissolved oxygen was lower in groundwater as compared to surface water. Parameters that were elevated in groundwater relative to surface water were: alkalinity, specific conductivity, calcium, magnesium, potassium, sulphate/sulphur, iron, arsenic, strontium, barium, boron, cobalt, lithium, molybdenum, vanadium and uranium. Concentrations of total cadmium, cobalt, manganese, selenium, and zinc exceeded one or more of the guidelines in under ice/baseflow samples in two or more of the watersheds and were also common exceedances in streambed groundwater. These total metals were less likely to be found at concentrations exceeding guidelines in the open water or freshet surface water samples.

Conclusion

In general, the Eagle Plains study successfully documented the water and sediment baseline conditions in the area prior to further development and/or potential impacts from climate change. This study offered an opportunity to partner with university and federal government and communities for independent study prior to additional development in the region. Surface water in some areas is sensitive to change, such as nutrient input or acidity. Season and streamflow influence the concentration of a many water quality parameters and water quality varied between watersheds. Differences in geology across the study area mainly affected the major ion chemistry of surface water and groundwater.

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1.0 INTRODUCTION

1.1 Background

The Eagle Plains region is in the central part of the northern Yukon Territory within the Yukon River and Mackenzie River watersheds, approximately 600 km north of Whitehorse. The Eagle Plains Ecoregion (Smith et al. 2004) is part of the Taiga Cordillera Ecozone. It faces several existing and potential pressures including the Dempster Highway use for residents and tourists, highway maintenance, past and future oil and gas exploration including seismic activity, hunting, future mineral exploration, and climate change.

Environment and Climate Change Canada monitors a hydrometric station on the Eagle River, Whitestone River, and the Peel River and Yukon Parks and Yukon Fish and Wildlife Enhancement Trust monitor fish at crossings along the Dempster Highway (McHugh 2013). An oil and gas company, Northern Cross, collects groundwater information near its camp along the highway. Information on the aquatic conditions away from the highway is, however limited. The Yukon Water Resources Branch (WRB) received funding through the *Yukon Environmental and Socio-Economical Assessment Act* implementation funding to collect seasonal baseline water quality and sediment samples in the Eagle Plains area in advance of further development pressure in the area. The study focused on collecting information on streams in remote areas of the ecoregion from 2012 to 2017.

This report contains an initial assessment of the baseline surface water, groundwater, and sediment quality for two of the Eagle Plains ecoregion main watercourses, namely tributaries to the Porcupine River (Chance Creek, Eagle River, McParlon Creek, Miner River, Whitestone River) heading north and west to the Yukon River and one in the south draining to the Peel River (Dalglish Creek), a tributary to the Mackenzie River (Figures 1 and 2). Surface water quality samples were collected from the six watercourses (or tributaries to the watercourses). Groundwater quality samples were collected from the streambeds of McParlon Creek, an unnamed tributary to Eagle River, Dalglish Creek, and a bedrock aquifer well installed at the Northern Cross exploration camp along the Dempster Highway. Sediment quality samples were collected from Chance Creek, an unnamed tributary of the Eagle River, McParlon Creek, Whitestone River and Dalglish Creek. Supporting hydrometric data was collected at McParlon Creek and Dalglish Creek along with groundwater level data.

1.2 Study Objectives

The objective of the Eagle Plains study was to document the water and sediment baseline conditions in the area prior to development and/or potential impacts from climate change. To this end, data from 2011 to 2017 were summarized to characterize the baseline conditions and to address three key questions:

- 1) What is surface water, groundwater, and sediment quality at baseline?
- 2) Do season, watershed, geology and streamflow, influence surface water or groundwater quality?
- 3) What is the interaction between groundwater quality and surface water quality?

2.0 STUDY AREA

The Eagle Plains Ecoregion is in the north Yukon, approximately 600 km north of Whitehorse. The only major infrastructure in the region is the Dempster Highway and there are no towns or other population centres outside of a rest stop, the Eagle Plains Lodge, and a Yukon Government Highways camp. This area includes the traditional territory of the Vuntut Gwitchin, as well as the Tetlit Gwich'in, Tr'ondëk Hwëch'in, and Na-cho Nyak Dun.

The Eagle Plains basin underlies much of the ecoregion and has proven oil and gas reserves (Osadetz et al. 2005).

The Eagle Plains is in the Taiga Cordillera Ecozone of the Yukon (Smith et al. 2004). The area contains large rivers, small streams and lakes (Smith et al. 2004). The region also contains part of the important Whitefish Lake wetland complex, a potential new protected area (Yukon and Vuntut Gwitchin Governments, 2009).

The ecoregion is located within the zone of continuous permafrost, with permafrost up to 200 m thick (Smith et al. 2004). An active layer thickness of 1.5 m was measured south the Eagle Plains Lodge (Burn et al. 2015), however it is likely somewhat variable over the region. Climate change is affecting permafrost distribution and active layer thickness which may lead to shifts in drainage patterns and timing of peak and minimum streamflow which can influence surface water quality (Yukon Government 2011). Focused permafrost monitoring along the Dempster Highway began in 2013 and showed that permafrost degradation is actively occurring in the Eagle Plains area (Idrees et al. 2015). Permafrost melting can release contaminants of potential concerns such as mercury and salts (e.g., Schuster et al 2018).

Topography

The Eagle Plains Ecoregion is located between the Richardson Mountains to the east and the North Ogilvies to the west. The region has rolling, low-relief terrain, ranging in elevation from 300 to 600 metres above sea level (masl), with few areas higher than 1,000 masl (Smith, et al. 2004).

Watershed Characteristics

The region is located within the Yukon River and Mackenzie River Watersheds. The Yukon River catchment, making up most of the ecoregion, includes the Whitestone River, Porcupine River, and Eagle River.

The Mackenzie River catchment, located within the southeast corner of the ecoregion, includes Ogilvie River, Peel River, and Wind River. There are a limited number of upland lakes at higher elevations. Most waterbodies (oxbow lakes and thermokarst lakes) and wetlands are in the lowlands associated with the Porcupine River and Eagle River (Smith et al. 2004).

Climate/Hydrology

The climate is typical of the northern Yukon, with prolonged winter conditions due to the northerly latitude and proximity to the Arctic Circle. Meteorological and hydrological data have been collected for the Ecoregion at the Eagle Plains, Parkin, and Old Crow climate stations and at the Whitestone, Eagle, and Porcupine River hydrology stations.

The mean annual temperature for the ecoregion is estimated to be approximately -7.5°C, with strong variation due to season and elevation (Smith et al. 2004). Average temperatures in January range from -31°C at lower elevations to -25°C at higher elevations (Smith et al. 2004). At Environment and Climate Change Canada's Eagle Plains weather station, annual precipitation is estimated to be approximately 384 mm, with two-thirds of precipitation falling as rain during the summer months. The average annual temperature from 1979 to 2007 (with some data gaps) was -6.1°C (summarized from Environment and Climate Change Canada in Lauriol et al. 2010).

Annual peak streamflows within the ecoregion are seen during May and are caused by spring snowmelt. Secondary peaks are observed during summer and into the fall. These are caused by rainfall events and possibly discharge from the shallow groundwater system activated by the annual thaw. These rainfall events can produce the annual peak within some streams within the ecoregion. Mean annual runoff from the Eagle Plains is estimated at 200 mm (Smith et al 2004). Hydrologic changes have been documented in the area and is the subject of a separate climate change study along the Dempster Highway (Jancowicz et al 2014).

Water Survey of Canada (WSC) discharge data is also available for stations located within or near the study area:

- One on Whitestone River near the mouth (09FA001) with continuous periods of record from 1979 to 1998 and from 2015 to 2018, and with a gross drainage area of 6,730 km²;
- One on the Eagle River at the Dempster Highway Bridge (09FB002) with continuous periods of record from 1978 to 1996 and from 2013 to 2018 and with a gross drainage area of 1,720 km²; and
- One on the Peel River above Canyon Creek (10MA001) with seasonal periods of record from 1961 to 1965 and continuous periods of record from 1968 to 1998, and from 2005 to 2017, and with a gross drainage area of 25,500 km².
- The Blackstone River near a local airstrip (10MA003) with records from 1984 to 1994, 2005 to 2010, 2011 to 2018 with a gross drainage area of 1180 km²;

Discharge from these stations was not directly compared to the data collected in this study as the locations were not overlapping. Discharge rates in the region are naturally highly variable dependant on waterbody size/stream order, drainage area and precipitation. These stations are active, with real time data available on-line as required (WSC 2017).

Geology

The Ecoregion is located within the Foreland tectonic belt in the northern Yukon Territory within the Mackenzie Platform (Whitfield et al. 1993). The Eagle Plains are covered predominantly by colluvial deposits, with alluvial sediments being present along river systems. Colluvial deposits can be thick along ridge crests and slopes and form a thin veneer of finer grained deposits on pediment surfaces (Smith et al. 2004). The thickness and composition of the deposits depends on the parent material, with up to 10 to 15m being present on shale lithologies and thinner colluvial deposits of several metres overlying sandstone and conglomerate lithologies (Thomas and Rampton, 1982). The study area remained unglaciated through the late Pleistocene as part of the ice-free region known as Beringia (Hopkins et al. 1982). The Laurentide ice sheet advanced to just east of the study area, where it blocked the Peel and Porcupine Rivers, creating glacial Lake Hughes and Glacial Lake Old Crow (Lauriol et al. 2010). Glaciolacustrine and glaciofluvial deposits are present across the study area. Thick colluvial deposits are present on ridge crests and slopes because of tectonic activity and pediment surfaces often have a layer of fine colluvium produced from local upslope bedrock.

Much of the Eagle Plains ecoregion is underlain by the Eagle Plains Basin, a Paleozoic to Cretaceous sedimentary basin which is divided into the Eagle Plains sub-basin and the Bell sub-basin within the study area. The east-west trending Eagle Arch separates the Eagle Plains sub-basin in the south from the Bell sub-basin to the north, both of which are underlain by similar sedimentary bedrock successions consisting of Cambrian to Carboniferous carbonate and clastic rocks overlain by Cretaceous clastic rocks (Osadetz et al. 2005). Layers of sandstone, siltstone, and shale of the Eagle Plains Group underlies two-thirds of the Ecoregion (Smith et al. 2004). Bedrock outcrops are minimal and occur mainly where rivers and streams have downcut

through the overlying Quaternary sediments. Unvegetated areas comprise loose chips of the underlying shale and sandstone units (Smith et al. 2004). Cretaceous rocks underly the Quaternary sediments in the lowlands of the Eagle Plains, while Paleozoic strata underly the sediments in much of the surrounding mountains (Jackson 2012).

Land Use Planning

As noted above, the Eagle Plains Ecoregion faces several existing and potential pressures. To date, there have been no major programs to monitor water quality in the more remote areas of the Eagle Plains away from the Dempster Highway. This study, which focuses on information from streams in remote areas of the ecoregion, will provide important baseline water quality data with which to inform future land use planning decisions.

Significant effort went into preparing the North Yukon Regional Land Use Plan, which includes the Eagle Plains area. The purpose of the Plan is to protect the natural and cultural resources of the region while allowing for current and future economic development opportunities (Yukon and Vuntut Gwitchin Governments, 2009). Most significantly, the Eagle Plains basin contains proven natural gas and oil reserves (Yukon and Vuntut Gwitchin Governments, 2009; Osadetz et al. 2005). Oil and gas exploration occurred in Eagle Plains area in the 1960s; almost all exploration wells are completed and abandoned and are tracked in a Government of the Yukon database.

Oil and Gas Impacts on Water

Exploration for oil and gas and conventional and unconventional production of these resources has the potential to affect water quality and quantity. Ground and surface water can be affected by various types of releases from oil and gas activity. Some examples include:

- surface runoff from a drill or well site
- production water released to local waterways either planned or as a spill
- seepage from failed well casings or drill waste sumps, especially in areas of permafrost melt
- injection of different types of production water into deep groundwater areas
- spills of oil or other non-aqueous phase liquids (e.g., condensate) from tanker trucks or pipelines

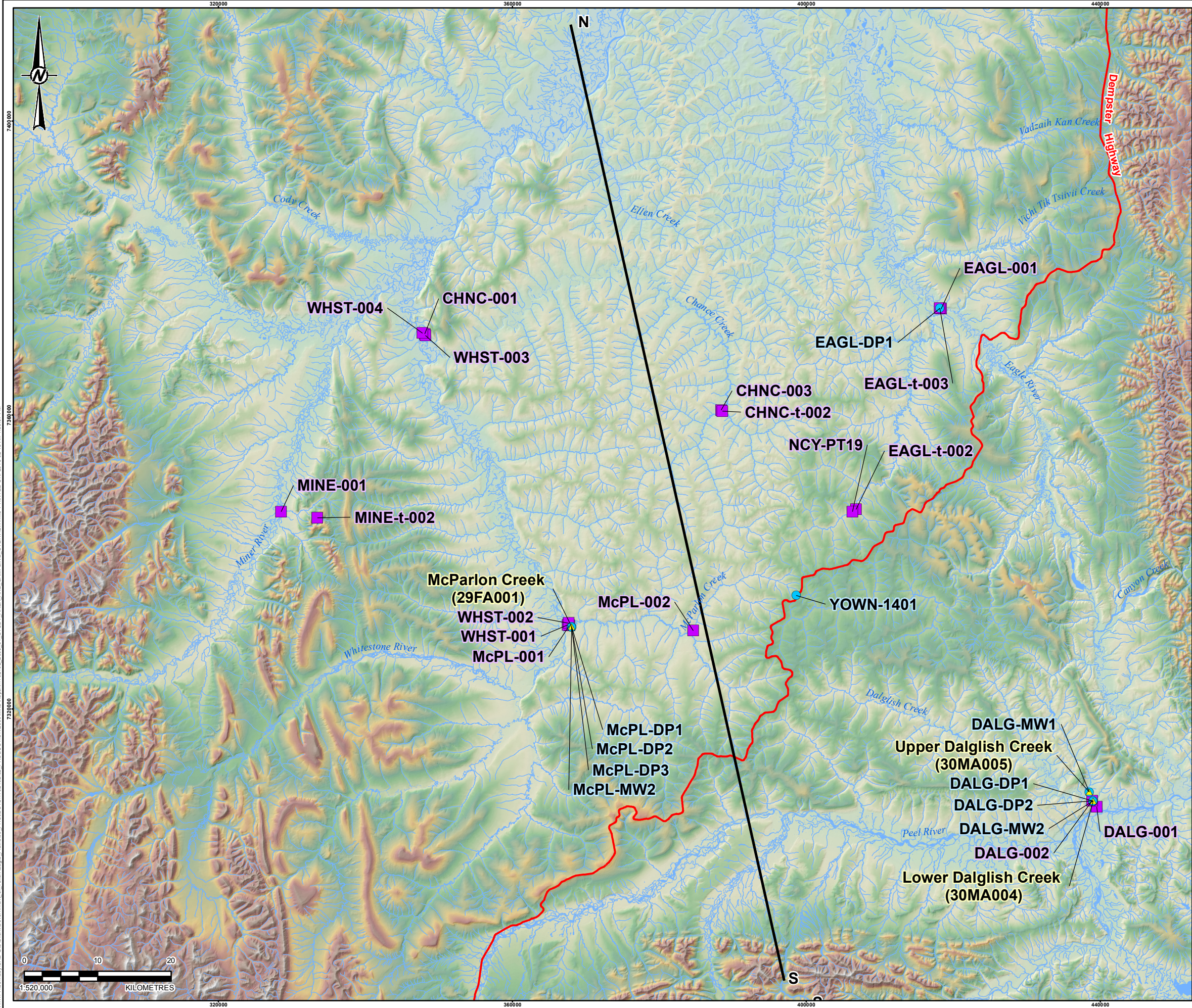
Water from oil and gas sites contains potential contaminants of concern. This can include salts, metals, radioactive isotopes, and organic compounds like benzene. Many of these same constituents can be released from melting permafrost, which is occurring in response to climate warming, and may lead to increased potential for 'salination' of freshwater in the region.

Oil and gas related activities may use and release large quantities of water depending on the production type. This often removes groundwater and surface water from some areas of a watershed. Conversely, waste disposal and some production methods sometimes include injecting water deep into the ground, introducing potentially contaminated waters into deep groundwater aquifers.

Subpermafrost aquifers may be artesian due to the confining nature of the overlying permafrost. Drilling through permafrost into an artesian aquifer has the potential to create uncontrolled discharge conditions when drilling disturbs the thermal regime. Drilling may create an unfrozen conduit for discharge of groundwater under artesian pressures that can be costly to control (e.g. Linell, 1973).

Many of these potential effects can be mitigated. Examples include recycling of water, obtaining proper permits, regulation amount of water use and waste disposal, permit requirements for extensive groundwater monitoring in oil and gas areas, project planning to avoid wetland and surface watersheds wherever possible, increased water treatment of production water, incorporation of appropriate drilling and well construction methods for permafrost conditions as well as incorporation of local land use planning and traditional knowledge.

As noted above, the intention of this study is to improve the understanding of local conditions prior to further development in the Eagle Plains area or further climate change.



LEGEND

- ▲ HYDROMETRIC SAMPLING LOCATION
- GROUNDWATER SAMPLING LOCATION
- SURFACE WATER/SEDIMENT SAMPLING LOCATION
- CROSS SECTION TRANSECT
- HIGHWAY
- WATERCOURSE
- WATERBODY

DRAFT

REFERENCE(S)

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COORDINATE SYSTEM: NAD 1983 UTM ZONE 8N

CLIENT

GOVERNMENT OF YUKON

PROJECT

EAGLE PLAINS WATER AND SEDIMENT QUALITY STUDY

TITLE

EAGLE PLAINS STUDY AREA AND SAMPLING OVERVIEW

CONSULTANT	YYYY-MM-DD	2018-02-15
	DESIGNED	EH
	PREPARED	CDB/MH
	REVIEWED	
	APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
1792402	2000	A	1

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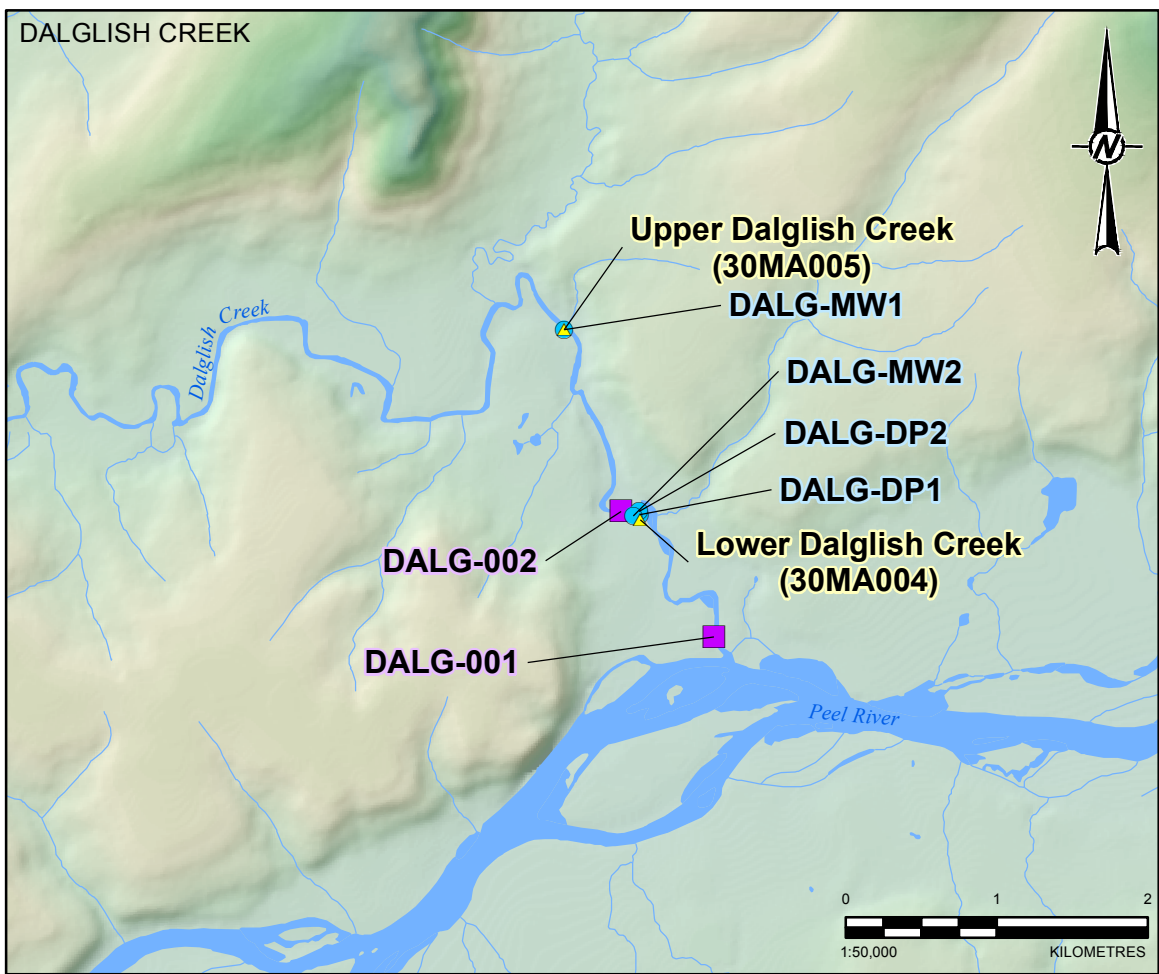
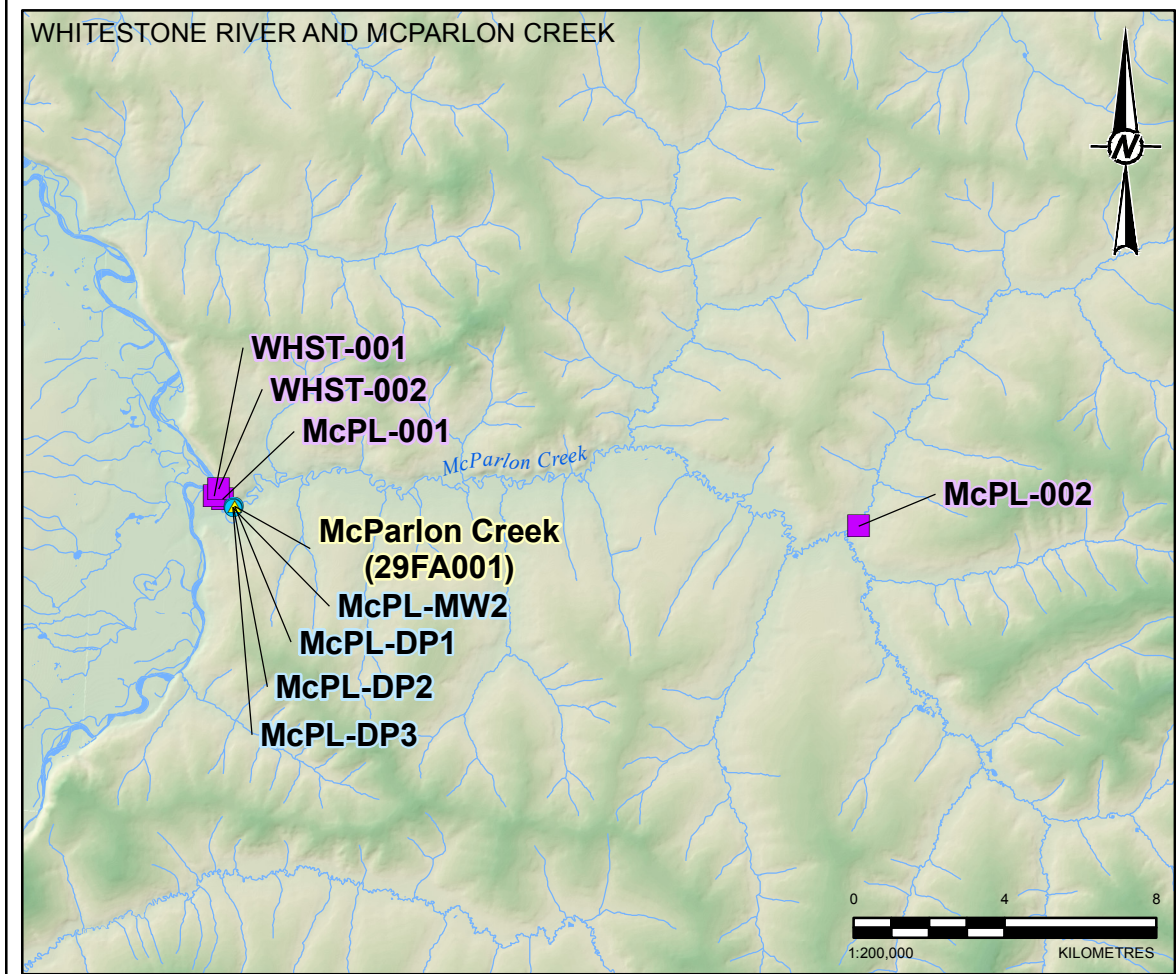
3.0 METHODS

The WRB collected surface water, groundwater, and sediment samples at multiple times of the year: under-ice, freshet, and open-water conditions between March 2012 and September 2017. Surface water samples were collected during four under-ice sampling events (March [winter]), two freshet events (May and June [spring], and nine open-water sampling events (June [late spring], July [late spring], August [summer], and September [fall]) from 2012 to 2017 (Table 1 and 2). Groundwater samples were collected in 2013, 2015, 2016 and 2017 (Table 2). Sediment quality samples were collected once in fall of 2016 (Table 2).

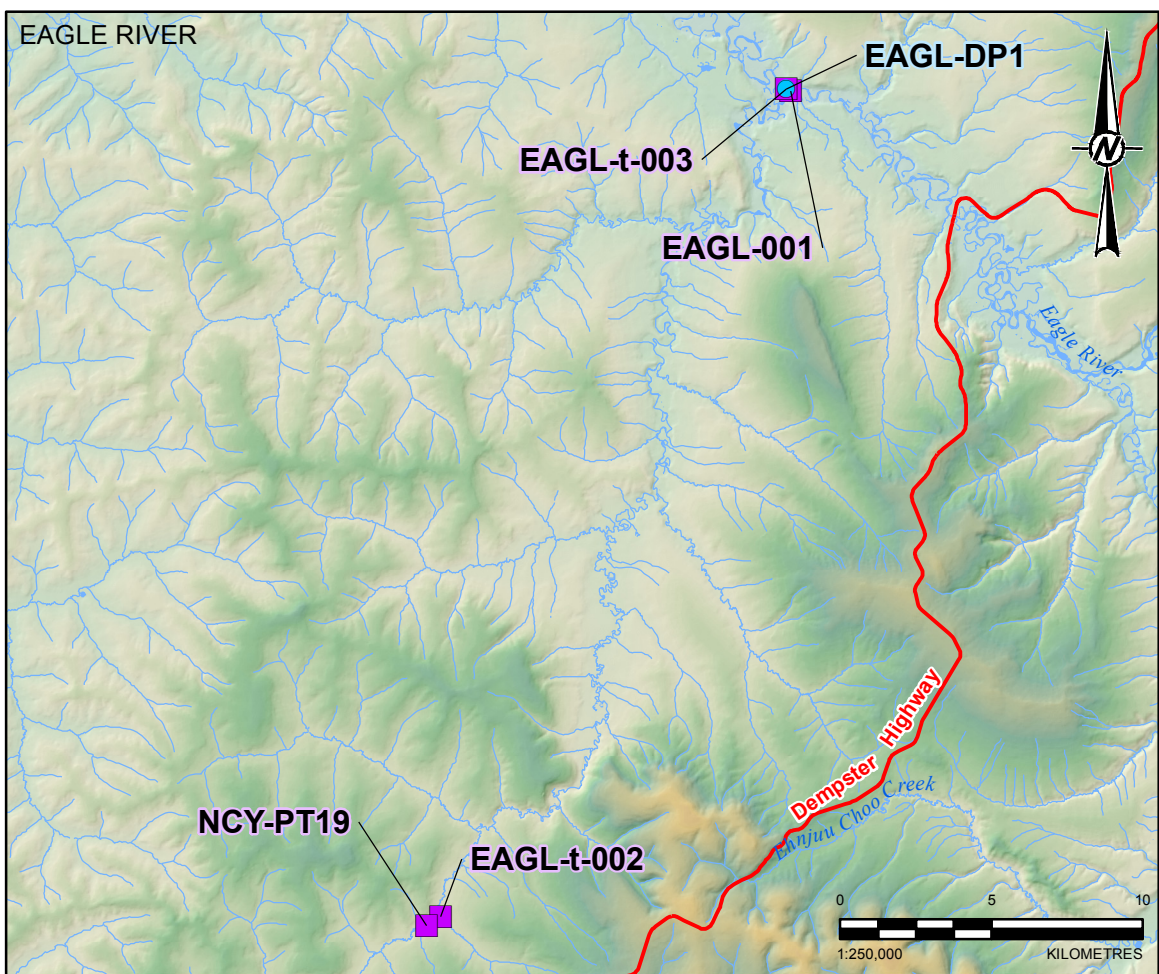
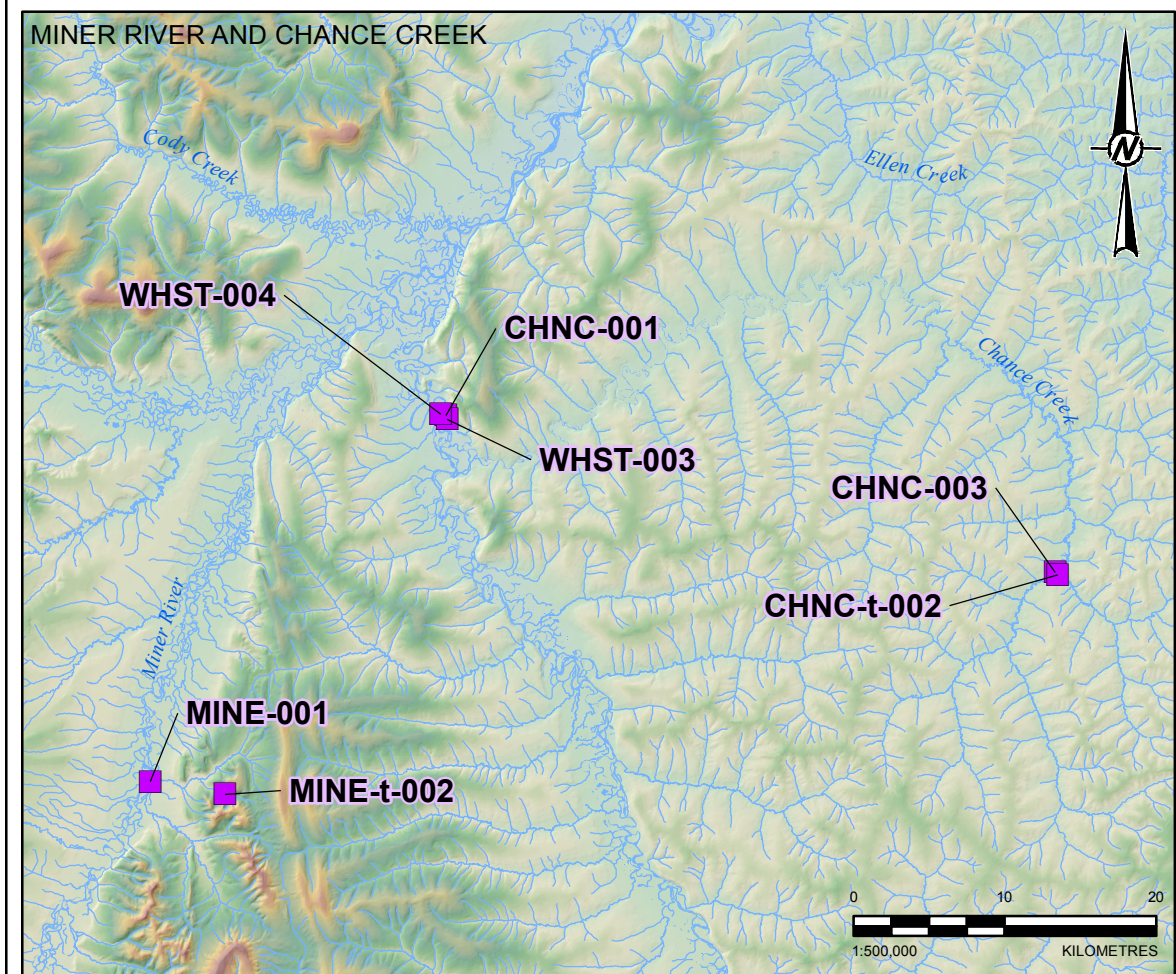
Hydrometric site visits were conducted at three locations, one on lower Dalglish Creek (2013 to 2015), one on upper Dalglish Creek (2015 to 2017), and one on McParlon Creek (2013 to 2017). The Dalglish Creek hydrometric site was relocated in summer 2015 to a more appropriate channel control section. There are no significant stream inputs between the upper and lower site; therefore, it is assumed that the two sites have equivalent discharge. Concurrent stage measurements were continued at both upper and lower Dalglish sites through 2016 and discharge was computed at both sites to confirm they could be related. The full record of Dalglish Creek hydrometric data should be considered as the combined time series for “Dalglish Lower” and “Dalglish Upper.” Because of poor channel control, Dalglish Lower required a rating curve shift for higher water levels.

Table 1: Summary of the Frequency of Surface Water Sampling, 2012 – 2017

Sampling Program	Season	Timing of Sampling
Under-Ice	Winter	March 7 to 25
Freshet	Spring	May 10 and June 5 to 6
Open Water	Late Spring	June 21 to 27 and July 22 to 30
	Summer	August 26 to 27
	Fall	September 18 to 23



- LEGEND
- ▲ HYDROMETRIC SAMPLING LOCATION
 - GROUNDWATER SAMPLING LOCATION
 - SURFACE WATER/SEDIMENT SAMPLING LOCATION
 - HIGHWAY
 - WATERCOURSE
 - WATERBODY



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COORDINATE SYSTEM: NAD 1983 UTM ZONE 8N

CLIENT
GOVERNMENT OF YUKON

PROJECT
EAGLE PLAINS WATER AND SEDIMENT QUALITY STUDY

TITLE
EAGLE PLAINS BASELINE STUDY SAMPLE LOCATIONS

CONSULTANT	YYYY-MM-DD	2018-02-15
DESIGNED	EH	
PREPARED	CDB/MH	
REVIEWED		
APPROVED		

PROJECT NO.	CONTROL	REV.	FIGURE
1792402	2000	A	2



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Table 2: Summary of Water Quality Samples for the Eagle Plains Baseline Water Quality Study

Watershed	Station	Year	2012	2013		2014		2015			2016			2017			Notes	
		Season	Under-Ice	Open-Water		Open-Water		Under-Ice	Freshet	Open-Water	Under-Ice	Freshet	Open-Water		Under-Ice	Open-Water		
		Month	March	July	August	July	Sept	March	June	Sept	March	May	June	Sept	March	June		Sept
Chance Creek	CHNC-001		-	WQ		WQ	WQ	WQ	WQ	WQ	WQ	-	WQ	WQ, SQ	WQ	WQ	WQ	-
	CHNC-t-002		-	-	WQ	WQ	WQ	-	WQ	WQ	WQ	-	-	WQ	-	-	-	-
	CHNC-003		-	-	WQ	WQ	WQ	-	WQ	WQ	-	-	-	-	-	WQ	-	-
Dalglish Creek	DALG-001		WQ	WQ	-	WQ		-	-	-	-	-	-	-	-	-	-	-
	Hydrometric Station 30MA005		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Hydrometric data collected 2015 to 2016
	DALG-002		-	-	-		WQ	-	WQ	WQ	WQ	WQ	WQ	WQ, SQ	WQ	WQ	WQ	-
	Hydrometric Station 30MA004		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Hydrometric data collected 2013 to 2015
	DALG-DP1		-	-	-	-	-	-	-	-	-	-	GW	GW	-	-	-	June to Sept 2016
	DALG-DP2		-	-	-	-	-	-	-	-	-	-	GW	GW	-	-	-	June to Sept 2016
Eagle River	EAGL-001		-	-	WQ	WQ	WQ	WQ	WQ	WQ	WQ	-	-	-	-	-	-	-
	EAGL-t-002		-	-	WQ	WQ	WQ	-	WQ	WQ	-	-	WQ	WQ, SQ	-	-	WQ	-
	EAGL-t-003		-	-	WQ	WQ	WQ	WQ	WQ	WQ	WQ	-	WQ	WQ, SQ	WQ	WQ	WQ	-
	EAGL-DP1		-	-	-	-	-	-	-	GW	-	-	-	-	-	-	-	-
	NCY-PT19		-	-	WQ	WQ	WQ	-	WQ	WQ	-	-	-	-	-	-	-	-
McParlon Creek	McPL-001		-	WQ	-	WQ	WQ	-	WQ	WQ	-	WQ	WQ	WQ, SQ	WQ	WQ	WQ	-
	Hydrometric Station 29FA001		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Hydrometric data collected 2013 to 2016
	McPL-002		-	-	WQ	WQ	WQ	-	WQ	WQ	WQ	-	-	-	-	-	-	-
	McPL-DP1		-	-	-	-	-	-	-	GW	-	-	GW	-	-	-	-	Well destroyed, no monitoring after June 2016
	McPL-DP2		-	-	-	-	-	-	-	-	-	-	GW	GW	-	-	GW	June to Sept 2016
	McPL-DP3		-	-	-	-	-	-	-	-	-	-	-	GW	-	-	-	Replaced well McPL-DP1; no water level data
	McPL-MW1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Sept 2015 to June 2016; well destroyed.
	McPL-MW2		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	June 2016 to Sept 2016; replaced well MW1.
Miner River	MINE-001		-	-	WQ	WQ	WQ	WQ	WQ	-	WQ	-	-		-	-	WQ	-
	MINE-t-002		-	-	WQ	WQ	WQ		WQ	-	-	-	-		-	-	-	-
Whitestone River	WHST-001		-	WQ	-	WQ	WQ	WQ	WQ	WQ	WQ	-	-	-	-	-	-	-
	WHST-002		-	WQ	-	WQ	WQ	WQ	WQ	WQ	WQ	-	-	-	-	-	-	-
	WHST-003		-	WQ	-	WQ	WQ	WQ	WQ	WQ	WQ	-	WQ	WQ	-	-	-	-
	WHST-004		-	WQ	-	WQ	WQ	WQ	WQ	WQ	WQ	-	-	SQ	WQ	WQ	WQ	-
-	YOWN-1401		-	-	GW	-	-	GW	-	-	GW	-	-	GW	GW	-	GW	-

Note: - = no sample collected or no data; WQ= water quality sample collected; GW = groundwater sample collected; SQ = sediment quality sample collected; WSC = Water Survey of Canada.

3.1 Location of Sample Stations

Sampling stations in the Eagle Plains for surface water, groundwater, and sediment are shown in Figures 1 and 2. Coordinates for each station are presented in Table 3. Groundwater sampling stations are divided into two groups: shallow streambed and one deep well at the Northern Cross field camp (YOWN-1401). Note that two groundwater stations, the McPL-DP1 drivepoint piezometer and the McPL-MW1 monitoring well were damaged and were replaced by McPL-DP3 and McPL-MW2 respectively. The sample stations were chosen to approximate areas of new development or downgradient of historic oil and gas exploration wells.

Sampling stations were accessed by helicopter except for groundwater well YOWN-1401, which was accessible by road. Inclement weather and stream conditions prevented access to some of the stations, especially during fall and winter sampling programs.

Table 3: Coordinates of the Surface Water, Groundwater, and Sediment Quality Sampling Stations

Station Code	Data Collected	Latitude	Longitude	Station Description
CHNC-001	WQ, SQ	66.42196	-138.40485	Chance Creek above Whitestone River (Lower Chance Creek)
CHNC-t-002	WQ	66.34446	-137.48928	Chance Creek tributary to Upper Chance Creek
CHNC-003	WQ	66.34589	-137.49375	Chance Creek u/s tributary (Upper Chance Creek)
DALG-001	WQ	65.87538	-136.32643	Dalglish Creek at mouth
30MA005	Flow	5.893400	-136.349150	Upper Dalglish Creek Hydrometric Station
DALG-002	WQ SQ	65.88268	-136.34033	Dalglish Creek u/s Peel River
30MA004	Flow	65.882222	-136.337507	Lower Dalglish Creek Hydrometric Station
DALG-DP1	SB	65.88252	-136.33763	Dalglish Creek drivepoint piezometer
DALG-DP2	SB	65.88272	-136.33773	Dalglish Creek drivepoint piezometer
EAGL-001	WQ	66.47876	-136.83437	Eagle River ~ 8 km below highway
EAGL-DP1	SB	66.47936	-136.83752	Eagle River Trib. drivepoint piezometer
EAGL-t-002	WQ SQ	66.23065	-137.07379	Eagle River tributary
EAGL-t-003	WQ SQ	66.47936	-136.83752	Eagle River tributary
NCY-PT19	WQ	66.22780	-137.08371	Unknown Tributary to Eagle River (d/g Permit 19)
McPL-001	WQ SQ	66.07509	-137.92321	McParlon Creek u/s Whitestone River
29FA001	Flow	66.073590	-137.915900	McParlon Creek u/s Whitestone River Hydrometric Station
McPL-002	WQ	66.07540	-137.55093	McParlon Creek headwaters
McPL-DP1	SB	66.07355	-137.91590	McParlon Creek drivepoint piezometer
McPL-DP2	SB	66.07335	-137.91645	McParlon Creek drivepoint piezometer
McPL-DP3	SB	66.07342	-137.91668	McParlon Creek drivepoint piezometer
McPL-MW1	WL	-	-	McParlon Creek water level monitoring
McPL-MW2	WL	66.07305	-137.91631	McParlon Creek water level monitoring
MINE-001	WQ	66.19488	-138.80895	Miner River u/s Fishing Branch River

Table 3: Coordinates of the Surface Water, Groundwater, and Sediment Quality Sampling Stations

Station Code	Data Collected	Latitude	Longitude	Station Description
MINE-t-002	WQ	66.19012	-138.69850	Miner River tributary
WHST-001	WQ	66.07584	-137.92802	Whitestone River u/s McParlon Creek
WHST-002	WQ	66.07756	-137.92541	Whitestone River d/s McParlon Creek
WHST-003	WQ	66.41982	-138.40279	Whitestone River u/s Chance Creek
WHST-004	WQ SQ	66.42233	-138.41244	Whitestone River d/s Chance Creek
YOWN-1401	GW	66.12307	-137.24473	Northern Cross Camp Well

Note: - = data not available; WQ = surface water quality; SB = streambed groundwater quality; SQ = sediment quality; GW = groundwater quality; u/s = upstream; d/s = downstream; d/g = downgradient; WL = water level monitoring.

Most of the sampling stations are located with bedrock that is part of the Eagle Plains Group, including the Cody Creek Formation, Burnthill Creek Formation and Parkin Formation. Bedrock of the Eagle Plains Group consists mostly of shale and mudstone with some minor occurrences of sandstone, siltstone, coal and conglomerate. Sampling locations within the Eagle Plains Group include stations located in the Whitestone River watershed, McParlon Creek, YOWN-1401, Chance Creek, and the Eagle River tributary stations NCY-PT19 and EAGLE-t-002. The remainder of the Eagle River and tributary stations are located within the Upper Devonian Imperial formation, which consists of dark grey shale and siltstone. Dalglish Creek sampling locations are found within the Heart River Formation, a clastic carbonate formation including limestone, packstone, sandstone, siltstone and shale. Miner River and Miner River tributary sampling stations are in the Ford Lake Formation, which consists of mainly of pyritic shale with lesser occurrences of siltstone, conglomerate, silty limestone and sandstone.

3.2 Monitoring Well Installation

3.2.1 Streambed Sampling Stations

Solinst™ 615N drivepoint piezometers were installed in streambeds beneath three creeks to sample the groundwater in the transition zone between surface water and groundwater. The Solinst 615N drivepoints piezometers are stainless steel with stainless steel couplings and extensions. The piezometers were installed using a manual slide hammer to a depth of approximately 1 m below the surface of the streambed. The drivepoints consist of a pointed drive tip followed by a section containing circular slots screened with a stainless-steel mesh.

Six (6) drivepoint piezometers were sampled for this study, one at an Eagle River Tributary (EAGL-DP1), two in Dalglish Creek (DALG-DP1 and DALG-DP2) and three in McParlon Creek (McPL-DP1, McPL-DP2, McPL-DP3).

3.2.2 Northern Cross Camp Well (YOWN-1401)

YOWN-1401 was drilled and installed as a water supply well at the Northern Cross Yukon Ltd. Eagle Plains field camp. YOWN-1401 was drilled using the air rotary drilling method to a depth of 45 m with a borehole diameter of 155.6 mm. A plastic liner was installed in the borehole from a depth of 18 m to 42 m. The liner is slotted from 26.5 m to 42 m. Bentonite grout was used to seal the hole from surface to 20 m. During drilling, claystone or silty claystone were the dominant rock type encountered. Depth to water in YOWN-1401 varied between approximately 7 to 10 metres below ground surface (mbgs). A datalogger was installed in the well in 2014 and had recorded continuous data (water level, temperature and conductivity) from 2014 to 2017.

3.2.3 Monitoring Wells

Monitoring wells for water level were installed using a Shaw backpack drill with a 51 mm outside diameter coring bit. Well construction consisted of 10-slot (0.010 inch), schedule 40 PVC pipe with a 2" outside diameter. Monitoring wells were installed next to the creek hydrometric stations at McParlon Creek and Dalglish Creek and equipped with dataloggers which recorded water level, temperature and specific conductivity. Due to issues encountered with the dataloggers (specific conductivity was below the minimum value the datalogger could measure) and the lack of consistent manual measurements with which to correct water level data, the continuous logger data is not presented here.

3.3 Field Sampling Methods

3.3.1 Surface Water Quality

At each sampling station, water depth and physico-chemical measurements were collected. In situ physico-chemical measurements of specific conductivity, dissolved oxygen concentration (DO), pH, water temperature, and turbidity were collected at the time the surface water sample was collected.

During freshet and open-water conditions, surface water samples were collected by hand. Bottles were submerged below the water surface and filled with the opening facing upstream into the current. During under-ice conditions, a hole was chipped or augured through the ice and the surface water samples were collected with a sampling pole with a plastic 1 L sampling bottle attached to the end. Sample bottles were filled using the sampling pole, except for hydrocarbon bottles, which were filled by hand from the hole in the ice.

An extra "Field" sampling container was filled at each station to use later for filtering. The "Field" sampling container was used to fill the total mercury vials and filter water for dissolved constituent analysis (i.e., dissolved trace metals, dissolved mercury, and dissolved organic carbon). After sample collection, and after filtering, samples were preserved: nutrient samples were preserved with sulphuric acid; total and dissolved organic carbon and total and dissolved mercury samples were preserved with hydrochloric acid; total and dissolved metals, Radium 226, and naturally occurring radioactive materials (NORMs) samples were preserved with nitric acid; benzene, toluene, ethylbenzene, styrene and xylenes (BTEX)/volatile hydrocarbons (VH) and volatile petroleum hydrocarbons (VPH) vials were pre-preserved with sodium bisulphate; and polycyclic aromatic hydrocarbons (PAH) samples were preserved with sodium azide.

Water samples for dissolved gas analysis were collected in 150mL glass serum bottles that were pre-sealed with butyl-blue stoppers and evacuated to 1×10^{-2} mbars. Gas samples were collected using an inverted bottle method, where an evacuated bottle is filled in an inverted position, underwater such that the container is filled without contact with the atmosphere. Gas samples were analyzed at the University of Calgary by the Applied Geochemistry Group. Prior to analysis, 25mL of headspace is created in each bottle by replacing 25 mL of water with ultra-pure helium. Gas samples were then analyzed on a gas chromatograph. Gas sampling and analysis was completed following EPA Standard Operating Procedures (EPA 2001, 2006).

Isotope samples were collected by filling the sample bottle leaving no headspace. Isotope samples were analyzed at the University of Calgary Applied Geochemistry - Isotope Science Laboratory.

Duplicate samples, field blanks and/or trip blanks were collected for Quality Assurance/Quality Control purposes during each sampling event. Field blanks and trip blanks were provided by the analytical laboratory prior to each survey. Duplicate samples were collected on-site immediately following the regular sample using the same methods. Field blanks were processed on-site by pouring blank water from DI water supplied by the laboratory into the sample bottles, except for PAH and NA samples which were provided in the sample container and were

briefly exposed to the sampling station environment by removing the lid. Trip blanks accompanied samplers for at least one day of the survey and were never opened.

Surface water quality samples were analyzed for a suite of constituents as follows:

- Conventional parameters: pH, specific conductivity, hardness, alkalinity, total dissolved solids (TDS), total suspended solids (TSS), total organic carbon (TOC), dissolved organic carbon (DOC), total inorganic carbon (TIC), and dissolved inorganic carbon (DIC);
- Major ions: bicarbonate, bromide, calcium, carbonate, chloride, hydroxide, magnesium, potassium, sodium, and sulphate;
- Nutrients: nitrate, nitrite, nitrate+nitrite, total ammonia, total Kjeldahl nitrogen, total nitrogen, total phosphorus, dissolved phosphorus, and dissolved phosphorus as phosphate;
- Volatile organic hydrocarbons: (BTEX, VH and VPH); and
- Total and dissolved metals.

Additionally, the following constituents were analyzed during a subset of sampling events:

- Radium 226, naturally occurring radioactive materials (NORMs), polycyclic aromatic hydrocarbons (PAHs), and naphthenic acids (NAs);
- Isotopes: oxygen-18 ($\delta^{18}\text{O}$) in water, deuterium ($\delta^2\text{H}$) in water, $\delta^{13}\text{C}$ in dissolved inorganic carbon (DIC), $\delta^{34}\text{S}$ in sulphate (SO_4) and $\delta^{18}\text{O}$ in SO_4 ; and
- Dissolved gases: methane (CH_4), C_2 and C_3 hydrocarbons (primarily ethane and propane), carbon dioxide (CO_2), nitrogen (N_2), and oxygen (O_2).

Naphthenic acids and PAH sample collection was discontinued after March 2015. Some nutrient parameters (nitrate+nitrite, total Kjeldahl nitrogen, total phosphorus, and dissolved phosphorus) were not reported during sampling conducted in 2014. Ultra-trace PAH analysis was conducted and initially provided as non-blank corrected data. After discussion with the laboratory, blank-corrected data was provided to make interpretation and future use of the data more straightforward.

Samples, including QA/QC samples were kept in coolers with ice packs during the survey and shipped back to Whitehorse typically within three days of sample collection. Samples were sent to Exova Canada Inc. based in Surrey, BC for laboratory analysis with the following exceptions:

- July 2014, September 2014, and March 2015 samples were analyzed by CARO Analytical Services, based in Richmond, BC; and
- PAHs and NAs samples were analyzed by AXYS Analytical Services in Sydney, BC

3.3.2 Groundwater Quality

Groundwater samples from the drivepoint piezometers were acquired using either a peristaltic pump or a micro-flow Waterra™ foot valve. Temperature, pH, specific conductivity, dissolved oxygen, redox potential, and turbidity were measured in the field.

Groundwater samples were analyzed for a similar suite of parameters as surface water (Section 3.3.1), including: conventional parameters (pH, conductivity, alkalinity, total dissolved solids, total suspended solids and total and dissolved organic and inorganic carbon), major ions, total and dissolved metals, volatile organic compounds, polycyclic aromatic hydrocarbons, Radium 226 and NORMs, isotopes, and dissolved gases.

Water samples for dissolved gas analysis are collected in 150mL glass serum bottles that have been pre-sealed with butyl-blue stoppers and evacuated to 1×10^{-2} mbars. Gas samples were collected using an inverted bottle method, where an evacuated bottle is filled in an inverted position, underwater such that the container is filled without contact with the atmosphere. Gas samples were analyzed at the University of Calgary Applied Geochemistry Group. Prior to analysis, 25 mL of headspace is created in each bottle by replacing 25 mL of water with ultra-pure helium. Gas samples were then analyzed on a gas chromatograph. Gas sampling and analysis was completed following EPA Standard Operating Procedures (EPA 2001, 2006).

Isotope samples were collected by filling the sample bottle with no headspace. Isotope samples were analyzed at the University of Calgary Applied Geochemistry - Isotope Science Laboratory.

An extra “Field” sampling container was filled at each sampling station to use later for filtering. At the Eagle Plains Hotel, the “Field” sampling container was used to fill the total mercury vials and for filtering dissolved samples (dissolved trace metals, dissolved mercury, and dissolved organic carbon). Nutrients samples were preserved with sulphuric acid. Total and dissolved organic carbon, and total and dissolved mercury samples were preserved with hydrochloric acid. Total and dissolved metals, Radium 226, and NORMs samples were preserved with nitric acid. BTEX/VH/VPH vials were pre-preserved with sodium bisulphate. PAH samples were preserved with sodium azide.

3.3.3 Sediment Quality

In September 2016, sediment samples were collected at six stations using a handheld Rotary-Bucket Bed Material Sampler (Edwards and Glysson 1999). Samples were collected from depositional areas targeting the finest grain size observed at the station.

Composite samples of 200 grams of sediment (composited from two or three grabs) were collected at each station and placed in a Ziploc® sample bag. Composite samples were analyzed for total metals, total nitrogen, and total phosphorus.

An additional 100 grams of sediment (from one grab sample) was collected and placed in a glass jar without headspace. At EAGL-T-003, sediment from two grab samples was required to meet the sample volume and was first combined in a Ziploc bag and then transferred into a glass jar. Jarred samples were analyzed for BTEX and VPH.

Sediment samples were stored, transported, and analyzed as described in Section 3.3.1 above. Samples collected from each sampling station were analyzed as whole fraction and as 2 mm size fraction (assumed to be as per USEPA 2001).

3.3.4 Hydrometric and Continuous Data

Hydrometric data was collected at three sampling stations, two on Dalglish Creek (upper Dalglish [30MA005] and lower Dalglish [30MN004]) and one on McParlon Creek (29FA001). The upper Dalglish hydrometric station replaced the lower Dalglish station in 2015 and the two stations create a combined time series covering 2013 to 2017. Solinst level loggers and barologgers were used to record stage as instantaneous values at 15-minute intervals. Stage was measured during field visits from 2013 to 2017 using a manual staff gauge and level survey results tied into benchmarks. Field discharge measurements were measured using either a Price AA current meter or Sontek S5 ADP flow meter. Groundwater levels near the creek banks were recorded in monitoring wells at McParlon Creek using Solinst level loggers (McPL-MW1/MW2). Groundwater levels were also recorded in McParlon and Dalglish Creeks using Solinst level loggers in the drivepoint piezometers DALG-DP1, DALG-DP2, and McPL-DP2. Specific conductivity was also recorded by level logger at hourly intervals at EAGL-t-003, McPL-001, DALG-002 and EAGL-t-002; however specific conductivity data was only available for EAGL-t-003 (September 2016 to September 2017) and McPL-001 (June 2017 to September 2017).

3.4 Data Compilation and Screening

3.4.1 Data Receipt and Upload to Database

Surface water quality, groundwater quality, and sediment quality data collected from March 2012 to September 2017 in the Eagle Plains area were provided by Environment Yukon. Data provided included global positioning system (GPS) coordinates, field sampling methodology, field data (where available), and, the original laboratory reports (i.e., electronic data files and pdfs). Data was checked for completeness and initial quality assurance (QA) checks were conducted. Quality control (QC) samples (e.g., duplicates, split samples, field blanks, and/or trip blanks) were identified for further assessment, and field data underwent a validation step. The field and laboratory results were uploaded to EQulS to facilitate the data analyses and avoid transcription errors associated with manual data entry. Hydrology data was provided by Environment Yukon in the format of Excel spreadsheet. Hydrology data was stored in the Environment Yukon database, Aquarius.

3.4.2 Quality Assurance and Quality Control Procedures

A rigorous QA/QC assessment was completed to determine whether data collected were of known, acceptable, and defensible quality. A brief description of the methods is provided below. Detailed QA/QC procedures and the results from the analyses are provided in Appendix A.

Field data underwent a validation step before loading to EQulS to verify that all necessary data were collected, and that outliers or suspect data were identified and appropriate follow-up completed. Field sampling methodologies provided by Environment Yukon were reviewed for completeness and for consistency with CCME methodologies (CCME 2011, 2015). Hydrological data underwent similar and appropriate QA/QC checks.

The original laboratory reports were reviewed for deviations that could affect the integrity of the sample (e.g., sample storage, sample temperature, bottle breakage), the use of the appropriate detection limits, assignment of laboratory qualifiers, and the laboratory QC results (e.g., laboratory duplicates, spikes, and method blank samples). Environment Yukon was informed of any issues, and additional follow-up with the laboratories was completed, if and when required and appropriate.

Parameters with holding times longer than the laboratory recommended holding times (i.e., derived from American Public Health Association [APHA] 2012) were reviewed for patterns and the significance of not meeting the recommended times. Corresponding dissolved and total concentrations were compared for each parameter to

determine whether the dissolved values were greater than corresponding total values and if necessary the appropriate flags were added.

Approximately 10% of the hard copies of the laboratory results were compared to the data entered in the database, and if errors were identified, data was re-entered, and further checks were completed.

The available QC results from field blanks, travel blanks, duplicates, or split samples were evaluated based on CCME protocols for water quality samples (CCME 2011) and were used to assess potential sample contamination during collection, shipping and analysis, as well as to check intra-station variation and precision of field sampling methods. Water quality data from the principal water samples were interpreted with any identified limitations or bias in mind.

3.4.3 Isotope Precipitation Data

Isotopic data for $\delta^{18}\text{O}$ and $\delta^2\text{H}$ in surface water and groundwater samples was compared to isotopic data for precipitation from the International Atomic Energy Association (IAEA) Global Network of Isotopes in Precipitation (GNIP). The closest GNIP station was in Mayo, with an isotopic record from 1985 to 1989 (IAEA 2017). Years for which complete, or almost complete monthly datasets were available were limited to 1986 to 1988. The local meteoric water line (LMWL), which represents the relationship between $\delta^{18}\text{O}$ and $\delta^2\text{H}$ in the local precipitation, was calculated by Golder for this project using data from 1986 to 1988 and was found to be $\delta^2\text{H} = 6.3 \delta^{18}\text{O} - 37$. This LMWL for Mayo is similar to the LMWL described in Lapp (2015) for Dawson City ($\delta^2\text{H} = 6.3 \delta^{18}\text{O} - 35.7$), which is 280 km southwest of Eagle Plains. Mayo is located approximately 150 km south of the Eagle Plains Region, at similar elevation, and as such the isotopic signature of precipitation in the study area may differ slightly from that observed at the Mayo GNIP station. Isotopic data from Eagle Plains was also compared to the isotopic data from the Inuvik GNIP station, however there is a more limited record from this station ($n = 14$). The LMWL for Inuvik, based on the GNIP data, was calculated to be $\delta^2\text{H} = 7.3 \delta^{18}\text{O} - 3.6$. The LMWLs for Mayo and Dawson City plot below the global meteoric water line (GMWL), defined as $\delta^2\text{H} = 8.2 \delta^{18}\text{O} + 11.3$ (Rozanski et al. 1993), while the LMWL for Inuvik plots above the LMWL.

The average values for $\delta^{18}\text{O}$ and $\delta^2\text{H}$ in Mayo precipitation were weighted by the amount of precipitation each month from 1986 to 1988 and were found to be -20.6 and -164 ‰, respectively. The amount-weighted precipitation values for the Eagle Plains area, based on a map of precipitation values for Canada (Gibson et al. 2005) is approximately -23 and -177 ‰, respectively. In general, the trend in $\delta^{18}\text{O}$ and $\delta^2\text{H}$ at increasing latitude is towards more depleted (more negative) isotopic values.

3.4.4 Data Validation

Once loaded in EQulS, data was exported in a format appropriate for use in the Golder Excel-based post-processor tools. The data were initially screened using a tool that illustrates the spatial and geographical spread of the data; the focus of the screening was to identify the following:

- extreme outliers (i.e., data points that fell well outside of the remaining data cloud);
- step changes in the observed data that, upon further inspection, were likely attributable to changes in analytical methods of the laboratory completing the analysis (i.e., change of method detection limits); and
- potential seasonality that could later be further characterized.

Invalidation of the individual outliers was determined case by case, and these results were appropriately flagged or removed from the assessment.

3.5 Data Analyses

3.5.1 Key Question 1: What is surface water, groundwater, and sediment quality at baseline?

3.5.1.1 *Comparison to Water Quality Guidelines*

The seasonal surface water quality data was compared to the acute, chronic (long-term) and interim water quality guidelines for the protection of aquatic life (CCME 1999, with updates to 2017). If no CCME aquatic life guideline was available for a parameter, Approved Water Quality Guidelines (BC MOE 2017) from British Columbia Ministry of Environment (BC MOE) were used to supplement guideline comparison. Detailed guideline comparisons of seasonal surface water quality data in each watershed are provided in Tables B-1 to B-6. A summary of water quality guidelines applied in the Eagle Plain Baseline Study is presented in Table 4.

Like surface water, groundwater quality data was compared to the CCME chronic water quality guidelines for the protection of aquatic life and Approved Water Quality Guidelines from BC MOE. In addition, groundwater data was also compared to the Yukon Contaminated Sites Regulation Generic Numerical Water Standards for the Protection of Freshwater Aquatic Life (CSR – Environment Yukon, 2002). Both total and dissolved metals in groundwater were compared to the Yukon CSR standards. The Yukon CSR standards apply to total metals in surface water; however, the CCME and BC MOE guidelines were considered more up-to-date and useful for surface water comparisons. The comparison to total metals in groundwater is made for reference purposes only. Detailed guideline comparisons of groundwater quality data in each watershed are provided in Tables C-1 to C-4.

Table 4: Water Quality Guidelines Applied in the Eagle Plain Baseline Study

Parameter	Units	Water Quality Guidelines for the Protection of Aquatic Life					CSR Aquatic Life Numerical Standards (Environment Yukon)
		Acute (CCME)	Chronic (CCME)	Interim Guideline (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	
Field Measured							
pH	-	-	6.5 to 9.0	-	-	-	-
Dissolved oxygen	mg/L	-	5.5 to 9.5	-	-	-	-
Conventional Parameters							
Total alkalinity	mg/L	-	-	-	20 ^(a)	-	-
Major Ions							
Chloride	mg/L	640	120	-	-	-	-
Fluoride	mg/L	-		0.12	-	-	-
Sulphate	mg/L	-	-	-	128 to 429 ^(b, c)	-	1,000
Nutrients							
Nitrate	mg-N/L	550	13	-	-	-	400
Nitrite	mg-N/L	-	0.06	-	-	-	0.2
Nitrate and nitrite	mg-N/L	-	-	-	3.0	33	-
Total ammonia	mg-N/L	-	0.07 to 23.9 ^(d)	-	-	-	1.3 to 18.4 ^(d)
Total Metals							
Aluminium	µg/L	-	5.0 to 100 ^(e, f)	-	-	-	-
Antimony	µg/L	-	-	-	9.0	-	200
Arsenic	µg/L	-	5.0	-	-	-	50
Barium	µg/L	-	-	-	1,000	-	10,000
Beryllium	µg/L	-	-	-	0.13	-	53
Boron	µg/L	29,000	1,500	-	-	-	-
Cadmium	µg/L	0.11 to 7.7 ^(b)	0.040 to 0.37 ^(b)	-	-	-	0.3 to 0.6 ^(b)
Chromium	µg/L	-	1.0	-	-	-	10
Cobalt	µg/L	-	-	-	4.0	110	9.0
Copper	µg/L	-	2.0 to 4.0 ^(b)	-	-	-	30 to 90 ^(b)
Iron	µg/L	-	300	-	-	-	-

Table 4: Water Quality Guidelines Applied in the Eagle Plain Baseline Study

Parameter	Units	Water Quality Guidelines for the Protection of Aquatic Life					CSR Aquatic Life Numerical Standards (Environment Yukon)
		Acute (CCME)	Chronic (CCME)	Interim Guideline (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	
Total Metals (cont'd)							
Lead	µg/L	-	1.0 - 7.0 ^(b)	-	-	-	50 to 160 ^(b)
Manganese	µg/L	-	-	-	878 to 2,585 ^(b)	1,223 to 3,394 ^(b)	-
Mercury	µg/L	-	0.026	-	-	-	1.0
Molybdenum	µg/L	-	73	-	-	-	10,000
Nickel	µg/L	-	25 to 150 ^(b)	-	-	-	650 to 1500 ^(b)
Selenium	µg/L	-	1.0	-	-	-	10
Silver	µg/L	-	0.25	-	-	-	0.5 to 15 ^(b)
Thallium	µg/L	-	0.8	-	-	-	3.0
Titanium	µg/L	-	-	-	-	-	1,000
Uranium	µg/L	33	15	-	-	-	3,000
Vanadium	µg/L	-	-	-	-	0.1	-
Zinc	µg/L	-	30	-	-	-	75 to 2400 ^(b)
Dissolved Metals							
Aluminium	µg/L	-	-	-	33 to 50 ^(e)	65 to 100 ^(e)	-
Antimony	µg/L	-	-	-	-	-	200
Arsenic	µg/L	-	-	-	-	-	50
Barium	µg/L	-	-	-	-	-	10,000
Beryllium	µg/L	-	-	-	-	-	53
Cadmium	µg/L	-	-	-	0.15 to 0.46 ^(b)	0.36 to 2.8 ^(b)	0.3 to 0.6 ^(b)
Chromium	µg/L	-	-	-	-	-	10
Cobalt	µg/L	-	-	-	-	-	9.0
Copper	µg/L	-	-	-	-	-	30 to 90 ^(b)
Iron	µg/L	-	-	-	-	350	-
Lead	µg/L	-	-	-	-	-	50 to 160 ^(b)
Mercury	µg/L	-	-	-	-	-	1.0

Table 4: Water Quality Guidelines Applied in the Eagle Plain Baseline Study

Parameter	Units	Water Quality Guidelines for the Protection of Aquatic Life					CSR Aquatic Life Numerical Standards (Environment Yukon)
		Acute (CCME)	Chronic (CCME)	Interim Guideline (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	
Dissolved Metals (cont'd)							
Molybdenum	µg/L	-	-	-	-	-	10,000
Nickel	µg/L	-	-	-	-	-	650 to 1500 ^(b)
Selenium	µg/L	-	-	-	-	-	10
Silver	µg/L	-	-	-	-	-	0.5 to 15 ^(b)
Thallium	µg/L	-	-	-	-	-	3.0
Titanium	µg/L	-	-	-	-	-	1,000
Uranium	µg/L	-	-	-	-	-	3,000
Zinc	µg/L	-	-	-	-	-	75 to 2400 ^(b)
Volatile Organics							
Benzene	µg/L	-	-	370	-	-	4,000
Ethylbenzene	µg/L	-	-	90	-	-	2,000
Toluene	µg/L	-	-	2.0	-	-	390
Xylenes	µg/L	-	-	-	30	-	
Styrene	µg/L	-	-	72	-	-	
Volatile Hydrocarbons	µg/L	-	-	-	-	-	15,000
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	-	-	1,500
Methyl tert-Butyl-Ether	µg/L	-	-	10,000	-	-	-
PAHs							
Naphthalene	µg/L	-	-	1.1	1.0	-	10
Acenaphthene	µg/L	-	-	5.8	6.0	-	-
Fluorene	µg/L	-	-	3.0	12	-	120
Phenanthrene	µg/L	-	-	0.4	0.3	-	3.0
Anthracene	µg/L	-	-	0.012	0.1	-	1.0
Pyrene	µg/L	-	-	0.025	0.02	-	0.2

Table 4: Water Quality Guidelines Applied in the Eagle Plain Baseline Study

Parameter	Units	Water Quality Guidelines for the Protection of Aquatic Life					CSR Aquatic Life Numerical Standards (Environment Yukon)
		Acute (CCME)	Chronic (CCME)	Interim Guideline (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	
PAHs (cont'd)							
Fluoranthene	µg/L	-	-	0.04	0.2	-	2.0
Benzo(a)anthracene	µg/L	-	-	0.018	0.1	-	1.0
Benzo(a)pyrene	µg/L	-	-	0.015	0.01	-	0.1

a) Guideline is a minimum value, unless the background concentration or value is lower.

b) Guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (12 to 2,420 mg/L). The guideline is calculated based on the individual hardness value for each sample.

c) For some samples, water hardness was greater than 250 mg/L. At this hardness, no BC MOE water quality guideline has been established for sulphate; however, the observed data were screened against the guideline for very hard water (i.e., 429 mg/L) for comparative purposes.

d) The ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.07 mg-N/L) is based on the combination of field pH (9.0) and water temperature (17°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.

e) Guideline is pH dependent. The guideline range shown is based on the pH range observed in the dataset (5.9 to 8.2). The guideline is calculated based on the individual pH for each sample.

f) Guideline is pH dependent: 5 µg/L at pH <6.5 and 100 µg/L at pH ≥ 6.5.

Note: - = no guideline; CaCO₃ = calcium carbonate; µg/L = micrograms per litre; mg/L = milligrams per litre; mg-N/L = milligrams of nitrogen per litre.

CCME (Canadian Council of Ministers of the Environment). 1999, with updates to 2017. Canadian Environmental Quality Guidelines. Winnipeg, MB, Canada.

BC MOE Guidelines (British Columbia Ministry of Environment Guidelines). 2017. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture.

Environment Yukon Contaminated Sites Regulation, 2002.

3.5.1.2 Water Quality Parameters without Guidelines

The following summary tables provide general ranges for water quality comparisons. The classifications used are not specific to the Yukon but do provide general context for interpreting water quality data, particularly for those parameters that do not have national water quality guidelines. If local conditions warranted further examination, consideration was given to the site-specific characteristics of the Eagle Plains related to the complex glacial history of the watershed.

pH

The pH is a measure of the hydrogen ion activity (or concentration) in a solution and is expressed as the negative logarithm of hydrogen ion concentration. The greater the hydrogen ion activity in water, the more acidic it is. Because it is expressed as the negative logarithm, higher hydrogen ion activity corresponds to lower pH values. Solutions with low hydrogen ion activity are alkaline (basic) and have a high pH. Neutral waters have a pH of 7. Most aquatic organisms can tolerate waters with a pH between 6 and 9, as commonly found in many of the natural surface waters in Canada. Acidic deposition can lower the pH of a waterbody. Also, during spring freshet, the pH of surface waters can temporarily drop to values approximating the pH of precipitation (e.g., 5.1 to 5.4; Schindler 1996), which is referred to as an acid pulse, or episodic acidification.

Dissolved Oxygen

Adequate amounts of dissolved oxygen (DO) are required to support fish and other organisms in aquatic systems (Wetzel 2001). The solubility of oxygen depends on the partial pressure of oxygen in the air, water temperature, turbulence, mineral content of the water, and the ability of the water to exchange freely with the atmosphere.

McNeely et al. (1979) state the typical concentration of DO in surface waters to be less than 10 mg/L. The solubility of atmospheric oxygen in fresh water ranges from approximately 15 mg/L at 0 degrees Celsius (°C) to 8 mg/L at 25°C at sea level (McNeely et al. 1979). Concentrations less than 5 mg/L may result in adverse effects to aquatic organisms (CCME 1999).

Alkalinity

The capacity of a water sample to neutralize acids is termed alkalinity. This measurement provides an indication of a waterbody's sensitivity to acid deposition or its acid neutralizing capacity (ANC). Saffran and Trew (1996) presented a scale of surface water sensitivity to acidification based on alkalinity and acid neutralizing capability (Table 5).

Table 5: Scale of Acid Sensitivity Based on Alkalinity in Lakes

Acid Sensitivity	Alkalinity or Acid Neutralizing Capacity	
	(mg/L as CaCO ₃)	(µeq/L)
High	0 to 10	0 to 200
Moderate	>10 to 20	>200 to 400
Low	>20 to 40	>400 to 800
Least	>40	>800

Source: Saffran and Trew (1996).

mg/L = milligrams per litre; µeq/L = microequivalents per litre; CaCO₃ = calcium carbonate.

Total Suspended Solids

The concentration of all solid particles in the water column is referred to as total suspended solids (TSS). High TSS values can cause stress to aquatic life depending on both the TSS concentration and the duration of exposure (Newcombe and Jensen 1996). Concentrations of TSS below 25 mg/L are generally not considered harmful to aquatic life (DFO and DOE 1983; EIFAC 1965; US EPA 1973). Aquatic organisms can withstand low concentrations of TSS for long periods and higher concentrations for shorter periods (Newcombe and MacDonald 1991). CCME guidance for TSS is dependent upon background concentrations (Table 6). Given the variability in the receiving environment TSS, a general characterization was provided as low, moderate, or high based on Newcombe and MacDonald (1991) (Table 7).

Table 6: Water Quality Guidelines for Total Particulate Matter

Description	Suspended Solids (mg/L) Short-Term Exposure (24-hour period)	Suspended Solids (mg/L) Longer Term Exposures (24-hour to 30-day period)
Clear Flow	Maximum increase of 25 mg/L from background levels	Maximum average increase of 5 mg/L from background levels
High Flow	Maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L. Should not increase more than 10% of background levels when background is >250 mg/L.	

Source: Canadian Water Quality Guidelines for the Protection of Aquatic Life – Total Particulate Matter. (Caux et al. 1997)
Available at: <http://ceqg-rcqe.ccme.ca/download/en/217>.

mg/L = milligrams per litre.

Table 7: Qualitative Scale of Total Suspended Solids

Description	Total Suspended Solids (mg/L)
Low	<10
Moderate	10 to 25
High	>25

Source: Newcombe and MacDonald (1991).

mg/L = milligrams per litre.

Turbidity

Turbidity is a measure of the lack of clarity or transparency of water caused by biotic and abiotic suspended or dissolved substances, with higher concentrations of these substances in water causing increased turbidity. Technically, when light passes through a water sample, turbidity is an expression of the optical properties of substances that cause light to be scattered and absorbed rather than transmitted in straight lines through the sample (Wetzel 1975). Turbidity is measured by a method called nephelometry, by measuring the transmission and scattering of light through a water sample. A turbidity meter is used for this measurement, and reports turbidity in the units of nephelometric turbidity units (NTUs). Environmental samples vary within the normal range of 1 to 1,000 NTUs (Chapman 1992). Water quality guidelines for categorizing turbidity are shown in Table 8.

Table 8: Water Quality Guidelines for Turbidity (Caux et al. 1997)

Description	Turbidity (NTU) Short-Term Exposure (24-hour period)	Turbidity (NTU) Longer-Term Exposure (24-hour to 30-day period)
Clear Flow	Maximum increase of 8 NTUs from background levels.	Maximum average increase of 2 NTUs from background levels.
High Flow or Turbid Waters	Maximum increase of 8 NTUs from background levels at any one time when background levels are between 8 and 80 NTUs. Should not increase more than 10% of background levels when background is >80 NTUs.	

Source: Canadian Water Quality Guidelines for the Protection of Aquatic Life – Total Particulate Matter.

Available at: <http://ceqg-rcqe.ccme.ca/download/en/217>.

NTU = Nephelometric Turbidity Unit.

Total Organic Carbon

Total organic carbon (TOC) comprises particulate and dissolved organic carbon (DOC). Natural waters can have concentrations that vary from 1 to 30 mg/L (McNeely et al. 1979). Most TOC is derived from humic substances and partly degraded plant and animal materials. In this report, TOC is characterized as low, moderate, or high (Table 9).

Table 9: Qualitative Scale of Total Organic Carbon

Description	Total Organic Carbon (mg/L)
Low	<5
Moderate	5 to 20
High	>20

Source: McNeely et al. 1979.

mg/L = milligrams per litre.

Major Ions

Major ion concentrations (i.e., salinity) in surface waters can be measured by hardness, TDS, and conductivity. Hardness is the sum of calcium and magnesium concentrations. A scale of water hardness, expressed as mg/L equivalent to calcium carbonate (CaCO_3), is provided in Table 10. The toxicity of many metals decreases as hardness increases. The concentration of TDS is another measure of ion concentration. This is the amount of dissolved salts remaining after filtered water is evaporated at 180°C. Waters high in TDS (greater than 10,000 mg/L) are sometimes referred to as saline; concentrations below 1,000 mg/L are usually not considered to be harmful to aquatic life (Hart et al. 1990; Mitchell and Prepas 1990; Baker et al. 2015; Chapman and McPherson 2015). Conductivity is a measure of the water's ability to conduct electricity. This ability varies based on the concentration of dissolved ions in the water. Thus, the concentration of TDS and conductivity are usually strongly correlated. Descriptive scales for conductivity and TDS are provided in Table 11.

Table 10: Qualitative Scale of Water Hardness

Hardness Scale	Hardness (mg/L as CaCO_3)
Very soft (low)	0 to 30 (<28)
Soft	31 to 60
Moderately soft (relatively low)	61 to 120 (28 to 120)
Hard	121 to 180
Very hard	>180

Note:

Bold font indicates definitions of hardness ranges by Mitchell and Prepas (1990).

Source: McNeely et al. (1979); Mitchell and Prepas (1990).

mg/L = milligram per litre; CaCO_3 = calcium carbonate.

Table 11: Scale of Total Dissolved Solids and Specific Conductivity

Description	Total Dissolved Solids (mg/L)	Specific Conductivity ($\mu\text{S}/\text{cm}$)
Low	<100	<165
Moderate	101 to 500	166 to 830
High	>500	>830

Note: The categories in this table were operationally defined to facilitate description of water quality in this document in a standardized format.

mg/L = milligrams per litre; $\mu\text{S}/\text{cm}$ = microSiemens per centimetre.

The major ion (sulphate, chloride, bicarbonate/carbonate, sodium, potassium, calcium and magnesium) composition of groundwater and surface water samples were also compared using Piper Plots, which visually compare the major cations and anions as a percentage of total cations or anions.

Nutrients

The main nutrients of interest in most surface waters are nitrogen and phosphorus. Both are required in very small amounts (i.e., less than 1 mg/L) for plant growth. Total Kjeldahl nitrogen (TKN) is a measure of ammonia and organic nitrogen and is an indicator of biologically available nitrogen. The TKN concentrations in rivers that are not influenced by excessive organic inputs typically range from 0.1 to 0.5 mg/L (McNeely et al. 1979). In this report, TKN is characterized as low, moderate, or high (Table 12), based on the typically observed range in freshwater.

Biological productivity of surface water can be described in terms of trophic classification based on total phosphorus (TP) concentration (Table 13). Phosphorus is often the limiting nutrient (i.e., the nutrient in shortest supply) in controlling trophic status in freshwaters.

Table 12: Qualitative Scale of Total Kjeldahl Nitrogen

Description	Total Kjeldahl Nitrogen (mg-N/L)
Low	<0.1
Moderate	0.1 to 0.5
High	>0.5

Source: McNeely et al. 1979.

mg-N/L = milligrams of nitrogen per litre.

Table 13: General Relationship of Surface Water Productivity to Average Concentration of Epilimnetic Total Phosphorus

Trophic Status	Total Phosphorus (mg/L)	
	Waterbodies ^(a)	Watercourses ^(b)
Ultra-oligotrophic (very nutrient-poor)	<0.004	n/a
Oligotrophic (nutrient-poor)	0.004 to 0.01	<0.025
Mesotrophic (containing a moderate concentration of nutrients)	0.01 to 0.02	0.025 to 0.075
Meso-eutrophic (containing moderate to high concentration of nutrients)	0.02 to 0.035	n/a
Eutrophic (nutrient rich)	0.035 to 0.1	>0.075
Hypereutrophic (very nutrient rich)	>0.1	n/a

Source: a) CCME (2004); b) Dodds et al (1998).

mg/L = milligrams per litre; n/a = not applicable.

Metals

Metals naturally occur in surface waters in small quantities. Aquatic organisms can be affected by elevated metal concentrations; however, the concentration at which metals are toxic varies by metal. The toxicity of some metals is also dependent on the hardness of the water, with the toxicity decreasing as hardness increases. In this report, total metal concentrations are discussed relative to guidelines to protect aquatic life.

Organic Compounds

Organic compounds (organics) include chemicals consisting of chains or rings of carbon atoms, such as hydrocarbons (e.g., oil and grease), total phenolics, and PAHs. These compounds may originate from natural sources (e.g., forest fires), or may be released from industrial sources (e.g., vehicle exhaust, wastewater discharges). Elevated concentrations of organic compounds may be harmful to aquatic organisms; however, toxicity varies widely by chemical.

Isotopes

Isotopes are atoms of the same element (same atomic number, or number of protons) that have a different number of neutrons, and thus a different atomic weight. Isotopes that do not decay into other isotopes or elements are called stable isotopes and include the isotopes analyzed in this study ($\delta^{18}\text{O}$, $\delta^2\text{H}$, $\delta^{13}\text{C-DIC}$, $\delta^{34}\text{S-SO}_4$ and $\delta^{18}\text{O-SO}_4$). Isotopes are expressed as a ratio between two isotopes of the same element. The isotopic ratio in the sample is compared to that of a standard to eliminate inconsistencies between laboratories and machines. Using $\delta^{18}\text{O}$ as an example, the isotopic ratio is calculated by:

$$\delta^{18}\text{O} = \left(\frac{(^{18}\text{O}/^{16}\text{O})_{\text{sample}}}{(^{18}\text{O}/^{16}\text{O})_{\text{reference}}} - 1 \right) \cdot 1000 \text{ ‰ VSMOW}$$

Vienna Standard Mean Ocean Water (VSMOW) is the standard for $\delta^{18}\text{O}$ and $\delta^2\text{H}$ and the results are expressed in per mille (‰). Different isotopes of the same element will behave differently during chemical and physical processes, causing the ratio between the isotopes to change. This process is called fractionation. A good example is evaporation. During evaporation of water (H_2O), the lighter isotope (^{16}O or ^1H) is more easily incorporated into the vapour phase than the heavy isotope (^{18}O or ^2H). The remaining liquid water will be left with a greater abundance of the heavy isotope, and thus the ratio between the heavy isotope and the light isotope will increase and $\delta^{18}\text{O}$ and $\delta^2\text{H}$ will become greater or more positive. This is termed “enrichment”. The vapour phase will have a greater abundance of the light isotope, and thus the ratio will between isotopes will decrease and $\delta^{18}\text{O}$ and $\delta^2\text{H}$ values will become lower, or more negative. This is termed “depletion”. Due to fractionation effects, isotopic analysis can provide information on the physical and chemical processes that water, gases or dissolved or suspended components have undergone. Isotopic ratios can also be used to determine the source of water, gas or other components as constituents or fluids from a particular source, for example methane produced biogenically by bacteria or sulphate derived from the oxidation of pyrite, will fall within a characteristic range of values.

Dissolved Gases

Dissolved gases in groundwater and surface water originate from the atmosphere or from ground sources, such as soil gas or seeps of natural gas. Elevated concentrations of gases such as CO_2 and CH_4 can be biogenic (bacteriological) or thermogenic (geological) in origin. Elevated concentrations of some gases, such as methane can be harmful to aquatic life.

3.5.1.3 Comparison to Sediment Quality Guidelines

Sediment quality with respect to metals was compared to the CCME Interim Sediment Quality Guideline (ISQG) and the probable effects level (PEL) for the protection of aquatic life (Table 14; CCME 2001).

Table 14: Sediment Quality Guidelines Applied in the Eagle Plain Baseline Study

Parameter	Units	Guideline	
		ISQG	PEL
Total Metals ^(a)			
Arsenic	µg/g	5.9	17
Cadmium	µg/g	0.6	3.5
Chromium	µg/g	37.3	90
Copper	µg/g	35.7	197
Lead	µg/g	35	91.3
Mercury	µg/g	0.17	0.486
Zinc	µg/g	123	315

a) Source: CCME (Canadian Council of Ministers of the Environment). 2001a. Canadian Environmental Quality Guidelines. Winnipeg, MB, Canada.

ISQG = Interim Sediment Quality Guideline; PEL = probable effect level; µg/g = micrograms per gram.

3.5.2 Key Question 2: Analysis of trends in season, streamflow, watershed and geology

For each watershed, summary statistics (i.e. number of values, minimum, maximum, median, mean, 75th and 95th percentiles, and standard deviations) were calculated for the laboratory and field data. Mean and standard deviations were not calculated if more than 50% of the data were non-detectable. Values below the detection limit were replaced with the detection limit value. Data were summarized by season (e.g., under-ice, freshet, and open-water [depending on sample frequency]) such that the influence of season and watershed could be evaluated. The hydrometric (i.e. flow) data was compared directly against water quality chemistry using x-y plots of stream discharge to determine whether relationships exist between parameter concentrations and seasonal flows in the study area. The bedrock geology for each sampling station was inferred based on the compilation bedrock geology map available from the Yukon Geological Survey and differences in water quality between sampling stations were analyzed based on the generalized geology for the area.

Seasonal analysis of the water quality data was limited to descriptive statistics and graphical plots. The possibility of using more complex statistical methods was explored and ultimately rejected given that there are multiple gaps in the current sampling effort. This is largely because not all sites were sampled in the same months, which preclude any meaningful inferences about broader-scale patterns in the data. As a result, detecting statistical differences may be an artefact given data were not collected in a consistent way across space and time. For example, statistical differences within and across watersheds might be detected due to the different years or months sites were sampled and because not all the sites within a watershed were sampled in all months and years consistently. A similar problem occurs with inferences about temporal patterns. In 2015, 2016, and 2017, three of sixteen sites (EAGL-t-003, WHST-004 and CHNC-001) were sampled in the same months (March, June, and September) but in other years data were collected only in July and August (2013) and July and September (2014). Using the entire data set, trends detected at the annual or seasonal scale may simply be due to the different months that data were collected in different years. Sites that are missing measured water quality parameters would be further limiting. It is acknowledged that the purpose of the sampling was to capture

variability in areas and seasons and based on logistics and timing, a formal sampling plan to correspond to a statistical analysis was not possible.

3.5.3 Key Question 3: Groundwater Quality and Surface Water Quality Comparison

The groundwater and surface water quality were compared where data existed for both within a watershed (Dalglish Creek, McParlon Creek and the Eagle River Tributary). The interaction between groundwater and surface water was based on four assumptions:

- 1) Surface water samples collected during under-ice conditions and in the late winter represent the time period when the percentage of groundwater contributions (baseflow) to the total flow is the greatest (Whitfield et al. 1993; Czarnecki and Beavers, 2002); surface water quality samples are representative of the chemical composition of the groundwater component of streamflow.
- 2) Surface water samples collected during periods of high flow with large contributions from run-off, for example during freshet, would include a proportionately low volume of groundwater.
- 3) Streambed groundwater samples collected from drivepoint piezometers likely represent a mixture of groundwater and surface water.
- 4) Groundwater from YOWN-1401 represents bedrock groundwater.

To characterize the groundwater component in surface water, baseflow, streambed, and YOWN-1401 samples were compared to freshet and open water samples to determine which general parameters, metals, anions, and nutrients were typically elevated in groundwater. A comparison was also made between hydrocarbon, nutrient, and metal standard exceedances in groundwater and surface waters. The potential influence of groundwater discharge to surface water bodies or surface water recharge to groundwater was evaluated based on these two comparisons.

It is assumed that the shallow groundwater samples are under the direct influence of the overlying surface water in the stream. Key Question 3 is designed to characterize the groundwater signature in the surface water. Only the groundwater from YOWN-1401 at the Northern Cross camp represents deeper groundwater in fractured bedrock as opposed to pore water in stream bed sediments. A further uncertainty is that this one well may not be representative of groundwater across the entire Eagle Plains Region.

4.0 RESULTS AND DISCUSSION

4.1 Quality Assurance and Quality Control Summary

The QA/QC program included a review of field data, assessment of QC samples that comprised surface water quality field and travel blank samples, surface water and groundwater quality duplicate samples, and a comparison of dissolved and total parameter concentrations. The QA/QC practices applied during this study and detailed results of the QC analysis are provided in Appendix A. This section provides a summary of the QC results.

Review of field physico-chemical data indicated that the field-measured data collected for surface water samples were generally reliable and within range; however, during 2016, four field-measured conductivity values (sample collected in Dalglish Creek on 15 March 2016; sample collected in McParlon Creek on 16 March 2016; sample collected in Chance Creek on 16 March 2016; and two samples collected in Eagle River on 16 March 2016) from the under-ice program were inconsistent with laboratory conductivity results, which was possibly related to ice build-up on the field meter sensor. As a result, these four field-measured conductivity data from the under-ice program were invalidated. During 2017, field specific conductivity and lab specific conductivity values were outside of the normal range (normal range set between 100 and 500 $\mu\text{S}/\text{cm}$) on several occasions. For QC purposes, “normal ranges” are the typical range of values observed in fresh, surface water samples and are used solely as a means to identify outliers. A sample falling outside the “normal range” does not necessarily represent a data quality issue but allowed samples to be identified for further analysis. In this case, field and lab values were similar so the specific conductivity data was not invalidated. Dissolved oxygen concentrations were below the normal range (normal range set between 5 and 14 mg/L) at CHNC-001 and McPL-001. These values were not invalidated, as they were reported in March when dissolved oxygen concentrations are generally at their lowest. Field and lab pH differed by greater than 1 pH unit at EAGL-T-003 in March but it is assumed that the field pH is more reliable than the lab pH and data was not invalidated.

In addition, review of field notes indicated that the wrong preservatives were added to the dissolved metal bottles for two surface water samples (MINE-T-002 and EAGL-001) collected during August 2013; dissolved metal results for these two surface water samples were invalidated. Review of laboratory results of surface water samples indicated that one TDS result (sample collected in McParlon Creek on 5 June 2015) was inconsistent with field and laboratory conductivity values and lab error was suspected; this TDS value was invalidated. Review of laboratory data for the field blank collected on 25 March 2012 indicated that naphthalene was found in the field blank at a concentration 15 times the reporting limit; naphthalene in the associated field sample (DALG-001) was invalidated. Review of laboratory data for sulphate and dissolved sulphur indicated that one sample, collected at EAGL-001 on 18 September 2015 had a dissolved sulphate concentration significantly below the expected concentration based on dissolved sulphur and this value was invalidated (see section A2.5.4. Invalidated results were flagged in the water quality results table in Table B-1, and were not included in the analysis.

No data quality issue was noted in the field physico-chemical data collected for groundwater samples. A review of laboratory results indicated that six TDS results (two samples collected in Dalglish Creek on 22 September, 2016; one sample collected in McParlon Creek on 5 June 2015; two samples collected in McParlon Creek on 22 June, 2016; and one sample collected in McParlon Creek on 22 September 2016) were inconsistent with field and laboratory conductivity results. In addition, one bromide result and one sulphate result (sample collected in Eagle River on 16 September 2015) collected during open-water season in 2015 appeared to be outliers (i.e., bromide result is at least 100 times higher than other data and sulphate result significantly below expected

range). As a result, these TDS and bromide values were invalidated. Invalidated results were flagged in the water quality results tables in Table C-1 and were not included in the analysis.

Data quality issues were noted for the dissolved gas data. These included 29% of gas samples having an analytical dissolved oxygen concentration that had greater than 30% RPD from field measured dissolved oxygen. Additionally, 15% of gas samples had a dissolved oxygen saturation that was greater than 110% and 12 samples were invalidated. These issues are most likely related to entrainment of additional oxygen in the sample bottle during sampling, especially in turbulent waters.

Samples for laboratory analyses were submitted as soon as possible after collection to maintain sample integrity. Analytical holding times were met for all surface water samples, with the exception of ammonia for nine samples (one trip blank and field blank; two samples in Chance Creek; one sample in Dalglish Creek; two samples in Eagle River; one sample in McParlon Creek; and one sample in Whitestone River) collected on 20 September 2016, and TDS and TSS for one sample collected in Dalglish Creek on 21 June 2016. Analytical holding times were met for all groundwater samples, with the exception of TDS and TSS for three samples (one sample in Dalglish Creek and two samples in McParlon Creek) collected on 22 June 2016. Results of internal lab QA/QC were not evaluated, as no QA/QC results were provided by the laboratory for 2017 data.

No data quality issues were noted in sediment data, respecting that QA/QC samples were not collected. Despite the exclusion of some surface water parameters, the overall quality of the surface water, groundwater, and sediment quality data was determined to be high. Therefore, the results reported herein are determined to be adequate to meet the needs of the study.

4.2 Key Question 1: What is Surface Water, Groundwater, and Sediment Quality at Baseline?

4.2.1 Surface Water Quality

This section of the report presents an evaluation of surface water quality data collected from different watersheds. Raw data and statistical summaries are provided in Appendix B.

Surface water in the sampling stations was generally slightly acidic to circumneutral, with pH ranging from 5.9 to 8.2. Several samples in Chance Creek had field pH measurements outside of CCME recommended range for the protection of aquatic life. Field pH measurements in Dalglish Creek and McParlon Creek during the 2016 freshet season were also outside the CCME recommended range for the protection of aquatic life.

Surface water was generally well oxygenated during freshet and open-water season but had dissolved oxygen concentrations below CCME aquatic life guidelines during ice-cover season (Table B-1).

Surface water was well oxygenated during September during all sampling years, and did not drop below 9.5 mg/L, the lowest acceptable dissolved oxygen concentration for early life stages in cold water.

Surface water was generally well oxygenated during freshet, with 20 of the 30 dissolved oxygen measurements taken throughout the study area being above the acceptable limit for all life stages in cold water and with all of the dissolved oxygen measurements being above the acceptable limit for non-early life stages in cold water and all life stages in warm water.

Surface water was also generally well oxygenated during the summer (July and August), with 11 of the 17 dissolved oxygen measurements taken throughout the study area being above the acceptable limit for all life stages in cold water and with all of the dissolved oxygen measurements being above the acceptable limit for non-early life stages in cold water and all life stages in warm water.

During the ice-cover season, all the samples taken from Chance Creek were below the lowest acceptable limit for cold water biota, for both early and other life stages, ranging from 0.93 mg/L to 5.82 mg/L. Both measurements taken at Dalglish Creek were below the lowest acceptable dissolved oxygen concentration for early life stages in cold water, and one of the two samples was below the lowest acceptable dissolved oxygen concentration for other life stages in cold water. Within the Eagle River watershed, neither of the two measurements taken at EALG-001 were below the acceptable dissolved oxygen concentration for other life stages in cold water and one of the two measurements taken at the site was below the acceptable dissolved oxygen concentration for early life stages in cold water. At EALG-t-003, all measurements taken were below the acceptable dissolved oxygen concentration for all life stages in cold water. Within McParlon Creek, the one measurement taken at McPL-001 was below the acceptable dissolved oxygen concentration for all life stages in cold water and the one measurement taken at McPL-002 was above the acceptable dissolved oxygen concentration for all life stages. Within Miner River, surface water was well oxygenated during the ice-cover season. Within the Whitestone River, seven of the nine measurements taken were below the acceptable dissolved oxygen concentration for early life stages in cold water, and two out of the nine measurements taken were below the acceptable dissolved oxygen concentration for other life stages in cold water.

Specific conductivity in surface water samples was widely variable (Table B-1), ranging from 24.5 to 1,221 $\mu\text{S}/\text{cm}$. Concentration of TSS, TDS, and TOC in surface water were also variable (Newcombe and MacDonald 1991 and McNeely et al. 1979). Bicarbonate, calcium, and sulphate are dominant ions found in the surface waters. Concentrations of TKN ranged from moderate to high (McNeely et al. 1979) and concentrations of total phosphorus indicate surface water collected from sampling stations are oligotrophic to meso-eutrophic (Dodds et al. 1998), depending on the location and season (Appendix B).

Several total metal parameters had concentrations above surface water quality guidelines. Dominant metal parameters with guideline exceedances across different watersheds included total aluminum, chromium, copper, iron, and zinc. Isolated guideline exceedances were also observed in total arsenic, beryllium, cadmium, cobalt, lead, manganese, mercury, selenium, and silver. Concentrations of dissolved aluminum and iron were also above the applicable surface water guidelines in majority of the samples, with isolated guideline exceedances also occurring for dissolved cadmium (Table B-1).

Conventional Parameters

Hardness of surface water varied by watershed, ranging from soft to very hard (McNeely et al. 1979; Mitchell and Prepas 1990) with maximum hardness of 2,420 mg/L observed in McParlon Creek during ice-cover season during 2016 (Table B-1). Concentrations of total alkalinity in most samples collected in Chance Creek and McParlon Creek were below the BCMOE chronic aquatic life guideline of 20 mg/L, indicating a moderate to high acid sensitivity (Table B-2 and B-5). Three samples collected during freshet season in Dalglish Creek also had concentrations of total alkalinity below CCME chronic aquatic life guidelines, indicating a moderate to high sensitivity to acid deposition (i.e., low buffering capacity) (Saffran and Trew 1996) (Table B-3). Six samples collected in the Eagle River tributaries and two samples collected in the Eagle River NCY Tributary during freshet and open-water season had concentrations of total alkalinity below CCME chronic aquatic life guidelines, ranging from 12 to 17 mg/L, indicating a moderate (Saffran and Trew 1996) sensitivity to acid deposition (Table B-4). In Miner River and Whitestone River, total alkalinity concentrations were above 35 mg/L indicating a low sensitivity to acid deposition (Saffran and Trew 1996) (Tables B-6 and B-7).

Concentrations of TSS and turbidity were variable in Chance Creek, Eagle River, Dalglish Creek, McParlon Creek, and Whitestone River, ranging from low to high (Newcombe and MacDonald 1991) (Tables B-2 to B-5, and B-7). Concentrations of TSS were above 25 mg/L, and therefore high, in the following samples:

- Chance Creek: CHNC-001 during September 2015 and CHNC-003 during September 2015 and September 2016;
- Dalglish Creek: DALG-002 during September 2014, September 2015, March 2016, May 2016, and March 2017;
- Eagle River: EAGL-001 during June 2015, EAGL-t-002 during September 2015, EAGL-t-003 during September 2015, March 2016, September 2016, and March 2017;
- McParlon Creek: McPL-001 during July 2013 and September 2015, McPL-002 during March 2016; and
- Whitestone Creek: WHST-001, WHST-002, and WHST-004 during September 2015 and WHST-003 during March 2016.

Field measured turbidity and laboratory measured TSS were generally aligned such that high field measurements (i.e., more than 20 NTU) generally correlated with high TSS values (more than 12 mg/L [75th percentile from all samples]). The majority of these “high” TSS events occurred during September 2015. Field notes collected during September 2015 indicate that water levels were generally elevated during the sampling event, and in some cases, also indicate that water was observed to be “turbid” or “brown.” “High” TSS values during September 2014 and September 2016 can also be linked to stations which had observations of high turbidity during the sampling events. Freshet sampling events during June 2015 (EAGL-001; 26 mg/L) and May 2016 (DALG-002; 75 mg/L) each had “high” concentrations of TSS. These “high” TSS values could be attributed to elevated freshet flows at the location, though field notes do not indicate any observed increases in turbidity. “High” TSS concentrations were also measured in under-ice samples collected during March 2016 at four locations. Field notes at two of the four locations indicate that water was coloured, but these higher TSS values could also be attributed to stream bottom disturbance during ice auguring or sampling. “High” TSS was noted at McPL-001 during July 2013 (86 mg/L), and the site was noted to have a width of approximately 20 metres, a mid-channel depth of approximately 0.9 metres, and a mid-channel velocity of 0.79 metres. During 2017 sampling, TSS was elevated during March at DALG-002 and EAGL-t-003. All other stations and sampling dates had TSS values measured at 5 mg/L or below. Water was noted to be “very turbid and rusty brown” at both sites during the sampling event.

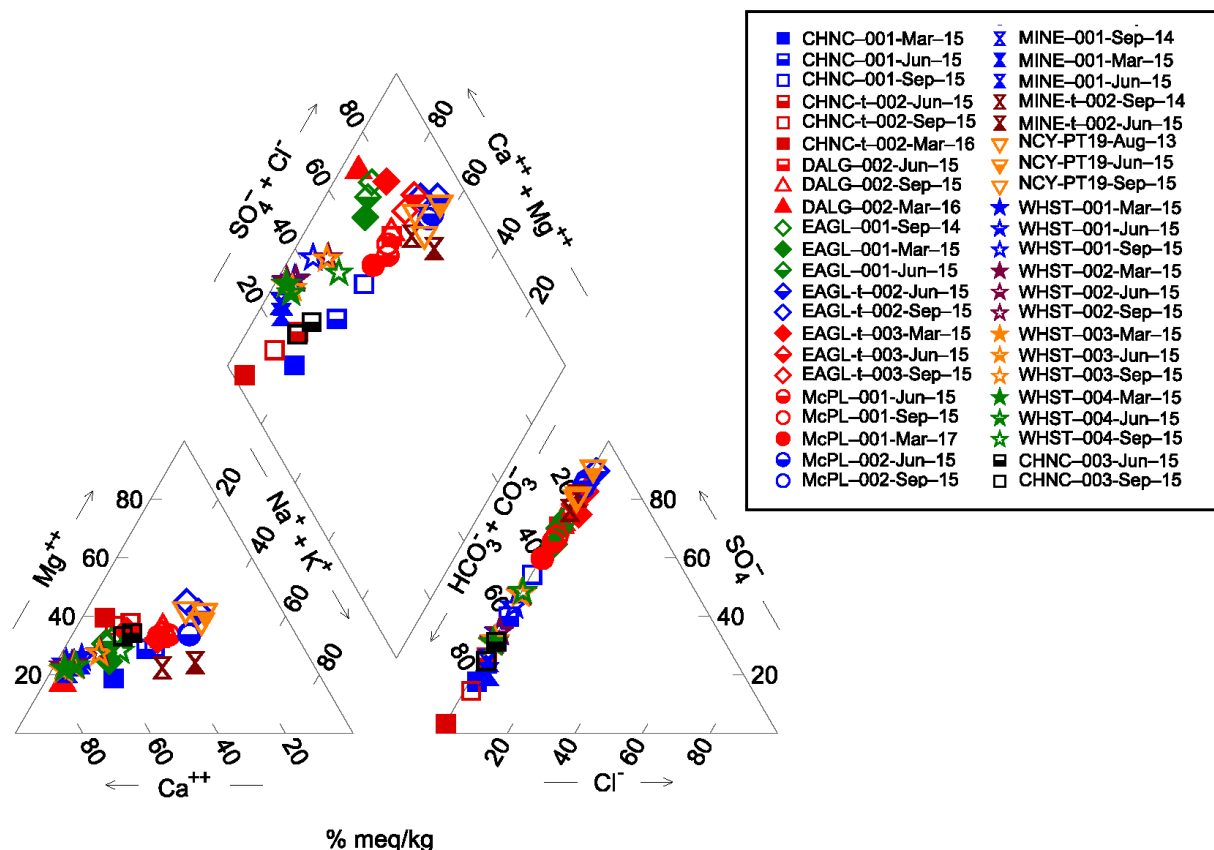
Concentrations of TSS and turbidity were consistently low in Miner River (Table B-6), with TSS being above the detection limit, measured at 4 mg/L, in only one of the eleven samples collected within Miner River, and turbidity consistently being measured below 4 NTU at all Miner River sites during sampling.

TOC concentrations were similar between watersheds and less than 30 mg/L in most surface water samples. Based on the qualitative TOC scale (Table 9), water within the study area was “moderate” to “high” in TOC concentrations. Concentrations were below 5 mg/L, and therefore “low”, in the following samples:

- **Eagle River:** EAGL-001 during under-ice sampling in March 2015 and March 2016;
- **Miner River:** MINE-001 during all five sampling events for which TOC was analyzed; and
- **Whitestone Creek:** Each sample collected during under-ice sampling in March 2015, March 2016, and March 2017, as well as one freshet sampling during June 2017.

Major Ions

Bicarbonate, calcium, and sulphate were the dominant ions found in the surface water collected from sampling stations (Figure 3). The major ion composition varied between and within the different watersheds, with some watersheds such as Chance Creek and the Whitestone River having a higher proportion of anions as bicarbonate and carbonate compared to sulphate. Chance Creek also showed a high degree of variability in the proportion of anions as sulphate between sampling events, with under ice samples tending to have less than 20% anions as sulphate and greater than 80% as bicarbonate and carbonate while some freshet and open water samples had greater than 50% anions as sulphate (Figure 3). Samples with sulphate proportions higher than approximately 20% indicate either dissolution of evaporite minerals such as gypsum or oxidation of sulphide minerals such as pyrite. These potential sources are evaluated with sulphur isotopes below. While calcium tended to be the dominant cation, Miner River, the Eagle River tributary, the un-named tributary to Eagle River and McParlon Creek had greater than 20% cations as sodium; potassium is generally low in concentration. Some samples from the Eagle River tributaries also had a higher proportion of cations as magnesium (around 40%) while the Eagle River itself tended to be more calcium dominated (Figure 3). Given the low chloride concentrations, the samples with higher sodium proportions suggest discharge of groundwater interacting with particles with high cation exchange capacity such as clays or organics.

Figure 3: Piper Plot of Surface Water Data

Note: Piper plot showing a subset of surface water data for each surface water sampling location. Where available, an under ice (filled symbol), freshet (half-filled symbol) and open water (open symbol) sample were shown for each location.

Concentrations of chloride and sulphate were below the CCME and BC MOE guidelines in each stream, as shown in Table B-1, although concentrations of sulphate in March 2017 were elevated at DALG-002 and at McPL-001. Fluoride was greater than the CCME interim aquatic life guideline in one sample from Dalglish Creek (from the ice-cover season) (Table B-3). Fluoride results were only available for the one site during the one sampling event.

Based on the quantitative hardness scale (Table 10), water in Chance Creek is “very soft” to “soft” in freshet and open-water and “hard” to “very hard” in winter (under-ice samples). In Dalglish Creek, most sampling events indicated that the water was “soft” to “moderately soft”, with the exceptions of the samples collected during under-ice sampling in March 2012, March 2016, and March 2017, which were “very hard” and during freshet in May 2016, which was “very soft.”

In the Eagle River watershed, samples collected in the Eagle River mainstem (EAGL-001) were “very hard”, and samples collected at the Eagle River tributary, EAGL-t-002, were “hard” to “very hard” with the exception of one sample collected at the site during July 2014, which was “moderately soft.” In the Eagle River tributary, EAGL-t-003, and in the unnamed tributary, NCY-PT19, hardness was “soft” to “moderately soft”, with the

exceptions of August 2013, March 2015, March 2016, March 2017, and June 2017, when hardness was “hard” at EAGL-t-003, and September 2015, when hardness was “hard” at NCY-PT19.

Water in McParlon Creek is “very soft” to “soft” during all sampling events, with the exception of McPL-002 during July 2014 and during September 2015, when it was “moderately soft” and at McPL-002 during March 2016 and McPL-001 during March 2017 when it was “very hard.”

Water in Miner River was “hard” to “very hard” during all sampling events at both sampling locations.

Water in Whitestone River was “hard” to “very hard” during each sampling event at each sampling location, with the exceptions of July 2013 at WHST-002 and September 2015 at WHST-002 and WHST-004, when water was “moderately soft.”

Overall, hardness varied between the different watersheds studied. At some locations, hardness varied seasonally, for example the unnamed tributary of Eagle River (NCY-PT19) generally had harder water during the under-ice sampling events in March. This suggests that some watersheds with softer water or with seasonally softer water may be more susceptible to metal toxicity than watersheds with harder water.

Based on the scale for specific conductivity (Table 11), the conductivity of water in Chance Creek is classified as “low” in freshet and open-water and “moderate” in winter (under-ice samples) and water conductivity of Dalglish Creek is classified as “low” to “moderate.” No seasonal patterns in specific conductivity were observed in samples from this creek. In the Miner River and Whitestone River, conductivity of water is generally classified as “moderate”, while in McParlon Creek, water conductivity is generally classified as “low”, with “moderate” conductivity being measured at McPL-001 during March 2017, and at McPL-002 during July 2014 and September 2015. Conductivity in the Eagle River and tributaries was generally “moderate”, with “low” conductivity being measured at EAGL-t-003 during September 2014, September 2016, and March 2017 and “high” conductivity being measured at EALG-t-003 during July 2014.

Nutrients

Concentrations of nitrate, nitrate+nitrite, and total ammonia were below applicable guidelines in surface water samples. Nitrite concentrations exceeded the CCME chronic aquatic life guideline on several occasions: one sample collected in Chance Creek during the ice-covered season (Table B-2); one sample collected in Miner River during the freshet season (Table B-6); and eight samples collected during two sampling events (during the ice-covered and freshet seasons) in Whitestone River (Table B-7). No nitrite guideline exceedances were observed in Dalglish Creek, Eagle River, McParlon Creek, and Eagle River Tributary (Table B-3 to B-5). The detection limit for nitrite was greater than the CCME chronic aquatic life guideline for one sample collected in the Eagle River during open water season and for one sample collected in the Whitestone River during the ice-covered season.

Based on the quantitative scale for TKN (Table 12), water in Chance Creek, Dalglish Creek, and McParlon Creek is consistently “high” in TKN, Eagle River watershed ranges between “moderate” (mainstem) and “high” (tributaries) in TKN, Miner River is “moderate” (mainstem) to “high” (tributary) in TKN, and water in Whitestone River is generally “moderate” in TKN, with two “high” measurements being recorded during September 2014.

Surface water phosphorus concentrations from streams within the study area ranged from <0.03 to 0.11 mg-P/L; (Table B-1), corresponding to the oligotrophic to the eutrophic category (Table 13). Median concentrations (<0.01 to 0.037 mg-P/L), however, fall within the meso-eutrophic category for waterbodies and the mesotrophic category

for streams. Nutrient concentrations tend to be higher in the tributaries (mesotrophic to eutrophic) than the mainstems (oligotrophic to mesotrophic) and trophic classification can vary between seasons. An exception is Whitestone River that consistently had phosphorus concentrations in the oligotrophic class.

Metals

Concentrations of total antimony, barium, boron, mercury, molybdenum, nickel, silver, thallium, and uranium were below applicable CCME or BC MOE aquatic life in surface water samples from all watersheds. Concentrations of metals, and concentrations relative to guidelines, varied by watershed. By watershed, metals that exceeded guidelines are summarized as follows:

■ Chance Creek (Table B-2)

- Total aluminium, arsenic, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, selenium, and zinc; and
- Dissolved aluminium, cadmium, and iron.

■ Dalglish Creek (Table B-3)

- Total aluminium, arsenic, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, and zinc;
- Total selenium was at the guideline value during one sampling event; and
- Dissolved aluminium and iron.

■ Eagle River (Table B-4)

- Total aluminium, beryllium, cadmium, chromium, cobalt, copper, iron, selenium, and zinc; and
- Dissolved aluminium, dissolved cadmium, and iron.

■ McParlon Creek (Table B-5)

- Total aluminium, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, silver selenium, zinc; and
- Dissolved aluminium, cadmium, and iron.

■ Miner River (Table B-6)

- Total and dissolved iron.

■ Whitestone River (Table B-7)

- Total aluminium, chromium, copper, iron, and selenium; and
- Dissolved aluminium and iron.

Hydrocarbons, PAHs, Naphthenic Acids, and Radionuclides

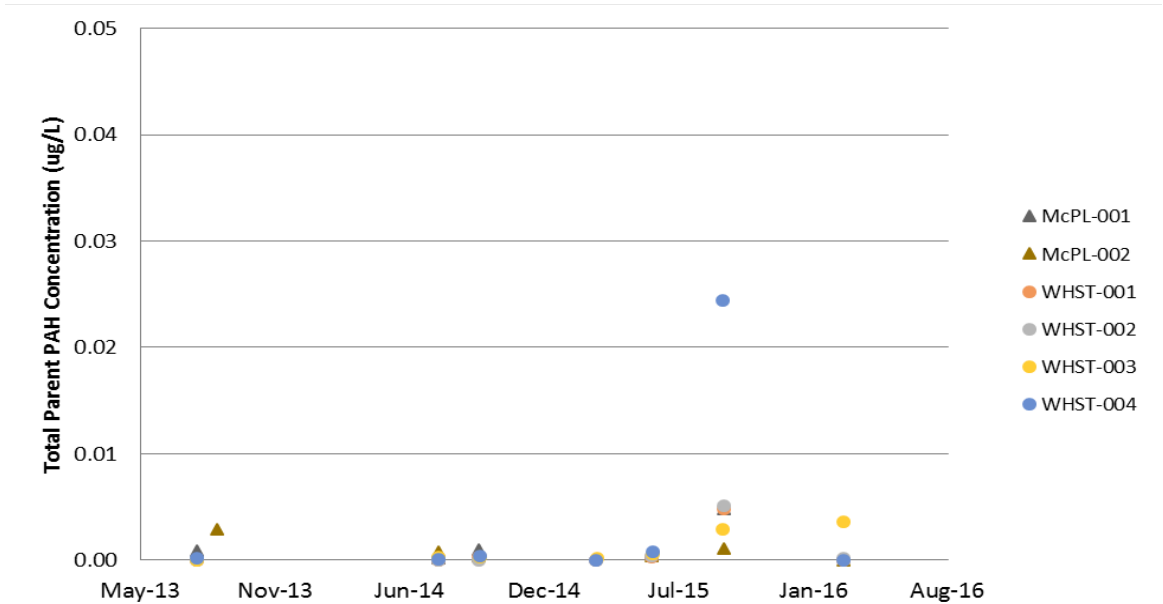
There were no detectable concentrations of volatile organic compounds in the surface water samples collected. PAH concentrations in surface waters were generally below the reporting limit, but detectable concentrations of PAHs were observed in each watershed. Concentrations of PAHs in surface water samples were less than the CCME interim aquatic life guidelines (Table B-1). Figure 4 shows total PAH concentrations (the sum of all parent PAH compounds) in each watershed. Concentrations of PAHs varied between watersheds and sampling events. The Eagle River and Eagle River Tributary (excluding sampling station NCY-PT19), Dalglish Creek, Chance Creek, and the Whitestone River (September 2015 only) had higher concentrations of PAH compounds, up to 0.34 µg/L total parent PAHs, compared to Miner River and McParlon Creek which generally had total concentrations of parent PAH of less than 0.005 µg/L, close to or below the detection limits (Figure 4). The highest PAH concentrations in surface water samples were measured during the 2015 sampling events. Elevated PAH concentrations in 2015 may be related to increased forest fire activity near the Eagle Plains Region (Yukon Government, Wildland Fire Management, 2015). A comparison of total PAH concentrations, in addition to the distribution of parent PAH concentrations between September 2014 and September 2015, is shown in Figure 5. Total PAH was greater during the September 2015 sampling event for all sampling locations except for DALG-002. Retene, a PAH compound associated with wood combustion (e.g. Gabos et al. 2001), was found at many of the sampling locations and often made up a significant component (up to 100%) of parent PAHs (Figure 5).

For comparison, low (parts per billion) concentrations of PAH compounds, below the CCME guidelines for the protection of aquatic life, have also been observed in the Peel River and were attributed to natural hydrocarbon sources such as upstream petroleum and/or coal formations or forest fires (Stantec, 2012; INAC, 2008). As there are known oil and gas reserves in the Eagle Plains region and very little development, it is likely that the low concentrations of PAH compounds observed in surface waters are also derived from forest fires and petroleum-bearing formations.

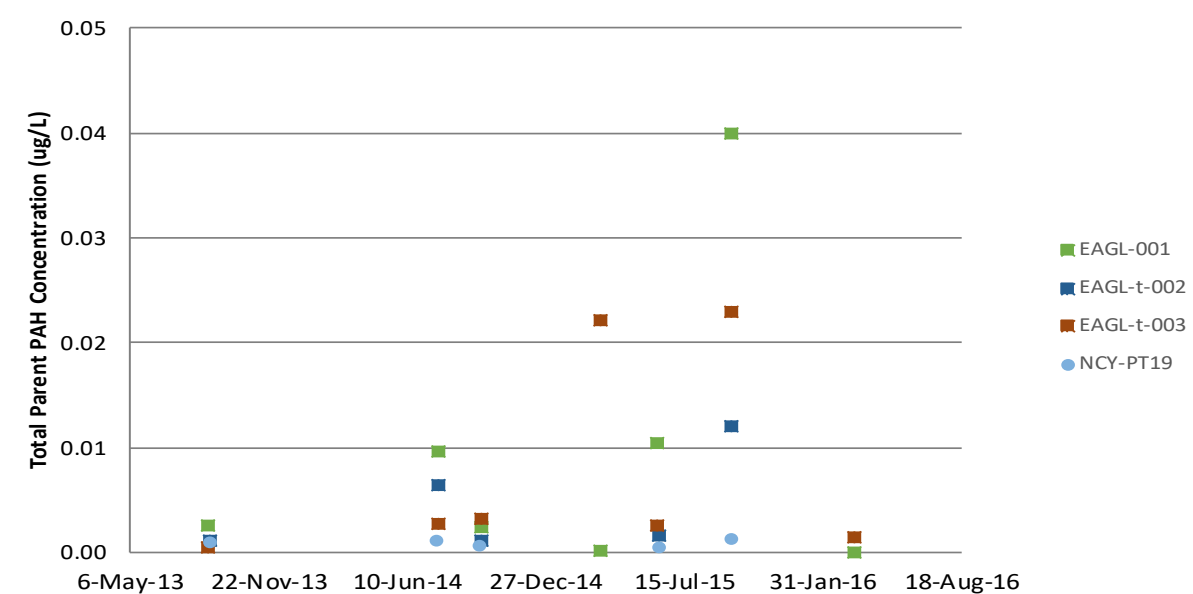
There are no guidelines for naphthenic acids and radionuclides in the applied guidelines. However, Health Canada does provide guidelines for Lead-210 and Radium-226 in drinking water. All surface water samples had concentrations of radium-226 below the guideline value of 0.5 Bq/L. Surface water samples generally had a detection limit for lead-210 above 1 Bq/L, exceeding the guideline value of 0.2 Bq/L. All but one sample had lead-210 concentrations below the detection limit. One sample, EAGL-t-003 on 16 March 2016, had a lead-210 concentration of 4 Bq/L, exceeding the guideline value. However, as no other samples exceeded the detection limit, including at the same station and the detected result is close to the detection limit, this result should be confirmed by further sampling if necessary. The detection limits varied in the dataset, but there were some concentrations measured above the method detection limits of the individual constituents in samples from each area. Minimum and maximum values for radionuclides and naphthenic acids are provided in the summary tables in Appendix B (Tables B-2 to B-7).

Figure 4: Total Parent PAH Concentrations in Surface Water in the Eagle Plains Study Area

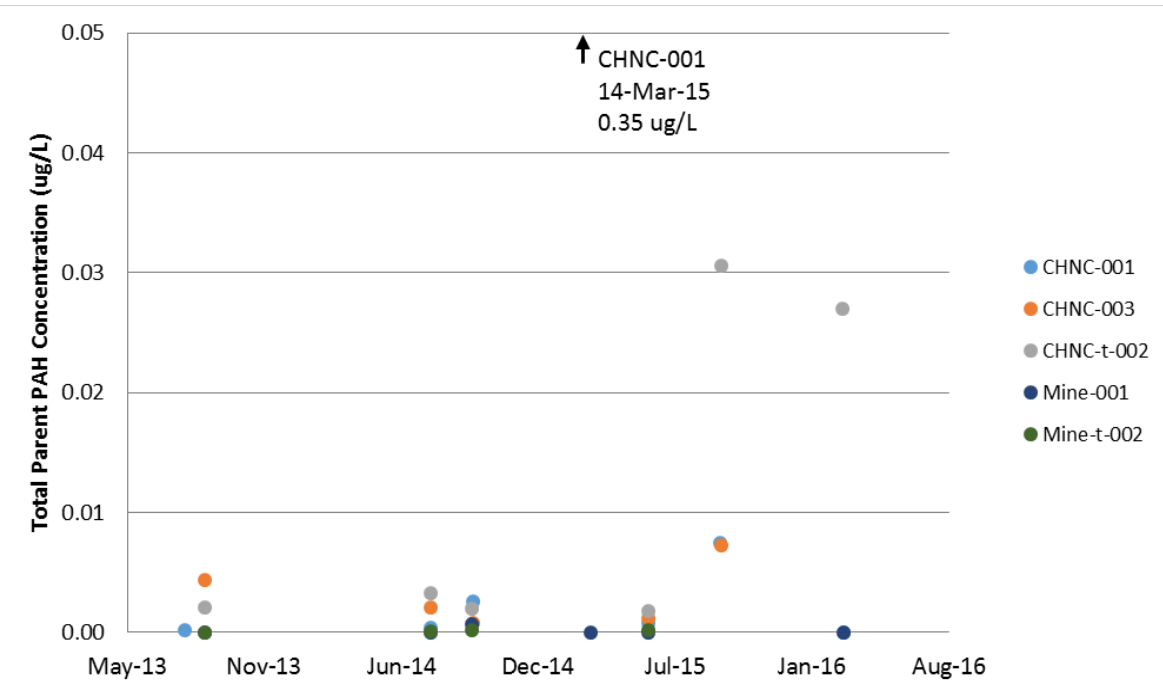
a) McParlon Creek and Whitestone River surface water



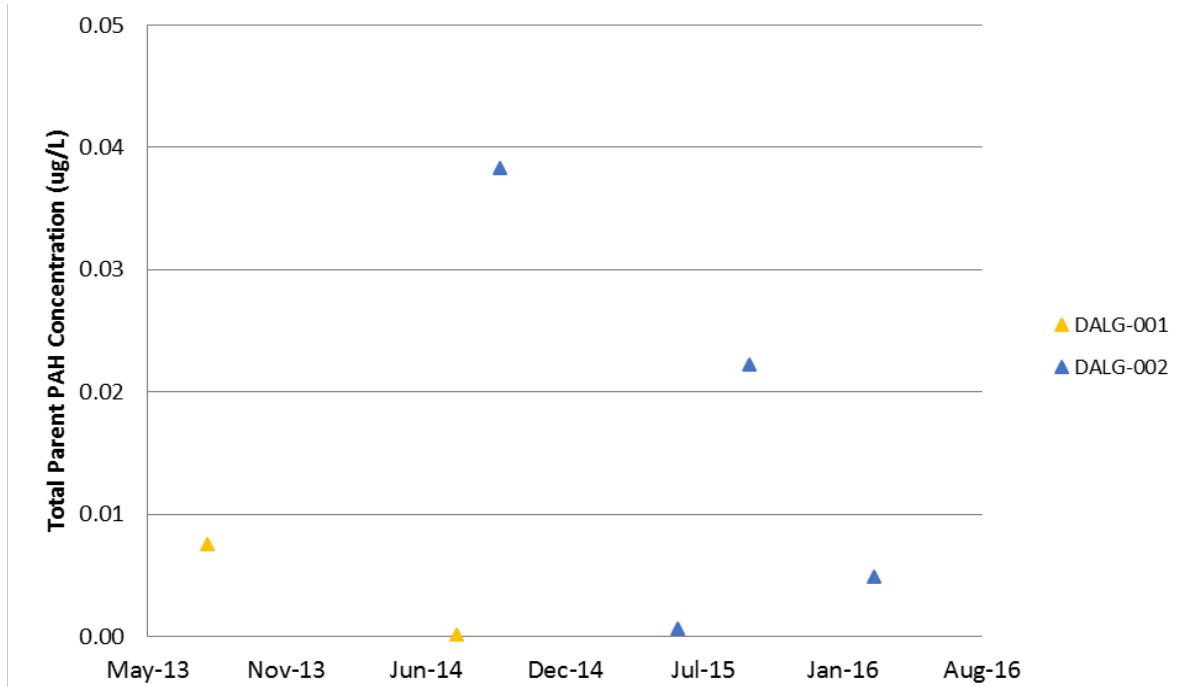
b) Eagle River and tributaries surface water and groundwater



c) Miner and Chance Creek surface water and groundwater



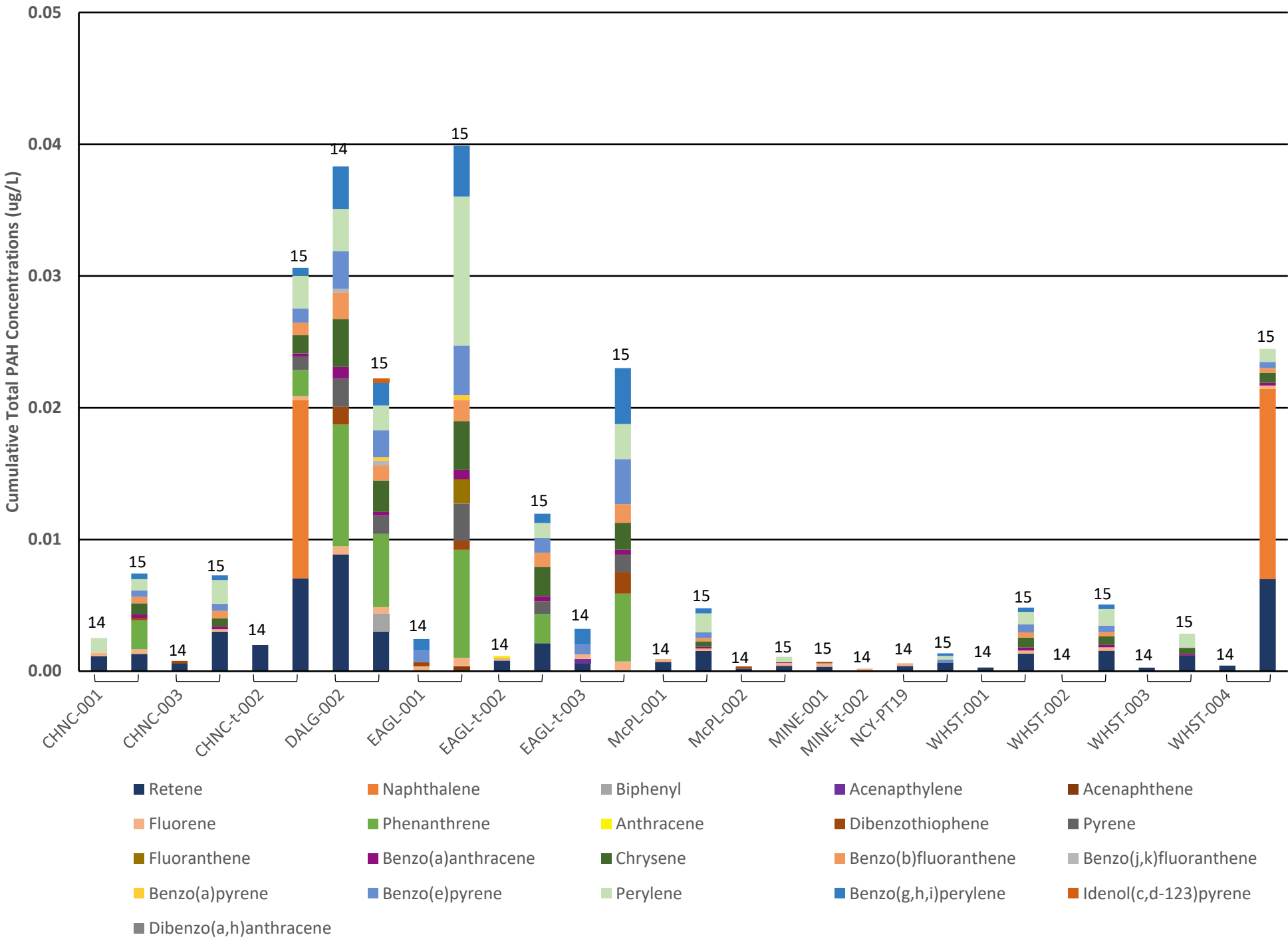
d) Dalglish Creek surface water and groundwater



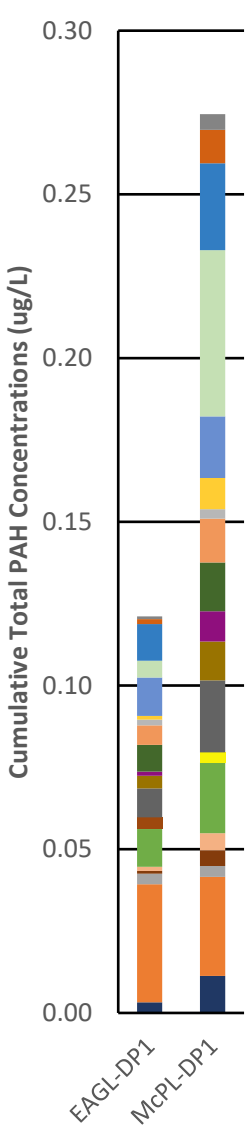
Note: All parent PAH compounds (see Table B-1) were included. Results below detection limit were treated as 0 ug/L and a total PAH concentration of 0 represents samples for which no parent PAH compounds were above detection limit.

Figure 5: Parent PAH Compounds in Surface Water and Groundwater as Proportions of the Total PAH Concentration at Individual Sampling Stations in the Eagle Plains Study Area

a) Surface Water Locations Sampled in September 2014 and September 2015



b) Groundwater (September 2015)

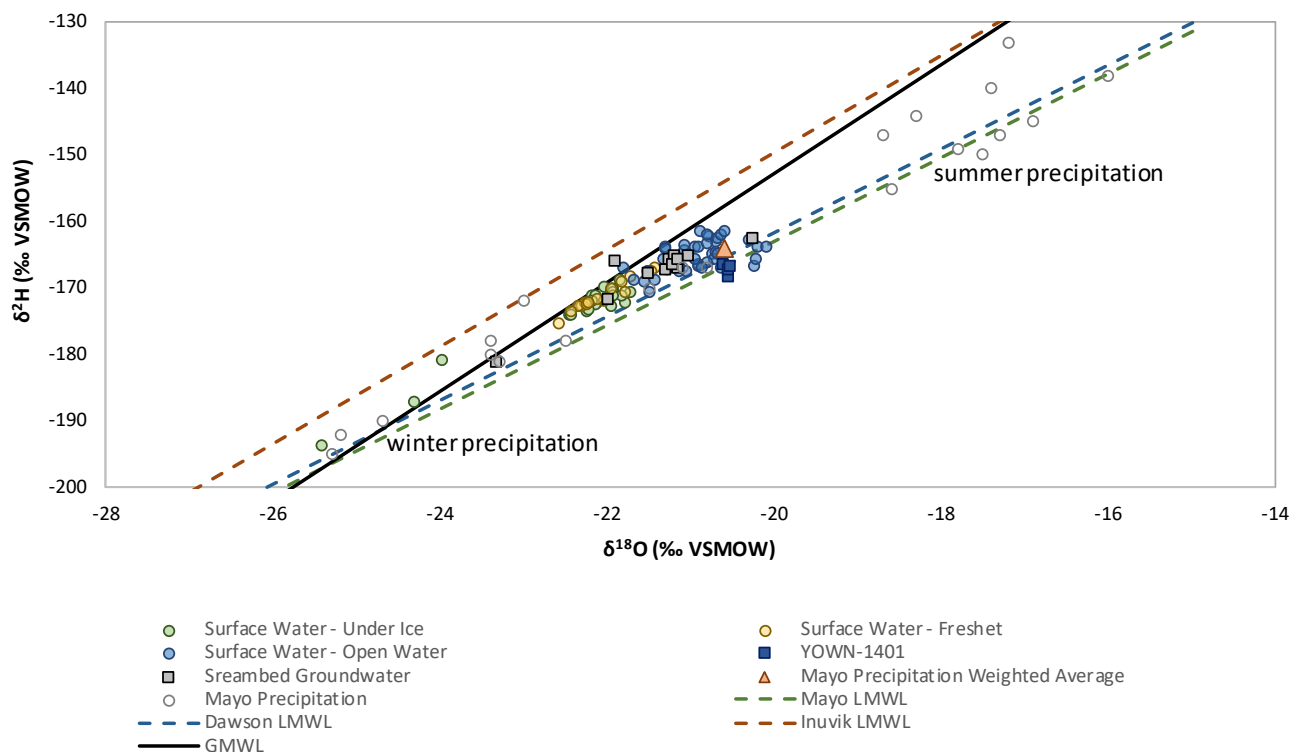


Note: All parent PAH compounds (see Tables B-1 and C-1) were included. Results below detection limit were treated as 0 ug/L and a total PAH concentration of 0 represents samples for which no parent PAH compounds were above detection limit.

Isotopic Composition of Surface Waters

Surface waters in the Eagle Plains study area had $\delta^{18}\text{O}$ isotopic values that ranged from -20.1 to -25.4‰ and $\delta^2\text{H}$ values that ranged from -161.3 to -193.7‰. Figure 6 shows the $\delta^{18}\text{O}$ and $\delta^2\text{H}$ values for surface waters and groundwaters as well as the local meteoric water lines (LMWL) for Mayo, Inuvik (IAEA 2017) and Dawson City (Lapp 2015). Surface waters fell on or above the LMWLs for Mayo and Dawson and below the LMWL for Inuvik. Surface waters fell on or below the GMWL (Figure 6). During the open-water season, the $\delta^{18}\text{O}$ and $\delta^2\text{H}$ isotopic signature of surface waters in Eagle Plains tended to be similar to the weighted annual average value for precipitation at Mayo, and some samples may fall along a subtle evaporation trendline. Samples during freshet and under-ice, which are dominated by the more depleted isotopic signature of winter precipitation, tend to be more depleted than during open-water. This seasonal variation measured in the Eagle Plains area is similar to the variation in the Liard River near the mouth, from $\delta^{18}\text{O}$ approaching -22‰ under ice in winter to approaching -20‰ in open water in fall (Gibson et al. 2005). Gibson et al. 2005 attributed the variation to a transition from snowmelt dominance to an increasing signature of evaporation in the fall. This seasonal evolution of the water cycle appears to be subtler in the Eagle Plains area, relative to the Liard River watershed, based on the lack of a strong evaporative signature for the Eagle Plains. Little evaporative signature was also noted in the Yukon River and tributaries (Northern Climate ExChange, 2015).

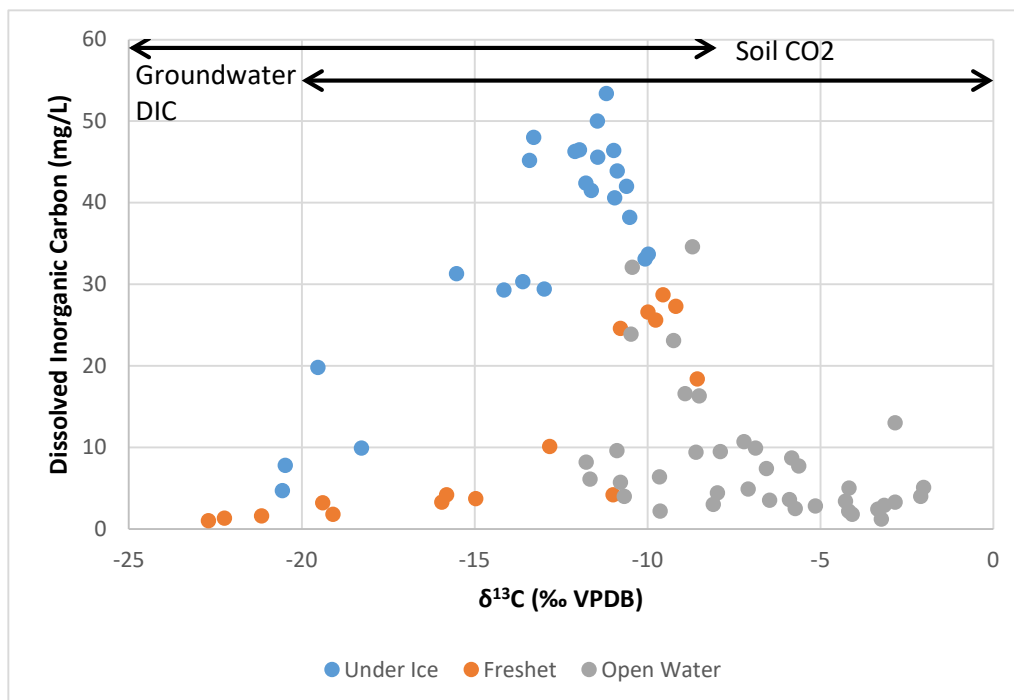
Figure 6: Oxygen-18 and Deuterium in Surface Water and Groundwater Samples



Note: The isotopic composition of precipitation at the Mayo GNIP station and Mayo LMWL (IAEA 2017) are included along with the Inuvik LMWL (IAEA 2017) and Dawson City LMWL (Lapp 2015). Based on the map of amount weighted mean annual $\delta^{18}\text{O}$ isotopic values in precipitation in Gibson et al. (2005), the $\delta^{18}\text{O}$ of precipitation in the Eagle Plains area likely falls somewhere between -22 and -26‰.

Carbon-13 in DIC in surface waters had values ranging from -6.3 to -22.7‰ (Figure 7), with open water samples falling at the more enriched end of this range and freshet and under ice samples at the more depleted end of the range (Figure 7). The carbon-13 in DIC may reflect a mixture of a variety of carbon sources including soil gas, dissolution of carbonate minerals from the shallow aquifer, and potentially degradation of dissolved organic carbon from the aquifer or contained in runoff. The majority of surface water samples fall within the typical range for groundwater DIC (Figure 7; Clark and Fritz, 1997). The negative Carbon-13 ratios suggest that methane oxidation may be a more dominant reaction than methanogenesis.

Figure 7: Carbon-13 and DIC in Surface Waters

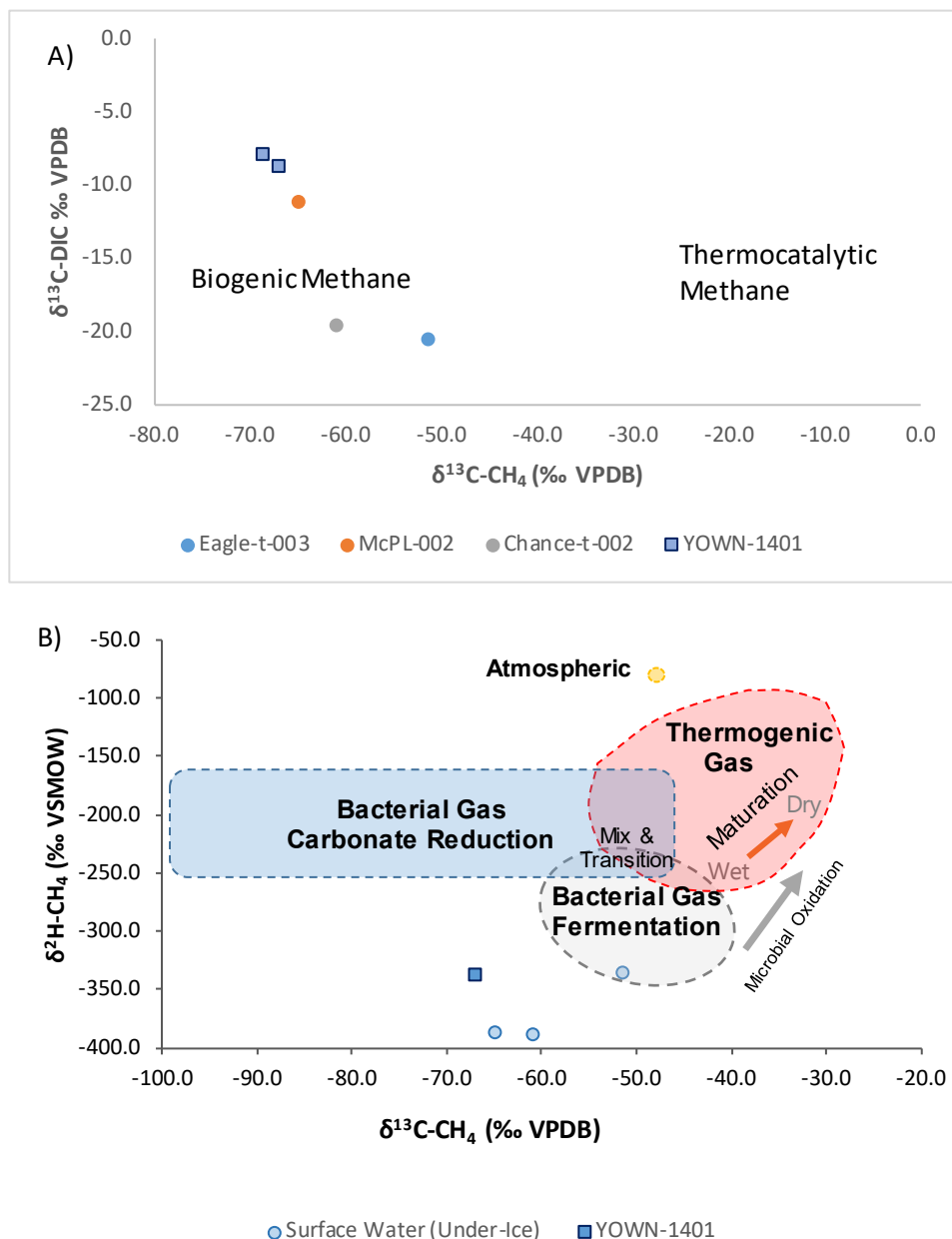


Note: The typical range of values for soil CO₂ and dissolved inorganic carbon in groundwater (Clark and Fritz, 1997) are also shown for comparison.

Due to the low concentrations of methane in samples, there was insufficient gas to analyze the majority of samples for $\delta^{13}\text{C}$ and $\delta^2\text{H}$ of methane. Three surface water samples, collected during under ice conditions, had sufficient concentrations of methane to analyze both $\delta^{13}\text{C}$ and $\delta^2\text{H}$ of methane. $\delta^{13}\text{C}\text{-CH}_4$ of the under-ice surface water samples ranged from -51.4 to -65.0‰ and $\delta^2\text{H}\text{-CH}_4$ ranged from -335 to -387‰. This range of isotopes in methane is typical of methane formed by bacterial degradation of organic material by fermentation (Whiticar 1999). The isotopic composition of methane and carbon dioxide in the under-ice surface water samples is indicative of biogenic methane which tends to have a depleted $\delta^{13}\text{C}\text{-CH}_4$ signature of less than -50‰ and $\delta^2\text{H}\text{-CH}_4$ from -150 to -400‰ (Clark and Fritz, 1997). The slightly more enriched isotopic signature of methane at Eagle-t-003 (16 March 2016) of -51.4‰ and -335‰ for $\delta^{13}\text{C}$ and $\delta^2\text{H}$, respectively, may suggest that methane oxidation has occurred at this location. Comparing the $\delta^{13}\text{C}$ of methane to that of DIC (Figure 8a) and to $\delta^2\text{H}$ of methane (Figure 8b) shows that the surface water and groundwater samples from Eagle Plains fall within the typical ranges for biogenically produced methane.

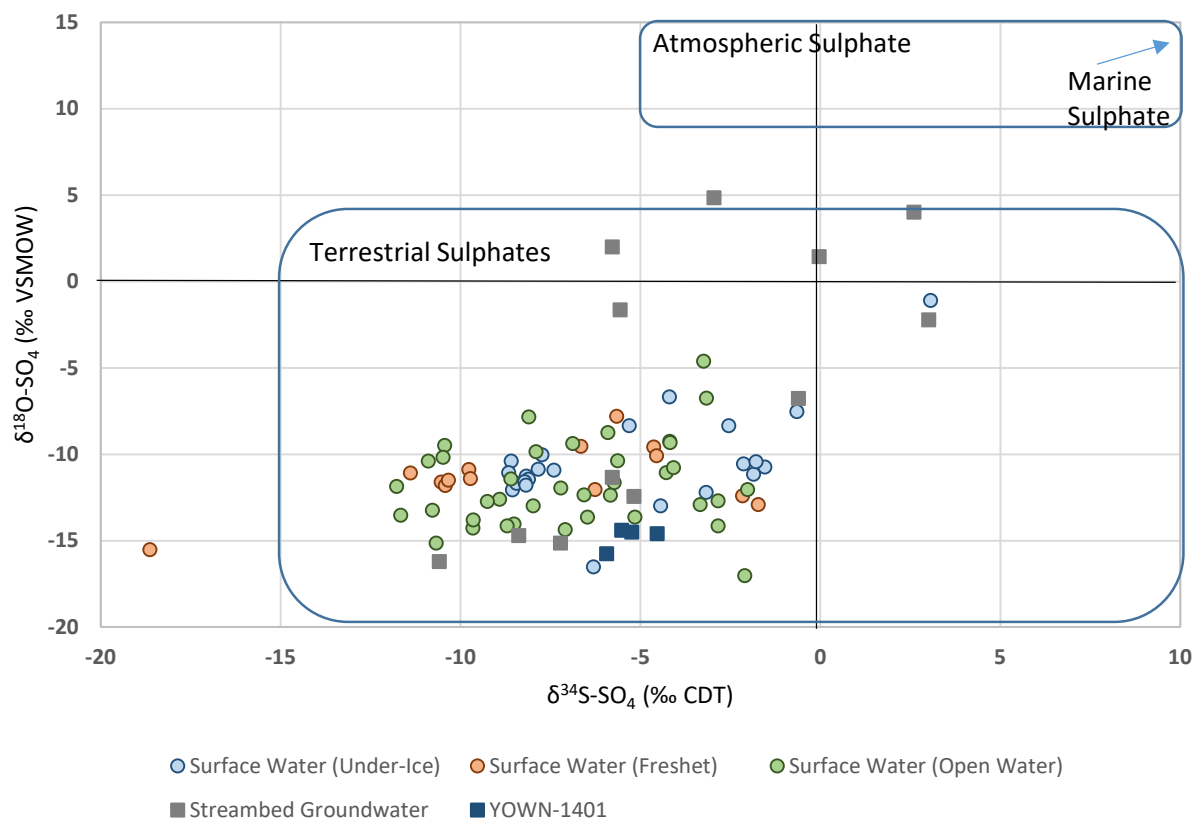
Methane in natural gas resources in the Eagle Plains Basin has been suggested to be possibly formed by biogenic processes, as opposed to thermogenic processes (e.g., Osadetz et al. 2005). Distinguishing biogenic fossil gas sourced from petroleum reservoirs from shallow gas generated by present-day breakdown of organic material can be challenging. Isotopic analyses of a suite of methane, ethane, propane and carbon dioxide together with mud gas logs during drilling of resource wells are commonly used in this type of setting (for example central Alberta; Tilley and Muehlenbachs 2011).

Figure 8: (A) Carbon-13 of Methane and DIC in Surface Water and Groundwater and (B) Schoell Diagram of Carbon-13 and Deuterium in Methane Gas.



Sulphur-34 and oxygen-18 of sulphate in surface water are shown in Figure 9. $\delta^{34}\text{S-SO}_4$ ranged from -8.6 to 3.1‰ while $\delta^{18}\text{O-SO}_4$ ranged from -17.0 to 9.31‰. The isotopic signature of surface water likely reflects a combination of geological and atmospheric sources and biological processes. Oxidation of pyrite tends to produce sulphate with a $\delta^{34}\text{S}$ that is similar to or slightly depleted (2 to 5.5‰) relative to the sulphide and $\delta^{18}\text{O-SO}_4$ that is proportional to the relative contributions of atmospheric oxygen and water during the reaction (Clark and Fritz, 1997). Oxidation of pyrite in black shales at Engineer Creek (km 181 of the Dempster Highway) produced sulphate with an isotopic signature of -23.2‰ and -22.5 to -23‰ for $\delta^{34}\text{S}$ and $\delta^{18}\text{O}$, respectively (van Everdingen et al. 1985). Alternatively, CaSO_4 of marine origin, which can be found in limestone formations or other formations of marine origin, tends to have a more enriched isotopic signature, with $\delta^{34}\text{S}$ and $\delta^{18}\text{O}$ above 0‰ (Clark and Fritz, 1997). Deposition of atmospheric SO_4 , which has an enriched isotopic signature that varies throughout the year, may also be a source of sulphate in streams and rivers. Finally, bacterial sulphate reduction can cause enrichment in both $\delta^{34}\text{S}$ and $\delta^{18}\text{O}$ of SO_4 (Clark and Fritz 1997). The range in sulphate isotopic signatures observed in Eagle Plains are likely a result of the various sources and processes outlined above, with the dominant source likely sulphide oxidation. Bacterial sulphate reduction may more commonly affect groundwater.

Figure 9: Sulphur-34 and Oxygen-18 Isotopic Composition of Sulphate in Groundwater and Surface Water Samples



Note: Typical ranges for atmospheric sulphate and terrestrial sulphates, such as those derived from the oxidation of pyrite are included based on Clark and Fritz (1994). Marine sulphates would plot off the figure, with more enriched $\delta^{18}\text{O}$ and $\delta^2\text{H}$.

Dissolved Gas Composition of Surface Waters

Findings based on laboratory measured dissolved oxygen were similar to those for the field measured dissolved oxygen. Oxygen concentrations from dissolved gas sampling ranged from 0.5 mg/L to 15 mg/L. Surface water was generally well oxygenated during freshet and open-water season but had dissolved oxygen concentrations below CCME aquatic life guidelines during ice-cover season (Table B-1). CH₄ concentrations ranged from 0 mg/L to 8.8 mg/L, and CO₂ concentrations ranged from 0 mg/L to 97 mg/L. Typically, dissolved gas samples collected during the open water season are reflective of surface water at equilibrium with the atmosphere (approximately 10 to 20 mg/L oxygen, 5 to 10 mg/L CO₂ and less than 0.1 mg/L CH₄). CH₄ and CO₂ tended to be higher during the ice-covered season when exposure to the atmosphere is limited and gases released by biological, or potentially thermogenic, activity can become trapped under the ice. Ethane and propane were typically not detected. Dissolved nitrogen gas concentrations ranged from 18 mg/L to 35 mg/L, with no clear seasonal trend across all sampling stations.

The dry gas index is calculated by dividing the molar concentration of methane by the sum of the molar concentrations of C₂ and C₃ gas. High values for the dry gas index, over 1,000, indicate microbial production of methane while values less than 1,000 indicate thermogenic methane such as natural gas seeps (Whiticar 1999). In many samples where methane was observed, ethane (C₂) and propane (C₃) were below the detection limit, suggesting the methane is of microbial origin. In two samples, MCPL-002 and CHNC-t-002, both collected on 14 March 2016, the dry gas index was 5,500 and 14,834 respectively, which was consistent with the methane isotope data in indicating a microbial origin of the dissolved methane in these surface waters. In the other four samples for which the dry gas index could be calculated, the result was below 1,000. DALG-002 (15 March 2016) had a dry gas index value of 830. EAGL-001 (18 September 2015), Mine-t-002 (6 June 2015) and NCY-PT19 (6 June 2015) had low dry gas index values of 10, 11 and 39 respectively, suggesting there may be some component of thermogenic gas in these rivers and creeks. Thermogenic gas seeps have been observed in the Richardson Mountains, just to the east of the Eagle River (Allen and Osadetz, 2013). However, this would need to be confirmed with additional sampling as the dry gas index could only be calculated for one sampling event at each of the above locations, and low dry gas values can also be the result of methane oxidation (Whiticar 1999).

4.2.2 Groundwater Quality

This section of the report presents an evaluation of groundwater quality data collected from the Eagle Plains baseline study area. Detailed results are provided in Tables C-1 to C-4 in Appendix C. Groundwater field and lab parameters that were greater than the guideline values are summarized in Tables 15 to 17.

Conventional Parameters

Streambed groundwater in the study area had specific conductivity ranging from 135 to 843 µS/cm, and would be considered fresh by the classification of natural waters by Davis (1964). The groundwater in the bedrock aquifer at YOWN-1401 had significantly higher specific conductivity than the streambed groundwater. Specific conductivity in the YOWN-1401 groundwater decreased over time, from 11,410 µS/cm in August 2013 to 8,720 µS/cm in September 2017.

The range of field-measured pH values at all streambed groundwater sampling stations indicate that the groundwater is generally circumneutral but ranges from mildly acidic to mildly alkaline. The pH of the YOWN-1401 groundwater fell into a similar range to the streambed groundwater, ranging from 7.3 during the August 2013 sampling event to 9.0 during the September 2017 sampling event and has been increasing over time.

The pH was less than the CCME chronic guideline of 6.5 during the June 2016 sampling event in the Dalglish Creek drivepoint piezometers (DALG-DP1 and DALG-DP2) (Table 15) as well as in the September 2015 groundwater sample from the Eagle River Tributary (EAGL-DP1) (Table C-1).

Total suspended solids were elevated in many of the groundwater samples, especially in the McParlon Creek samples (mean of 198 mg/L), resulting in total metals concentrations that were up to 4000 times higher than the dissolved metals concentrations.

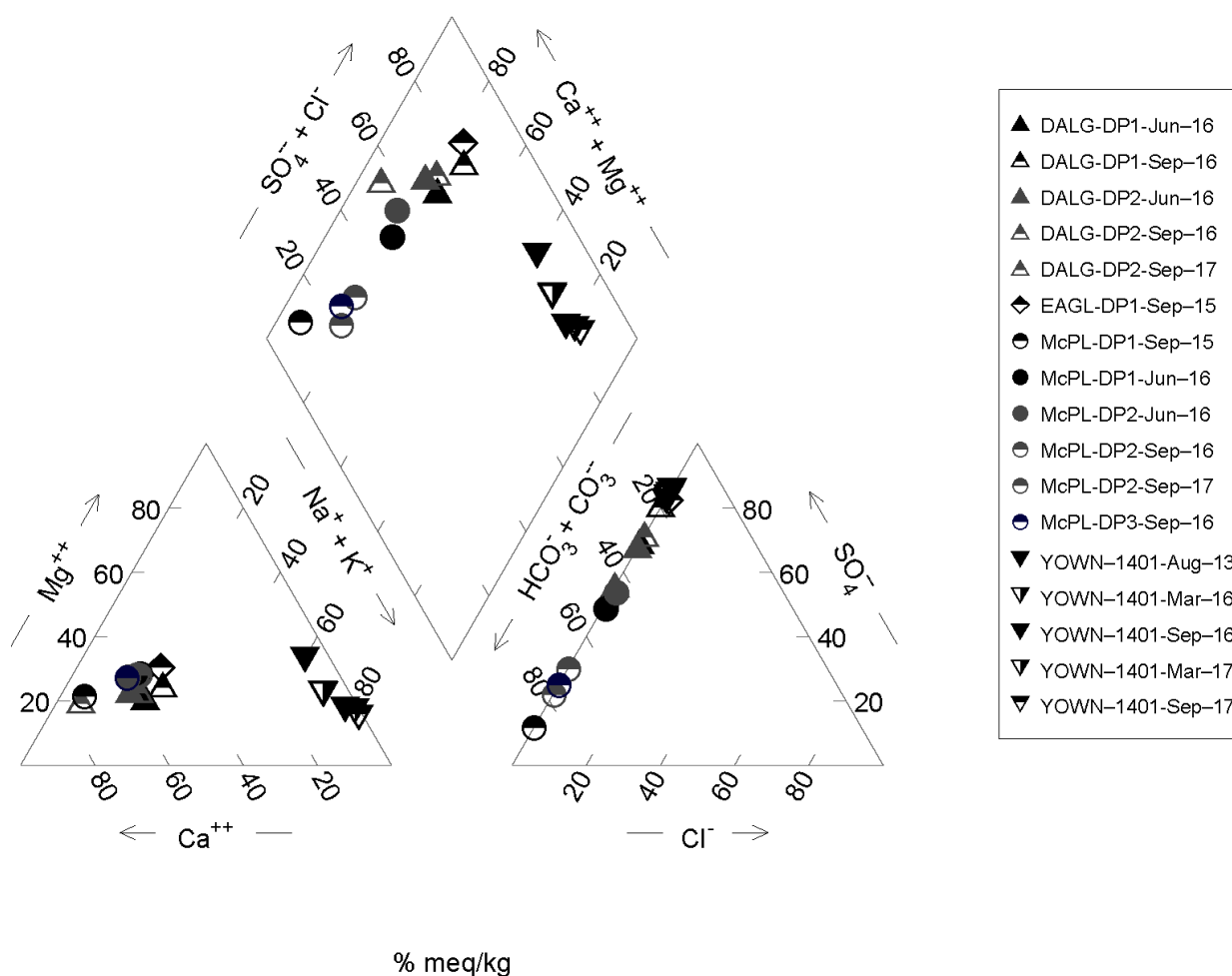
Total hardness in streambed groundwater was generally moderately hard (75 to 150 mg/L as CaCO₃) but ranged from soft (<75 mg/L as CaCO₃) to hard (150 to 300 mg/L as CaCO₃) as based on the hardness classification scale (Table 10). Hardness was highest at the Dalglish Creek sampling stations. The range in total alkalinity in streambed groundwater was similar across the three watersheds for which groundwater data was collected, ranging from very low (17 mg/L) to moderate (222 mg/L). Hardness was greater than alkalinity in all streambed groundwater samples, indicating that hardness is derived from other sources in addition to carbonate dissolution (for example, dissolution of evaporite minerals).

Groundwater from YOWN-1401 has very high hardness (up to 3,670 mg/L) and alkalinity (up to 1,310 mg/L) that greatly exceeded that measured in the streambed groundwater. Hardness was greater than alkalinity in the YOWN-1401 groundwater, indicating that hardness is derived from other sources in addition to carbonate dissolution. A common non-carbonate source of hardness is dissolution of evaporite minerals such as gypsum (calcium-sulphate), where present. High concentrations of magnesium are an important component of the water hardness in the YOWN-1401 groundwater. It is likely high hardness and alkalinity would also be encountered elsewhere in groundwater in the Eagle Plains Region where carbonate rocks such as limestone (for example, the Hart River Formation) or other carbonate sedimentary units which are present throughout the study area (Osadetz et al. 2005; Yukon Geological Survey 2017). Overall the hardness and alkalinity along with overall TDS and major ions except sodium, decreased in concentration over time in YOWN-1401. It is unclear why the water in YOWN-1401 has become fresher with time. It is possible that drilling disturbed the local thermal regime in the vicinity of the borehole, providing a conduit for fresher surface water to mix with deeper, more brackish water over time. However, further study would be needed to confirm the cause of water chemistry changes in YOWN-1401. Alkalinity in the June 2016 sample from McPL-DP2 (17 mg/L) was less than the BC MOE 30-day mean guideline of 20 mg/L as CaCO₃. Total alkalinity in the remaining groundwater samples was above the BC MOE guideline (Tables 15 to 17).

Major Ions

Major ions in groundwater are controlled by local geology and by the length of time over which groundwater has interacted with the aquifer materials (e.g. Freeze and Cherry, 1979). The dominant major ions in the streambed groundwater were calcium bicarbonate (Ca-HCO_3), calcium bicarbonate sulphate ($\text{Ca-HCO}_3\text{-SO}_4$), or calcium sulphate bicarbonate ($\text{Ca-SO}_4\text{-HCO}_3$). The major ion compositions of the groundwater are shown in a Piper plot in Figure 10. Calcium bicarbonate typically dominates shallow groundwater, especially in areas of carbonate bedrock which are observed throughout the study area (Osadetz et al. 2005; Yukon Geological Survey, 2017). Sulphate in groundwater may be derived from shale units which are found interbedded with sandstone and siltstone units throughout the study area, and which are known to be pyrite bearing (Yukon Geological Survey, 2017f; van Everdingen et al. 1985). The brackish groundwater from the YOWN-1401 differed from the streambed groundwater and was dominated by sodium sulphate (Tables C-1 and C-4).

Figure 10: Piper Plot of Groundwater Major Ion Composition



Note: Piper plot of groundwater sampling locations shows a subset of sampling events for clarity. Sampling events at each sampling location were categorized based on season with under ice samples indicated by filled symbols, freshet samples indicated by half filled symbols and open-water samples indicated by open symbols.

Sulphate concentrations varied between Dalglish Creek, McParlon Creek, and Eagle River Tributary sampling stations and are compared between these three watersheds in Figure 10 and Figure 11. Sulphate concentrations were low (<30 mg/L) in the McParlon Creek groundwater. The proportion of anions as sulphate compared to carbonate and bicarbonate varies more between June and September sampling events at McParlon Creek than at Dalglish Creek (Figure 10). Higher concentrations of sulphate were observed in Dalglish Creek groundwater, ranging from 123 to 264 mg/L. These results were somewhat unexpected based on the geology as Dalglish Creek is located in an area of carbonate bedrock (Heart River Formation), suggesting that a higher proportion of anions as bicarbonate/carbonate might be expected. Sulphate concentrations were very high in YOWN-1401 groundwater but have been decreasing over the study period from 7,990 mg/L in August 2013 to 4,450 mg/L in September 2017. Sulphate concentrations in the YOWN-1401 groundwater exceed the BC MOE 30-day mean guideline (218 to 429 mg/L) and the Yukon CSR standard (1,000 mg/L). Overall, the groundwater at YOWN-1401 appears to be getting fresher over time with decreasing sulphate, hardness, alkalinity, and TDS.

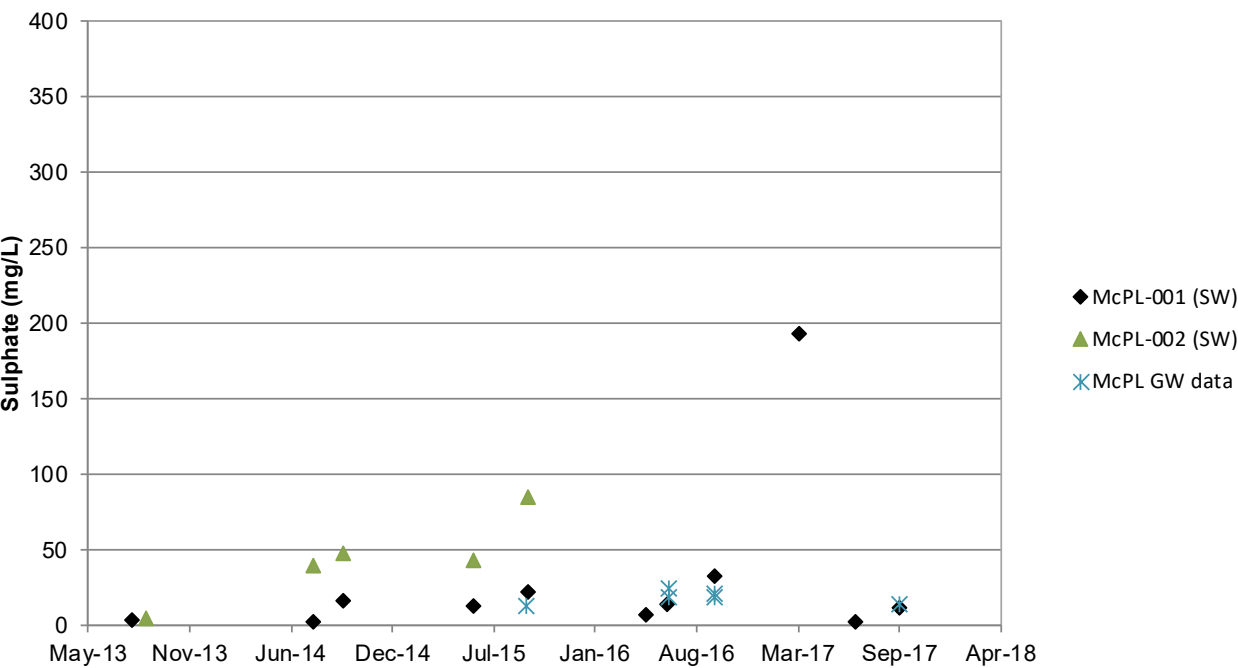
Chloride was found at low concentrations in both the streambed groundwater samples (maximum of 1.03 mg/L) and the YOWN-1401 groundwater samples (maximum of 1.88 mg/L) and did not contribute significantly to major ion chemistry (Figure 10). The high sulphate concentrations in YOWN-1401, together with sulphur isotope results discussed below and common presence of pyrite in Cretaceous shales in the region, suggest active sulphide oxidation at that location.

Nutrients

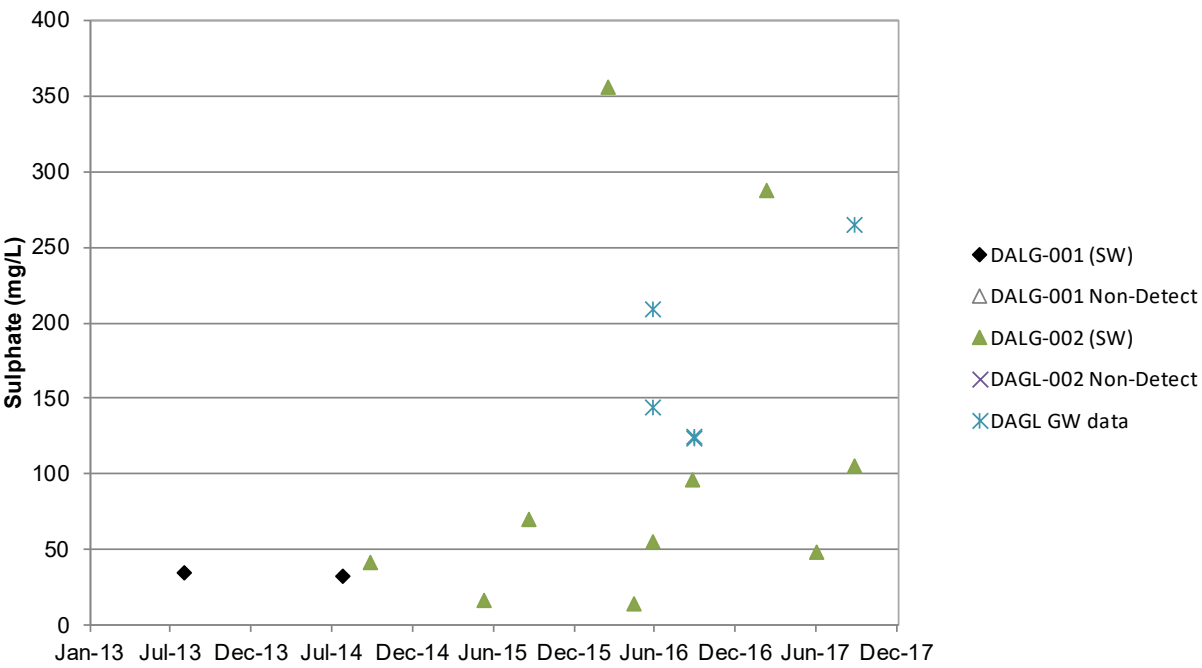
Ammonia concentrations ranged from typical (i.e., <0.2 mg-N/L WHO, 2003) to slightly above typical concentrations for groundwater in all streambed groundwater samples, ranging from 0.09 to 0.55 mg-N/L, and varied between sampling stations (Table C-1). The highest concentrations were found in the McParlon Creek piezometers (mean of 0.36 mg-N/L; Table C-2). Groundwater from YOWN-1401 had very high ammonia concentrations (mean of 3.2 mg-N/L; Table C-4) that exceeded the CCME chronic guideline. Groundwater ammonia concentrations are shown in Figure 12.

Figure 11: Sulphate Concentrations at all Groundwater Stations and in Ground and Surface Water at the McParlon Creek and Dalglish Creek Stations

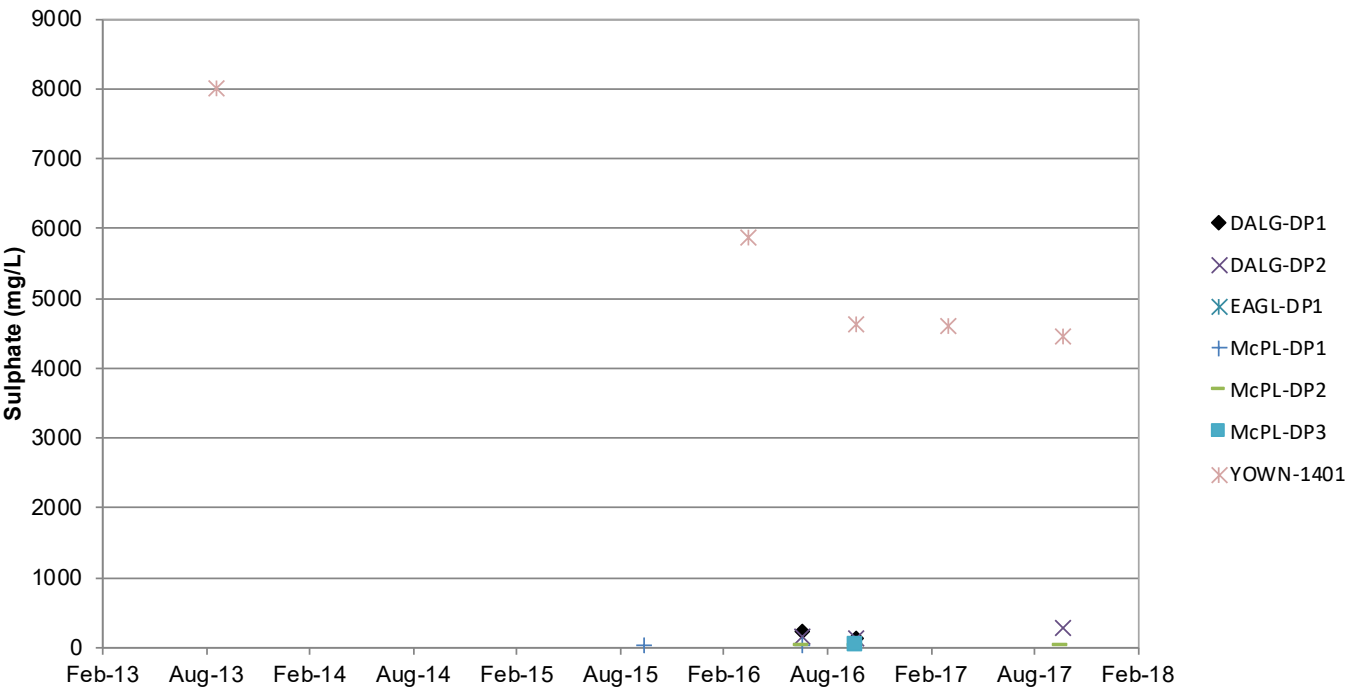
a) McParlon Creek surface water and groundwater.



b) Dalglish Creek surface water and groundwater



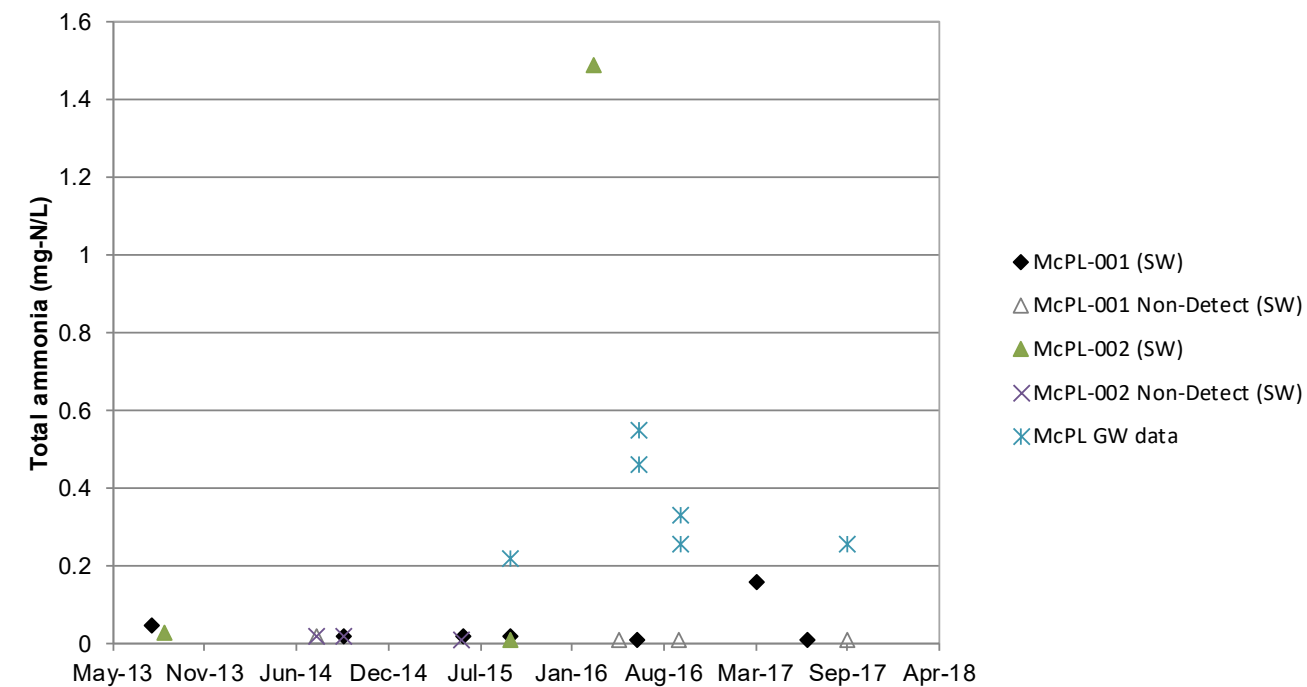
c) All groundwater sampling stations



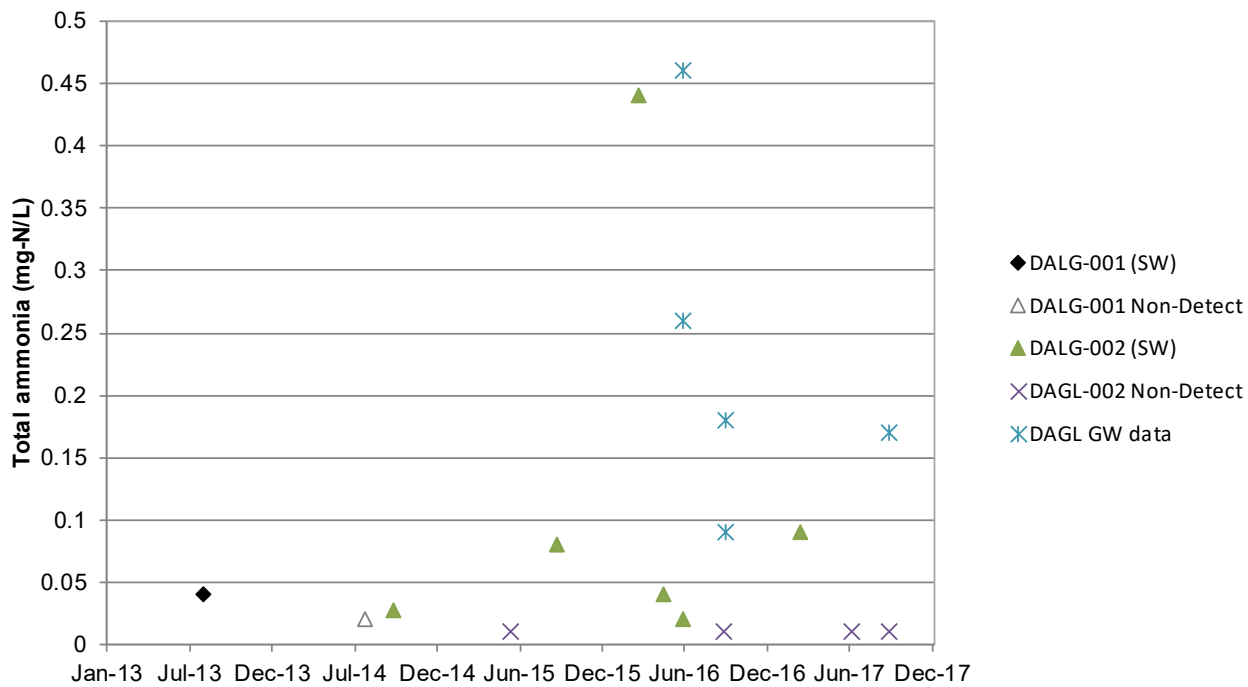
Note: (SW) = surface water sampling station. GW = Groundwater Sampling Stations. All concentrations in mg/L.

Figure 12: Total Ammonia Concentrations at all Groundwater Stations and in Ground and Surface Water at the McParlon Creek and Dalglish Creek Stations

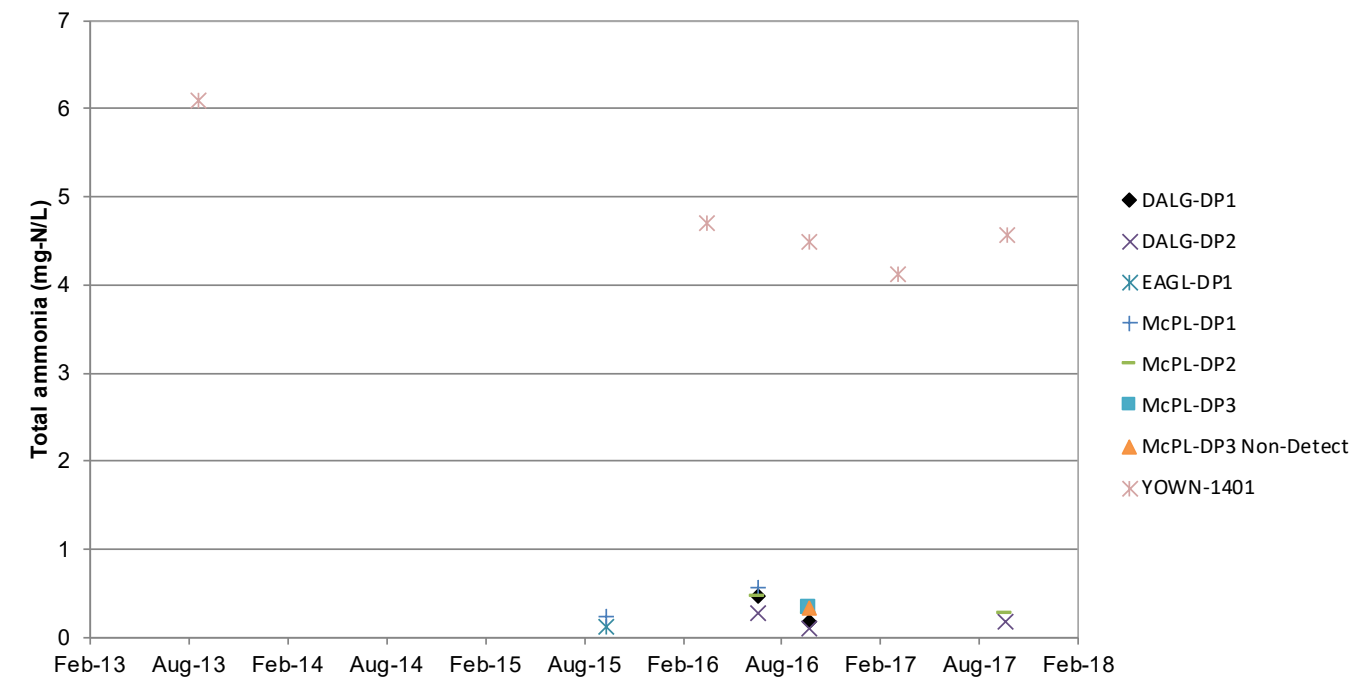
a) McParlon Creek surface water and groundwater



b) Dalglish Creek surface water and groundwater



c) All groundwater sampling stations



Note: (SW) = surface water sampling station. GW = Groundwater Sampling Stations. All concentrations in mg-N/L.

Nitrite concentrations were less than the detection limit in streambed groundwater samples with the exception of the August 2015 EAGL-DP1 and the September 2015 McPL-DP1 samples, which had 0.03 and 0.07 mg/L-N of nitrite, respectively. The concentration of nitrite in the McPL-DP1 sample exceeded the CCME chronic guideline of 0.06 mg/L-N.

Phosphorous concentrations in streambed groundwaters varied with season, year and location, ranging from 0.006 to 1.51 mg-P/L (Tables C-1 to C-3). The mean phosphorous concentration in the YOWN-1401 groundwater was lower than that observed in the streambed groundwater with a mean concentration of 0.008 mg/L (Table C-4).

Metals

Total metals in the streambed groundwater samples were generally much higher (up to 4,000 times higher) than the dissolved metals concentrations and were generally similar to or elevated relative to the associated surface water samples (Table B-1 for all surface water data and Table C-1 for all groundwater data). Total suspended solids were high in many of the streambed groundwater samples, complicating the interpretation of total metals concentrations.

Many of the total metals concentrations in the streambed groundwater exceeded one or more of the applied standards. These exceedances are noted on an individual sample basis in Table C-1 and in Tables 15 to 17. Total chromium, aluminium, iron, and copper had the highest percentage of guidelines exceedances across the Eagle Plains Baseline study area. Concentrations of these parameters in groundwater are shown in Figure 13.

At the Eagle River Tributary sampling station, concentrations of total metals including aluminium, beryllium, chromium and copper, iron and concentrations of dissolved iron exceeded one or more of the applicable standards for groundwater during the single sampling event in September 2015.

At the Dalglish Creek sampling stations, concentrations of total metals including aluminium, arsenic, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, selenium, silver and zinc and concentrations of dissolved iron exceeded one or more of the applicable guidelines for groundwater (Table 15), largely driven by high total suspended solids in two of the five Dalglish Creek samples.

Table 15: Percentage of Streambed Groundwater Parameters with Concentrations Exceeding Guidelines in Dalglish Creek, 2016 - 2017

Parameter	2016 - 2017			
	% Above Guideline			
	Chronic (Long-term)	BC MOE		>Yukon CSR
		Mean	Max	
Field Measured				
pH	20	-	-	-
Dissolved Oxygen	100	-	-	-
Total Metals				
Aluminium	60	-	-	-
Arsenic	40	-	-	0
Beryllium	-	40	-	0
Cadmium	40	-	-	40
Chromium	40	-	-	40

Table 15: Percentage of Streambed Groundwater Parameters with Concentrations Exceeding Guidelines in Dalglish Creek, 2016 - 2017

Parameter	2016 - 2017			
	% Above Guideline			
	Chronic (Long-term)	BC MOE		>Yukon CSR
		Mean	Max	
Total Metals (cont'd)				
Cobalt	-	60	0	20
Copper	40	-	-	20
Iron	100	-	-	-
Lead	20	-	-	0
Manganese	-	540	20	-
Mercury	20	-	-	0
Selenium	40	-	-	20
Silver	40	-	-	20
Zinc	40	-	-	40
Dissolved Metals				
Iron	-	-	80	-

Chronic = concentration is higher than the chronic aquatic life CCME guideline or outside the recommended pH, DO or total alkalinity range.
 BC MOE mean = concentration is higher than the 30-day mean BC MOE guideline or outside the recommended pH, DO or total alkalinity range.

BC MOE max = concentration is higher than the maximum BC MOE guideline or outside the recommended pH, DO or total alkalinity range.

>Yukon CSR = concentration is higher than the Yukon CSR standard.

Source: Yukon Contaminated Sites Regulation 2012.

Source: CCME (Canadian Council of Ministers of the Environment). 1999, with updates to 2017. Canadian Environmental Quality Guidelines. Winnipeg, MB, Canada.

Source: BC MOE Guidelines (British Columbia Ministry of Environment Guidelines). 2017. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture.

- = no guideline; 0% = no guideline exceedance; µg/L = micrograms per litre; mg/L = milligrams per litre; mg-N/L = milligrams nitrogen per litre.

At the McParlon Creek sampling stations, concentrations of total metals in groundwater exceeded one or more guidelines for aluminium, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, silver, thallium, titanium, and zinc and for dissolved concentrations of iron (Table 16), driven by high total suspended solids in four of the six McParlon Creek samples.

Table 16: Percentage of Streambed Groundwater Parameters with Concentrations Exceeding Guidelines in McParlon Creek, 2015 – 2017

Parameter	2013- 2017			
	% Above Guideline			
	Chronic (Long-term)	BC MOE		>Yukon CSR
		mean	max	
Field Measured				
Dissolved oxygen	100	-	-	-
Conventional Parameters				
pH	33	-	-	-
Total alkalinity, as CaCO ₃	-	17	-	-

Table 16: Percentage of Streambed Groundwater Parameters with Concentrations Exceeding Guidelines in McParlon Creek, 2015 – 2017

Parameter	2013- 2017			
	% Above Guideline			
	Chronic (Long-term)	BC MOE		>Yukon CSR
		mean	max	
Nutrients				
Nitrite	17	-	-	-
Total Metals				
Aluminium	100	-	-	-
Arsenic	100	-	-	17
Barium	-	50	-	170
Beryllium	-	100	-	0
Cadmium	83	-	-	83
Chromium	100	-	-	67
Cobalt	-	83	0	50
Copper	83			33
Iron	100	-	-	-
Lead	83	-	-	33
Manganese	-	100	100	-
Mercury	17	-	-	0
Nickel	33	-	-	0
Selenium	83	-	-	33
Silver	50	-	-	33
Thallium	17	-	-	0
Titanium	-	-	-	17
Zinc	83	-	0	50
Dissolved Metals				
Iron	-	-	100	-

Chronic = concentration is higher than the chronic aquatic life CCME guideline or outside the recommended pH, DO or total alkalinity range.
 BC MOE mean = concentration is higher than the 30-day mean BC MOE guideline or outside the recommended pH, DO or total alkalinity range.

BC MOE max = concentration is higher than the maximum BC MOE guideline or outside the recommended pH, DO or total alkalinity range.

>Yukon CSR = concentration is higher than the Yukon CSR standard. Yukon CSR standards are for dissolved metals and do not strictly apply to total metals concentrations.

Source: Yukon Contaminated Sites Regulation 2012.

Source: CCME (Canadian Council of Ministers of the Environment). 1999, with updates to 2017. Canadian Environmental Quality Guidelines. Winnipeg, MB, Canada.

Source: BC MOE Guidelines (British Columbia Ministry of Environment Guidelines). 2017. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture.

- = no guideline; 0% = no guideline exceedance; µg/L = micrograms per litre; mg/L = milligrams per litre; mg-N/L = milligrams nitrogen per litre.

At YOWN-1401, concentrations of total metals in groundwater including aluminium, chromium, cobalt, copper, iron, manganese, selenium, silver, uranium and zinc and for dissolved aluminium, chromium, iron, and zinc exceeded one or more of the applicable guidelines for groundwater (Table 17).

Table 17: Percentage of Groundwater Samples with Guideline Exceedances at YOWN-1401, 2013 – 2017

Parameter	2013- 2017			
	% Above Guideline			
	Chronic (Long-term)	BC MOE		>Yukon CSR
		mean	max	
Field Measured				
Dissolved oxygen	100	-	-	-
Major Ions				
Sulphate	-	100	-	100
Total Metals				
Aluminium	20	-	-	-
Chromium	20	-	-	-
Cobalt	-	20	-	-
Copper	20	-	-	-
Iron	100	-	-	-
Manganese	-	25	25	-
Selenium	20	-	-	-
Silver	20	-	-	20
Uranium	20	-	-	-
Zinc	20	-	-	-
Dissolved Metals				
Aluminium	-	40	20	-
Chromium	-	-	-	20
Iron	-	-	100	-
Zinc	-	-	-	20

Chronic = concentration is higher than the chronic aquatic life CCME guideline or outside the recommended pH, DO or total alkalinity range.
BC MOE mean = concentration is higher than the 30-day mean BC MOE guideline or outside the recommended pH, DO or total alkalinity range.

BC MOE max = concentration is higher than the maximum BC MOE guideline or outside the recommended pH, DO or total alkalinity range.

>Yukon CSR = concentration is higher than the Yukon CSR standard.

Source: Yukon Contaminated Sites Regulation 2012.

Source: CCME (Canadian Council of Ministers of the Environment). 1999, with updates to 2017. Canadian Environmental Quality Guidelines. Winnipeg, MB, Canada.

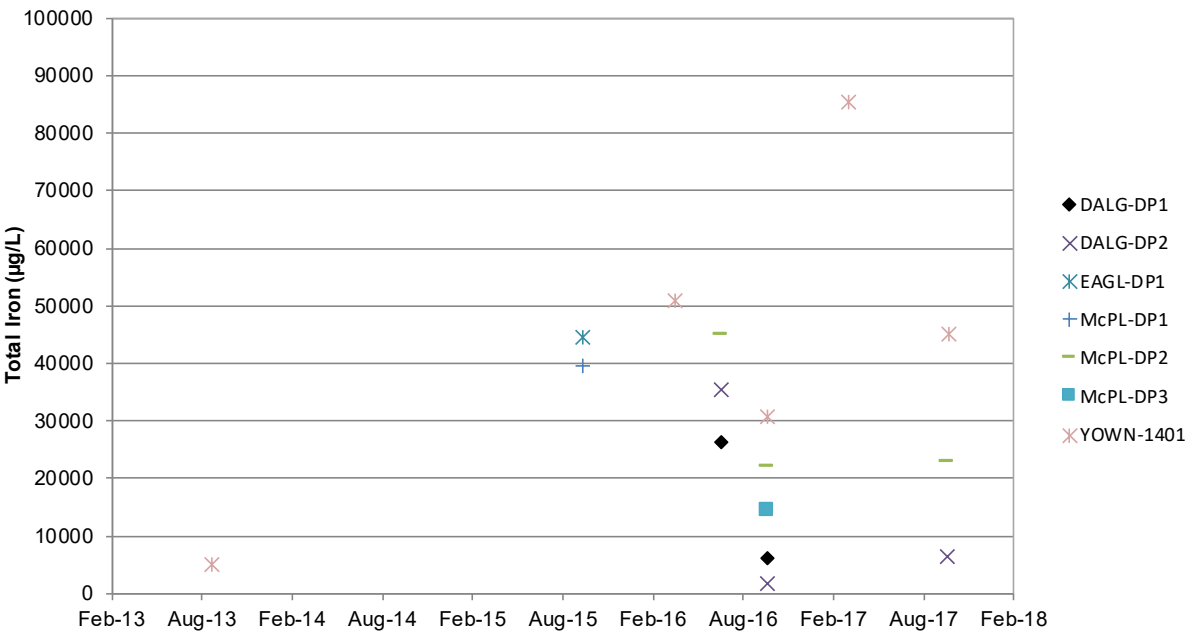
Source: BC MOE Guidelines (British Columbia Ministry of Environment Guidelines). 2017. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture.

- = no guideline; 0% = no guideline exceedance; µg/L = micrograms per litre; mg/L = milligrams per litre; mg-N/L = milligrams nitrogen per litre.

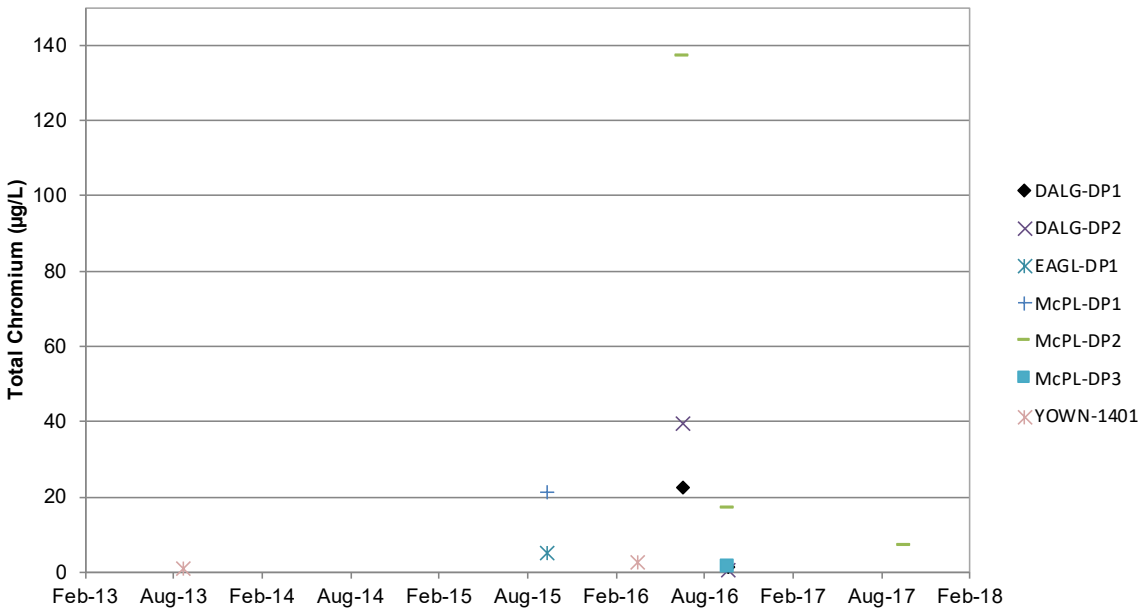
Dissolved metals concentrations were generally below the guideline concentrations except for iron. Concentrations of dissolved iron in streambed groundwater samples were high in all three watersheds (McParlon Creek, Dalglish Creek, and Eagle River Tributary) and varied between and within these watersheds. The Eagle River Tributary streambed groundwater had the highest measured dissolved iron concentration (22 mg/L) and the Dalglish Creek groundwater samples the lowest dissolved iron concentrations (mean 3.8 mg/L). The YOWN-1401 groundwater also contained high concentrations of dissolved iron (mean 10.4 mg/L). Iron concentrations in groundwater are shown in Figure 14. High concentrations of dissolved iron may be related to pyrite and other iron-bearing minerals in shale units found throughout the study area. Van Everdingen et al. (1985) found that iron, zinc, nickel, and sulphate in groundwater discharging into Engineer Creek, located in the southeast of the study area, were related to sulphide mineralization in Devonian and Ordovician black shales. Jackson (2012) documented pyrite in Cretaceous shales in the Eagle River Basin.

Figure 13: Total Metals Concentrations in Groundwater for Iron, Aluminium, Chromium and Copper

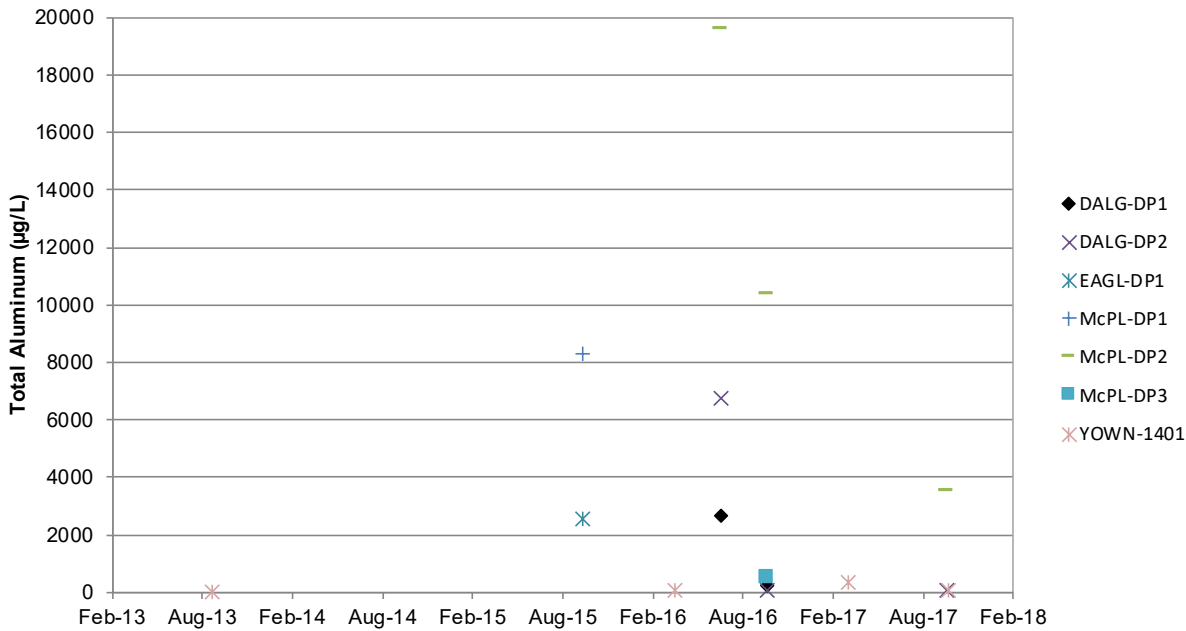
a) Total iron in groundwater



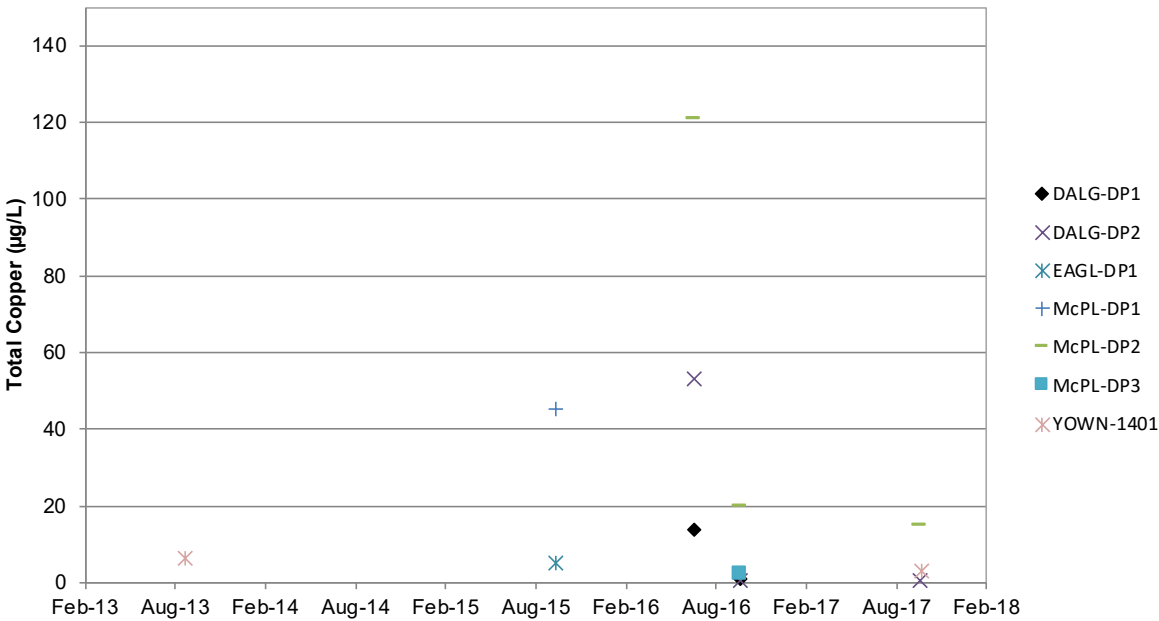
b) Total chromium in groundwater



c) Total aluminium in groundwater



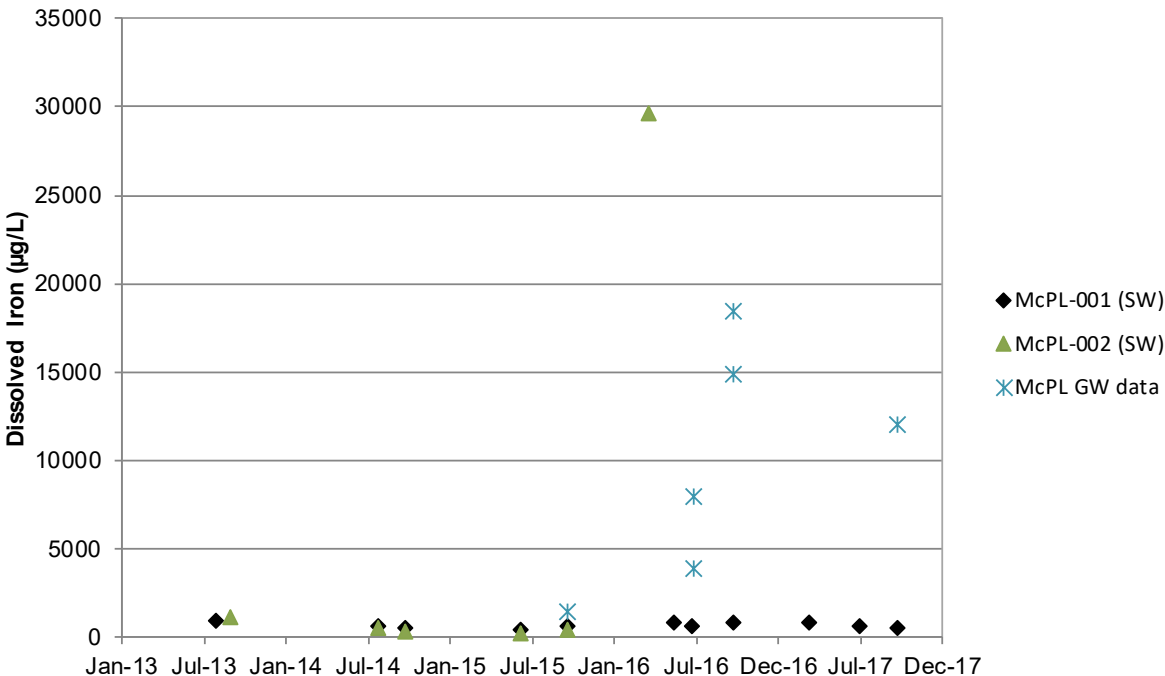
d) Total copper in groundwater



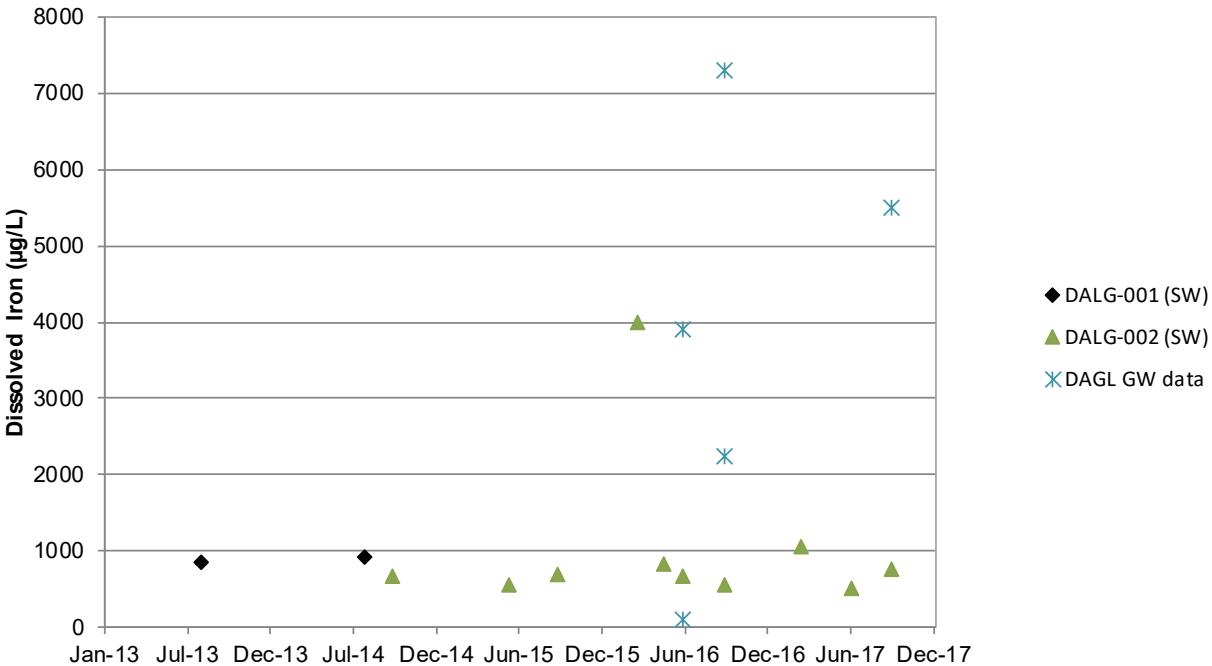
Note: (SW) = surface water sampling station. GW = Groundwater Sampling Stations. All concentrations in ug/L. McPL-DP1 (22 June 2016) aluminium not plotted due to high concentrations not representative of Y-axis (108000 ug/L). Total metals concentrations in McPL-DP2 are: iron 223000 µg/L, chromium 225 µg/L, aluminium 108,000 µg/L and copper 418 µg/L.

Figure 14: Dissolved Iron Concentrations at all Groundwater Stations and in Ground and Surface Water at the McParlon Creek and Dalglish Creek Stations

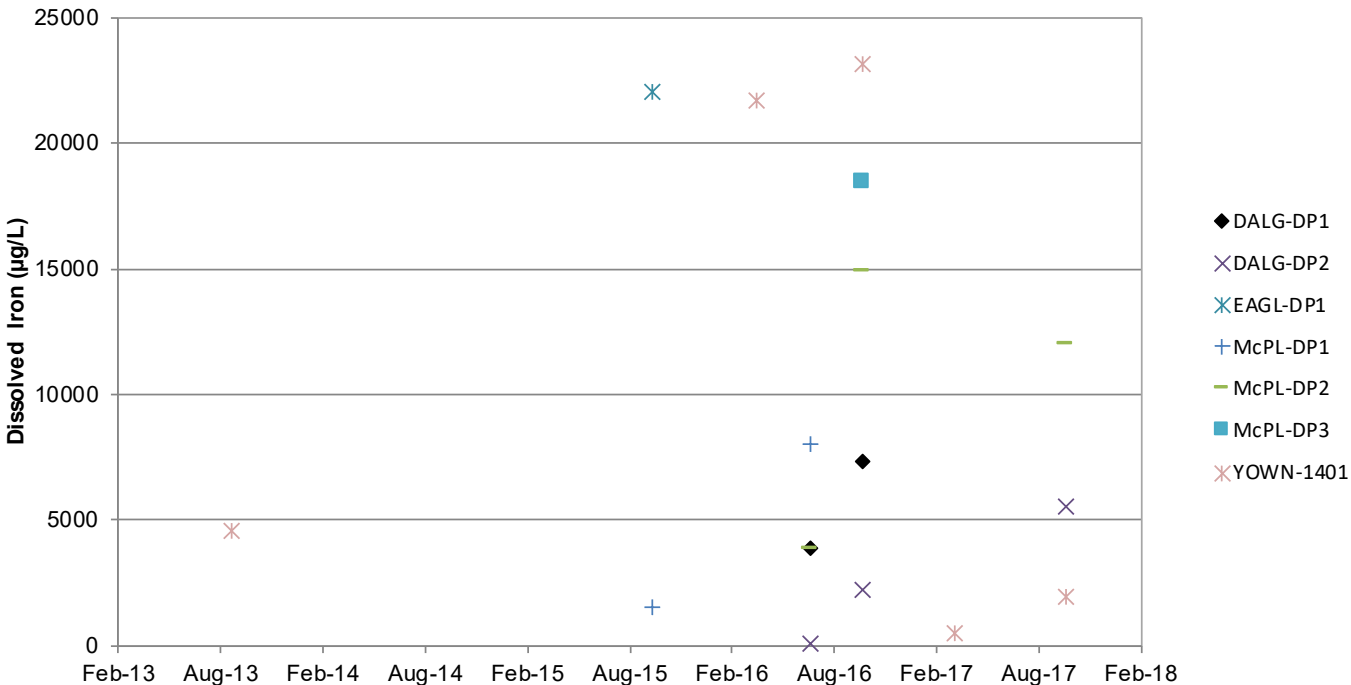
a) McParlon Creek surface water and groundwater



b) Dalglish Creek surface water and groundwater



c) All groundwater sampling stations



Note: (SW) = surface water sampling station. GW = Groundwater Sampling Stations. No results were below detection limit. All concentrations in ug/L.

Hydrocarbons

There were no detectable concentrations of volatile organic compounds (benzene, ethylbenzene, toluene, xylenes, styrene and methyl tert-Butyl Ether) in the streambed groundwater samples or in the YOWN-1401 groundwater samples (Table C-1).

Two groundwater samples (EAGL-DP1 and MCPL-DP1) from September 2015 were analyzed for PAH parent compounds and alkylated PAH. Concentrations of PAH in groundwater were generally less than guideline concentrations with the exception of pyrene in MCPL-DP1, which had a concentration of 0.022 ug/L, exceeding the BC MoE 30-day mean guideline for the protection of aquatic life of 0.02 ug/L. Concentrations of total parent PAHs in the streambed groundwater samples were higher than those observed in associated surface water samples (Figure 4). Naphthalene, phenanthrene, perylene, pyrene, benzo(a)anthracene and benzo(g,h,i)perylene made up the greatest proportion of the total parent PAH concentrations (Figure 5).

It is likely that, as with the Eagle Plains surface waters, PAH in the groundwater samples are derived from natural sources such as forest fires and naturally occurring oil and gas deposits. However, high total suspended solids in both groundwater samples analyzed for PAH compounds may influence the measured PAH concentrations. PAH compounds, dominated by naphthalene, phenanthrene fluoranthene, and pyrene were found in Peel River sediments at concentrations that exceeded the CCME threshold effects levels (TEL) but were far below the probable effect levels (PEL) (CCME, 2001; Stantec, 2012). Entrainment of sediment from the streambed into groundwater samples may produce artificially high PAH concentrations.

Radionuclides

Radionuclide activity in both the streambed and YOWN-1401 groundwater was generally less than the method detection limit for the naturally occurring radionuclides analyzed in this study. Low levels of natural, background radioactivity from actinium-228, bismuth-212, lead-212, lead-214, and thallium-208 were found in groundwater in the study area (Table C-1).

Isotopic Composition of Groundwater

The $\delta^{18}\text{O}$ and $\delta^2\text{H}$ isotopic composition of streambed groundwater is similar to that observed in surface waters, most often similar to the open-water composition of surface water, but with some variation (Figure 6) and plots above the LMWL (Figure 6). This indicates that either the streambed groundwater is mixing with the overlying surface water or that the shallow groundwater is derived from a similar source (i.e., local precipitation). Groundwater at YOWN-1401 is isotopically similar to average annual precipitation and plots on the LWML (Figure 6). This indicates that bedrock groundwater at YOWN-1401 likely represents recharge of modern meteoric water, recharged under similar climatic conditions to those observed in the region today.

The carbon-13 isotopic signature of DIC in the streambed groundwater ranges from -9.5 to -21.2‰. The bedrock groundwater at YOWN-1401 is more enriched, at -7.9 to -9.8‰ and has high concentrations of DIC, suggesting an aquifer source of carbon with the enriched $\delta^{13}\text{C}$ isotopic signature associated with marine carbonates (-5 to 10‰; Clark and Fritz 1997). As noted for surface water, the negative Carbon-13 ratios suggest that methane oxidation may be a more dominant reaction than methanogenesis. Figure 8 compares the carbon-13 signature of DIC and methane in the YOWN-1401 groundwater and shows carbon-13 in methane in the bedrock groundwater is slightly more depleted and the carbon-13 in DIC slightly more enriched than surface water samples and is indicative of biogenically produced methane.

The $\delta^{34}\text{S}$ and $\delta^{18}\text{O}$ isotopic signature of sulphate in streambed groundwater covers a broad range of values (Figure 9). $\delta^{34}\text{S-SO}_4$ ranges from -10.6 to 3.0‰ and $\delta^{18}\text{O-SO}_4$ from -16.2 to 4.9‰, indicating sulphide oxidation as the likely dominant source of sulphate in the groundwaters sampled. The enrichment of $\delta^{34}\text{S}$ and $\delta^{18}\text{O}$ beyond that normally observed in the surface water samples likely represents enrichment due to bacterial sulphate reduction in the streambed sediments. Bedrock groundwater at YOWN-1401 has a less variable sulphate isotopic signature, with $\delta^{34}\text{S-SO}_4$ ranging from -5.9 to -4.5‰ and $\delta^{18}\text{O-SO}_4$ from -15.8 to -14.4‰.

Dissolved Gas Composition of Groundwater

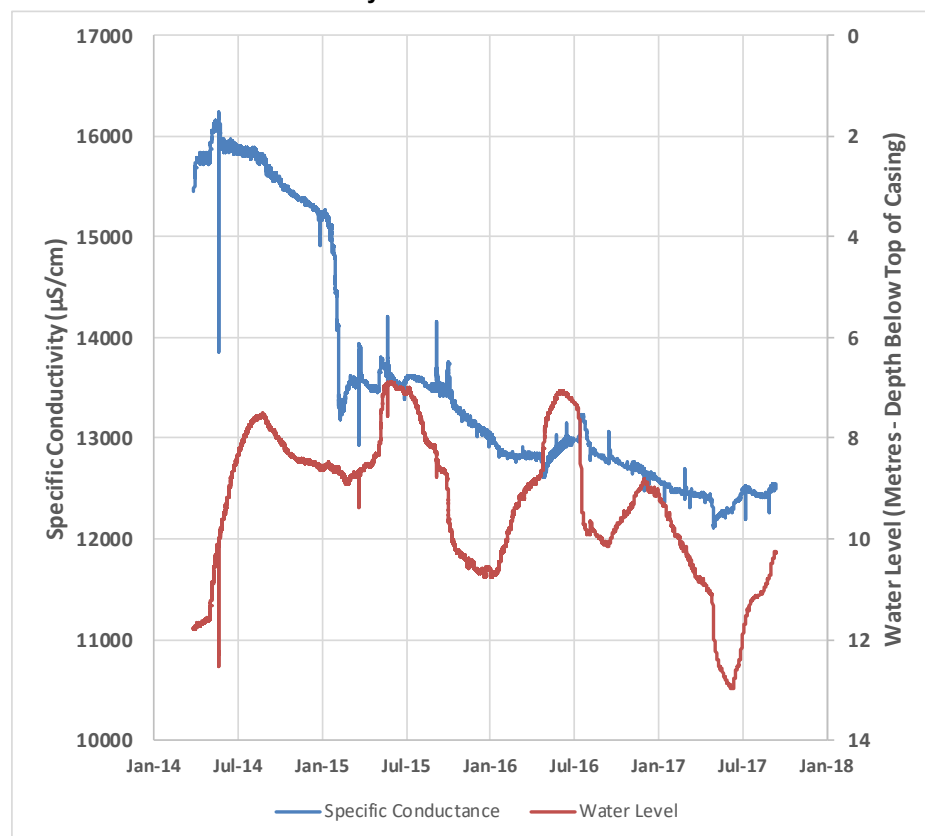
Dissolved gases in streambed groundwaters are characterized by less dissolved oxygen (less than 15 molar percent) and increased proportions of methane and carbon dioxide than in surface water. This reflects the more reducing nature of the streambed sediments where there is a lack of mixing with atmospheric oxygen. Methane, which is likely biogenic in origin based on the lack of detectable ethane and propane, is found at up to 0.5 mg/L or 3% of total gas (on a molar basis).

Bedrock groundwater at YOWN-1401 has had high concentrations of dissolved CO_2 , up to 161 mg/L (15 March 2015). However, concentrations of CO_2 in the well have decreased over time and were found to be 6 mg/L in September 2017, coinciding with an overall increase in the freshness of the water (decreased TDS, sulphate, hardness and alkalinity) as discussed in the Major Ion section above. The dry gas index can be calculated for YOWN-1401 and ranged from 30 to 40, suggesting that methane at YOWN-1401 may be thermogenic in origin rather than biogenic. This distinction would require further investigation, as low dry gas values are also possible as a result of methane oxidation, a process indicated to be likely occurring based on the carbon-13 isotopic values.

Bedrock Groundwater Continuous Monitoring

The specific conductivity and water level in the YOWN-1401, monitored using a datalogger hung in the well, are shown in Figure 15. Sudden, brief fluctuations in water level and specific conductivity are indicative of pumping events, but the main trends in water levels appear to be due to seasonal variation. Water level has varied over time by six metres (6.8 to 12.9 metres below top of casing). Water levels tended to be highest during summer months (2014 to 2016). Water levels were low in June 2017 but showed a trend of increasing over the remaining summer months to the end of the monitoring record in September 2017. The seasonal variations in water level in YOWN-1401 may support the theory that a connection to shallow groundwater could be driving the decrease in TDS with time in YOWN-1401. The continuous specific conductivity measurements also show an overall decrease with time from 2014 to 2017.

Figure 15: Specific Conductivity and Water Level in the Bedrock Well YOWN-1401, 2014 - 2017, Recorded At Hourly Intervals



4.2.3 Sediment Quality

The following is a summary of the parameters which exceeded sediment quality guidelines, detailed results are found in Table D-1. Given the small sample size, no comparison to surface or groundwater is made.

Concentrations of copper, lead and mercury were less than the ISQG and PEL guidelines in sediment samples at each sampling station.

Arsenic concentrations exceeded the ISQG in the full fraction and 2 mm fraction at each station and exceeded the PEL in the full fraction samples at lower Chance Creek (CHNC-001), Dalglish Creek (DALG-002), in the tributary to Eagle River (EAGL-t-003), and in lower McParlon Creek (McPL-001).

Cadmium concentrations exceeded the ISQG in both the full fractions and 2 mm fractions collected at lower Chance Creek (CHNC-001), in lower McParlon Creek (McPL-001), and in the Whitestone River (WHST-004). Cadmium concentrations also exceeded the ISQG in the 2mm fractions collected in Dalglish Creek (DALG-002) and in the Eagle River tributary (EAGL-t-003).

Chromium concentrations exceeded the ISQG in the 2 mm fractions collected at lower Chance Creek (CHNC-001) and at lower McParlon Creek (McPL-001).

Zinc concentrations exceeded the ISQG in both the full fractions and the 2 mm fractions collected at lower Chance Creek (CHNC-001), in Dalglish Creek (DALG-002), in the tributary to the Eagle River (EAGL-t-003), and in McParlon Creek (McPL-001). Zinc concentrations also exceeded the ISQG in the 2 mm fraction collected in the Whitestone River (WHST-004).

4.3 Key Question 2: Do Season, Geology, Watershed and Streamflow Influence Surface Water Quality?

Conventional Parameters

Conventional parameters which appeared to be influenced by seasonality were hardness, alkalinity, total and dissolved organic carbon, and total and dissolved inorganic carbon. Hardness, alkalinity, and total and dissolved inorganic carbon had higher concentrations during the under-ice period as compared to other seasons. Total and dissolved organic carbon had higher concentrations during the open water period in September, and lower concentrations during the under-ice period.

Stage records for McParlon Creek and Dalglish Creek are shown in Figures 16 and 17 by discharge year. The variations of concentrations of conventional parameters in Dalglish Creek and McParlon Creek were compared against the stage records for these two creeks. Total suspended solids and total organic carbon at one or more stations on Dalglish Creek and McParlon Creek mirrored stage data, indicating that the concentrations of these parameters are influenced by flow. Figures 18a, 19a and 20a show total organic carbon compared to stage data for McParlon Creek and the Lower and Upper Dalglish Creek hydrometric stations, respectively.

Discharge data was compared to specific conductivity recorded at hourly intervals by a datalogger at McPL-001 (available from June 2017 to September 2017 only). Specific conductivity was inversely related to discharge during this time period, with higher specific conductivity measured during the periods of lowest discharge. Continuous logger data for specific conductivity was also available for EAGL-t-003 from September 2016 to September 2017, however there was no corresponding discharge data and the logger was likely frozen from November 2016 to April 2017. The lowest specific conductivity recorded at the EAGL-t-003 station occurred during freshet in 2017, which is generally a time of high discharge. Although limited continuous data is available for specific conductivity, it seems likely that this parameter is strongly influenced by streamflow with periods of high discharge representing greater dilution of dissolved constituents.

Figure 16: McParlon Creek Daily Average Discharge Data by Year

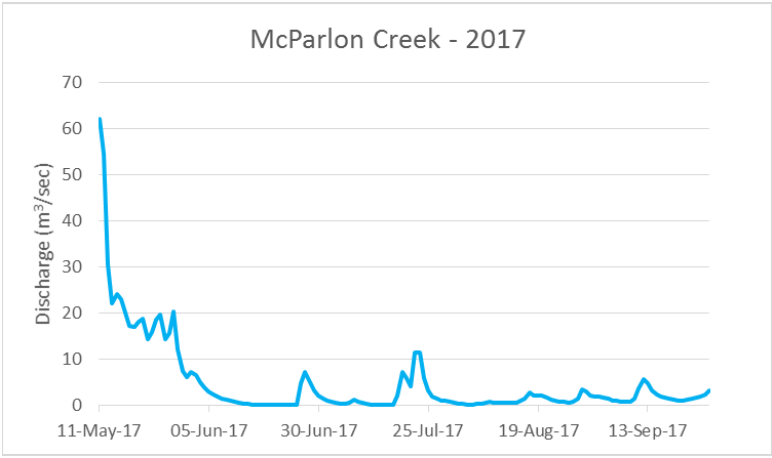
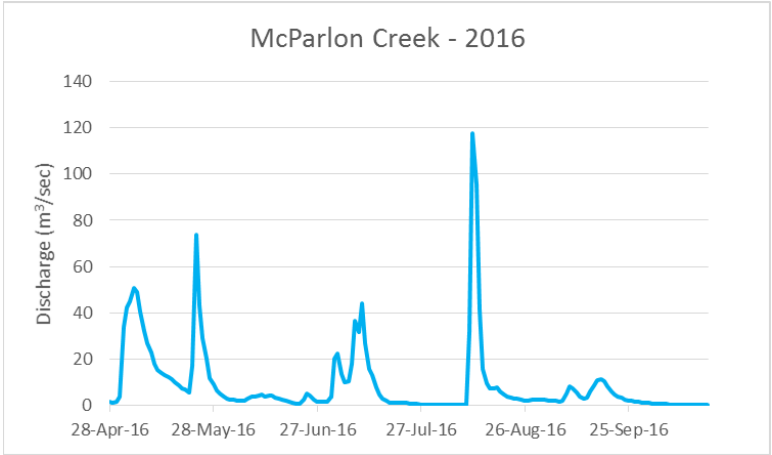
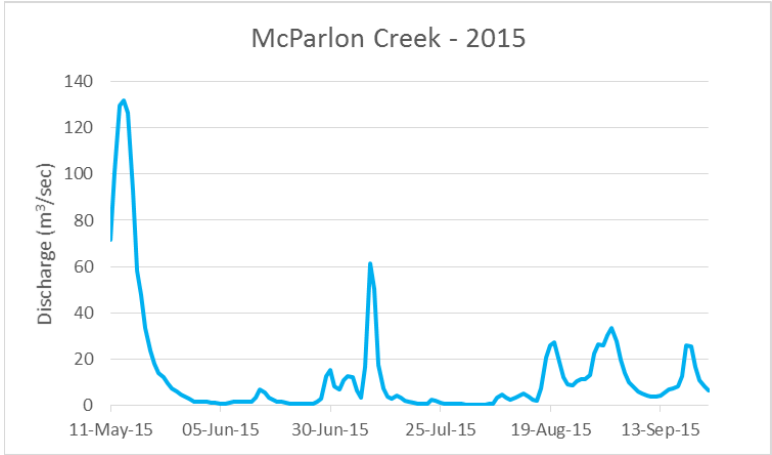
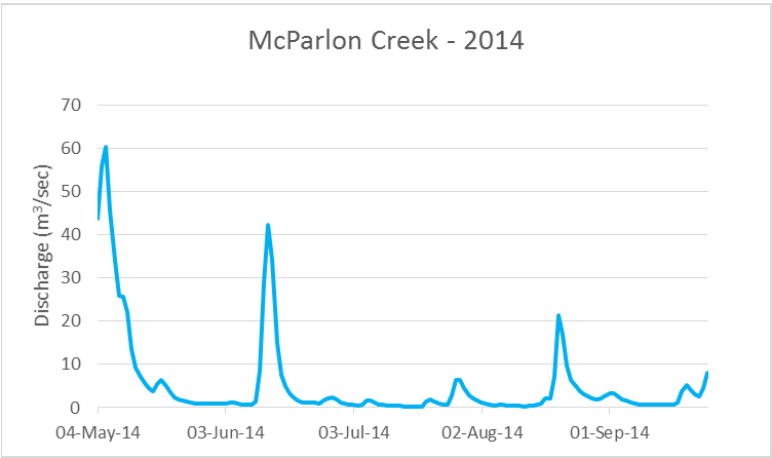
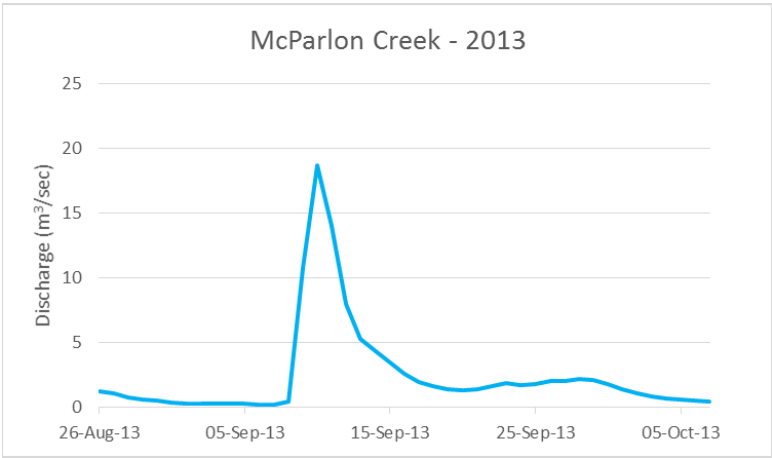


Figure 17: Dalglish Creek Daily Average Discharge Data by Year

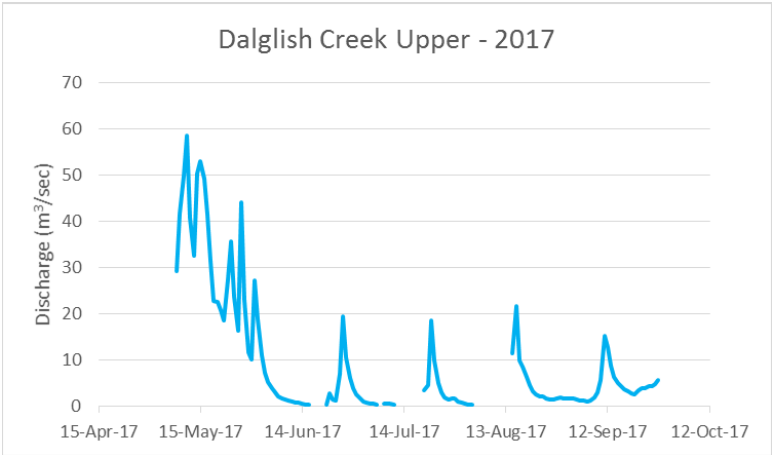
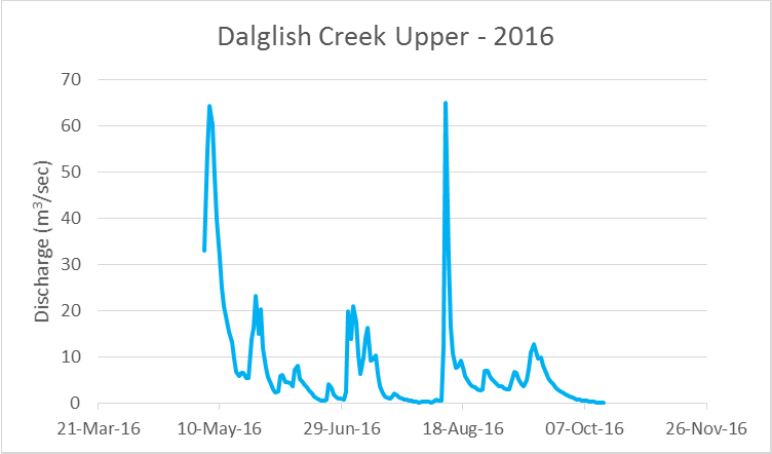
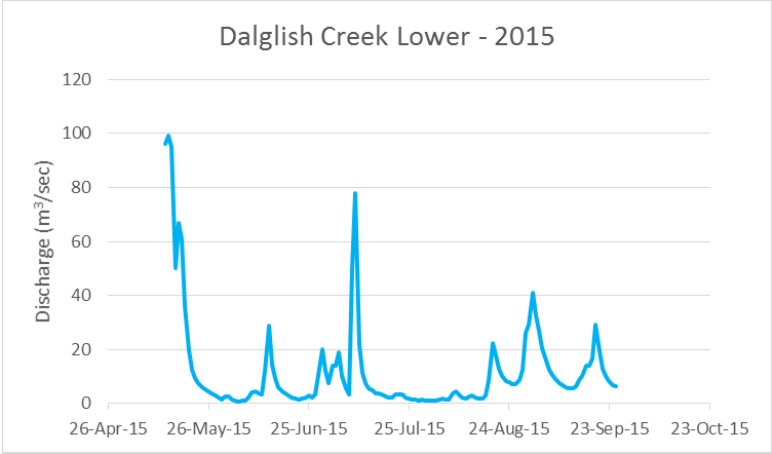
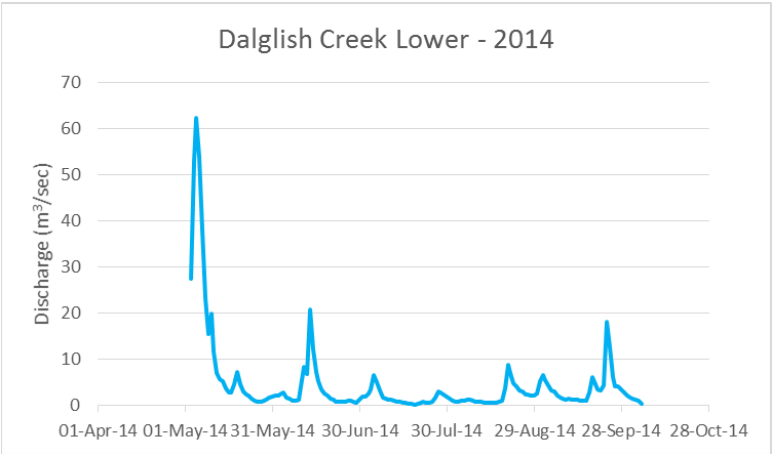
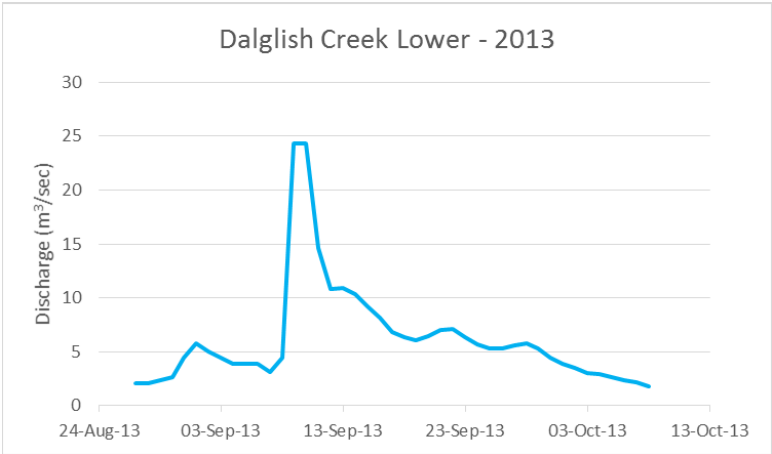
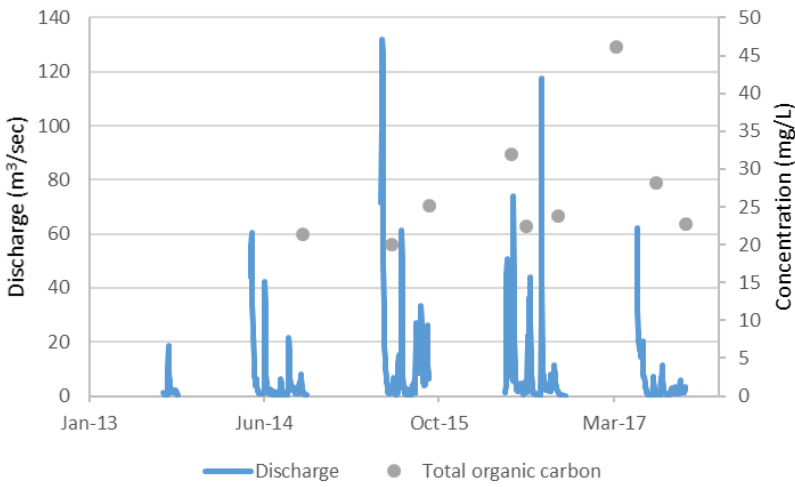
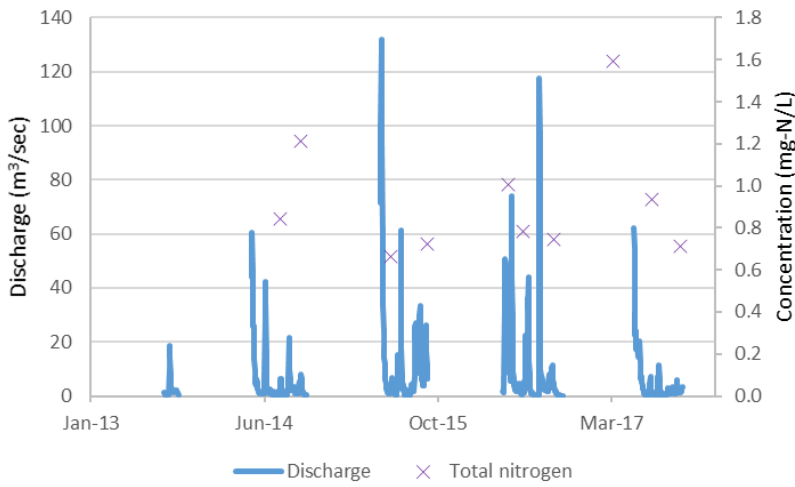


Figure 18: Stream Discharge at the McParlon Creek Hydrometric Station Compared to Concentrations of Key Constituents

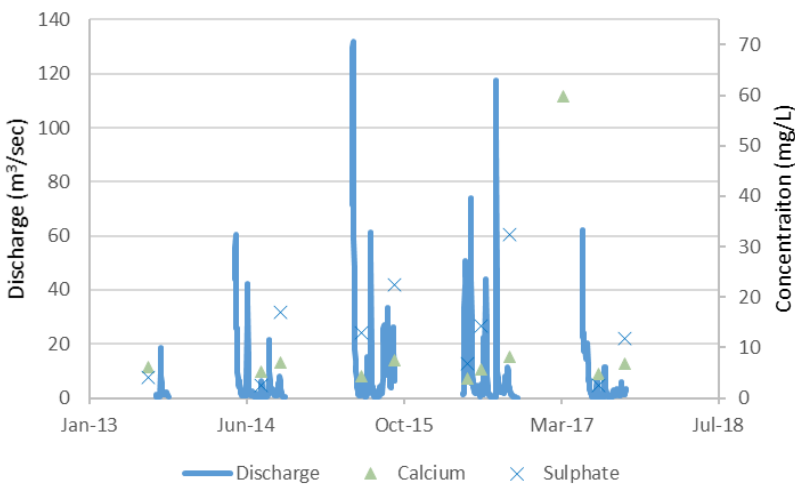
a) Total Organic Carbon and Average Daily Discharge



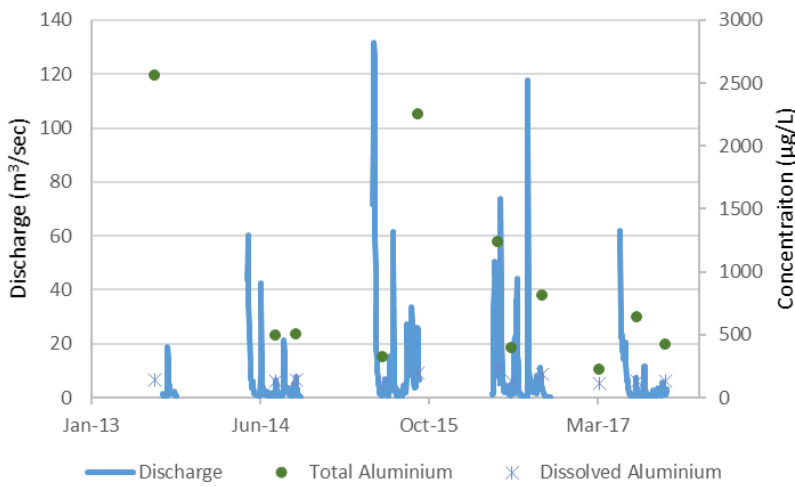
b) Total Nitrogen and Average Daily Discharge



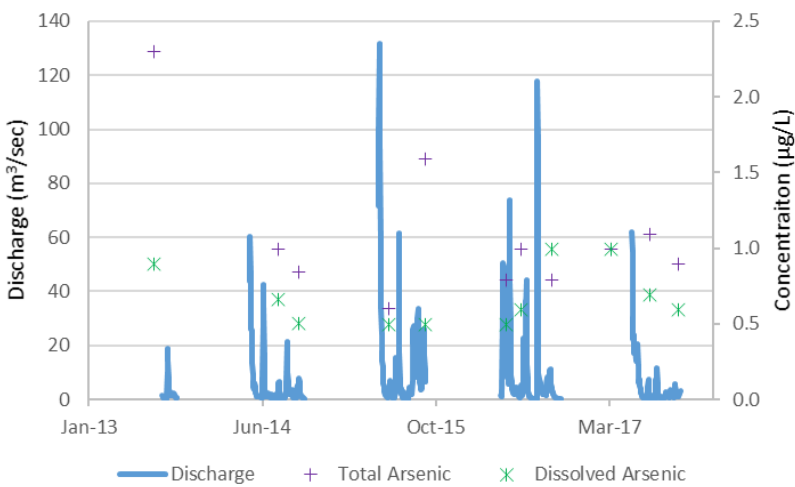
c) Calcium, Sulphate, and Average Daily Discharge



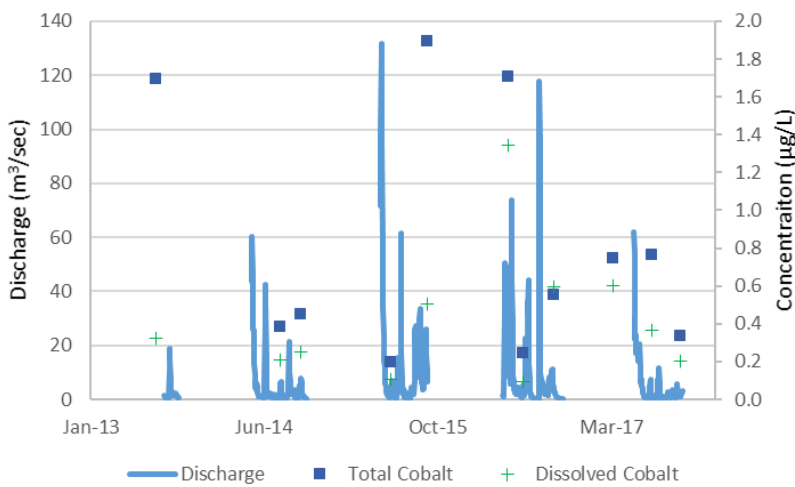
d) Total and Dissolved Aluminium and Average Daily Discharge



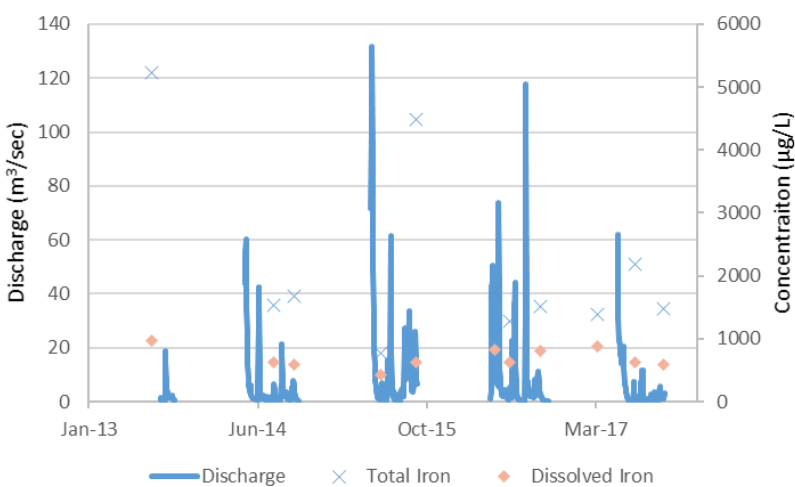
e) Total and Dissolved Arsenic and Average Daily Discharge



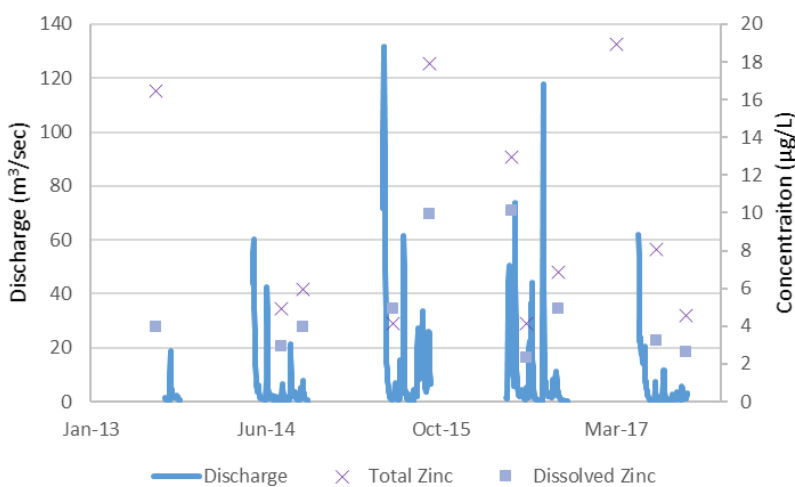
f) Total and Dissolved Cobalt and Average Daily Discharge



g) Total and Dissolved Iron and Average Daily Discharge



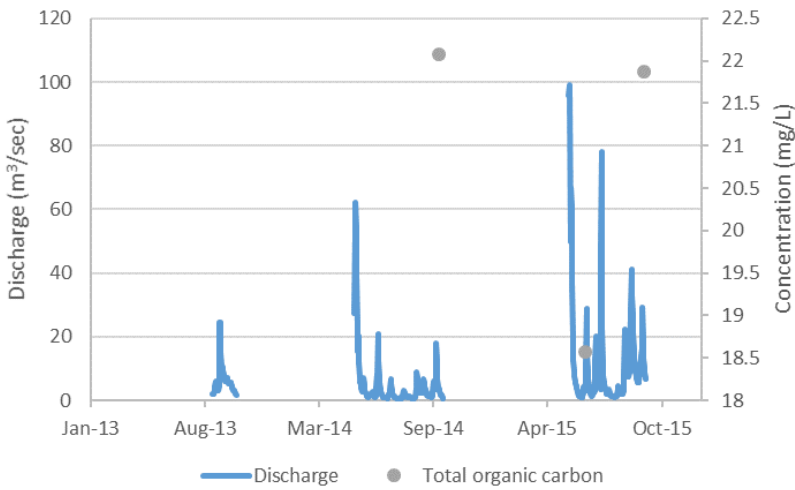
h) Total and Dissolved Zinc and Average Daily Discharge



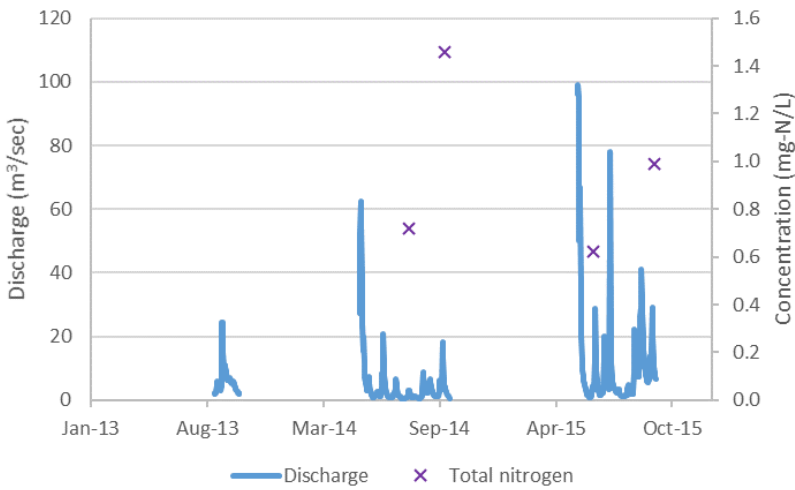
Note: Results below detection limit were treated as equal to the detection limit value.

Figure 19: Stream Discharge at the Lower Dalglish Creek Hydrometric Station Compared to Concentrations of Key Constituents

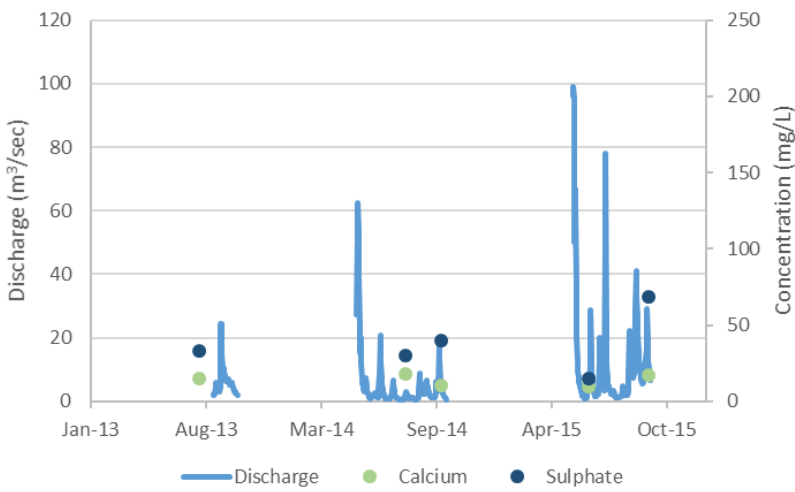
a) Total Organic Carbon and Average Daily Discharge



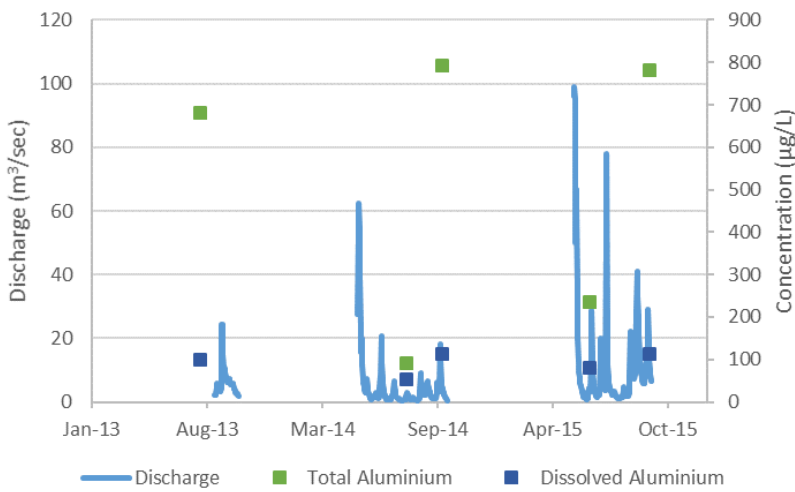
b) Total Nitrogen and Average Daily Discharge



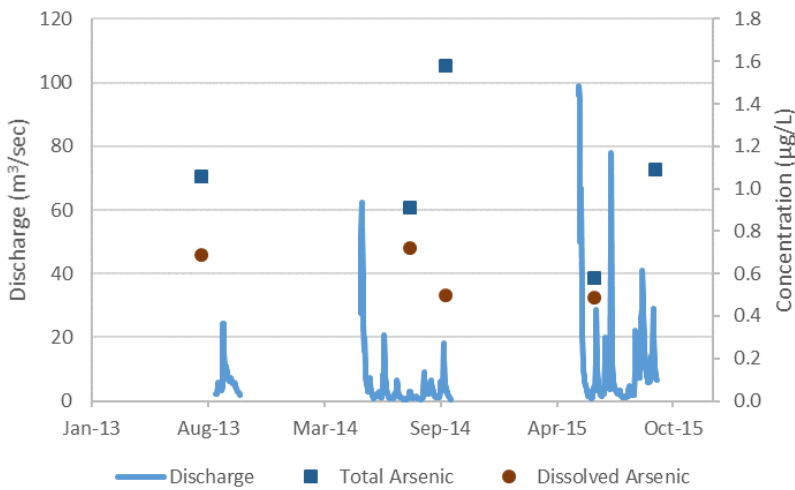
c) Calcium, Sulphate, and Average Daily Discharge



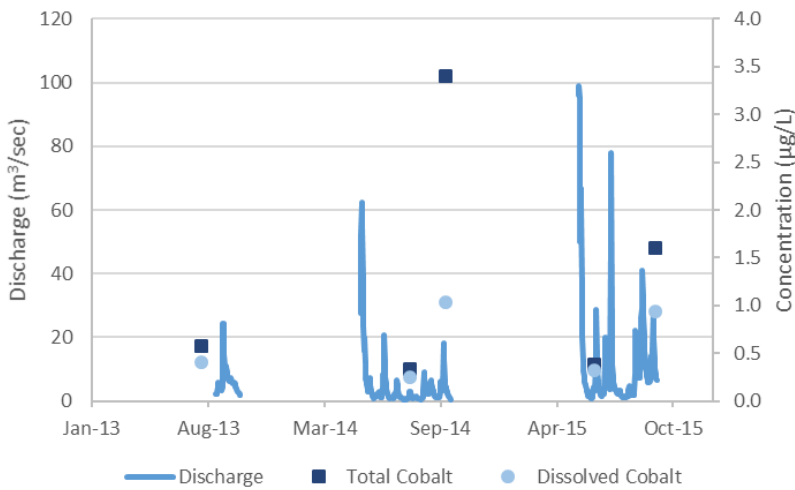
d) Total and Dissolved Aluminium and Average Daily Discharge



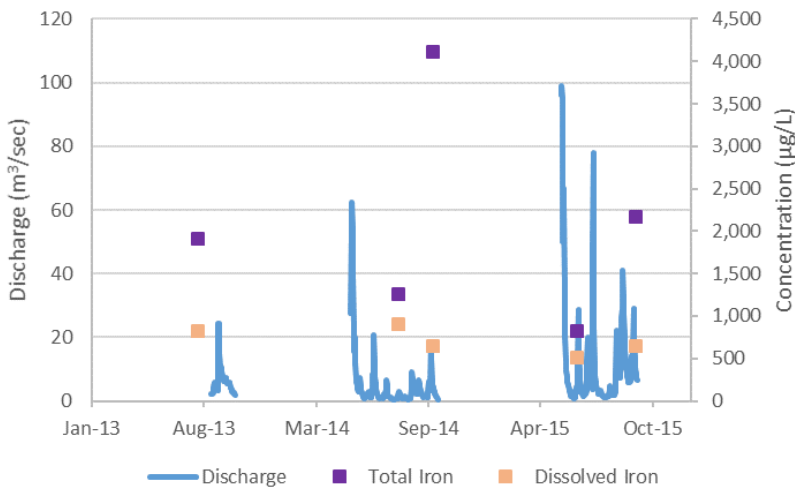
e) Total and Dissolved Arsenic and Average Daily Discharge



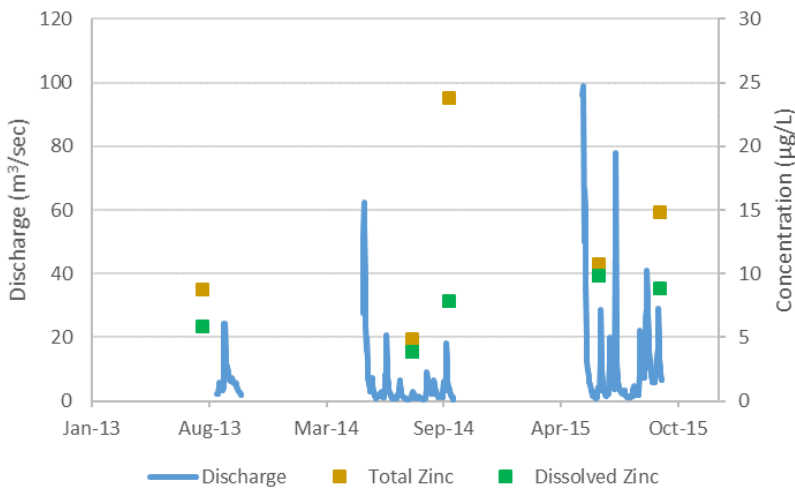
f) Total and Dissolved Cobalt and Average Daily Discharge



g) Total and Dissolved Iron and Average Daily Discharge



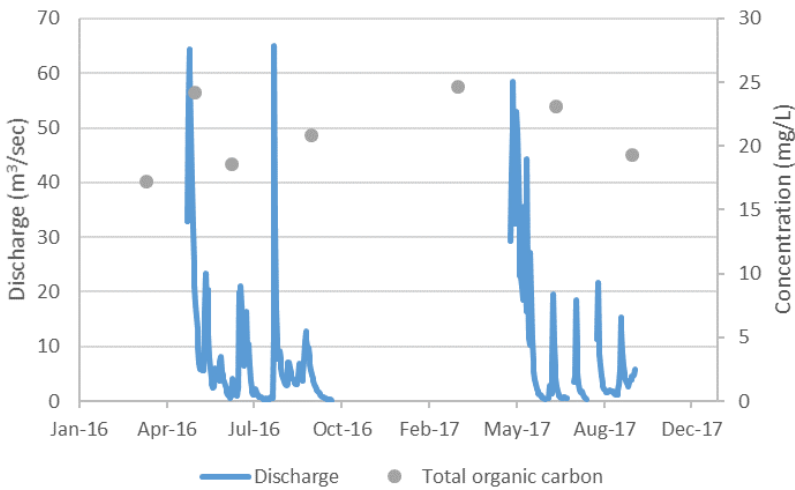
h) Total and Dissolved Zinc and Average Daily Discharge



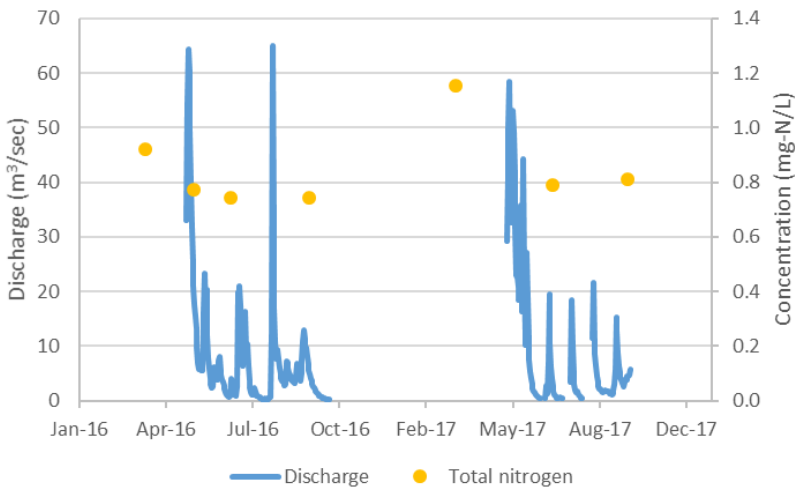
Note: Results below detection limit were treated as equal to the detection limit value.

Figure 20: Stream Discharge at the Upper Dalglish Creek Hydrometric Station Compared to Concentrations of Key Constituents

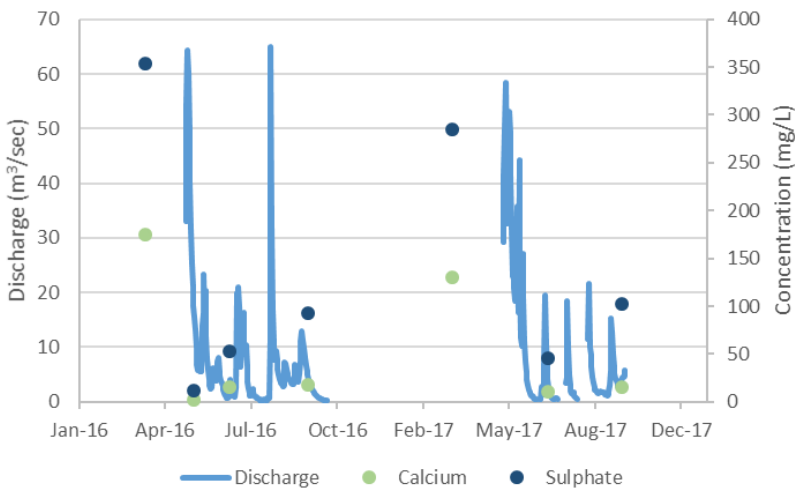
a) Total Organic Carbon and Average Daily Discharge



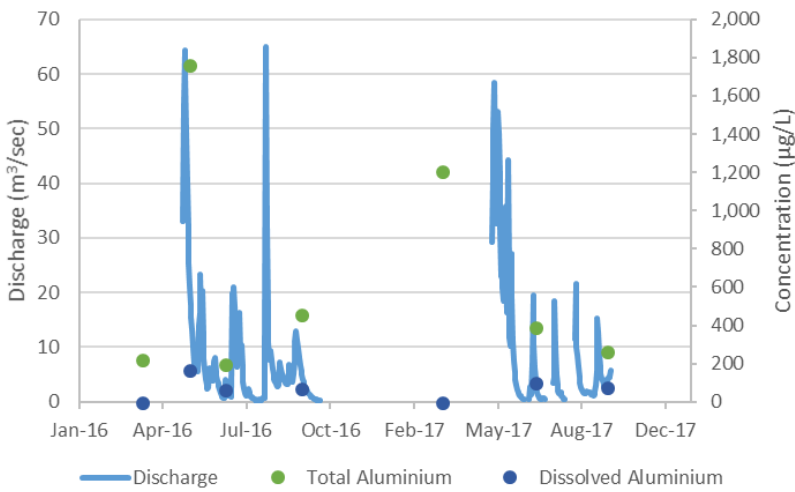
b) Total Nitrogen and Average Daily Discharge



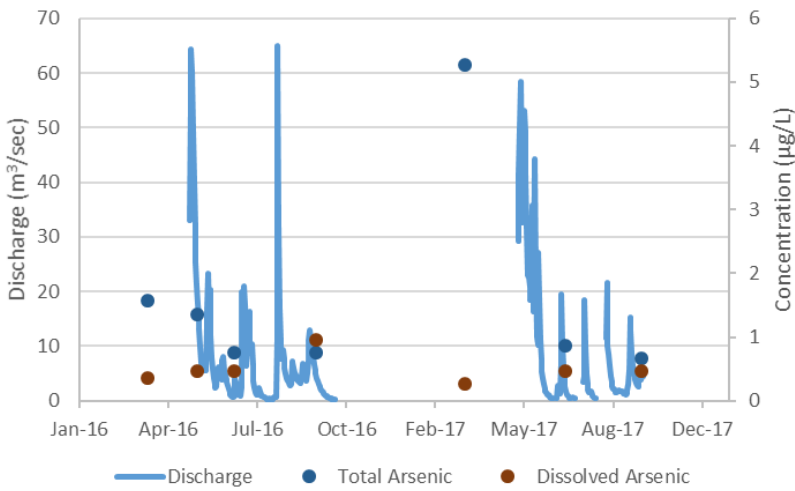
c) Calcium, Sulphate, and Average Daily Discharge



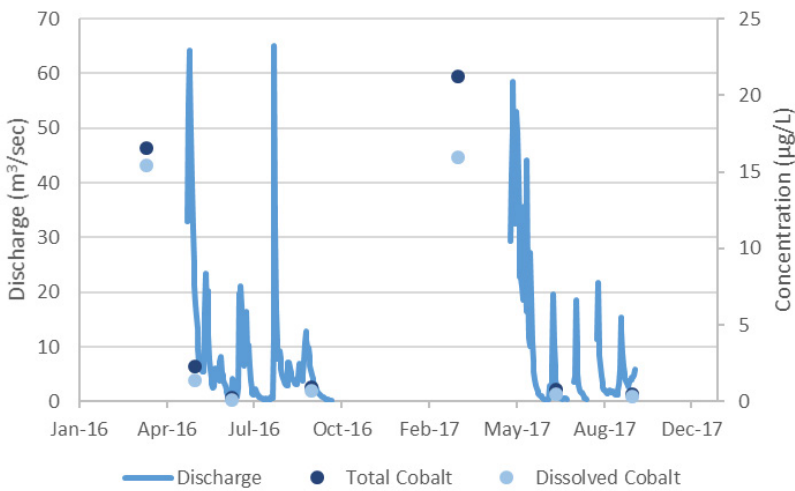
d) Total and Dissolved Aluminium and Average Daily Discharge



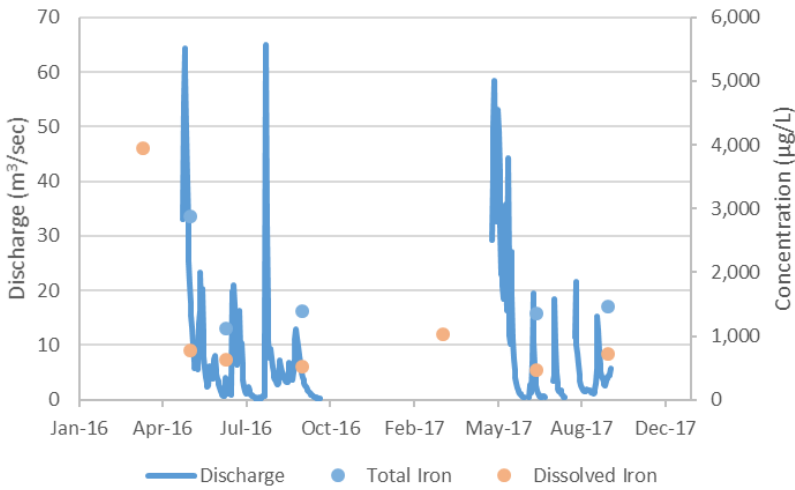
e) Total and Dissolved Arsenic and Average Daily Discharge



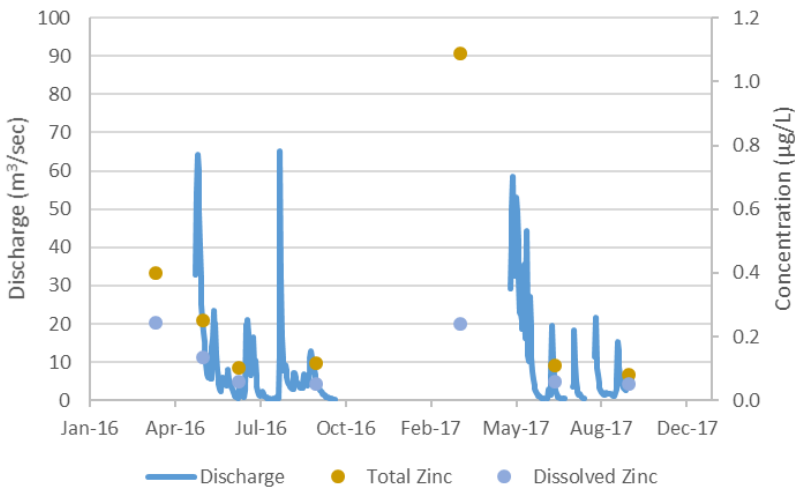
f) Total and Dissolved Cobalt and Average Daily Discharge



g) Total and Dissolved Iron and Average Daily Discharge



h) Total and Dissolved Zinc and Average Daily Discharge



Note: Results below detection limit were treated as equal to the detection limit value.

Major Ions

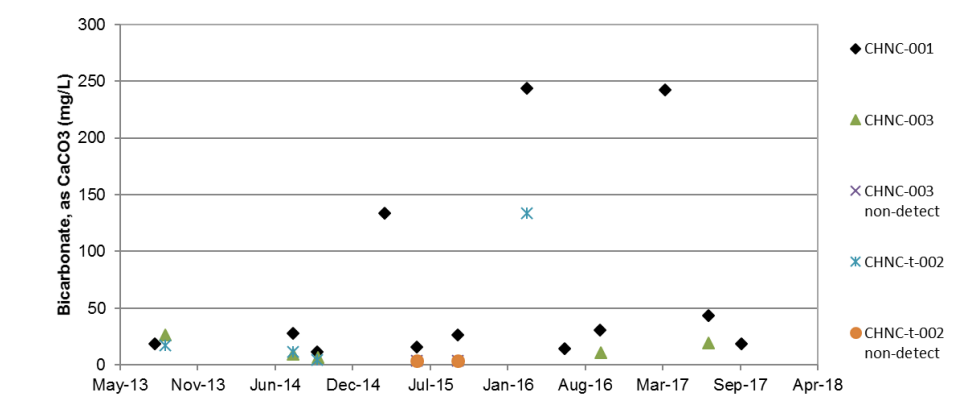
Bicarbonate (Figure 21) and calcium showed strong seasonal variation, with higher concentrations in the under-ice samples as compared to samples collected during the other seasons.

Chloride, magnesium, potassium, sodium, and sulphate (e.g. sulphate shown in Figure 22) also showed seasonal variation at some stations. These parameters mostly showed increased concentrations during the under-ice period, but at some stations showed higher concentrations during high fall flow events, indicating that concentrations of these parameters may be influenced by flow.

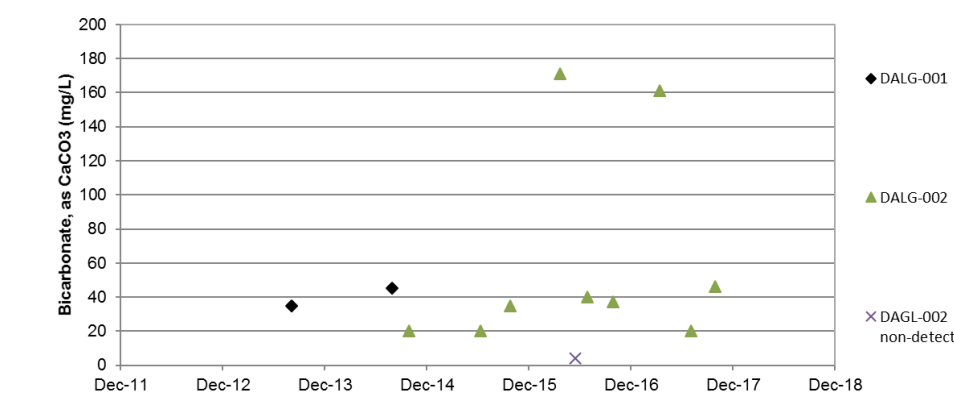
The variation of major ion concentrations in Dalglish Creek and McParlon Creek were compared against the stage records for these two creeks. None of the parameters at stations on Dalglish Creek and McParlon Creek mirrored stage data, indicating that the concentrations of these parameters are not strongly influenced by flow. For example, Figures 18c, 19c and 20c show sulphate and calcium concentrations compared to stream discharge.

Figure 21: Bicarbonate Concentrations in Surface Water Stations Over Time

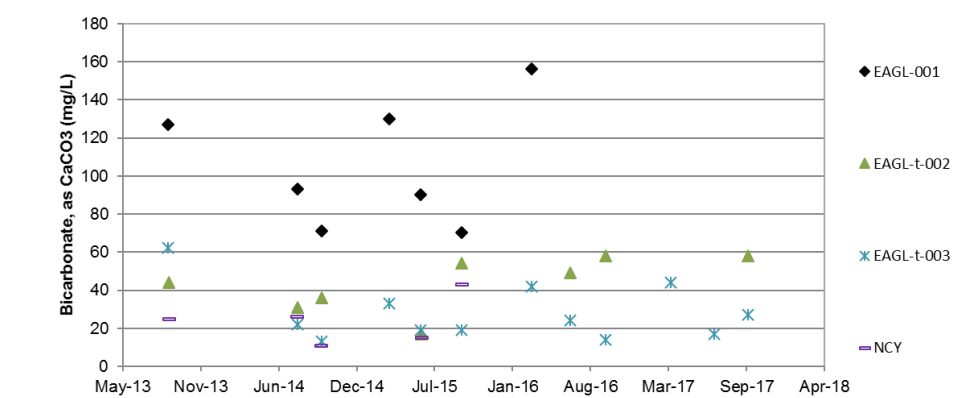
a) Chance Creek surface water.



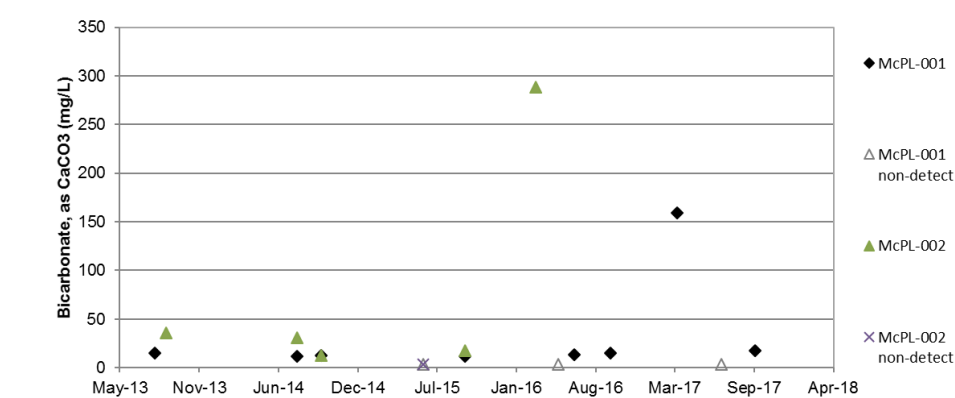
b) Dalglish Creek surface water.



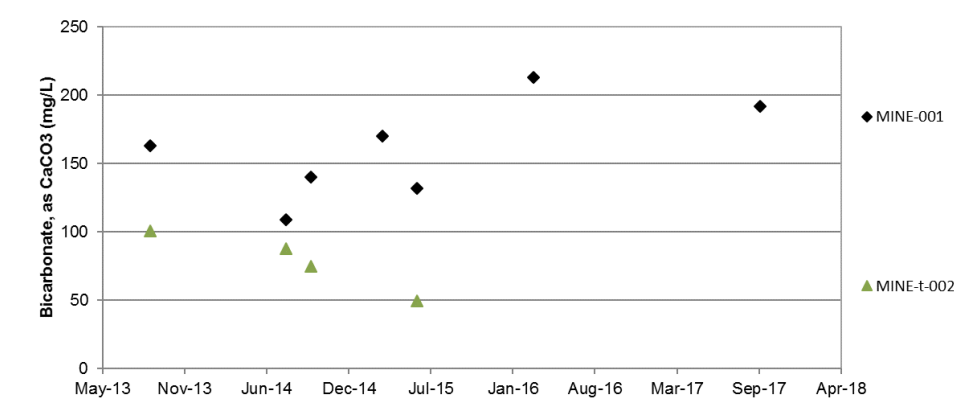
c) Eagle River surface water.



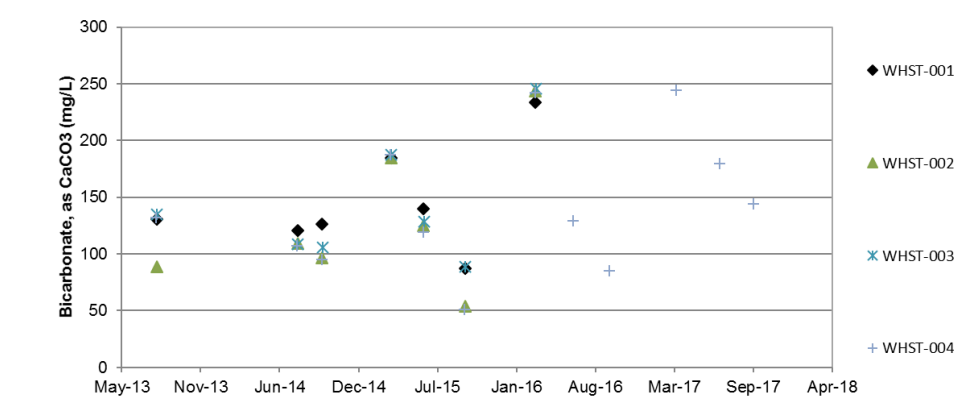
d) McParlon Creek surface water.



e) Miner River surface water.



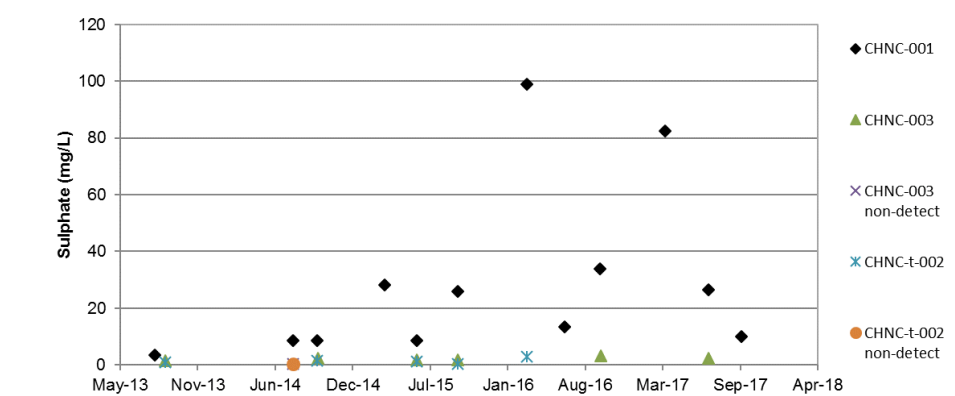
f) Whitestone River surface water.



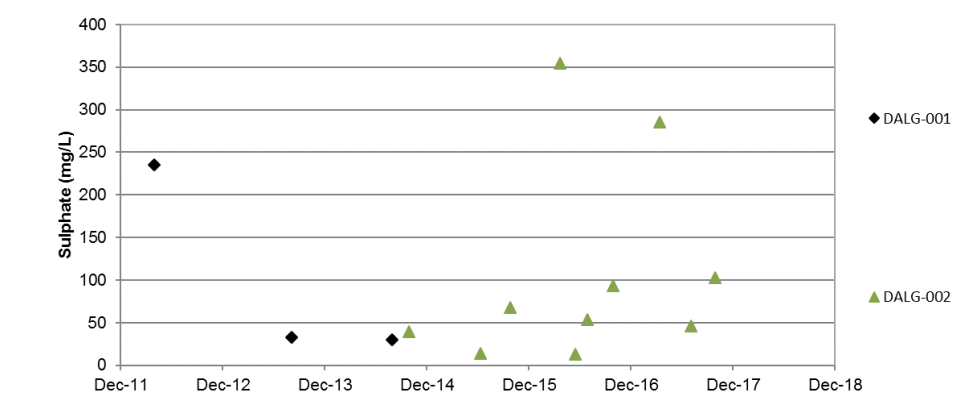
Note: Results below detection limit were treated as equal to the detection limit value.

Figure 22: Sulphate Concentrations in Surface Water Stations Over Time

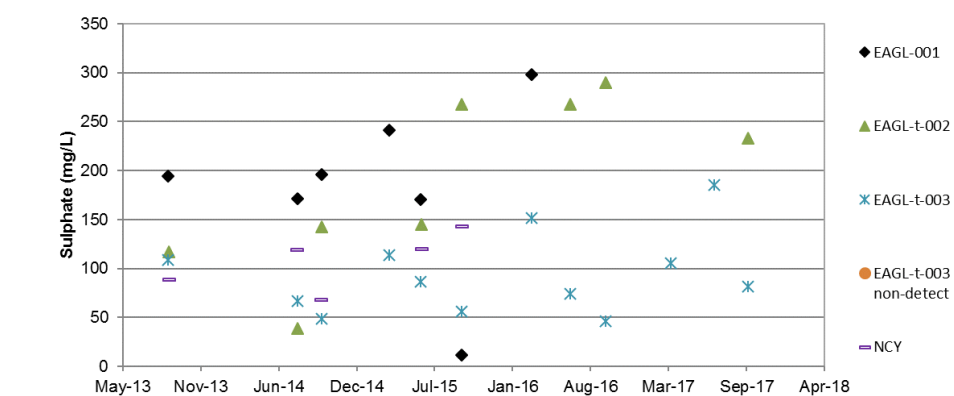
a) Chance Creek surface water.



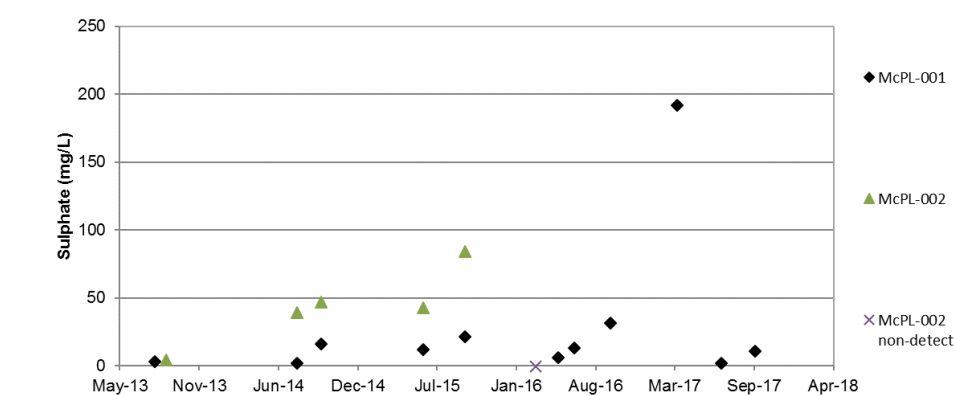
b) Dalglish Creek surface water.



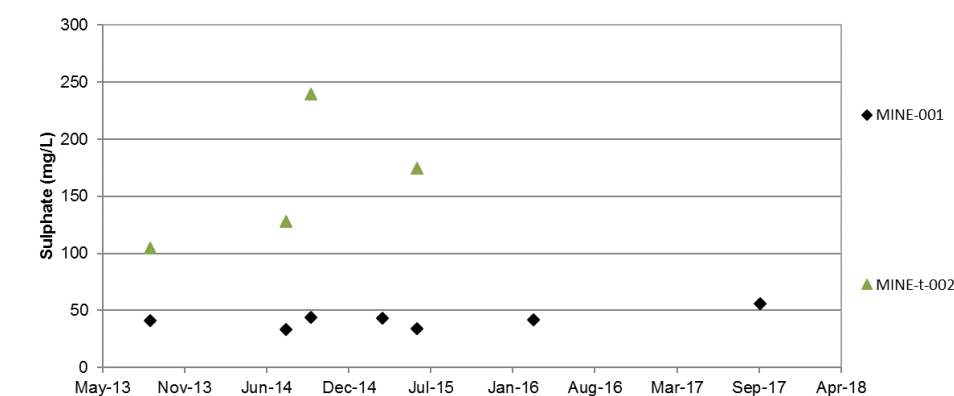
c) Eagle River surface water.



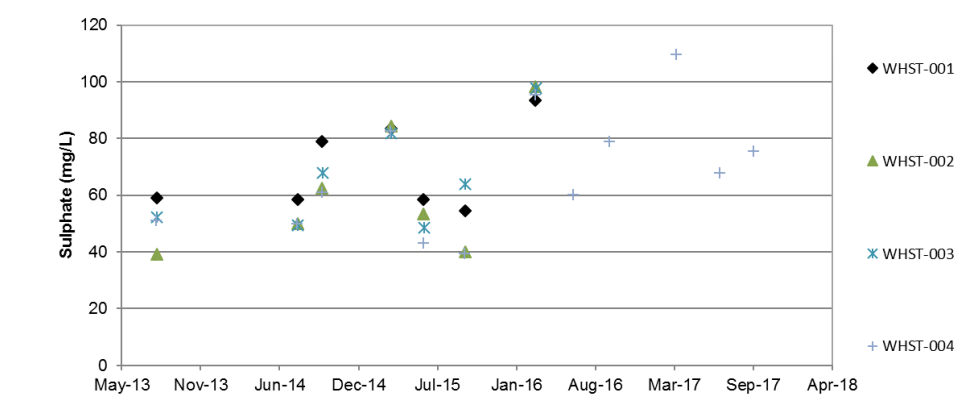
d) McParlon Creek surface water.



e) Miner River surface water.



f) Whitestone River surface water.



Note: Results below detection limit were treated as equal to the detection limit value.

The impact of geology and watershed size on major ion chemistry varied between watersheds. For example, the Miner River and Miner River tributary locations MINE-001 and MINE-t-002 are located within the Ford Lake Formation, which consists mainly of shales and pyritic shales. The tributary, MINE-t-002, contains higher proportions of anions as sulphate and cations as sodium, whereas MINE-001, which drains a larger watershed, has high proportions of anions as bicarbonate and cations as calcium. This may suggest the smaller, localized flowpaths of the tributary encounter more shales and fewer carbonates whereas the larger watershed of the Miner River incorporates flow through more carbonate bearing rocks.

Within the Cody Creek formation, the Whitestone River surface water sampling locations also had greater than 50% of anions as bicarbonate and cations as calcium. McParlon Creek, which flows into the Whitestone River and is also located within the Cody Creek formation had generally had greater than 40% anions as bicarbonate, however there as much greater variation in major ion composition of the smaller watershed, McParlon Creek, than the Whitestone River. In this case, the smaller watershed only showed a tendency towards higher proportions of sulphate than the larger during some sampling events.

In the Eagle River watershed, sampling locations are located within both the Imperial formation and Burnthill Creek formation, both of which consist mainly of shales. The Eagle River sampling location, EAGL-001 had only a slightly higher (30 to 40%) proportion of anions as bicarbonate compared to the tributaries (EAGL-t-002, EAGL-t-003 and NCY-PT19) which generally had less than 30% anions as bicarbonate and greater than 70% as sulphate. Overall the sampling locations located within the Burnthill Creek Formation (NCY-PT19 and EAGL-t-002) had high proportions of anions as sulphate and high proportions of cations as magnesium and sodium than the sampling locations within the Imperial Formation (EAGL-001 and EAGL-t-003), suggesting there may be more carbonate bearing rocks within the Imperial Formation.

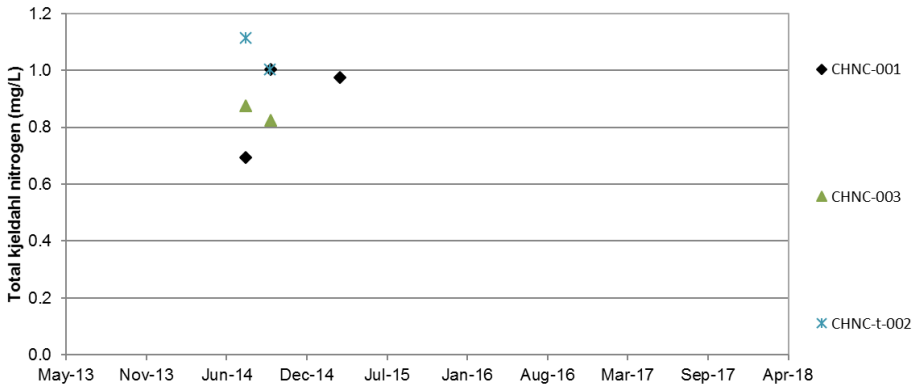
Nutrients

Ammonia showed strong seasonal variation, with higher concentrations in the under-ice samples as compared to samples collected during freshet or open-water. Nitrogen also displayed seasonal variation with higher concentrations during the open water period in September at some, but not all, stations. There were not enough data for TKN (Figure 23), total phosphorus (Figure 24), nitrite (Figure 25), or dissolved phosphorus to draw any conclusions about seasonal variation in these parameters. Further sampling of nutrients is suggested to understand if the nutrient regime of the streams is meso eutrophic or do nutrients vary throughout the season.

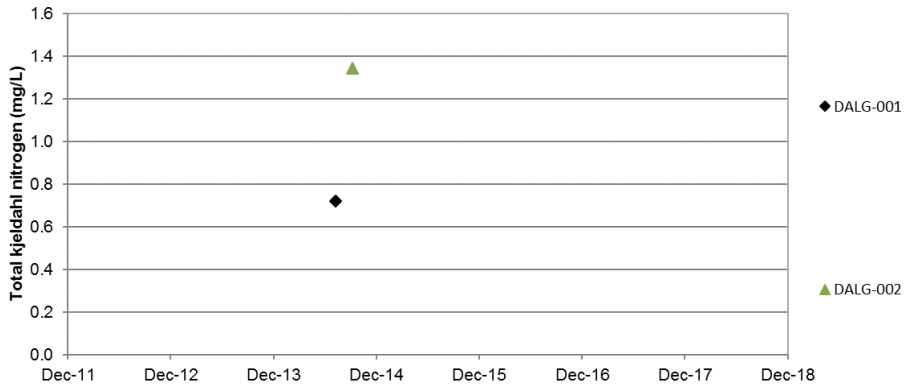
The variable concentrations of nutrients in Dalglish Creek and McParlon Creek were compared against the stage records for these two creeks. Total nitrogen and phosphorus at one or more stations on Dalglish Creek and McParlon Creek mirrored stage data, indicating that the concentrations of these parameters are influenced by flow. For example, Figures 18b, 19b and 20b show total nitrogen compared to stream discharge.

Figure 23: Total Kjeldahl Nitrogen Concentrations in Surface Water Stations over Time

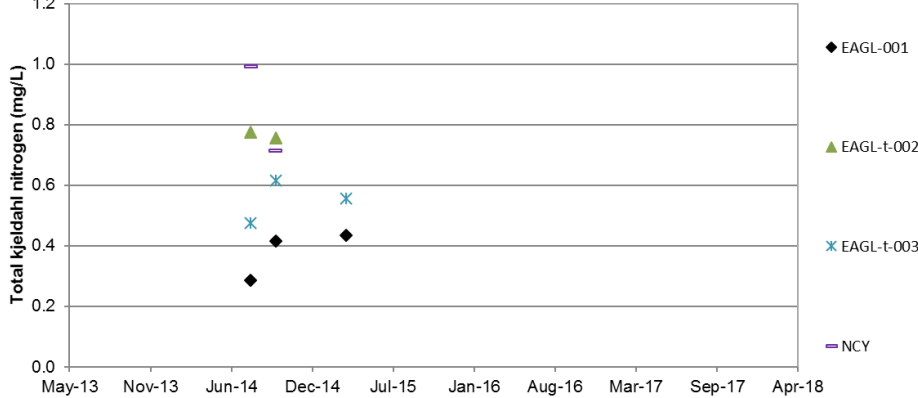
a) Chance Creek surface water.



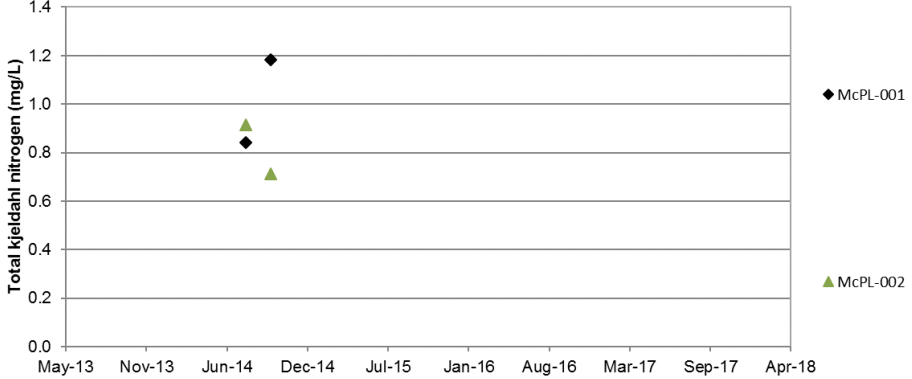
b) Dalglish Creek surface water.



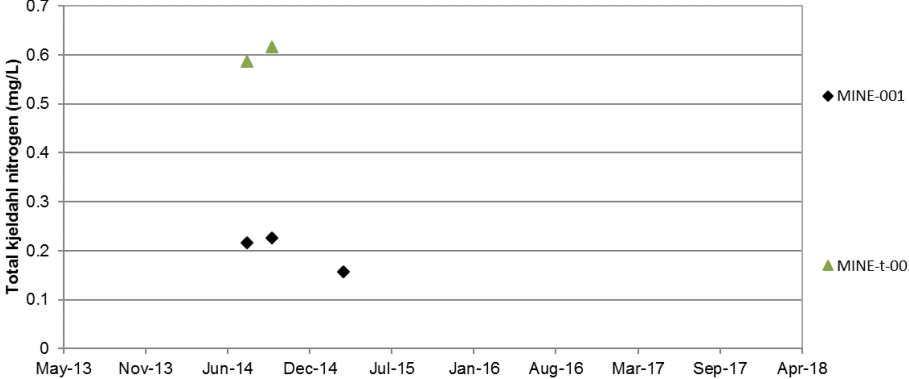
c) Eagle River surface water.



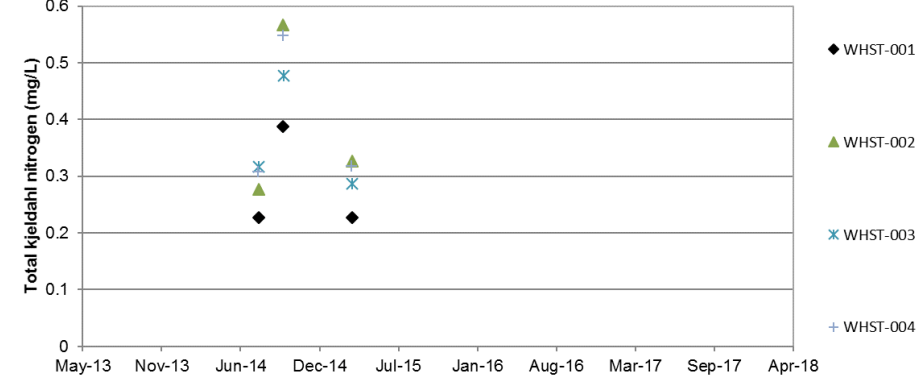
d) McParlon Creek surface water.



e) Miner River surface water.



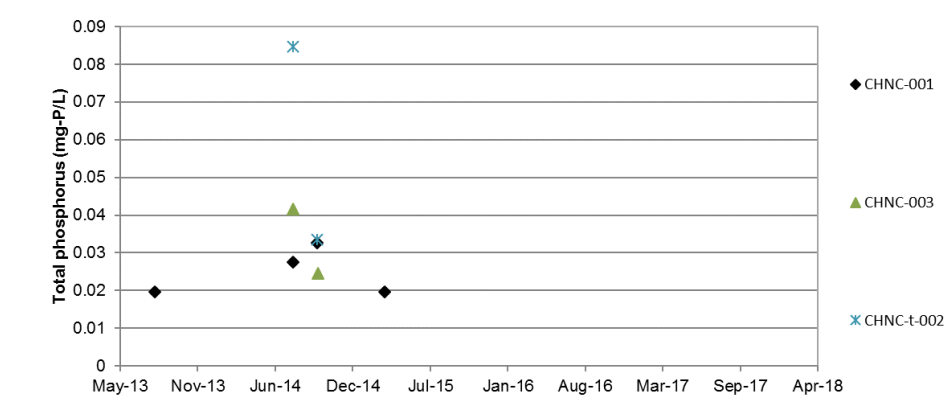
f) Whitestone River surface water.



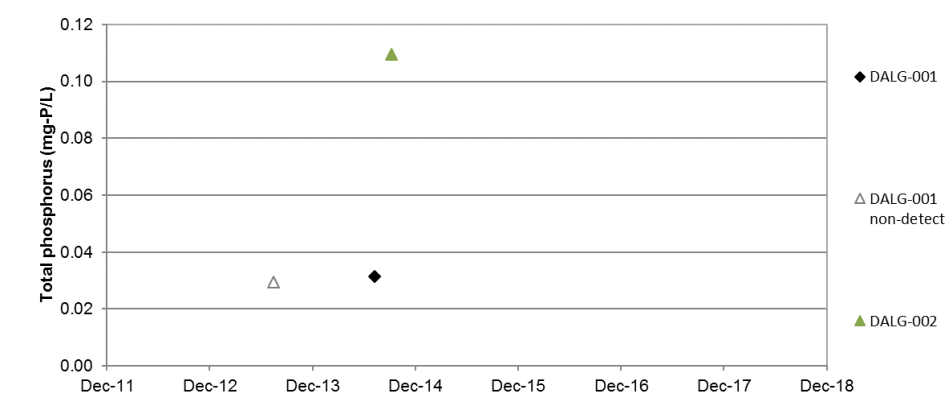
Note: Results below detection limit were treated as equal to the detection limit value.

Figure 24: Total Phosphorus (as phosphate) Concentrations in Surface Water Stations over Time

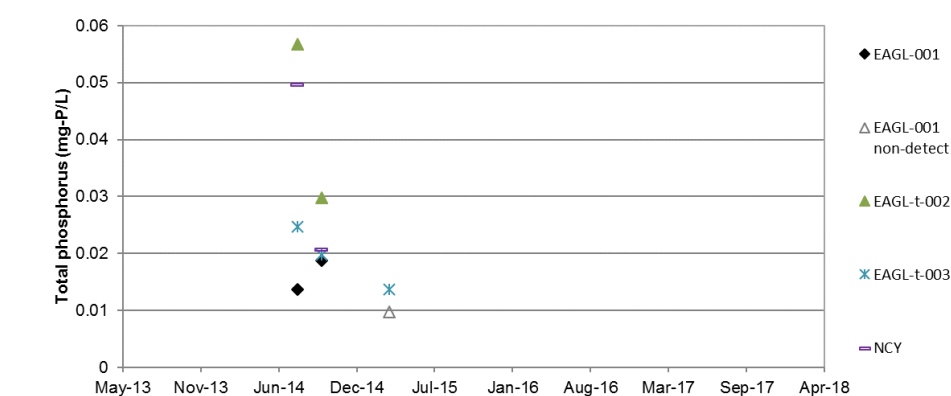
a) Chance Creek surface water.



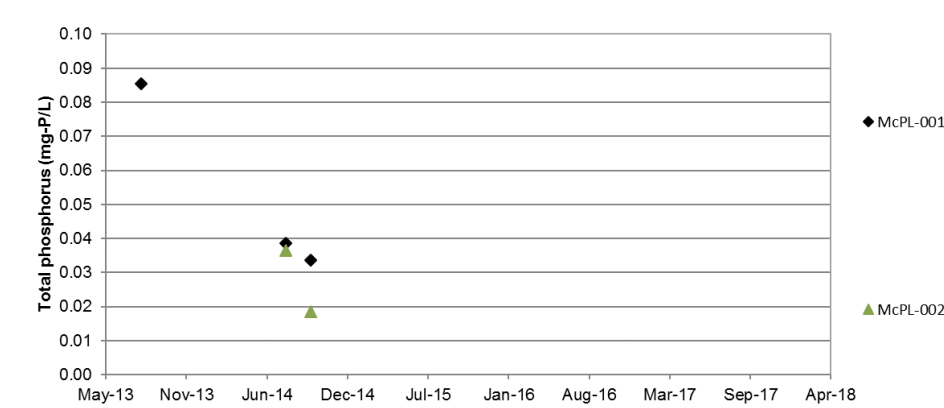
b) Dalglish Creek surface water.



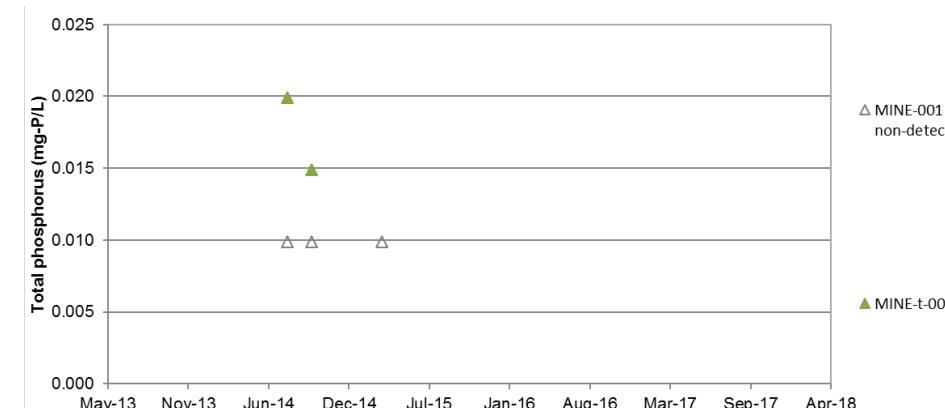
c) Eagle River surface water.



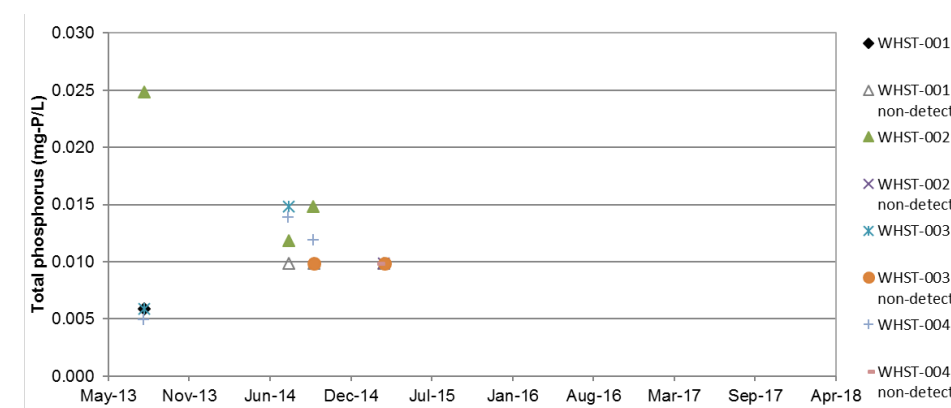
d) McParlon Creek surface water.



e) Miner River surface water.



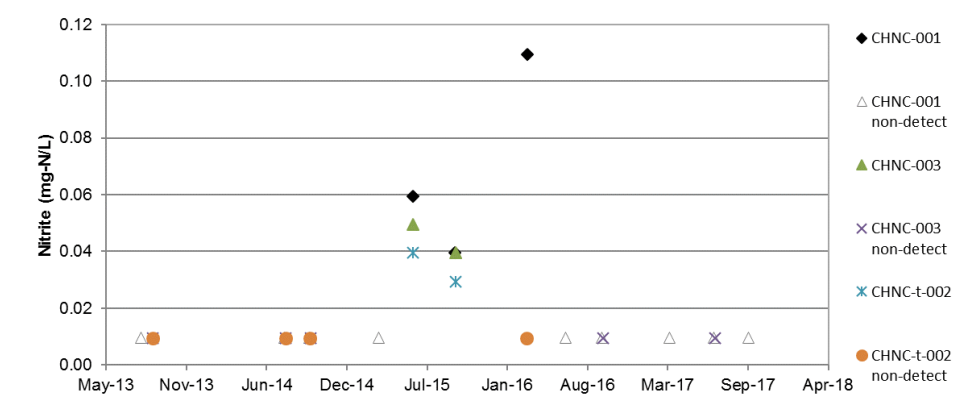
f) Whitestone River surface water.



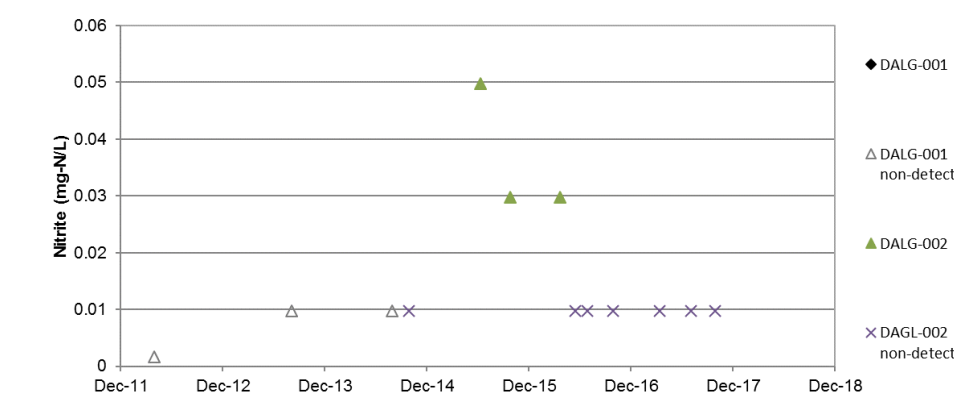
Note: Results below detection limit were treated as equal to the detection limit value.

Figure 25: Nitrite Concentrations in Surface Water Stations over Time

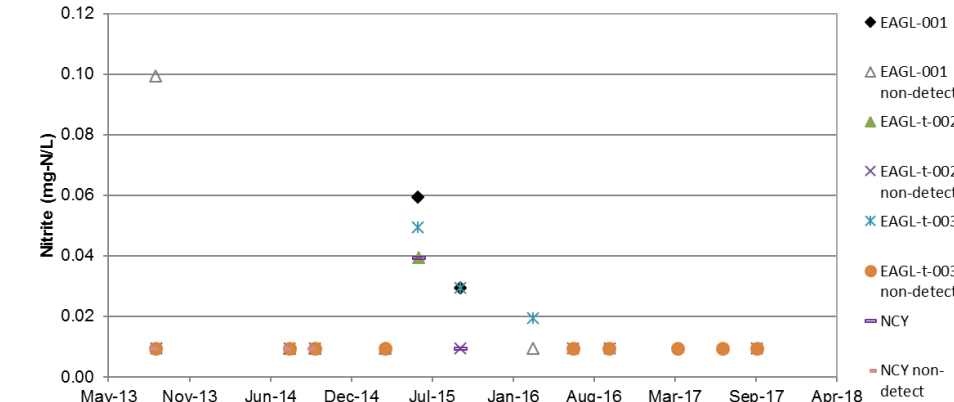
a) Chance Creek surface water.



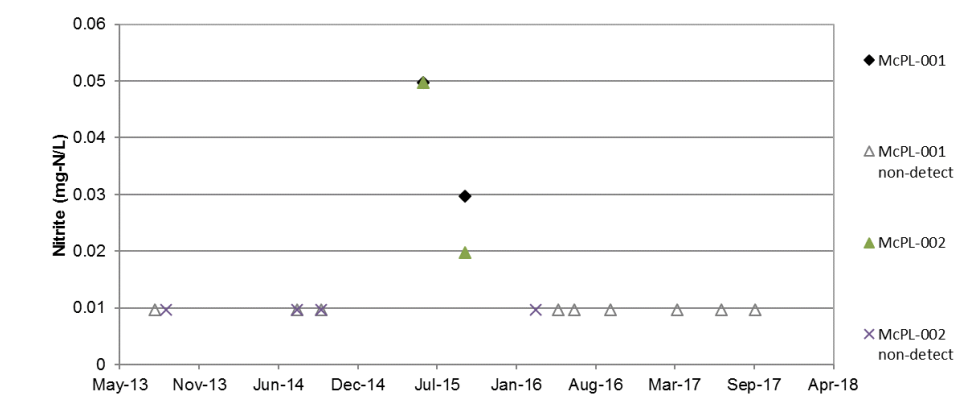
b) Dalglish Creek surface water.



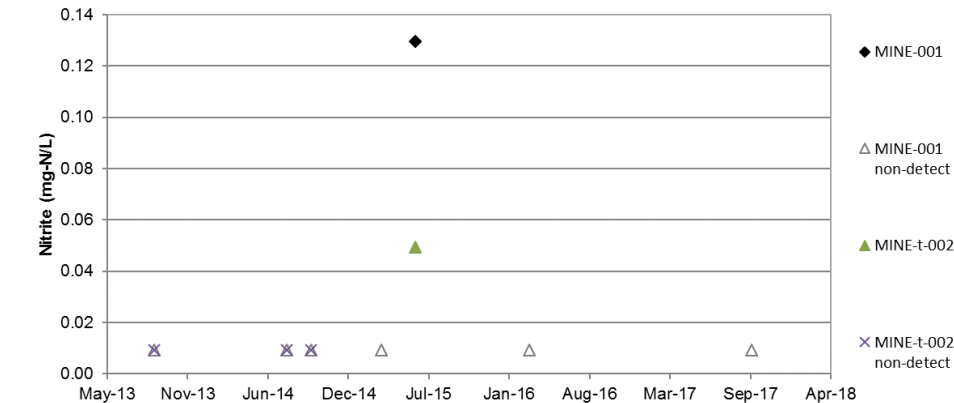
c) Eagle River surface water.



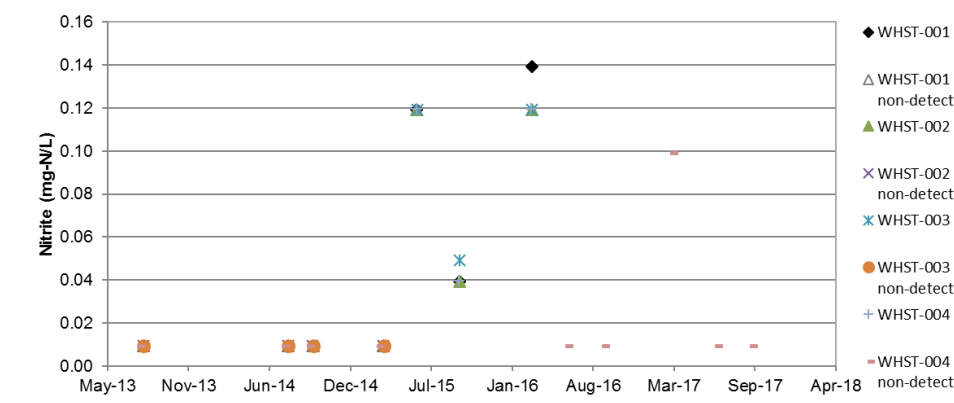
d) McParlon Creek surface water.



e) Miner River surface water.



f) Whitestone River surface water.



Note: Results below detection limit were treated as equal to the detection limit value.

Metals

Total and dissolved barium, manganese, molybdenum, strontium, sulphur, and uranium showed strong seasonal variation, with higher concentrations being observed during the under-ice period at most stations. Parameters that frequently exceeded the applied BCMOE and CCME guidelines, such as aluminium, copper, chromium, iron and zinc varied in their seasonal response between watersheds. Aluminium did not have strong seasonal variations (Figure 26). Copper showed some seasonal variations, peaking during open-water conditions in September and lowest during under-ice conditions in March, in the Eagle River and Whitestone River watersheds (Figure 27). Chromium showed seasonal variations in most watersheds, with peak concentrations occurring in September (Figure 28). Iron showed seasonal variations in the Chance Creek, Eagle River and Whitestone River watersheds, with peak concentrations occurring during open-water conditions in September or March (Figure 29). Similar to copper, chromium and iron, zinc also showed increasing concentrations from March through September in some watersheds (e.g. Eagle River, Whitestone River, Chance Creek) and peak concentration during under-ice conditions in March in other Watersheds (e.g. Eagle River tributary, Dalglish Creek) (Figure 30).

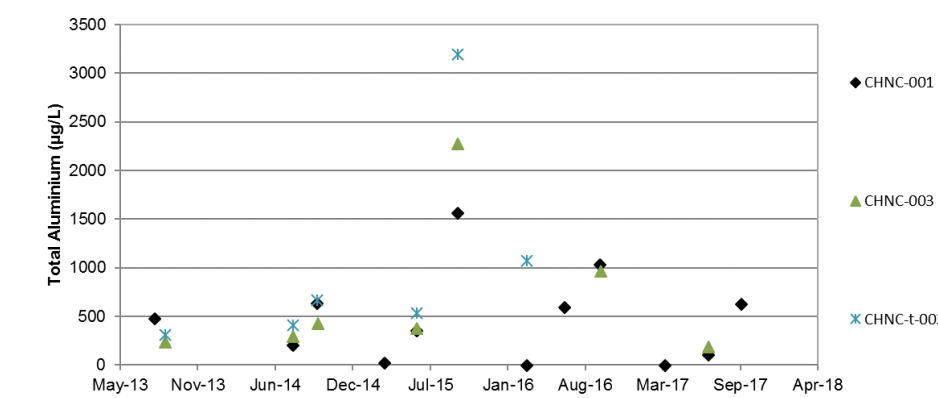
The variation of metals concentrations in Dalglish Creek and McParlon Creek were compared against the stage records for these two creeks. Total and dissolved aluminium, total arsenic, total barium, total and dissolved cadmium, total chromium, total and dissolved cobalt, total copper, total and dissolved iron, total lead, total and dissolved manganese, total potassium, total and dissolved silicon, total thallium, total titanium, total uranium, total vanadium, and total and dissolved zinc concentrations at one or more stations on Dalglish Creek and McParlon Creek mirrored stage data, indicating that the concentrations of these parameters are influenced by flow. Figures 18 to 20 show total and dissolved aluminium, arsenic, cobalt, iron and zinc compared to the stage records for the McParlon and Upper and Lower Dalglish hydrometric stations.

Total and dissolved antimony, dissolved beryllium, total and dissolved bismuth, total and dissolved mercury, total and dissolved silver, total and dissolved tellurium, dissolved thallium, dissolved thorium, total and dissolved tin, and dissolved titanium did not have enough data above detection limits to determine if a seasonal trend exists.

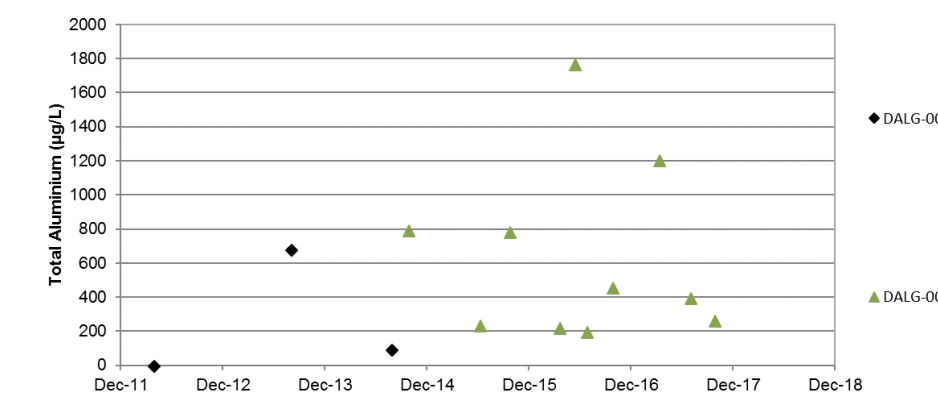
Overall, watershed size tended to have more of an influence on metals concentrations than geology. The Miner River and Whitestone River tended to have lower concentrations of metals than the smaller creeks (Figure 26 to Figure 30). The exception was the Eagle River, which tended to have concentrations of metals that were more similar to the smaller creeks.

Figure 26: Total Aluminium Concentrations in Surface Water Stations Over Time

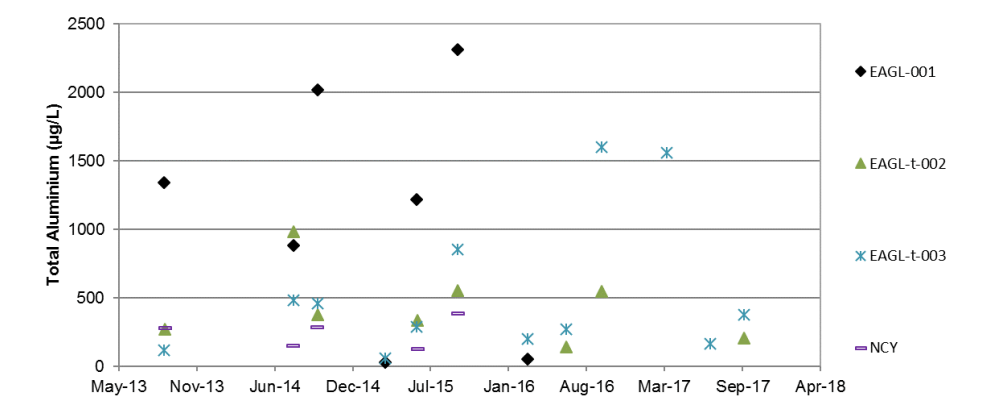
a) Chance Creek surface water.



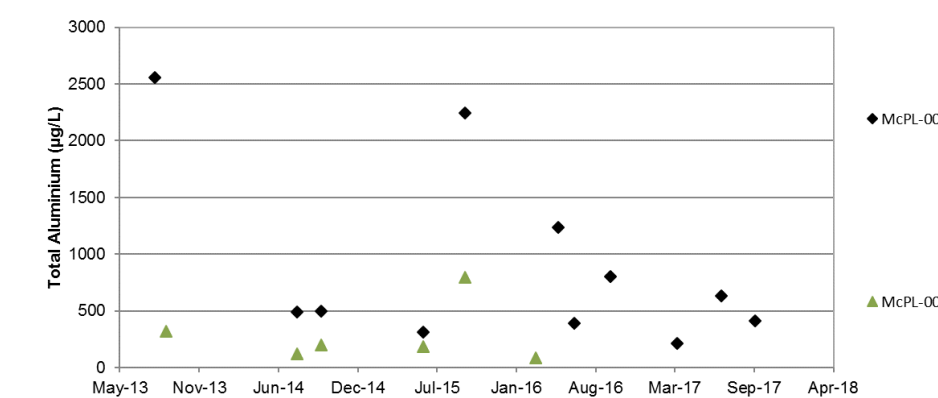
b) Dalglish Creek surface water.



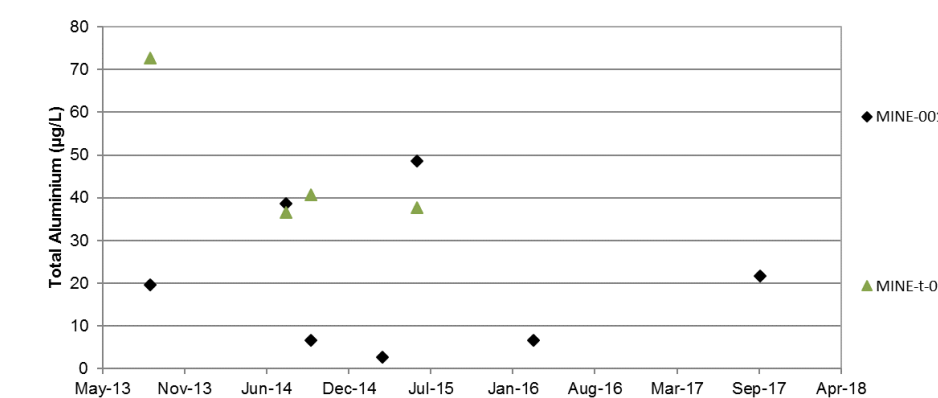
c) Eagle River surface water.



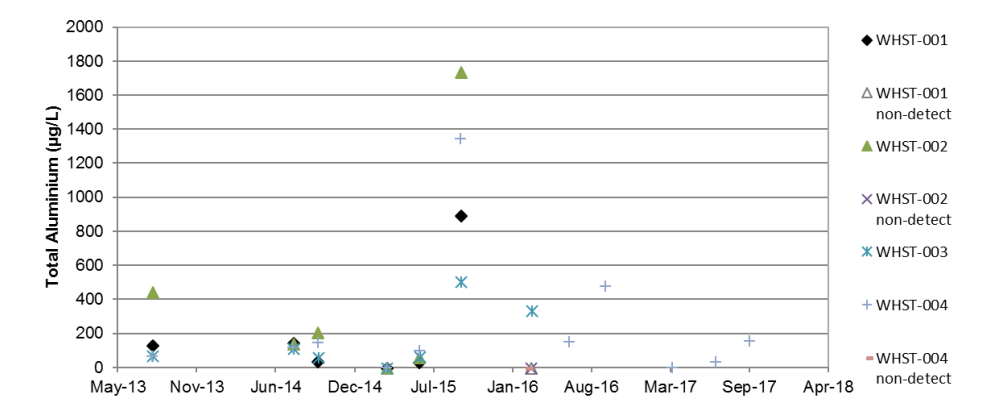
d) McParlon Creek surface water.



e) Miner River surface water.



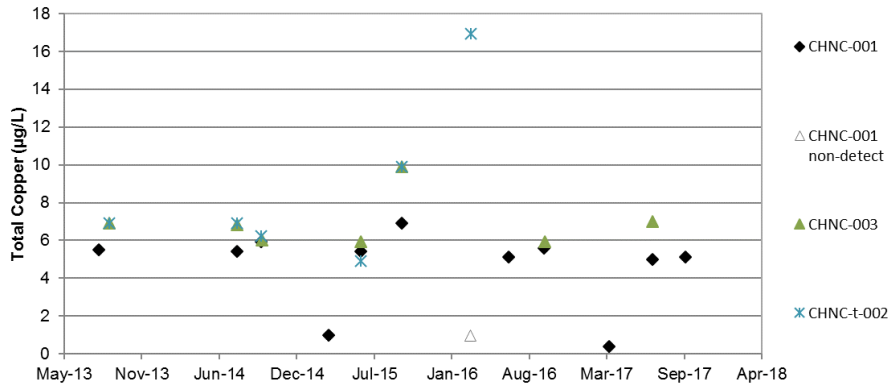
f) Whitestone River surface water.



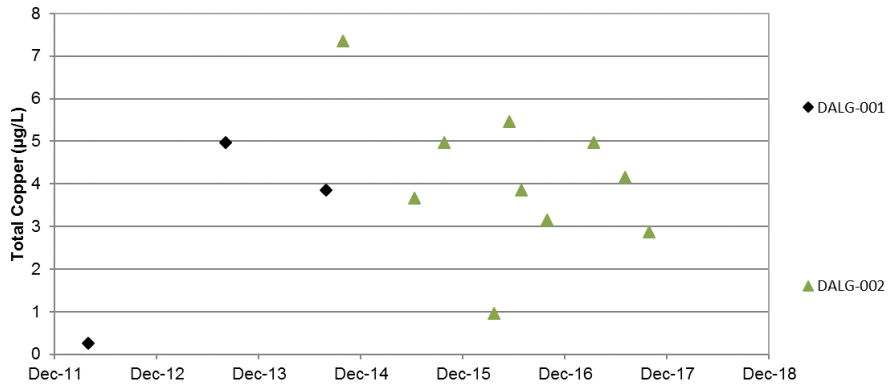
Note: Results below detection limit were treated as equal to the detection limit value.

Figure 27: Total Copper Concentrations in Surface Water Stations Over Time

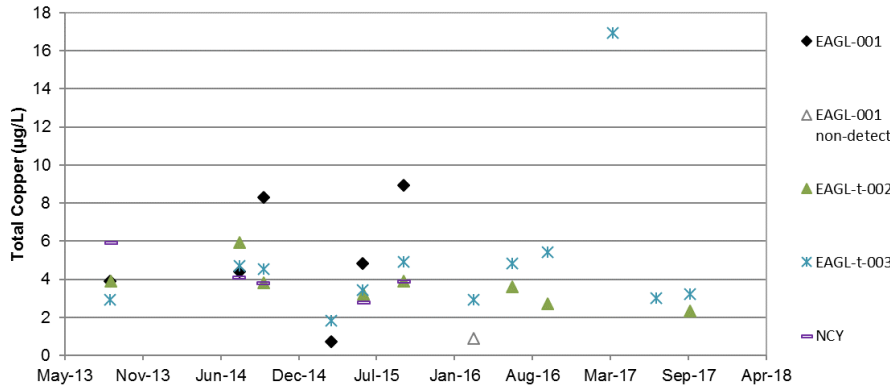
a) Chance Creek surface water.



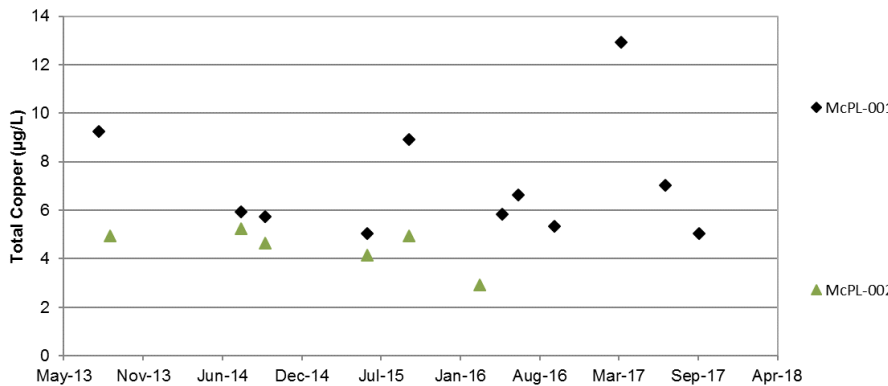
b) Dalglish Creek surface water.



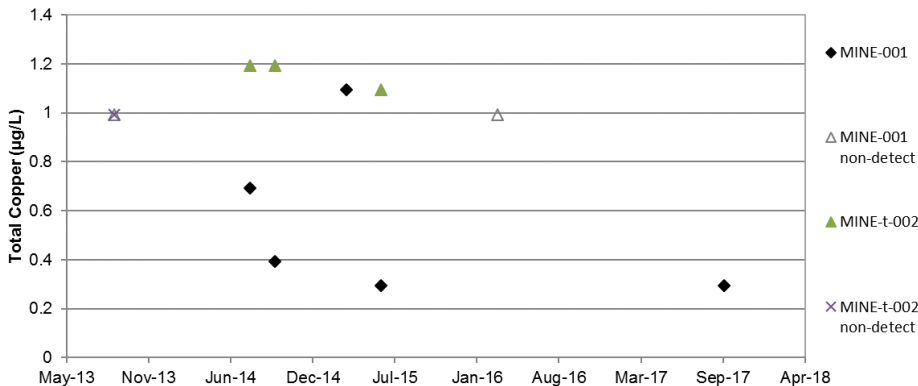
c) Eagle River surface water.



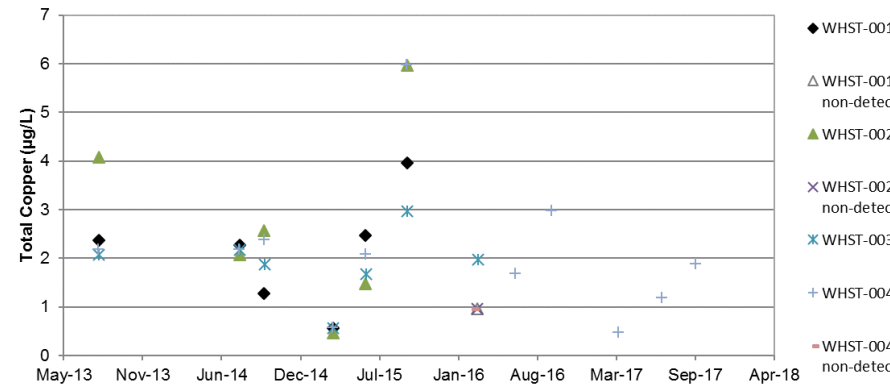
d) McParlon Creek surface water.



e) Miner River surface water.



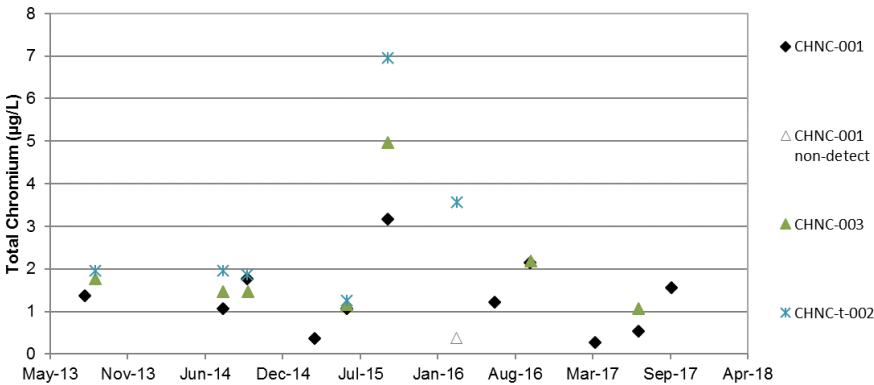
f) Whitestone River surface water.



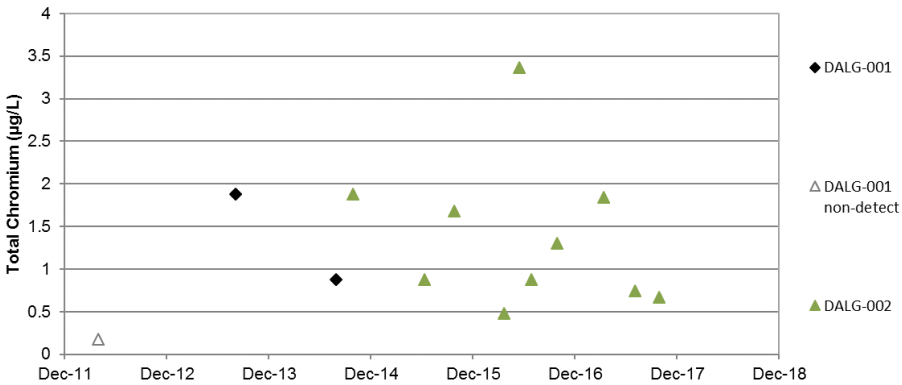
Note: Results below detection limit were treated as equal to the detection limit value.

Figure 28: Total Chromium Concentrations in Surface Water Stations Over Time

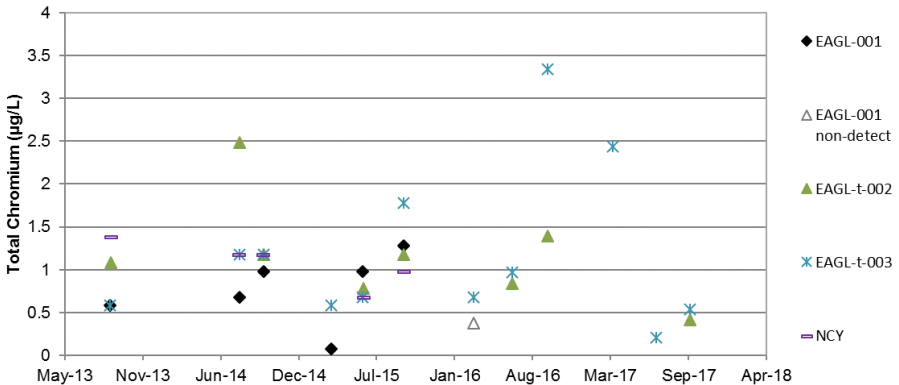
a) Chance Creek surface water.



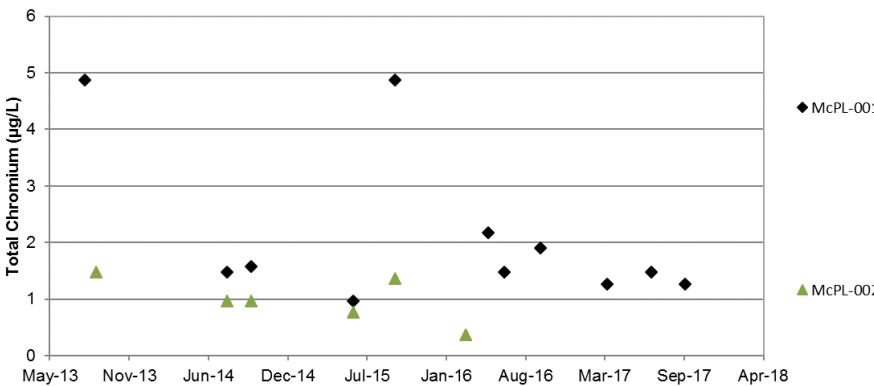
b) Dalglish Creek surface water.



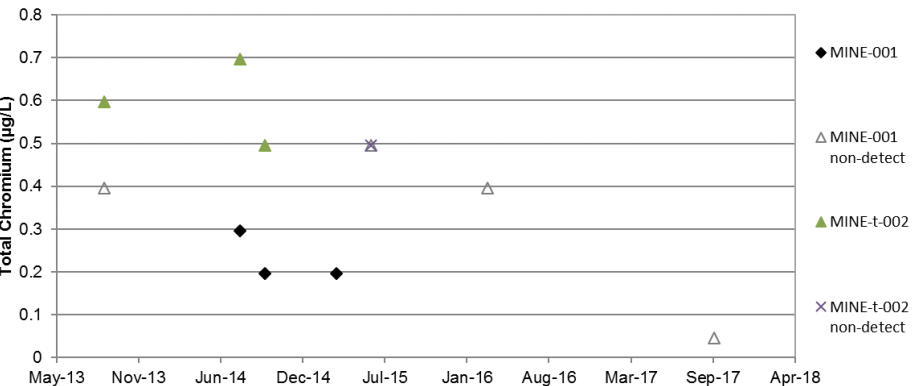
c) Eagle River surface water.



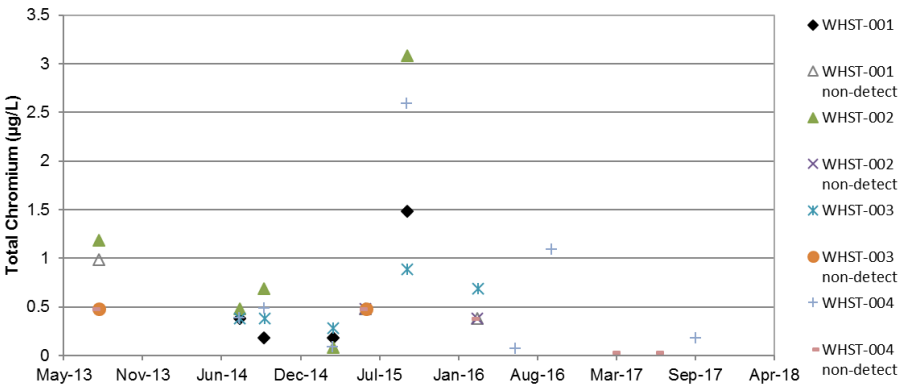
d) McParlon Creek surface water.



e) Miner River surface water.



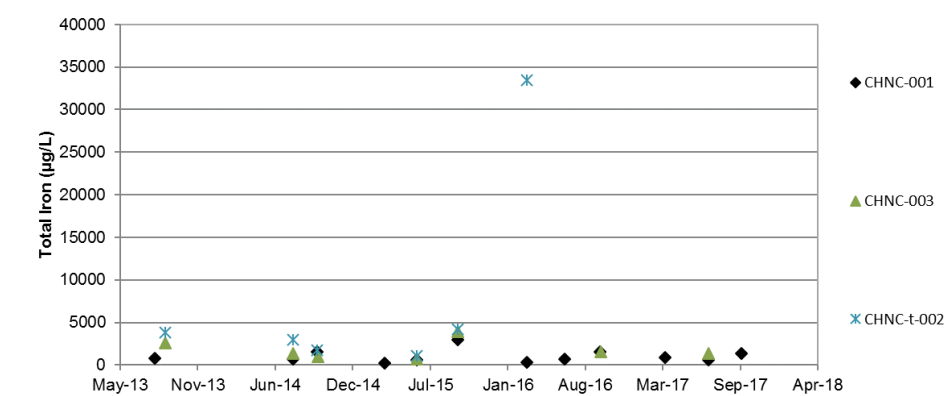
f) Whitestone River surface water.



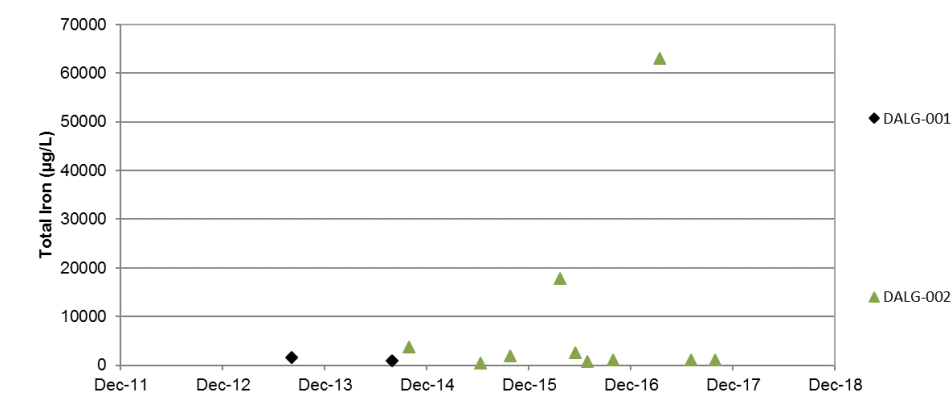
Note: Results below detection limit were treated as equal to the detection limit value.

Figure 29: Total Iron Concentrations in Surface Water Stations Over Time

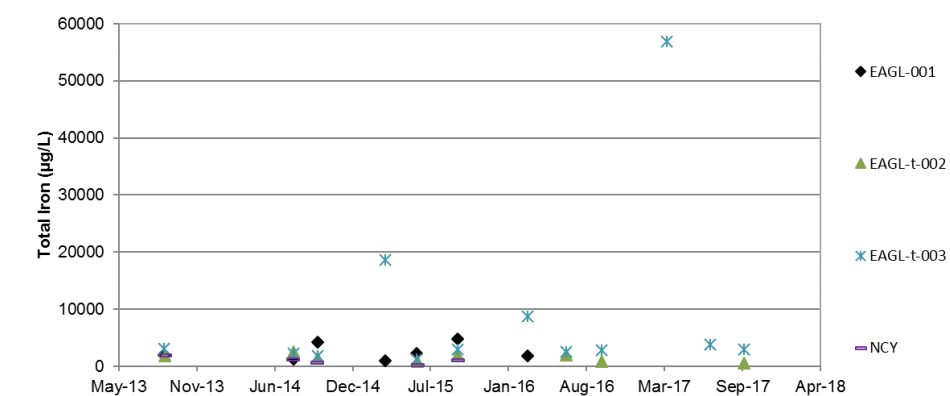
a) Chance Creek surface water.



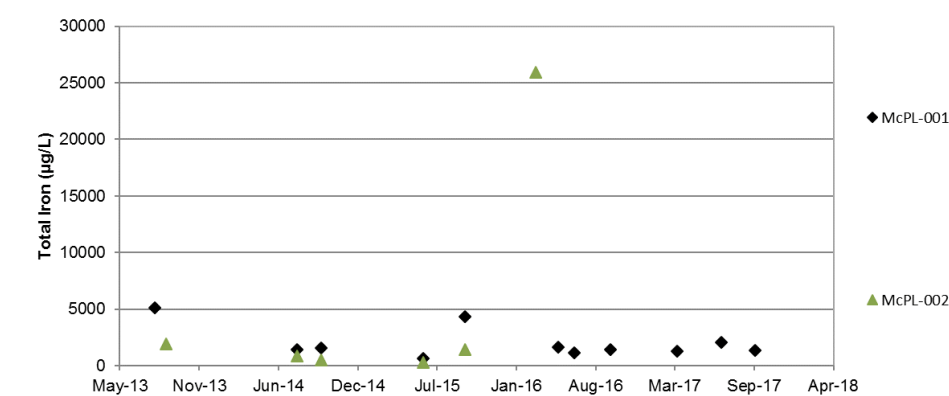
b) Dalglish Creek surface water.



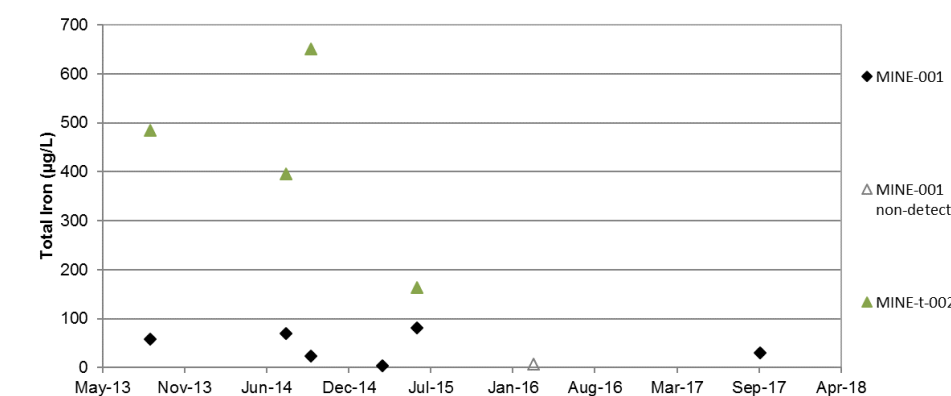
c) Eagle River surface water.



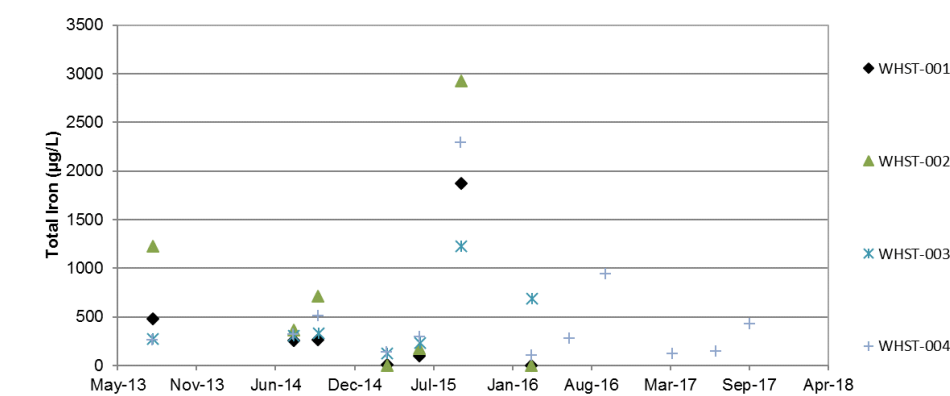
d) McParlon Creek surface water.



e) Miner River surface water.



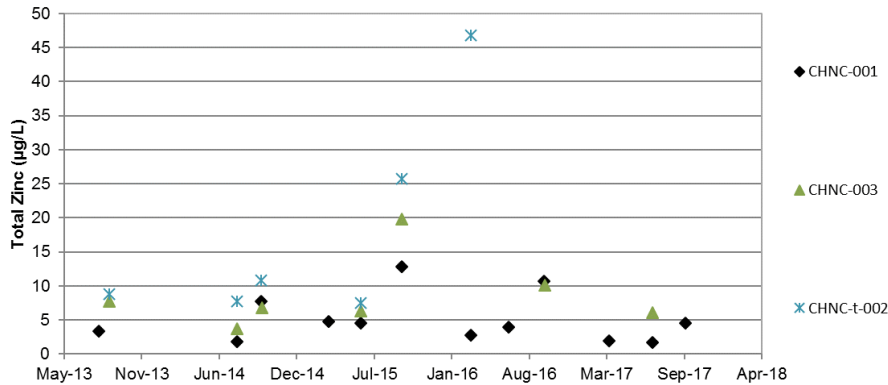
f) Whitestone River surface water.



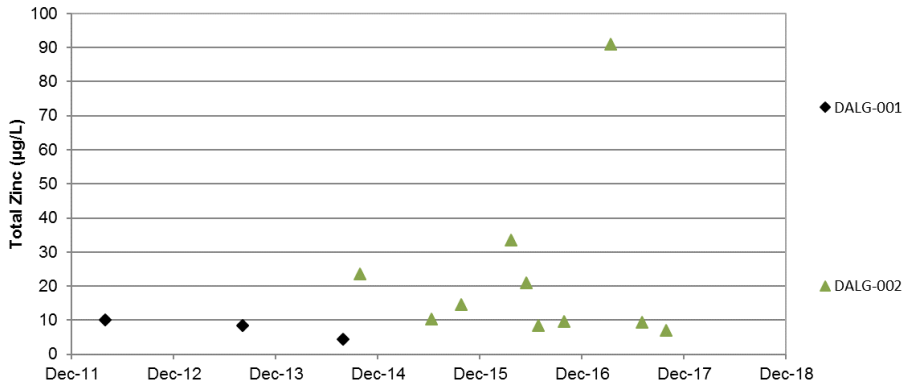
Note: Results below detection limit were treated as equal to the detection limit value.

Figure 30: Total Zinc Concentrations in Surface Water Stations Over Time

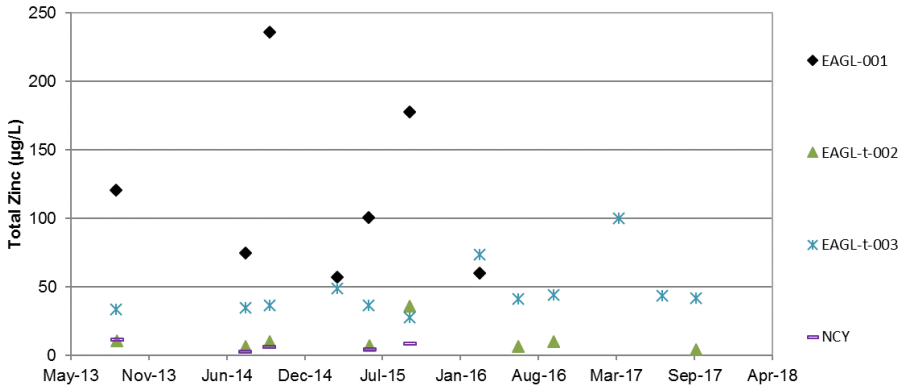
a) Chance Creek surface water.



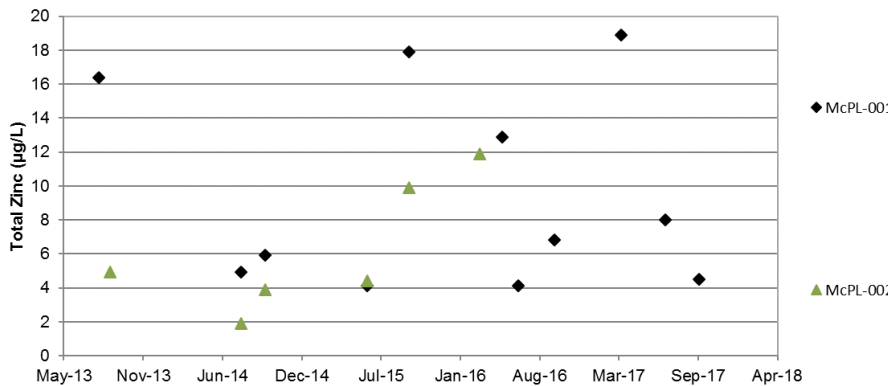
b) Dalglish Creek surface water.



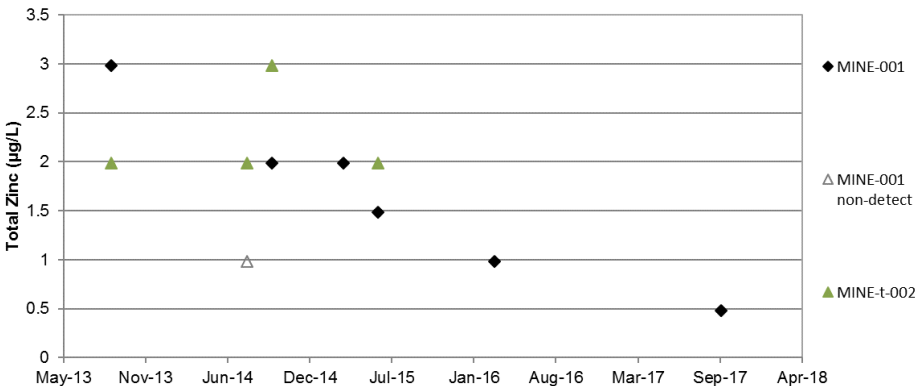
c) Eagle River surface water.



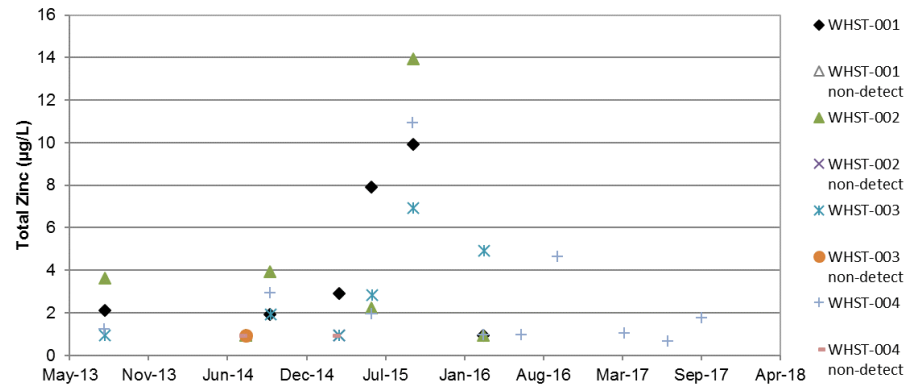
d) McParlon Creek surface water.



e) Miner River surface water.



f) Whitestone River surface water.



Note: Results below detection limit were treated as equal to the detection limit value.

Isotopes

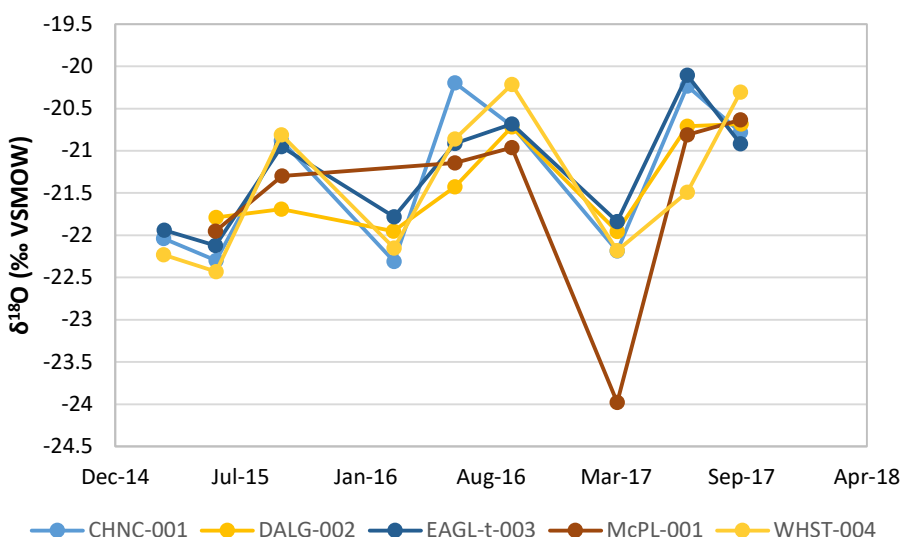
Oxygen-18 and Deuterium

The $\delta^{18}\text{O}$ and $\delta^2\text{H}$ isotopic signature of surface water samples has a strong seasonal signal, with more depleted isotopic values observed during under-ice and freshet sampling events and more enriched isotopic values observed during open water sampling events (Figure 31). Precipitation occurring during the winter, under colder temperatures and less humidity, tends to have a more depleted isotopic signature than during the warmer, more humid summer months (Clark and Fritz 1997). This seasonal variability in the isotopic signature of precipitation is reflected in surface water samples. The following observations can be made based on Figure 6:

- Under-Ice: Depleted $\delta^{18}\text{O}$ and $\delta^2\text{H}$ that plots above the LMWL
- Freshet: Depleted $\delta^{18}\text{O}$ and $\delta^2\text{H}$ reflecting the depleted isotopic signature of snowmelt. Samples plot above the LMWL.
- Open-Water: $\delta^{18}\text{O}$ and $\delta^2\text{H}$ values close to meteoric water line and more similar to average precipitation values. Enriched relative under-ice and freshet.

The findings outlined above are similar to those of Lapp (2015) for the North Klondike River. Lapp found that under-ice samples plotted close to the LMWL in the North Klondike River, under-ice samples in the Eagle Plains Region were found to be depleted in $\delta^{18}\text{O}$ and $\delta^2\text{H}$, plotted above the Mayo and Dawson LMWLs but above or on the GMWL and below the Inuvik LWML and were generally similar to those observed during freshet. An LMWL for Eagle Plains is not available, but given its geographical location between Mayo and Inuvik, the LWML may fall somewhere between those locations, in which case the freshet and under-ice samples would likely fall on the LMWL. This would need to be confirmed with isotopic data for precipitation from the Eagle Plains. Enriched $\delta^{18}\text{O}$ and $\delta^2\text{H}$ values in the open-water season are consistent with an evaporative trend also measured in the Liard River by Gibson et al. (2005).

Figure 31: Seasonal Variations in Oxygen-18



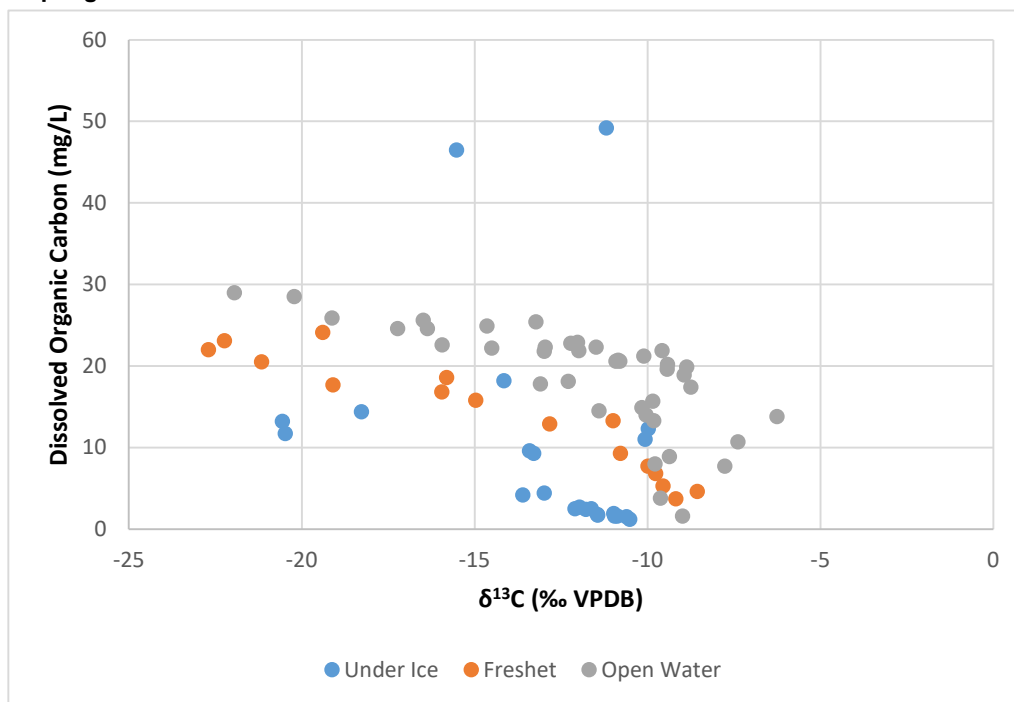
Note: Only sampling stations with sufficient temporal coverage (n >6) are shown.

Carbon-13

The carbon-13 isotopic signature of DIC in surface waters depends on the relative influence of different carbon sources: atmospheric CO₂ ($\delta^{13}\text{C} \sim -6.4\text{‰}$), dissolution of carbonate minerals ($\delta^{13}\text{C} = 0\text{‰} \pm \sim 5\text{‰}$), dissolution of soil CO₂ ($\delta^{13}\text{C} \sim -23\text{‰}$) and degradation of dissolved organic carbon ($\delta^{13}\text{C} = -25 \pm 2\text{‰}$) (Clark and Fritz, 1997). Figures 32 and 33 show the variation in $\delta^{13}\text{C}$ by sampling season and time. The following observations can be made about seasonal differences in $\delta^{13}\text{C}$ in Eagle Plains surface waters:

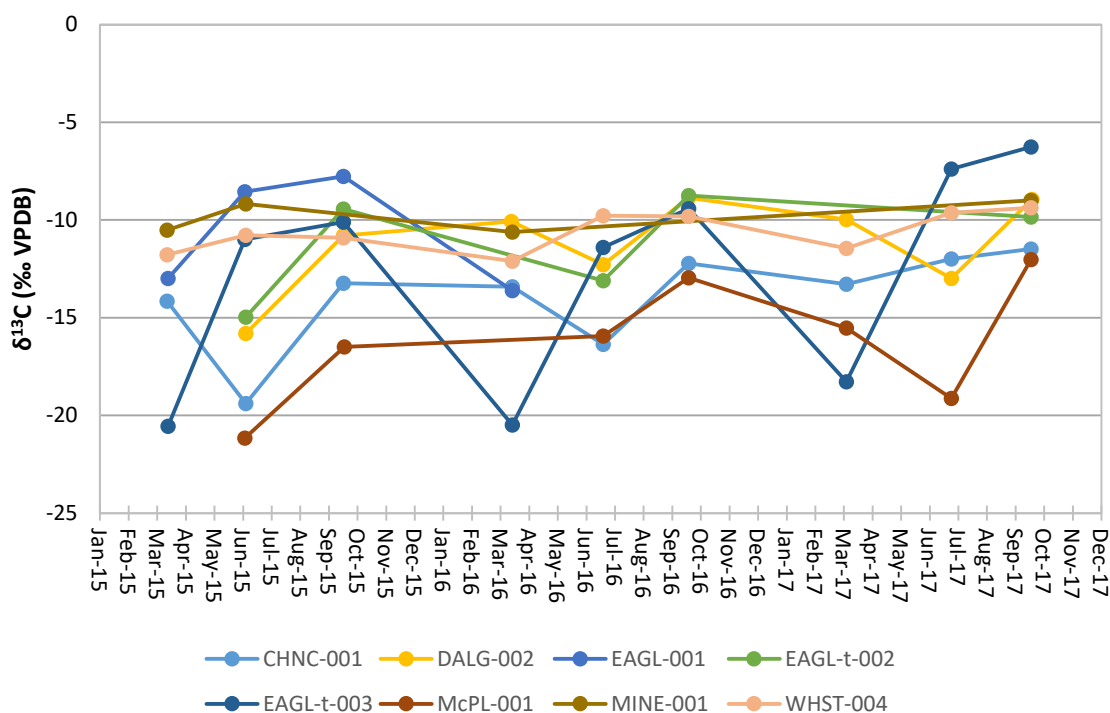
- Under Ice: Depleted $\delta^{13}\text{C}$ values, ranging from -8.6 to -20.6‰. Trend of depletion with decreasing concentrations of DIC. DOC trend less clear, but may show depletion with increasing concentrations of DOC.
- Freshet: Depleted $\delta^{13}\text{C}$ values, ranging from -8.7 to -22.7‰. Trend of depletion with increasing concentrations of DOC and decreasing concentrations of DIC.
- Open Water: Some slightly more enriched $\delta^{13}\text{C}$ values, ranging from -6.3 to -22.0‰. No trend with DOC, however open water samples with more depleted $\delta^{13}\text{C}$ values may have higher concentrations of DIC (>10 mg/L) compared to samples with more depleted $\delta^{13}\text{C}$ values (<-10 ‰), which tend to have less than 10 mg/L DIC.

Figure 32: Carbon-13 (DIC) and Dissolved Organic Carbon in Surface Water Samples, Categorized by Sampling Season



Similar to the findings in Lapp (2015), dissolved inorganic carbon was associated with baseflow (i.e., concentrations were highest during under-ice conditions) (Figure 7). Dissolved organic carbon concentrations were lowest during under-ice conditions in both Eagle Plains surface waters and the North Klondike River (Lapp 2015) (Figure 32). In the Eagle Plains surface water samples, the seasonal variation in $\delta^{13}\text{C}$ values varied between sampling stations (Figure 33). For example, at MINE-001 and WHST-004, there was little seasonal variation, while at EAGL-t-003 there was a strong seasonal variation and the most depleted $\delta^{13}\text{C}$ values were observed in March. At McPL-001, DALG-002 and EAGL-t-002, $\delta^{13}\text{C}$ values were most depleted during June sampling vents. Overall seasonality may account for a large degree of the variability in $\delta^{13}\text{C}$ (DIC) values, with larger watersheds, such the Miner River and Whitestone River, having less seasonal variability and tributary streams having a greater degree of variability.

Figure 33: Temporal Plot of the Carbon-13 Isotopic Signature of Selected Surface Water Stations

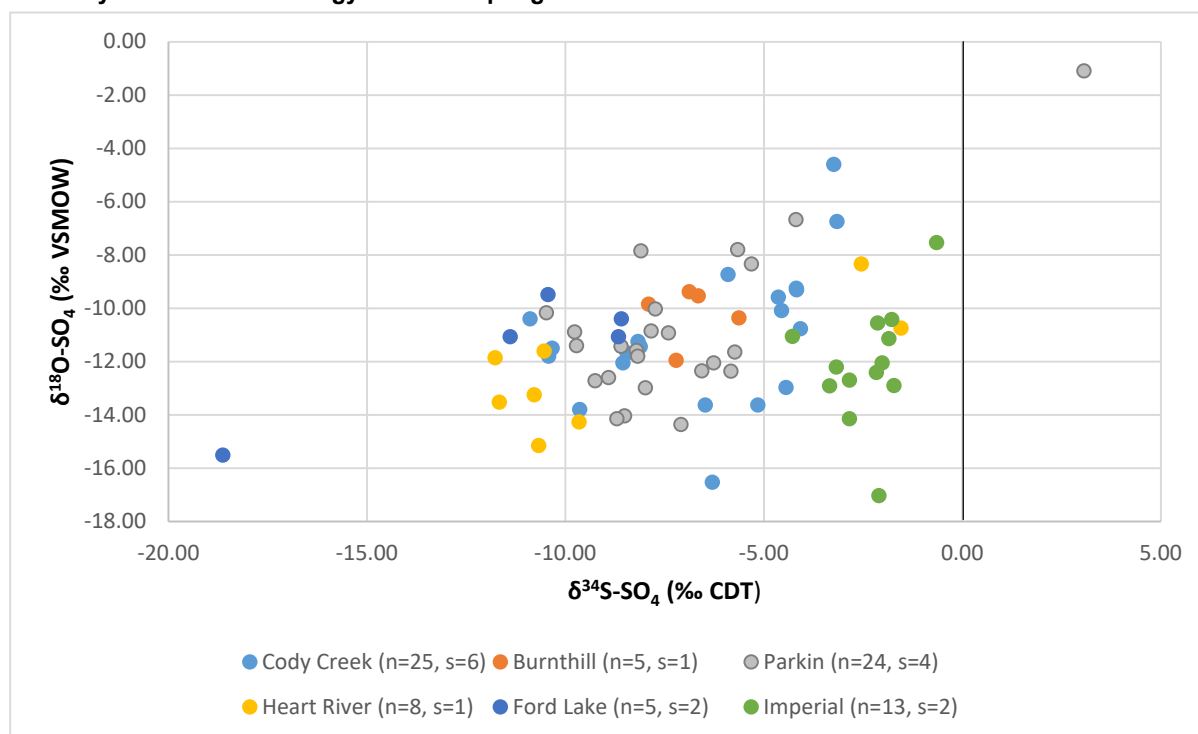


Sulphur-34 and Oxygen-18 of Sulphate

In general, $\delta^{34}\text{S-SO}_4$ was more enriched during under-ice conditions than during freshet or open water. The enrichment of $\delta^{34}\text{S}$ and $\delta^{18}\text{O}$ of sulphate during under ice conditions, as well as in streambed groundwater, suggests that bacterial sulphate reduction may be occurring where reducing conditions occur. Bacterial sulphate reduction causes isotopic enrichment as the bacteria preferentially use the light isotopes, leaving the dissolved sulphate enriched in the heavier isotopes.

When the sulphur-34 and oxygen-18 isotopic composition of surface water samples are plotted based on the bedrock geology of each sampling location (Figure 34), surface waters associated with some geologic units, such as the Parkin Formation (Upper Cretaceous shale), show a large range of isotopic values while others, such as surface water associated with the Imperial Formation (Devonian sandstone), have a more limited range. However, when the number of samples (n) and the number of different locations(s) sampled in each formation are taken into consideration, the bedrock formation with the greatest degree of isotopic variability in the surface water are also those with the greatest number of different locations sampled, making it difficult to draw any conclusions on the influence of geology on the isotopic composition of sulphate in surface water. However, the results as a whole indicate sulphate sourced from oxidation of sulphide minerals such as pyrite, with no indication of sulphate sourced from dissolution of marine evaporite minerals.

Figure 34: The Sulphur-34 and Oxygen-18 Isotopic Composition of Sulphate in Surface Water Samples, Categorized by the Bedrock Geology at the Sampling Locations.



Note: n = total number of samples for each bedrock formation and s = number of individual sampling locations for each bedrock formation.

4.4 Key Question 3: What is the Interaction between Groundwater Quality and Surface Water Quality?

Groundwater inputs to surface water bodies can have a significant effect on the chemical composition of surface water quality. By the end of winter, streamflow in the Yukon Territory is composed entirely of baseflow (e.g., Whitfield et al. 1993; Czarnecki and Beavers 2002). During the open-water period (categorized as freshet and open-water in this study), baseflow (contributed by groundwater) is diluted by freshet (i.e., melting and draining of the snowpack) and major precipitation events.

4.4.1 Comparison of Groundwater and Surface Water Quality

Parameters that were strongly associated with groundwater (i.e., greater in groundwater samples than in surface water samples or elevated in under-ice samples) include alkalinity, specific conductivity, calcium, magnesium, potassium, sulphate/sulphur (Figure 11), iron (Figure 13), arsenic, strontium, barium, boron, cobalt, lithium, molybdenum, vanadium and uranium. These parameters were elevated in at least two of the three types of groundwater or mixed groundwater-surface water samples (baseflow samples, streambed groundwater samples and YOWN-1401). Some streambed groundwater samples also had a more enriched $\delta^{34}\text{S}$ and $\delta^{18}\text{O}$ isotopic signature of sulphate by approximately five to ten per mille. A more detailed comparison of groundwater and surface water quality is provided below.

In terms of conventional parameters, pH is similar between surface and groundwater samples.

Groundwater samples have greater specific conductivity than open-water and freshet surface water samples, ranging from approximately 50 $\mu\text{S}/\text{cm}$ higher at McParlon Creek to up to 500 $\mu\text{S}/\text{cm}$ higher during some sampling events at Dalglish Creek. The highest conductivities at each sampling station are observed in surface water samples collected during the under-ice, late winter season. Dissolved oxygen is lower in the streambed groundwater samples than the associated surface waters. Alkalinity was elevated in all baseflow samples and most streambed groundwater samples relative to freshet and open-water samples in all watersheds with the exception of the Eagle River Tributary.

The major ion composition of surface waters compared to groundwater are shown in Figure 35, Figure 36 and Figure 37. At Dalglish Creek, the major ion composition of both surface and groundwater samples varied between sampling events, but overall was similar between groundwater and surface water (Figure 35). At McParlon Creek, there was a greater variation between sampling events in groundwater and surface water than at Dalglish Creek, but overall groundwater and surface were similar in major ion composition, though surface water samples tended to have a slightly higher proportion of anions as sulphate (Figure 36). While only one groundwater sample is available from the Eagle River drivepoint, the major ion composition of that sample is similar to that observed in the Eagle River tributary (EAGL-t-003) (Figure 37), streambed groundwater samples and the associated surface water samples generally had similar proportions of major ions but different concentrations (i.e. higher in groundwater than surface water) (Figure 11 and Figure 38).

Figure 35: Piper plot Showing Major Ion Composition of Both Surface Water and Streambed Groundwater in Dalglish Creek

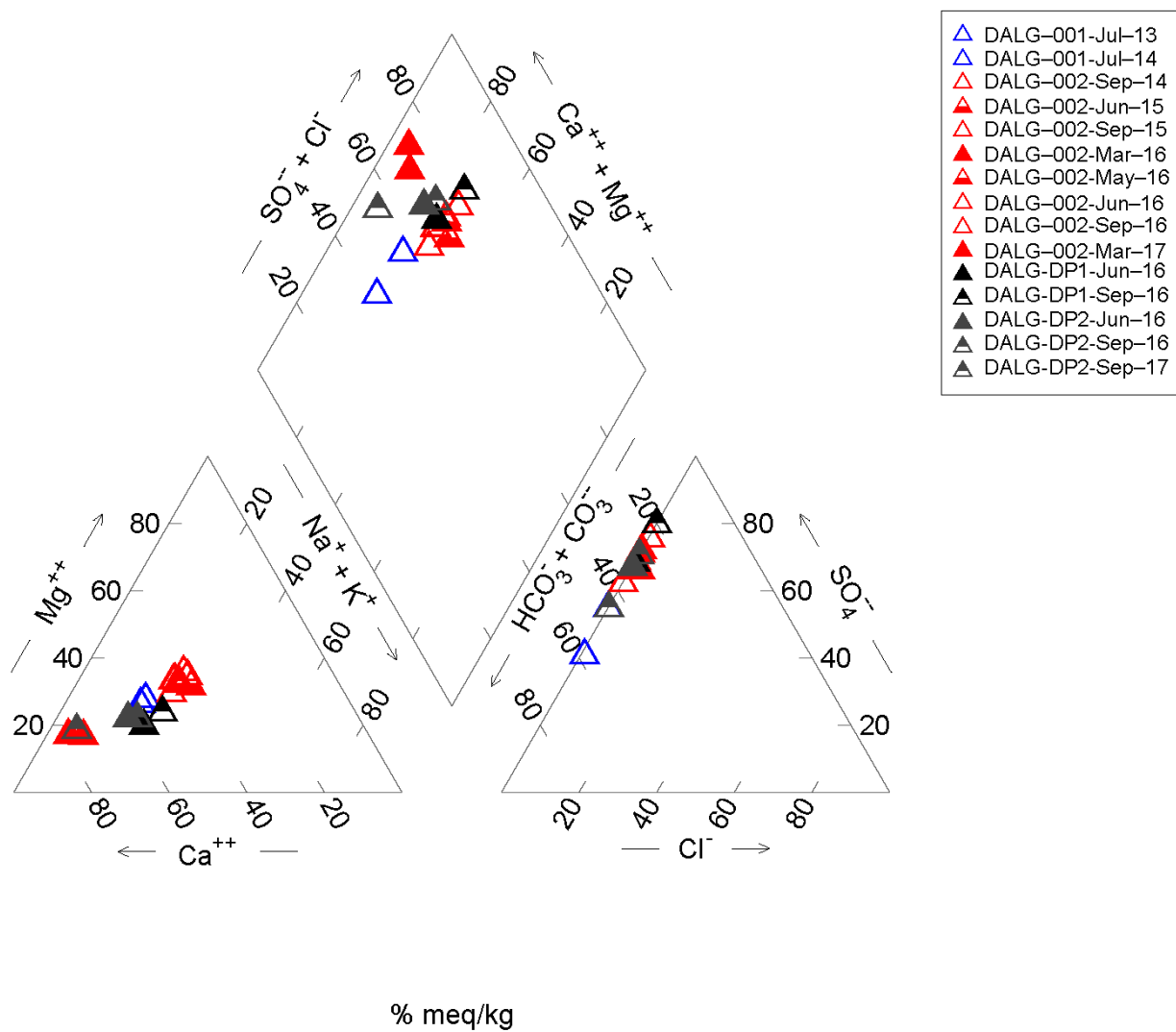


Figure 36: Piper plot Showing Major Ion Composition of Both Surface Water and Streambed Groundwater in McParlon Creek

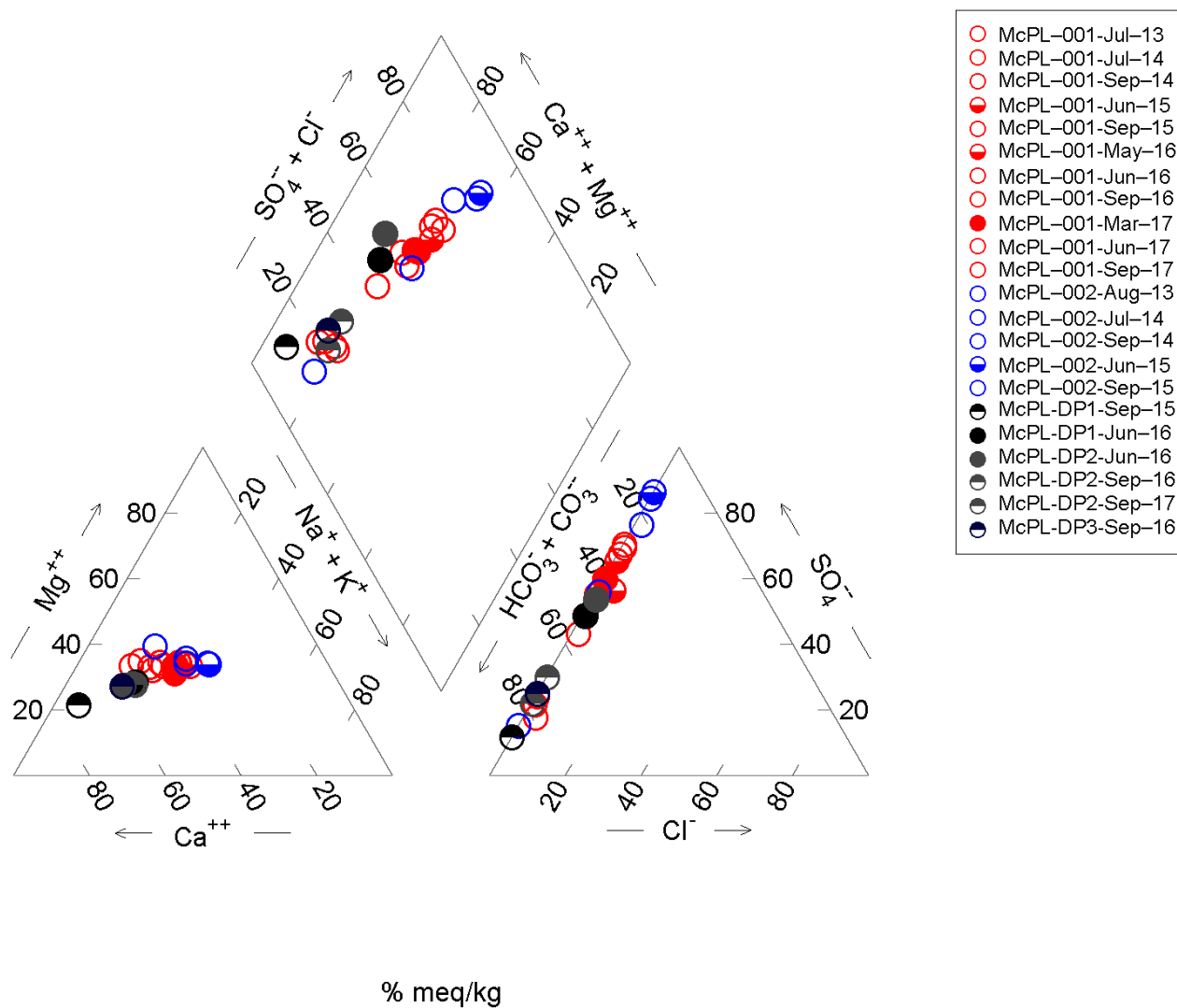
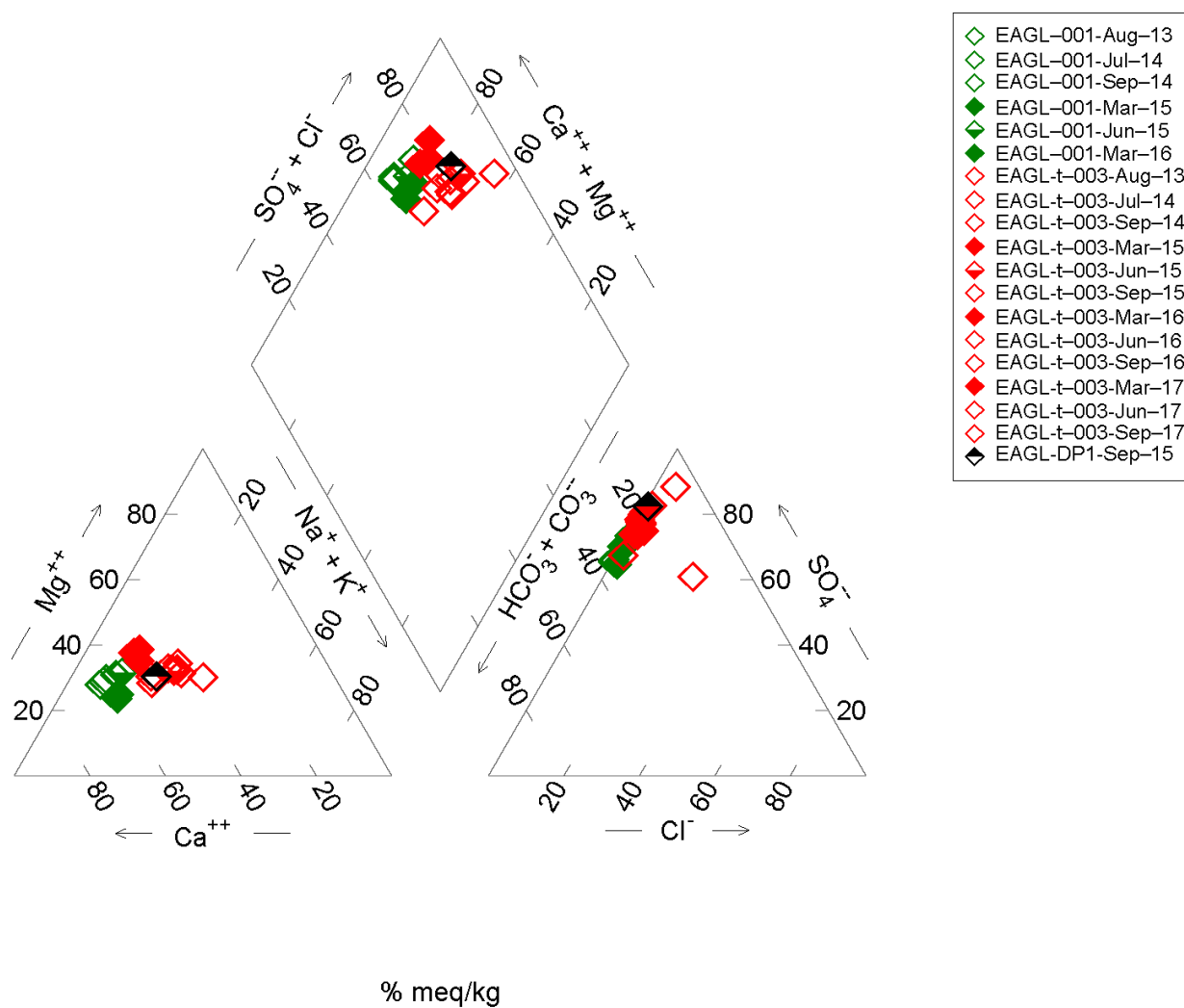


Figure 37: Piper plot Showing Major Ion Composition of Both Surface Water and Streambed Groundwater in Eagle River and Tributary

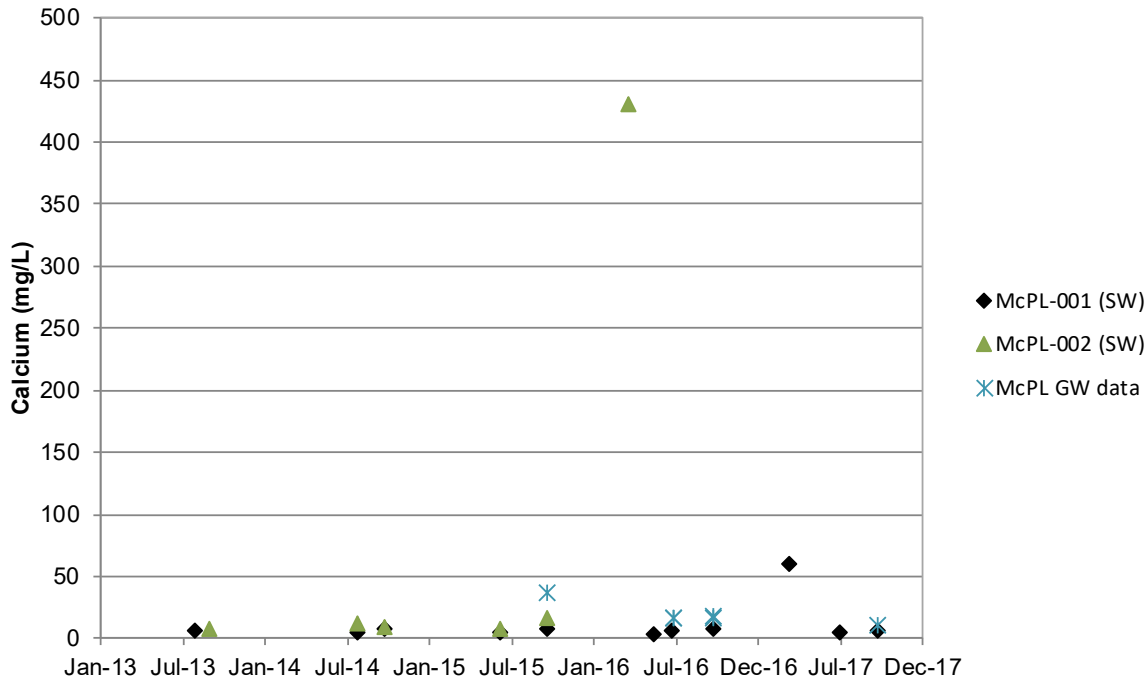


Elevated calcium, magnesium, and sulphate (e.g. sulphate shown in Figure 11) concentrations were found in the streams in winter (March sampling events) confirming the findings of Whitfield et al. (1983) and Lapp (2015) that groundwater dominates streamflow at this time. Concentrations of these elements in streambed groundwater relative to the associated surface water samples varied between the three streams:

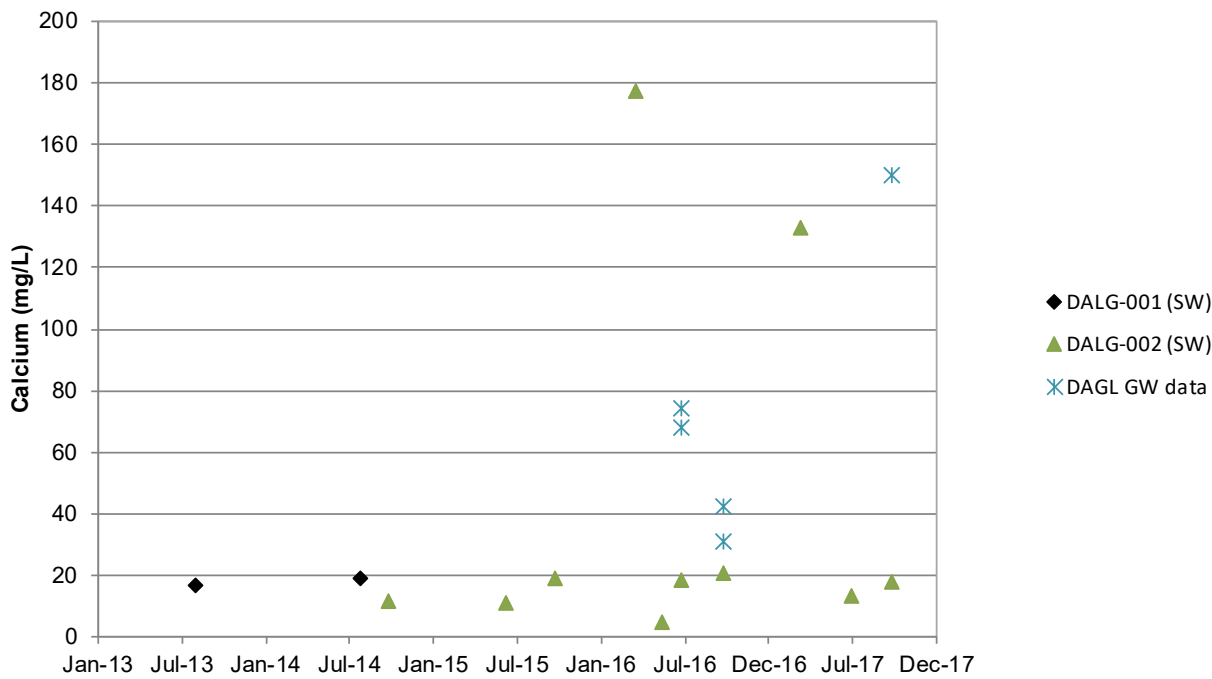
- Calcium and magnesium were elevated in the Dalglish Creek streambed samples when compared to the freshet and open-water surface water samples. Streambed groundwater in McParlon Creek and Eagle River Tributary was similar in major ion concentrations to the open-water and freshet surface water samples (Figure 38).
- Chloride, potassium, and sodium were elevated in the baseflow (under-ice season) samples from McParlon Creek when compared to the streambed groundwater, and when compared to surface water samples from open-water and freshet seasons. In Dalglish Creek, chloride, potassium and sodium concentrations were similar between surface water and groundwater samples and concentrations were not elevated in the baseflow sample.
- Sulphate concentrations were high in baseflow (under-ice season) and streambed groundwater samples from Dalglish Creek (Figure 11).

Figure 38: Dissolved Calcium Concentrations at Groundwater Stations and in Ground and Surface Water at the McParlon Creek and Dalglish Creek Stations

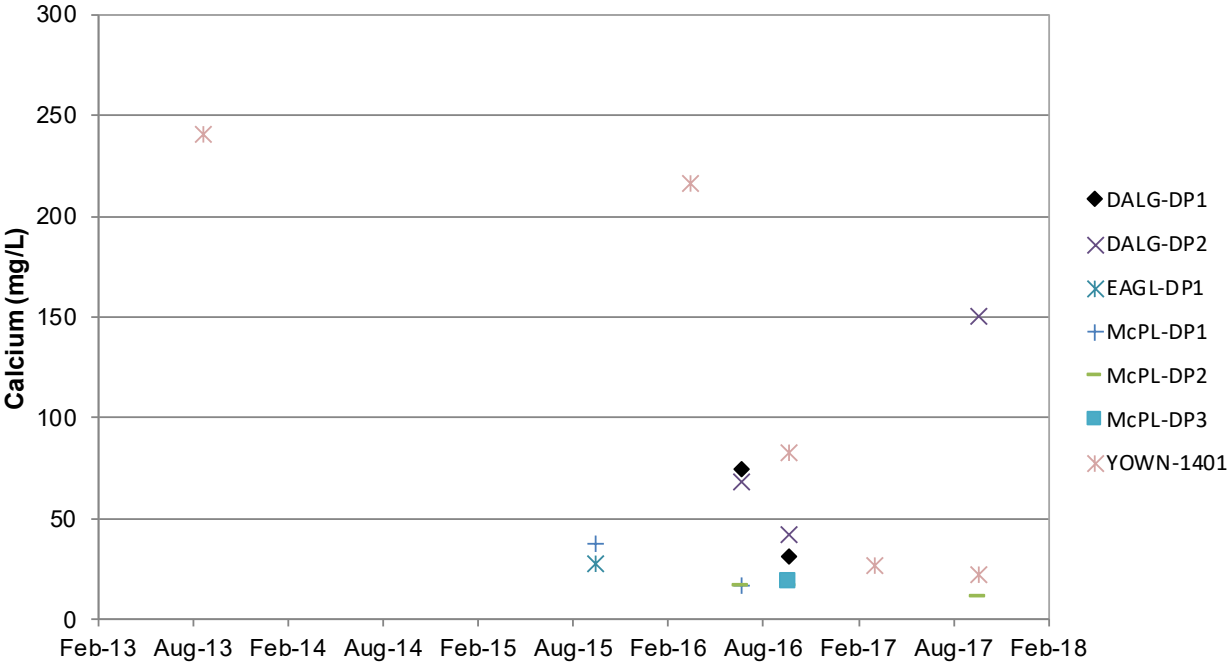
a) McParlon Creek surface water and groundwater



b) Dalglish Creek surface water and groundwater



c) All groundwater sampling stations



Note: (SW) = surface water sampling station. GW = Groundwater Sampling Stations. All concentrations in mg/L.

A baseline water quality study conducted on the nearby Peel watershed (Czarnecki and Beavers, 2002) provides some regional context for the Eagle Plains baseline water quality study. The Peel baseline water quality study indicated that parameters showing the highest concentrations during winter, and lower concentrations during freshet and open-water seasons, included calcium, magnesium, sodium, alkalinity, strontium, chloride, selenium sulphate, total dissolved solids, and specific conductivity (Czarnecki and Beavers, 2002). This observation from the Peel baseline study was also observed in some of the Eagle Plains watersheds. Chance Creek, McParlon Creek, Dalglish Creek, Eagle River, and the Whitestone River had similar trends in winter water quality to the Peel watershed, with most of the major ion parameters and conductivity elevated in winter water samples and streambed groundwater samples. Chloride, selenium, and to a lesser extent, sodium did not follow the same trends as the Peel Watershed and were generally not elevated in winter water samples (Tables B-2 to B-7); the specific reason for this pattern is not known.

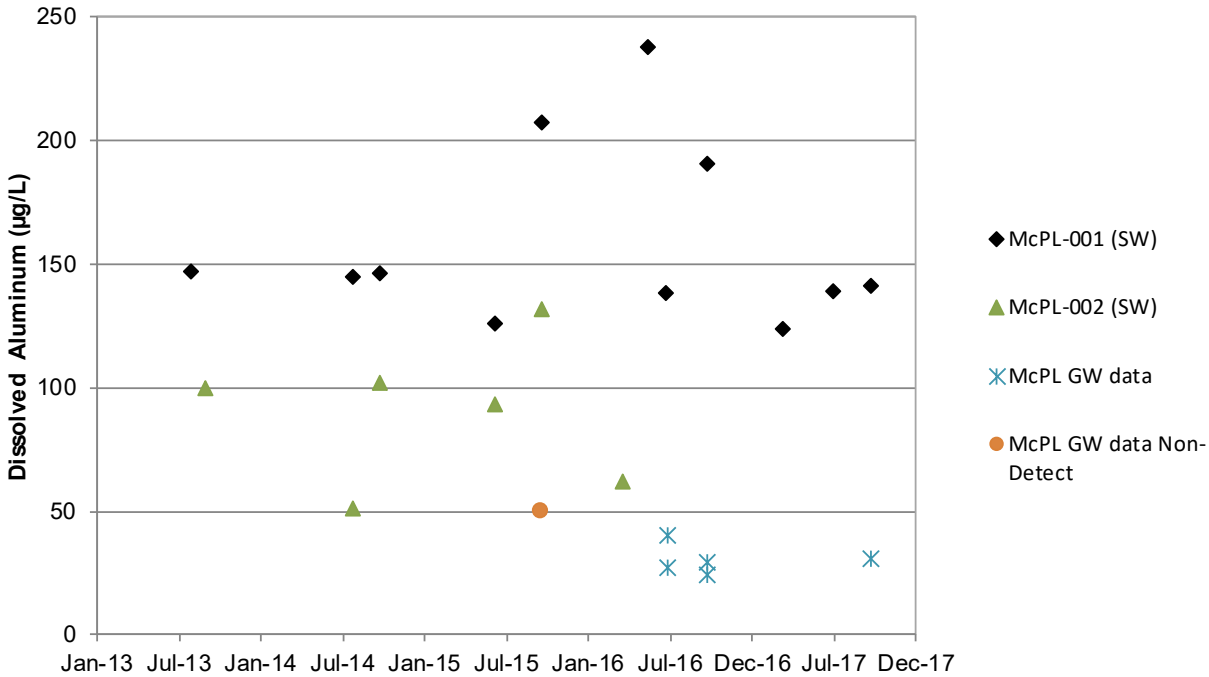
Groundwater samples, including baseflow samples, streambed groundwaters, and deep groundwater (YOWN-1401) had higher ammonia concentrations, up to 6.1 mg-N/L, than surface water samples collected at other times of the year, with concentrations up to 0.17 mg-N/L (Table B-1 and Table C-1). Ammonia concentrations are compared between surface water and groundwater samples in Figure 12.

Dissolved metals concentrations in the streambed groundwater samples were generally similar to dissolved metals concentrations in the associated surface water samples with the following exceptions:

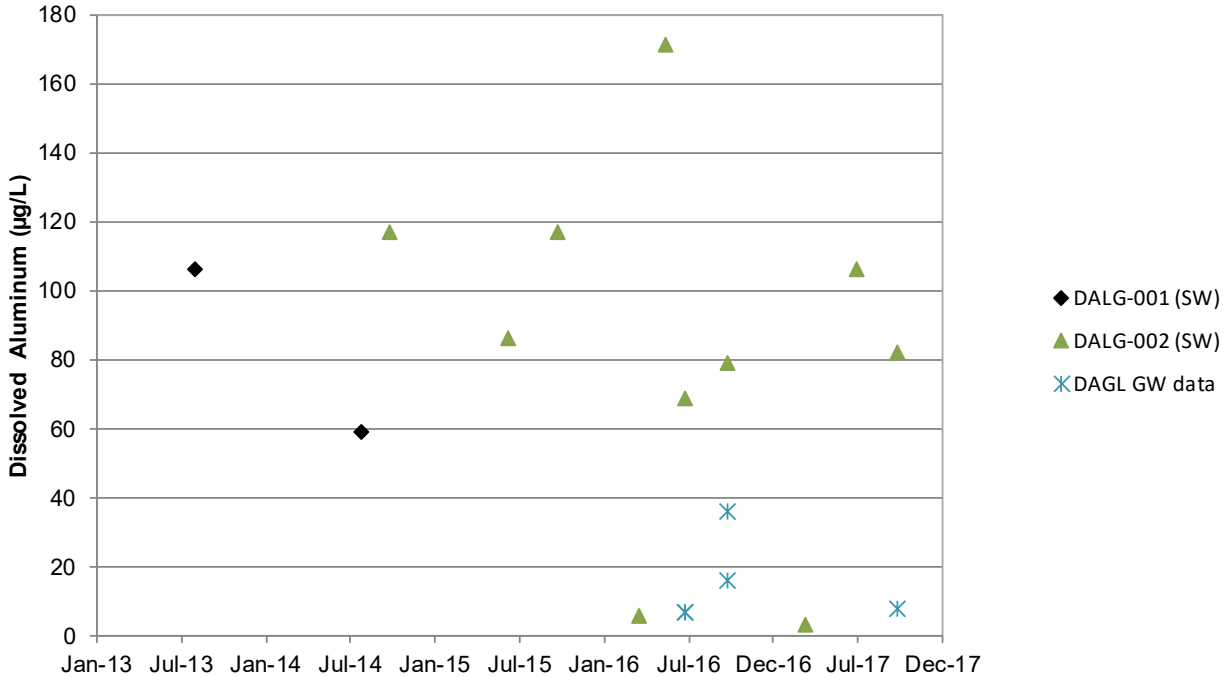
- Dissolved aluminium and copper were at least 50% lower in groundwater samples at Dalglish Creek and McParlon Creek than the associated surface water samples (Figure 39).
- Dissolved arsenic, molybdenum, and vanadium were higher (generally at least 2 times) in groundwater samples than the associated surface water samples.
- Dissolved barium was at least 2 times higher in groundwater samples at the McParlon Creek and Eagle River sampling stations.
- Dissolved boron was 5 times higher in the June 2016 groundwater samples from DALG-DP1 than the concentrations found in the Dalglish Creek surface water samples.

Figure 39: Dissolved Aluminium and Copper Concentrations in McParlon Creek and Dalglish Creek Groundwater and Surface Water

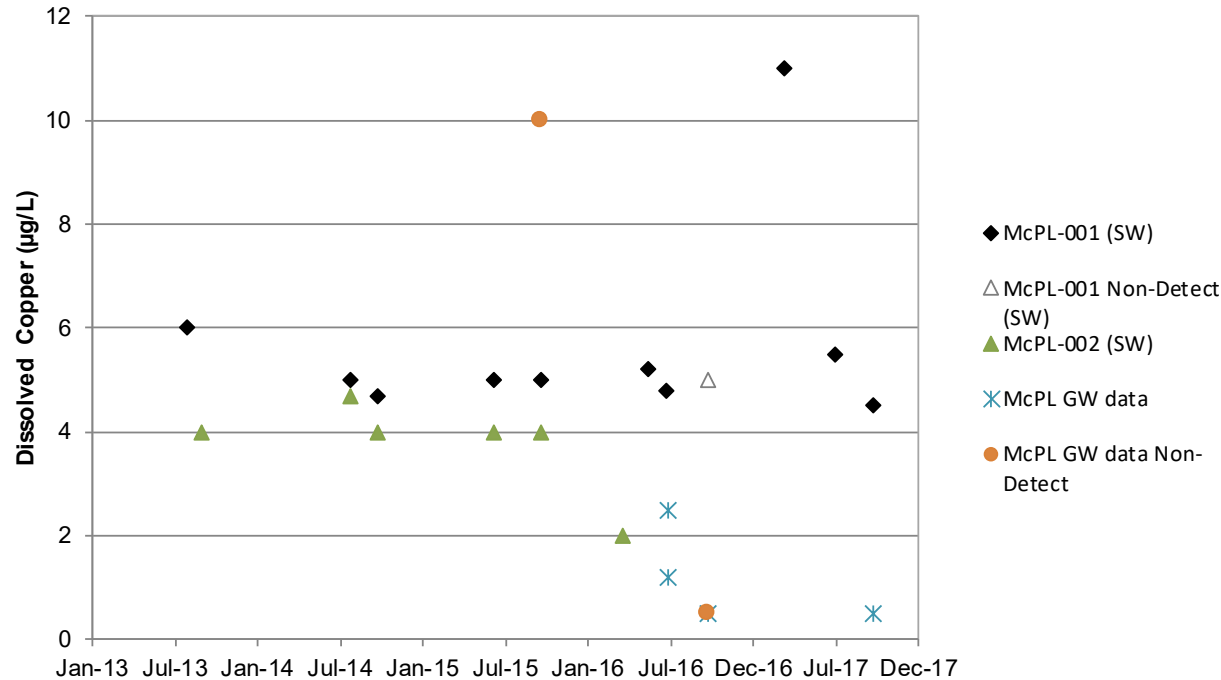
a) McParlon Creek surface water and groundwater



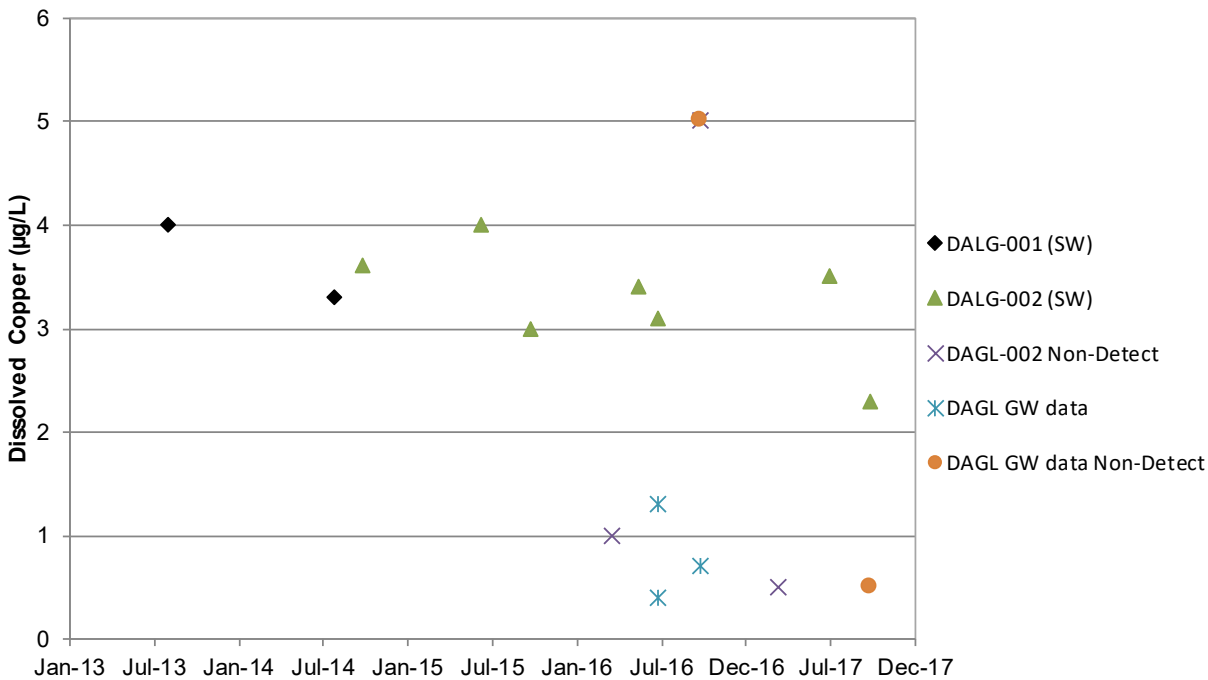
b) Dalglish Creek surface water and groundwater



c) McParlon Creek surface water and groundwater.



d) Dalglish Creek surface water and groundwater.



Note: (SW) = surface water sampling station. GW = Groundwater Sampling Stations. All concentrations in ug/L.

As summarized in Section 4.3, dissolved metals that peaked in concentration during late winter varied between watersheds. Comparing the under-ice season samples to the streambed groundwater samples suggests that dissolved metals that were elevated in the streambed samples were also elevated in the under-ice samples including:

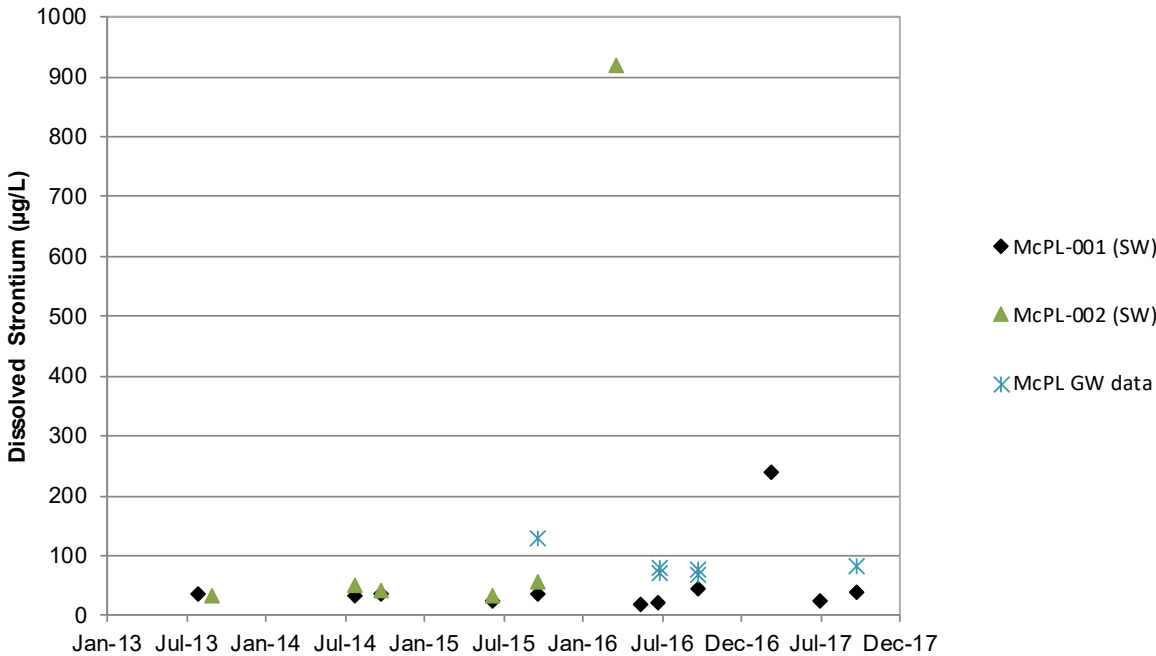
- Dissolved iron in McParlon Creek, Dalglish Creek and the Eagle River Tributary;
- Dissolved strontium in the McParlon Creek and Dalglish Creek; and,
- Dissolved manganese, nickel, and uranium in the Dalglish Creek.

High concentrations of iron, strontium, and uranium were also found in the YOWN-1401 groundwater samples, suggesting these metals may be associated with both shallow and deep groundwater throughout the study area. Comparisons of iron and strontium concentrations are shown in Figures 13a and 40, respectively.

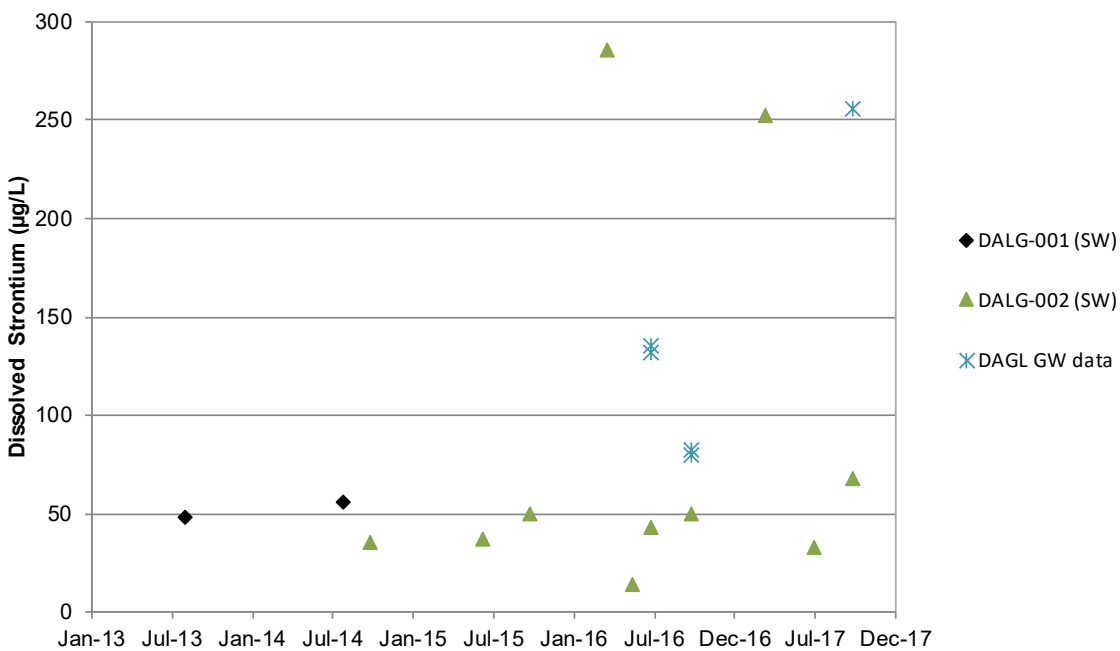
A notable difference between the Peel watershed study and this study is that the highest total iron concentrations in the Peel watershed were observed during spring freshet with very low concentrations during winter baseflow (Czarnecki and Beavers, 2002), while the highest total iron concentrations for most of the Eagle Plains sampling stations were associated with under-ice samples. This suggests that the source of iron in most of the watersheds within the eagle plains may be related to groundwater flow while in the Peel watershed iron is more likely to be transported in surface runoff. The Miner and Whitestone Rivers are an exception to this trend, with concentrations of total iron being highest during open-water sampling events in summer and fall.

Figure 40: Dissolved Strontium Concentrations at all Groundwater Stations and in Ground and Surface Water at the McParlon Creek and Dalglish Creek Stations

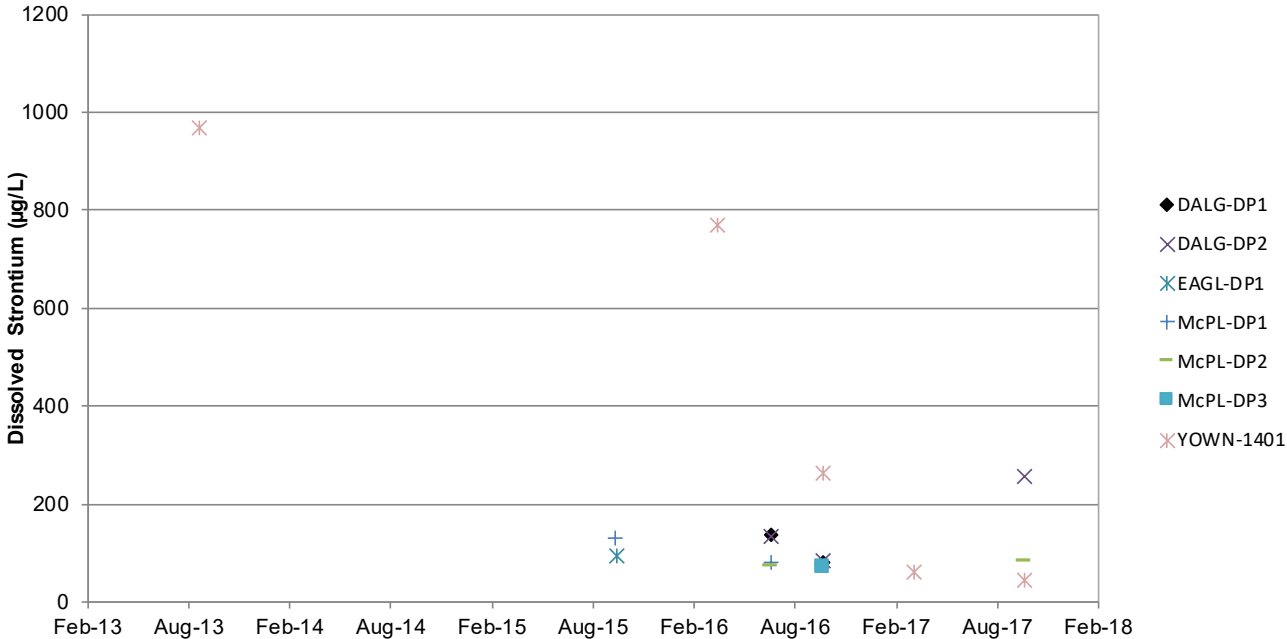
a) McParlon Creek surface water and groundwater



b) Dalglish Creek surface water and groundwater



c) All groundwater sampling stations



Note: (SW) = surface water sampling station. GW = Groundwater Sampling Stations. All concentrations in ug/L.

4.4.2 Groundwater-Surface Water Interaction

Streams may interact with groundwater in one of three ways: streams may gain water from groundwater (gaining stream), lose water to groundwater (losing stream), or they may do both depending on the sampling station and time of year (Winter et al. 1998). Whether a stream is gaining or losing will depend on the local and regional groundwater flow system. In general, if the groundwater level around the stream is higher than the stream surface, the stream will be a gaining stream. If the groundwater level around the stream is lower than the stream surface, the stream will be a losing stream (Winter et al. 1998).

Water level measurements were taken at three of the drivepoint piezometers (Table 18). Two of the sampling stations (DALG-DP2 and McPL-DP2) had no difference between the water level in the piezometer (measured at 1 m below the streambed) and the water level outside the piezometer (the surface of the stream), indicating that there is no, or little hydraulic gradient between the stream and shallow groundwater at those stations at the time of measurement. At DALG-DP1, the water level at a depth of one metre in the streambed was lower than the water level of the stream, suggesting that Dalglish Creek may be a losing stream at this station at the time of measurement. As water level measurements were only collected once, future sampling is required to confirm the predominant pattern.

Table 18: Water Level Measurements in Drivepoint Piezometers (22 September 2016)

Station	Water Level in Piezometer (m btoc)	Water Level Outside Piezometer (m btoc)	Stream Depth (m ags)	Gaining/Losing
DALG-DP1	0.55	0.33	0.17	Losing
DALG-DP2	0.3	0.3	0.29	No gradient
McPL-DP2	0.275	0.275	0.41	No gradient

Note: m btoc = metres below top of casing; m ags = metres above ground surface.

The hydraulic conditions between the creek and streambed (i.e., no gradient, losing or gaining) may vary spatially and temporally and be affected by streamflow. In both Dalglish Creek and McParlon Creek, the June 2016 streambed groundwater samples were collected at low flow while the September 2016 samples were collected during a period of higher flow. The June and September 2016 streambed groundwater samples from McParlon Creek generally show little or no difference between the two sampling events. The Dalglish Creek streambed groundwater samples generally had higher concentrations of many parameters during the June 2016 as compared to the September 2016 sampling event, suggesting that in this area of Dalglish Creek, streamflow has a greater influence on the degree of mixing between the more concentrated groundwater component and the more dilute surface water component. This demonstrates that the degree of groundwater-surface water interaction can vary by station and streamflow.

Groundwater Influence on Surface Water

Groundwater discharge to surface waters has the potential to influence surface water quality where concentrations are higher in groundwater as compared to surface water and the surface water is classified as a gaining stream (Section 4.4.1). From this study, it was determined that concentrations of calcium, magnesium, potassium, sulphate/sulphur, ammonia, iron, strontium, boron, cobalt, lithium, molybdenum, and uranium were generally higher in groundwater than in surface water. Where groundwater discharges to surface water, the surrounding surface water may have higher concentrations of these constituents as compared to areas where surface water recharges groundwater.

Groundwater influence on surface water is most apparent in the surface water samples from the under-ice season. The under-ice season samples generally had higher concentrations of the parameters listed above and for some total metals parameters exceeded guideline concentrations. Concentrations of total cadmium, cobalt, manganese, selenium, and zinc exceeded one or more of the guidelines (CCME or BC-MOE aquatic life guidelines) in under-ice/baseflow samples in two or more of the watersheds and were also common exceedances in streambed groundwater. These total metals were less likely to be found at concentrations exceeding guidelines in the open water or freshet surface water samples.

Surface Water Influence on Ground Water

In general, surface waters (with the exception of baseflow samples) were more dilute than groundwater in the study area. Surface water can influence groundwater through dilution. This dilution effect can be observed in the comparison of the more dilute streambed groundwater, which represents a mixture of groundwater and surface water, to the more concentrated baseflow and YOWN-1401 groundwater (summarized in Section 4.4.1). Figures 11 to 14, Figure 38, Figure 39 and Figure 40 provide a visual comparison of concentrations of various parameters in baseflow and groundwater samples compared to surface water samples collected at other times of the year.

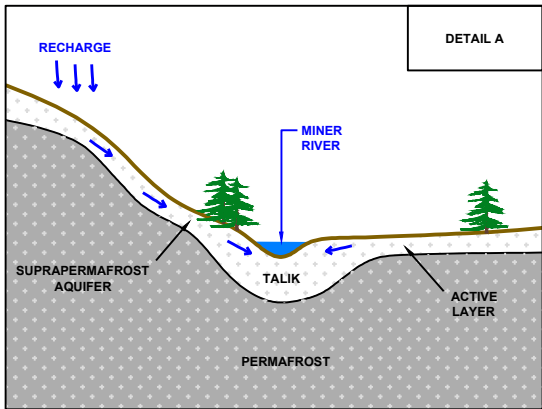
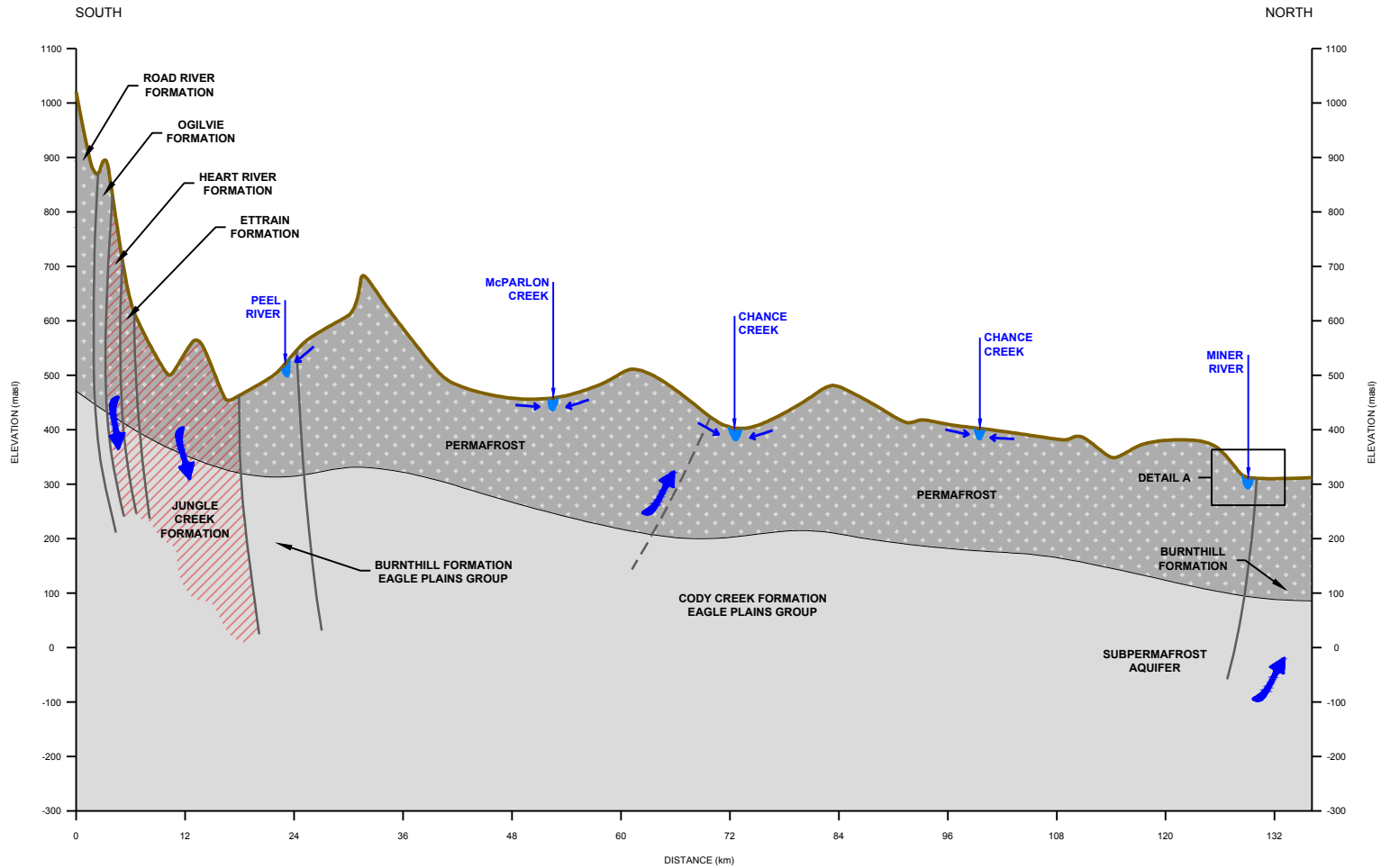
In contrast, some parameters are more concentrated in surface water as compared to groundwater, and in losing streams, surface water may influence groundwater by increasing concentrations of some parameters. Parameters that were found in higher concentrations in surface water samples as compared to groundwater samples included aluminium, copper, and zinc. As discussed in Section 4.2, total metals concentrations for aluminium and copper that exceeded the applicable guidelines were found in a majority of the surface water samples from the freshet and open-water seasons (Tables B-1 to B-7). Higher concentrations of aluminium, copper, and zinc could potentially be found in groundwater under the influence of surface water in the study area; however, this could not be confirmed with the available dataset.

4.5 Regional Hydrogeology

Figure 41 depicts a conceptual hydrogeological cross section of the Eagle Plains Region, based on the ground surface elevations, rivers, creek, and bedrock outcrops along an N-S transect. This is conceptual given the paucity of publicly available information on groundwater flow or permafrost in the region.

The continuous permafrost present across the study area acts as an aquitard or aquiclude, preventing interaction between the superpermafrost aquifer, and above the permafrost and subpermafrost groundwater. Thus, groundwater flow to streams and rivers is often limited to shallow groundwater flow in the suprapermfrost aquifer (see Figure 41 Detail A) (Lapp, 2015). Recharge and discharge of subpermafrost groundwater in areas of continuous permafrost generally occurs through taliks, unfrozen conduits through the permafrost. Taliks can form beneath large lakes or rivers that do not fully freeze during the winter. Further study would be needed to confirm the nature of taliks in the region. Deeper groundwater recharge may also occur in areas of higher elevation where conductive structural features or karstic terrain exist. In northeast Alaska, a continuous permafrost zone, Kane et al. (2012) found that recharge to the subpermafrost aquifer occurred on the south side of the Brooks Range through limestone bedrock outcrops. In the Eagle Plains Region, a potential area of subpermafrost groundwater recharge could be where the limestone Heart River Formation outcrops in the Ogilvie Mountains to the south.

Groundwater discharge may occur at lower elevations where hydraulically conductive structural features provide a pathway for topographically drive groundwater flow. Taliks may also form where groundwater is sufficiently saline or warm to remain unfrozen in the permafrost zone. Springs, and the associated ice formations (aufeis), provided evidence of groundwater discharge in northeast Alaska and were found to be associated with faults (Kane et al. 2012).



LEGEND

- HYDROCARBON BEARING FORMATION
- PERMAFROST
- HYPOTHETICAL STRUCTURAL FEATURE

- HYPOTHETICAL REGIONAL GROUNDWATER FLOW
- SMALL SCALE LOCAL FLOW IN ACTIVE LAYER

CLIENT
ENVIRONMENT YUKON,
YUKON WATER RESOURCES BRANCH

CONSULTANT



YYYY-MM-DD 2018-10-25
DESIGNED EH
PREPARED RTJ
REVIEWED MN
APPROVED MN

PROJECT
EAGLE PLAINS BASELINE WATER AND SEDIMENT QUALITY
CHARACTERIZATION REPORT UPDATE

TITLE
EAGLE PLAINS CONCEPTUAL HYDROGEOLOGICAL
CROSS SECTION

PROJECT NO.	PHASE	REV.	FIGURE
1792402	2000	0	41

4.6 Climate Change Impacts

Climate change has the potential to have several long-term impacts on both water quality and quantity in the Eagle Plains region.

Recent data in Yukon suggest air temperature and precipitation fluctuations could be outside the natural range of variability, with greater winter temperature increases in northern Yukon. These temperature and precipitation changes are associated with changes in the hydrological cycle, such as the river ice cover period shortening due to later freeze-up (Rasouli et al., 2014). In Yukon, the largest increases in groundwater flow due to climate change have been reported in the Yukon headwaters and the Porcupine River watershed within the Eagle Plains region (Yukon Government 2011). One potential impact on the hydrologic cycle in the Eagle Plains region has been observed as increased streamflow in the fall due to fall rains. Permafrost degradation (discussed further below) may also impact streamflow, as reported by Walvoord and Striegl (2007) which show river flow in winter and April has increased in Yukon regions of significant permafrost with ground thaw.

Further, permafrost distribution of northern regions is changing due to permafrost warming and degradation (Yukon Government 2011). As the permafrost degrades from the warming climate, it can lead to increased interaction between surface and groundwater which would otherwise be restricted by permafrost (Yukon Government 2011). An increase in groundwater and surface water interaction may affect areas in the Eagle Plain region that are noted to have a greater degree of mixing between the more concentrated groundwater component and the more dilute surface water component (e.g. Streambed groundwater samples collected from Dalglish Creek). For example, aluminium, copper and zinc concentrations in the region generally found in higher concentrations in surface water samples as compared to groundwater samples could potentially be found in higher concentrations in groundwater under the influence of surface water.

Recent studies have documented changes in water quality cause by permafrost thaw, including increased turbidity, temperature and major ions and nutrients (e.g. calcium, magnesium, sulphate and nitrate) which may cause changes to aquatic ecosystems. The increase in ions is associated with the deepening of flow pathways and increased contributions of deep groundwater to the surface water bodies. In addition, thickening of the active layer and melting of near-surface ground ice can influence inorganic chemical fluxes from permafrost into surface water (Columbo et al., 2017). The results of Columbo et al. (2017) suggest that the water quality of some streams appear to be acid-sensitive, with potential to be significantly impacted by a change in water chemistry and negatively affect aquatic ecosystems. A recent study has found that a significant amount of mercury may be stored in permafrost, resulting in mercury release to the aquatic environment should permafrost thaw (Schuster et al. 2018).

The water quality information collected for the Eagle Plains area will form a baseline against which further changes may be compared.

5.0 SUMMARY

This report documents the existing conditions of streams in the Eagle Plains Ecoregion of the Yukon based on the surface water, sediment, and groundwater quality data collected from 2012 to 2017. Description and interpretation of the results was structured around three key questions as follows:

- 1) What is surface water, groundwater, and sediment quality at baseline?
- 2) Do season, geology, watershed and streamflow influence surface water or groundwater quality?
- 3) What is the interaction between groundwater quality and surface water quality?

5.1 Key Question 1: What is Surface Water, Groundwater, and Sediment Quality at Baseline?

Surface Water

Surface water in the study area was generally slightly acidic to circumneutral, with some samples from Chance Creek being outside of the CCME recommended pH range for the protection of aquatic life, and with some of the samples from the 2016 freshet season being outside the CCME recommended pH range for the protection of aquatic life in other areas. Surface water was generally well oxygenated during freshet and open-water season but had dissolved oxygen concentrations below CCME aquatic life guidelines during ice-cover season.

Specific conductivity in surface water samples was widely variable. Concentration of TSS, TDS, and TOC in surface water was variable within and between watersheds.

Bicarbonate, calcium, and sulphate are the dominant ions found in surface water in the study area.

Concentrations of TKN ranged from moderate to high and concentrations of total phosphorus indicate surface waters are oligotrophic to meso-eutrophic, depending on the location and season.

Several total metals had concentrations above surface water quality guidelines in samples taken from Chance Creek, Dalglish Creek, Eagle River, McParlon Creek, and Whitestone Creek. These parameters were total aluminium, chromium, copper, iron, and zinc. Isolated guideline exceedances were also observed for total arsenic, beryllium, cadmium, cobalt, lead, manganese, mercury, selenium, and silver. Concentrations of dissolved aluminium and iron were above the applicable surface water guidelines in most of the samples, with isolated guideline exceedances also occurring for dissolved cadmium. In Miner River, concentrations of total and dissolved iron were occasionally above guidelines and all other metals were below guidelines.

Surface water in Miner and Whitestone rivers has low sensitivity to acid deposition, while surface water in the other watersheds has moderate to high sensitivity to acid deposition depending upon season and position in the watershed, as indicated by total alkalinity concentrations.

Groundwater

Groundwater in the study area was slightly acidic to circumneutral. Streambed groundwater had low specific conductivity compared to the deeper groundwater from YOWN-1401, which was brackish in quality (average TDS of 8,984 mg/L) with very high hardness (average of 1,868 mg CaCO_3/L) and alkalinity (average of 999 mg/L as CaCO_3). Calcium, bicarbonate, and sulphate were the dominant ions found in streambed groundwater in the study area while the brackish groundwater from YOWN-1401 was dominated by sodium and sulphate. Calcium bicarbonate typically dominates shallow groundwater, especially in areas of carbonate bedrock which are observed throughout the study area (Osadetz et al. 2005; Yukon Geological Survey, 2017), while sulphate may be derived from shale units (Yukon Geological Survey, 2017f; van Everdingen et al. 1985).

Ammonia concentrations in groundwater (baseflow, streambed sampling stations and YOWN-1401) were higher than concentrations in surface waters collected during the freshet and open-water seasons. High TSS concentration, up to 504 mg/L, in many of the groundwater samples resulted in total metals concentrations, which exceeded one or more of the CCME, BC MOE, or Yukon-CSR guidelines. Dissolved metals concentrations were generally below the CCME, BC MOE, or Yukon-CSR guideline values except for dissolved iron.

Sediment

Metals concentrations were analyzed from full and 2 mm fractions of sediments collected across the study area. Concentrations of copper, lead, and mercury were below guidelines in all samples. Metal concentrations that exceeded the guidelines included arsenic (Chance Creek, Dalglish Creek, Eagle River, and McParlon Creek), cadmium (Chance Creek, Dalglish Creek, Eagle River, and McParlon Creek) chromium (Chance and McParlon creeks), and zinc (Chance Creek, Dalglish Creek, Eagle River, and McParlon Creek). There is general alignment of the sediment exceedances with exceedances in surface water and full alignment with exceedances in groundwater.

5.2 Key Question 2: What factors (Season, Streamflow, Geology and Watershed) Influence Surface Water or Groundwater Quality?

Seasonality, geology, watershed and flow were both found to influence surface water quality. The following is a summary of surface water parameters which showed the strongest seasonal and/or flow related influence.

Hardness, alkalinity, total and dissolved organic carbon, and total and dissolved inorganic carbon were strongly influenced by season. Hardness, alkalinity, and total and dissolved inorganic carbon concentrations peaked under ice, whereas total and dissolved organic carbon concentrations had higher concentrations during the open water period in September and lower concentrations during the under-ice period. The variations of concentrations of conventional parameters in Dalglish Creek and McParlon Creek were compared against the stage records for these two creeks. Total suspended solids and total organic carbon at one or more stations on Dalglish Creek and McParlon Creek mirrored stage data, indicating that the concentrations of these parameters are influenced by flow.

Bicarbonate and calcium showed strong seasonal variation, with higher concentrations in the under-ice samples as compared to samples collected during the other seasons, and no parameters at stations on Dalglish Creek or McParlon Creek mirrored stage data.

Ammonia showed strong season variation, with higher concentrations in the under-ice samples as compared to samples collected during freshet or open-water. Total nitrogen and phosphorus at one or more stations on Dalglish Creek and McParlon Creek mirrored stage data, indicating that the concentrations of these parameters are influenced by flow.

Total and dissolved barium, manganese, molybdenum, strontium, sulphur, and uranium showed strong seasonal variation, with higher concentrations being observed during the under-ice period at most stations. Total and dissolved aluminium, total arsenic, total barium, total and dissolved cadmium, total chromium, total and dissolved cobalt, total copper, total and dissolved iron, total lead, total and dissolved manganese, total potassium, total and dissolved silicon, total thallium, total titanium, total uranium, total vanadium, and total and dissolved zinc concentrations at one or more stations on Dalglish Creek and McParlon Creek mirrored stage data, indicating that the concentrations of these parameters are influenced by flow.

Groundwater discharge to surface water was most evident in baseflow samples acquired during under ice conditions in late winter.

Water quality, as well as the impact of season, geology and flow varied between watersheds and between watershed size. Major ion composition varied between watersheds and may also be impacted by watershed size, with larger watersheds showing higher proportions of anions as bicarbonate than their tributaries, which had a greater proportion of anions as sulphate. The Whitestone and Miner River tended to show a greater dilution effect on metals concentrations than the Eagle River.

The impact of geology on groundwater and surface water quality was less clear, but some differences in major ion chemistry may be related to differences in bedrock geology while metals concentrations did not show clear trends related to geology.

5.3 Key Question 3: What is the Interaction between Groundwater Quality and Surface Water Quality?

In general, groundwater and surface water samples from the same watershed had similar pH. While the proportions of major ions, namely calcium and bicarbonate or sulphate, were similar in surface water and groundwater, concentrations of many constituents in groundwater were higher than in surface water, dissolved oxygen was lower in groundwater as compared to surface water. Parameters that were elevated in groundwater relative to surface water were: alkalinity, specific conductivity, calcium, magnesium, potassium, sulphate/sulphur, iron, arsenic, strontium, barium, boron, cobalt, lithium, molybdenum, vanadium and uranium. Concentrations of total cadmium, cobalt, manganese, selenium and zinc exceeded one or more of the guidelines in under ice/baseflow samples in two or more of the watersheds and were also common exceedances in streambed groundwater. These total metals were less likely to be found at concentrations exceeding guidelines in the open water or freshet surface water samples.

6.0 RECOMMENDATIONS

The surface water quality and groundwater quality data collected to date provides spatial and temporal information on existing conditions for the study area; the sediment quality data collected to date provides limited information on existing conditions. Depending upon future resource development and future management plans, additional data collection programs may be required.

- Further sampling of nutrients is suggested to understand if the nutrient regime of the streams is meso-eutrophic or do nutrients vary throughout the season.
- Streams draining to the Porcupine River appear acid-sensitive; this should be confirmed.
- Future sediment quality programs should include analysis of sediment particle size analysis.
- Currently YOWN-1401 is assumed to be the only example of groundwater that is unlikely to be influenced by surface water in this study. Additional groundwater samples from wells not under the influence of surface water should be acquired to provide a better assessment of groundwater quality across the study area, including both subpermafrost and suprapermafrost groundwater.
- Develop a detailed watershed map to assess cumulative stressors by layering delineated watersheds with other available map layers such as fire history, oil and gas exploration wells, known permafrost slump areas, gravel pits, and highways/roads. This could further be paired with climate change research on the hydrological response of the area (e.g., Janowicz et al 2014) as well as the long-term permafrost monitoring stations (see Indrees et al 2015) to visually illustrate cumulative stressors to refine future studies documenting change to water in the region at various watershed scales.
- The preliminary assessment of groundwater – surface water interaction in this baseline study is based on limited groundwater quality and level data. Should future sampling programs become possible, twice yearly groundwater sampling in combination with hydrometric, surface water quality and groundwater level data at the McParlon Creek and Dalglish Creek watersheds is recommended. This would provide a better basis to assess the influence of season, streamflow and hydraulic gradients on groundwater-surface water interaction.
- A more detailed discussion of the impact of geology on surface water and groundwater would benefit from a study intended to specifically answer this question. For example, selecting similar stream orders in areas of different bedrock geology and seeking through field work and a detailed literature review to better define the geology of the local drainage at the sampling stations. Many of the sites in this study were in broadly similar geologic units but specific details of the localized geology were less well understood.
- If desired, level loggers and sondes could continue to be used in-stream to further document the relationship of flow/discharge to specific conductivity under current conditions. Changes to specific conductivity in streams could be future indicator of climate change or oil and gas activities as both involve possible changes in ions (salts).
- A statistical interpretation of the data was not possible due to variations in data collection methods over space and time. Statistical differences could result from an artefact given sampling methodology differences. If a more statistical approach to data analysis is desired, it is recommended that a sampling program be initiated in which samples are collected consistently at each sampling station during specific months of the

year intended to capture freshet, open-water and under-ice conditions. A repeated measures analysis or seasonal trend analyses may then be possible.

- Detection limits of PAH analytical packages should be reviewed, and the analytical package should provide blank-corrected data.
- Sediment in water samples can artificially raise PAH concentrations. Groundwater samples analyzed for PAHs should have low TSS if possible. Low flow sampling methods may help decrease sediment in the samples, but field filtering is not recommended.
- The addition of traditional knowledge and traditional land use of the tributaries in the area prior to development would be useful. This could assist in obtaining an assessment of existing water quality from a traditional user perspective.

7.0 CLOSURE

We trust this information in this draft report is sufficient for your needs at this time. Should you have any questions or concerns, please do not hesitate to contact the undersigned at 867-633-6076.

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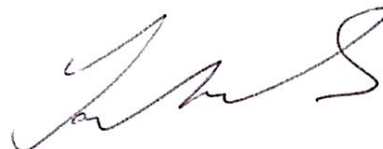
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8.0 REFERENCES

- Allen T.L. and K.G. Osadetz. 2013. Natural thermogenic gas seeps at the front of the Richardson Mountains: Indications for a petroleum system in the Peel Plateau, Yukon Canada. *Bulletin of Canadian Petroleum Geology*, 61(4): p. 283 – 294.
- APHA (American Public Health Association). 2012. *Standard Methods for the Examination of Water and Wastewater*, 22nd Edition.
- Baker J.A., J.R. Elphick, C.A. McPherson and P.M. Chapman. 2015. Effect of total dissolved solids on fertilization and development of two salmonid species. *Bulletin of Environmental Contamination and Toxicology*, 95 (4): p. 488-493.
- BC MOE (British Columbia Ministry of Environment). 2017. *British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture*. Water Protection & Sustainability Branch, Ministry of Environment, Victoria, BC.
- Burn, C.R., Moore, J.L., O'Neill, H.B., Hayley, D.W., Trimble, J.R., Calmels, F., Orban, S.N. and Idress, M. 2015. Permafrost characterization of the Dempster Highway, Yukon and Northwest Territories. In: *Conference proceedings from the 7th Canadian Permafrost Conference*, Quebec City, Canada.
- CCME (Canadian Council of Ministers of the Environment). 1999. *Canadian Environmental Quality Guidelines*, 1999. Canadian Environmental Quality Guidelines Summary Table, with updates to 2017. Winnipeg, MB, Canada. Available at: <http://st-ts.ccme.ca/>. Accessed January 2017.
- CCME. 2001. *Canadian Sediment Quality Guidelines for the Protection of Aquatic Life: Introduction*. Updated. Canadian Environmental Quality Guidelines, 1999. Winnipeg, MB, Canada.
- CCME. 2004. *Canadian Guidance Framework for the Management of Phosphorus in Freshwater Systems*. Report No. 1-8, Ecosystem Health, Science-Based Solutions. National Guidelines and Standards Office, Environment Canada. Gatineau, QC.
- CCME. 2011. *Protocols Manual for Water Quality Sampling in Canada*. Winnipeg, MB, Canada.
- CCME. 2015. *Guidance Manual for Optimizing Water Quality Monitoring Program*. Winnipeg, MB, Canada.
- Chapman, P.M. and C.A. McPherson. 2015. Development of a total dissolved solids (TDS) chronic effects benchmark for a northern Canadian Lake. *Integrated Environmental Assessment and Management*, DOI 10.1007/s00128-015-1589-2.
- Clark and Fritz. 1997. *Environmental Isotopes in Hydrogeology*. CRC Press. Boca Raton, Florida.
- Colombo, N., Salerno, F., Gruber, S., Freppaz, M., Fratianni, S., Giardino, M. 2017. Review: Impacts of permafrost degradation on inorganic chemistry of surface fresh water, *Global and Planetary Change* 162: 69-83.
- Czarnecki, A. and Beavers, R. 2002. *Peel River Basin Water Quality Report*. Water Resources division, Indian and Northern Affairs Canada. Yellowknife, NT.

- Davis, S.N. 1964. The chemistry of saline waters. In: Krieger, R.A. – Discussion. *Groundwater* 2(1): p. 51.
- DFO (Fisheries and Oceans Canada) and DOE (Department of Environment) Environment Canada. 1983. A Rationale for Standards Relating to the Discharge of Sediments into Yukon Streams From Placer Mines. Interdepartmental Committee on Placer Mining. New Westminster, BC.
- Dodds, W.K., J.R. Jones, E.B. Welch. 1998. Suggested Classification of Stream Trophic State: Distribution of Temperate Stream Types by Chlorophyll, Total Nitrogen and Phosphorus. *J. Water Resources* 32:p. 1455-1462.
- Edwards, T.K., and Glysson, G.D., 1999. Field Methods for Measurement of Fluvial Sediment: U.S. Geological Survey Techniques of Water Resources Investigations, Book 3, Chapter C2, 89 p., available at <http://pubs.usgs.gov/twri/.Smith, C.A.S.>,
- EIFAC (European Inland Fisheries Advisory Commission). 1965. Water Quality Criteria for European Fresh Water Fish. Report on Finely Divided Solids and Inland Fisheries. European Inland Fisheries Advisory Commission. *Air Water Pollution* 9:p. 151–168.
- Environment Yukon. 2002. Contaminated Sites Regulation, Environment Act, Yukon Regulations, Environment Yukon, Whitehorse, Yukon.
- United States Environmental Protection Agency (EPA). 2001. Technical Guidance for the Natural Attenuation Indicators: Methane, Ethane and Ethene. Prepared by EPA New England. July, 2001. pp. 18.
- United States Environmental Protection Agency (EPA). 2006. Standard Operating Procedure: Sample Preparation and Calculations for Dissolved Gas Analysis in Water Samples Using a GC Headspace Equilibration Technique. RSKOP-175. August, 2006. pp.15.
- Freeze, R.A. and J.A. Cherry. 1979. Chapter 7: Chemical Evolution of Natural Groundwater. In: *Groundwater*. Prentice Hall, Englewood Cliffs, NJ. 237 – 295.
- Gabos, S., M.G. Ikonou, D. Schopflocher, B.R. Fowler, J. White, E. Prepas, D. Prince, and W. Chen. 2001. Characteristics of PAHs, PCDD/Fs and PCBs in sediment following forest fires in northern Alberta. *Chemosphere* 43: 709 – 719.
- Gibson, J.J., T.W.D. Edwards, S.J. Birks, N.A. St Amour, W.M. Buhay, P. McEachern, B.B. Wolfe, D.L. Peters. 2005. Progress in isotope tracer hydrology in Canada. *Hydrological Processes*, 19:303-327.
- Hart, B.T., P. Bailey, R. Edwards, K. Hurtle, K. James, A. McMahon, C. Meredith and K. Swadling. 1990. Effects of Salinity on River, Stream and Wetland Ecosystems in Victoria, Australia. *Water Research* 24(9):p. 1103-1117.
- Hopkins, D.M., J.V. Mathews, Jr., C.E. Schweger and S.B. Young. 1982. *Paleoecology of Beringia*. Academic Press, New York, N.Y.

- Idrees, M., C.R. Burn, J.L. Moore and F. Calmels. 2015. Monitoring permafrost conditions along the Dempster Highway. GeoQuebec 2015. Available at: <https://carleton.ca/permafrost/wp-content/uploads/703.pdf>.
- Indian and Northern Affairs Canada (INAC), Water Resources Division. 2008. Peel River Water and Suspended Sediment Sampling Program (2002 – 2007).
- International Atomic Energy Association (IAEA), Global Network of Isotopes in Precipitation Station Data for Mayo, 1985-1989. Accessed via the WISER database on December 17, 2017.
- Jackson, K. 2012. Mid- to Late-Cretaceous stratigraphy, sedimentology and hydrocarbon potential, Eagle Plain Basin, northern Yukon. MSc thesis, University of Calgary, Canada
- Janowicz, JR., JW. Pomeroy, S, Carey, T. Williams, and S. Krogh. 2014. Sensitivity of Dempster Highway Hydrological Response to Climate Warming. 2nd Annual General Meeting of the Changing Cold Regions Network of Expertise, October 20 –22, 2014, Waterloo, ON. Available at: http://ccrnetwork.ca/documents/2nd%20Annual%20Meeting/CCRN_AM2_141022_v2.pdf.
- Lapp, A. 2015. Seasonal Variability of Groundwater Contribution to Watershed Discharge in Discontinuous Permafrost in the North Klondike River Valley, Yukon (Master's thesis, University of Ottawa, Ottawa, Ontario, Canada).
- Lauriol, B., D. Lacelle, M. St-Jean., I. Clark., G.D. Zazula. 2010. Late Quaternary paleoenvironments and growth of intrusive ice in eastern Beringia (Eagle River valley, northern Yukon Canada). Canadian Journal of Earth Sciences 47: p. 841 – 955.
- Linell, K.A. 1973. Risk of Uncontrolled Flow from Wells through Permafrost. In: *Conference Proceedings from the Second International Conference on Permafrost*, Yakutsk, Siberia. pp. 462 – 468.
- McHugh, M. 2013. Fish of the Dempster Country: Results Report. Prepared by Wild Country Fisheries Ltd. for Yukon Parks and Yukon Fish and Wildlife enhancement Trust.
- McNeely, R.N., V.P. Neimanis and L. Dwyer. 1979. Water Quality Sourcebook – A Guide to Water Quality Parameters. Inland Waters Directorate, Water Quality Branch, Minister of Supply and Services Canada. Ottawa, ON.
- Meikle, J.C., and Roots, C.F. (editors), 2004. Ecoregions of the Yukon Territory: Biophysical properties of Yukon Landscapes. Agriculture and Agri-Food Canada, PARC Technical Bulletin No. 04-01, Summerland, BC, 313 p.
- Mitchell, P. and E. Prepas (editors). 1990. Atlas of Alberta Lakes. The University of Alberta Press. Edmonton, Alberta.
- Newcombe and Jensen. 1996. Channel suspended sediment and fisheries: a synthesis for quantitative assessment of risk and impact. North American Journal of Fisheries Management 16: 693-727.

- Newcombe, C.P. and D.D. MacDonald. 1991. Effects of Suspended Sediments on Aquatic Ecosystems. *North American Journal of Fisheries Management* 11:p. 72-82.
- Osadetz, K.G., Z. Chen and T.D. Bird. 2005. Petroleum Resource Assessment, Eagle Plain Basin and Environs, Yukon Territory, Canada. Produced by the Yukon Geological Survey for the Minister of Energy, Mines and Resources, Yukon Government.
- Rasouli, K., Pomeroy, J.W., Janowicz, J.R., Carey, S.K., Williams, T.J. 2014. Hydrogeological sensitivity of a northern mountain basin to climate change. *Hydrogeological Processes*. DOI: 10.1002/hyp.10244.
- Rozanski, K., L. Araguas-Araguas, R. Gonfiantini. 1993. Isotopic patterns in modern global precipitation. *American Geophysical Union Geophysical Monograph* 78: Climate Change in Continental Isotopic Records.
- Saffran, K.A. and D.O. Trew. 1996. Sensitivity of Alberta Lakes to Acidifying Deposition: An Update of Sensitivity Maps with Emphasis on 109 Northern Lakes. Water Sciences Branch, Water Management Division, Alberta Environmental Protection.
- Schier, H., Erlebach, W; Albright, L. 1980; Variations in Water quality during winter in Two Yukon Rivers with Emphasis on Dissolved Oxygen Concentration. *Water Research* 14 (9), p 1345-1351, September, 1980.
- Schindler, D.W. 1996. Scientific Appendix to the Final Report of the Target Loading Subgroup on Critical and Target Loading in Alberta. Section 2. The Response of Aquatic Ecosystems in Alberta to Acidifying Deposition.
- Schuster, P. F., Schaefer, K. M., Aiken, G. R., Antweiler, R. C., Dewild, J. F., Gryziec, J. D. Zhang, T. (2018). Permafrost stores a globally significant amount of mercury. *Geophysical Research Letters*, 45, 1463–1471. <https://doi.org/10.1002/2017GL075571>
- Smith, C.A.S, J.C. Meikle, and C.F. Roots (editors). 2004. Ecoregions of the Yukon Territory: biophysical properties of Yukon landscapes. Agriculture and Agri-Food Canada, PARC Technical Bulletin No. 04-01, Summerland, British Columbia, 313pp.
- Stantec. 2012. Status and Trends of Flow, Water Quality and Suspended Sediment Quality in the Peel River Watershed. Prepared for Aboriginal Affairs and Northern Development Canada, Water Resources Division.
- Thomas, R.D. and Rampton, V.N. 1982. Surficial geology and geomorphology, Moose Lake, Yukon Territory, Geological Survey of Canada, Preliminary Map no. 10-1982.
- Tilley, B., K. Muehlenbachs. 2011. Fingerprinting of Gas Contaminating Groundwater and Soil in a Petroliferous Region, Alberta, Canada. Proceedings from International Network of Environmental Forensics conference. 10p.
- US EPA (United States Environmental Protection Agency). 1973. Water Quality Criteria 1972. Environmental Studies Board, U.S. Environmental Protection Agency, Washington, D.C. EPA-R-73-033. 127-129.

- US EPA 2001. Methods for Collection, Storage and Manipulation of Sediments for Chemical and Toxicological Analyses: Technical Manual.
- van Everdingen, R.O., M.A. Shakur and F.A. Michel. 1985. Oxygen- and sulfur-isotope geochemistry of acidic groundwater discharge in British Columbia, Yukon and District of Mackenzie, Canada. *Canadian Journal of Earth Science* 22: p. 1689 – 1695.
- WSC (Water Survey of Canada). 2017. Real-Time Hydrometric Data Map Search. Available at: https://wateroffice.ec.gc.ca/google_map/google_map_e.html?search_type=province&province=YT
- Walvoord, M.A. and Striegl R.G. 2007. Increased groundwater to stream discharge from permafrost thawing in the Yukon River basin: Potential impacts on lateral export of carbon and nitrogen. *Geophysical Research Letters*, Vol 34, L12402.
- Wetzel, R. G. 2001. *Limnology, Lake and River Ecosystems* 3rd Edition. Academic Press ISBN-10: 0127447601.
- Whitfield, P.H., Whitley, W.G. and Wade, N.L. 1993. Chemistry of winter flows in the Yukon Territory. *Proceedings of the Workshop on Environmental Aspects of River Ice*. T.D. Prowse (Ed.). National Hydrology Research Institute, Saskatoon, Saskatchewan. NHRI Symposium Series No. 12, p. 217 – 234.
- Whiticar, M.J. 1999. Carbon and hydrogen isotope systematics of bacterial formation and oxidation of methane. *Chemical Geology* 161: p. 291 – 314.
- World Health Organization (WHO). 2003. Ammonia in drinking water: Background document preparation of WHO Guidelines for drinking-water quality. Geneva, World Health Organization.
- Winter, T.C., J.W. Harvey, O.L. Franke and W.M. Alley. 1998. *Ground Water and Surface Water A Single Resource*. U.S. Geological Survey Circular 1139.
- Yukon Ecoregions Working Group, 2004. Yukon Coastal Plain. In: *Ecoregions of the Yukon Territory: Biophysical properties of Yukon landscapes*, C.A.S. Smith, J.C. Meikle and C.F. Roots (eds.), Agriculture and Agri-Food Canada, PARC Technical Bulletin No. 04-01, Summerland, BC, p. 63-72.
- Yukon Geological Survey. 2017. Yukon Digital Bedrock Geology. http://www.geology.gov.yk.ca/update_yukon_bedrock_geology_map.html, accessed: January 27, 2017.
- Yukon Government and Vuntut Gwitchin Government. 2009. North Yukon Regional Land Use Plan. Prepared by the North Yukon Planning Commission.
- Yukon Government. 2011. Yukon Water: a Summary of Climate Change Vulnerabilities. Published by Yukon Government.
- Yukon Government, Wildland Fire Management. 2015. 2015 Yukon Wildland Fire Maps. <http://www.community.gov.yk.ca/firemanagement/wfarchives.html>, accessed: April 11, 2017.

APPENDIX A

Quality Assurance and Quality
Control Procedures and Results

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A1.0 INTRODUCTION

The Quality Assurance and Quality Control (QA/QC) protocols were designed to achieve field sampling, laboratory analysis, data entry, data analysis, and report preparation activities that produce technically sound and scientifically defensible results. Office QA/QC procedures involve validation of field measurements and analytical results provided by analytical laboratories, and checks of all data analyses and interpretations.

The field samples and data were collected by the Yukon Government and laboratory results were provided to Golder for assessment. This appendix describes the office QA/QC procedures, evaluates QC data, and describes the implications of QC results to the interpretation of study results.

A1.1 Office Operations

Office-related QA included:

- using appropriately trained personnel for each data management, analysis, and reporting task;
- using standardized data manipulation/summary tools, where required;
- filing data and project information according to standardized protocols;
- establishing a data management system to ensure an organized, consistent system of data storage, QC, and retrieval; and,
- senior review of work products at appropriate milestones.

A2.0 QUALITY CONTROL

A2.1 Field Control Procedures

The QC sample types used in this study included:

- **Travel blanks** (surface water and groundwater samples) consist of deionized water provided in sampling bottles by the analytical laboratory. Travel blanks accompany the samples through all steps of collection and transportation. They are handled, stored, and treated the same as the collected samples, but are not filtered or exposed to sampling equipment. Travel blanks are used to detect potential sample contamination due to ambient conditions, or that may have occurred during shipping and laboratory analysis
- **Field blanks** (surface water samples only) consist of deionized water provided by the analytical laboratory, which are processed in the field, handled the same, and analyzed for the same constituents as the water samples collected during the field program (e.g., preserved, filtered). Field blanks are used to detect potential sample contamination during sample collection, handling, shipping, and analysis.
- **Duplicate samples** (water samples only) consist of additional samples collected at the same time and location as water or sediment samples collected during a field program, using the same sampling methods. They are used to check within-site variation, and the precision of field sampling methods and laboratory analysis.

The surface water quality field QC analysis for this project consisted of the collection and analysis of blank samples and field duplicate samples. The groundwater quality field QC analysis for this project consisted of the collection and analysis of field duplicate samples. No sediment quality field QC samples were collected.

Quality control blanks and duplicate samples for the surface water quality component of the field program accounted for approximately nine percent (%) of the total number of water samples submitted for analysis. Quality control duplicate samples for the groundwater quality component of the field program accounted for approximately 6% of the total number of groundwater samples submitted for analysis. QC samples were analyzed for the same set of parameters as the collected surface water and groundwater samples.

A2.2 Office Quality Control Procedures

Relevant elements of office-based QC include:

- saving unaltered data files received from Yukon Government in the Project directory so they are accessible to the team as required;
- comparing sample data entered into the Project database against raw client data files to confirm data accuracy;
- creating backup files before each major operation as data are analyzed;
- checking the data in the Project database against the raw data obtained from database; and,
- verifying the accuracy of calculations performed to generate summary statistics.

A2.3 Initial Laboratory Data Screening

Upon receipt of water and sediment quality data from the client, a series of standard checks were performed to screen for potential data quality issues. These checks allowed potential re-analysis of samples to verify questionable data, or generate data for missing parameters. Data checks included:

- review field notes provided by client for any potential issues (e.g. sample preservation) related to field data quality;
- verification that data were reported using appropriate units;
- verification that analyses were done with appropriate detection limit;
- verification that field versus laboratory data were similar for parameters with corresponding field and laboratory data (e.g., conductivity); if large discrepancies were present, then laboratory data were considered correct;
- data logic checks: presence of zero values, comparisons of total dissolved solids and conductivity, hardness and alkalinity, total and dissolved phosphorus, total and dissolved organic carbon, total and dissolved metals, dissolved sulphate and dissolved sulphur;
- identification of outliers and non-detectable results with high detection limits;
- review of blank results for evidence of contamination (Section A2.5.2);
- review of duplicate sample results for evidence of unacceptable variation (Section A2.5.3);
- review of laboratory QC data (i.e., holding times); and,
- review of field-collected data for completeness, and unexpected values and trends.

If results of data screening indicated that there were any errors or potential data quality issues, the analytical laboratory was contacted and further clarification of the parameters in question in the affected samples was requested. If data remained questionable based on the above evaluation, data were excluded from further analysis (and identified in the report or appendix tables as excluded, with the corresponding reasons). Non-detectable results with detection limits ten times higher than highest detectable values were also removed from dataset for further analysis. Detection limits are sometimes raised due to dilution during analyses; however, detection limits significantly higher than detectable results warrant further analysis.

A2.4 PAH Lab Blank Correction

Samples were submitted to SGS AXYS of Sidney, BC, for ultra-low detection limit analysis of PAH compounds. Laboratory blank results were used to correct sample results by subtracting the concentration of any analyte detected in the lab blank from the analytical result for that analyte and comparing the residual to 3 times the concentration measured in the associated laboratory blank. Residuals which were not greater than 3 times the concentration in the lab blank were considered non-detect.

A2.5 Quality Control Data Evaluation

A2.5.1 Blanks

Concentrations in surface water quality blanks were considered notable if they were greater than or equal to five times the corresponding detection limit (DL). This threshold is based on the Practical Quantitation Limit defined by the United States Environmental Protection Agency and takes into account the potential for reduced accuracy when concentrations approach or are below DLs (USEPA 2000; AENV 2006). This criterion was not applied to pH, however, because detection limits are not applicable to pH in the deionized water used to prepare field blanks.

The results from field and travel blanks were used to evaluate the water quality data. The validation method using blank samples was based on recommended methods prepared by British Columbia's Ministry of Environment (BCMOE 1998).

For each type of blank sample and for each parameter, detected parameter results were reviewed and the percentage of parameter results above five times their DL calculated. Blank samples were combined in the results summary for the purposes of assessing the overall frequency of blank contamination and to determine the potential influence on the sample results. If potential contamination was found, blank sample results were compared to sample results to determine data validity.

A2.5.2 Duplicate Samples

Differences between concentrations measured in duplicate surface water and groundwater samples were calculated as the relative percent difference (RPD) for each parameter. Before calculating the RPD, concentrations below the DL were replaced with the DL value in cases when only one of the concentrations for a given parameter was detectable. The RPD was calculated using the following formula:

$$RPD = (|difference\ in\ concentration\ between\ two\ of\ the\ duplicate\ samples| / mean\ concentration) \times 100$$

The RPD value for a given parameter was considered notable if:

- it was greater than 20%; and,
- concentrations in both samples were greater than or equal to five times the DL.

The number of parameters with exceedances of the evaluation criteria was compared with the total number of parameters analyzed to evaluate analytical precision. Analytical precision was rated as follows:

- **high**, if less than 10% of the total number of parameters were notably different from one another;
- **moderate**, if 10% to 30% of the total number of parameters were notably different from one another; or,
- **low**, if more than 30% of the total number of parameters were notably different from one another.

A2.5.3 Dissolved to Total Results Comparison

Measured dissolved concentrations in the surface water and groundwater quality data for a number of metals constituents were compared to their corresponding measured total concentrations. Samples were screened by a comparison of values between samples (RPD) and the value relative to the detection limit (DL; greater than 5 x DL). If the dissolved concentration was greater than 30% of the corresponding total concentration, and both (total and dissolved) concentrations were greater than 5 x DL, the dissolved concentration was considered notable.

A2.5.4 Dissolved Sulphate to Dissolved Sulphur Comparison

Measured dissolved sulphate concentrations were compared to corresponding dissolved sulphate concentrations calculated using measured dissolved sulphur concentrations (i.e. the concentration of dissolved sulphate that should be present if 100% of the dissolved sulphur is present as sulphate). Samples were screened by comparison of values between samples (RPD) and the value relative to the detection limit (DL; greater than 5x DL). If the calculated sulphate concentrations had an RPD greater than 40% , and both dissolved sulphate and dissolved sulphur concentrations were greater than 5 x DL, the dissolved sulphate and sulphur concentrations were considered notable. Sulphur and sulphate concentrations were then evaluated to determine which concentration could be erroneous. If this could not be determined, both values were flagged in the dataset for potential error but not invalidated.

A2.5.5 Dissolved Oxygen Comparison

Field measured dissolved oxygen concentrations in surface water and groundwater quality were compared to their corresponding laboratory measured dissolved oxygen concentrations and to dissolved oxygen saturation. Samples were screened by the RPD between field dissolved oxygen and lab dissolved oxygen. Samples with an RPD greater than 50% were flagged and an overall percentage of samples exceeding this value was calculated. The percent saturation for dissolved oxygen was also calculated for each sample based on the field measured temperature. Lab measured O2 concentrations that were greater than 110% saturation were flagged and listed in a table. Sample results greater than saturation can occur when sampling in a turbulent stream, where additional air can be mixed with the sample or if air is introduced while collecting the off-gas from the sample in the lab.

A2.6 Quality Control Results

A2.6.1 Field and Laboratory Data Invalidation

Sampling notes with field observations were provided to Golder to identify potential data quality issues raised from field activities. After reviewing the field note and comparing field results with corresponding laboratory results, several surface water and groundwater results were invalidated and not used for analysis. Details of invalidated results are presented in Table A2-1. No sediment data was invalidated.

Table A2-1: Summary of Invalidated Surface Water Results

Sample Matrix	Sampling Station	Sample Date	Parameter Invalidated	Rationale for Data Invalidation
Surface Water	MINE-T-002	26-Aug-13	All dissolved metals	Wrong preservative used for dissolved metals bottle (sulfuric acid was used instead of nitric acid)
Surface Water	EAGL-001	26-Aug-13	All dissolved metals	
Surface Water	McPL-002	5-Jun-15	TDS	TDS value is inconsistent with field and laboratory conductivity results.
Surface Water	EAGL-001	18-Sep-15	Sulphate	Dissolved sulphate concentration significantly below expected range – improbable result
Surface Water	DALG-002	15-Mar-16	Field conductivity	Field conductivity is inconsistent with laboratory conductivity and TDS results.
Surface Water	McPL-002	15-Mar-16	Field conductivity	Field conductivity was taken when field probe was not stabilized; field conductivity is inconsistent with laboratory conductivity and TDS results.
Surface Water	CHNC-001	16-Mar-16	Field Conductivity	Ice was suspected on the field probe sensor; field conductivity is inconsistent with laboratory conductivity and TDS results.
Surface Water	EAGL-T-003	16-Mar-16	Field Conductivity	
Surface Water	EAGL-001	16-Mar-16	Field Conductivity	
Surface Water	DALG-001	25-Mar-12	Naphthalene	Naphthalene at high concentration in field blank. Result in sample inconsistent with results from same sampling location.
Groundwater	DALG-DP1	22-Sep-16	TDS	TDS value was inconsistent with conductivity result.
Groundwater	DALG-DP2	22-Sep-16	TDS	TDS value was inconsistent with conductivity result.
Groundwater	McPL-DP1	16-Sep-15	TDS	TDS value was inconsistent with conductivity result.
Groundwater	McPL-DP1	22-Jun-16	TDS	TDS value was inconsistent with conductivity result.
Groundwater	McPL-DP2	22-Jun-16	TDS	TDS value was inconsistent with conductivity result.
Groundwater	McPL-DP2	22-Sep-16	TDS	TDS value was inconsistent with conductivity result.
Groundwater	EAGL-DP1	16-Sep-15	Bromide and Sulphate	- Value of 102 mg/L was invalidated as data outlier; all other bromide results were <0.2 mg/L. - Dissolved sulphate concentration significantly below expected range – improbable result

TDS = total dissolved solids.

A2.6.2 Surface Water Quality Field Blanks

Twenty-six discrete blank QC samples (twelve travel blanks and fourteen field blanks) were collected and analyzed for the surface water dataset. All measured parameter concentrations in the blank QC samples were reviewed, especially those where concentrations measured more than or equal to five times the detection limit (i.e., reportable detections). Of all the parameters analyzed from the QC blank samples, reportable detections occurred in 13% of the entire dataset. Concentrations equal to or greater than five times the detection were 1.2% of the entire dataset.

Most notable parameters with results more than five times the detection limits were observed in PAH and alkylated PAH groups. Field blanks collected on March 25, 2012 had the most notable results which were 7% of the total analyzed parameters. Travel blank collected on March 7, 2017 had the most notable results at 3.5% of total analyzed parameters.

The frequency of contamination in the QC blank samples was considered low. As a consequence, all sample results were considered valid and appropriate to use in all data analyses with the following exception:

- A naphthalene concentration of 0.1173 ug/L was measured in the field blank from March 25, 2012. There is one surface water sample (DALG-001) associated with this field blank with a naphthalene concentration (0.0673 ug/L) an order of magnitude higher than other surface water samples from this location. Due to the relatively high concentration of naphthalene in the field blank (15 x the reporting limit), the naphthalene result for DALG-001 cannot be considered reliable.

Results for the discrete water quality field blank samples are provided in Section A3, Tables A3-1 and A3-2.

A2.6.3 Discrete Water Quality Duplicate Samples

Twelve discrete duplicate samples were collected as part of the surface water dataset. One discrete duplicate sample was collected as part of the groundwater dataset. The groundwater field duplicate was collected March 18, 2016 at YOWN-1401. Eight field duplicates were collected during open-water season for surface water samples, three were collected during ice-cover seasons, and one was collected during freshet. Duplicate samples were collected as follows:

- Winter (ice-covered for surface water): stations WHST-003, MINE-001, WHST-004 (surface water) and YOWN-1401 (groundwater);
- Freshet: station WHST-003; and,
- Open-water: stations McPL-001, EAGL-001, DALG-002 (2 samples), WHST-003, McPL-001, EAGL-t-003 and CHNC-001.

Across the dataset of duplicate samples (i.e., thirteen pairs of samples in total), 3.2% of the concentrations differed by more than 20% between duplicate pairs (Table A2-2).

The most notable result of the duplicate sample analysis was for the duplicate pair from DALG-002 collected on September 23, 2014. Thirteen percent of parameter pairs exceed the 20% RPD. The RPD exceedances were mostly for PAH and naphthenic acid compounds. Due to the low detection limits of these compounds, small natural variability between samples can produce large RPDs. Overall, the level of precision for this dataset is rated as high.

Table A2-2: Summary of Relative Percent Difference between Discrete Water Quality Duplicate Samples

Sample Month	Duplicate Pairs	Sample Date	RPD over 20%	
			Number of Parameters	Percent of Parameters
Ice-covered	WHST-003	15-Mar-15	4	2
	MINE-001	16-Mar-16	1	1
	YOWN-1401	18-Mar-16	4	3
	WHST-004	7-Mar-17	4	4
Freshet	WHST-003	6-Jun-15	6	3
Open-water	McPL-001	29-Jul-13	1	0.4
	EAGL-001	23-Jul-14	9	4
	DALG-002	23-Sep-14	32	13
	McPL-001	19-Sep-15	3	2
	CHNC-001	21-Jun-16	6	3
	CHNC-001	20-Sep-16	1	1
	DALG-002	27-Jun-17	1	0.9
	EAGL-t-003	20-Sep-17	4	4
All duplicate pairs (total)			72	3.2

RPD = relative percent difference; % = percent.

Results for the discrete water quality duplicate samples are provided in Section A3, Table A3-3 and A3-4.

Three duplicate samples were also collected for isotopic analysis and two for dissolved gas analysis, which is 3 and 2% of their respective datasets. The results of the duplicate analysis are shown in Table A2-3. All RPDs for isotopic analysis were below the data quality objective of 20% and showed very little variability between sample and duplicate (less than 10% RPD). Dissolved gas samples showed a high degree of variability between sample and duplicate suggesting either high degree of natural variability or that samples were contaminated during or after sample collected by atmospheric gases or were altered after sampling by bacteriological processes. This variability is likely to affect the data interpretation. Results for the duplicate samples are provided in Table A2-3.

Table A2-3: Duplicate Sample Analysis for Isotope and Dissolved Gas Samples

Sample ID	2017093	2017094	RPD (%)	2015137	2015138	RPD (%)	2016021	2016022	RPD (%)
Station Code	DALG-002			MCPL-001			MINE-001		
Sampling Date	27-Jun-17	27-Jun-17		19-Sep-15	19-Sep-15		16-Mar-16	16-Mar-16	
δ ¹⁸ O _{water} (‰)	-20.7	-20.8	0.3	-21.3	-21.2	0.3	-21.3	-21.4	0.3
δ ² H _{water} (‰)	-164.6	-164.9	0.2	-163.9	-163.2	0.4	-167.1	-168.7	0.9
δ ¹³ C-DIC (‰)	-13.0	-13.0	0.1	-16.5	-16.2	2.1	-10.6	-10.9	2.5
δ ³⁴ S-SO ₄ (‰)	-10.7	-10.3	3.6	-5.9	-5.9	0.7	-8.7	-8.7	0.1
δ ¹⁸ O-SO ₄ (‰)	-15.1	-13.9	8.6	-8.7	-9.6	9.3	-11.1	-10.6	4.5
CH ₄ (mg/L)	-	-	-	0.0046	0.004	6.5	0.010	0.002	139.2
C ₂ (mg/L)	-	-	-	0.0	0.0	n/a	0.0	0.0	n/a
C ₃ (mg/L)	-	-	-	0.0	0.0	n/a	0.0	0.0	n/a

Table A2-3: Duplicate Sample Analysis for Isotope and Dissolved Gas Samples

Sample ID	2017093	2017094	RPD (%)	2015137	2015138	RPD (%)	2016021	2016022	RPD (%)
Station Code	DALG-002			MCPL-001			MINE-001		
Sampling Date	27-Jun-17	27-Jun-17		19-Sep-15	19-Sep-15		16-Mar-16	16-Mar-16	
CO ₂ (mg/L)	-	-	-	4.8	5.3	10.1	8.0	7.9	1.1
N ₂ (mg/L)	-	-	-	45.8	20.5	76.2	22.6	28.8	24.3
O ₂ (mg/L)	-	-	-	18.2	11.2	47.7	9.3	11.4	20.0

A2.6.4 Dissolved to Total Results Comparison

For the discrete surface water and groundwater quality dataset, 0.7% and 4.0% of the dissolved metals parameter concentrations were considered notable, respectively; that is, they were more than 30% higher than their corresponding total metals concentration. Of these parameters, 3.8% of the dissolved organic carbon concentrations were higher than their TOC concentrations, and 5.0% of the dissolved phosphorus were higher than their corresponding total concentrations. The overall level of precision for surface water and groundwater dataset is, therefore, rated as high.

A2.6.5 Dissolved Oxygen Comparison

For the surface water and groundwater dissolved gas dataset, 29% of the lab measured dissolved oxygen concentrations had greater than 50% RPD when compared to field measured dissolved oxygen, suggesting poor agreement between these parameters. 15% of gas samples also had a lab measured dissolved oxygen concentration that exceeded 110% of dissolved oxygen saturation at the field sample temperature. Samples that exceeded 110% saturation are listed in Table A2-4 and have been invalidated. Invalidated values are flagged in results tables (Table B-1 and Table C-1) and are not included in analysis.

Table A2-4: Samples with Dissolved Oxygen Exceeded 110% Saturation and have been Invalidated

Sample Location	Sample Date	Field Temp (°C)	Field Dissolved Oxygen (mg/L)	Dissolved Oxygen Lab (mg/L)	Lab Dissolved Oxygen Saturation (%)
EAGL-t-003	18-Sep-2015	3.2	12.53	15.0	111
WHST-001	05-Jun-2015	9.2	10.84	13.5	117
EAGL-t-003	21-Jun-2016	16.7	8.99	12.1	125
McPL-001	19-Sep-2015	2.1	12.32	18.2	132
CHNC-001	27-Jun-2017	16.4	8.18	13.7	139
DALG-002	27-Jun-2017	8.9	10.92	16.7	144
MINE-001	20-Sep-2017	5.6	11.84	18.4	149
WHST-004	18-Sep-2015	3.7	12.18	19.9	152
EAGL-t-002	20-Sep-2017	2.8	12.43	24.8	184
WHST-004	27-Jun-2017	14.2	9.13	20.0	194
DALG-002	06-Jun-2015	11	10.61	21.8	199
EAGL-t-003	20-Sep-2017	5.6	11.9	38.0	306

A3.0 DETAILED RESULTS TABLES

Table A3-1: Surface Water Quality Field Blank Results from the Eagle Plain Project, 2012 – 2017

Parameter	Units	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank
		3/25/2012	7/29/2013	8/26/2013	7/22/2014	7/23/2014	9/21/2014	3/14/2015	6/5/2015	9/18/2015	3/16/2016	6/21/2016	9/20/2016	3/7/2017	6/27/2017
WQTC02-Conventional Parameters															
pH	-	5.5	5.4	5.8	5.5	5.6	5.7	5.7	6.5	5.4	6.9	5.9	6.0	5.79	5.98
Specific conductivity	µS/cm	<2	<1	<1	<2	<2	<2	<2	<1	<1	2	<1	<1	<1	<1
Hardness, as CaCO ₃	mg/L	<0.4	<5	<5	<0.1	<0.1	<0.1	<0.1	<5	<5	<5	<5	<5	<5	<5
Total alkalinity, as CaCO ₃	mg/L	<0.5	<5	<5	<1	<1	<1	<1	<5	<5	<5	<5	<5	<5	<5
Alkalinity, Phenolphthalein as CaCO ₃	mg/L	-	-	<5	<1	<1	<1	<1	<5	<5	<5	<5	<5	<5	<5
Total dissolved solids	mg/L	„(a)	10	<5	<10	<10	<10	<10	<5	<5	<5	20	<5	12	42
Total suspended solids	mg/L	<5	<2	<2	<1	<1	<1	<2	<3	<3	<2	<2	<2	<2	<2
Total organic carbon	mg/L	-	-	-	-	-	2.0	<0.5	<0.5	<0.5	0.5	0.8	<0.5	0.6	1.1
Total inorganic carbon	mg/L	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	0.8	<0.5
Dissolved organic carbon	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	1.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2
Dissolved inorganic carbon	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	0.5	<0.5	<0.5	0.7	<0.5
Turbidity	NTU	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
WQTC03-Major Ions															
Bicarbonate, as CaCO ₃	mg/L	-	<5	<5	<1	<1	<1	<1	<5	<5	<5	<5	<5	<5	<5
Bromide	mg/L	-	-	-	<0.1	<0.1	<0.1	<0.1	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Calcium	mg/L	-	0.13	<0.1	<0.04	<0.04	<0.04	<0.04	<0.1	<0.1	<0.1	<0.1	0.06	0.05	0.05
Carbonate, as CaCO ₃	mg/L	-	<6	<6	<1	<1	<1	<1	<6	<6	<6	<6	<6	<6	<6
Chloride	mg/L	<0.1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.05	0.06	<0.05	0.07	<0.05	<0.05	<0.05
Fluoride	mg/L	<0.01	-	-	-	-	-	-	-	-	-	-	-		
Hydroxide, as CaCO ₃	mg/L	-	<5	<5	<1	<1	<1	<1	<5	<5	<5	<5	<5	<5	<5
Magnesium	mg/L	-	<0.1	<0.1	<0.005	<0.005	<0.005	<0.005	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.02
Potassium	mg/L	-	0.1	<0.1	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.1	<0.04	<0.04	<0.04
Sodium	mg/L	-	0.9	0.1	<0.01	<0.01	0.012	0.021	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sulphate	mg/L	<0.5	<0.5	<0.5	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	<0.1

Table A3-1: Surface Water Quality Field Blank Results from the Eagle Plain Project, 2012 – 2017

Parameter	Units	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank
		3/25/2012	7/29/2013	8/26/2013	7/22/2014	7/23/2014	9/21/2014	3/14/2015	6/5/2015	9/18/2015	3/16/2016	6/21/2016	9/20/2016	3/7/2017	6/27/2017
WQTC04-Nutrients and Chlorophyll a															
Nitrate	mg-N/L	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nitrite	mg-N/L	<0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	0.03	0.02	<0.01	<0.01	<0.01
Nitrate + nitrite	mg-N/L	<0.002	-	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-		
Total ammonia	mg-N/L	<0.002	0.03	0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.01	<0.01	0.01	0.02	<0.01	<0.01
Total nitrogen	mg-N/L	-	-	-	<0.05	<0.05	0.08	<0.05	<0.06	0.3	0.44	<0.06	0.09	0.21	<0.06
Total kjeldahl nitrogen	mg-N/L	-	-	-	<0.05	<0.05	0.08	<0.05	-	-	-	-	-		
Total phosphorus	mg-P/L	-	<0.003	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-		
Dissolved phosphorus	mg-P/L	-	-	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-		
Phosphorus (as phosphate)	mg-P/L	<0.002	<0.003	<0.003	0.002	<0.002	<0.002	<0.002	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
WQTC06-Total Metals															
Aluminum	µg/L	32.3	<5	6	1	1	<1	<1	<5	<5	<5	2	20	1	2
Antimony	µg/L	<0.05	<0.1	<0.2	<0.05	<0.05	<0.05	<0.05	<0.1	<0.2	<0.2	<0.02	<0.02	<0.02	<0.02
Arsenic	µg/L	<0.1	<0.05	<2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1
Barium	µg/L	0.59	0.23	<1	<0.1	<0.1	<0.1	<0.1	0.09	<1	<1	<0.1	<0.1	0.3	<0.1
Beryllium	µg/L	<0.002	<0.05	<0.04	<0.01	<0.01	<0.01	<0.01	<0.05	<0.04	<0.05	<0.05	<0.05	<0.05	<0.05
Bismuth	µg/L	0.15	<0.1	<1	<0.01	<0.01	<0.01	<0.01	<0.1	<1	<1	<0.1	<0.1	<0.1	<0.1
Boron	µg/L	-	<2	60	<1	<1	<1	3	3	<5	<4	<2	<2	<2	<2
Cadmium	µg/L	<0.01	<0.01	0.01	<0.002	<0.002	<0.002	<0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Calcium	µg/L	-	130	60	<40	<40	<40	<40	<50	<50	<50	<50	<10	83	10
Chromium	µg/L	<0.2	<0.5	<0.4	<0.1	<0.1	<0.1	<0.1	<0.5	<0.4	<0.4	<0.05	<0.05	<0.05	<0.05
Cobalt	µg/L	0.025	<0.1	<0.02	<0.005	<0.005	<0.005	<0.005	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	µg/L	4.1	0.2	<1	<0.1	<0.1	<0.1	<0.1	0.6	<1	<1	<0.2	<0.2	<0.2	<0.2
Iron	µg/L	-	22	<10	<2	<2	<2	<2	3	<10	<10	2	<2	6	<2
Lead	µg/L	0.1	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
Lithium	µg/L	<0.05	<0.5	<1	<0.05	<0.05	<0.05	<0.05	<0.5	<1	<1	<0.5	<0.5	<0.5	<0.5
Magnesium	µg/L	-	<40	<50	<5	<5	<5	<5	<40	<50	<50	<50	<20	<20	<20
Manganese	µg/L	1.55	<1	<5	<0.05	<0.05	<0.05	<0.05	<1	<5	<1	<1	<1	<1	<1
Mercury	µg/L	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Molybdenum	µg/L	0.22	<0.05	<0.1	<0.01	<0.01	<0.01	0.03	<0.05	<0.1	<0.1	<0.02	<0.02	<0.02	<0.02
Nickel	µg/L	0.3	<0.2	<10	<0.02	<0.02	<0.02	<0.02	<0.2	<1	<1	1	<0.2	<0.2	<0.2

Table A3-1: Surface Water Quality Field Blank Results from the Eagle Plain Project, 2012 – 2017

Parameter	Units	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank
		3/25/2012	7/29/2013	8/26/2013	7/22/2014	7/23/2014	9/21/2014	3/14/2015	6/5/2015	9/18/2015	3/16/2016	6/21/2016	9/20/2016	3/7/2017	6/27/2017
WQTC06-Total Metals (cont'd)															
Potassium	µg/L	-	<100	<100	<10	<10	<10	<10	<100	<100	<100	<100	<40	<40	<40
Selenium	µg/L	<0.2	<0.1	<6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.6	<0.6	<0.2	<0.2	<0.2	<0.2
Silicon	µg/L	-	40	<50	<50	<50	<50	<50	<20	<50	<50	<50	<5	<5	<5
Silver	µg/L	<0.02	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
Sodium	µg/L	-	800	110	<10	<10	<10	<10	<100	<20	<20	<20	159	150	<100
Strontium	µg/L	4.51	0.4	<1	<0.1	0.1	<0.1	<0.1	<0.1	<1	<1	<0.1	<0.1	<0.1	<0.1
Sulphur	µg/L	-	-	<100	600	<500	<500	<500	-	<100	<100	<100	<20	40	<20
Tellurium	µg/L	-	-	<0.1	<0.05	<0.05	<0.05	<0.05	-	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05
Thallium	µg/L	0.005	<0.01	<0.01	<0.004	<0.004	<0.004	<0.004	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thorium	µg/L	-	<0.01	<4	<0.01	<0.01	<0.01	<0.01	<0.01	<0.4	0.5	<0.05	<0.05	0.052	<0.05
Tin	µg/L	0.19	<0.1	<0.1	<0.05	<0.05	0.07	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Titanium	µg/L	-	<0.5	<1	<0.2	<0.2	<0.2	<0.2	<0.5	<1	<1	<1	<2	<2	<2
Uranium	µg/L	0.007	<0.01	<4	<0.001	<0.001	<0.001	<0.001	<0.01	<0.4	<0.4	<0.01	<0.01	<0.01	<0.01
Vanadium	µg/L	0.17	0.2	<1	0.2	<0.2	<0.2	<0.2	<0.1	0.2	<0.1	<0.05	<0.05	<0.05	<0.05
Zinc	µg/L	6.5	<0.5	<10	<1	<1	<1	<1	0.7	<1	2	<0.5	<0.5	<0.5	<0.5
Zirconium	µg/L	-	<0.5	<1	<0.01	<0.01	<0.01	<0.01	<0.5	<0.1	0.1	<0.1	<0.1	<0.1	<0.1
WQTC07-Dissolved Metals															
Aluminum	µg/L	0.5	<5	<5	1	2	<1	<1	<5	<5	<5	<5	<10	<1	<1
Antimony	µg/L	<0.05	<0.2	<0.2	<0.05	<0.05	<0.05	0.06	<0.2	<0.2	<0.2	<0.2	<0.2	<0.02	<0.02
Arsenic	µg/L	<0.1	<0.2	<0.2	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.2	<0.2	<1	<0.1	<0.1
Barium	µg/L	0.04	<1	<1	<0.1	<0.1	<0.1	<0.1	<1	<1	<1	<1	<1	0.1	<0.1
Beryllium	µg/L	0.002	<0.04	<0.04	<0.01	<0.01	<0.01	<0.01	<0.04	<0.04	<0.04	<0.04	<0.5	<0.05	<0.05
Bismuth	µg/L	<0.02	<1	<1	<0.01	<0.01	<0.01	<0.01	<1	<1	<1	<1	<1	<0.1	<0.1
Boron	µg/L	-	<4	<40	<1	<1	<1	<1	<4	<4	<4	<4	<20	<2	<2
Cadmium	µg/L	<0.01	<0.01	0.01	<0.002	<0.002	<0.002	<0.002	<0.01	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01
Chromium	µg/L	<0.2	<0.4	<4	<0.1	<0.1	<0.1	<0.1	<0.4	<0.4	<0.4	<0.4	<0.5	0.054	0.098
Cobalt	µg/L	<0.005	<0.02	<0.02	<0.005	<0.005	<0.005	<0.005	<0.02	<0.02	<0.02	<0.02	<0.2	<0.02	<0.02
Copper	µg/L	0.08	<1	<1	<0.1	<0.1	<0.1	0.1	<1	<1	<1	<0.2	<5	<0.5	<0.5
Iron	µg/L	-	<5	<5	<2	<2	<2	<2	<5	<5	<5	<5	<20	3	<2
Lead	µg/L	<0.01	<0.1	<1	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.01	<0.01

Table A3-1: Surface Water Quality Field Blank Results from the Eagle Plain Project, 2012 – 2017

Parameter	Units	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank
		3/25/2012	7/29/2013	8/26/2013	7/22/2014	7/23/2014	9/21/2014	3/14/2015	6/5/2015	9/18/2015	3/16/2016	6/21/2016	9/20/2016	3/7/2017	6/27/2017
WQTC07-Dissolved Metals (cont'd)															
Lithium	µg/L	<0.05	<1	<1	<0.05	<0.05	<0.05	<0.05	<1	<1	<1	<1	<5	<0.5	<0.5
Manganese	µg/L	0.01	<1	<1	<0.05	0.06	<0.05	<0.05	<1	<1	<1	<1	<10	<1	<1
Mercury	µg/L	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Molybdenum	µg/L	0.14	<0.1	<0.1	<0.01	<0.01	<0.01	0.01	<0.1	<0.1	<0.1	<0.1	<0.2	0.034	<0.02
Nickel	µg/L	<0.05	<1	<10	<0.02	<0.02	<0.02	<0.02	<1	<1	<1	<1	<2	<0.2	<0.2
Selenium	µg/L	<0.2	<0.6	<6	<0.1	<0.1	<0.1	<0.1	<0.6	<0.6	<0.6	<0.6	<2	<0.2	<0.2
Silicon	µg/L	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<5	<5	<5
Silver	µg/L	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	0.029	<0.01
Strontium	µg/L	0.219	<1	<1	0.1	0.2	<0.1	0.1	<1	<1	<1	<1	<1	0.1	0.1
Sulphur	µg/L	-	<200	<200	<500	<500	<500	<500	<200	<200	<200	<200	<20	80	50
Tellurium	µg/L	-	-	<0.1	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.5	<0.05	<0.05
Thallium	µg/L	<0.002	<0.01	<0.1	<0.004	<0.004	<0.004	<0.004	<0.01	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01
Thorium	µg/L	-	<0.4	<4	<0.01	<0.01	<0.01	<0.01	<0.4	<0.4	<0.4	<0.4	<0.5	<0.05	<0.05
Tin	µg/L	0.06	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1
Titanium	µg/L	-	<10	<10	<0.2	<0.2	<0.2	<0.2	<10	<10	<10	<10	<2	<2	<2
Uranium	µg/L	<0.002	<0.4	<4	<0.001	<0.001	0.001	<0.001	<0.4	<0.4	<0.4	<0.4	<0.1	<0.01	<0.01
Vanadium	µg/L	<0.05	<0.1	<1	<0.2	<0.2	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5	<0.05	<0.05
Zinc	µg/L	0.5	<1	1	1	1	<1	<1	<1	<1	<1	<0.5	<5	<0.5	<0.5
Zirconium	µg/L	-	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1
WQTC08-Volatile Organics															
Benzene	µg/L	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	µg/L	-	-	-	-	-	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	µg/L	-	-	-	-	-	<1	<1	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylenes	µg/L	-	-	-	-	-	<2	<2	1.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Styrene	µg/L	-	-	-	-	-	-	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Volatile Hydrocarbons	µg/L	-	-	-	-	-	<100	<100	<50	<50	<50	<50	<50	<50	<50
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	-	-	<100	<100	<50	<50	<50	<50	<50	<50	<50
Methyl tert-Butyl Ether	µg/L	-	-	-	-	-	-	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Table A3-1: Surface Water Quality Field Blank Results from the Eagle Plain Project, 2012 – 2017

Parameter	Units	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank
		3/25/2012	7/29/2013	8/26/2013	7/22/2014	7/23/2014	9/21/2014	3/14/2015	6/5/2015	9/18/2015	3/16/2016	6/21/2016	9/20/2016	3/7/2017	6/27/2017
WQTC09-Parent PAHs															
Naphthalene	µg/L	0.11732	<0.00531	0.00272	<0.00354	<0.00354	<0.00564	<0.00447	<0.00765	0.01445	<0.00414	-	-	-	-
Acenaphthylene	µg/L	0.000289	<0.0000457	<0.000144	<0.000075	<0.0000867	<0.000119	<0.000284	<0.000115	<0.000307	<0.000176	-	-	-	-
Biphenyl	µg/L	<0.00348	<0.002463	0.000648	<0.002241	<0.002241	<0.001836	<0.001866	<0.00468	<0.001191	<0.001449	-	-	-	-
Acenaphthene	µg/L	<0.00324	<0.000291	<0.00025	<0.000346	<0.000225	0.000526	<0.000296	<0.00022	<0.000421	<0.000221	-	-	-	-
Fluorene	µg/L	<0.000982	<0.000244	<0.000143	<0.000255	<0.000255	0.000212	0.000135	<0.000246	<0.000314	<0.000318	-	-	-	-
Phenanthrene	µg/L	0.004424	<0.00198	0.000853	<0.002607	<0.002607	<0.002298	<0.002328	<0.0033	<0.001986	<0.00318	-	-	-	-
Anthracene	µg/L	0.000217	<0.00031	<0.000125	<0.000153	<0.000153	<0.0000546	<0.000141	<0.0000899	<0.000134	<0.0000822	-	-	-	-
Dibenzothiophene	µg/L	<0.002904	<0.00084	0.000242	<0.00048	<0.00048	0.000081	<0.000193	<0.0000841	<0.000416	<0.000321	-	-	-	-
Pyrene	µg/L	<0.000432	<0.000912	0.000314	<0.000573	<0.000573	<0.001383	<0.001077	<0.001467	<0.000747	<0.000711	-	-	-	-
Fluoranthene	µg/L	<0.000347	<0.001215	0.000347	<0.001149	<0.001149	<0.001752	<0.001263	<0.001131	<0.001077	<0.001101	-	-	-	-
Benzo(a)anthracene	µg/L	<0.000219	<0.000096	<0.000071	<0.00012	<0.00012	<0.000495	<0.000186	<0.00111	<0.0000479	<0.000129	-	-	-	-
Chrysene	µg/L	<0.000306	<0.000345	0.000139	<0.000303	<0.000303	<0.000747	<0.00063	<0.000429	<0.000393	<0.000285	-	-	-	-
1-Methyl-7-isopropyl-phenanthrene (Retene)	µg/L	<0.00023	<0.000741	<0.000166	<0.000744	<0.000744	<0.000251	<0.000306	<0.00021	<0.000467	<0.000429	-	-	-	-
Benzo(b)fluoranthene	µg/L	<0.000117	<0.000103	<0.0000884	<0.0000423	<0.0000878	<0.001131	<0.000103	<0.000157	<0.000188	<0.0000673	-	-	-	-
Benzo(b,j,k)fluoranthenes	µg/L	<0.000117	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(j,k)fluoranthenes	µg/L	<0.000134	<0.000121	<0.000121	<0.000043	<0.0000937	<0.000166	<0.00011	<0.000155	<0.000206	<0.0000688	-	-	-	-
Benzo(a)pyrene	µg/L	<0.000192	<0.000171	<0.000177	<0.0000589	<0.000126	<0.000246	<0.000155	<0.000238	<0.000291	<0.000101	-	-	-	-
Benzo(e)pyrene	µg/L	<0.000165	<0.000156	<0.000161	<0.0000604	<0.000129	<0.00024	<0.000156	<0.00024	<0.000291	<0.000102	-	-	-	-
Perylene	µg/L	<0.000201	<0.000191	<0.000228	<0.0000676	<0.000141	<0.000261	<0.000163	<0.000246	<0.000318	<0.000106	-	-	-	-
Benzo(g,h,i)perylene	µg/L	<0.000627	<0.0000503	0.000164	<0.0000959	<0.0000974	<0.000347	<0.00016	<0.000504	<0.000124	<0.000255	-	-	-	-
Indeno(c,d-123)pyrene	µg/L	<0.000561	<0.0000484	<0.000126	<0.0000998	<0.000104	<0.000444	<0.000196	<0.000198	<0.000285	<0.000309	-	-	-	-
Dibenzo(a,h)anthracene	µg/L	<0.000133	<0.000111	<0.0000913	<0.0000709	<0.000129	<0.000588	<0.00034	<0.00025	<0.00027	<0.000103	-	-	-	-
WQTC10-Alkylated PAHs															
7-Methylbenzo[a]pyrene	µg/L	<0.000205	<0.000142	<0.000181	<0.000102	<0.000105	<0.000512	<0.000188	<0.000257	<0.000392	<0.000142	-	-	-	-
2-Methylantracene	µg/L	<0.00617	<0.000155	<0.00035	<0.0000942	0.000134	<0.00016	<0.000283	<0.000164	<0.000305	<0.00017	-	-	-	-
C1 substituted acenaphthenes	µg/L	<0.000188	<0.0000958	<0.000218	<0.00036	<0.000166	<0.00019	<0.000391	<0.000308	<0.000323	<0.000398	-	-	-	-
C1 substituted benzo(a)anthracenes / chrysenes	µg/L	<0.000261	<0.0000792	0.000092	<0.0000478	<0.0000277	0.000084	<0.000136	0.000123	<0.0000725	<0.000062	-	-	-	-
C2 substituted benzo(a)anthracenes / chrysenes	µg/L	<0.00072	<0.00102	0.000203	<0.0000641	<0.00005	<0.000438	<0.000211	<0.0000876	<0.000213	<0.0000738	-	-	-	-
C3 substituted benzo(a)anthracenes / chrysenes	µg/L	0.000144	<0.001092	0.00034	<0.000537	<0.000537	<0.000159	<0.000122	0.000234	<0.000221	<0.0000738	-	-	-	-
C4 substituted benzo(a)anthracenes / chrysenes	µg/L	<0.000129	0.000112	0.000234	<0.0000755	<0.0000762	<0.0002	<0.000109	<0.000414	<0.000182	<0.0000864	-	-	-	-

Table A3-1: Surface Water Quality Field Blank Results from the Eagle Plain Project, 2012 – 2017

Parameter	Units	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank
		3/25/2012	7/29/2013	8/26/2013	7/22/2014	7/23/2014	9/21/2014	3/14/2015	6/5/2015	9/18/2015	3/16/2016	6/21/2016	9/20/2016	3/7/2017	6/27/2017
WQTC10-Alkylated PAHs (cont'd)															
C1 substituted benzofluoranthenes / benzopyrenes	µg/L	<0.001434	<0.001062	0.000409	<0.000663	<0.000663	<0.000512	<0.000188	0.000422	<0.000392	<0.000142	-	-	-	-
C2 substituted benzofluoranthenes / benzopyrenes	µg/L	<0.000187	<0.002082	0.000201	<0.001392	<0.001392	<0.000235	<0.0002	<0.000456	<0.000227	<0.000124	-	-	-	-
C1 substituted biphenyls	µg/L	<0.02457	<0.0024	0.00149	<0.00927	<0.00927	<0.00375	<0.00384	<0.001857	<0.000936	<0.00645	-	-	-	-
C2 substituted biphenyls	µg/L	<0.2325	<0.01035	0.00415	<0.0414	<0.0414	<0.01707	<0.01635	<0.0033	0.000621	<0.02328	-	-	-	-
5,9-Dimethylchrysene	µg/L	<0.0000846	<0.0000717	<0.0000787	<0.0000641	<0.00005	<0.000134	<0.000211	<0.0000876	<0.000213	<0.0000738	-	-	-	-
5/6-Methylchrysenes	µg/L	<0.0000593	<0.0000829	<0.000047	<0.0000494	<0.0000286	<0.0000774	<0.00014	<0.000064	<0.0000753	<0.0000629	-	-	-	-
1-Methylchrysene	µg/L	<0.0000627	<0.0000759	<0.0000431	<0.0000464	0.000029	<0.0000746	<0.000132	<0.0000603	<0.00007	<0.0000612	-	-	-	-
2,4-Dimethyldibenzothiophene	µg/L	<0.000171	<0.0000866	<0.000178	<0.00023	<0.000161	<0.000137	<0.000257	<0.0000979	<0.000576	<0.000189	-	-	-	-
2/3-Methyldibenzothiophenes	µg/L	0.000217	<0.000101	<0.000203	<0.000207	<0.000207	<0.000094	<0.000259	<0.000143	<0.000283	<0.000147	-	-	-	-
C1 substituted dibenzothiophenes	µg/L	<0.000104	<0.000101	<0.000203	<0.000121	<0.0000913	<0.000094	<0.000259	<0.000143	<0.000283	<0.000147	-	-	-	-
C2 substituted dibenzothiophenes	µg/L	<0.001866	<0.002364	0.000948	<0.000555	<0.000555	<0.002103	<0.000257	0.000442	<0.000576	<0.000189	-	-	-	-
C3 substituted dibenzothiophenes	µg/L	0.002662	<0.00432	0.00111	<0.001056	<0.001056	<0.001377	<0.000193	0.000391	<0.001185	<0.001161	-	-	-	-
C4 substituted dibenzothiophenes	µg/L	<0.00351	<0.002262	0.00118	<0.001017	<0.001017	<0.002763	<0.00135	<0.002319	<0.001938	<0.001032	-	-	-	-
C1 substituted fluoranthenes / pyrenes	µg/L	<0.001737	<0.001275	<0.000341	<0.00108	<0.00108	<0.001653	<0.000348	<0.000708	<0.000148	<0.000132	-	-	-	-
C2 substituted fluoranthenes / pyrenes	µg/L	<0.001935	<0.0033	0.000354	<0.000106	<0.000132	<0.00207	<0.000218	0.000266	<0.000373	<0.000109	-	-	-	-
C3 substituted fluoranthenes / pyrenes	µg/L	<0.002334	<0.001221	0.000197	<0.000423	<0.000423	<0.000846	<0.000239	<0.00012	<0.000169	<0.0000983	-	-	-	-
C4 substituted fluoranthenes / pyrenes	µg/L	0.000434	<0.000822	0.000263	<0.0000599	<0.0000816	0.000219	<0.000185	<0.0000898	<0.000141	<0.0000853	-	-	-	-
3-Methylfluoranthene / benzo(a)fluorene	µg/L	<0.000495	<0.000138	<0.000341	<0.000504	<0.000504	<0.000245	<0.000348	<0.000588	<0.000148	<0.000132	-	-	-	-
1,7-Dimethylfluorene	µg/L	<0.000327	<0.000224	<0.000229	<0.000267	<0.000211	<0.000202	<0.000285	<0.000159	<0.000814	<0.000125	-	-	-	-
2-Methylfluorene	µg/L	<0.0005	<0.000131	<0.000439	<0.000116	<0.00012	<0.000192	<0.000549	<0.000185	<0.000238	<0.000124	-	-	-	-
C1 substituted fluorenes	µg/L	<0.00798	<0.0021	0.00253	<0.001029	<0.001029	<0.001497	<0.000549	0.00165	0.000733	<0.001491	-	-	-	-
C2 substituted fluorenes	µg/L	0.005144	<0.001899	0.000689	<0.000939	<0.000939	<0.000202	<0.000285	0.00106	<0.000814	0.000678	-	-	-	-
C3 substituted fluorenes	µg/L	0.00999	<0.01116	0.00163	<0.0039	<0.0039	<0.002589	<0.000558	<0.00534	0.000858	0.000693	-	-	-	-
1,2-Dimethylnaphthalene	µg/L	<0.00124	<0.000267	0.000766	<0.001188	<0.001188	<0.00122	<0.00147	<0.000479	<0.00202	<0.000456	-	-	-	-
1,4,6,7-Tetramethylnaphthalene	µg/L	<0.01746	<0.00013	0.000233	<0.00024	<0.000221	<0.000146	<0.000191	<0.000161	<0.000476	<0.000169	-	-	-	-
2,3,5-Trimethylnaphthalene	µg/L	0.000661	<0.000552	<0.000208	<0.000465	<0.000465	<0.000489	<0.000222	0.000412	<0.000454	<0.000236	-	-	-	-
2,3,6-Trimethylnaphthalene	µg/L	0.00114	<0.000456	<0.000209	<0.000597	<0.000597	<0.000756	<0.000205	<0.000972	<0.000415	<0.000217	-	-	-	-
2,6-Dimethylnaphthalene	µg/L	<0.00206	<0.000309	0.000206	<0.000357	<0.000395	<0.000327	<0.00124	<0.000405	<0.00171	<0.000387	-	-	-	-
1-Methylnaphthalene	µg/L	0.004585	<0.001071	0.000541	<0.000849	<0.000849	<0.001674	<0.001425	<0.001656	<0.002328	<0.001335	-	-	-	-
2-Methylnaphthalene	µg/L	0.007016	<0.00225	0.00102	<0.001812	<0.001812	<0.01176	<0.00648	<0.00939	<0.00675	<0.00813	-	-	-	-

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Parameter	Units	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank
		3/25/2012	7/29/2013	8/26/2013	7/22/2014	7/23/2014	9/21/2014	3/14/2015	6/5/2015	9/18/2015	3/16/2016	6/21/2016	9/20/2016	3/7/2017	6/27/2017
WQTC10-Alkylated PAHs (cont'd)															
C1 substituted naphthalenes	µg/L	0.01158	<0.00333	0.00156	<0.002661	<0.002661	<0.01344	<0.00792	<0.00939	<0.00906	<0.00945	-	-	-	-
C2 substituted naphthalenes	µg/L	0.01073	<0.00951	0.00328	<0.00642	<0.00642	<0.01377	<0.00732	<0.01257	<0.00756	<0.01314	-	-	-	-
C3 substituted naphthalenes	µg/L	0.01996	<0.00528	0.00148	<0.00372	<0.00372	<0.00663	0.000273	<0.00582	<0.001614	<0.002967	-	-	-	-
C4 substituted naphthalenes	µg/L	<0.01116	<0.002556	0.0015	<0.00024	<0.000221	<0.002802	<0.000191	<0.000161	<0.00573	<0.001623	-	-	-	-
1,2,6-Trimethylphenanthrene	µg/L	<0.000157	<0.000106	<0.000122	<0.0000355	<0.0000294	<0.0000838	<0.000134	<0.0000646	<0.000136	<0.0000713	-	-	-	-
1,7-Dimethylphenanthrene	µg/L	<0.000103	<0.000127	0.000168	<0.000249	<0.000249	<0.000261	<0.000359	<0.0000549	<0.000152	<0.000219	-	-	-	-
1,8-Dimethylphenanthrene	µg/L	<0.0000944	<0.000128	0.000067	<0.000144	<0.0000333	<0.0000554	<0.000365	<0.0000558	<0.000154	<0.0000407	-	-	-	-
2,6-Dimethylphenanthrene	µg/L	<0.000139	<0.000128	0.000053	<0.000315	<0.000315	<0.000144	<0.000365	<0.000175	<0.000154	<0.000144	-	-	-	-
3,6-Dimethylphenanthrene	µg/L	0.00225	<0.000129	0.000062	<0.000146	<0.000037	<0.000159	<0.000371	<0.0000567	<0.000155	<0.0000409	-	-	-	-
2-Methylphenanthrene	µg/L	0.000483	<0.000147	<0.000333	<0.000378	<0.000378	<0.00016	<0.000274	<0.000159	<0.000289	<0.000702	-	-	-	-
3-Methylphenanthrene	µg/L	<0.000788	<0.00015	<0.000339	<0.0000946	<0.000126	<0.00016	<0.000276	<0.00016	<0.000294	<0.000504	-	-	-	-
9/4-Methylphenanthrene	µg/L	<0.000277	<0.00015	<0.000339	<0.000099	<0.00009	<0.00016	<0.000276	<0.00016	<0.000294	<0.000167	-	-	-	-
1-Methylphenanthrene	µg/L	<0.000347	<0.000148	<0.000334	<0.000372	<0.000372	<0.000161	<0.00027	<0.000157	<0.000289	<0.000441	-	-	-	-
C1 substituted phenanthrenes / anthracenes	µg/L	0.000483	<0.000148	<0.000334	<0.000372	<0.000372	<0.000161	<0.00027	<0.000157	<0.000289	<0.001647	-	-	-	-
C2 substituted phenanthrenes / anthracenes	µg/L	0.002625	<0.002049	0.000675	<0.001182	<0.001182	<0.000981	<0.000365	0.000431	0.0011	<0.000978	-	-	-	-
C3 substituted phenanthrenes / anthracenes	µg/L	<0.000918	<0.002682	0.000441	<0.00114	<0.00114	<0.000339	<0.000134	<0.000576	<0.000136	0.000086	-	-	-	-
C4 substituted phenanthrenes / anthracenes	µg/L	<0.00363	<0.00459	0.00112	<0.001035	<0.001035	<0.002622	<0.000306	<0.00021	0.003393	<0.00033	-	-	-	-
Naphthenic Acid															
C12H18O2	ng/L	-	<5.12	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C12H20O2	ng/L	-	24.5	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C12H22O2	ng/L	-	55.3	<4.96	<5	<4.93	7.34	<5.17	-	-	-	-	-	-	-
C12H24O2	ng/L	-	295	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C13H20O2	ng/L	-	<5.12	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C13H22O2	ng/L	-	25.9	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C13H24O2	ng/L	-	53.5	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C13H26O2	ng/L	-	280	<7.31	<7.73	6.42	<15.9	<5.17	-	-	-	-	-	-	-
C14H20O2	ng/L	-	13.8	<4.96	<5	<4.93	6.13	6.47	-	-	-	-	-	-	-
C14H22O2	ng/L	-	5.68	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C14H24O2	ng/L	-	16.1	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C14H26O2	ng/L	-	42.8	<4.96	8.86	<4.93	<5.43	<5.17	-	-	-	-	-	-	-

Table A3-1: Surface Water Quality Field Blank Results from the Eagle Plain Project, 2012 – 2017

Parameter	Units	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank
		3/25/2012	7/29/2013	8/26/2013	7/22/2014	7/23/2014	9/21/2014	3/14/2015	6/5/2015	9/18/2015	3/16/2016	6/21/2016	9/20/2016	3/7/2017	6/27/2017
Naphthenic Acid (cont'd)															
C14H28O2	ng/L	-	270	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C15H18O2	ng/L	-	12.6	<4.96	<5	<4.93	6.5	<5.17	-	-	-	-	-	-	-
C15H20O2	ng/L	-	<5.12	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C15H22O2	ng/L	-	6.51	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C15H24O2	ng/L	-	181	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C15H26O2	ng/L	-	21.8	<4.96	5.65	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C15H28O2	ng/L	-	48.2	<4.96	<5	<4.93	5.61	<5.17	-	-	-	-	-	-	-
C15H30O2	ng/L	-	270	<28.3	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C16H20O2	ng/L	-	<5.12	9.4	<5	<4.93	13.8	13.2	-	-	-	-	-	-	-
C16H22O2	ng/L	-	<5.12	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C16H24O2	ng/L	-	7.92	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C16H26O2	ng/L	-	11.6	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C16H28O2	ng/L	-	21.4	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C16H30O2	ng/L	-	36.3	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C16H32O2	ng/L	-	<5.12	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C17H22O2	ng/L	-	13	<4.96	<5	<4.93	7.22	<5.17	-	-	-	-	-	-	-
C17H24O2	ng/L	-	<5.12	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C17H26O2	ng/L	-	7.31	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C17H28O2	ng/L	-	<5.12	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C17H30O2	ng/L	-	17.4	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C17H32O2	ng/L	-	31.2	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C17H34O2	ng/L	-	245	<4.96	<5	<4.93	<9.34	<5.17	-	-	-	-	-	-	-
C18H24O2	ng/L	-	153	19	16.2	12.7	41.7	56.9	-	-	-	-	-	-	-
C18H26O2	ng/L	-	6.74	<4.96	<5	<4.93	13	<5.17	-	-	-	-	-	-	-
C18H28O2	ng/L	-	30.5	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C18H30O2	ng/L	-	<5.12	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C18H32O2	ng/L	-	<5.12	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C18H34O2	ng/L	-	<5.12	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C18H36O2	ng/L	-	278	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C19H26O2	ng/L	-	22.8	6.02	10.1	<4.93	52.5	<5.17	-	-	-	-	-	-	-

Table A3-1: Surface Water Quality Field Blank Results from the Eagle Plain Project, 2012 – 2017

Parameter	Units	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank
		3/25/2012	7/29/2013	8/26/2013	7/22/2014	7/23/2014	9/21/2014	3/14/2015	6/5/2015	9/18/2015	3/16/2016	6/21/2016	9/20/2016	3/7/2017	6/27/2017
Naphthenic Acid (cont'd)															
C19H28O2	ng/L	-	<5.12	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C19H30O2	ng/L	-	16.8	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C19H32O2	ng/L	-	11.8	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C19H34O2	ng/L	-	21	<4.96	5.1	6.48	8.38	6.64	-	-	-	-	-	-	-
C19H36O2	ng/L	-	29.3	<4.96	<5	<4.93	7.79	<5.17	-	-	-	-	-	-	-
C19H38O2	ng/L	-	57.4	<4.96	8.45	6.45	45	<5.17	-	-	-	-	-	-	-
C20H28O2	ng/L	-	199	55.5	<5	<4.93	<5.43	<11.9	-	-	-	-	-	-	-
C20H30O2	ng/L	-	296	21.5	40.3	9.33	11400	60.9	-	-	-	-	-	-	-
C20H32O2	ng/L	-	47.7	<4.96	9.82	6.09	3060	73.4	-	-	-	-	-	-	-
C20H34O2	ng/L	-	7.4	<4.96	<5	<4.93	182	8.97	-	-	-	-	-	-	-
C20H36O2	ng/L	-	5.49	<4.96	<5	<4.93	19.2	<5.17	-	-	-	-	-	-	-
C20H38O2	ng/L	-	18.1	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C21H30O2	ng/L	-	57.4	<4.96	<5	<4.93	<8.57	<14.5	-	-	-	-	-	-	-
C21H32O2	ng/L	-	<10	<4.96	<5	<4.93	<5.43	5.6	-	-	-	-	-	-	-
C21H34O2	ng/L	-	7.95	<4.96	<5	<4.93	31.9	<5.17	-	-	-	-	-	-	-
C21H36O2	ng/L	-	<5.12	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C21H38O2	ng/L	-	9.66	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
C21H40O2	ng/L	-	10.8	<4.96	<5	<4.93	<5.43	<5.17	-	-	-	-	-	-	-
WQTC12-Radionuclides															
Actinium-228	Bq/L	-	-	-	-	-	-	-	-	<0.6	<0.8	<0.8	<0.4	<1	<1
Bismuth-212	Bq/L	-	-	-	-	-	-	-	-	<2	<1	<2	<2	<2	<2
Bismuth-214	Bq/L	-	-	-	-	-	-	-	-	<0.6	0.6	<0.5	<0.6	<0.6	<0.8
Lead-210	Bq/L	-	-	-	-	-	-	-	-	<4	<3	<3	<4	<4	5
Lead-211	Bq/L	-	-	-	-	-	-	-	-	<2	<3	<4	<8	<5	<6
Lead-212	Bq/L	-	-	-	-	-	-	-	-	0.5	<0.2	<0.3	<0.5	0.4	0.7
Lead-214	Bq/L	-	-	-	-	-	-	-	-	0.6	<0.4	<0.4	0.7	<0.4	<0.7
Potassium-40	Bq/L	-	-	-	-	-	-	-	-	<5	<4	<4	<6	17	<6
Radium-223	Bq/L	-	-	-	-	-	-	-	-	<0.9	<0.8	<0.8	<0.5	<0.9	<1
Radium-226	Bq/L	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<3	<3	<0.005	<4	<5
Radon-219	Bq/L	-	-	-	-	-	-	-	-	<1	<0.9	<0.9	<1	<0.7	<1

Table A3-1: Surface Water Quality Field Blank Results from the Eagle Plain Project, 2012 – 2017

Parameter	Units	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank	Field Blank
		3/25/2012	7/29/2013	8/26/2013	7/22/2014	7/23/2014	9/21/2014	3/14/2015	6/5/2015	9/18/2015	3/16/2016	6/21/2016	9/20/2016	3/7/2017	6/27/2017
WQTC12-Radionuclides (cont'd)															
Thallium-208	Bq/L	-	-	-	-	-	-	-	-	<0.2	0.2	0.3	0.6	0.5	0.3
Thorium-227	Bq/L	-	-	-	-	-	-	-	-	<0.6	<0.9	<1	<0.6	<0.7	<1
Thorium-230	Bq/L	-	-	-	-	-	-	-	-	<20	<20	<10	<20	<20	<20
Thorium-234	Bq/L	-	-	-	-	-	-	-	-	<3	<3	<3	<4	<3	<4
Uranium-235	Bq/L	-	-	-	-	-	-	-	-	<1	<0.7	<0.9	<1	<1	<0.9
Calculated Quantities															
Values over five times the MDL	%	7%	1%	1%	0%	0%	3%	1%	3%	1%	2%	0%	2%	0.9%	0.9%

Note:
Bolded values indicate result is greater than five times the detection limit.
The percentage of values over five times the DL for the entire dataset is 1.5%.
a) Questionable value of 569 mg/L was removed and not used for analysis.
<= less than; - = no data; µS/cm = microSiemens per centimetre; NTU = formazin nephelometric unit; ng/L = nanogram per litre; µg/L = micrograms per litre; mg/L = milligrams per litre; mg-N/L = milligrams nitrogen per litre; mg-P/L = milligrams phosphorus per litre; Bq/L = becquerel per litre; CaCO₃ = calcium carbonate.

Table A3-2: Surface Water and Groundwater Quality Trip Blank Results from the Eagle Plain Project, 2013 – 2017

Parameter	Units	Trip Blank 8/26/2013	Trip Blank 7/22/2014	Trip Blank 9/3/2014	Trip Blank 3/15/2015	Trip Blank 9/18/2015	Trip Blank 3/15/2016	Trip Blank 6/21/2016	Trip Blank 9/20/2016	Trip Blank 9/22/2016	Trip Blank 3/7/2017	Trip Blank 6/27/2017	Trip Blank 9/20/2017	Trip Blank 9/21/2017
WQTC02-Conventional Parameters														
pH	-	5.85	5.57	5.66	5.83	5.81	5.84	5.6	5.61	8.69	5.56	5.89	5.69	6.81
Specific conductivity	µS/cm	<1	<2	<2	<2	<1	1	<1	<1	<1	<1	<1	<1	3
Hardness, as CaCO ₃	mg/L	<5	<0.1	<0.1	<0.1	<5	<5	<5	<5	<5	<5	<5	<5	<5
Total alkalinity, as CaCO ₃	mg/L	<5	<1	<1	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5
Alkalinity, Phenolphthalein as CaCO ₃	mg/L	<5	<1	<1	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5
Total dissolved solids	mg/L	<5	<10	<10	<10	<5	<5	98	<5	<5	68	64	22	54
Total suspended solids	mg/L	<2	<1	<1	<2	<5	<2	<2	<2	<2	<2	<2	<2	<2
Total organic carbon	mg/L	-	-	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5
Total inorganic carbon	mg/L	-	-	0.6	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	0.8	<0.5	<0.5	<0.5
Dissolved organic carbon	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5
Dissolved inorganic carbon	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	<0.5	<0.5
WQTC03-Major Ions														
Bicarbonate, as CaCO ₃	mg/L	<5	<1	<1	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5
Bromide	mg/L	-	<0.1	<0.1	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Calcium	mg/L	0.18	0.088	<0.04	<0.04	<0.1	<0.1	<0.1	<0.01	0.02	0.05	0.02	<0.01	<0.01
Carbonate, as CaCO ₃	mg/L	<6	<1	<1	<1	<6	<6	<6	<6	<6	<6	<6	<6	<6
Chloride	mg/L	<0.05	<0.1	<0.1	<0.1	0.08	<0.05	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Hydroxide, as CaCO ₃	mg/L	<5	<1	<1	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5
Magnesium	mg/L	0.11	<0.005	<0.005	<0.005	<0.1	<0.1	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Potassium	mg/L	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Sodium	mg/L	1.2	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sulphate	mg/L	<0.5	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1
WQTC04-Nutrients and Chlorophyll a														
Nitrate	mg-N/L	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nitrite	mg-N/L	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	0.03	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nitrate + nitrite	mg-N/L	-	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-
Total ammonia	mg-N/L	0.02	<0.02	<0.02	<0.02	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total nitrogen	mg-N/L	-	<0.05	<0.05	<0.05	0.19	<0.06	0.1	0.06	<0.06	0.06	<0.06	<0.06	0.18
Total kjeldahl nitrogen	mg-N/L	-	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-
Dissolved phosphorus	mg-P/L	-	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-
Phosphorus (as phosphate)	mg-P/L	<0.003	0.008	<0.002	0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.01	<0.003	<0.003
WQTC06-Total Metals														
Aluminum	µg/L	8	1	<1	<1	<5	<5	2	2	<1	2	<1	2	1
Antimony	µg/L	<0.2	<0.05	<0.05	<0.05	<0.2	<0.2	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Arsenic	µg/L	<2	<0.05	<0.05	<0.05	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Barium	µg/L	<1	<0.1	<0.1	<0.1	<1	<1	<0.1	<0.1	<0.1	0.5	<0.1	<0.1	<0.1
Beryllium	µg/L	<0.04	<0.01	<0.01	<0.01	<0.04	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Bismuth	µg/L	<1	<0.01	<0.01	<0.01	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Boron	µg/L	110	<1	<1	6	<5	<4	<2	<2	<2	<2	<2	<2	<2
Cadmium	µg/L	<0.01	<0.002	<0.002	<0.002	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Calcium	µg/L	170	<40	<40	<40	60	<50	<50	<10	30	56	20	<10	20
Chromium	µg/L	<0.4	<0.1	<0.1	<0.1	<0.4	<0.4	0.07	<0.05	<0.05	0.44	<0.05	<0.05	<0.05

Table A3-2: Surface Water and Groundwater Quality Trip Blank Results from the Eagle Plain Project, 2013 – 2017

Parameter	Units	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank
		8/26/2013	7/22/2014	9/3/2014	3/15/2015	9/18/2015	3/15/2016	6/21/2016	9/20/2016	9/22/2016	3/7/2017	6/27/2017	9/20/2017	9/21/2017
WQTC06-Total Metals (cont'd)														
Cobalt	µg/L	<0.02	<0.005	<0.005	<0.005	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	µg/L	<1	<0.1	<0.1	0.1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Iron	µg/L	174	<2	<2	<2	13	<10	<2	<2	3	26	<2	<2	<2
Lead	µg/L	<0.1	<0.05	<0.05	<0.05	<0.1	<0.1	<0.01	0.025	<0.01	<0.01	<0.01	<0.01	<0.01
Lithium	µg/L	<1	<0.05	<0.05	0.07	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Magnesium	µg/L	110	<5	<5	<5	<50	<50	<50	<20	<20	<20	<20	<20	<20
Manganese	µg/L	<5	<0.05	<0.05	<0.05	<5	<1	<1	<1	<1	1	<1	<1	<1
Mercury	µg/L	<0.01	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Molybdenum	µg/L	<0.1	<0.01	<0.01	0.01	<0.1	<0.1	<0.02	<0.02	0.027	<0.02	<0.02	<0.02	<0.02
Nickel	µg/L	<10	<0.02	<0.02	<0.02	<1	<1	0.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Potassium	µg/L	<100	<10	<10	<10	<100	<100	<100	<40	<40	<40	<40	<40	<40
Selenium	µg/L	<6	<0.1	<0.1	<0.1	<0.6	<0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Silicon	µg/L	<50	<50	<50	<50	<50	70	<50	<5	6	<5	<5	<5	<5
Silver	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sodium	µg/L	1260	12	<10	<10	<20	<20	<20	<100	133	178	<100	<100	<100
Strontium	µg/L	1	<0.1	<0.1	<0.1	<1	<1	<0.1	<0.1	<0.1	0.3	<0.1	<0.1	<0.1
Sulphur	µg/L	200	<500	<500	<500	<100	<100	<100	<20	<20	40	30	30	40
Tellurium	µg/L	<0.1	<0.05	<0.05	<0.05	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Thallium	µg/L	<0.01	<0.004	<0.004	<0.004	<0.01	<0.01	<0.01	<0.01	0.018	<0.01	<0.01	<0.01	<0.01
Thorium	µg/L	<4	<0.01	<0.01	<0.01	<0.4	0.5	<0.05	<0.05	<0.05	<0.05	<0.05	0.08	0.08
Tin	µg/L	<0.1	<0.05	0.06	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.3
Titanium	µg/L	1.2	<0.2	<0.2	<0.2	<1	<1	<1	<2	<2	<2	<2	<2	<2
Uranium	µg/L	<4	<0.001	<0.001	<0.001	<0.4	<0.4	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	µg/L	<1	0.3	<0.2	<0.2	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Zinc	µg/L	<10	<1	<1	<1	<1	<1	<0.5	<0.5	1.4	<0.5	<0.5	<0.5	<0.5
Zirconium	µg/L	<1	<0.01	<0.01	<0.01	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WQTC07-Dissolved Metals														
Aluminum	µg/L	<5	1	<1	<1	<5	<5	<5	<10	<1	<1	<1	<1	<1
Antimony	µg/L	<0.2	<0.05	<0.05	0.09	<0.2	<0.2	<0.2	<0.2	0.026	<0.02	<0.02	<0.02	<0.02
Arsenic	µg/L	<0.2	<0.05	<0.05	<0.05	<0.2	<0.2	<0.2	<1	<0.1	<0.1	<0.1	<0.1	<0.1
Barium	µg/L	<1	<0.1	<0.1	<0.1	<1	<1	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1
Beryllium	µg/L	<0.04	<0.01	<0.01	<0.01	<0.04	<0.04	<0.04	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05
Bismuth	µg/L	<1	<0.01	<0.01	<0.01	<1	<1	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1
Boron	µg/L	<40	<1	<1	1	<4	<4	<4	<20	<2	<2	<2	<2	<2
Cadmium	µg/L	<0.01	<0.002	<0.002	<0.002	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	µg/L	<4	<0.1	<0.1	<0.1	<0.4	<0.4	<0.4	<0.5	<0.05	0.13	<0.05	<0.05	<0.05
Cobalt	µg/L	<0.02	<0.005	<0.005	<0.005	<0.02	<0.02	<0.02	<0.2	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	µg/L	<1	0.1	<0.1	<0.1	<1	<1	<0.2	<5	<0.5	<0.5	<0.5	<0.5	<0.5
Iron	µg/L	<5	<2	<2	<2	5	<5	<5	<20	<2	<2	5	<2	<2
Lead	µg/L	<1	<0.05	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01
Lithium	µg/L	<1	<0.05	<0.05	<0.05	<1	<1	<1	<5	<0.5	<0.5	<0.5	<0.5	<0.5
Manganese	µg/L	<1	<0.05	<0.05	<0.05	<1	<1	<1	<10	<1	<1	<1	<1	<1
Mercury	µg/L	<0.01	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Table A3-2: Surface Water and Groundwater Quality Trip Blank Results from the Eagle Plain Project, 2013 – 2017

Parameter	Units	Trip Blank 8/26/2013	Trip Blank 7/22/2014	Trip Blank 9/3/2014	Trip Blank 3/15/2015	Trip Blank 9/18/2015	Trip Blank 3/15/2016	Trip Blank 6/21/2016	Trip Blank 9/20/2016	Trip Blank 9/22/2016	Trip Blank 3/7/2017	Trip Blank 6/27/2017	Trip Blank 9/20/2017	Trip Blank 9/21/2017
WQTC07-Dissolved Metals (cont'd)														
Molybdenum	µg/L	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.2	<0.02	<0.02	<0.02	<0.02	0.03
Nickel	µg/L	<10	<0.02	<0.02	<0.02	<1	<1	<1	<2	<0.2	<0.2	1.1	<0.2	<0.2
Selenium	µg/L	<6	<0.1	<0.1	<0.1	<0.6	<0.6	<0.6	<2	<0.2	<0.2	<0.2	<0.2	<0.2
Silicon	µg/L	<50	<50	<50	<50	<50	<50	<50	<5	<5	<5	<5	<5	6
Silver	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01
Strontium	µg/L	1	0.5	<0.1	<0.1	<1	<1	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1
Sulphur	µg/L	<200	<500	<500	<500	<200	<200	<200	<20	30	50	30	30	30
Tellurium	µg/L	<0.1	<0.05	<0.05	<0.05	<0.1	<0.1	<0.1	<0.5	<0.05	<0.05	<0.05	<0.05	0.08
Thallium	µg/L	<0.1	<0.004	<0.004	<0.004	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01
Thorium	µg/L	<4	<0.01	<0.01	<0.01	<0.4	<0.4	<0.4	<0.5	<0.05	<0.05	<0.05	<0.05	0.09
Tin	µg/L	<0.1	<0.05	<0.05	<0.05	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1
Titanium	µg/L	<10	<0.2	<0.2	<0.2	<10	<10	<10	<2	<2	<2	<2	<2	<2
Uranium	µg/L	<4	<0.001	<0.001	<0.001	<0.4	<0.4	<0.4	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	µg/L	<1	<0.2	<0.2	<0.2	<0.1	<0.1	<0.1	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05
Zinc	µg/L	1	7	1	<1	<1	<1	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5
Zirconium	µg/L	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1
WQTC08-Volatile Organics														
Benzene	µg/L	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	µg/L	-	-	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	µg/L	-	-	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylenes	µg/L	-	-	<2	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Styrene	µg/L	-	-	-	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Volatile Hydrocarbons	µg/L	-	-	<100	<100	<50	<50	<50	<50	<50	<50	<50	<50	<50
Volatile Petroleum Hydrocarbons	µg/L	-	-	<100	<100	<50	<50	<50	<50	<50	<50	<50	<50	<50
Methyl tert-Butyl Ether	µg/L	-	-	-	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
WQTC09-Parent PAHs														
Naphthalene	µg/L	0.00291	<0.00354	<0.00564	<0.00447	<0.01275	<0.00414	-	-	-	-	-	-	-
Acenaphthylene	µg/L	<0.000116	<0.0000682	<0.000255	<0.000475	<0.000303	<0.000241	-	-	-	-	-	-	-
Biphenyl	µg/L	0.00061	<0.002241	<0.001836	<0.001866	<0.001191	<0.001449	-	-	-	-	-	-	-
Acenaphthene	µg/L	<0.000209	<0.000198	0.000664	<0.000391	<0.000544	<0.000182	-	-	-	-	-	-	-
Fluorene	µg/L	<0.000172	<0.00123	0.000251	<0.000321	<0.000356	<0.000318	-	-	-	-	-	-	-
Phenanthrene	µg/L	0.000817	<0.002607	<0.002298	<0.002328	<0.001986	<0.00318	-	-	-	-	-	-	-
Anthracene	µg/L	<0.000182	<0.000153	<0.000273	<0.00028	<0.000245	<0.00011	-	-	-	-	-	-	-
Dibenzothiophene	µg/L	0.000246	<0.00048	<0.000136	<0.000555	<0.000198	<0.000321	-	-	-	-	-	-	-
Pyrene	µg/L	0.00033	<0.000573	<0.001383	<0.001077	<0.000747	<0.000711	-	-	-	-	-	-	-
Fluoranthene	µg/L	0.000263	<0.001149	<0.001752	<0.001263	<0.001077	<0.001101	-	-	-	-	-	-	-
Benzo(a)anthracene	µg/L	<0.00007	<0.00012	<0.000495	<0.000186	<0.0000501	<0.000129	-	-	-	-	-	-	-
Chrysene	µg/L	0.000113	<0.000303	<0.000747	<0.00063	<0.000393	<0.000285	-	-	-	-	-	-	-
1-Methyl-7-isopropyl-phenanthrene (Retene)	µg/L	<0.000255	<0.000744	<0.000223	<0.000473	<0.000336	<0.000429	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	<0.0000739	<0.000105	<0.001131	<0.000118	<0.000128	<0.000089	-	-	-	-	-	-	-
Benzo(j,k)fluoranthenes	µg/L	<0.000093	<0.000112	<0.000209	<0.000121	<0.00014	<0.0000925	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	<0.000141	<0.000142	<0.000302	<0.000184	<0.000186	<0.000133	-	-	-	-	-	-	-
Benzo(e)pyrene	µg/L	<0.000129	<0.000145	<0.000295	<0.000186	<0.000186	<0.000134	-	-	-	-	-	-	-

Table A3-2: Surface Water and Groundwater Quality Trip Blank Results from the Eagle Plain Project, 2013 – 2017

Parameter	Units	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank
		8/26/2013	7/22/2014	9/3/2014	3/15/2015	9/18/2015	3/15/2016	6/21/2016	9/20/2016	9/22/2016	3/7/2017	6/27/2017	9/20/2017	9/21/2017
WQTC09-Parent PAHs (cont'd)														
Perylene	µg/L	<0.000229	<0.00015	<0.000318	<0.000194	<0.000203	<0.000143	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00011	<0.0000626	<0.000247	<0.00015	<0.000161	<0.000255	-	-	-	-	-	-	-
Indeno(c,d-123)pyrene	µg/L	0.000173	<0.0000639	<0.00031	<0.000186	<0.000285	<0.000309	-	-	-	-	-	-	-
Dibenzo(a,h)anthracene	µg/L	<0.000042	0.000063	<0.00049	<0.000413	<0.000319	<0.0000961	-	-	-	-	-	-	-
WQTC10-Alkylated PAHs														
7-Methylbenzo[a]pyrene	µg/L	<0.000204	<0.000142	<0.000359	<0.000281	<0.000185	<0.000141	-	-	-	-	-	-	-
2-Methylanthracene	µg/L	<0.000292	<0.000213	<0.000249	<0.000318	<0.000456	<0.000156	-	-	-	-	-	-	-
C1 substituted acenaphthenes	µg/L	<0.000132	<0.000259	<0.000384	<0.000414	<0.000331	<0.000341	-	-	-	-	-	-	-
C1 substituted benzo(a)anthracenes / chrysenes	µg/L	0.000088	<0.0000668	<0.000101	<0.000121	<0.0000779	<0.0000523	-	-	-	-	-	-	-
C2 substituted benzo(a)anthracenes / chrysenes	µg/L	0.000172	<0.0000599	<0.000438	<0.000141	<0.0000949	<0.0000664	-	-	-	-	-	-	-
C3 substituted benzo(a)anthracenes / chrysenes	µg/L	0.000223	<0.000537	<0.000178	<0.000222	<0.00012	<0.000081	-	-	-	-	-	-	-
C4 substituted benzo(a)anthracenes / chrysenes	µg/L	0.00014	<0.000113	<0.00014	<0.000111	<0.00011	<0.000081	-	-	-	-	-	-	-
C1 substituted benzofluoranthenes / benzopyrenes	µg/L	0.000609	<0.000663	<0.000359	<0.000281	<0.000185	<0.000141	-	-	-	-	-	-	-
C2 substituted benzofluoranthenes / benzopyrenes	µg/L	0.000274	<0.001392	<0.0002	<0.000312	<0.000149	<0.000129	-	-	-	-	-	-	-
C1 substituted biphenyls	µg/L	0.00142	<0.00927	<0.00375	<0.00384	<0.000936	<0.00645	-	-	-	-	-	-	-
C2 substituted biphenyls	µg/L	0.00709	<0.0414	<0.01707	<0.01635	<0.000475	<0.02328	-	-	-	-	-	-	-
5,9-Dimethylchrysene	µg/L	<0.000113	<0.0000599	<0.000131	<0.000141	<0.0000949	<0.0000664	-	-	-	-	-	-	-
5/6-Methylchrysenes	µg/L	<0.0000644	<0.000069	<0.000103	<0.000125	<0.0000809	<0.0000531	-	-	-	-	-	-	-
1-Methylchrysene	µg/L	<0.000059	<0.0000648	<0.0000989	<0.000118	<0.0000752	<0.0000516	-	-	-	-	-	-	-
2,4-Dimethyldibenzothiophene	µg/L	<0.000155	<0.000249	<0.00024	<0.000403	<0.000385	<0.00026	-	-	-	-	-	-	-
2/3-Methyldibenzothiophenes	µg/L	<0.000205	<0.000207	<0.000124	<0.000399	<0.000378	<0.000169	-	-	-	-	-	-	-
C1 substituted dibenzothiophenes	µg/L	<0.000205	<0.0000995	<0.00011	<0.000399	<0.000378	<0.000169	-	-	-	-	-	-	-
C2 substituted dibenzothiophenes	µg/L	0.000563	<0.000555	<0.002103	<0.000403	<0.000385	<0.00026	-	-	-	-	-	-	-
C3 substituted dibenzothiophenes	µg/L	0.000713	<0.001056	<0.001377	<0.000263	<0.001185	<0.001161	-	-	-	-	-	-	-
C4 substituted dibenzothiophenes	µg/L	0.0012	<0.001017	<0.002763	<0.00135	<0.001938	<0.001032	-	-	-	-	-	-	-
C1 substituted fluoranthenes / pyrenes	µg/L	0.000664	<0.00108	<0.001653	<0.000386	<0.000207	0.000321	-	-	-	-	-	-	-
C2 substituted fluoranthenes / pyrenes	µg/L	0.000582	0.000633	<0.00207	<0.0004	<0.000188	0.000236	-	-	-	-	-	-	-
C3 substituted fluoranthenes / pyrenes	µg/L	0.000635	0.000454	<0.000846	<0.00022	<0.000179	0.000095	-	-	-	-	-	-	-
C4 substituted fluoranthenes / pyrenes	µg/L	0.000378	0.000092	<0.000147	<0.000289	<0.00016	0.000123	-	-	-	-	-	-	-
3-Methylfluoranthene / benzo(a)fluorene	µg/L	0.000224	<0.000504	<0.000147	<0.000386	<0.000207	0.000155	-	-	-	-	-	-	-
1,7-Dimethylfluorene	µg/L	<0.000245	<0.000164	<0.000329	<0.000438	<0.000293	<0.000207	-	-	-	-	-	-	-
2-Methylfluorene	µg/L	<0.000287	<0.000458	<0.000267	<0.00068	<0.0011	<0.000117	-	-	-	-	-	-	-
C1 substituted fluorenes	µg/L	0.00164	0.001257	<0.001497	<0.00068	0.00065	<0.001491	-	-	-	-	-	-	-
C2 substituted fluorenes	µg/L	0.000591	<0.000939	<0.000329	<0.000438	<0.000293	0.000657	-	-	-	-	-	-	-
C3 substituted fluorenes	µg/L	0.00156	<0.0039	<0.002589	<0.000553	0.000958	0.000588	-	-	-	-	-	-	-
1,2-Dimethylnaphthalene	µg/L	0.000438	<0.001188	<0.000542	<0.000491	<0.0007	<0.000265	-	-	-	-	-	-	-
1,4,6,7-Tetramethylnaphthalene	µg/L	0.000267	<0.00023	<0.000186	<0.00081	<0.000344	<0.000131	-	-	-	-	-	-	-
2,3,5-Trimethylnaphthalene	µg/L	<0.000255	<0.000465	<0.000489	<0.000882	<0.00025	<0.000223	-	-	-	-	-	-	-
2,3,6-Trimethylnaphthalene	µg/L	<0.000257	<0.000597	<0.000756	<0.000814	<0.00025	<0.000205	-	-	-	-	-	-	-
2,6-Dimethylnaphthalene	µg/L	0.000201	<0.000357	<0.00046	<0.000415	<0.00045	0.000235	-	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	0.000534	<0.000849	<0.001674	<0.001425	<0.002328	<0.001335	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	0.00106	<0.001812	<0.01176	<0.00648	<0.00675	<0.00813	-	-	-	-	-	-	-
C1 substituted naphthalenes	µg/L	0.0016	<0.002661	<0.01344	<0.00792	<0.00906	<0.00945	-	-	-	-	-	-	-

Table A3-2: Surface Water and Groundwater Quality Trip Blank Results from the Eagle Plain Project, 2013 – 2017

Parameter	Units	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank
		8/26/2013	7/22/2014	9/3/2014	3/15/2015	9/18/2015	3/15/2016	6/21/2016	9/20/2016	9/22/2016	3/7/2017	6/27/2017	9/20/2017	9/21/2017
WQTC10-Alkylated PAHs (cont'd)														
C2 substituted naphthalenes	µg/L	0.00341	<0.00642	<0.01377	<0.00732	<0.00756	<0.01314	-	-	-	-	-	-	-
C3 substituted naphthalenes	µg/L	0.00111	<0.00372	<0.00663	<0.000846	<0.001614	<0.002967	-	-	-	-	-	-	-
C4 substituted naphthalenes	µg/L	0.0012	<0.00023	<0.002802	<0.00081	<0.00573	<0.001623	-	-	-	-	-	-	-
1,2,6-Trimethylphenanthrene	µg/L	<0.000106	<0.0000751	<0.0000967	<0.000187	<0.0000936	<0.0000676	-	-	-	-	-	-	-
1,7-Dimethylphenanthrene	µg/L	0.000085	<0.000249	<0.000261	<0.000173	<0.000113	<0.000219	-	-	-	-	-	-	-
1,8-Dimethylphenanthrene	µg/L	0.000138	<0.000112	<0.000201	<0.000176	<0.000114	<0.0000516	-	-	-	-	-	-	-
2,6-Dimethylphenanthrene	µg/L	0.000091	<0.000315	<0.000201	<0.000176	<0.000114	<0.000144	-	-	-	-	-	-	-
3,6-Dimethylphenanthrene	µg/L	<0.0000807	<0.000114	<0.000205	<0.000179	<0.000116	<0.0000519	-	-	-	-	-	-	-
2-Methylphenanthrene	µg/L	<0.000278	<0.000378	<0.000249	<0.000308	<0.000432	<0.000702	-	-	-	-	-	-	-
3-Methylphenanthrene	µg/L	<0.000283	<0.000214	<0.00025	<0.00031	<0.000441	<0.000504	-	-	-	-	-	-	-
9/4-Methylphenanthrene	µg/L	<0.000283	<0.000214	<0.00025	<0.00031	<0.000441	0.000159	-	-	-	-	-	-	-
1-Methylphenanthrene	µg/L	<0.000279	<0.000372	<0.000251	<0.000304	<0.000433	<0.000441	-	-	-	-	-	-	-
C1 substituted phenanthrenes / anthracenes	µg/L	<0.000279	<0.000372	<0.000251	<0.000304	<0.000433	<0.001647	-	-	-	-	-	-	-
C2 substituted phenanthrenes / anthracenes	µg/L	0.000611	<0.001182	<0.000981	<0.000176	0.000237	<0.000978	-	-	-	-	-	-	-
C3 substituted phenanthrenes / anthracenes	µg/L	0.000689	<0.00114	<0.000339	<0.000187	<0.0000936	0.000174	-	-	-	-	-	-	-
C4 substituted phenanthrenes / anthracenes	µg/L	0.00134	0.001595	<0.002622	<0.000473	<0.000591	<0.00033	-	-	-	-	-	-	-
Naphthenic Acid														
C12H18O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C12H20O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C12H22O2	ng/L	6.97	<5.14	7.25	<4.99	-	-	-	-	-	-	-	-	-
C12H24O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C13H20O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C13H22O2	ng/L	5.31	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C13H24O2	ng/L	7.88	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C13H26O2	ng/L	11.9	5.98	<5.06	10.7	-	-	-	-	-	-	-	-	-
C14H20O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C14H22O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C14H24O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C14H26O2	ng/L	17.4	<5.14	8.83	<4.99	-	-	-	-	-	-	-	-	-
C14H28O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C15H18O2	ng/L	<5.06	<5.14	<5.06	5.04	-	-	-	-	-	-	-	-	-
C15H20O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C15H22O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C15H24O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C15H26O2	ng/L	11.8	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C15H28O2	ng/L	18.4	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C15H30O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C16H20O2	ng/L	13.3	6.97	25.1	7.95	-	-	-	-	-	-	-	-	-
C16H22O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C16H24O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C16H26O2	ng/L	6.85	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C16H28O2	ng/L	10.3	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C16H30O2	ng/L	14.6	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-

Table A3-2: Surface Water and Groundwater Quality Trip Blank Results from the Eagle Plain Project, 2013 – 2017

Parameter	Units	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank
		8/26/2013	7/22/2014	9/3/2014	3/15/2015	9/18/2015	3/15/2016	6/21/2016	9/20/2016	9/22/2016	3/7/2017	6/27/2017	9/20/2017	9/21/2017
Naphthenic Acid (cont'd)														
C16H32O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C17H22O2	ng/L	<5.06	<5.14	7.55	6.54	-	-	-	-	-	-	-	-	-
C17H24O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C17H26O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C17H28O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C17H30O2	ng/L	12.5	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C17H32O2	ng/L	5.88	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C17H34O2	ng/L	<5.06	<7.1	<5.74	<4.99	-	-	-	-	-	-	-	-	-
C18H24O2	ng/L	25.7	34.3	62.9	37.6	-	-	-	-	-	-	-	-	-
C18H26O2	ng/L	<5.06	<5.14	5.65	<4.99	-	-	-	-	-	-	-	-	-
C18H28O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C18H30O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C18H32O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C18H34O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C18H36O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C19H26O2	ng/L	7.57	18.9	40.8	<4.99	-	-	-	-	-	-	-	-	-
C19H28O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C19H30O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C19H32O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C19H34O2	ng/L	5.12	<5.77	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C19H36O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C19H38O2	ng/L	<5.06	8.24	10.9	<4.99	-	-	-	-	-	-	-	-	-
C20H28O2	ng/L	76	<10.5	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C20H30O2	ng/L	31.2	12.3	114	29.2	-	-	-	-	-	-	-	-	-
C20H32O2	ng/L	<5.06	<5.14	19.8	5.97	-	-	-	-	-	-	-	-	-
C20H34O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C20H36O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C20H38O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C21H30O2	ng/L	<5.06	10.2	7.38	8.27	-	-	-	-	-	-	-	-	-
C21H32O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C21H34O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C21H36O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C21H38O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
C21H40O2	ng/L	<5.06	<5.14	<5.06	<4.99	-	-	-	-	-	-	-	-	-
WQTC12-Radionuclides														
Actinium-228	Bq/L	-	-	-	-	<0.7	<0.4	<0.8	<0.8	<0.5	<1	<1	-	-
Bismuth-212	Bq/L	-	-	-	-	<1	<2	2	<2	<1	<2	<2	-	-
Bismuth-214	Bq/L	-	-	-	-	<0.4	<0.6	<0.5	0.8	<0.4	<0.5	0.6	-	-
Lead-210	Bq/L	-	-	-	-	<3	<5	<4	<3	<3	<4	<4	-	-
Lead-211	Bq/L	-	-	-	-	<4	<5	<4	<3	<4	<4	<5	-	-
Lead-212	Bq/L	-	-	-	-	<0.3	<0.4	<0.3	0.5	<0.3	0.4	0.9	-	-
Lead-214	Bq/L	-	-	-	-	<0.4	0.7	<0.4	<0.4	<0.3	<0.5	<0.6	-	-
Potassium-40	Bq/L	-	-	-	-	<4	<5	<4	<5	<4	14	<6	-	-

Table A3-2: Surface Water and Groundwater Quality Trip Blank Results from the Eagle Plain Project, 2013 – 2017

Parameter	Units	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank
		8/26/2013	7/22/2014	9/3/2014	3/15/2015	9/18/2015	3/15/2016	6/21/2016	9/20/2016	9/22/2016	3/7/2017	6/27/2017	9/20/2017	9/21/2017
WQTC12-Radionuclides (cont'd)														
Radium-223	Bq/L	-	-	-	-	<0.8	1	<1	<0.8	0.6	<0.8	<1	-	-
Radium-226	Bq/L	-	-	<0.005	<0.005	<0.005	<5	<4	<0.005	<4	<4	<5	-	-
Radon-219	Bq/L	-	-	-	-	<0.8	<1	<0.8	<1	<1	<0.9	<0.7	-	-
Thallium-208	Bq/L	-	-	-	-	<0.2	<0.2	<0.3	<0.2	0.3	0.7	0.3	-	-
Thorium-227	Bq/L	-	-	-	-	<0.7	<0.9	<0.5	<0.7	<0.7	<0.7	<1	-	-
Thorium-230	Bq/L	-	-	-	-	<20	<10	<20	<10	<20	<20	<20	-	-
Thorium-234	Bq/L	-	-	-	-	<3	<4	<3	<3	<3	<4	<4	-	-
Uranium-235	Bq/L	-	-	-	-	<0.9	<1	<0.9	<0.8	<0.9	<0.8	<1	-	-
Calculated Quantities														
Values over five times the MDL	%	2%	1%	1%	0%	0%	0%	1%	0%	0%	4%	2%	0%	1%

Note:
Bolded value indicates result is greater than five times the detection limit.
The percentage of values over five times the DL for the entire dataset is 0.9%.
<= less than; - = no data; µS/cm = microSiemens per centimetre; ng/L = nanogram per litre; µg/L = micrograms per litre; mg/L = milligrams per litre; mg-N/L = milligrams nitrogen per litre; mg-P/L = milligrams phosphorus per litre; Bq/L = becquerel per litre; CaCO₃ = calcium carbonate.

Table A3-3: Surface Water Quality Duplicate Results from the Eagle Plain Project, 2013 – 2017

Parameter	Unit	McPL-001			EAGL-001			DALG-002			WHST-003			WHST-003			McPL-001			MINE-001			CHNC-001			CHNC-001			DALG-002-1			EAGL-003-1			WHST-004-1			
		29-Jul-13	29-Jul-13	RPD	23-Jul-14	23-Jul-14	RPD	23-Sep-14	23-Sep-14	RPD	15-Mar-15	15-Mar-15	RPD	6-Jun-15	6-Jun-15	RPD	19-Sep-15	19-Sep-15	RPD	16-Mar-16	16-Mar-16	RPD	21-Jun-16	21-Jun-16	RPD	20-Sep-16	20-Sep-16	RPD	27-Jun-17	27-Jun-17	RPD	20-Sep-17	20-Sep-17	RPD	7-Mar-17	7-Mar-17	RPD	
		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		
WQTC02-Conventional Parameters																																						
pH	-	6.49	6.5	0%	7.8	7.76	1%	6.99	6.91	1%	7.84	7.75	1%	7.53	7.47	1%	6.77	6.38	6%	7.71	7.72	0%	6.52	6.4	2%	6.94	6.89	1%	6.74	6.76	5%	7.19	7.19	0%	7.58	7.75	39%	
Specific conductivity	µS/cm	50	50	0%	510	508	0%	145	145	0%	515	514	0%	313	302	4%	96	89	8%	419	417	0%	64	67	5%	135	134	1%	146	146	0%	239	238	0%	540	538	0%	
Hardness, as CaCO3	mg/L	26	26	0%	258	262	2%	59.2	61.1	3%	279	270	3%	153	154	1%	36	37	3%	245	228	7%	29	29	0%	48	48	0%	58	58	0%	85	85	0%	301	293	3%	
Total alkalinity, as CaCO3	mg/L	14	14	0%	94	93	1%	21	21	0%	189	187	1%	107	106	1%	11	10	10%	175	177	1%	13	13	0%	26	25	n/c	17	17	-	23	23	-	201	201	0	
Alkalinity, Phenolphthalein as CaCO3	mg/L	-	-	-	<1	<1	n/c	<1	<1	n/c	<1	<1	n/c	<5	<5	n/c	<5	<5	n/c	<5	<5	n/c	<5	<5	n/c	<5	<5	n/c	-5	-5	-	-5	-5	-	-5	-5	-	
Total dissolved solids	mg/L	96	76	23%	347	336	3%	152	156	3%	326	330	1%	134	166	21%	20	46	n/c	144	150	4%	184	158	15%	146	128	13%	150	120	22%	220	190	15%	378	306	21%	
Total suspended solids	mg/L	86	86	0%	12	<1	n/c	169	175	3%	<2	<2	n/c	3	18	n/c	114	120	5%	<2	<2	n/c	5	6	18%	11	10	10%	5	8.5	-	-2	-2	-	2	2	-	
Total organic carbon	mg/L	-	-	-	-	-	-	22.1	22.3	1%	3.7	2.5	n/c	7	7	0%	25.4	25.8	2%	1.6	1.5	n/c	25.1	25	0%	24.4	24.3	n/c	23.3	23.1	1%	15	15.2	1%	2.4	2.3	-	
Total inorganic carbon	mg/L	-	-	-	-	-	-	4.2	3.8	10%	42.7	44.8	5%	26.9	26.8	0%	2.6	2.6	0%	42.6	42.9	1%	2.7	2.5	n/c	5.1	5.1	n/c	5	5.3	6%	5.2	5.3	2%	50.4	50	0.008	
Dissolved organic carbon	mg/L	26.8	27.1	1%	9.6	10.3	7%	21.3	21.8	2%	2.5	2.5	n/c	7.7	7	10%	25.6	25.6	0%	1.5	1.1	n/c	24.6	23.9	3%	22.8	22.5	1%	21.8	21.6	1%	13.8	13.8	0%	1.8	2	-	
Dissolved inorganic carbon	mg/L	3	3	0%	19.2	19.2	0%	3.8	3.8	0%	41.5	43.2	4%	26.6	26.6	0%	3.6	2.1	n/c	42	41.7	1%	2.5	2.4	n/c	4.9	4.6	6%	4	4	0%	5.1	5.3	4%	50	49	2%	
WQTC03-Major Ions																																						
Bicarbonate, as CaCO3	mg/L	17	17	0%	94	93	1%	21	21	0%	189	187	1%	130	129	1%	13	13	0%	214	215	0%	16	16	n/c	32	31	3%	21	21	-	28	28	0%	245	246	0%	
Bromide	mg/L	-	-	-	<0.1	<0.1	n/c	<0.1	<0.1	n/c	<0.1	<0.1	n/c	<0.02	<0.02	n/c	<0.02	<0.02	n/c	<0.02	<0.02	n/c	<0.02	<0.02	n/c	<0.02	<0.02	n/c	-0.02	-0.02	-	0.03	0.03	-	-	-0.02	-	
Calcium	mg/L	6.26	6.28	0%	63.5	68.5	8%	11.8	11.7	1%	79.5	80.6	1%	46.4	46.6	0%	7.7	7.89	2%	74.9	69.6	7%	6.8	6.8	0%	11.6	11.4	2%	13	12	8%	19	19	0%	94	91.3	3%	
Carbonate, as CaCO3	mg/L	<6	<6	n/c	<1	<1	n/c	<1	<1	n/c	<1	<1	n/c	<6	<6	n/c	<6	<6	n/c	<6	<6	n/c	<6	<6	n/c	<6	<6	n/c	-6	-6	-	-6	-6	-	-6	-6	-	
Chloride	mg/L	0.1	0.1	0%	0.89	0.67	28%	0.34	0.39	14%	0.57	0.58	2%	0.31	0.3	3%	0.27	0.27	0%	6.36	6.31	1%	0.1	0.23	n/c	0.15	0.16	n/c	-0.05	-0.05	-	1.51	1.66	9%	0.51	0.579	13%	
Hydroxide, as CaCO3	mg/L	<5	<5	n/c	<1	<1	n/c	<1	<1	n/c	<1	<1	n/c	<5	<5	n/c	<5	<5	n/c	<5	<5	n/c	<5	<5	n/c	<5	<5	n/c	-5	-5	-	-5	-5	-	-5	-5	-	
Magnesium	mg/L	2.56	2.64	3%	18.6	18.1	3%	5.69	5.73	1%	14.5	14.1	3%	9.13	9.13	0%	4.07	4.17	2%	14.1	13.2	7%	2.9	2.9	0%	4.7	4.7	0%	6.5	6.5	0%	9.2	9.1	1%	16.1	15.7	3%	
Potassium	mg/L	0.3	0.3	n/c	0.708	0.709	0%	0.687	0.689	0%	0.567	0.554	2%	0.5	0.5	n/c	0.4	0.4	n/c	0.4	0.4	n/c	0.3	0.3	n/c	0.4	0.3	29%	0.64	0.62	3%	0.7	0.72	3%	0.6	0.6	0%	
Sodium	mg/L	3	2.8	7%	10.9	10.6	3%	7.49	7.53	1%	4.03	3.91	3%	4.2	4.2	0%	5.8	6	3%	7.4	6.9	7%	4.8	4.7	2%	9.4	9.1	3%	10	10	0%	14	14	0%	5.1	4.7	8%	
Sulphate	mg/L	4.3	4.3	0%	173	177	2%	41.4	40.8	1%	82.5	81.6	1%	49.1	49	0%	22.6	22.6	0%	43.5	43.4	0%	14.1	14.3	1%	34.4	33.9	1%	48.3	48.3	0%	83	81	2%	110	92.7	17%	
WQTC04-Nutrients and Chlorophyll a																																						
Nitrate	mg-N/L	0.06	0.05	n/c	0.045	0.05	n/c	0.13	0.13	0%	0.49	0.32	42%	0.09	0.09	0%	0.01	0.01	n/c	0.18	0.18	0%	0.01	<0.01	n/c	<0.01	0.03	n/c	0.03	0.03	-	0.02	-0.01	-	0.25	0.319	24%	
Nitrite	mg-N/L	<0.01	<0.01	n/c	<0.01	<0.01	n/c	<0.01	<0.01	n/c	<0.01	<0.01	n/c	0.12	0.13	8%	0.03	0.03	n/c	<0.01	<0.01	n/c	<0.01	<0.01	n/c	<0.01	<0.01	n/c	-0.01	-0.01	-	-0.01	-0.01	-	-	-0.01	-	
Nitrate + nitrite	mg-N/L	-	-	-	0.045	0.05	n/c	0.13	0.13	0%	0.49	0.32	42%	-	-	-	-	-	-	-	-	n/c	-	-	n/c	-	-	n/c	-	-	-	-	-	-	-	-	-	-
Total ammonia	mg-N/L	0.05	0.04	-	<0.02	0.039	n/c	0.027	0.025	8%	0.036	0.044	n/c	<0.01	<0.01	n/c	0.02	0.02	0%	<0.01	<0.01	n/c	0.02	0.42	n/c	<0.01	<0.01	n/c	-0.01	0.01	-	0.03	0.03	-	0.01	0.02	-	
Total nitrogen	mg-N/L	-	-	-	0.336	0.246	n/c	1.47	1.58	7%	0.78	0.55	35%	0.36	0.35	3%	0.73	0.69	6%	0.33	0.38	14%	0.59	0.6	2%	0.69	0.63	9%	0.8	0.86	7%	0.47	0.5	6%	0.4	0.43	7%	
Total kjeldahl nitrogen	mg-N/L	-	-	-	0.29	0.2	n/c	1.35	1.45	7%	0.29	0.23	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	0.086	0.092	7%	0.014	0.014	0%	0.11	0.11	0%	<0.01	<0.01	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved phosphorus	mg-P/L	-	-	-	<0.01	<0.01	n/c	0.016	0.018	n/c	<0.01	<0.01	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus (as phosphate)	mg-P/L	0.086	0.092	7%	0.027	0.009	n/c	0.289	0.29	0%	0.002	0.003	n/c	0.015	0.026	-	0.095	0.099	4%	<0.003	<0.003	n/c	0.016	0.031	64%	0.032	0.027	17%	0.081	0.073	10%	0.012	0.013	-	-0.003	-0.003	-	
WQTC06-Total Metals																																						
Aluminum	µg/L	2570	2550	1%	892	849	5%	798	903	12%	5	5	n/c	72	63	13%	2260	2720	18%	7	<5	n/c	609	461	28%	1050	1020	3%	400	380	5%	390	380	3%	4	5	-	
Antimony	µg/L	0.2	0.2	n/c	0.24	0.25	n/c	0.2	0.32	n/c	0.1	0.11	n/c	0.1	0.1	n/c	<0.2	0.2	n/c	<0.2	<0.2	n/c	0.13	0.16	21%	0.16	0.15	6%	0.14	0.14	0%	0.12	0.11	9%	0.22	0.16	32%	
Arsenic	µg/L	2.31	2.41	4%	0.49	0.5	2%	1.59	1.77	11%	0.24	0.22	n/c	0.36	0.38	5%	1.6	1.7	6%	<0.2	<0.2	n/c	0.7	0.8	13%	0.8	0.8	12%	0.9	0.8	12%	0.7	0.7	0%	0.3	0.3	-	
Barium	µg/L	179</																																				

Parameter	Unit	McPL-001		RPD	EAGL-001		RPD	DALG-002		RPD	WHST-003		RPD	WHST-003		RPD	McPL-001		RPD	MINE-001		RPD	CHNC-001		RPD	CHNC-001		RPD	DALG-002-1		RPD	EAGL-003-1		RPD	WHST-004-1		RPD
		29-Jul-13	29-Jul-13		23-Jul-14	23-Jul-14		23-Sep-14	23-Sep-14		15-Mar-15	15-Mar-15		6-Jun-15	6-Jun-15		19-Sep-15	19-Sep-15		16-Mar-16	16-Mar-16		21-Jun-16	21-Jun-16		20-Sep-16	20-Sep-16		27-Jun-17	27-Jun-17		20-Sep-17	20-Sep-17		7-Mar-17	7-Mar-17	
		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate	
WQTC06-Total Metals (cont'd)																																					
Zinc	µg/L	16.5	17	3%	76	76	0%	24	26	8%	1	<1	n/c	2.9	3	3%	18	20	11%	1	1	n/c	4.2	4.9	15%	10.9	9.2	17%	9.8	10	2%	43	43	0%	1.1	0.6	-
Zirconium	µg/L	1.5	1.5	n/c	0.32	0.26	21%	1.4	1.4	0%	0.07	0.07	0%	<0.5	<0.5	n/c	1.9	1.5	24%	<0.1	<0.1	n/c	2	1.6	22%	1.7	1.5	13%	1.7	1.4	19%	1.2	1.1	9%	0.1	0.1	-
WQTC07-Dissolved Metals																																					
Aluminum	µg/L	147	141	4%	94	92	2%	117	117	0%	1	1	n/c	18	17	n/c	207	193	7%	<5	<5	n/c	188	180	4%	195.6	196.9	1%	106	111	5%	189	147	25%	-1	-1	-
Antimony	µg/L	<0.2	<0.2	n/c	0.24	0.21	n/c	0.15	0.14	n/c	0.09	0.12	n/c	<0.2	<0.2	n/c	<0.2	<0.2	n/c	<0.2	<0.2	n/c	<0.2	<0.2	n/c	<0.2	<0.2	n/c	0.13	0.14	7%	0.08	0.08	-	0.095	0.085	-
Arsenic	µg/L	0.9	0.9	n/c	0.15	0.15	n/c	0.51	0.52	2%	0.16	0.16	n/c	0.4	0.3	n/c	0.5	0.5	n/c	<0.2	<0.2	n/c	0.5	0.5	n/c	<1	<1	n/c	0.5	0.5	-	0.4	0.4	-	0.2	0.2	-
Barium	µg/L	83	83	0%	39.8	40	1%	74.1	74	0%	173	168	3%	116	116	0%	83	81	2%	85	79	7%	65	64	2%	70	68	3%	62.2	60.6	3%	52.4	51.8	1%	168.3	166.9	1%
Beryllium	µg/L	0.04	0.04	n/c	0.02	0.01	n/c	0.04	0.04	n/c	<0.01	<0.01	n/c	<0.04	<0.04	n/c	0.05	0.06	n/c	<0.04	<0.04	n/c	0.06	0.05	n/c	<0.5	<0.5	n/c	-0.05	-0.05	-	-0.05	0.07	-	-0.05	-0.05	-
Bismuth	µg/L	<1	<1	n/c	<0.01	<0.01	n/c	<0.01	<0.01	n/c	<0.01	<0.01	n/c	<1	<1	n/c	<1	<1	n/c	<1	<1	n/c	<1	<1	n/c	<1	<1	n/c	-0.1	-0.1	-	-0.1	-0.1	-	-0.1	-0.1	-
Boron	µg/L	6	<4	n/c	21	22	5%	27	25	8%	7	8	13%	8	8	n/c	7	7	0%	11	11	n/c	5	6	n/c	<20	<20	n/c	25	24	4%	33	30	10%	9	9	-
Cadmium	µg/L	0.03	0.03	n/c	0.152	0.156	3%	0.046	0.046	0%	0.009	0.009	n/c	0.01	<0.01	n/c	0.05	0.05	0%	0.02	0.02	n/c	0.03	0.02	n/c	<0.1	<0.1	n/c	0.03	0.03	-	0.14	0.12	15%	0.012	0.012	-
Chromium	µg/L	1.1	1.1	n/c	<0.1	0.1	n/c	0.8	0.7	13%	<0.1	<0.1	n/c	<0.4	<0.4	n/c	0.7	0.7	0%	<0.4	<0.4	n/c	0.7	0.8	n/c	<0.5	<0.5	n/c	0.67	0.75	11%	0.57	0.47	19%	-0.05	-0.05	-
Cobalt	µg/L	0.33	0.32	3%	5.75	5.65	2%	1.06	1.0																												

Table A3-3: Surface Water Quality Duplicate Results from the Eagle Plain Project, 2013 – 2017

Parameter	Unit	McPL-001			RPD	EAGL-001			RPD	DALG-002			RPD	WHST-003			RPD	WHST-003			RPD	McPL-001			RPD	MINE-001			RPD	CHNC-001			RPD	CHNC-001			RPD	DALG-002-1			RPD	EAGL-1-003-1			RPD	WHST-004-1			RPD
		29-Jul-13	29-Jul-13			23-Jul-14	23-Jul-14			23-Sep-14	23-Sep-14			15-Mar-15	15-Mar-15			6-Jun-15	6-Jun-15			19-Sep-15	19-Sep-15			16-Mar-16	16-Mar-16			21-Jun-16	21-Jun-16			20-Sep-16	20-Sep-16			27-Jun-17	27-Jun-17			20-Sep-17	20-Sep-17			7-Mar-17	7-Mar-17		
		Sample	Duplicate			Sample	Duplicate			Sample	Duplicate			Sample	Duplicate			Sample	Duplicate			Sample	Duplicate			Sample	Duplicate			Sample	Duplicate			Sample	Duplicate			Sample	Duplicate			Sample	Duplicate			Sample	Duplicate		
WQTC10-Alkylated PAHs																																																	
7-Methylbenzo[a]pyrene	µg/L	<0.000093	<0.00015	n/c	0.000385	<0.000416	n/c	<0.000581	<0.000443	n/c	<0.000217	<0.000225	n/c	<0.000259	<0.000194	n/c	<0.000363	<0.000355	n/c	<0.000132	<0.000124	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
2-Methylanthracene	µg/L	<0.00024	<0.000236	n/c	<0.000204	<0.000479	n/c	<0.000199	<0.000335	n/c	<0.000372	<0.000207	n/c	<0.000113	<0.0000974	n/c	<0.000137	<0.000198	n/c	<0.00016	<0.000172	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
C1 substituted acenaphthenes	µg/L	<0.000159	<0.000104	n/c	<0.000149	<0.000362	n/c	<0.000927	<0.000417	n/c	<0.000288	<0.000271	n/c	<0.000309	<0.00031	n/c	<0.000257	<0.000225	n/c	<0.000447	<0.000384	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
C1 substituted benzo(a)anthracenes / chrysenes	µg/L	0.000381	0.000296	n/c	0.00159	0.0018	12%	0.00444	0.00645	n/c	<0.000149	<0.000141	n/c	0.000309	0.00053	n/c	0.000342	0.000291	n/c	<0.0000777	<0.0000886	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
C2 substituted benzo(a)anthracenes / chrysenes	µg/L	<0.00102	<0.00102	n/c	0.000582	0.00106	58%	0.002544	0.003764	39%	<0.00021	<0.000134	n/c	<0.000128	0.00025	n/c	<0.00016	<0.000107	n/c	<0.0000783	<0.0000678	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
C3 substituted benzo(a)anthracenes / chrysenes	µg/L	<0.001092	<0.001092	n/c	<0.000537	<0.000537	n/c	0.000246	0.000548	n/c	<0.000154	<0.000134	n/c	0.000092	0.000092	n/c	<0.000123	<0.000143	n/c	<0.000107	<0.0000527	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
C4 substituted benzo(a)anthracenes / chrysenes	µg/L	<0.0000677	0.000195	n/c	<0.000106	<0.0000984	n/c	0.000274	0.000393	n/c	<0.000119	<0.000102	n/c	<0.000414	<0.000414	n/c	<0.000123	<0.000131	n/c	<0.0000622	<0.000064	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
C1 substituted benzofluoranthenes / benzopyrenes	µg/L	<0.001062	<0.001062	n/c	0.002139	0.001779	n/c	0.00446	0.0057	24%	<0.000217	<0.000225	n/c	0.000331	0.000454	n/c	<0.000363	<0.000355	n/c	<0.000132	<0.000124	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
C2 substituted benzofluoranthenes / benzopyrenes	µg/L	<0.002082	<0.002082	n/c	<0.001392	<0.001392	n/c	0.0023	0.0025	n/c	<0.000217	<0.000313	n/c	<0.000456	<0.000456	n/c	<0.000206	<0.000203	n/c	<0.00019	<0.000185	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
C1 substituted biphenyls	µg/L	<0.0024	<0.0024	n/c	<0.00927	<0.00927	n/c	0.00433	<0.00375	n/c	<0.00384	<0.00384	n/c	<0.001857	<0.001857	n/c	<0.000936	<0.000936	n/c	<0.00645	<0.00645	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
C2 substituted biphenyls	µg/L	<0.01035	<0.01035	n/c	<0.0414	<0.0414	n/c	<0.01707	<0.01707	n/c	<0.01635	<0.01635	n/c	<0.0033	<0.0033	12%	0.000412	0.000362	n/c	<0.02328	<0.02328	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
5,9-Dimethylchrysene	µg/L	<0.0000596	<0.0000792	n/c	0.000218	0.000327	n/c	<0.000411	0.000727	n/c	<0.00021	<0.000134	n/c	<0.000128	<0.000149	n/c	<0.00016	<0.000107	n/c	<0.0000783	<0.0000678	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
5/6-Methylchrysenes	µg/L	<0.000116	<0.000138	n/c	0.000207	0.000273	n/c	<0.00122	0.00058	n/c	<0.000153	<0.000145	n/c	<0.000082	<0.0000823	n/c	<0.000124	<0.0000725	n/c	<0.0000788	<0.0000898	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
1-Methylchrysene	µg/L	<0.000106	<0.000126	n/c	0.000253	0.000307	n/c	<0.00118	0.000695	n/c	<0.000144	<0.000137	n/c	<0.0000773	<0.0000776	n/c	<0.000116	<0.0000673	n/c	<0.0000767	<0.0000874	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
2,4-Dimethyldibenzothiophene	µg/L	<0.0000763	<0.0000898	n/c	<0.000172	<0.000182	n/c	<0.00151	<0.00126	n/c	<0.000316	<0.000293	n/c	<0.0000847	<0.0000843	n/c	<0.000306	<0.000332	n/c	<0.000154	<0.000156	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
2/3-Methyldibenzothiophenes	µg/L	<0.000202	<0.0000856	n/c	0.000535	0.000513	n/c	0.00127	0.0027	n/c	<0.000277	<0.000346	n/c	<0.000111	<0.000142	n/c	<0.00019	<0.000185	n/c	<0.000238	<0.000266	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
C1 substituted dibenzothiophenes	µg/L	<0.000202	<0.0000856	n/c	0.00131	0.00159	19%	0.00275	0.00888	n/c	<0.000277	<0.000346	n/c	<0.000111	<0.000142	n/c	<0.00019	<0.000185	n/c	<0.000238	<0.000266	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
C2 substituted dibenzothiophenes	µg/L	<0.002364	<0.002364	n/c	0.001355	0.001105	n/c	0.011499	0.017099	39%	<0.000316	<0.000233	n/c	0.000793	<0.000952	18%	<0.000306	<0.000332	n/c	<0.000154	<0.000156	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
C3 substituted dibenzothiophenes	µg/L	<0.00432	<0.00432	n/c	<0.001056	0.001068	n/c	0.010441	0.014541	33%	<0.000285	<0.000217	n/c	0.000653	0.000469	n/c	<0.001185	<0.001185	n/c	<0.001161	<0.001161	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
C4 substituted dibenzothiophenes	µg/L	<0.002262	<0.002262	n/c	<0.001017	<0.001017	n/c	0.003979	0.005759	n/c	<0.00135	<0.00135	n/c	<0.002319	<0.002319	n/c	<0.001938	<0.001938	n/c	<0.001032	<0.001032	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
C1 substituted fluoranthenes / pyrenes	µg/L	<0.001275	<0.001275	n/c	0.00452	0.00505	n/c	0.012549	0.016749	29%	<0.000405	<0.000233	n/c	0.000854	0.001444	n/c	0.00134	0.00144	n/c	<0.000178	<0.000167	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
C2 substituted fluoranthenes / pyrenes	µg/L	<0.0033	<0.0033	n/c	0.00485	0.00665	n/c	0.02111	0.02211	5%	<0.000235	<0.000117	n/c	0.00103	0.00171	50%	0.000538	0.000525	n/c	<0.00014	<0.0000914	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
C3 substituted fluoranthenes / pyrenes	µg/L	<0.001221	<0.001221	n/c	0.002489	0.001369	n/c	0.004638	0.004818	n/c	<0.000248	<0.000254</																																					

Parameter	Unit	McPL-001			EAGL-001			DALG-002			WHST-003			WHST-003			McPL-001			MINE-001			CHNC-001			CHNC-001			DALG-002-1			EAGL-t-003-1			WHST-004-1		
		29-Jul-13	29-Jul-13	RPD	23-Jul-14	23-Jul-14	RPD	23-Sep-14	23-Sep-14	RPD	15-Mar-15	15-Mar-15	RPD	6-Jun-15	6-Jun-15	RPD	19-Sep-15	19-Sep-15	RPD	16-Mar-16	16-Mar-16	RPD	21-Jun-16	21-Jun-16	RPD	20-Sep-16	20-Sep-16	RPD	27-Jun-17	27-Jun-17	RPD	20-Sep-17	20-Sep-17	RPD	7-Mar-17	7-Mar-17	RPD
		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate	
Naphthenic Acid																																					
C12H18O2	ng/L	46.9	50.6	n/c	7.02	11	n/c	61.8	70	12%	<4.93	<4.96	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C12H20O2	ng/L	28.5	72.8	n/c	12.8	16.5	n/c	96.8	136	34%	<4.93	<4.96	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
C12H22O2	ng/L	20.6	150	n/c	<7.47	<4.99	n/c	48.6	64.7	28%	<4.93	<4.96	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
C12H24O2	ng/L	78.1	507	n/c	<4.91	<4.99	n/c	<5.16	<4.97	n/c	<4.93	11.1	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
C13H20O2	ng/L	18.3	23.2	n/c	<4.91	<4.99	n/c	76.1	94.5	22%	<4.93	<4.96	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
C13H22O2	ng/L	31.6	74.4	n/c	11.8	11.2	n/c	175	197	12%	<4.93	<4.96	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
C13H24O2	ng/L	18.8	130	n/c	6.92	<4.99	n/c	46.6	47.8	3%	<4.93	<4.96	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
C13H26O2	ng/L	111	635	n/c	10.6	37.1	n/c	28.7	18	n/c	<4.93	<4.96	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
C14H20O2	ng/L	21.2	34.1	n/c	8.37	13.6	n/c	57.5	65	12%	<4.93	<4.96	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
C14H22O2	ng/L	26.1	40.4	n/c	8.58	15.8	n/c	133	171	25%	<4.93	<4.96	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
C14H24O2	ng/L	14.1	34.3	n/c	8.39	6.35	n/c	167	190	13%	<4.93	<4.96	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
C14H26O2	ng/L	14.8	95.7	n/c	<4.91	<4.99	n/c	27.4	34.8	24%	<4.93	<4.96	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
C14H28O2	ng/L	84.3	<519	n/c	<4.91	<4.99	n/c	<5.16	<4.97	n/c	<4.93	<4.96	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
C15H18O2	ng/L	17.8	28.6	n/c	13.8	<4.99	n/c	49.2	61.8	23%	<4.93	<4.96	n/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
C15H20O2	ng/L	34.5	46.8	n/c	7.48	&lt																															

Table A3-3: Surface Water Quality Duplicate Results from the Eagle Plain Project, 2013 – 2017

Parameter	Unit	McPL-001			EAGL-001			DALG-002			WHST-003			WHST-003			McPL-001			MINE-001			CHNC-001			CHNC-001			DALG-002-1			EAGL-t-003-1			WHST-004-1			
		29-Jul-13	29-Jul-13	RPD	23-Jul-14	23-Jul-14	RPD	23-Sep-14	23-Sep-14	RPD	15-Mar-15	15-Mar-15	RPD	6-Jun-15	6-Jun-15	RPD	19-Sep-15	19-Sep-15	RPD	16-Mar-16	16-Mar-16	RPD	21-Jun-16	21-Jun-16	RPD	20-Sep-16	20-Sep-16	RPD	27-Jun-17	27-Jun-17	RPD	20-Sep-17	20-Sep-17	RPD	7-Mar-17	7-Mar-17	RPD	
		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		
WQTC12-Radionuclides																																						
Actinium-228	Bq/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<0.4	n/c	<0.7	<0.8	-	<0.6	0.7	-	<0.9	<1	-	<0.7	<0.1	-	-	-	-	<1	<0.8	-	
Bismuth-212	Bq/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<2	2	n/c	<2	<1	-	<1	<2	-	<1	<3	-	<2	<2	-	-	-	-	<2	3	-	
Bismuth-214	Bq/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.6	0.6	n/c	<0.6	<0.4	-	<0.3	0.8	-	<0.6	<0.6	-	<0.6	1	-	-	-	-	<0.7	1	-	
Lead-210	Bq/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<4	<5	n/c	<3	<3	-	<3	<4	-	<3	<4	-	<4	<4	-	-	-	-	<4	<4	-	
Lead-211	Bq/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	<4	n/c	<4	<3	-	<2	<7	-	<2	<7	-	<5	<4	-	-	-	-	<2	<7	-	
Lead-212	Bq/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8	0.5	n/c	<0.3	0.4	-	0.3	0.4	-	<0.3	0.8	-	0.7	0.8	NC	-	-	-	0.8	0.4	NC	
Lead-214	Bq/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.4	n/c	<0.4	<0.4	-	0.4	0.5	-	<0.5	<0.5	-	0.8	<0.4	-	-	-	-	<0.6	<0.5	-	
Potassium-40	Bq/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<4	<5	n/c	<4	<4	-	<3	<5	-	<4	<7	-	<5	<5	-	-	-	-	11	12	NC	
Radium-223	Bq/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.9	<1	n/c	<0.6	<0.8	-	<0.7	<1	-	<0.8	<0.6	-	<1	<0.5	-	-	-	-	<0.6	<1	-	
Radium-226	Bq/L	-	-	-	-	-	-	0.006	-	n/c	<0.005	0.007	n/c	0.01	0.006	n/c	0.02	<0.1	n/c	<4	<3	-	<3	<5	-	0.02	0.01	-	<4	<5	-	-	-	-	<5	<4	-	
Radon-219	Bq/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	n/c	<1	<1	-	<1	<2	-	<1	<2	-	<0.6	<1	-	-	-	-	<1	0.7	-	
Thallium-208	Bq/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	0.5	n/c	<0.2	<0.2	-	<0.2	<0.2	-	<0.2	0.3	-	<0.2	<0.2	-	-	-	-	0.4	0.4	NC	
Thorium-227	Bq/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.6	<0.5	n/c	<0.9	<0.5	-	<0.9	<1	-	<0.7	<1	-	<1	<0.8	-	-	-	-	<1	<1	-	
Thorium-230	Bq/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<30	<30	n/c	<10	<10	-	<20	<10	-	<20	<20	-	<20	<10	-	-	-	-	<20	<10	-	
Thorium-234	Bq/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<4	4	n/c	<3	<3	-	<2	<4	-	<3	<4	-	<4	<4	-	-	-	-	<4	<4	-	
Uranium-235	Bq/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<0.8	n/c	<0.8	<0.9	-	<0.8	<1	-	<0.9	<1	-	<1	2	-	-	-	-	<1	<1	-	
Calculated Quantities																																						
RPD values over 20%	-	-	-	0.4%	-	-	4%	-	-	13%	-	-	2%	-	-	3%	-	-	2%	-	-	1%	-	-	3%	-	-	1%			1%			4%			4%	

Note:

RPD were not calculated if concentrations of either field sample or duplicate is less than five times above the detection limit or detection limit was not available.

Relative percentage difference greater than 20% were **bolded**.

The percentage of RPD values over 20% for the entire dataset is 3.8%.

<= less than; - = no data; n/c = not calculated; µS/cm = microSiemens per centimetre; ng/L = nanogram per litre; µg/L = micrograms per litre; mg/L = milligrams per litre; mg-N/L = milligrams nitrogen per litre; mg-P/L = milligrams phosphorus per litre; Bq/L = becquerel per litre; CaCO₃ = calcium carbonate.

Table A3-4: Groundwater Quality Duplicate Results from the Eagle Plain Project, 2013 – 2017

Parameter	Unit	YOWN-1401		RPD
		18-Mar-16	18-Mar-16	
		Sample	Duplicate	
WQTC02-Conventional Parameters				
pH	-	7.41	7.47	1%
Specific conductivity	µS/cm	10200	10100	1%
Hardness, as CaCO ₃	mg/L	2320	2400	3%
Total alkalinity, as CaCO ₃	mg/L	1140	1120	2%
Alkalinity, Phenolphthalein as CaCO ₃	mg/L	<5	<5	n/c
Total dissolved solids	mg/L	9640	9720	1%
Total suspended solids	mg/L	170	171	1%
Total organic carbon	mg/L	4.5	4	12%
Total inorganic carbon	mg/L	265	266	0%
Dissolved organic carbon	mg/L	3.8	3.5	8%
Dissolved inorganic carbon	mg/L	81.9	83.1	1%
WQTC03-Major Ions				
Bicarbonate, as CaCO ₃	mg/L	1390	1360	2%
Bromide	mg/L	<0.2	<0.2	n/c
Calcium	mg/L	216	223	3%
Carbonate, as CaCO ₃	mg/L	<6	<6	n/c
Chloride	mg/L	1.13	1.25	10%
Hydroxide, as CaCO ₃	mg/L	<5	<5	n/c
Magnesium	mg/L	433	447	3%
Potassium	mg/L	10	10.6	6%
Sodium	mg/L	2500	2560	2%
Sulphate	mg/L	5860	5850	0%
WQTC04-Nutrients and Chlorophyll a				
Nitrate	mg-N/L	<0.1	<0.1	n/c
Nitrite	mg-N/L	<0.1	<0.1	n/c
Total ammonia	mg-N/L	4.7	4.83	3%
Total nitrogen	mg-N/L	6.02	6.29	4%
Total Kjeldahl nitrogen	mg-N/L	-	-	n/c
Phosphorus (as phosphate)	mg-P/L	0.004	0.004	n/c

Table A3-4: Groundwater Quality Duplicate Results from the Eagle Plain Project, 2013 – 2017

Parameter	Unit	YOWN-1401		RPD
		18-Mar-16	18-Mar-16	
		Sample	Duplicate	
WQTC06-Total Metals				
Aluminum	µg/L	51	38	29%
Antimony	µg/L	1.5	1.8	18%
Arsenic	µg/L	2	2	0%
Barium	µg/L	9	7	25%
Beryllium	µg/L	<0.5	<0.5	n/c
Bismuth	µg/L	<1	<1	n/c
Boron	µg/L	338	338	0%
Cadmium	µg/L	<0.1	<0.1	n/c
Calcium	µg/L	219000	221000	1%
Chromium	µg/L	2.3	1.7	30%
Cobalt	µg/L	2.13	2.11	1%
Copper	µg/L	<5	<5	n/c
Iron	µg/L	50900	51100	0%
Lead	µg/L	0.3	0.2	40%
Lithium	µg/L	172	171	1%
Magnesium	µg/L	437000	435000	0%
Manganese	µg/L	1060	1030	3%
Mercury	µg/L	<0.01	<0.01	n/c
Molybdenum	µg/L	5.2	5.6	7%
Nickel	µg/L	9	9	0%
Potassium	µg/L	9900	10100	2%
Selenium	µg/L	<2	<2	n/c
Silicon	µg/L	3440	3510	2%
Silver	µg/L	<0.1	<0.1	n/c
Sodium	µg/L	2590000	2530000	2%
Strontium	µg/L	759	730	4%
Sulphur	µg/L	2060000	2100000	2%
Tellurium	µg/L	<0.5	<0.5	n/c
Thallium	µg/L	<0.1	<0.1	n/c
Thorium	µg/L	0.7	0.7	0%
Tin	µg/L	<1	<1	n/c
Titanium	µg/L	11	11	0%
Uranium	µg/L	11.1	10.6	5%
Vanadium	µg/L	<0.5	<0.5	n/c
Zinc	µg/L	5	5	0%
Zirconium	µg/L	5	5	0%

Table A3-4: Groundwater Quality Duplicate Results from the Eagle Plain Project, 2013 – 2017

Parameter	Unit	YOWN-1401		RPD
		18-Mar-16	18-Mar-16	
		Sample	Duplicate	
WQTC07-Dissolved Metals				
Aluminum	µg/L	52	<50	n/c
Antimony	µg/L	<2	<2	n/c
Arsenic	µg/L	<2	<2	n/c
Barium	µg/L	<10	<10	n/c
Beryllium	µg/L	<0.4	<0.4	n/c
Bismuth	µg/L	<10	<10	n/c
Boron	µg/L	380	426	11%
Cadmium	µg/L	<0.1	<0.1	n/c
Chromium	µg/L	<4	<4	n/c
Cobalt	µg/L	1.17	1.07	9%
Copper	µg/L	3	<2	n/c
Iron	µg/L	21700	23000	6%
Lead	µg/L	<1	<1	n/c
Lithium	µg/L	177	193	9%
Manganese	µg/L	949	974	3%
Mercury	µg/L	<0.01	<0.01	n/c
Molybdenum	µg/L	5	5	0%
Nickel	µg/L	<10	<10	n/c
Selenium	µg/L	<6	<6	n/c
Silicon	µg/L	2930	3030	3%
Silver	µg/L	<0.1	<0.1	n/c
Strontium	µg/L	768	775	1%
Sulphur	µg/L	2120000	2210000	4%
Tellurium	µg/L	<1	<1	n/c
Thallium	µg/L	<0.1	<0.1	n/c
Thorium	µg/L	<4	<4	n/c
Tin	µg/L	<1	<1	n/c
Titanium	µg/L	<10	<10	n/c
Uranium	µg/L	10	10	0%
Vanadium	µg/L	<1	<1	n/c
Zinc	µg/L	<5	<5	n/c
Zirconium	µg/L	4	4	0%

Table A3-4: Groundwater Quality Duplicate Results from the Eagle Plain Project, 2013 – 2017

Parameter	Unit	YOWN-1401		RPD
		18-Mar-16	18-Mar-16	
		Sample	Duplicate	
WQTC08-Volatile Organics				
Benzene	µg/L	<0.5	<0.5	n/c
Ethylbenzene	µg/L	<0.5	<0.5	n/c
Toluene	µg/L	<0.5	<0.5	n/c
Xylenes	µg/L	<0.5	<0.5	n/c
Styrene	ug/L	<0.5	<0.5	n/c
Volatile Hydrocarbons	µg/L	<50	<50	n/c
Volatile Petroleum Hydrocarbons	µg/L	<50	<50	n/c
Methyl tert-Butyl Ether	ug/L	<0.5	<0.5	n/c
WQTC12-Radionuclides				
Actinium-228	Bq/L	<1	<0.8	n/c
Bismuth-212	Bq/L	<1	<0.9	n/c
Bismuth-214	Bq/L	<0.5	<0.4	n/c
Lead-210	Bq/L	<3	<3	n/c
Lead-211	Bq/L	<3	<4	n/c
Lead-212	Bq/L	0.3	<0.2	n/c
Lead-214	Bq/L	<0.5	<0.4	n/c
Potassium-40	Bq/L	<4	<4	n/c
Radium-223	Bq/L	<0.6	<0.6	n/c
Radium-226	Bq/L	0.005	0.006	n/c
Radon-219	Bq/L	<1	<1	n/c
Thallium-208	Bq/L	<0.2	0.2	n/c
Thorium-227	Bq/L	<0.6	<0.6	n/c
Thorium-230	Bq/L	<10	<20	n/c
Thorium-234	Bq/L	<3	<3	n/c
Uranium-235	Bq/L	<0.8	<0.9	n/c
Calculated Quantities				
RPD values over 20%	-	-	-	3%

Note:

RPD were not calculated if concentrations of either field sample or duplicate is less than five times above the detection limit.

Relative percentage difference greater than 20% were **bolded**.

The percentage of RPD values over 20% for the entire dataset is 2.2%.

<= less than; - = no data; n/c = not calculated; µS/cm = microSiemens per centimetre; µg/L = micrograms per litre; mg/L = milligrams per litre; mg-N/L = milligrams nitrogen per litre; mg-P/L = milligrams phosphorus per litre; Bq/L = becquerel per litre; CaCO₃ = calcium carbonate.

A3.1 Overall Data Quality

The results of the overall review of field data indicated that the majority of the data recorded in the field was of high quality. Key outcomes included:

- Several field measurements and laboratory results were invalidated and excluded from data analysis due to quality control issues.
- Evaluation of the surface water and groundwater quality QC samples indicated that:
 - Reportable detections were observed in 1.5% of the field blank samples and 0.9% of the trip blank samples;
 - 3.8% and 3.4% of duplicate concentrations differed by more than 20% for surface water samples and groundwater samples, respectively;
 - 0.7% and 4.0% of the values differed by more than 30% between dissolved and total metal water quality parameters for surface water and groundwater, respectively;
- No quality control samples were collected for sediment.

The overall quality of the surface water and groundwater quality data was determined to be high. Therefore, the results reported herein are determined to be adequate to meet the needs of the study.

A4.0 REFERENCES

- AENV (Alberta Environment). 2006. Guidelines for Quality Assurance and Quality Control in Surface Water Quality Programs in Alberta. Edmonton, AB, Canada. 67 pp. ISBN: 0-7785-5081-8 (Print Edition); 0-7785-5082-6 (Online Edition).
- BCMOE (British Columbia Ministry of the Environment). 1998. Guidelines for Interpreting Water Quality Data. Version 1.0. Available at: <http://www.ilmb.gov.bc.ca/risc/pubs/aquatic/interp/index.htm>. Accessed: December 2016.
- USEPA (United States Environmental Protection Agency). 2000. EPA Quality Manual for Environmental Programs. CIO 2105-P-01-0 (formerly 5360 A1).

[https://golderassociates.sharepoint.com/sites/21901g/deliverables/2017 report/appendices/app a - qaqc/app-a_qaqc text_17oct2018.docx](https://golderassociates.sharepoint.com/sites/21901g/deliverables/2017%20report/appendices/app%20a%20-%20qaqc/app-a_qaqc_text_17oct2018.docx)

APPENDIX B

**Surface Water Quality Data
and Summary Statistics**

APPENDIX B
Table B-1: Surface Water Quality Summary for Eagle Plain Baseline Study, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations												
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-003
							29-Jul-13	22-Jul-14	22-Sep-14	14-Mar-15	6-Jun-15	18-Sep-15	16-Mar-16	21-Jun-16	20-Sep-16	7-Mar-17	27-Jun-17	20-Sep-17	26-Aug-13
Field Measured																			
pH	-	-	6.5 - 9.0	-	-	7.3	6.3 ^(Chronic)	6.8	7.5	7.1	7.0	8.2	6.8	7.4	7.42	7.35	7.6	7.0	
Specific conductivity	µS/cm	-	-	-	-	54	89	61	320	60	116	28 ^(s)	72	137	507	140.4	71.4	58	
Temperature	°C	-	-	-	-	17	16	4.8	0.10	11	3.0	0.0	15	1.4	0	16.4	5.1	7.4	
Dissolved oxygen	mg/L	-	5.5-9.5	-	-	8.8	-	12	2.0 ^(Chronic)	10	12	5.8 ^(Chronic)	8.8	14	0.93 ^(Chronic)	8.18	11.91	10	
Turbidity	NTU	-	-	-	-	8.3	-	-	-	5.9	46	3.1	8.4	17	-	-	-	8.1	
Conventional Parameters																			
Hardness, as CaCO ₃	mg/L	-	-	-	-	28	48	27	133	24	47	286	29	48	248	53	31	33	
Total alkalinity, as CaCO ₃	mg/L	-	-	-	20 ^(a)	-	16 ^(BC MOE mean)	29	13 ^(BC MOE mean)	135	14 ^(BC MOE mean)	23	201	13 ^(BC MOE mean)	26	200	37	17 ^(BC MOE mean)	23
Total dissolved solids	mg/L	-	-	-	-	86	102	88	222	32	12	202	184	146	310	210	98	94	
Total suspended solids	mg/L	-	-	-	-	4.0	3.0	15	<2.0	4.0	81	<2.0	5.0	11	3	< 2	2	4.0	
Total organic carbon	mg/L	-	-	-	-	-	-	24	19	23	24	10	25	24	9.7	23.3	22.8	-	
Dissolved organic carbon	mg/L	-	-	-	-	26	51	23	18	24	25	9.6	25	23	9.3	21.9	22.3	32	
Total inorganic carbon	mg/L	-	-	-	-	-	-	2.3	29	3.6	4.7	46	2.7	5.1	48	9.3	3.4	-	
Dissolved inorganic carbon	mg/L	-	-	-	-	3.4	5.8	2.3	29	3.2	4.4	45	2.5	4.9	48	8.7	3	4.5	
Major Ions																			
Bicarbonate, as CaCO ₃	mg/L	-	-	-	-	20	29	13	135	17	28	245	16	32	244	45	20	28	
Bromide	mg/L	-	-	-	-	-	<0.1	<0.1	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	< 0.02	< 0.02	0.03	-	
Calcium	mg/L	-	-	-	-	7.5	11	6.1	37	5.9	11	90	6.8	12	77.8	13	7.7	7.8	
Carbonate, as CaCO ₃	mg/L	-	-	-	-	<6.0	<1.0	<1.0	<1.0	<6.0	<6.0	<6.0	<6.0	<6.0	< 6	< 6	< 6	<6.0	
Chloride	mg/L	640	120	-	-	<0.05	0.62	1.1	2.7	0.080	0.12	0.46	0.10	0.15	0.957	0.09	0.06	<0.05	
Fluoride	mg/L	-	-	0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Magnesium	mg/L	-	-	-	-	2.3	3.0	2.4	6.9	2.2	4.6	15	2.9	4.7	13	4.7	2.9	3.4	
Potassium	mg/L	-	-	-	-	0.40	0.46	0.31	0.82	0.40	0.30	1.0	0.30	0.40	1.1	0.71	0.43	0.50	
Sodium	mg/L	-	-	-	-	1.8	2.4	3.0	13	3.3	7.7	12	4.8	9.4	17	9.4	3.3	1.6	
Sulphate	mg/L	-	-	-	128 - 429 ^(b, c)	-	4.2	9.2	9.1	29	9.1	27	99	14	34	82.9	27	10.7	2.2
Nutrients																			
Nitrate	mg-N/L	550	13.0	-	-	<0.01	<0.01	0.040	0.020	0.080	0.030	<0.01	0.010	<0.01	< 0.1	< 0.01	< 0.01	<0.01	
Nitrite	mg-N/L	-	0.060	-	-	<0.01	<0.01	<0.01	<0.01	0.06	0.04	0.11 ^(Chronic)	<0.01	<0.01	< 0.01	< 0.01	< 0.01	<0.01	
Nitrate + nitrite	mg-N/L	-	-	-	3.0	33	-	<0.01	0.040	0.020	-	-	-	-	-	-	-	-	
Total ammonia	mg-N/L	-	0.50 - 198 ^(d)	-	-	0.040	<0.02	0.026	0.16	<0.01	0.010	0.090	0.020	<0.01	0.22	0.03	< 0.01	0.030	
Total kjeldahl nitrogen	mg-N/L	-	-	-	-	-	0.70	1.0	0.98	-	-	-	-	-	-	-	-	-	
Total nitrogen	mg-N/L	-	-	-	-	-	0.70	1.1	1.0	0.69	0.75	0.47	0.59	0.69	0.51	0.72	0.7	-	
Total nitrogen (calculated)	mg-N/L	-	-	-	-	-	0.70	1.1	1.0	-	-	-	-	-	-	-	-	-	
Total phosphorus	mg-P/L	-	-	-	-	0.020	0.028	0.033	0.020	-	-	-	-	-	-	-	-	-	
Dissolved phosphorus	mg-P/L	-	-	-	-	-	0.010	0.010	0.014	-	-	-	-	-	-	-	-	-	
Phosphorus (as phosphate)	mg-P/L	-	-	-	-	0.020	0.017	0.064	0.013	0.039	0.063	<0.003	0.016	0.032	-	-	-	0.050	
Total Metals																			
Aluminum	µg/L	-	5.0 - 100 ^(e, f)	-	-	494 ^(Chronic)	218 ^(Chronic)	650 ^(Chronic)	39	368 ^(Chronic)	1,580 ^(Chronic)	13	609 ^(Chronic)	1,050 ^(Chronic)	12	120 ^(Chronic)	640 ^(Chronic)	249 ^(Chronic)	
Antimony	µg/L	-	-	9.0	-	0.10	0.22	0.19	0.10	0.10	<0.2	<0.2	0.13	0.16	0.12	0.18	0.23	0.20	
Arsenic	µg/L	-	5.0	-	-	0.79	0.71	0.81	0.64	0.61	1.2	0.40	0.70	0.80	0.6	0.7	0.8	1.5	
Barium	µg/L	-	-	1,000	-	102	109	95	471	93	148	471	79	99	657	110	94	123	
Beryllium	µg/L	-	-	0.13	-	0.090	0.070	0.090	0.020	0.080	0.080	<0.05	0.080	0.080	< 0.05	0.06	0.06	<0.04	
Bismuth	µg/L	-	-	-	-	<0.1	<0.01	0.010	<0.01	<0.1	-	-	<0.1	<0.1	< 0.1	< 0.1	< 0.1	-	
Boron	µg/L	29,000	1,500	-	-	7.0	9.0	8.0	15	8.0	9.0	12	2.0	10	14	11	5	<5.0	
Cadmium	µg/L	0.11 - 7.7 ^(b)	0.040 - 0.37 ^(b)	-	-	0.040	0.027	0.061 ^(Chronic)	0.13	0.040	0.10 ^(Chronic)	0.080	0.030	0.060	0.070	0.03	0.04	0.060	
Chromium	µg/L	-	1.0	-	-	1.4 ^(Chronic)	1.1 ^(Chronic)	1.8 ^(Chronic)	0.40	1.1 ^(Chronic)	3.2 ^(Chronic)	<0.4	1.3 ^(Chronic)	2.2 ^(Chronic)	0.3	0.57 ^(s)	1.6 ^(Chronic)	1.8 ^(Chronic)	
Cobalt	µg/L	-	-	4.0	110	0.30	0.18	0.55	0.89	0.20	1.3	0.33	0.23	0.72	1.12	0.15	0.32	0.42	
Copper	µg/L	-	2.0 - 4.0 ^(b)	-	-	5.6 ^(Chronic)	5.5 ^(Chronic)	6.0 ^(Chronic)	1.1	5.5 ^(Chronic)	7.0 ^(Chronic)	<1.0	5.2 ^(Chronic)	5.7 ^(Chronic)	0.5	5.1 ^(Chronic)	5.2 ^(Chronic)	7.0 ^(Chronic)	
Iron	µg/L	-	300	-	-	1,020 ^(Chronic)	902 ^(Chronic)	1,760 ^(Chronic)	389 ^(Chronic)	827 ^(Chronic)	3,140 ^(Chronic)	540 ^(Chronic)	925 ^(Chronic)	1,760 ^(Chronic)	1,040 ^(Chronic)	750 ^(Chronic)	1500 ^(Chronic)	2,780 ^(Chronic)	
Lead	µg/L	-	1.0 - 7.0 ^(b)	-	-	0.30	0.75	0.53	0.050	0.30	1.2 ^(Chronic)	<0.1	0.16	0.52	< 0.01	0.27	0.36	0.40	
Lithium	µg/L	-	-	-	-	1.8	2.6	2.4	3.6	1.6	4.0	5.0	1.8	3.8	4.8	2.2	2.1	1.0	
Manganese	µg/L	-	-	768 - 2,585 ^(b)	816 - 3,394 ^(b)	55	39	48	1,930 ^(BC MOE Max)	47	109	804	28	82	1,960 ^(BC MOE max)	61	35	53	
Mercury	µg/L	-	0.026	-	-	<0.01	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	0.02	<0.01	< 0.01	< 0.01	< 0.01	<0.01	
Molybdenum	µg/L	-	73	-	-	0.28	0.39	0.24	1.6	0.17	0.30	1.1	0.18	0.26	1.23	0.39	0.3	0.50	
Nickel	µg/L	-	25 - 150 ^(b)	-	-	5.5	5.0	6.9	4.0	5.0	9.0	3.0	5.3	6.0	3	4.2	5.9	10	
Selenium	µg/L	-	1.0	-	-	0.40	0.50	0.50	0.30	0.30	0.80	<0.6	0.40	0.80	< 0.2	0.4	0.4	0.80	
Silicon	µg/L	-	-	-	-	3,460	1,800	3,200	2,600	2,320	5,830	2,790	3,160	5,600	2680	1600	5100	1,830	
Silver	µg/L	-	0.25	-	-	<0.05	0.030	0.020	<0.01	<0.05	0.030	<0.01	0.020	0.021	< 0.01	< 0.01	0.02	0.030	
Strontium	µg/L	-	-	-	-	36	47	33	144	31	46	236	29	48	223	50	40	45	
Sulphur	µg/L	-	-	-	-	-	3,300	2,500	8,800	-	9,700	35,900	5,200	12,100	30100	9400	3900	900	
Tellurium	µg/L	-	-	-	-	<0.05	<0.05	<0.05	<0.05	-	<0.1	<0.1	<0.05	<0.05	< 0.05	< 0.05	< 0.05	<0.1	
Thallium	µg/L	-	0.80	-	-	<0.01	0.0050	0.012	<										

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		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-003	
							29-Jul-13	22-Jul-14	22-Sep-14	14-Mar-15	6-Jun-15	18-Sep-15	16-Mar-16	21-Jun-16	20-Sep-16	7-Mar-17	27-Jun-17	20-Sep-17	26-Aug-13	
Alkylated PAHs																				
C1 substituted naphthalenes	µg/L	-	-	-	-	-	<0.0033	<0.0027	<0.0134	0.35	<0.0094	<0.0091	<0.0095	-	-	-	-	-	<0.0041	
C2 substituted naphthalenes	µg/L	-	-	-	-	-	<0.0095	<0.00642	<0.0138	0.093	<0.0126	<0.0076	<0.0131	-	-	-	-	-	<0.0085	
C3 substituted naphthalenes	µg/L	-	-	-	-	-	<0.0053	<0.0037	<0.0066	0.025	<0.0058	0.0050	<0.0030	-	-	-	-	-	<0.0029	
C4 substituted naphthalenes	µg/L	-	-	-	-	-	<0.00256	<0.00015	0.0034	0.0057	<0.0087	<0.0057	<0.00162	-	-	-	-	-	0.0033	
1-Methylnaphthalene	µg/L	-	-	-	-	-	<0.00107	<0.00085	<0.0017	0.13	<0.00166	<0.0023	<0.00134	-	-	-	-	-	<0.00132	
2-Methylnaphthalene	µg/L	-	-	-	-	-	<0.0023	<0.0018	<0.0118	0.22	<0.0094	<0.0068	<0.00813	-	-	-	-	-	<0.0028	
1,2-Dimethylnaphthalene	µg/L	-	-	-	-	-	<0.00027	<0.00119	<0.0012	0.0077	<0.0006	<0.00053	<0.00035	-	-	-	-	-	<0.00177	
2,6-Dimethylnaphthalene	µg/L	-	-	-	-	-	<0.00031	<0.00047	<0.0011	0.023	<0.00051	0.00083	<0.0003	-	-	-	-	-	<0.00038	
C1 substituted acenaphthenes	µg/L	-	-	-	-	-	<0.00012	<0.00014	<0.00046	<0.00046	<0.00022	<0.00030	<0.00031	-	-	-	-	-	<0.00037	
C1 substituted biphenyls	µg/L	-	-	-	-	-	<0.0024	<0.0093	<0.0038	0.0046	<0.00186	<0.00094	<0.0065	-	-	-	-	-	0.0016	
C2 substituted biphenyls	µg/L	-	-	-	-	-	<0.0104	<0.041	<0.017	<0.0164	<0.0033	0.00028	<0.0233	-	-	-	-	-	0.0067	
2,3,5-Trimethylnaphthalene	µg/L	-	-	-	-	-	<0.00055	<0.00047	<0.00054	<0.0053	0.00040	0.0012	<0.00024	-	-	-	-	-	<0.00072	
2,3,6-Trimethylnaphthalene	µg/L	-	-	-	-	-	<0.00046	<0.00060	<0.00076	0.0057	<0.00097	0.0010	0.00023	-	-	-	-	-	<0.00073	
C1 substituted fluorenes	µg/L	-	-	-	-	-	<0.00210	<0.00103	<0.00150	0.0043	0.00079	0.00086	<0.00149	-	-	-	-	-	<0.00226	
C2 substituted fluorenes	µg/L	-	-	-	-	-	<0.00190	<0.00094	<0.00048	0.0066	<0.00022	<0.00028	0.00080	-	-	-	-	-	<0.0016	
C3 substituted fluorenes	µg/L	-	-	-	-	-	<0.0112	<0.00390	<0.0026	0.0026	<0.0053	0.0012	0.00082	-	-	-	-	-	<0.0041	
2-Methylfluorene	µg/L	-	-	-	-	-	<0.00035	<0.00027	<0.00019	0.0020	<0.00019	<0.00058	<0.00017	-	-	-	-	-	<0.00047	
1,4,6,7-Tetramethylnaphthalene	µg/L	-	-	-	-	-	<0.00016	<0.00015	<0.00074	<0.0015	<0.00018	<0.00046	<0.00016	-	-	-	-	-	<0.00041	
C1 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	<0.00019	0.00045	0.0012	0.0088	<0.00013	0.0031	<0.00165	-	-	-	-	-	<0.00029	
C2 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	<0.00205	<0.00118	<0.00098	0.0036	0.00058	0.0010	<0.00098	-	-	-	-	-	<0.0013	
C3 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	<0.00268	<0.00114	0.00078	0.0023	<0.00058	0.00037	0.00011	-	-	-	-	-	<0.0016	
C4 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	<0.0046	<0.00104	<0.0026	<0.0011	0.0013	0.0026	<0.00033	-	-	-	-	-	0.0055	
1-Methylphenanthrene	µg/L	-	-	-	-	-	<0.00019	<0.00037	0.00028	0.0013	<0.00018	0.00084	<0.00044	-	-	-	-	-	<0.00029	
2-Methylphenanthrene	µg/L	-	-	-	-	-	<0.00019	<0.00038	0.00027	0.0022	<0.00013	0.00065	<0.00070	-	-	-	-	-	<0.00029	
3-Methylphenanthrene	µg/L	-	-	-	-	-	<0.00020	0.00020	0.00031	0.0021	<0.00021	0.00072	<0.00050	-	-	-	-	-	<0.00029	
9/4-Methylphenanthrene	µg/L	-	-	-	-	-	<0.00020	<0.00012	0.00033	0.0019	<0.00026	0.00093	<0.00012	-	-	-	-	-	<0.00029	
2-Methylanthracene	µg/L	-	-	-	-	-	<0.00020	<0.00010	<0.00017	0.0012	<0.00013	<0.00030	<0.00012	-	-	-	-	-	<0.00030	
1,7-Dimethylfluorene	µg/L	-	-	-	-	-	<0.00019	<0.00044	<0.00048	<0.0011	<0.00022	<0.00028	<0.00012	-	-	-	-	-	<0.00022	
C1 substituted dibenzothiophenes	µg/L	-	-	-	-	-	<0.00016	<0.00014	0.00057	<0.00041	<0.00011	0.00037	<0.00017	-	-	-	-	-	<0.00014	
C2 substituted dibenzothiophenes	µg/L	-	-	-	-	-	<0.00236	<0.00056	<0.00210	<0.00036	0.00046	0.00066	<0.00016	-	-	-	-	-	<0.00194	
C3 substituted dibenzothiophenes	µg/L	-	-	-	-	-	<0.00432	<0.00106	<0.0014	<0.00014	0.00041	<0.00119	<0.001161	-	-	-	-	-	<0.00215	
C4 substituted dibenzothiophenes	µg/L	-	-	-	-	-	<0.00226	<0.00102	<0.0028	<0.00135	<0.00232	<0.00194	<0.00103	-	-	-	-	-	<0.0032	
2/3-Methyldibenzothiophenes	µg/L	-	-	-	-	-	<0.00016	<0.00021	<0.00024	<0.00041	<0.00011	<0.00033	<0.00017	-	-	-	-	-	<0.00014	
1,7-Dimethylphenanthrene	µg/L	-	-	-	-	-	<0.00020	<0.00025	<0.00026	<0.00028	<0.000084	0.00020	<0.000219	-	-	-	-	-	0.00015	
1,8-Dimethylphenanthrene	µg/L	-	-	-	-	-	<0.00020	<0.00016	<0.000085	<0.00029	<0.000085	<0.00014	<0.000035	-	-	-	-	-	<0.00014	
2,6-Dimethylphenanthrene	µg/L	-	-	-	-	-	<0.00020	<0.00032	<0.000144	0.00060	<0.000085	<0.00014	<0.000144	-	-	-	-	-	<0.000213	
3,6-Dimethylphenanthrene	µg/L	-	-	-	-	-	<0.00021	<0.00016	<0.000159	0.00054	<0.000087	0.00015	<0.000035	-	-	-	-	-	<0.000240	
2,4-Dimethyldibenzothiophene	µg/L	-	-	-	-	-	<0.000051	<0.00038	<0.00042	<0.00036	<0.00016	<0.0004	<0.00016	-	-	-	-	-	<0.00012	
C1 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	-	<0.00128	<0.00108	<0.0017	0.0050	<0.00071	0.0027	<0.00019	-	-	-	-	-	<0.0013	
C2 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	-	<0.0033	0.00024	<0.0021	0.0035	0.00076	0.0025	<0.00011	-	-	-	-	-	<0.00125	
C3 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	-	<0.00122	<0.00042	<0.00085	<0.00061	<0.00019	<0.00046	<0.00013	-	-	-	-	-	<0.00089	
C4 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	-	<0.00082	<0.00012	0.00027	<0.00026	<0.000094	<0.00020	<0.00012	-	-	-	-	-	<0.00056	
1,2,6-Trimethylphenanthrene	µg/L	-	-	-	-	-	<0.000050	<0.000061	<0.00016	<0.00027	<0.000087	<0.00014	<0.000092	-	-	-	-	-	<0.00014	
C1 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	-	0.00027	<0.000098	0.00054	0.00048	0.00024	0.00059	<0.000070	-	-	-	-	-	<0.00028	
C2 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	-	<0.00102	<0.00012	<0.00044	<0.00030	<0.00018	<0.00029	<0.000090	-	-	-	-	-	<0.00051	
C3 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	-	<0.00109	<0.000537	<0.00016	<0.00014	0.00024	<0.00014	<0.000090	-	-	-	-	-	<0.00080	
C4 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	-	<0.000100	<0.000097	<0.00015	<0.00016	<0.00041	<0.00014	<0.000069	-	-	-	-	-	<0.00071	
5/6-Methylchrysenes	µg/L	-	-	-	-	-	<0.000053	<0.00010	<0.00027	<0.00011	<0.00010	<0.000093	<0.000071	-	-	-	-	-	<0.000046	
5,9-Dimethylchrysene	µg/L	-	-	-	-	-	<0.00011	<0.00012	<0.00015	<0.00030	<0.00018	<0.00029	<0.000090	-	-	-	-	-	0.00012	
C1 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	-	<0.00106	<0.00066	<0.00038	<0.00028	<0.00037	<0.00017	<0.00020	-	-	-	-	-	<0.00103	
C2 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	-	<0.00208	<0.00139	<0.00032	<0.00031	<0.00046	<0.00031	<0.000094	-	-	-	-	-	<0.00080	
7-Methylbenzo[a]pyrene	µg/L	-	-	-	-	-	<0.00012	<0.00011	<0.00038	<0.00028	<0.00037	<0.00017	<0.00020	-	-	-	-	-	<0.00022	
1-methylchrysene	µg/L	-	-	-	-	-	<0.000049	<0.000095	<0.00026	<0.00010	<0.000095	0.00010	<0.000069	-	-	-	-	-	<0.000042	
3-methylfluoranthene / benzo(a)fluorene	µg/L	-	-	-	-	-	<0.00024	<0.00050	0.00063	0.0028	<0.00059	0.0013	<0.00019	-	-	-	-	-	<0.00041	

APPENDIX B
Table B-1: Surface Water Quality Summary for Eagle Plain Baseline Study, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations												
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-003
							29-Jul-13	22-Jul-14	22-Sep-14	14-Mar-15	6-Jun-15	18-Sep-15	16-Mar-16	21-Jun-16	20-Sep-16	7-Mar-17	27-Jun-17	20-Sep-17	26-Aug-13
Naphthenic Acid																			
C12H18O2	ng/L	-	-	-	-	-	42	55	59	69	-	-	-	-	-	-	-	-	106
C12H20O2	ng/L	-	-	-	-	-	58	26	37	71	-	-	-	-	-	-	-	-	61
C12H22O2	ng/L	-	-	-	-	-	96	<16	<5.0	<31	-	-	-	-	-	-	-	-	8.8
C12H24O2	ng/L	-	-	-	-	-	305	<16	<5.0	43	-	-	-	-	-	-	-	-	<5.0
C13H20O2	ng/L	-	-	-	-	-	21	24	32	70	-	-	-	-	-	-	-	-	38
C13H22O2	ng/L	-	-	-	-	-	59	25	27	95	-	-	-	-	-	-	-	-	30
C13H24O2	ng/L	-	-	-	-	-	97	<16	<5.0	36	-	-	-	-	-	-	-	-	<5.0
C13H26O2	ng/L	-	-	-	-	-	449	35	35	56	-	-	-	-	-	-	-	-	<5.0
C14H20O2	ng/L	-	-	-	-	-	31	46	53	53	-	-	-	-	-	-	-	-	62
C14H22O2	ng/L	-	-	-	-	-	46	41	48	98	-	-	-	-	-	-	-	-	64
C14H24O2	ng/L	-	-	-	-	-	25	21	31	106	-	-	-	-	-	-	-	-	29
C14H26O2	ng/L	-	-	-	-	-	72	<16	<5.0	<25	-	-	-	-	-	-	-	-	<5.0
C14H28O2	ng/L	-	-	-	-	-	317	<16	<5.0	<15	-	-	-	-	-	-	-	-	<5.0
C15H18O2	ng/L	-	-	-	-	-	94	<16	18	19	-	-	-	-	-	-	-	-	12
C15H20O2	ng/L	-	-	-	-	-	25	25	55	59	-	-	-	-	-	-	-	-	60
C15H22O2	ng/L	-	-	-	-	-	67	100	209	137	-	-	-	-	-	-	-	-	160
C15H24O2	ng/L	-	-	-	-	-	130	234	314	138	-	-	-	-	-	-	-	-	254
C15H26O2	ng/L	-	-	-	-	-	48	28	29	119	-	-	-	-	-	-	-	-	44
C15H28O2	ng/L	-	-	-	-	-	41	<16	<5.0	47	-	-	-	-	-	-	-	-	<5.0
C15H30O2	ng/L	-	-	-	-	-	213	<16	<5.0	<15	-	-	-	-	-	-	-	-	<46
C16H20O2	ng/L	-	-	-	-	-	<4.9	<16	21	32	-	-	-	-	-	-	-	-	24
C16H22O2	ng/L	-	-	-	-	-	<4.9	<16	<6.5	<26	-	-	-	-	-	-	-	-	16
C16H24O2	ng/L	-	-	-	-	-	208	<16	<5.0	45	-	-	-	-	-	-	-	-	26
C16H26O2	ng/L	-	-	-	-	-	75	30	32	89	-	-	-	-	-	-	-	-	51
C16H28O2	ng/L	-	-	-	-	-	18	<30	<5.0	131	-	-	-	-	-	-	-	-	<5.0
C16H30O2	ng/L	-	-	-	-	-	<4.9	<16	<5.0	<15	-	-	-	-	-	-	-	-	<5.0
C16H32O2	ng/L	-	-	-	-	-	<7.6	<16	<5.0	<15	-	-	-	-	-	-	-	-	<5.0
C17H22O2	ng/L	-	-	-	-	-	44	<16	18	25	-	-	-	-	-	-	-	-	18
C17H24O2	ng/L	-	-	-	-	-	<4.9	<16	<5.0	<15	-	-	-	-	-	-	-	-	12
C17H26O2	ng/L	-	-	-	-	-	16	<16	7.5	42	-	-	-	-	-	-	-	-	17
C17H28O2	ng/L	-	-	-	-	-	17	88	72	119	-	-	-	-	-	-	-	-	100
C17H30O2	ng/L	-	-	-	-	-	17	<16	<5.0	68	-	-	-	-	-	-	-	-	17
C17H32O2	ng/L	-	-	-	-	-	29	<16	<5.0	<15	-	-	-	-	-	-	-	-	<5.0
C17H34O2	ng/L	-	-	-	-	-	160	<16	<5.0	<15	-	-	-	-	-	-	-	-	<5.0
C18H24O2	ng/L	-	-	-	-	-	316	40	58	60	-	-	-	-	-	-	-	-	47
C18H26O2	ng/L	-	-	-	-	-	39	<16	<5.0	27	-	-	-	-	-	-	-	-	<5.0
C18H28O2	ng/L	-	-	-	-	-	568	<16	<5.0	41	-	-	-	-	-	-	-	-	<5.0
C18H30O2	ng/L	-	-	-	-	-	15	<16	<5.0	<44	-	-	-	-	-	-	-	-	<5.0
C18H32O2	ng/L	-	-	-	-	-	<4.9	<16	<5.0	<15	-	-	-	-	-	-	-	-	<5.0
C18H34O2	ng/L	-	-	-	-	-	<4.9	<16	<5.0	<15	-	-	-	-	-	-	-	-	<5.0
C18H36O2	ng/L	-	-	-	-	-	165	<16	<5.0	<15	-	-	-	-	-	-	-	-	<5.0
C19H26O2	ng/L	-	-	-	-	-	72	33	61	<15	-	-	-	-	-	-	-	-	55
C19H28O2	ng/L	-	-	-	-	-	5.6	<16	<5.0	40	-	-	-	-	-	-	-	-	<5.0
C19H30O2	ng/L	-	-	-	-	-	12	<16	<5.0	43	-	-	-	-	-	-	-	-	<5.0
C19H32O2	ng/L	-	-	-	-	-	8.8	<16	<5.0	46	-	-	-	-	-	-	-	-	<5.0
C19H34O2	ng/L	-	-	-	-	-	13	<30	<5.0	22	-	-	-	-	-	-	-	-	<5.0
C19H36O2	ng/L	-	-	-	-	-	<13	19	7.3	<15	-	-	-	-	-	-	-	-	<5.0
C19H38O2	ng/L	-	-	-	-	-	<21	72	26	<15	-	-	-	-	-	-	-	-	<5.0
C20H28O2	ng/L	-	-	-	-	-	288	<16	13	<15	-	-	-	-	-	-	-	-	74
C20H30O2	ng/L	-	-	-	-	-	247	139	117	247	-	-	-	-	-	-	-	-	48
C20H32O2	ng/L	-	-	-	-	-	118	221	47	80	-	-	-	-	-	-	-	-	13
C20H34O2	ng/L	-	-	-	-	-	12	<16	<5.0	45	-	-	-	-	-	-	-	-	<5.0
C20H36O2	ng/L	-	-	-	-	-	<4.9	<16	<5.0	<15	-	-	-	-	-	-	-	-	<5.0
C20H38O2	ng/L	-	-	-	-	-	10	<16	<5.0	<15	-	-	-	-	-	-	-	-	<5.0
C21H30O2	ng/L	-	-	-	-	-	76	22	11	33	-	-	-	-	-	-	-	-	<5.0
C21H32O2	ng/L	-	-	-	-	-	<4.9	<16	<5.0	<15	-	-	-	-	-	-	-	-	<5.0
C21H34O2	ng/L	-	-	-	-	-	<4.9	<16	<5.0	<15	-	-	-	-	-	-	-	-	<6.2
C21H36O2	ng/L	-	-	-	-	-	<4.9	<16	<5.0	<15	-	-	-	-	-	-	-	-	<5.0
C21H38O2	ng/L	-	-	-	-	-	<4.9	<16	<5.0	<15	-	-	-	-	-	-	-	-	<5.0
C21H40O2	ng/L	-	-	-	-	-	<4.9	<16	<5.0	<15	-	-	-	-	-	-	-	-	<5.0

APPENDIX B
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Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations												
							CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-001	CHNC-003	
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	29-Jul-13	22-Jul-14	22-Sep-14	14-Mar-15	6-Jun-15	18-Sep-15	16-Mar-16	21-Jun-16	20-Sep-16	7-Mar-17	27-Jun-17	20-Sep-17	26-Aug-13
Radionuclides																			
Actinium-228	Bq/L	-	-	-	-	-	-	-	-	-	-	<0.8	<0.4	<0.6	<0.9	< 0.9	< 1	-	-
Bismuth-212	Bq/L	-	-	-	-	-	-	-	-	-	-	<2.0	1.0	<1.0	<1.0	< 2	< 2	-	-
Bismuth-214	Bq/L	-	-	-	-	-	-	-	-	-	-	<0.5	<0.3	<0.3	<0.6	< 0.5	< 0.8	-	-
Lead-210	Bq/L	-	-	-	-	-	-	-	-	-	-	<4.0	<2.0	<3.0	<3.0	< 4	< 4	-	-
Lead-211	Bq/L	-	-	-	-	-	-	-	-	-	-	<3.0	<2.0	<2.0	<2.0	< 6	< 2	-	-
Lead-212	Bq/L	-	-	-	-	-	-	-	-	-	-	0.50	0.40	0.30	<0.3	0.6	1.2	-	-
Lead-214	Bq/L	-	-	-	-	-	-	-	-	-	-	<0.4	<0.2	0.40	<0.5	0.5	< 0.6	-	-
Potassium-40	Bq/L	-	-	-	-	-	-	-	-	-	-	<5.0	<2.0	<3.0	<4.0	14	< 6	-	-
Radium-223	Bq/L	-	-	-	-	-	-	-	-	-	-	<0.4	<0.4	<0.7	<0.8	< 0.8	< 0.7	-	-
Radium-226	Bq/L	-	-	-	-	-	-	-	-	-	-	<0.01	-	-	0.020	< 4	< 5	-	-
Radon-219	Bq/L	-	-	-	-	-	-	-	-	-	-	<1.0	<0.4	<1.0	<1.0	< 1	< 2	-	-
Thallium-208	Bq/L	-	-	-	-	-	-	-	-	-	-	<0.2	0.20	<0.2	<0.2	0.4	0.6	-	-
Thorium-227	Bq/L	-	-	-	-	-	-	-	-	-	-	<1.0	<0.4	<0.9	<0.7	< 0.9	< 1	-	-
Thorium-230	Bq/L	-	-	-	-	-	-	-	-	-	-	<1.0	<1.0	<2.0	<2.0	< 20	< 20	-	-
Thorium-234	Bq/L	-	-	-	-	-	-	-	-	-	-	<3.0	<1.0	<2.0	<3.0	< 4	< 4	-	-
Uranium-235	Bq/L	-	-	-	-	-	-	-	-	-	-	<1.0	<0.4	<0.8	<0.9	< 1	1	-	-
Isotopes																			
δ ¹⁸ O _{water} (VSMOW)	‰	-	-	-	-	-	-	-	-	-22.04	-22.30	-20.88	-22.31	-20.20	-20.71	-22.18	-20.24	-20.78	-
δ ² H _{water} (VSMOW)	‰	-	-	-	-	-	-	-	-	-169.72	-172.73	-161.3	-172.7	-163.7	-163.0	-171.2	-166.64	-162.1	-
δ ¹³ C-DIC (VPDB)	‰	-	-	-	-	-	-	-	-	-14.15	-19.39	-13.2	-13.4	-16.4	-12.2	-13.3	-11.99	-11.5	-
δ ³⁴ S-SO4 (CDT)	‰	-	-	-	-	-	-	-	-	3.07	-5.66	-7.98	-5.31	-5.73	-7.09	-4.19	-5.83	-8.10	-
δ ¹⁸ O-SO4 (VSMOW)	‰	-	-	-	-	-	-	-	-	-1.09	-7.80	-12.98	-8.33	-11.64	-14.35	-6.67	-12.36	-7.84	-
Dissolved Gases																			
CH ₄	(mg/L)	-	-	-	-	-	-	-	-	-	0.0307	0.0036	0.0043	0.0060	0.0039	-	0.0075(s)	0.0027	-
C ₂	(mg/L)	-	-	-	-	-	-	-	-	-	0.0000	0.0000	0.0000	0.0000	0.0000	-	0.0 (s)	0.0000	-
C ₃	(mg/L)	-	-	-	-	-	-	-	-	-	0.0000	0.0000	0.0000	0.0000	0.0000	-	0.0 (s)	0.0000	-
CO ₂	(mg/L)	-	-	-	-	-	-	-	-	-	5.13	4.77	21.42	5.48	6.78	-	4.21 (s)	4.52	-
N ₂	(mg/L)	-	-	-	-	-	-	-	-	-	19.96	21.03	28.97	26.45	31.82	-	36.64 (s)	23.32	-
O ₂	(mg/L)	-	-	-	-	-	-	-	-	-	9.75	11.99	1.86	10.58	14.87	-	13.72 (s)	11.07	-

APPENDIX B
Table B-1: Surface Water Quality Summary for Eagle Plain Baseline Study, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations											
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	CHNC-003 22-Jul-14	CHNC-003 23-Sep-14	CHNC-003 5-Jun-15	CHNC-003 19-Sep-15	CHNC-003 22-Sep-16	CHNC-003 27-Jun-17	CHNC-t-002 26-Aug-13	CHNC-t-002 22-Jul-14	CHNC-t-002 21-Sep-14	CHNC-t-002 5-Jun-15	CHNC-t-002 19-Sep-15	CHNC-t-002 15-Mar-16
Field Measured																		
pH	-	-	6.5 - 9.0		-	-	6.4 ^(Chronic)	6.7	6.4 ^(Chronic)	6.2 ^(Chronic)	6.7	6.09 ^(Chronic)	6.8	6.9	6.0 ^(Chronic)	6.2 ^(Chronic)	5.9 ^(Chronic)	8.0
Specific conductivity	µS/cm	-	-		-	-	42	38	29	34	40	51.8	50	46	32	25	27	285
Temperature	°C	-	-		-	-	16	3.1	8.6	1.7	1.7	13.9	5.9	16	2.7	8.3	1.4	0.0
Dissolved oxygen	mg/L	-	5.5-9.5		-	-	-	12	10	12	13	6.76	11	-	12	10	12	1.8 ^(Chronic)
Turbidity	NTU	-	-		-	-	-	-	7.2	63	88	-	0.80	-	-	13	68	4.3
Conventional Parameters																		
Hardness, as CaCO ₃	mg/L	-	-		-	-	23	21	13	18	20	24	31	25	18	12	16	133
Total alkalinity, as CaCO ₃	mg/L	-	-		20 ^(B)	-	11 ^(BC MOE mean)	8.0 ^(BC MOE mean)	5.0 ^(BC MOE mean)	7.0 ^(BC MOE mean)	10 ^(BC MOE mean)	17 ^(BC MOE mean)	16 ^(BC MOE mean)	13 ^(BC MOE mean)	6.0 ^(BC MOE mean)	<5.0	<5.0	110
Total dissolved solids	mg/L	-	-		-	-	86	80	40	40	24	86	88	111	86	<5.0	<5.0	284
Total suspended solids	mg/L	-	-		-	-	4.0	5.0	<3.0	88	46	11	4.0	8.0	19	<3.0	<5.0	14
Total organic carbon	mg/L	-	-		-	-	-	24	23	30	25	27.3	-	-	24	21	29	120
Dissolved organic carbon	mg/L	-	-		-	-	62	23	23	29	25	24.6	35	66	24	22	29	119
Total inorganic carbon	mg/L	-	-		-	-	-	1.4	1.7	1.8	2.4	5.9	-	-	0.70	1.5	1.3	25
Dissolved inorganic carbon	mg/L	-	-		-	-	2.4	1.3	1.3	1.4	2.2	5	3.6	1.4	0.60	1.0	1.0	20
Major Ions																		
Bicarbonate, as CaCO ₃	mg/L	-	-		-	-	11	8.0	<5.0	<5.0	12	21	19	13	6.0	<5.0	<5.0	135
Bromide	mg/L	-	-		-	-	<0.1	<0.1	<0.02	<0.02	<0.02	< 0.02	-	<0.1	<0.1	<0.02	<0.02	<0.02
Calcium	mg/L	-	-		-	-	5.1	4.8	3.1	4.5	4.9	5.6	6.9	5.2	3.8	2.6	3.7	31
Carbonate, as CaCO ₃	mg/L	-	-		-	-	<1.0	<1.0	7.0	8.0	<6.0	< 6	<6.0	<1.0	<1.0	<6.0	<6.0	<6.0
Chloride	mg/L	640	120		-	-	0.24	<0.1	0.060	0.10	0.11	0.06	<0.05	0.35	0.57	<0.05	0.090	0.23
Fluoride	mg/L	-	-	0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	mg/L	-	-		-	-	2.0	1.8	1.3	1.8	1.9	2.4	3.3	2.3	1.6	1.3	1.6	14
Potassium	mg/L	-	-		-	-	0.40	0.25	0.30	0.40	0.20	0.57	0.40	0.42	0.17	0.30	0.20	0.80
Sodium	mg/L	-	-		-	-	0.90	1.2	1.1	1.3	1.8	1.9	1.1	0.72	0.83	0.80	0.80	4.0
Sulphate	mg/L	-	-		128 - 429 ^(B, C)	-	<1.0	2.9	2.2	2.3	3.7	2.8	1.6	<1.0	2.1	1.7	0.84 ^(B)	3.5 ^(B)
Nutrients																		
Nitrate	mg-N/L	550	13.0		-	-	<0.01	0.010	0.010	<0.01	0.010	< 0.01	<0.01	<0.01	0.010	0.010	<0.01	<0.01
Nitrite	mg-N/L	-	0.060		-	-	<0.01	<0.01	0.05	0.04	<0.01	< 0.01	<0.01	<0.01	<0.01	0.04	0.03	<0.01
Nitrate + nitrite	mg-N/L	-	-		3.0	33	<0.01	0.010	-	-	-	-	-	<0.01	0.010	-	-	-
Total ammonia	mg-N/L	-	0.50 - 198 ^(D)		-	-	<0.02	0.026	0.010	0.020	<0.01	0.04	0.030	<0.02	<0.02	0.010	0.050	1.2
Total kjeldahl nitrogen	mg-N/L	-	-		-	-	0.88	0.83	-	-	-	-	-	1.1	1.0	-	-	-
Total nitrogen	mg-N/L	-	-		-	-	0.88	0.84	0.63	0.68	0.62	1.53	-	1.1	1.0	0.58	0.72	5.3
Total nitrogen (calculated)	mg-N/L	-	-		-	-	0.88	0.84	-	-	-	-	-	1.1	1.0	-	-	-
Total phosphorus	mg-P/L	-	-		-	-	0.042	0.025	-	-	-	-	-	0.085	0.034	-	-	-
Dissolved phosphorus	mg-P/L	-	-		-	-	0.015	0.013	-	-	-	-	-	0.034	0.013	-	-	-
Phosphorus (as phosphate)	mg-P/L	-	-		-	-	0.071	0.040	0.035	0.092	0.029	-	0.056	0.11	0.062	0.039	0.095	0.14
Total Metals																		
Aluminum	µg/L	-	5.0 - 100 ^(E, F)		-	-	308 ^(Chronic)	445 ^(Chronic)	396 ^(Chronic)	2,290 ^(Chronic)	982 ^(Chronic)	200 ^(Chronic)	330 ^(Chronic)	427 ^(Chronic)	684 ^(Chronic)	552 ^(Chronic)	3,210 ^(Chronic)	1,090 ^(Chronic)
Antimony	µg/L	-	-		9.0	-	0.22	0.19	0.20	<0.2	0.16	0.21	<0.2	0.23	0.18	0.20	<0.4	0.60
Arsenic	µg/L	-	5.0		-	-	1.1	0.71	0.62	1.5	0.90	1.1	1.5	1.7	0.86	0.64	2.0	8.0 ^(Chronic)
Barium	µg/L	-	-		1,000	-	101	88	73	146	91	110	113	119	100	71	170	509
Beryllium	µg/L	-	-		0.13	-	0.080	0.070	0.070	0.23 ^(Mn)	0.080	0.11	0.050	0.080	0.080	0.060	0.080	<0.5 ^(DL>BC MOE mean)
Bismuth	µg/L	-	-		-	-	0.010	<0.1	<0.1	-	<0.1	< 0.1	-	0.020	0.010	<0.1	-	-
Boron	µg/L	29,000	1,500		-	-	5.0	8.0	7.0	7.0	4.0	6	<5.0	5.0	9.0	7.0	<10	<20
Cadmium	µg/L	0.11 - 7.7 ^(B)	0.040 - 0.37 ^(B)		-	-	0.055 ^(Chronic)	0.055 ^(Chronic)	0.050 ^(Chronic)	0.12 ^(Chronic)	0.090 ^(Chronic)	0.09 ^(Chronic)	0.070 ^(Chronic)	0.084 ^(Chronic)	0.078 ^(Chronic)	0.060 ^(Chronic)	0.15 ^(Chronic)	0.59 ^(Chronic)
Chromium	µg/L	-	1.0		-	-	1.5 ^(Chronic)	1.5 ^(Chronic)	1.2 ^(Chronic)	5.0 ^(Chronic)	2.2 ^(Chronic)	1.1 ^(Chronic)	2.0 ^(Chronic)	2.0 ^(Chronic)	1.9 ^(Chronic)	1.3 ^(Chronic)	7.0 ^(Chronic)	3.6 ^(Chronic)
Cobalt	µg/L	-	-		4.0	110	0.38	0.37	0.20	1.9	0.68	0.83	0.61	1.1	0.92	0.30	2.4	28 ^(BC MOE mean)
Copper	µg/L	-	2.0 - 4.0 ^(B)		-	-	6.9 ^(Chronic)	6.1 ^(Chronic)	6.0 ^(Chronic)	10 ^(Chronic)	6.0 ^(Chronic)	7.1 ^(Chronic)	7.0 ^(Chronic)	7.0 ^(Chronic)	6.3 ^(Chronic)	5.0 ^(Chronic)	10 ^(Chronic)	17 ^(Chronic)
Iron	µg/L	-	300		-	-	1,560 ^(Chronic)	1,180 ^(Chronic)	886 ^(Chronic)	4,100 ^(Chronic)	1,690 ^(Chronic)	1,500 ^(Chronic)	3,970 ^(Chronic)	3,160 ^(Chronic)	1,880 ^(Chronic)	1,270 ^(Chronic)	4,400 ^(Chronic)	33,600 ^(Chronic)
Lead	µg/L	-	1.0 - 7.0 ^(B)		-	-	0.83	0.32	0.20	1.6 ^(Chronic)	0.51	0.38	0.40	0.62	0.58	0.30	2.0 ^(Chronic)	1.6
Lithium	µg/L	-	-		-	-	1.2	1.7	1.2	4.0	2.2	1.1	1.0	1.3	2.1	1.5	5.0	<5.0
Manganese	µg/L	-	-		768 - 2,585 ^(B)	816 - 3,394 ^(B)	54	28	27	125	53	170	43	119	61	23	124	4,580 ^(BC MOE mean, BC MOE max)
Mercury	µg/L	-	0.026		-	-	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	0.02
Molybdenum	µg/L	-	73		-	-	0.44	0.27	0.19	0.30	0.26	0.37	0.50	0.62	0.21	0.19	0.30	1.5
Nickel	µg/L	-	25 - 150 ^(B)		-	-	6.6	6.3	4.5	9.0	6.7	7.3	13	9.7	8.0	5.2	10	48
Selenium	µg/L	-	1.0		-	-	0.40	0.30	0.20	<0.6	0.50	0.4	0.70	0.50	0.40	0.20	<1.0	2.0 ^(Chronic)
Silicon	µg/L	-	-		-	-	1,800	3,100	2,240	7,580	5,500	1600	2,520	1,700	3,400	2,620	7,210	12,400
Silver	µg/L	-	0.25		-	-	0.030	0.020	<0.05	0.050	0.020	0.01	0.030	0.050	0.020	<0.05	0.06	0.16
Strontium	µg/L	-	-		-	-	34	27	20	27	27	33	30	26	18	13	20	125
Sulphur	µg/L	-	-		-	-	<500	570	-	1,200	1,700	1300	700	<500	<500	-	600	3,000
Tellurium	µg/L	-	-		-	-	<0.05	<0.05	-	<0.1	<0.05	< 0.05	<0.1	<0.05	<0.05	-	<0.2	<0.5
Thallium	µg/L	-	0.80		-	-	0.0040	0.0070	<0.01	0.040	0.016	< 0.01	<0.01	0.0050	0.0090	<0.01	0.060	<0.1
Thorium	µg/L	-	-		-	-	0.18	0.22	0.19	0.50	0.36	0.21	<0.4	0.22	0.27	0.20	<0.8	1.7
Tin	µg/L	-	-		-	-	<0.05	<0.05	<0.1	<								

Table B-1: Surface Water Quality Summary for Eagle Plain Baseline Study, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations											
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	CHNC-003	CHNC-003	CHNC-003	CHNC-003	CHNC-003	CHNC-003	CHNC-t-002	CHNC-t-002	CHNC-t-002	CHNC-t-002	CHNC-t-002	CHNC-t-002
							22-Jul-14	23-Sep-14	5-Jun-15	19-Sep-15	22-Sep-16	27-Jun-17	26-Aug-13	22-Jul-14	21-Sep-14	5-Jun-15	19-Sep-15	15-Mar-16
Dissolved Metals																		
Aluminum	µg/L	-	-		18 - 50 ⁽⁵⁾	44 - 100 ⁽⁶⁾	135 ^(BC MOE mean, BC MOE max)	202 ^(BC MOE mean, BC MOE max)	155 ^(BC MOE mean, BC MOE max)	283 ^(BC MOE mean, BC MOE max)	245 ^(BC MOE mean, BC MOE max)	102 ^(BC MOE mean, BC MOE max)	192 ^(BC MOE mean, BC MOE max)	152 ^(BC MOE mean, BC MOE max)	218 ^(BC MOE mean, BC MOE max)	173 ^(BC MOE mean, BC MOE max)	301 ^(BC MOE mean, BC MOE max)	930 ^(BC MOE mean, BC MOE max)
Antimony	µg/L	-	-		-	-	0.18	0.16	<0.2	<0.2	0.16	0.18	0.20	0.19	0.16	<0.2	<0.2	<2.0
Arsenic	µg/L	-	-		-	-	0.78	0.48	0.60	0.60	0.60	0.8	2.0	0.93	0.56	0.50	0.60	7.0
Barium	µg/L	-	-		-	-	84	70	64	69	71	97.2	101	95	67	61	66	475
Beryllium	µg/L	-	-		-	-	0.070	0.070	0.060	0.070	0.10	0.06	0.040	0.060	0.060	0.10	0.060	<0.4
Bismuth	µg/L	-	-		-	-	<0.01	<0.01	<1.0	<1.0	<0.1	< 0.1	<1.0	<0.01	<0.01	<1.0	<1.0	<10
Boron	µg/L	-	-		-	-	6.0	6.0	<4.0	6.0	5.0	6	<4.0	6.0	8.0	<4.0	4.0	<40
Cadmium	µg/L	-	-		0.044 - 0.46 ^(b)	0.066 - 2.8 ^(b)	0.042	0.032	0.030	0.060 ^(BC MOE mean)	0.054	0.06	0.060	0.052	0.037	0.030	0.060 ^(BC MOE mean)	0.37 ^(BC MOE mean)
Chromium	µg/L	-	-		-	-	1.1	1.0	0.80	0.90	0.89	0.99	1.5	1.2	1.0	0.90	1.1	<4.0
Cobalt	µg/L	-	-		-	-	0.25	0.23	0.17	0.57	0.37	0.58	0.48	0.83	0.57	0.22	0.83	27
Copper	µg/L	-	-		-	-	6.0	5.0	5.0	6.0	5.7	6.4	7.0	5.8	4.6	5.0	6.0	13
Iron	µg/L	-	-		-	350	720 ^(BC MOE max)	578 ^(BC MOE max)	496 ^(BC MOE max)	795 ^(BC MOE max)	744 ^(BC MOE max)	615 ^(BC MOE max)	2,540 ^(BC MOE max)	985 ^(BC MOE max)	757 ^(BC MOE max)	694 ^(BC MOE max)	1,100 ^(BC MOE max)	36,900 ^(BC MOE max)
Lead	µg/L	-	-		-	-	0.35	0.090	0.10	0.10	<0.01	0.16	0.20	0.16	0.12	0.10	0.10	1.0
Lithium	µg/L	-	-		-	-	0.97	1.4	1.0	1.0	1.3	0.9	1.0	1.0	1.7	1.0	1.0	<10
Manganese	µg/L	-	-		-	-	37	21	24	82	41	122	37	94	43	20	87	4,520
Mercury	µg/L	-	-		-	-	<0.01	<0.01	0.010	<0.01	0.010	< 0.01	<0.01	<0.01	<0.01	0.010	0.010	0.010
Molybdenum	µg/L	-	-		-	-	0.37	0.19	0.19	0.15	0.16	0.34	0.45	0.49	0.17	0.17	0.15	1.0
Nickel	µg/L	-	-		-	-	5.9	5.4	4.0	5.0	6.0	6.1	12	8.4	6.3	5.0	6.0	45
Selenium	µg/L	-	-		-	-	0.30	0.30	<0.6	<0.6	0.60	0.4	1.4	0.40	0.30	<0.6	<0.6	<6.0
Silicon	µg/L	-	-		-	-	1,580	2,650	1,690	3,370	3,260	1400	2,340	1,270	2,680	2,000	3,230	12,100
Silver	µg/L	-	-		-	-	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	0.020	<0.01	<0.01	<0.01	<0.01	<0.1
Strontium	µg/L	-	-		-	-	32	25	19	23	24	30.8	29	24	16	13	15	121
Sulphur	µg/L	-	-		-	-	<500	596	1,000	1,300	1,600	1200	700	<500	<500	800	700	2,900
Tellurium	µg/L	-	-		-	-	<0.05	<0.05	<0.1	<0.1	0.054	< 0.05	<0.1	<0.05	<0.05	<0.1	<0.1	<1.0
Thallium	µg/L	-	-		-	-	<0.004	<0.004	<0.01	<0.01	0.011	< 0.01	<0.01	<0.004	<0.004	<0.01	<0.01	<0.1
Thorium	µg/L	-	-		-	-	0.15	0.21	<0.4	<0.4	<0.05	0.33	<0.4	0.17	0.22	<0.4	<0.4	<4.0
Tin	µg/L	-	-		-	-	<0.05	<0.05	<0.1	<0.1	<0.1	< 0.1	<0.1	<0.05	<0.05	<0.1	<0.1	<1.0
Titanium	µg/L	-	-		-	-	2.2	2.8	<10	<10	2.0	2	<10	2.8	1.8	<10	<10	32
Uranium	µg/L	-	-		-	-	0.076	0.075	<0.4	<0.4	0.077	0.099	<0.4	0.073	0.068	<0.4	<0.4	<4.0
Vanadium	µg/L	-	-		-	-	0.90	0.50	0.64	0.59	0.053	0.75	1.4	0.90	0.50	0.78	0.75	18
Zinc	µg/L	-	-		-	-	4.0	6.0	6.0	7.0	17	4.9	11	6.0	7.0	8.0	9.0	32
Zirconium	µg/L	-	-		-	-	1.6	1.7	1.3	1.9	1.5	1.6	2.0	1.5	1.4	1.3	1.9	10
Volatile Organics																		
Benzene	µg/L	-	-	370	-	-	-	<0.5	<0.5	<0.5	<0.5	< 500	-	-	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	µg/L	-	-	90	-	-	-	<1.0	<0.5	<0.5	<0.5	< 500	-	-	<1.0	<0.5	<0.5	<0.5
Toluene	µg/L	-	-	2.0	-	-	-	<1.0	<0.5	<0.5	<0.5	< 500	-	-	<1.0	<0.5	<0.5	1.0
Xylenes	µg/L	-	-	-	30	-	-	<2.0	<0.5	<0.5	<0.5	< 500	-	-	<2.0	<0.5	<0.5	<0.5
Styrene	µg/L	-	-	72	-	-	-	-	<0.5	<0.5	<0.5	< 500	-	-	-	<0.5	<0.5	<0.5
Extractable Petroleum Hydrocarbons (C10-C19)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Extractable Petroleum Hydrocarbons (C10-C32)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Volatile Hydrocarbons	µg/L	-	-	-	-	-	-	<100	<50	<50	<50	< 50000	-	-	<100	<50	<50	<50
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	-	-	-	<100	<50	<50	<50	< 50000	-	-	<100	<50	<50	<50
Methyl tert-Butyl Ether	µg/L	-	-	10000	-	-	-	-	<0.5	<0.5	<0.5	< 500	-	-	-	<0.5	<0.5	<0.5
Parent PAHs																		
Naphthalene	µg/L	-	-	1.1	-	-	<0.0035	<0.0056	<0.0077	<0.0128	-	-	<0.0072	<0.0035	<0.0056	<0.0077	0.014	<0.0041
Acenaphthylene	µg/L	-	-	-	-	-	<0.00019	<0.00015	<0.000088	<0.00015	-	-	<0.00014	<0.000096	<0.00034	<0.00014	<0.00029	<0.00024
Biphenyl	µg/L	-	-	-	-	-	<0.0022	<0.00184	<0.0047	<0.00119	-	-	<0.0016	<0.00224	<0.00184	<0.0047	<0.0012	<0.00145
Acenaphthene	µg/L	-	-	5.8	-	-	<0.00035	<0.00040	<0.00025	<0.00060	-	-	<0.00060	<0.00019	<0.00053	<0.00024	<0.00051	<0.00046
Fluorene	µg/L	-	-	3.0	-	-	<0.00026	<0.00023	<0.00012	0.00018	-	-	<0.00014	<0.000255	<0.00017	<0.00014	0.00028	<0.0011
Phenanthrene	µg/L	-	-	0.40	-	-	<0.0026	<0.00230	<0.0033	<0.0020	-	-	<0.0024	<0.00261	<0.00230	<0.0033	0.0020	<0.0032
Anthracene	µg/L	-	-	0.012	-	-	<0.000153	<0.000092	<0.000081	<0.00021	-	-	<0.00018	<0.000153	<0.000098	<0.000072	<0.00037	<0.00012
Dibenzothiophene	µg/L	-	-	-	-	-	<0.00048	0.00021	<0.000067	<0.00024	-	-	<0.00063	<0.00048	<0.00013	<0.00012	<0.00043	<0.00032
Pyrene	µg/L	-	-	0.025	-	-	<0.00057	<0.00138	<0.0015	<0.00075	-	-	<0.00100	<0.00057	<0.00138	<0.0015	0.0010	<0.00071
Fluoranthene	µg/L	-	-	0.040	-	-	<0.00115	<0.00175	<0.00113	<0.00108	-	-	<0.00093	<0.00115	<0.00175	<0.00113	<0.00108	<0.00110
Benzo(a)anthracene	µg/L	-	-	0.018	-	-	<0.000120	<0.000495	<0.00111	<0.00020	-	-	<0.000114	<0.000120	<0.000495	<0.001110	0.00027	<0.000129
Chrysene	µg/L	-	-	-	-	-	<0.00030	<0.00075	<0.00043	0.00063	-</							

Table B-1: Surface Water Quality Summary for Eagle Plain Baseline Study, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations											
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	CHNC-003 22-Jul-14	CHNC-003 23-Sep-14	CHNC-003 5-Jun-15	CHNC-003 19-Sep-15	CHNC-003 22-Sep-16	CHNC-003 27-Jun-17	CHNC-t-002 26-Aug-13	CHNC-t-002 22-Jul-14	CHNC-t-002 21-Sep-14	CHNC-t-002 5-Jun-15	CHNC-t-002 19-Sep-15	CHNC-t-002 15-Mar-16
Alkylated PAHs																		
C1 substituted naphthalenes	µg/L	-	-	-	-	-	<0.0027	<0.0134	<0.0094	<0.0091	-	-	<0.0041	<0.0027	<0.0134	<0.0094	<0.0091	<0.0095
C2 substituted naphthalenes	µg/L	-	-	-	-	-	<0.0064	<0.0138	<0.0126	<0.0076	-	-	<0.0085	<0.0064	<0.0138	<0.0126	<0.0076	<0.0131
C3 substituted naphthalenes	µg/L	-	-	-	-	-	<0.0037	<0.0066	<0.0058	0.0027	-	-	<0.0029	<0.0037	<0.0066	<0.0058	0.0040	<0.0030
C4 substituted naphthalenes	µg/L	-	-	-	-	-	<0.00030	<0.00280	0.00038	<0.0057	-	-	0.0031	<0.00014	<0.0028	0.00039	0.016	<0.00162
1-Methylnaphthalene	µg/L	-	-	-	-	-	<0.00085	<0.00167	<0.00166	<0.0023	-	-	<0.0013	<0.00085	<0.00167	<0.00166	0.0030	<0.00134
2-Methylnaphthalene	µg/L	-	-	-	-	-	<0.0018	<0.0118	<0.0094	<0.0068	-	-	<0.0028	<0.00181	<0.0118	<0.0094	<0.0068	<0.0081
1,2-Dimethylnaphthalene	µg/L	-	-	-	-	-	<0.00119	<0.00064	<0.00059	<0.00053	-	-	<0.00177	<0.00119	<0.0011	<0.00060	<0.00043	<0.00043
2,6-Dimethylnaphthalene	µg/L	-	-	-	-	-	<0.00040	<0.00055	<0.00050	0.00049	-	-	0.00048	<0.00036	<0.00060	<0.00051	0.00100	0.00040
C1 substituted acenaphthenes	µg/L	-	-	-	-	-	<0.000080	<0.00028	<0.00042	<0.00037	-	-	<0.00026	<0.00024	<0.00096	<0.00040	<0.00027	<0.00022
C1 substituted biphenyls	µg/L	-	-	-	-	-	<0.0093	<0.00375	<0.00186	<0.00094	-	-	0.0021	<0.0093	<0.00375	<0.00186	0.0010	<0.0065
C2 substituted biphenyls	µg/L	-	-	-	-	-	<0.041	<0.01707	<0.0033	0.00052	-	-	0.009	<0.041	<0.01707	<0.0033	0.00088	<0.023
2,3,5-Trimethylnaphthalene	µg/L	-	-	-	-	-	<0.00047	<0.00049	0.00032	0.00093	-	-	<0.00044	<0.00047	<0.00049	0.00038	0.0013	<0.00056
2,3,6-Trimethylnaphthalene	µg/L	-	-	-	-	-	<0.00060	<0.00076	<0.00097	0.00087	-	-	<0.00065	<0.00060	<0.00076	<0.00097	0.0013	<0.00052
C1 substituted fluorenes	µg/L	-	-	-	-	-	<0.00103	<0.00150	0.00049	0.00075	-	-	<0.0023	<0.00103	<0.00150	0.00089	0.0016	<0.00149
C2 substituted fluorenes	µg/L	-	-	-	-	-	<0.00094	<0.00032	0.00051	0.00063	-	-	<0.0016	<0.00094	0.00050	0.00053	0.0010	0.0033
C3 substituted fluorenes	µg/L	-	-	-	-	-	<0.0039	<0.0026	<0.0053	<0.0008	-	-	<0.0041	<0.0039	<0.0026	<0.0053	0.0023	0.0011
2-Methylfluorene	µg/L	-	-	-	-	-	<0.00016	<0.00019	<0.00016	<0.00017	-	-	<0.00036	0.000075	<0.00018	<0.00013	<0.00074	<0.00016
1,4,6,7-Tetramethylnaphthalene	µg/L	-	-	-	-	-	<0.00030	<0.00027	<0.00026	<0.00032	-	-	<0.00060	<0.00014	<0.00024	<0.00018	<0.00049	<0.00036
C1 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	0.00044	<0.00021	<0.00010	0.00021	-	-	<0.00021	<0.00037	0.00022	<0.00014	0.0035	<0.00165
C2 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	<0.00118	<0.00098	0.00020	0.0010	-	-	<0.00131	<0.00118	<0.00098	0.00044	0.0033	<0.00098
C3 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	<0.00114	<0.00034	<0.00058	0.00022	-	-	<0.00164	<0.00114	<0.00034	<0.00058	0.0012	0.00025
C4 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	0.0016	<0.0026	0.0013	0.0033	-	-	0.0027	0.0033	<0.0026	0.0023	0.011	0.027
1-Methylphenanthrene	µg/L	-	-	-	-	-	<0.00037	<0.00021	<0.00010	0.00054	-	-	<0.00021	<0.00037	<0.00029	<0.00014	0.00085	<0.00044
2-Methylphenanthrene	µg/L	-	-	-	-	-	<0.00038	<0.00021	<0.00010	0.00047	-	-	<0.00021	<0.00038	0.00022	<0.00014	0.00084	<0.00070
3-Methylphenanthrene	µg/L	-	-	-	-	-	<0.00030	<0.00021	<0.00010	0.00041	-	-	<0.00021	<0.00014	<0.00032	<0.00014	0.00077	<0.00050
9/4-Methylphenanthrene	µg/L	-	-	-	-	-	<0.00015	<0.00021	<0.00010	0.00064	-	-	<0.00021	<0.000088	<0.00021	<0.00014	0.00100	<0.00026
2-Methylanthracene	µg/L	-	-	-	-	-	<0.000098	<0.00021	<0.00011	<0.00015	-	-	<0.00026	<0.000058	<0.00021	<0.00014	<0.00018	<0.00026
1,7-Dimethylfluorene	µg/L	-	-	-	-	-	<0.00038	<0.00032	<0.00021	<0.0002	-	-	<0.00022	<0.00017	<0.00044	<0.00019	<0.00061	<0.00041
C1 substituted dibenzothiophenes	µg/L	-	-	-	-	-	<0.00013	0.00018	<0.00014	0.00027	-	-	<0.00011	<0.00011	0.00019	<0.00017	0.00083	<0.00028
C2 substituted dibenzothiophenes	µg/L	-	-	-	-	-	<0.00056	<0.00210	0.00030	0.00064	-	-	<0.00194	<0.00056	<0.00210	0.00022	0.0011	0.00038
C3 substituted dibenzothiophenes	µg/L	-	-	-	-	-	<0.00106	<0.00138	0.00020	<0.0012	-	-	<0.00215	<0.00106	<0.0014	0.00058	0.0018	<0.00116
C4 substituted dibenzothiophenes	µg/L	-	-	-	-	-	<0.00102	<0.0028	<0.00232	<0.00194	-	-	<0.0032	<0.00102	<0.0028	<0.00232	<0.0019	<0.0010
2/3-Methyldibenzothiophenes	µg/L	-	-	-	-	-	<0.00021	<0.00014	<0.00014	<0.00022	-	-	<0.00011	<0.00021	<0.00019	<0.00017	0.00032	<0.00028
1,7-Dimethylphenanthrene	µg/L	-	-	-	-	-	<0.00025	<0.000261	<0.000065	<0.00018	-	-	<0.00014	<0.000249	<0.000261	<0.00007	0.00039	<0.00022
1,8-Dimethylphenanthrene	µg/L	-	-	-	-	-	<0.000065	<0.000072	<0.000067	<0.000062	-	-	<0.00016	<0.000037	<0.000087	<0.000071	<0.00009	<0.000092
2,6-Dimethylphenanthrene	µg/L	-	-	-	-	-	<0.000315	<0.000144	<0.000067	<0.000066	-	-	<0.000213	<0.000315	<0.000144	<0.000071	0.00015	<0.000144
3,6-Dimethylphenanthrene	µg/L	-	-	-	-	-	<0.000066	<0.000159	<0.000068	<0.00013	-	-	<0.000240	<0.000038	<0.000159	<0.000072	<0.000025	<0.000093
2,4-Dimethyldibenzothiophene	µg/L	-	-	-	-	-	<0.00027	<0.00024	<0.000079	<0.00051	-	-	<0.00015	<0.00017	<0.00033	<0.000098	<0.00073	<0.00027
C1 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	-	<0.0011	<0.00165	<0.00071	0.0019	-	-	<0.00131	<0.00108	<0.00165	<0.00071	0.0038	0.00089
C2 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	-	<0.00027	<0.00207	0.00032	0.0015	-	-	<0.00125	<0.00017	<0.0021	0.00084	0.0036	0.00036
C3 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	-	<0.00042	<0.00085	<0.00013	<0.00024	-	-	<0.00089	<0.00042	<0.00085	<0.00013	<0.00050	0.00014
C4 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	-	<0.00010	<0.00016	<0.000086	<0.00022	-	-	<0.00056	<0.000057	<0.00013	<0.00023	<0.00012	<0.00012
1,2,6-Trimethylphenanthrene	µg/L	-	-	-	-	-	<0.000098	<0.00012	<0.000077	<0.000088	-	-	<0.00012	<0.000059	<0.00012	<0.000082	<0.00017	<0.00011
C1 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	-	<0.000080	0.00018	<0.000096	0.00047	-	-	<0.00028	<0.000072	0.00034	0.00021	0.0012	0.00012
C2 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	-	<0.000086	<0.00044	<0.00013	<0.00024	-	-	<0.00051	<0.000052	<0.00044	<0.00012	<0.00040	<0.000078
C3 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	-	<0.000537	<0.000099	<0.00014	<0.00024	-	-	<0.00080	<0.00054	<0.00013	0.00033	<0.00015	<0.0001
C4 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	-	<0.000093	0.00012	<0.00041	<0.00017	-	-	<0.00071	<0.000066	<0.00013	0.00071	<0.00018	<0.000087
5/6-Methylchrysenes	µg/L	-	-	-	-	-	<0.000083	<0.000084	<0.000099	<0.00023	-	-	<0.000059	<0.000075	<0.00016	<0.000071	<0.00017	<0.000082
5,9-Dimethylchrysene	µg/L	-	-	-	-	-	<0.000086	<0.00011	<0.00013	<0.00024	-	-	<0.000060	<0.000052	<0.00018	<0.00012	<0.00040	<0.000078
C1 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	-	<0.00066	0.00055	<0.00032	<0.00033	-	-	<0.00103	<0.00066	0.00057	0.00069	<0.00085	<0.00020
C2 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	-	<0.00139	0.00039	<0.00046	<0.00028	-	-	<0.00080	<0.00139	0.00023	0.00066	<0.00036	<0.00020
7-Methylbenzo[a]pyrene	µg/L	-	-	-	-	-	<0.00012	<0.00027	<0.00032	<0.00033	-	-	<0.00017	<0.00013	<0.00032	<0.00033	<0.00085	<0.00020

APPENDIX B
Table B-1: Surface Water Quality Summary for Eagle Plain Baseline Study, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations											
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	CHNC-003	CHNC-003	CHNC-003	CHNC-003	CHNC-003	CHNC-003	CHNC-t-002	CHNC-t-002	CHNC-t-002	CHNC-t-002	CHNC-t-002	CHNC-t-002
							22-Jul-14	23-Sep-14	5-Jun-15	19-Sep-15	22-Sep-16	27-Jun-17	26-Aug-13	22-Jul-14	21-Sep-14	5-Jun-15	19-Sep-15	15-Mar-16
Naphthenic Acid																		
C12H18O2	ng/L	-	-	-	-	-	55	134	-	-	-	-	157	82	66	-	-	-
C12H20O2	ng/L	-	-	-	-	-	22	69	-	-	-	-	83	46	42	-	-	-
C12H22O2	ng/L	-	-	-	-	-	<16	<5.1	-	-	-	-	27	<16	<4.9	-	-	-
C12H24O2	ng/L	-	-	-	-	-	<16	<5.1	-	-	-	-	<5.3	<16	<4.9	-	-	-
C13H20O2	ng/L	-	-	-	-	-	22	81	-	-	-	-	63	43	35	-	-	-
C13H22O2	ng/L	-	-	-	-	-	<24	64	-	-	-	-	56	39	40	-	-	-
C13H24O2	ng/L	-	-	-	-	-	<16	<5.1	-	-	-	-	18	<16	<14	-	-	-
C13H26O2	ng/L	-	-	-	-	-	<25	<5.1	-	-	-	-	19	<16	34	-	-	-
C14H20O2	ng/L	-	-	-	-	-	46	157	-	-	-	-	82	81	90	-	-	-
C14H22O2	ng/L	-	-	-	-	-	44	114	-	-	-	-	74	88	43	-	-	-
C14H24O2	ng/L	-	-	-	-	-	18	66	-	-	-	-	46	<25	39	-	-	-
C14H26O2	ng/L	-	-	-	-	-	<16	<5.1	-	-	-	-	<5.3	<16	<8.8	-	-	-
C14H28O2	ng/L	-	-	-	-	-	<16	<5.1	-	-	-	-	<5.3	<16	<4.9	-	-	-
C15H18O2	ng/L	-	-	-	-	-	<16	32	-	-	-	-	13	<16	17	-	-	-
C15H20O2	ng/L	-	-	-	-	-	39	152	-	-	-	-	84	59	62	-	-	-
C15H22O2	ng/L	-	-	-	-	-	159	559	-	-	-	-	280	164	217	-	-	-
C15H24O2	ng/L	-	-	-	-	-	186	500	-	-	-	-	255	209	186	-	-	-
C15H26O2	ng/L	-	-	-	-	-	19	94	-	-	-	-	48	29	47	-	-	-
C15H28O2	ng/L	-	-	-	-	-	<16	<5.1	-	-	-	-	<5.3	<16	<4.9	-	-	-
C15H30O2	ng/L	-	-	-	-	-	<16	<5.1	-	-	-	-	<5.3	<16	45	-	-	-
C16H20O2	ng/L	-	-	-	-	-	18	51	-	-	-	-	17	18	27	-	-	-
C16H22O2	ng/L	-	-	-	-	-	<16	<9.8	-	-	-	-	22	<22	<4.9	-	-	-
C16H24O2	ng/L	-	-	-	-	-	<16	<7.3	-	-	-	-	29	<16	<4.9	-	-	-
C16H26O2	ng/L	-	-	-	-	-	26	92	-	-	-	-	61	45	37	-	-	-
C16H28O2	ng/L	-	-	-	-	-	<16	<5.1	-	-	-	-	<5.3	<16	<18	-	-	-
C16H30O2	ng/L	-	-	-	-	-	<16	<5.4	-	-	-	-	<5.3	<16	<4.9	-	-	-
C16H32O2	ng/L	-	-	-	-	-	<16	<10	-	-	-	-	<5.3	<16	125	-	-	-
C17H22O2	ng/L	-	-	-	-	-	<16	35	-	-	-	-	<5.3	<16	<4.9	-	-	-
C17H24O2	ng/L	-	-	-	-	-	<16	24	-	-	-	-	<5.3	<16	<4.9	-	-	-
C17H26O2	ng/L	-	-	-	-	-	<16	35	-	-	-	-	<12	21	<4.9	-	-	-
C17H28O2	ng/L	-	-	-	-	-	65	172	-	-	-	-	73	133	65	-	-	-
C17H30O2	ng/L	-	-	-	-	-	<16	37	-	-	-	-	17	24	<4.9	-	-	-
C17H32O2	ng/L	-	-	-	-	-	<16	<5.1	-	-	-	-	<5.3	<16	<4.9	-	-	-
C17H34O2	ng/L	-	-	-	-	-	<16	<13	-	-	-	-	<5.3	<16	<6.7	-	-	-
C18H24O2	ng/L	-	-	-	-	-	103	123	-	-	-	-	42	41	79	-	-	-
C18H26O2	ng/L	-	-	-	-	-	<16	<5.1	-	-	-	-	<5.3	<16	<4.9	-	-	-
C18H28O2	ng/L	-	-	-	-	-	<16	12	-	-	-	-	<5.3	<16	<4.9	-	-	-
C18H30O2	ng/L	-	-	-	-	-	<16	<5.1	-	-	-	-	<5.3	<16	<4.9	-	-	-
C18H32O2	ng/L	-	-	-	-	-	<16	<5.1	-	-	-	-	<5.3	<16	<4.9	-	-	-
C18H34O2	ng/L	-	-	-	-	-	<16	<5.3	-	-	-	-	<5.3	<16	<4.9	-	-	-
C18H36O2	ng/L	-	-	-	-	-	<16	<5.1	-	-	-	-	<5.3	<16	<4.9	-	-	-
C19H26O2	ng/L	-	-	-	-	-	41	104	-	-	-	-	<5.3	23	39	-	-	-
C19H28O2	ng/L	-	-	-	-	-	<16	<5.1	-	-	-	-	<5.3	<16	<4.9	-	-	-
C19H30O2	ng/L	-	-	-	-	-	<16	13	-	-	-	-	<5.3	<16	<4.9	-	-	-
C19H32O2	ng/L	-	-	-	-	-	<16	<5.1	-	-	-	-	<5.3	<16	<4.9	-	-	-
C19H34O2	ng/L	-	-	-	-	-	<16	26	-	-	-	-	<5.3	17	<4.9	-	-	-
C19H36O2	ng/L	-	-	-	-	-	<16	23	-	-	-	-	9.7	32	<4.9	-	-	-
C19H38O2	ng/L	-	-	-	-	-	22	84	-	-	-	-	<5.3	33	28	-	-	-
C20H28O2	ng/L	-	-	-	-	-	<16	<14	-	-	-	-	810	<16	<84	-	-	-
C20H30O2	ng/L	-	-	-	-	-	41	253	-	-	-	-	95	87	86	-	-	-
C20H32O2	ng/L	-	-	-	-	-	115	74	-	-	-	-	11	122	60	-	-	-
C20H34O2	ng/L	-	-	-	-	-	<16	17	-	-	-	-	<5.3	<16	16	-	-	-
C20H36O2	ng/L	-	-	-	-	-	<16	7.7	-	-	-	-	<5.3	<16	<4.9	-	-	-
C20H38O2	ng/L	-	-	-	-	-	<16	17	-	-	-	-	<5.3	<16	<4.9	-	-	-
C21H30O2	ng/L	-	-	-	-	-	20	18	-	-	-	-	9.2	<16	9.8	-	-	-
C21H32O2	ng/L	-	-	-	-	-	<16	<5.1	-	-	-	-	<5.3	<16	<4.9	-	-	-
C21H34O2	ng/L	-	-	-	-	-	<16	<7.6	-	-	-	-	<5.3	<16	<8.1	-	-	-
C21H36O2	ng/L	-	-	-	-	-	<16	<5.1	-	-	-	-	<5.3	<16	<4.9	-	-	-
C21H38O2	ng/L	-	-	-	-	-	<16	<5.1	-	-	-	-	<5.3	<16	<4.9	-	-	-
C21H40O2	ng/L	-	-	-	-	-	<16	<5.1	-	-	-	-	<5.3	<16	6.4	-	-	-

APPENDIX B
Table B-1: Surface Water Quality Summary for Eagle Plain Baseline Study, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations												
							CHNC-003	CHNC-003	CHNC-003	CHNC-003	CHNC-003	CHNC-003	CHNC-t-002	CHNC-t-002	CHNC-t-002	CHNC-t-002	CHNC-t-002	CHNC-t-002	
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	22-Jul-14	23-Sep-14	5-Jun-15	19-Sep-15	22-Sep-16	27-Jun-17	26-Aug-13	22-Jul-14	21-Sep-14	5-Jun-15	19-Sep-15	15-Mar-16	
Radionuclides																			
Actinium-228	Bq/L	-	-	-	-	-	-	-	-	<1.0	<0.7	< 1	-	-	-	-	1.0	0.80	
Bismuth-212	Bq/L	-	-	-	-	-	-	-	-	<2.0	<2.0	< 2	-	-	-	-	<2.0	<2.0	
Bismuth-214	Bq/L	-	-	-	-	-	-	-	-	<0.5	0.70	< 0.6	-	-	-	-	<0.5	0.80	
Lead-210	Bq/L	-	-	-	-	-	-	-	-	<5.0	<3.0	< 5	-	-	-	-	<4.0	<4.0	
Lead-211	Bq/L	-	-	-	-	-	-	-	-	<7.0	<3.0	< 5	-	-	-	-	<3.0	<7.0	
Lead-212	Bq/L	-	-	-	-	-	-	-	-	0.50	<0.3	1.1	-	-	-	-	<0.4	<0.4	
Lead-214	Bq/L	-	-	-	-	-	-	-	-	<0.5	0.80	0.7	-	-	-	-	<0.5	<0.5	
Potassium-40	Bq/L	-	-	-	-	-	-	-	-	<6.0	<4.0	< 6	-	-	-	-	<6.0	<6.0	
Radium-223	Bq/L	-	-	-	-	-	-	-	-	<1.0	<1.0	< 0.9	-	-	-	-	<1.0	<0.9	
Radium-226	Bq/L	-	-	-	-	-	-	<0.005	0.010	0.010	-	< 5	-	-	<0.005	0.030	0.0080	-	
Radon-219	Bq/L	-	-	-	-	-	-	-	-	<1.0	<1.0	< 0.9	-	-	-	-	<1.0	<1.0	
Thallium-208	Bq/L	-	-	-	-	-	-	-	-	0.30	0.40	< 0.3	-	-	-	-	<0.2	<0.2	
Thorium-227	Bq/L	-	-	-	-	-	-	-	-	<1.0	<0.6	< 1	-	-	-	-	<1.0	<1.0	
Thorium-230	Bq/L	-	-	-	-	-	-	-	-	<20	<10	< 20	-	-	-	-	<30	<30	
Thorium-234	Bq/L	-	-	-	-	-	-	-	-	<4.0	<3.0	< 4	-	-	-	-	<4.0	<4.0	
Uranium-235	Bq/L	-	-	-	-	-	-	-	-	<1.0	<0.8	< 1	-	-	-	-	<1.0	<1.0	
Isotopes																			
δ ¹⁸ O _{water} (VSMOW)	‰	-	-	-	-	-	-	-	-22.04	-21.21	-20.75	-20.63	-	-	-	-	-22.26	-21.15	-24.31
δ ² H _{water} (VSMOW)	‰	-	-	-	-	-	-	-	-171.82	-165.6	-164.8	-166.8	-	-	-	-	-172.1	-167.5	-187.0
δ ¹³ C-DIC (VPDB)	‰	-	-	-	-	-	-	-	-22.24	-20.2	-14.6	-17.2	-	-	-	-	-22.0	-22.0	-19.5
δ ³⁴ S-SO4 (CDT)	‰	-	-	-	-	-	-	-	-	-	-4.18	-4.17	-	-	-	-	-	-	-
δ ¹⁸ O-SO4 (VSMOW)	‰	-	-	-	-	-	-	-	-	-	-9.24	9.31	-	-	-	-	-	-	-
Dissolved Gases																			
CH ₄	(mg/L)	-	-	-	-	-	-	-	0.0133	0.0056	0.0060	0.0435	-	-	-	-	0.0101	0.0101	8.7536
C ₂	(mg/L)	-	-	-	-	-	-	-	0.0000	0.0000	0.0000	0.0000	-	-	-	-	0.0000	0.0000	0.0000
C ₃	(mg/L)	-	-	-	-	-	-	-	0.0000	0.0000	0.0000	0.0000	-	-	-	-	0.0000	0.0000	0.0016
CO ₂	(mg/L)	-	-	-	-	-	-	-	5.19	5.72	2.32	8.04	-	-	-	-	5.15	6.47	81.70
N ₂	(mg/L)	-	-	-	-	-	-	-	21.65	30.81	24.08	23.41	-	-	-	-	19.26	24.77	24.03
O ₂	(mg/L)	-	-	-	-	-	-	-	10.82	13.91	12.18	5.02	-	-	-	-	9.87	12.77	0.79

APPENDIX B
Table B-1: Surface Water Quality Summary for Eagle Plain Baseline Study, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations																	
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	DALG-001	DALG-001	DALG-001	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	EAGL-001	EAGL-001	EAGL-001
							25-Mar-12	30-Jul-13	23-Jul-14	23-Sep-14	6-Jun-15	18-Sep-15	15-Mar-16	10-May-16	21-Jun-16	20-Sep-16	22-Sep-16	7-Mar-17	27-Jun-17	21-Sep-17	26-Aug-13	23-Jul-14	23-Sep-14	
Field Measured																								
pH	-	-	6.5 - 9.0		-	-	-	7.8	6.8	7.0	7.3	7.3	7.7	6.5 ^(Chronic)	7.3	7.4	7.5	7.94	6.73	7.87	7.8	8.1	7.5	
Specific conductivity	µS/cm	-	-		-	-	-	138	174	147	131	228	148 ^(S)	60	200	281	302	380	157.8	313	572	508	529	
Temperature	°C	-	-		-	-	-	15	16	3.1	11	3.1	0.0	1.8	17	1.9	2.7	-0.1	8.9	4.2	7.3	13	4.2	
Dissolved oxygen	mg/L	-	5.5-9.5		-	-	-	9.6	-	13	11	12	1.2 ^(Chronic)	13	9.3	14	13	7.03	10.92	12.59	11	-	12	
Turbidity	NTU	-	-		-	-	-	20	-	-	5.7	30	26	50	3.8	13	10	-	-	-	7.9	-	-	
Conventional Parameters																								
Hardness, as CaCO ₃	mg/L	-	-		-	-	403	63	77	59	49	91	541	22	75	99	-	410	58	85	280	258	273	
Total alkalinity, as CaCO ₃	mg/L	-	-		20 ^(A)	-	168	29	46	21	17 ^(BC MOE mean)	29	141	7.0 ^(BC MOE mean)	34	31	-	133	17 ^(BC MOE mean)	38	105	94	72	
Total dissolved solids	mg/L	-	-		-	-	577	152	150	152	<5.0	118	578	<5.0	250	246	-	540	150	340	442	347	375	
Total suspended solids	mg/L	-	-		-	-	<5.0	10	1.0	169	7.0	46	83	75	3.0	4.0	-	136	5	2	12	12	17	
Total organic carbon	mg/L	-	-		-	-	-	-	-	22	19	22	17	24	19	21	-	24.8	23.3	19.5	-	-	7.6	
Dissolved organic carbon	mg/L	-	-		-	-	14	24	50	21	19	21	11	18	18	20	-	12.3	21.8	18.9	6.0	9.6	6.8	
Total inorganic carbon	mg/L	-	-		-	-	-	-	-	4.2	4.4	6.0	34	2.0	6.6	6.8	-	34.2	5	8.2	-	-	16	
Dissolved inorganic carbon	mg/L	-	-		-	-	37	6.5	10	3.8	4.2	5.7	33	1.6	6.1	6.4	-	33.7	4	8.2	25	19	17	
Major Ions																								
Bicarbonate, as CaCO ₃	mg/L	-	-		-	-	-	36	46	21	21	36	172	<5.0	41	38	-	162	21	47	128	94	72	
Bromide	mg/L	-	-		-	-	-	-	<0.1	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	< 0.02	< 0.02	0.03	-	<0.1	<0.1	
Calcium	mg/L	-	-		-	-	-	16	19	12	11	19	177	4.8	18	21	-	133	13	18	77	64	64	
Carbonate, as CaCO ₃	mg/L	-	-		-	-	-	<6.0	<1.0	<1.0	<6.0	<6.0	<6.0	8.0	<6.0	<6.0	-	< 6	< 6	< 6	<6.0	<1.0	<1.0	
Chloride	mg/L	640	120		-	-	0.50	0.060	0.55	0.34	0.050	0.14	0.18	0.43	<0.05	0.40	-	0.187	< 0.05	0.11	0.70	0.89	1.6	
Fluoride	mg/L	-	-	0.12	-	-	0.37 ^(Interim)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Magnesium	mg/L	-	-		-	-	-	5.4	5.7	5.7	5.3	11	24	2.4	7.3	12	-	18.6	6.5	9.7	21	19	20	
Potassium	mg/L	-	-		-	-	-	0.50	0.76	0.69	0.70	0.80	1.9	1.1	0.90	0.80	-	1.6	0.64	0.66	0.80	0.71	0.71	
Sodium	mg/L	-	-		-	-	-	6.9	7.5	7.5	7.8	14	13	3.6	12	17	-	18.6	10	15	13	11	14	
Sulphate	mg/L	-	-		128 - 429 ^(B, C)	-	237	34	32	41	16	70	356	15	55	96	-	287	48.3	105	196	173	198	
Nutrients																								
Nitrate	mg-N/L	550	13.0		-	-	-	0.080	<0.01	0.13	0.020	0.080	<0.01	<0.01	<0.01	0.12	-	< 0.01	0.03	0.2	0.23	0.045	0.080	
Nitrite	mg-N/L	-	0.060		-	-	<0.002	<0.01	<0.01	<0.01	0.05	0.03	0.03	<0.01	<0.01	<0.01	-	< 0.01	< 0.01	< 0.01	<0.1 ^(DL>Chronic)	<0.01	<0.01	
Nitrate + nitrite	mg-N/L	-	-		3.0	33	0.0080	-	<0.01	0.13	-	-	-	-	-	-	-	-	-	-	-	0.045	0.080	
Total ammonia	mg-N/L	-	0.50 - 198 ^(D)		-	-	0.34	0.040	<0.02	0.027	<0.01	0.080	0.44	0.040	0.020	<0.01	-	0.09	< 0.01	< 0.01	0.040	<0.02	0.060	
Total kjeldahl nitrogen	mg-N/L	-	-		-	-	-	-	0.73	1.4	-	-	-	-	-	-	-	-	-	-	-	0.29	0.42	
Total nitrogen	mg-N/L	-	-		-	-	-	-	0.73	1.5	0.63	1.0	0.93	0.78	0.75	0.75	-	1.16	0.8	0.82	-	0.34	0.50	
Total nitrogen (calculated)	mg-N/L	-	-		-	-	-	-	0.73	1.5	-	-	-	-	-	-	-	-	-	-	-	0.34	0.50	
Total phosphorus	mg-P/L	-	-		-	-	-	<0.03	0.032	0.11	-	-	-	-	-	-	-	-	-	-	-	0.014	0.019	
Dissolved phosphorus	mg-P/L	-	-		-	-	-	-	0.014	0.016	-	-	-	-	-	-	-	-	-	-	-	<0.01	<0.01	
Phosphorus (as phosphate)	mg-P/L	-	-		-	-	<0.002	<0.03	0.046	0.29	0.029	0.054	0.059	0.11	0.020	0.022	-	-	-	-	0.013	0.027	0.024	
Total Metals																								
Aluminum	µg/L	-	5.0 - 100 ^(E, F)		-	-	4.8	686 ^(Chronic)	97	798 ^(Chronic)	240 ^(Chronic)	788 ^(Chronic)	226 ^(Chronic)	1,770 ^(Chronic)	203 ^(Chronic)	464 ^(Chronic)	-	1210 ^(Chronic)	400 ^(Chronic)	270 ^(Chronic)	1,350 ^(Chronic)	892 ^(Chronic)	2,030 ^(Chronic)	
Antimony	µg/L	-	-		9.0	-	0.070	0.20	0.21	0.20	0.10	<0.2	<0.2	0.10	0.17	0.13	-	0.42	0.14	0.14	<0.2	0.24	0.19	
Arsenic	µg/L	-	5.0		-	-	0.20	1.1	0.92	1.6	0.59	1.1	1.6	1.4	0.80	0.80	-	5.3 ^(Chronic)	0.9	0.7	0.50	0.49	0.65	
Barium	µg/L	-	-		1,000	-	28	106	94	158	79	114	78	110	85	93	-	174	97	94	47	55	53	
Beryllium	µg/L	-	-		0.13	-	0.0030	0.070	0.040	0.13	<0.05	0.050	<0.05	0.12	0.070	<0.05	-	0.29 ^(BC MOE mean)	0.05	< 0.05	0.11	0.11	0.32 ^(BC MOE mean)	
Bismuth	µg/L	-	-		-	-	<0.02	<0.1	<0.01	0.020	<0.1	-	-	<0.1	<0.1	<0.1	-	< 0.5	< 0.1	< 0.1	-	<0.01	<0.01	
Boron	µg/L	29,000	1,500		-	-	-	30	35	32	29	31	40	19	45	36	-	40	27	36	25	24	44	
Cadmium	µg/L	0.11 - 7.7 ^(B)	0.040 - 0.37 ^(B)		-	-	<0.01	0.050	0.031	0.19 ^(Chronic)	0.030	0.080	0.18	0.11 ^(Chronic)	0.030	0.060	-	0.51 ^(Chronic)	0.07	0.04	0.35	0.27	0.63 ^(Chronic)	
Chromium	µg/L	-	1.0		-	-	<0.2	1.9 ^(Chronic)	0.90	1.9 ^(Chronic)	0.90	1.7 ^(Chronic)	0.50	3.4 ^(Chronic)	0.90	1.3 ^(Chronic)	-	1.86 ^(Chronic)	0.76	0.69	0.60	0.70	1.0	
Cobalt	µg/L	-	-		4.0	110	2.0	0.60	0.35	3.4	0.40	1.6	17 ^(BC MOE mean)	2.5	0.43	1.1	-	21.4 ^(BC MOE mean)	0.91	0.64	9.1 ^(BC MOE mean)	7.4 ^(BC MOE mean)	16 ^(BC MOE mean)	
Copper	µg/L	-	2.0 - 4.0 ^(B)		-	-	0.30	5.0 ^(Chronic)	3.9 ^(Chronic)	7.4 ^(Chronic)	3.7 ^(Chronic)	5.0 ^(Chronic)	1.0	5.5 ^(Chronic)	3.9 ^(Chronic)	3.2 ^(Chronic)	-	5 ^(Chronic)	4.2 ^(Chronic)	2.9 ^(Chronic)	4.0	4.5 ^(Chronic)	8.4 ^(Chronic)	
Iron	µg/L	-	300		-	-	-	1,940 ^(Chronic)	1,280 ^(Chronic)	4,140 ^(Chronic)	844 ^(Chronic)	2,190 ^(Chronic)	18,200 ^(Chronic)	2,920 ^(Chronic)	1,160 ^(Chronic)	1,420 ^(Chronic)	-	63,400 ^(Chronic)	1,400 ^(Chronic)	1,500 ^(Chronic)	2,260 ^(Chronic)	1,520 ^(Chronic)	4,540 ^(Chronic)	
Lead	µg/L	-	1.0 - 7.0 ^(B)		-	-	0.020	0.50	0.44	1.7 ^(Chronic)	0.20	1.2	0.20	1.2 ^(Chronic)	0.10	0.27	-	1.58	0.61	0.18	<0.1	0.19	0.23	
Lithium	µg/L	-	-		-	-	11	4.8	5.2	5.7	4.1	8.0	8.0	4.0	6.6	8.9	-	9.5	4.7	8.4	12	12	17	
Manganese	µg/L	-	-		768 - 2,585 ^(B)	816 - 3,394 ^(B)																		

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Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations																	
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	DALG-001	DALG-001	DALG-001	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	EAGL-001	EAGL-001	EAGL-001	
							25-Mar-12	30-Jul-13	23-Jul-14	23-Sep-14	6-Jun-15	18-Sep-15	15-Mar-16	10-May-16	21-Jun-16	20-Sep-16	22-Sep-16	7-Mar-17	27-Jun-17	21-Sep-17	26-Aug-13	23-Jul-14	23-Sep-14	
Dissolved Metals																								
Aluminum	µg/L	-	-		18 - 50 ⁽⁶⁾	44 - 100 ⁽⁶⁾	2.7	106 ^(BC MOE mean, BC MOE max)	59 ^(BC MOE mean)	117 ^(BC MOE mean, BC MOE max)	86 ^(BC MOE mean)	117 ^(BC MOE mean, BC MOE max)	6.0	171 ^(BC MOE mean, BC MOE max)	69 ^(BC MOE mean)	79 ^(BC MOE mean)	-	3.391	106 ^(BC MOE mean, BC MOE max)	82 ^(BC MOE mean)	76 ⁽⁵⁾	94 ^(BC MOE mean)	60 ^(BC MOE mean)	
Antimony	µg/L	-	-		-	-	0.070	<0.2	0.18	0.15	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	0.117	0.13	0.12	< 0.2 ⁽⁵⁾	0.24	0.16	
Arsenic	µg/L	-	-		-	-	0.20	0.70	0.73	0.51	0.50	0.50	0.40	0.50	0.50	<1.0	-	0.3	0.5	0.5	< 0.2 ⁽⁵⁾	0.15	0.14	
Barium	µg/L	-	-		-	-	28	81	80	74	68	81	58	44	59	76	-	65.8	62.2	82.1	41 ⁽⁵⁾	40	40	
Beryllium	µg/L	-	-		-	-	0.0040	<0.04	0.030	0.040	0.040	<0.04	<0.04	<0.04	<0.04	<0.5	-	< 0.05	< 0.05	< 0.05	< 0.04 ⁽⁵⁾	0.020	0.030	
Bismuth	µg/L	-	-		-	-	<0.02	<1.0	<0.01	<0.01	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	< 0.1	< 0.1	< 0.1	< 1 ⁽⁵⁾	<0.01	<0.01	
Boron	µg/L	-	-		-	-	-	25	34	27	24	31	39	18	36	30	-	36	25	35	23 ⁽⁵⁾	21	32	
Cadmium	µg/L	-	-		0.044 - 0.46 ^(b)	0.066 - 2.8 ^(b)	<0.01	0.030	0.028	0.046	0.020	0.040	0.060	0.060	0.020	<0.1	-	0.035	0.03	0.03	0.19 ⁽⁵⁾	0.15	0.34	
Chromium	µg/L	-	-		-	-	<0.2	0.80	0.70	0.80	0.60	0.50	<0.4	0.40	0.50	<0.5	-	0.119	0.67	0.6	< 0.4 ⁽⁵⁾	<0.1	0.10	
Cobalt	µg/L	-	-		-	-	2.0	0.43	0.28	1.1	0.35	0.96	16	1.5	0.25	0.87	-	16.08	0.63	0.51	8.21 ⁽⁵⁾	5.8	13	
Copper	µg/L	-	-		-	-	0.31	4.0	3.3	3.6	4.0	3.0	<1.0	3.4	3.1	<5.0	-	< 0.5	3.5	2.3	4 ⁽⁵⁾	2.1	2.5	
Iron	µg/L	-	-		-	350	-	856 ^(BC MOE max)	927 ^(BC MOE max)	673 ^(BC MOE max)	542 ^(BC MOE max)	678 ^(BC MOE max)	3,980 ^(BC MOE max)	815 ^(BC MOE max)	665 ^(BC MOE max)	560 ^(BC MOE max)	-	1,060 ^(BC MOE max)	503 ^(BC MOE max)	765 ^(BC MOE max)	17 ⁽⁵⁾	28	97	
Lead	µg/L	-	-		-	-	<0.01	0.20	0.34	0.080	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	< 0.01	0.098	0.05	< 0.1 ⁽⁵⁾	<0.05	<0.05	
Lithium	µg/L	-	-		-	-	9.9	4.0	5.0	5.0	4.0	7.0	8.0	2.0	5.0	9.0	-	7.7	4.4	8	11 ⁽⁵⁾	11	16	
Manganese	µg/L	-	-		-	-	1,324	35	31	99	17	102	4,960	185	23	90	-	4040	45	61	159 ⁽⁵⁾	124	201	
Mercury	µg/L	-	-		-	-	-	0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	< 0.01	< 0.01	< 0.01	< 0.01 ⁽⁵⁾	<0.01	<0.01	
Molybdenum	µg/L	-	-		-	-	0.74	0.44	0.62	0.21	0.25	0.23	0.50	0.10	0.30	0.21	-	0.684	0.19	0.28	0.77 ⁽⁵⁾	0.82	0.60	
Nickel	µg/L	-	-		-	-	14	8.0	6.7	7.5	6.0	7.0	41	5.0	5.0	5.0	-	32.6	5.4	6.2	38 ⁽⁵⁾	24	60	
Selenium	µg/L	-	-		-	-	0.40	<0.6	0.40	0.40	<0.6	0.60	<0.6	<0.6	<2.0	-	-	0.3	0.4	0.9	< 0.6 ⁽⁵⁾	0.50	0.80	
Silicon	µg/L	-	-		-	-	-	2,160	1,350	2,240	1,820	2,860	2,430	760	1,310	2,390	-	2350	1900	1500	1880 ⁽⁵⁾	1,900	1,970	
Silver	µg/L	-	-		-	-	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	-	0.064	< 0.01	< 0.01	< 0.01 ⁽⁵⁾	<0.01	<0.01	
Strontium	µg/L	-	-		-	-	233	48	56	35	37	50	285	14	43	50	-	252.1	32.8	67.3	265 ⁽⁵⁾	216	202	
Sulphur	µg/L	-	-		-	-	-	11,000	10,100	11,700	13,400	27,400	149,000	5,200	19,500	30,600	-	97000	17000	32000	3,420,000 ⁽⁵⁾	53,100	59,300	
Tellurium	µg/L	-	-		-	-	-	-	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	-	0.265	< 0.05	< 0.05	< 0.1 ⁽⁵⁾	<0.05	<0.05	
Thallium	µg/L	-	-		-	-	<0.002	<0.01	0.0050	<0.004	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	-	0.013	< 0.01	< 0.01	0.01 ⁽⁵⁾	0.015	0.019	
Thorium	µg/L	-	-		-	-	-	<0.4	0.11	0.21	<0.4	<0.4	<0.4	<0.4	<0.4	<0.5	-	0.387	0.21	0.19	< 0.4 ⁽⁵⁾	<0.01	<0.01	
Tin	µg/L	-	-		-	-	<0.05	<0.1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<1.0	-	0.1	< 0.1	< 0.1	< 0.1 ⁽⁵⁾	<0.05	<0.05	
Titanium	µg/L	-	-		-	-	-	<10	1.0	2.0	<10	<10	22	<10	<10	5.0	-	22	4	3	< 10 ⁽⁵⁾	<0.2	<0.2	
Uranium	µg/L	-	-		-	-	0.42	<0.4	0.14	0.089	<0.4	<0.4	1.4	<0.4	<0.4	0.12	-	1.081	0.1	0.13	0.8 ⁽⁵⁾	0.54	0.59	
Vanadium	µg/L	-	-		-	-	0.39	0.75	0.80	0.40	0.43	0.29	0.20	0.50	0.40	<0.5	-	0.101	0.39	0.4	0.41 ⁽⁵⁾	<0.2	<0.2	
Zinc	µg/L	-	-		-	-	3.6	6.0	4.0	8.0	10	9.0	21	12	5.4	<5.0	-	20.6	5.5	4.9	50 ⁽⁵⁾	20	92	
Zirconium	µg/L	-	-		-	-	-	0.99	0.88	1.1	0.86	1.1	0.40	0.60	0.70	<1.0	-	0.5	1.1	1.1	0.15 ⁽⁵⁾	0.070	0.13	
Volatile Organics																								
Benzene	µg/L	-	-	370	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	< 500	< 500	< 500	-	-	<0.5	
Ethylbenzene	µg/L	-	-	90	-	-	-	-	-	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	< 500	< 500	< 500	-	-	<1.0	
Toluene	µg/L	-	-	2.0	-	-	-	-	-	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	< 500	< 500	< 500	-	-	<1.0	
Xylenes	µg/L	-	-	-	30	-	-	-	-	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	< 500	< 500	< 500	-	-	<2.0	
Styrene	µg/L	-	-	72	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	< 500	< 500	< 500	-	-	-	
Extractable Petroleum Hydrocarbons (C10-C19)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Extractable Petroleum Hydrocarbons (C10-C32)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Volatile Hydrocarbons	µg/L	-	-	-	-	-	-	-	-	<100	<50	<50	<50	<50	<50	<50	-	< 50000	< 50000	< 50000	-	-	<100	
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	-	-	-	-	-	<100	<50	<50	<50	<50	<50	<50	-	< 50000	< 50000	< 50000	-	-	<100	
Methyl tert-Butyl Ether	µg/L	-	-	10000	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	< 500	< 500	< 500	-	-	-	
Parent PAHs																								
Naphthalene	µg/L	-	-	1.1	-	-	0.0673 ⁽⁵⁾	<0.0053	<0.0035	<0.0056	<0.0077	<0.0128	<0.0041	-	-	-	-	-	-	-	<0.0072	<0.0035	<0.0056	
Acenaphthylene	µg/L	-	-	-	-	-	<0.00020	<0.00010	<0.00014	<0.00034	<0.00021	<0.00033	<0.00026	-	-	-	-	-	-	-</				

APPENDIX B
Table B-1: Surface Water Quality Summary for Eagle Plain Baseline Study, 2012 to 2017

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		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	DALG-001	DALG-001	DALG-001	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-

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Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations																	
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	DALG-001	DALG-001	DALG-001	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	EAGL-001	EAGL-001	EAGL-001
							25-Mar-12	30-Jul-13	23-Jul-14	23-Sep-14	6-Jun-15	18-Sep-15	15-Mar-16	10-May-16	21-Jun-16	20-Sep-16	22-Sep-16	7-Mar-17	27-Jul-17	21-Sep-17	26-Aug-13	23-Jul-14	23-Sep-14	
Naphthenic Acid																								
C12H18O2	ng/L	-	-	-	-	-	-	45	41	62	-	-	-	-	-	-	-	-	-	-	-	13	7.0	14
C12H20O2	ng/L	-	-	-	-	-	-	92	41	97	-	-	-	-	-	-	-	-	-	-	-	34	13	27
C12H22O2	ng/L	-	-	-	-	-	-	94	19	49	-	-	-	-	-	-	-	-	-	-	-	34	<7.5	<22
C12H24O2	ng/L	-	-	-	-	-	-	184	<15	<5.2	-	-	-	-	-	-	-	-	-	-	-	30	<4.9	<5.5
C13H20O2	ng/L	-	-	-	-	-	-	46	24	76	-	-	-	-	-	-	-	-	-	-	-	11	<4.9	13
C13H22O2	ng/L	-	-	-	-	-	-	120	48	175	-	-	-	-	-	-	-	-	-	-	-	44	12	36
C13H24O2	ng/L	-	-	-	-	-	-	79	<15	47	-	-	-	-	-	-	-	-	-	-	-	59	6.9	25
C13H26O2	ng/L	-	-	-	-	-	-	317	19	29	-	-	-	-	-	-	-	-	-	-	-	41	11	79
C14H20O2	ng/L	-	-	-	-	-	-	41	31	58	-	-	-	-	-	-	-	-	-	-	-	18	8.4	23
C14H22O2	ng/L	-	-	-	-	-	-	77	49	133	-	-	-	-	-	-	-	-	-	-	-	20	8.6	31
C14H24O2	ng/L	-	-	-	-	-	-	111	57	167	-	-	-	-	-	-	-	-	-	-	-	56	8.4	23
C14H26O2	ng/L	-	-	-	-	-	-	59	<15	27	-	-	-	-	-	-	-	-	-	-	-	102	<4.9	60
C14H28O2	ng/L	-	-	-	-	-	-	248	<15	<5.2	-	-	-	-	-	-	-	-	-	-	-	<5.0	<4.9	<5.5
C15H18O2	ng/L	-	-	-	-	-	-	41	27	49	-	-	-	-	-	-	-	-	-	-	-	5.2	14	9.3
C15H20O2	ng/L	-	-	-	-	-	-	67	47	107	-	-	-	-	-	-	-	-	-	-	-	22	7.5	33
C15H22O2	ng/L	-	-	-	-	-	-	116	82	349	-	-	-	-	-	-	-	-	-	-	-	38	16	50
C15H24O2	ng/L	-	-	-	-	-	-	160	180	261	-	-	-	-	-	-	-	-	-	-	-	60	45	70
C15H26O2	ng/L	-	-	-	-	-	-	89	49	109	-	-	-	-	-	-	-	-	-	-	-	101	11	41
C15H28O2	ng/L	-	-	-	-	-	-	44	18	<5.2	-	-	-	-	-	-	-	-	-	-	-	115	<4.9	12
C15H30O2	ng/L	-	-	-	-	-	-	200	<25	<5.2	-	-	-	-	-	-	-	-	-	-	-	37	<4.9	<16
C16H20O2	ng/L	-	-	-	-	-	-	<5.0	34	81	-	-	-	-	-	-	-	-	-	-	-	15	36	15
C16H22O2	ng/L	-	-	-	-	-	-	48	35	71	-	-	-	-	-	-	-	-	-	-	-	13	<6.5	<14
C16H24O2	ng/L	-	-	-	-	-	-	180	33	59	-	-	-	-	-	-	-	-	-	-	-	21	<4.9	<18
C16H26O2	ng/L	-	-	-	-	-	-	103	66	110	-	-	-	-	-	-	-	-	-	-	-	59	8.1	17
C16H28O2	ng/L	-	-	-	-	-	-	45	61	67	-	-	-	-	-	-	-	-	-	-	-	75	<4.9	<5.5
C16H30O2	ng/L	-	-	-	-	-	-	46	<15	<5.2	-	-	-	-	-	-	-	-	-	-	-	<5.0	<4.9	<5.5
C16H32O2	ng/L	-	-	-	-	-	-	120	<15	<5.2	-	-	-	-	-	-	-	-	-	-	-	<5.0	<4.9	<5.5
C17H22O2	ng/L	-	-	-	-	-	-	48	40	70	-	-	-	-	-	-	-	-	-	-	-	10	15	14
C17H24O2	ng/L	-	-	-	-	-	-	34	32	59	-	-	-	-	-	-	-	-	-	-	-	18	<4.9	<16
C17H26O2	ng/L	-	-	-	-	-	-	30	28	43	-	-	-	-	-	-	-	-	-	-	-	22	5.1	9.9
C17H28O2	ng/L	-	-	-	-	-	-	63	213	82	-	-	-	-	-	-	-	-	-	-	-	42	6.8	9.3
C17H30O2	ng/L	-	-	-	-	-	-	32	51	24	-	-	-	-	-	-	-	-	-	-	-	95	<4.9	<5.5
C17H32O2	ng/L	-	-	-	-	-	-	27	<15	<5.2	-	-	-	-	-	-	-	-	-	-	-	37	<4.9	<5.5
C17H34O2	ng/L	-	-	-	-	-	-	129	<15	<5.2	-	-	-	-	-	-	-	-	-	-	-	<5.0	<4.9	<5.5
C18H24O2	ng/L	-	-	-	-	-	-	111	53	133	-	-	-	-	-	-	-	-	-	-	-	44	179	29
C18H26O2	ng/L	-	-	-	-	-	-	34	19	34	-	-	-	-	-	-	-	-	-	-	-	17	7.2	<5.5
C18H28O2	ng/L	-	-	-	-	-	-	298	38	23	-	-	-	-	-	-	-	-	-	-	-	18	<4.9	<5.5
C18H30O2	ng/L	-	-	-	-	-	-	21	36	14	-	-	-	-	-	-	-	-	-	-	-	20	<4.9	<5.5
C18H32O2	ng/L	-	-	-	-	-	-	<5.0	20	<5.2	-	-	-	-	-	-	-	-	-	-	-	<5.0	<4.9	<5.5
C18H34O2	ng/L	-	-	-	-	-	-	<5.0	<15	<5.2	-	-	-	-	-	-	-	-	-	-	-	<5.0	<4.9	<5.5
C18H36O2	ng/L	-	-	-	-	-	-	157	<15	<5.9	-	-	-	-	-	-	-	-	-	-	-	<5.0	<4.9	<5.5
C19H26O2	ng/L	-	-	-	-	-	-	26	39	83	-	-	-	-	-	-	-	-	-	-	-	32	48	28
C19H28O2	ng/L	-	-	-	-	-	-	18	36	15	-	-	-	-	-	-	-	-	-	-	-	16	<4.9	<5.5
C19H30O2	ng/L	-	-	-	-	-	-	20	28	21	-	-	-	-	-	-	-	-	-	-	-	23	<4.9	<5.5
C19H32O2	ng/L	-	-	-	-	-	-	13	30	16	-	-	-	-	-	-	-	-	-	-	-	23	<4.9	5.6
C19H34O2	ng/L	-	-	-	-	-	-	25	<15	<5.2	-	-	-	-	-	-	-	-	-	-	-	20	7.3	<5.5
C19H36O2	ng/L	-	-	-	-	-	-	19	<15	<5.2	-	-	-	-	-	-	-	-	-	-	-	<5.0	<4.9	<5.5
C19H38O2	ng/L	-	-	-	-	-	-	<27	<15	24	-	-	-	-	-	-	-	-	-	-	-	<5.0	17	<5.5
C20H28O2	ng/L	-	-	-	-	-	-	108	<15	17	-	-	-	-	-	-	-	-	-	-	-	928	9.7	<21
C20H30O2	ng/L	-	-	-	-	-	-	380	104	300	-	-	-	-	-	-	-	-	-	-	-	142	66	72
C20H32O2	ng/L	-	-	-	-	-	-	101	139	72	-	-	-	-	-	-	-	-	-	-	-	14	29	21
C20H34O2	ng/L	-	-	-	-	-	-	11	17	16	-	-	-	-	-	-	-	-	-	-	-	9.6	<4.9	<5.5
C20H36O2	ng/L	-	-	-	-	-	-	<5.0	<15	<5.2	-	-	-	-	-	-	-	-	-	-	-	<5.0	<4.9	<5.5
C20H38O2	ng/L	-	-	-	-	-	-	<5.0	<15	<5.2	-	-	-	-	-	-	-	-	-	-	-	<5.0	<4.9	<5.5
C21H30O2	ng/L	-	-	-	-	-	-	35	<15	16	-	-	-	-	-	-	-	-	-	-	-	16	16	<5.5
C21H32O2	ng/L	-	-	-	-	-	-	<5.0	<15	<5.2	-	-	-	-	-	-	-	-	-	-	-	7.2	<4.9	<5.5
C21H34O2	ng/L	-	-	-	-	-	-	<7.1	<15	<5.2	-	-	-	-	-	-	-	-	-	-	-	<5.0	<4.9	<5.5
C21H36O2	ng/L	-	-	-	-	-	-	<5.0	<15	<5.2	-	-	-	-	-	-	-	-	-	-	-	<5.0	<4.9	<5.5
C21H38O2	ng/L	-	-	-	-	-	-	<5.0	<15	<5.2	-	-	-	-	-	-	-	-	-	-	-	<5.0	<4.9	<5.5
C21H40O2	ng/L	-	-	-	-	-	-	5.9	<15	<5.2	-	-	-	-	-	-	-	-	-	-	-	<5.0	<4.9	<5.5

APPENDIX B
Table B-1: Surface Water Quality Summary for Eagle Plain Baseline Study, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations																
							DALG-001	DALG-001	DALG-001	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002	DALG-002
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	25-Mar-12	30-Jul-13	23-Jul-14	23-Sep-14	6-Jun-15	18-Sep-15	15-Mar-16	10-May-16	21-Jun-16	20-Sep-16	22-Sep-16	7-Mar-17	27-Jun-17	21-Sep-17	26-Aug-13	23-Jul-14	23-Sep-14
Radionuclides																							
Actinium-228	Bq/L	-	-	-	-	-	-	-	-	-	<1.0	<0.9	0.80	2.0	1.0	-	< 0.9	< 0.7	-	-	-	-	
Bismuth-212	Bq/L	-	-	-	-	-	-	-	-	-	<2.0	<2.0	1.0	4.0	<3.0	-	< 2	< 2	-	-	-	-	
Bismuth-214	Bq/L	-	-	-	-	-	-	-	-	-	1.0	0.60	<0.4	<0.7	1.0	-	< 0.6	< 0.6	-	-	-	-	
Lead-210	Bq/L	-	-	-	-	-	-	-	-	-	<4.0	<4.0	<3.0	<6.0	<4.0	-	< 4	< 4	-	-	-	-	
Lead-211	Bq/L	-	-	-	-	-	-	-	-	-	<6.0	<4.0	<3.0	<6.0	<7.0	-	< 4	< 5	-	-	-	-	
Lead-212	Bq/L	-	-	-	-	-	-	-	-	-	<0.4	<0.4	0.50	0.80	1.0	-	0.7	0.7	-	-	-	-	
Lead-214	Bq/L	-	-	-	-	-	-	-	-	-	0.70	<0.5	<0.3	<0.6	<0.7	-	< 0.6	0.8	-	-	-	-	
Potassium-40	Bq/L	-	-	-	-	-	-	-	-	-	<5.0	<5.0	<4.0	<7.0	<5.0	-	6	< 5	-	-	-	-	
Radium-223	Bq/L	-	-	-	-	-	-	-	-	-	<1.0	<0.9	<0.5	<0.7	<1.0	-	< 1	< 1	-	-	-	-	
Radium-226	Bq/L	-	-	-	-	-	-	-	-	0.0060	0.0090	0.0090	-	-	0.010	-	< 4	< 4	-	-	-	<0.005	
Radon-219	Bq/L	-	-	-	-	-	-	-	-	-	<2.0	<1.0	<0.8	<2.0	<2.0	-	< 1	< 0.6	-	-	-	-	
Thallium-208	Bq/L	-	-	-	-	-	-	-	-	-	<0.4	<0.2	0.30	<0.4	0.40	-	0.7	< 0.2	-	-	-	-	
Thorium-227	Bq/L	-	-	-	-	-	-	-	-	-	<1.0	<0.6	<0.7	<1.0	<0.9	-	< 1	< 1	-	-	-	-	
Thorium-230	Bq/L	-	-	-	-	-	-	-	-	-	<30	<20	<20	<20	<20	-	< 20	< 20	-	-	-	-	
Thorium-234	Bq/L	-	-	-	-	-	-	-	-	-	<4.0	<4.0	<2.0	<5.0	<4.0	-	< 4	< 4	-	-	-	-	
Uranium-235	Bq/L	-	-	-	-	-	-	-	-	-	<1.0	<1.0	<1.0	<2.0	<1.0	-	< 1	< 1	-	-	-	-	
Isotopes																							
δ ¹⁸ O _{water} (VSMOW)	‰	-	-	-	-	-	-	-	-	-	-21.79	-21.69	-21.95	-	-21.43	-20.72	-	-21.96	-20.71	-20.68	-	-	-
δ ² H _{water} (VSMOW)	‰	-	-	-	-	-	-	-	-	-	-170.54	-168.8	-172.6	-	-168.7	-165.7	-	-170.4	-164.6	-162.4	-	-	-
δ ¹³ C-DIC (VPDB)	‰	-	-	-	-	-	-	-	-	-	-15.81	-10.8	-10.1	-	-12.29	-8.9	-	-10.0	-13.0	-8.9	-	-	-
δ ³⁴ S-SO4 (CDT)	‰	-	-	-	-	-	-	-	-	-	-10.5	-10.8	-1.5	-	-11.7	-9.7	-	-2.5	-10.7	-11.8	-	-	-
δ ¹⁸ O-SO4 (VSMOW)	‰	-	-	-	-	-	-	-	-	-	-11.60	-13.24	-10.74	-	-13.52	-14.26	-	-8.33	-15.14	-11.85	-	-	-
Dissolved Gases																							
CH ₄	(mg/L)	-	-	-	-	-	-	-	-	-	0.0023 (s)	0.0022	0.1224	-	0.0023	0.0023	-	-	0.0019 (s)	0.0013	-	-	-
C ₂	(mg/L)	-	-	-	-	-	-	-	-	-	0.0 (s)	0.0000	0.0000	-	0.0000	0.0000	-	-	0.0 (s)	0.0000	-	-	-
C ₃	(mg/L)	-	-	-	-	-	-	-	-	-	0.0 (s)	0.0000	0.0004	-	0.0000	0.0000	-	-	0.0 (s)	0.0000	-	-	-
CO ₂	(mg/L)	-	-	-	-	-	-	-	-	-	3.78 (s)	3.73	41.51	-	6.44	3.71	-	-	5.58 (s)	1.72	-	-	-
N ₂	(mg/L)	-	-	-	-	-	-	-	-	-	64.22 (s)	22.87	25.94	-	23.98	24.67	-	-	37.04 (s)	22.85	-	-	-
O ₂	(mg/L)	-	-	-	-	-	-	-	-	-	21.84 (s)	12.81	0.72	-	8.99	13.19	-	-	16.73 (s)	11.14	-	-	-

APPENDIX B
Table B-1: Surface Water Quality Summary for Eagle Plain Baseline Study, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations																
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	EAGL-001 15-Mar-15	EAGL-001 5-Jun-15	EAGL-001 18-Sep-15	EAGL-001 16-Mar-16	EAGL-t-002 27-Aug-13	EAGL-t-002 23-Jul-14	EAGL-t-002 23-Sep-14	EAGL-t-002 6-Jun-15	EAGL-t-002 18-Sep-15	EAGL-t-002 21-Jun-16	EAGL-t-002 20-Sep-16	EAGL-t-002 20-Sep-17	EAGL-t-003 26-Aug-13	EAGL-t-003 23-Jul-14	EAGL-t-003 23-Sep-14	EAGL-t-003 15-Mar-15	EAGL-t-003 5-Jun-15
Field Measured																							
pH	-	-	6.5 - 9.0		-	-	6.9	7.5	7.1	8.1	7.2	6.7	7.2	6.9	7.2	6.9	7.1	7.13	7.3	6.7	7.0	6.6	7.0
Specific conductivity	µS/cm	-	-		-	-	772	493	519	42 ⁽⁶⁾	352	186	397	371	683	624	665	588	352	1,221	156	355	240
Temperature	°C	-	-		-	-	0.10	9.3	3.7	0.0	3.1	10	3.2	7.4	1.8	11	0.40	2.8	7.9	15	3.5	0.10	11
Dissolved oxygen	mg/L	-	5.5-9.5		-	-	11	11	12	8.8	12	-	12	11	12	8.9	14	12.43	11	-	12	3.1 ^(Chronic)	10
Turbidity	NTU	-	-		-	-	-	25	66	19	16	-	-	16	30	8.2	12	6.7	7.2	-	-	-	6.2
Conventional Parameters																							
Hardness, as CaCO ₃	mg/L	-	-		-	-	339	228	260	391	127	68	153	124	268	227	249	210	138	82	59	126	87
Total alkalinity, as CaCO ₃	mg/L	-	-		20 ⁽⁶⁾	-	131	75	58	129	37	32	37	15 ^(BC MOE mean)	45	41	48	48	52	23	14 ^(BC MOE mean)	34	17 ^(BC MOE mean)
Total dissolved solids	mg/L	-	-		-	-	486	224	104	656	290	167	296	238	190	522	524	440	268	181	135	240	142
Total suspended solids	mg/L	-	-		-	-	3.0	26	23	3.0	<2.0	7.0	<1.0	<3.0	28	2.0	2.0	<2	<2.0	7.0	6.0	20	6.0
Total organic carbon	mg/L	-	-		-	-	4.8	5.9	7.0	4.9	-	-	19	16	21	19	19	16.1	-	-	19	14	13
Dissolved organic carbon	mg/L	-	-		-	-	4.4	4.6	7.7	4.2	22	50	18	16	20	18	17	15.7	13	35	18	13	13
Total inorganic carbon	mg/L	-	-		-	-	30	19	14	33	-	-	7.8	4.2	10	8.7	11	10	-	3.1	4.9	4.5	4.5
Dissolved inorganic carbon	mg/L	-	-		-	-	29	18	13	30	8.3	6.5	7.9	3.7	9.5	7.7	11	9.9	12	4.9	2.9	4.7	4.2
Major Ions																							
Bicarbonate, as CaCO ₃	mg/L	-	-		-	-	131	91	71	157	45	32	37	18	55	50	59	59	63	23	14	34	20
Bromide	mg/L	-	-		-	-	<0.1	<0.02	<0.02	<0.02	-	<0.1	<0.1	<0.02	<0.2	<0.02	<0.02	0.03	-	<0.1	<0.1	<0.1	<0.02
Calcium	mg/L	-	-		-	-	89	58	65	113	20	11	24	19	40	36	38	32	35	19	14	26	20
Carbonate, as CaCO ₃	mg/L	-	-		-	-	<1.0	<6.0	<6.0	<6.0	<6.0	<1.0	<1.0	<6.0	<6.0	<6.0	<6	<6.0	<1.0	<1.0	<1.0	<1.0	<6.0
Chloride	mg/L	640	120		-	-	4.5	0.79	0.080	3.0	2.9	4.2	2.2	1.9	1.2	1.3	1.6	3.03	2.4	1.7	0.72	4.3	1.5
Fluoride	mg/L	-	-	0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	mg/L	-	-		-	-	22	20	24	26	19	8.0	20	19	41	34	38	32	12	7.3	5.1	11	9.1
Potassium	mg/L	-	-		-	-	1.5	0.80	0.80	1.4	1.2	0.94	1.3	1.4	2.6	2.4	2.4	2	1.1	0.76	0.43	1.1	0.80
Sodium	mg/L	-	-		-	-	26	15	16	32	23	12	21	28	47	48	41	39	18	9.6	6.5	8.8	14
Sulphate	mg/L	-	-		128 - 429 ^(b, c)	-	243	172	13.2 ⁽⁵⁾	300	119	40	144	147	269	269	291	235	110	69	50	115	88
Nutrients																							
Nitrate	mg-N/L	550	13.0		-	-	0.090	0.060	<0.01	0.010	0.24	0.081	0.22	0.15	0.11	<0.01	0.25	0.18	0.040	0.028	0.030	0.020	0.030
Nitrite	mg-N/L	-	0.060		-	-	<0.01	0.06	0.03	<0.01	<0.01	<0.01	<0.01	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
Nitrate + nitrite	mg-N/L	-	-		3.0	33	0.090	-	-	-	-	0.081	0.22	-	-	-	-	-	-	0.028	0.030	0.020	-
Total ammonia	mg-N/L	-	0.50 - 198 ^(d)		-	-	0.15	0.030	0.040	0.12	0.030	0.024	0.023	0.020	0.020	0.040	0.020	0.01	0.050	0.037	0.034	0.14	0.030
Total kjeldahl nitrogen	mg-N/L	-	-		-	-	0.44	-	-	-	-	0.78	0.76	-	-	-	-	-	-	0.48	0.62	0.56	-
Total nitrogen	mg-N/L	-	-		-	-	0.52	0.31	0.55	0.34	-	0.86	0.98	0.70	0.85	0.81	1.2	0.73	-	0.51	0.65	0.57	0.66
Total nitrogen (calculated)	mg-N/L	-	-		-	-	0.53	-	-	-	-	0.86	0.98	-	-	-	-	-	-	0.51	0.65	0.58	-
Total phosphorus	mg-P/L	-	-		-	-	<0.01	-	-	-	-	0.057	0.030	-	-	-	-	-	-	0.025	0.020	0.014	-
Dissolved phosphorus	mg-P/L	-	-		-	-	<0.01	-	-	-	-	0.011	0.012	-	-	-	-	-	-	<0.01	0.011	<0.01	-
Phosphorus (as phosphate)	mg-P/L	-	-		-	-	<0.002	0.023	0.042	<0.003	0.032	0.059	0.034	0.038	0.043	0.016	0.023	-	0.012	0.053	0.027	0.0070	0.016
Total Metals																							
Aluminum	µg/L	-	5.0 - 100 ^(e, f)		-	-	41	1,230 ^(Chronic)	2,320 ^(Chronic)	65	286 ^(Chronic)	996 ^(Chronic)	386 ^(Chronic)	346 ^(Chronic)	565 ^(Chronic)	153 ^(Chronic)	560 ^(Chronic)	220 ^(Chronic)	130 ^(Chronic)	494 ^(Chronic)	474 ^(Chronic)	69	302 ^(Chronic)
Antimony	µg/L	-	-	9.0	-	-	0.10	0.20	<0.2	<0.2	0.16	0.11	<0.1	<0.2	0.11	0.090	0.09	<0.2	0.15	0.12	0.070	<0.1	-
Arsenic	µg/L	-	5.0	-	-	-	0.27	0.75	1.3	0.30	0.90	1.0	0.62	0.50	0.80	0.80	0.60	0.4	0.70	0.82	0.71	1.0	0.53
Barium	µg/L	-	-	1,000	-	-	50	63	69	44	81	85	86	71	93	65	73	68	59	62	54	71	60
Beryllium	µg/L	-	-	0.13	-	-	0.010	0.13	0.27 ^(BC MOE mean)	<0.05	<0.04	0.080	0.050	<0.05	0.060	<0.05	<0.05	<0.05	<0.04	0.10	0.10	0.020	0.070
Bismuth	µg/L	-	-	-	-	-	<0.01	<0.1	-	-	-	0.010	<0.01	<0.1	-	<0.1	<0.1	<0.1	-	<0.01	<0.01	<0.01	<0.1
Boron	µg/L	29,000	1,500	-	-	-	31	25	28	33	38	39	56	48	53	86	53	52	57	40	26	24	31
Cadmium	µg/L	0.11 - 7.7 ^(b)	0.040 - 0.37 ^(b)	-	-	-	0.15	0.33 ^(Chronic)	0.65 ^(Chronic)	0.17	0.040	0.043	0.059	0.030	0.26	0.040	0.050	0.03	0.11	0.16 ^(Chronic)	0.18 ^(Chronic)	0.11	0.14
Chromium	µg/L	-	1.0	-	-	-	0.10	1.0	1.3 ^(Chronic)	<0.4	1.1 ^(Chronic)	2.5 ^(Chronic)	1.2 ^(Chronic)	0.80	1.2 ^(Chronic)	0.86	1.4 ^(Chronic)	0.43	0.60	1.2 ^(Chronic)	1.2 ^(Chronic)	0.60	0.70
Cobalt	µg/L	-	-	4.0	110	10 ^(BC MOE mean)	8.7 ^(BC MOE mean)	14 ^(BC MOE mean)	13 ^(BC MOE mean)	0.85	0.87	1.3	0.50	2.8	0.74	1.5	0.57	5.6 ^(BC MOE mean)	4.2 ^(BC MOE mean)	4.1 ^(BC MOE mean)	17 ^(BC MOE mean)	4.1 ^(BC MOE mean)	-
Copper	µg/L	-	2.0 - 4.0 ^(b)	-	-	-	0.80	4.9 ^(Chronic)	9.0 ^(Chronic)	<1.0	4.0 ^(Chronic)	6.0 ^(Chronic)	3.9 ^(Chronic)	3.3 ^(Chronic)	4.0	3.7	2.8	2.4	3.0	4.8 ^(Chronic)	4.6 ^(Chronic)	1.9	3.5 ^(Chronic)
Iron	µg/L	-	300	-	-	-	1,340 ^(Chronic)	2,560 ^(Chronic)	5,060 ^(Chronic)	2,130 ^(Chronic)	2,180 ^(Chronic)	2,840 ^(Chronic)	1,690 ^(Chronic)	1,110 ^(Chronic)	2,230 ^(Chronic)	2,300 ^(Chronic)	1,160 ^(Chronic)	880 ^(Chronic)	3,470 ^(Chronic)	2,510 ^(Chronic)	2,120 ^(Chronic)	18,900 ^(Chronic)	1,610 ^(Chronic)
Lead	µg/L	-	1.0 - 7.0 ^(b)	-	-	-	<0.05	0.30	0.60	<0.1	0.20	0.51	0.27	0.20	0.60	0.060	0.22	0.11	<0.1	0.57	0.28	<0.05	0.20
Lithium	µg/L	-	-	-	-	-	14	11	18	17	14	9.5	20	15	39	35	33	25	8.0	7.6	6.0	6.1	

APPENDIX B
Table B-1: Surface Water Quality Summary for Eagle Plain Baseline Study, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations																
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	EAGL-001 15-Mar-15	EAGL-001 5-Jun-15	EAGL-001 18-Sep-15	EAGL-001 16-Mar-16	EAGL-t-002 27-Aug-13	EAGL-t-002 23-Jul-14	EAGL-t-002 23-Sep-14	EAGL-t-002 6-Jun-15	EAGL-t-002 18-Sep-15	EAGL-t-002 21-Jun-16	EAGL-t-002 20-Sep-16	EAGL-t-002 20-Sep-17	EAGL-t-003 26-Aug-13	EAGL-t-003 23-Jul-14	EAGL-t-003 23-Sep-14	EAGL-t-003 15-Mar-15	EAGL-t-003 5-Jun-15
Dissolved Metals																							
Aluminum	µg/L	-	-	-	18 - 50 ^(e)	44 - 100 ^(e)	3.0	66 ^(BC MOE mean)	62 ^(BC MOE mean)	<5.0	70 ^(BC MOE mean)	77 ^(BC MOE mean)	69 ^(BC MOE mean)	42	85 ^(BC MOE mean)	33	53 ^(BC MOE mean)	37	46	133 ^(BC MOE mean, BC MOE max)	237 ^(BC MOE mean, BC MOE max)	41	149 ^(BC MOE mean, BC MOE max)
Antimony	µg/L	-	-	-	-	-	0.080	<0.2	<0.2	<0.2	<0.2	0.11	0.10	<0.2	<0.2	<0.2	0.22	0.08	<0.2	0.13	0.11	0.080	<0.2
Arsenic	µg/L	-	-	-	-	-	0.16	0.20	<0.2	0.20	1.0	0.48	0.39	0.40	0.40	0.60	<1.0	0.3	0.70	0.48	0.46	0.76	0.40
Barium	µg/L	-	-	-	-	-	43	39	48	43	68	47	73	57	74	46	59	61.8	58	50	46	61	55
Beryllium	µg/L	-	-	-	-	-	<0.01	<0.04	<0.04	<0.04	<0.04	0.040	0.030	<0.04	<0.04	<0.04	<0.5	< 0.05	<0.04	0.060	0.080	0.010	0.060
Bismuth	µg/L	-	-	-	-	-	<0.01	<1.0	<1.0	<1.0	<1.0	<0.01	<0.01	<1.0	<1.0	<1.0	<1.0	< 0.1	<1.0	<0.01	<0.01	<0.01	<1.0
Boron	µg/L	-	-	-	-	-	26	20	27	30	36	35	46	43	46	62	50	54	57	37	23	19	25
Cadmium	µg/L	-	-	-	0.044 - 0.46 ^(b)	0.066 - 2.8 ^(b)	0.12	0.18	0.51 ^(BC MOE mean)	0.17	0.040	0.018	0.040	0.020	0.070	0.030	<0.1	0.02	0.080	0.12	0.14	0.075	0.12
Chromium	µg/L	-	-	-	-	-	<0.1	<0.4	<0.4	<0.4	0.70	0.80	0.70	0.50	<0.4	0.60	<0.5	0.41	0.50	0.60	0.80	0.40	0.50
Cobalt	µg/L	-	-	-	-	-	9.1	7.4	12	12	0.76	0.50	1.1	0.46	2.0	0.48	1.4	0.47	5.5	3.5	3.7	15	3.9
Copper	µg/L	-	-	-	-	-	0.70	2.0	3.0	<1.0	4.0	4.2	3.0	3.0	3.0	3.0	<5.0	2.1	2.0	3.6	3.7	1.0	3.0
Iron	µg/L	-	-	-	-	350	12	<5.0	226	128	1,220 ^(BC MOE max)	859 ^(BC MOE max)	749 ^(BC MOE max)	408 ^(BC MOE max)	621 ^(BC MOE max)	1,090 ^(BC MOE max)	540 ^(BC MOE max)	354 ^(BC MOE max)	1,280 ^(BC MOE max)	1,020 ^(BC MOE max)	1,230 ^(BC MOE max)	16,100 ^(BC MOE max)	1,170 ^(BC MOE max)
Lead	µg/L	-	-	-	-	-	<0.05	<0.1	<0.1	<0.1	<0.1	0.10	0.070	<0.1	<0.1	<0.1	<0.1	0.02	<0.1	0.20	0.070	<0.05	<0.1
Lithium	µg/L	-	-	-	-	-	11	11	16	16	14	8.1	19	16	35	27	33	25.1	8.0	6.7	5.9	4.7	7.0
Manganese	µg/L	-	-	-	-	-	502	164	222	665	91	50	144	61	357	101	210	90	249	139	115	711	156
Mercury	µg/L	-	-	-	-	-	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	< 0.01	<0.01	<0.01	<0.01	<0.005	<0.01	
Molybdenum	µg/L	-	-	-	-	-	0.65	0.56	0.54	0.50	0.14	0.20	0.16	0.10	0.14	0.20	0.24	0.2	0.28	0.17	0.14	0.15	0.11
Nickel	µg/L	-	-	-	-	-	29	35	59	37	8.0	6.7	8.1	5.0	9.0	6.0	7.0	5	26	20	17	22	19
Selenium	µg/L	-	-	-	-	-	0.30	0.80	0.90	<0.6	2.8	0.30	0.20	<0.6	<0.6	<0.6	<2.0	0.4	<0.6	0.30	0.30	0.30	<0.6
Silicon	µg/L	-	-	-	-	-	2,530	1,820	2,540	2,430	2,340	2,150	2,110	1,840	2,560	1,530	2,350	2300	2,350	2,310	2,530	2,810	2,180
Silver	µg/L	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.12	0.02	<0.01	<0.01	<0.01	<0.01	<0.01
Strontium	µg/L	-	-	-	-	-	306	210	182	305	44	26	49	40	68	58	52	55.6	121	64	45	98	71
Sulphur	µg/L	-	-	-	-	-	82,700	63,800	75,500	116,000	38,600	12,900	41,900	53,000	110,000	96,800	91,000	79000	35,700	21,600	13,100	37,300	31,600
Tellurium	µg/L	-	-	-	-	-	<0.05	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.1	<0.1	<0.1	0.72	0.22	<0.1	<0.05	<0.05	<0.05	<0.1
Thallium	µg/L	-	-	-	-	-	0.015	0.010	0.010	0.020	<0.01	<0.004	<0.004	<0.01	<0.01	<0.01	< 0.01	0.010	0.011	0.0060	0.0080	<0.01	
Thorium	µg/L	-	-	-	-	-	<0.01	<0.4	<0.4	<0.4	<0.4	0.15	0.14	<0.4	<0.4	<0.4	<0.5	0.73	<0.4	0.080	0.16	0.030	<0.4
Tin	µg/L	-	-	-	-	-	<0.05	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.1	<0.1	<0.1	<1.0	< 0.1	<0.1	<0.05	<0.05	<0.05	<0.1
Titanium	µg/L	-	-	-	-	-	<0.2	<10	<10	17	<10	3.4	2.3	<10	<10	<10	10	6	<10	0.80	1.3	<0.2	<10
Uranium	µg/L	-	-	-	-	-	0.48	0.50	0.50	0.50	<0.4	0.072	0.16	<0.4	0.50	<0.4	0.59	0.21	<0.4	0.10	0.11	0.052	<0.4
Vanadium	µg/L	-	-	-	-	-	<0.2	0.12	<0.1	<0.1	0.55	0.60	0.40	0.31	0.18	0.40	<0.5	0.19	0.27	0.30	0.40	0.20	0.34
Zinc	µg/L	-	-	-	-	-	53	32	111	64	7.0	5.0	8.0	7.0	14	5.4	5.0	3.7	25	23	31	48	35
Zirconium	µg/L	-	-	-	-	-	0.040	<0.1	0.24	<0.1	1.2	1.3	1.1	0.73	1.1	0.80	<1.0	1.3	0.29	0.59	0.96	0.42	0.44
Volatile Organics																							
Benzene	µg/L	-	-	370	-	-	<0.5	<0.5	<0.5	<0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	< 500	-	-	<0.5	<0.5	<0.5
Ethylbenzene	µg/L	-	-	90	-	-	<1.0	<0.5	<0.5	<0.5	-	-	<1.0	<0.5	<0.5	<0.5	<0.5	< 500	-	-	<1.0	<1.0	<0.5
Toluene	µg/L	-	-	2.0	-	-	<1.0	<0.5	<0.5	<0.5	-	-	<1.0	<0.5	<0.5	<0.5	<0.5	< 500	-	-	<1.0	<1.0	<0.5
Xylenes	µg/L	-	-	-	30	-	<2.0	<0.5	<0.5	<0.5	-	-	<2.0	<0.5	<0.5	<0.5	<0.5	< 500	-	-	<2.0	<2.0	<0.5
Styrene	µg/L	-	-	72	-	-	<1.0	<0.5	<0.5	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	< 500	-	-	-	<1.0	<0.5
Extractable Petroleum Hydrocarbons (C10-C19)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Extractable Petroleum Hydrocarbons (C10-C32)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Volatile Hydrocarbons	µg/L	-	-	-	-	-	<100	<50	<50	<50	-	-	<100	<50	<50	<50	<50	< 50000	-	-	<100	<100	<50
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	-	-	<100	<50	<50	<50	-	-	<100	<50	<50	<50	<50	< 50000	-	-	<100	<100	<50
Methyl tert-Butyl Ether	µg/L	-	-	10000	-	-	<1.0	<0.5	<0.5	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	< 500	-	-	-	<1.0	<0.5
Parent PAHs																							
Naphthalene	µg/L	-	-	1.1	-	-	<0.0045	<0.0077	<0.0128	<0.0041	<0.0072	<0.0035	<0.0056	<0.0077	<0.0128	-	-	-	<0.0072	<0.0035	<0.0056	0.022	<0.0077
Acenaphthylene	µg/L	-	-	-	-	-	<0.00024	<0.0002	<0.00018	<0.00020	<0.00014	<0.00012	<0.00039	<0.00010	<0.00022	-	-	-					

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		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	EAGL-001 15-Mar-15	EAGL-001 5-Jun-15	EAGL-001 18-Sep-15	EAGL-001 16-Mar-16	EAGL-t-002 27-Aug-13	EAGL-t-002 23-Jul-14	EAGL-t-002 23-Sep-14	EAGL-t-002 6-Jun-15	EAGL-t-002 18-Sep-15	EAGL-t-002 21-Jun-16	EAGL-t-002 20-Sep-16	EAGL-t-002 20-Sep-17	EAGL-t-003 26-Aug-13	EAGL-t-003 23-Jul-14	EAGL-t-003 23-Sep-14	EAGL-t-003 15-Mar-15	EAGL-t-003 5-Jun-15
Alkylated PAHs																							
C1 substituted naphthalenes	µg/L	-	-	-	-	-	<0.0079	<0.0094	0.011	<0.0095	<0.0041	<0.0027	<0.0134	<0.0094	<0.0091	-	-	-	<0.0041	0.0030	<0.0134	0.020	<0.0094
C2 substituted naphthalenes	µg/L	-	-	-	-	-	<0.0073	<0.013	0.024	<0.0131	<0.0085	<0.0064	<0.0138	<0.0126	0.008	-	-	-	<0.0085	<0.0064	<0.0138	<0.0073	<0.013
C3 substituted naphthalenes	µg/L	-	-	-	-	-	0.00051	0.011	0.034	<0.0030	<0.0029	0.0058	<0.0066	<0.0058	0.011	-	-	-	<0.0029	0.0056	<0.0066	0.0023	0.0060
C4 substituted naphthalenes	µg/L	-	-	-	-	-	<0.00024	0.0071	0.018	<0.0016	0.0023	0.0018	<0.0028	0.0018	<0.0057	-	-	-	0.0046	0.0017	<0.0028	<0.00032	0.0027
1-Methylnaphthalene	µg/L	-	-	-	-	-	<0.00143	0.0023	0.0057	<0.00134	<0.00132	0.0012	<0.0017	<0.0017	<0.0023	-	-	-	<0.0013	0.0014	<0.0017	0.0081	0.0019
2-Methylnaphthalene	µg/L	-	-	-	-	-	<0.00648	<0.0094	<0.0068	<0.00813	<0.0028	<0.0018	<0.0118	<0.0094	<0.0068	-	-	-	<0.0028	<0.0018	<0.0118	0.012	<0.0094
1,2-Dimethylnaphthalene	µg/L	-	-	-	-	-	<0.00030	<0.00062	0.0020	<0.00033	<0.0018	<0.00119	<0.00077	<0.00044	<0.00085	-	-	-	<0.00177	<0.00119	<0.0012	<0.00098	<0.0010
2,6-Dimethylnaphthalene	µg/L	-	-	-	-	-	<0.00025	0.0023	0.0049	<0.00028	0.00053	0.0010	<0.00065	0.00086	0.0021	-	-	-	<0.00049	0.0012	0.0013	0.0018	0.0018
C1 substituted acenaphthenes	µg/L	-	-	-	-	-	<0.00029	<0.00035	<0.00026	<0.00035	<0.00022	<0.00014	<0.00060	<0.00031	<0.00033	-	-	-	<0.00032	<0.00022	<0.00039	<0.00036	<0.00047
C1 substituted biphenyls	µg/L	-	-	-	-	-	<0.0038	<0.0019	0.0011	<0.0065	0.0018	<0.0093	<0.00375	<0.00186	0.0013	-	-	-	<0.00149	<0.0093	<0.0038	<0.0038	<0.0019
C2 substituted biphenyls	µg/L	-	-	-	-	-	<0.0164	<0.0033	0.0019	<0.023	0.0069	<0.041	<0.0171	<0.0033	0.0014	-	-	-	<0.0037	<0.041	<0.017	<0.0164	<0.0033
2,3,5-Trimethylnaphthalene	µg/L	-	-	-	-	-	<0.00028	0.0027	0.0078	0.00017	0.00048	0.0009	<0.00049	0.00093	0.0021	-	-	-	<0.00081	0.0010	0.00077	<0.00094	0.0016
2,3,6-Trimethylnaphthalene	µg/L	-	-	-	-	-	<0.00026	0.0027	0.0080	0.00024	<0.00065	0.0013	<0.00076	0.0010	0.0032	-	-	-	<0.0011	0.0008	0.0011	<0.00086	0.0016
C1 substituted fluorenes	µg/L	-	-	-	-	-	<0.00049	0.0013	0.0029	<0.00149	<0.0023	<0.00103	<0.00150	0.00096	<0.00051	-	-	-	<0.0023	0.0015	<0.0015	<0.0013	0.0011
C2 substituted fluorenes	µg/L	-	-	-	-	-	<0.00042	0.0019	0.0060	0.00061	<0.00155	<0.00094	<0.00038	0.0011	<0.00044	-	-	-	<0.0016	0.0011	0.00096	<0.00074	0.00063
C3 substituted fluorenes	µg/L	-	-	-	-	-	<0.00039	<0.0053	0.0083	0.00073	<0.0041	<0.0039	0.0034	<0.0053	0.0039	-	-	-	<0.0041	<0.0039	<0.0026	<0.00038	<0.0053
2-Methylfluorene	µg/L	-	-	-	-	-	<0.00049	<0.00025	<0.00043	<0.00024	<0.00028	<0.00014	<0.00018	<0.00020	<0.00051	-	-	-	<0.00029	<0.00018	<0.00022	<0.0013	<0.00016
1,4,6,7-Tetramethylnaphthalene	µg/L	-	-	-	-	-	<0.00024	<0.00092	0.0028	<0.00021	<0.00045	<0.00035	<0.00062	<0.00021	<0.0013	-	-	-	<0.00039	<0.00047	<0.00051	<0.00032	0.00039
C1 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	<0.00025	0.0078	0.028	<0.00165	0.00071	0.0027	0.0022	0.0014	0.0060	-	-	-	0.00060	0.0024	0.0026	<0.00032	0.0022
C2 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	0.00018	0.0085	0.021	<0.00098	0.0015	0.0030	0.0019	0.0021	0.0041	-	-	-	<0.0013	<0.00118	0.0018	<0.00027	0.0026
C3 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	<0.00013	0.0060	0.016	0.00020	<0.0016	0.0020	0.0012	0.0012	0.0042	-	-	-	<0.0016	<0.0011	0.0013	<0.00027	0.0018
C4 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	<0.00031	0.0088	0.021	<0.00033	0.0031	0.0031	0.0028	0.0030	0.0047	-	-	-	0.0024	0.0012	<0.0026	<0.00056	0.0030
1-Methylphenanthrene	µg/L	-	-	-	-	-	<0.00025	0.0020	0.0072	<0.00044	0.00022	0.00074	0.00048	0.00051	0.0015	-	-	-	<0.00024	0.00041	0.00056	<0.00032	0.00080
2-Methylphenanthrene	µg/L	-	-	-	-	-	<0.00025	0.0022	0.0057	<0.00070	0.00029	0.00045	0.00066	<0.00056	0.0013	-	-	-	<0.00051	0.00047	0.00067	<0.00032	<0.00067
3-Methylphenanthrene	µg/L	-	-	-	-	-	<0.00025	0.0013	0.0049	<0.00050	0.00020	0.00061	0.00057	0.00038	0.0012	-	-	-	0.00033	0.00068	0.00063	<0.00032	0.00046
9/4-Methylphenanthrene	µg/L	-	-	-	-	-	<0.00025	0.0023	0.0099	0.00019	<0.00018	0.00080	0.00045	0.00055	0.0020	-	-	-	0.00027	0.00074	0.00076	<0.00032	0.00089
2-Methylanthracene	µg/L	-	-	-	-	-	<0.00026	<0.00038	<0.00020	<0.00019	<0.00018	<0.00018	<0.00031	<0.00029	<0.00057	-	-	-	<0.00025	<0.00013	<0.00029	<0.00033	<0.00023
1,7-Dimethylfluorene	µg/L	-	-	-	-	-	<0.00042	<0.00051	0.00041	<0.00017	<0.00028	<0.00042	<0.00038	<0.00024	<0.00044	-	-	-	<0.00032	<0.00020	<0.00050	<0.00074	<0.00032
C1 substituted dibenzothiophenes	µg/L	-	-	-	-	-	<0.00019	0.00060	0.0013	0.00014	0.00034	0.00040	0.0011	0.00078	0.0028	-	-	-	0.00030	0.00044	0.00099	<0.00044	0.00089
C2 substituted dibenzothiophenes	µg/L	-	-	-	-	-	<0.00029	0.0018	0.0054	0.00015	<0.0019	0.0039	<0.0021	0.0030	0.0073	-	-	-	<0.0019	0.0014	<0.0021	<0.00069	0.0029
C3 substituted dibenzothiophenes	µg/L	-	-	-	-	-	<0.00016	0.0019	0.0048	<0.00116	<0.0021	0.0030	0.0019	0.0018	0.0050	-	-	-	<0.00215	<0.0011	<0.0014	<0.00024	0.0019
C4 substituted dibenzothiophenes	µg/L	-	-	-	-	-	<0.00135	<0.00232	<0.00019	<0.00103	<0.0032	<0.00102	<0.0028	<0.0023	<0.00194	-	-	-	<0.0032	<0.00102	<0.0028	<0.00135	<0.0023
2/3-Methyldibenzothiophenes	µg/L	-	-	-	-	-	<0.00019	<0.00049	0.00068	<0.00012	<0.00017	<0.00045	0.00034	<0.00020	0.00082	-	-	-	<0.00015	0.00033	0.00044	<0.00044	<0.00039
1,7-Dimethylphenanthrene	µg/L	-	-	-	-	-	<0.00017	0.0011	0.0038	<0.000219	0.00015	0.00036	<0.00026	<0.00027	0.00071	-	-	-	0.00016	<0.00025	<0.00026	<0.00026	<0.00021
1,8-Dimethylphenanthrene	µg/L	-	-	-	-	-	<0.00017	<0.00033	0.0012	<0.000053	0.000079	0.00014	0.00011	<0.000059	<0.00026	-	-	-	<0.000081	<0.000071	<0.00011	<0.00027	<0.00011
2,6-Dimethylphenanthrene	µg/L	-	-	-	-	-	<0.00017	<0.00026	0.00087	<0.000144	<0.00021	<0.00032	<0.00014	<0.000064	<0.00038	-	-	-	<0.00021	<0.000315	<0.00014	<0.00027	<0.00011
3,6-Dimethylphenanthrene	µg/L	-	-	-	-	-	<0.00018	<0.00038	<0.0013	<0.000054	<0.000240	<0.00019	<0.00016	<0.00017	<0.00042	-	-	-	<0.000240	0.00015	<0.00016	<0.00027	<0.00014
2,4-Dimethyldibenzothiophene	µg/L	-	-	-	-	-	<0.00029	<0.00016	<0.00050	<0.00010	<0.00028	0.00035	<0.00030	<0.00012	<0.00047	-	-	-	<0.00024	<0.00017	<0.00044	<0.00069	<0.00023
C1 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	-	0.00064	0.0051	0.013	0.00016	<0.0013	0.0018	<										

APPENDIX B
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		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	EAGL-001 15-Mar-15	EAGL-001 5-Jun-15	EAGL-001 18-Sep-15	EAGL-001 16-Mar-16	EAGL-t-002 27-Aug-13	EAGL-t-002 23-Jul-14	EAGL-t-002 23-Sep-14	EAGL-t-002 6-Jun-15	EAGL-t-002 18-Sep-15	EAGL-t-002 21-Jun-16	EAGL-t-002 20-Sep-16	EAGL-t-002 20-Sep-17	EAGL-t-003 26-Aug-13	EAGL-t-003 23-Jul-14	EAGL-t-003 23-Sep-14	EAGL-t-003 15-Mar-15	EAGL-t-003 5-Jun-15
Naphthenic Acid																							
C12H18O2	ng/L	-	-	-	-	-	19	-	-	-	70	58	113	-	-	-	-	-	59	37	105	104	-
C12H20O2	ng/L	-	-	-	-	-	52	-	-	-	159	50	293	-	-	-	-	-	106	60	183	167	-
C12H22O2	ng/L	-	-	-	-	-	22	-	-	-	80	20	147	-	-	-	-	-	50	28	84	57	-
C12H24O2	ng/L	-	-	-	-	-	<5.0	-	-	-	<4.9	<14	<5.6	-	-	-	-	<4.9	<5.1	<4.9	34	-	
C13H20O2	ng/L	-	-	-	-	-	27	-	-	-	106	44	193	-	-	-	-	-	67	33	116	105	-
C13H22O2	ng/L	-	-	-	-	-	38	-	-	-	195	94	344	-	-	-	-	-	84	64	206	119	-
C13H24O2	ng/L	-	-	-	-	-	14	-	-	-	51	<21	91	-	-	-	-	-	30	16	78	31	-
C13H26O2	ng/L	-	-	-	-	-	22	-	-	-	<4.9	29	<5.6	-	-	-	-	-	24	34	55	<5.2	-
C14H20O2	ng/L	-	-	-	-	-	28	-	-	-	53	40	107	-	-	-	-	-	48	35	112	102	-
C14H22O2	ng/L	-	-	-	-	-	34	-	-	-	168	92	355	-	-	-	-	-	90	54	184	139	-
C14H24O2	ng/L	-	-	-	-	-	46	-	-	-	180	88	341	-	-	-	-	-	102	60	237	111	-
C14H26O2	ng/L	-	-	-	-	-	<8.9	-	-	-	<26	<14	60	-	-	-	-	-	24	22	48	27	-
C14H28O2	ng/L	-	-	-	-	-	<5.0	-	-	-	<4.9	<14	<5.6	-	-	-	-	<4.9	<5.1	<4.9	<5.2	-	
C15H18O2	ng/L	-	-	-	-	-	14	-	-	-	23	21	52	-	-	-	-	-	21	17	41	31	-
C15H20O2	ng/L	-	-	-	-	-	27	-	-	-	69	61	118	-	-	-	-	-	53	34	120	72	-
C15H22O2	ng/L	-	-	-	-	-	37	-	-	-	191	208	316	-	-	-	-	-	88	82	330	137	-
C15H24O2	ng/L	-	-	-	-	-	38	-	-	-	239	206	418	-	-	-	-	-	173	176	413	171	-
C15H26O2	ng/L	-	-	-	-	-	27	-	-	-	130	85	219	-	-	-	-	-	91	67	178	94	-
C15H28O2	ng/L	-	-	-	-	-	<6.5	-	-	-	<4.9	<14	26	-	-	-	-	-	22	15	33	10	-
C15H30O2	ng/L	-	-	-	-	-	<5.0	-	-	-	<4.9	<14	<5.6	-	-	-	-	<4.9	<5.1	<6.7	<5.2	-	
C16H20O2	ng/L	-	-	-	-	-	15	-	-	-	44	34	50	-	-	-	-	-	30	23	66	37	-
C16H22O2	ng/L	-	-	-	-	-	17	-	-	-	42	<33	81	-	-	-	-	-	32	25	75	38	-
C16H24O2	ng/L	-	-	-	-	-	14	-	-	-	57	56	113	-	-	-	-	-	45	30	75	57	-
C16H26O2	ng/L	-	-	-	-	-	19	-	-	-	113	115	218	-	-	-	-	-	82	62	170	70	-
C16H28O2	ng/L	-	-	-	-	-	13	-	-	-	43	28	65	-	-	-	-	-	37	38	130	30	-
C16H30O2	ng/L	-	-	-	-	-	<5.0	-	-	-	<4.9	<14	<5.6	-	-	-	-	<4.9	<5.1	<4.9	<5.2	-	
C16H32O2	ng/L	-	-	-	-	-	<5.0	-	-	-	<4.9	<14	98	-	-	-	-	-	28	<5.1	<4.9	<5.2	-
C17H22O2	ng/L	-	-	-	-	-	12	-	-	-	25	29	45	-	-	-	-	-	26	22	52	33	-
C17H24O2	ng/L	-	-	-	-	-	13	-	-	-	28	27	72	-	-	-	-	-	35	23	61	35	-
C17H26O2	ng/L	-	-	-	-	-	12	-	-	-	37	47	64	-	-	-	-	-	39	32	87	67	-
C17H28O2	ng/L	-	-	-	-	-	27	-	-	-	115	130	103	-	-	-	-	-	57	61	195	43	-
C17H30O2	ng/L	-	-	-	-	-	5.6	-	-	-	24	16	20	-	-	-	-	-	27	25	75	12	-
C17H32O2	ng/L	-	-	-	-	-	<5.0	-	-	-	<4.9	<14	<5.6	-	-	-	-	-	8.4	<5.1	<4.9	<5.2	-
C17H34O2	ng/L	-	-	-	-	-	<5.0	-	-	-	<4.9	<20	<5.6	-	-	-	-	-	11	<5.1	<4.9	<5.2	-
C18H24O2	ng/L	-	-	-	-	-	36	-	-	-	54	135	78	-	-	-	-	-	42	61	95	52	-
C18H26O2	ng/L	-	-	-	-	-	8.7	-	-	-	<18	29	33	-	-	-	-	-	24	18	48	24	-
C18H28O2	ng/L	-	-	-	-	-	5.2	-	-	-	17	22	14	-	-	-	-	-	18	21	59	10	-
C18H30O2	ng/L	-	-	-	-	-	<5.0	-	-	-	17	<14	20	-	-	-	-	-	17	19	46	9.9	-
C18H32O2	ng/L	-	-	-	-	-	<5.0	-	-	-	<4.9	<14	<5.6	-	-	-	-	-	9.2	<5.1	<4.9	<5.2	-
C18H34O2	ng/L	-	-	-	-	-	<5.0	-	-	-	<4.9	<14	<5.6	-	-	-	-	-	<4.9	<5.1	<5.2	<5.2	-
C18H36O2	ng/L	-	-	-	-	-	<5.0	-	-	-	<4.9	<14	<5.6	-	-	-	-	<4.9	<5.1	<6.4	<5.2	-	
C19H26O2	ng/L	-	-	-	-	-	<5.0	-	-	-	28	77	56	-	-	-	-	-	42	31	107	<5.2	-
C19H28O2	ng/L	-	-	-	-	-	6.3	-	-	-	16	16	<5.6	-	-	-	-	-	13	17	43	8.8	-
C19H30O2	ng/L	-	-	-	-	-	<5.0	-	-	-	13	16	12	-	-	-	-	-	16	15	47	7.2	-
C19H32O2	ng/L	-	-	-	-	-	<5.0	-	-	-	9.1	<14	<9.3	-	-	-	-	-	10	11	42	<5.2	-
C19H34O2	ng/L	-	-	-	-	-	<5.0	-	-	-	5.4	17	<5.6	-	-	-	-	-	7.0	9.6	29	7.6	-
C19H36O2	ng/L	-	-	-	-	-	<5.0	-	-	-	<4.9	<14	<5.6	-	-	-	-	-	<4.9	<5.1	12	<5.2	-
C19H38O2	ng/L	-	-	-	-	-	<5.0	-	-	-	<4.9	44	28	-	-	-	-	-	5.0	19	56	<5.2	-
C20H28O2	ng/L	-	-	-	-	-	<5.0	-	-	-	45	<14	<5.6	-	-	-	-	-	73	<9.5	21	<5.2	-
C20H30O2	ng/L	-	-	-	-	-	124	-	-	-	52	552	62	-	-	-	-	-	94	58	275	92	-
C20H32O2	ng/L	-	-	-	-	-	16	-	-	-	33	244	46	-	-	-	-	-	17	43	66	21	-
C20H34O2	ng/L	-	-	-	-	-	<5.0	-	-	-	<4.9	17	11	-	-	-	-	-	5.0	9.8	13	<5.2	-
C20H36O2	ng/L	-	-	-	-	-	<5.0	-	-	-	<4.9	<14	<5.6	-	-	-	-	<4.9	<5.1	<4.9	<5.2	-	
C20H38O2	ng/L	-	-	-	-	-	<5.0	-	-	-	<4.9	<14	<5.6	-	-	-	-	<4.9	<5.1	17	<5.2	-	
C21H30O2	ng/L	-	-	-	-	-	7.2	-	-	-	10	32	7.3	-	-	-	-	-	10	14	29	<5.2	-
C21H32O2	ng/L	-	-	-	-	-	<5.0	-	-	-	<4.9	<14	<5.6	-	-	-	-	-	<4.9	<5.1	<5.8	<5.2	-
C21H34O2	ng/L	-	-	-	-	-	<5.0	-	-	-	<4.9	<14	<5.6	-	-	-	-	<4.9	<5.1	<4.9	<5.2	-	
C21H36O2	ng/L	-	-	-	-	-	<5.0	-	-	-	<4.9	<14	<5.6	-	-	-	-	<4.9	<5.1	<4.9	<5.2	-	
C21H38O2	ng/L	-	-	-	-	-	<5.0	-	-	-	<4.9	<14	<5.6	-	-	-	-	<4.9	<5.1	<4.9	<5.2	-	
C21H40O2	ng/L	-	-	-	-	-	<5.0	-	-	-	<4.9	<14	<5.6	-	-	-	-	<4.9	<5.1	<4.9	<5.2	-	

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		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	EAGL-001 15-Mar-15	EAGL-001 5-Jun-15	EAGL-001 18-Sep-15	EAGL-001 16-Mar-16	EAGL-t-002 27-Aug-13	EAGL-t-002 23-Jul-14	EAGL-t-002 23-Sep-14	EAGL-t-002 6-Jun-15	EAGL-t-002 18-Sep-15	EAGL-t-002 21-Jun-16	EAGL-t-002 20-Sep-16	EAGL-t-002 20-Sep-17	EAGL-t-003 26-Aug-13	EAGL-t-003 23-Jul-14	EAGL-t-003 23-Sep-14	EAGL-t-003 15-Mar-15	EAGL-t-003 5-Jun-15
Radionuclides																							
Actinium-228	Bq/L	-	-	-	-	-	-	-	<1.0	1.0	-	-	-	-	<0.8	2.0	<0.8	-	-	-	-	-	-
Bismuth-212	Bq/L	-	-	-	-	-	-	-	<2.0	<2.0	-	-	-	-	<2.0	<2.0	<2.0	-	-	-	-	-	-
Bismuth-214	Bq/L	-	-	-	-	-	-	-	<0.6	<0.4	-	-	-	-	<0.5	<0.6	<0.5	-	-	-	-	-	-
Lead-210	Bq/L	-	-	-	-	-	-	-	<4.0	<3.0	-	-	-	-	<5.0	<4.0	<3.0	-	-	-	-	-	-
Lead-211	Bq/L	-	-	-	-	-	-	-	<6.0	<3.0	-	-	-	-	<4.0	<4.0	<2.0	-	-	-	-	-	-
Lead-212	Bq/L	-	-	-	-	-	-	-	0.50	<0.3	-	-	-	-	0.30	<0.4	0.50	-	-	-	-	-	-
Lead-214	Bq/L	-	-	-	-	-	-	-	<0.5	<0.4	-	-	-	-	0.40	<0.6	<0.4	-	-	-	-	-	-
Potassium-40	Bq/L	-	-	-	-	-	-	-	<4.0	<4.0	-	-	-	-	<5.0	<6.0	<5.0	-	-	-	-	-	-
Radium-223	Bq/L	-	-	-	-	-	-	-	<1.0	<0.9	-	-	-	-	<1.0	<0.9	<1.0	-	-	-	-	-	-
Radium-226	Bq/L	-	-	-	-	-	0.0080	<0.005	0.020	-	-	-	<0.005	<0.005	0.010	-	0.0050	-	-	-	<0.005	<0.005	<0.005
Radon-219	Bq/L	-	-	-	-	-	-	-	<0.6	<1.0	-	-	-	-	<0.9	<1.0	<1.0	-	-	-	-	-	-
Thallium-208	Bq/L	-	-	-	-	-	-	-	<0.2	<0.2	-	-	-	-	<0.2	<0.4	0.30	-	-	-	-	-	-
Thorium-227	Bq/L	-	-	-	-	-	-	-	<1.0	<0.6	-	-	-	-	<1.0	<2.0	<0.9	-	-	-	-	-	-
Thorium-230	Bq/L	-	-	-	-	-	-	-	<20	<20	-	-	-	-	<20	<20	<20	-	-	-	-	-	-
Thorium-234	Bq/L	-	-	-	-	-	-	-	<4.0	<3.0	-	-	-	-	<4.0	<4.0	<3.0	-	-	-	-	-	-
Uranium-235	Bq/L	-	-	-	-	-	-	-	<1.0	<0.6	-	-	-	-	<1.0	<1.0	<0.9	-	-	-	-	-	-
Isotopes																							
δ ¹⁸ O _{water} (VSMOW)	‰	-	-	-	-	-	-21.93	-22.59	-21.31	-21.73	-	-	-	-21.44	-21.80	-21.06	-20.91	-21.07	-	-	-	-21.94	-22.12
δ ² H _{water} (VSMOW)	‰	-	-	-	-	-	-170.1	-175.2	-163.8	-170.5	-	-	-	-166.9	-166.9	-167.4	-166.4	-164.2	-	-	-	-170.7	-171.7
δ ¹³ C-DIC (VPDB)	‰	-	-	-	-	-	-13.0	-8.6	-7.8	-13.61	-	-	-	-15.0	-9.4	-13.1	-8.8	-9.9	-	-	-	-20.56	-11
δ ³⁴ S-SO4 (CDT)	‰	-	-	-	-	-	-2.1	-1.7	-2.8	-3.2	-	-	-	-6.7	-7.9	-5.6	-7.2	-6.9	-	-	-	-0.7	-2.2
δ ¹⁸ O-SO4 (VSMOW)	‰	-	-	-	-	-	-10.55	-12.90	-12.69	-12.20	-	-	-	-9.53	-9.84	-10.36	-11.95	-9.38	-	-	-	-7.53	-12.40
Dissolved Gases																							
CH ₄	(mg/L)	-	-	-	-	-	-	0.0017	0.0014	0.0228	-	-	-	0.0046	0.0037	0.0082	0.0052	0.0046 (s)	-	-	-	-	0.0032
C ₂	(mg/L)	-	-	-	-	-	-	0.0000	0.0000	0.0000	-	-	-	0.0000	0.0000	0.0000	0.0000	0 (s)	-	-	-	-	0.0000
C ₃	(mg/L)	-	-	-	-	-	-	0.0000	0.0004	0.0000	-	-	-	0.0000	0.0000	0.0000	0.0000	0 (s)	-	-	-	-	0.0000
CO ₂	(mg/L)	-	-	-	-	-	-	4.67	7.96	43.88	-	-	-	5.15	5.92	9.46	6.97	5.32 (s)	-	-	-	-	4.30
N ₂	(mg/L)	-	-	-	-	-	-	20.42	20.34	24.32	-	-	-	20.22	22.34	22.42	25.56	71.39 (s)	-	-	-	-	18.39
O ₂	(mg/L)	-	-	-	-	-	-	10.71	11.78	5.21	-	-	-	10.51	12.53	9.07	13.76	24.8 (s)	-	-	-	-	9.46

APPENDIX B
Table B-1: Surface Water Quality Summary for Eagle Plain Baseline Study, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations													
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	EAGL-t-003	EAGL-t-003	EAGL-t-003	EAGL-t-003	EAGL-t-003	EAGL-t-003	EAGL-t-003	EAGL-t-003	McPL-001	McPL-001	McPL-001	McPL-001	McPL-001	McPL-001
							18-Sep-15	16-Mar-16	21-Jun-16	20-Sep-16	7-Mar-17	27-Jun-17	20-Sep-17	29-Jul-13	22-Jul-14	21-Sep-14	5-Jun-15	19-Sep-15	10-May-16	
Field Measured																				
pH	-	-	6.5 - 9.0		-	-	7.1	7.8	6.9	7.5	8	6.62	7.22	7.2	6.5	7.0	6.6	6.7	6.1 ^(Chronic)	
Specific conductivity	µS/cm	-	-		-	-	182	38 ^(s)	226	149	134.5	476.1	246.1	51	47	81	57	90	42	
Temperature	°C	-	-		-	-	3.2	0.0	17	0.80	0	15.2	5.6	13	13	3.9	7.6	2.1	0.30	
Dissolved oxygen	mg/L	-	5.5-9.5		-	-	13	5.8 ^(Chronic)	9.0	14	6.24	9.2	11.9	9.4	-	12	11	12	13	
Turbidity	NTU	-	-		-	-	29	1.5	7.4	36	-	-	-	81	-	-	12	65	22	
Conventional Parameters																				
Hardness, as CaCO ₃	mg/L	-	-		-	-	69	178	78	53	140	154	85	26	26	34	21	36	17	
Total alkalinity, as CaCO ₃	mg/L	-	-		20 ^(A)	-	16 ^(BC MOE mean)	36	20	12 ^(BC MOE mean)	37	14 ^(BC MOE mean)	23	14 ^(BC MOE mean)	13 ^(BC MOE mean)	14 ^(BC MOE mean)	7.0 ^(BC MOE mean)	11 ^(BC MOE mean)	5.0 ^(BC MOE mean)	
Total dissolved solids	mg/L	-	-		-	-	68	320	200	116	256	430	220	96	112	109	16	20	6.0	
Total suspended solids	mg/L	-	-		-	-	34	39	3.0	38	182	2	< 2	86	8.0	11	7.0	114	23	
Total organic carbon	mg/L	-	-		-	-	22	16	16	23	28.2	11.9	15	-	-	22	20	25	32	
Dissolved organic carbon	mg/L	-	-		-	-	21	12	15	20	14.4	10.7	13.8	27	13	22	21	26	26	
Total inorganic carbon	mg/L	-	-		-	-	3.8	12	3.9	2.8	11.8	4.9	5.2	-	-	2.4	1.9	2.6	1.6	
Dissolved inorganic carbon	mg/L	-	-		-	-	3.4	7.8	3.3	2.4	9.9	4	5.1	3.0	2.5	2.6	1.6	3.6	1.1	
Major Ions																				
Bicarbonate, as CaCO ₃	mg/L	-	-		-	-	20	43	25	15	45	18	28	17	13	14	<5.0	13	<5.0	
Bromide	mg/L	-	-		-	-	<0.02	<0.02	<0.02	<0.02	< 0.02	0.07	0.03	-	<0.1	<0.1	<0.02	<0.02	<0.02	
Calcium	mg/L	-	-		-	-	15	41	18	12	31.1	33	19	6.3	5.5	7.4	4.5	7.7	4.0	
Carbonate, as CaCO ₃	mg/L	-	-		-	-	<6.0	<6.0	<6.0	<6.0	< 6	< 6	< 6	<6.0	<1.0	<1.0	8.0	<6.0	7.0	
Chloride	mg/L	640	120		-	-	0.49	1.5	22	0.45	1.69	8.33	1.51	0.10	0.41	0.34	0.15	0.27	0.44	
Fluoride	mg/L	-	-	0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Magnesium	mg/L	-	-		-	-	7.8	19	8.3	5.6	15.2	17	9.2	2.6	2.1	3.4	2.4	4.1	1.8	
Potassium	mg/L	-	-		-	-	0.60	1.0	0.80	0.50	0.8	1.5	0.7	0.30	0.29	0.44	0.40	0.40	1.0	
Sodium	mg/L	-	-		-	-	11	12	14	7.6	9.9	37	14	3.0	1.6	4.2	3.7	5.8	2.4	
Sulphate	mg/L	-	-		128 - 429 ^(B, C)	-	58	153	76	48	107	187	83	4.3	2.8	17	13	23	7.0	
Nutrients																				
Nitrate	mg-N/L	550	13.0		-	-	0.030	<0.01	<0.01	<0.01	< 0.01	0.01	0.02	0.060	<0.01	0.030	0.020	0.010	<0.01	
Nitrite	mg-N/L	-	0.060		-	-	0.03	0.020	<0.01	<0.01	< 0.01	< 0.01	< 0.01	<0.01	<0.01	0.05	0.03	0.03	<0.01	
Nitrate + nitrite	mg-N/L	-	-		3.0	33	-	-	-	-	-	-	-	-	<0.01	0.030	-	-	-	
Total ammonia	mg-N/L	-	0.50 - 198 ^(D)		-	-	0.040	0.11	0.030	0.030	0.47	0.03	0.03	0.050	<0.02	0.023	0.020	0.020	<0.01	
Total kjeldahl nitrogen	mg-N/L	-	-		-	-	-	-	-	-	-	-	-	-	0.85	1.2	-	-	-	
Total nitrogen	mg-N/L	-	-		-	-	0.63	0.48	0.89	0.65	0.8	0.39	0.47	-	0.85	1.2	0.67	0.73	1.0	
Total nitrogen (calculated)	mg-N/L	-	-		-	-	-	-	-	-	-	-	-	-	0.85	1.2	-	-	-	
Total phosphorus	mg-P/L	-	-		-	-	-	-	-	-	-	-	-	0.086	0.039	0.034	-	-	-	
Dissolved phosphorus	mg-P/L	-	-		-	-	-	-	-	-	-	-	-	-	0.013	0.016	-	-	-	
Phosphorus (as phosphate)	mg-P/L	-	-		-	-	0.042	0.014	0.010	0.044	-	-	-	0.086	0.049	0.044	0.032	0.095	0.058	
Total Metals																				
Aluminum	µg/L	-	5.0 - 100 ^(E, F)		-	-	864 ^(Chronic)	215 ^(Chronic)	282 ^(Chronic)	1,610 ^(Chronic)	1570 ^(Chronic)	180 ^(Chronic)	390 ^(Chronic)	2,570 ^(Chronic)	507 ^(Chronic)	512 ^(Chronic)	328 ^(Chronic)	2,260 ^(Chronic)	1,250 ^(Chronic)	
Antimony	µg/L	-	-		9.0	-	<0.2	<0.2	0.11	0.14	0.3	0.09	0.12	0.20	0.21	0.20	0.20	<0.2	0.080	
Arsenic	µg/L	-	5.0		-	-	1.2	0.80	0.90	1.5	5	0.7	0.7	2.3	1.0	0.85	0.61	1.6	0.80	
Barium	µg/L	-	-		1,000	-	70	98	79	78	174	81	60	179	110	119	92	173	108	
Beryllium	µg/L	-	-		0.13	-	0.14 ^(BC MOE mean)	0.060	0.11	0.13	< 0.25	< 0.05	0.11	0.16 ^(BC MOE mean)	0.090	0.070	0.050	0.18 ^(BC MOE mean)	0.070	
Bismuth	µg/L	-	-		-	-	-	-	<0.1	<0.1	< 0.5	< 0.1	< 0.1	<0.1	0.010	0.010	<0.1	-	<0.1	
Boron	µg/L	29,000	1,500		-	-	18	26	49	17	30	65	29	7.0	5.0	9.0	8.0	8.0	7.0	
Cadmium	µg/L	0.11 - 7.7 ^(B)	0.040 - 0.37 ^(D)		-	-	0.13 ^(Chronic)	0.20	0.14 ^(Chronic)	0.17 ^(Chronic)	0.48 ^(Chronic)	0.2	0.18 ^(Chronic)	0.10 ^(Chronic)	0.048	0.060	0.040	0.13 ^(Chronic)	0.13 ^(Chronic)	
Chromium	µg/L	-	1.0		-	-	1.8 ^(Chronic)	0.70	0.99	3.4 ^(Chronic)	2.46 ^(Chronic)	0.23	0.56	4.9 ^(Chronic)	1.5 ^(Chronic)	1.6 ^(Chronic)	1.0	4.9 ^(Chronic)	2.2 ^(Chronic)	
Cobalt	µg/L	-	-		4.0	110	3.6	15 ^(BC MOE mean)	3.9	4.2 ^(BC MOE mean)	12.8 ^(BC MOE mean)	7.3 ^(BC MOE mean)	5.4 ^(BC MOE mean)	1.7	0.39	0.45	0.20	1.9	1.7	
Copper	µg/L	-	2.0 - 4.0 ^(H)		-	-	5.0 ^(Chronic)	3.0	4.9 ^(Chronic)	5.5 ^(Chronic)	17 ^(Chronic)	3.1	3.3 ^(Chronic)	9.3 ^(Chronic)	6.0 ^(Chronic)	5.8 ^(Chronic)	5.1 ^(Chronic)	9.0 ^(Chronic)	5.9 ^(Chronic)	
Iron	µg/L	-	300		-	-	3,250 ^(Chronic)	9,110 ^(Chronic)	2,830 ^(Chronic)	3,180 ^(Chronic)	57,100 ^(Chronic)	4,100 ^(Chronic)	3,300 ^(Chronic)	5,250 ^(Chronic)	1,550 ^(Chronic)	1,700 ^(Chronic)	788 ^(Chronic)	4,500 ^(Chronic)	1,770 ^(Chronic)	
Lead	µg/L	-	1.0 - 7.0 ^(B)		-	-	0.70	0.20	0.16	0.76	1.48	0.18	0.1	2.2 ^(Chronic)	0.40	0.44	0.20	1.9 ^(Chronic)	0.67	
Lithium	µg/L	-	-		-	-	7.0	6.0	8.9	7.6	5.7	8.6	8	3.4	1.4	1.8	1.2	4.0	1.8	
Manganese	µg/L	-	-		768 - 2,585 ^(B)	816 - 3,394 ^(B)	136	943	136	145	780	360	190	78	41	46	16	147	288	
Mercury	µg/L	-	0.026		-	-	<0.01	<0.01	0.010	<0.01	< 0.01	< 0.01	< 0.01	0.02	<0.01	<0.01	<0.01	0.010	0.010	
Molybdenum	µg/L	-	73		-	-	0.30	<0.1	0.18	0.25	0.69	0.09	0.17	0.60	0.35	0.31	0.19	0.30	0.17	
Nickel	µg/L	-	25 - 150 ^(B)		-	-	15	32	18	17	37	29	24	9.2	6.1	6.2	4.6	9.0	6.2	
Selenium	µg/L	-	1.0		-	-	<0.6	<0.6	0.60	0.60	1	0.4	0.4	0.80	0.40	0.50	0.30	0.70	0.40	
Silicon	µg/L	-	-		-	-	5,110	3,900	2,530	7,130	6500	2800	3300	6,050	2,500	3,000	2,320	7,270	3,580	
Silver	µg/L	-	0.25		-	-	0.020	0.010	0.010	0.023	< 0.05	< 0.01	0.01	0.080	0.030	0.030	<0.05	0.040	0.010	
Strontium	µg/L	-	-		-	-	40	117	72	35	101	110	67	41	38	39</				

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		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	EAGL-t-003	EAGL-t-003	EAGL-t-003	EAGL-t-003	EAGL-t-003	EAGL-t-003	EAGL-t-003	McPL-001	McPL-001	McPL-001	McPL-001	McPL-001	McPL-001
							18-Sep-15	16-Mar-16	21-Jun-16	20-Sep-16	7-Mar-17	27-Jun-17	20-Sep-17	29-Jul-13	22-Jul-14	21-Sep-14	5-Jun-15	19-Sep-15	10-May-16
Dissolved Metals																			
Aluminum	µg/L	-	-		18 - 50 ⁽⁶⁾	44 - 100 ⁽⁶⁾	259 ^(BC MOE mean, BC MOE max)	83 ^(BC MOE mean)	134 ^(BC MOE mean, BC MOE max)	308 ^(BC MOE mean, BC MOE max)	62.47 ^(BC MOE mean)	90 ^(BC MOE mean)	189 ^(BC MOE mean, BC MOE max)	147 ^(BC MOE mean, BC MOE max)	145 ^(BC MOE mean, BC MOE max)	146 ^(BC MOE mean, BC MOE max)	126 ^(BC MOE mean, BC MOE max)	207 ^(BC MOE mean, BC MOE max)	238 ^(BC MOE mean, BC MOE max)
Antimony	µg/L	-	-		-	-	<0.2	<0.2	<0.2	<0.2	0.086	0.09	0.08	<0.2	0.19	0.19	<0.2	<0.2	<0.2
Arsenic	µg/L	-	-		-	-	0.60	0.50	0.60	<1.0	0.4	0.4	0.4	0.90	0.67	0.51	0.50	0.50	0.50
Barium	µg/L	-	-		-	-	53	88	63	48	78.4	73.9	52.4	83	86	96	81	83	79
Beryllium	µg/L	-	-		-	-	0.11	<0.04	0.070	<0.5	< 0.05	0.06	< 0.05	0.040	0.060	0.050	0.050	0.050	0.11
Bismuth	µg/L	-	-		-	-	<1.0	<1.0	<1.0	<1.0	< 0.1	< 0.1	< 0.1	<1.0	<0.01	<0.01	<1.0	<1.0	<1.0
Boron	µg/L	-	-		-	-	18	25	37	<20	21	70	33	6.0	5.0	7.0	5.0	7.0	6.0
Cadmium	µg/L	-	-		0.044 - 0.46 ^(b)	0.066 - 2.8 ^(b)	0.11	0.10	0.12	0.12	0.163	0.14	0.14	0.030	0.039	0.033	0.030	0.050	0.11 ^(BC MOE mean, BC MOE max)
Chromium	µg/L	-	-		-	-	0.70	0.90	0.70	<0.5	0.368	0.4	0.57	1.1	0.90	1.0	0.70	0.70	0.50
Cobalt	µg/L	-	-		-	-	3.1	14	2.8	3.7	10.43	6.33	4.69	0.33	0.22	0.26	0.11	0.51	1.4
Copper	µg/L	-	-		-	-	4.0	2.0	4.1	<5.0	2.1	2.4	2.7	6.0	5.0	4.7	5.0	5.0	5.2
Iron	µg/L	-	-		-	350	1,340 ^(BC MOE max)	8,350 ^(BC MOE max)	1,490 ^(BC MOE max)	1,400 ^(BC MOE max)	5,770 ^(BC MOE max)	1,330 ^(BC MOE max)	1,610 ^(BC MOE max)	982 ^(BC MOE max)	636 ^(BC MOE max)	602 ^(BC MOE max)	439 ^(BC MOE max)	644 ^(BC MOE max)	841 ^(BC MOE max)
Lead	µg/L	-	-		-	-	<0.1	<0.1	<0.1	<0.1	0.021	0.15	0.02	0.30	0.12	0.090	<0.1	<1.0	<0.1
Lithium	µg/L	-	-		-	-	7.0	6.0	7.0	<5.0	4.8	8.5	7.6	<1.0	0.87	1.4	1.0	1.0	<1.0
Manganese	µg/L	-	-		-	-	130	921	114	120	775	344	170	32	29	36	14	81	314
Mercury	µg/L	-	-		-	-	<0.01	<0.01	<0.01	<0.01	< 0.01	< 0.01	< 0.01	0.010	<0.01	<0.01	0.010	<0.01	<0.01
Molybdenum	µg/L	-	-		-	-	0.18	<0.1	0.10	<0.2	0.111	0.07	0.15	0.45	0.31	0.26	0.19	0.19	0.10
Nickel	µg/L	-	-		-	-	13	30	18	14	22.5	25	20	6.0	5.2	5.4	4.0	5.0	5.0
Selenium	µg/L	-	-		-	-	<0.6	<0.6	<0.6	<2.0	0.3	0.3	0.3	<0.6	0.30	0.40	<0.6	<0.6	<0.6
Silicon	µg/L	-	-		-	-	3,320	3,640	2,140	3,000	3760	2700	2800	2,530	1,860	2,520	1,840	3,410	860
Silver	µg/L	-	-		-	-	<0.01	<0.01	<0.01	<0.1	0.031	< 0.01	< 0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.020
Strontium	µg/L	-	-		-	-	40	110	60	31	93.6	101.6	59.1	36	35	37	25	35	18
Sulphur	µg/L	-	-		-	-	23,000	54,700	27,100	15,400	39900	67000	28000	1,600	636	4,970	4,700	9,200	2,600
Tellurium	µg/L	-	-		-	-	<0.1	<0.1	<0.1	<0.5	0.067	< 0.05	< 0.05	-	<0.05	<0.05	<0.1	<0.1	<0.1
Thallium	µg/L	-	-		-	-	<0.01	0.010	<0.01	<0.1	0.012	0.02	< 0.01	<0.01	0.0040	<0.004	<0.01	<0.01	<0.01
Thorium	µg/L	-	-		-	-	<0.4	<0.4	<0.4	<0.5	0.186	0.07	0.15	<0.4	0.13	0.18	<0.4	<4.0	<0.4
Tin	µg/L	-	-		-	-	<0.1	<0.1	<0.1	<1.0	< 0.1	< 0.1	< 0.1	<0.1	<0.05	<0.05	<0.1	<0.1	0.10
Titanium	µg/L	-	-		-	-	<10	<10	<10	5.0	7	6	3	15	1.6	1.9	<10	<10	<10
Uranium	µg/L	-	-		-	-	<0.4	<0.4	<0.4	0.13	0.089	0.05	0.1	<0.4	0.073	0.075	<0.4	<0.4	<0.4
Vanadium	µg/L	-	-		-	-	0.40	0.20	0.40	0.66	0.11	0.12	0.23	1.0	0.60	0.40	0.49	0.45	0.60
Zinc	µg/L	-	-		-	-	26	77	30	34	58.3	31.7	33.6	4.0	3.0	4.0	5.0	<10	10
Zirconium	µg/L	-	-		-	-	1.3	0.70	0.80	<1.0	0.6	0.3	0.9	1.6	1.5	1.5	1.1	1.2	1.0
Volatile Organics																			
Benzene	µg/L	-	-	370	-	-	<0.5	<0.5	<0.5	<0.5	< 500	< 500	< 500	-	-	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	µg/L	-	-	90	-	-	<0.5	<0.5	<0.5	<0.5	< 500	< 500	< 500	-	-	<1.0	<0.5	<0.5	<0.5
Toluene	µg/L	-	-	2.0	-	-	<0.5	<0.5	<0.5	<0.5	< 500	< 500	< 500	-	-	<1.0	<0.5	<0.5	<0.5
Xylenes	µg/L	-	-	-	30	-	<0.5	<0.5	<0.5	<0.5	< 500	< 500	< 500	-	-	<2.0	<0.5	<0.5	<0.5
Styrene	µg/L	-	-	72	-	-	<0.5	<0.5	<0.5	<0.5	< 500	< 500	< 500	-	-	-	<0.5	<0.5	<0.5
Extractable Petroleum Hydrocarbons (C10-C19)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Extractable Petroleum Hydrocarbons (C10-C32)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Volatile Hydrocarbons	µg/L	-	-	-	-	-	<50	<50	<50	<50	< 50000	< 50000	< 50000	-	-	<100	<50	<50	<50
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	-	-	<50	<50	<50	<50	< 50000	< 50000	< 50000	-	-	<100	<50	<50	<50
Methyl tert-Butyl Ether	µg/L	-	-	10000	-	-	<0.5	<0.5	<0.5	<0.5	< 500	< 500	< 500	-	-	-	<0.5	<0.5	<0.5
Parent PAHs																			
Naphthalene	µg/L	-	-	1.1	-	-	-	<0.0041	-	-	-	-	-	<0.0053	<0.0035	<0.0056	<0.0077	<0.0128	-
Acenaphthylene	µg/L	-	-	-	-	-	-	<0.00025	-	-	-	-	-	<0.00011	<0.000077	<0.00019	<0.000088	<0.00018	-
Biphenyl	µg/L	-	-	-	-	-	-	<0.0014	-	-	-	-	-	<0.00246	<0.00224	<0.00184	<0.0047	<0.00119	-
Acenaphthene	µg/L	-	-	5.8	-	-	-	<0.00023	-	-	-	-	-	<0.00029	< 0.00025	<0.00040	<0.00021	<0.00041	-
Fluorene	µg/L	-	-	3.0	-	-	0.00074	<0.00032	-	-	-	-	-	<0.000083	<0.000255	0.00022	<0.00014	0.00019	-
Phenanthrene	µg/L	-	-	0.40	-	-	0.0051	<0.0032	-	-	-	-	-	<0.00020	<0.00261	<0.00230	<0.0033	<0.0020	-
Anthracene	µg/L	-	-	0.012	-	-	<0.00048	<0.000051	-	-	-	-	-	<0.000291	<0.000153	<0.0001	<0.000072	<0.000099	-
Dibenzothiophene	µg/L	-	-	-	-	-	0.0017	0.00048	-	-	-	-	-	<0.00084	<0.00048	<0.00017	<0.000089	<0.000020	-
Pyrene	µg/L	-	-	0.025	-	-	0.0013	<0.00071	-	-	-	-	-	<0.00091	<0.00057	<0.00138	<0.0015	<0.00075	-
Fluoranthene	µg/L	-	-	0.040	-	-	<0.0011	<0.00110	-	-	-	-	-	<0.00122	<0.00115	<0.00175	<0.00113	<0.00108	-
Benzo(a)anthracene	µg/L	-	-	0.018	-	-	0.00038	<0.000129	-										

APPENDIX B
Table B-1: Surface Water Quality Summary for Eagle Plain Baseline Study, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life						Sampling Stations											
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	EAGL-t-003 18-Sep-15	EAGL-t-003 16-Mar-16	EAGL-t-003 21-Jun-16	EAGL-t-003 20-Sep-16	EAGL-t-003 7-Mar-17	EAGL-t-003 27-Jun-17	EAGL-t-003 20-Sep-17	McPL-001 29-Jul-13	McPL-001 22-Jul-14	McPL-001 21-Sep-14	McPL-001 5-Jun-15	McPL-001 19-Sep-15	McPL-001 10-May-16
Alkylated PAHs																			
C1 substituted naphthalenes	µg/L	-	-	-	-	-	-	<0.0095	-	-	-	-	<0.0033	<0.0027	<0.0134	<0.0094	<0.0091	-	
C2 substituted naphthalenes	µg/L	-	-	-	-	-	-	<0.0131	-	-	-	-	<0.0095	<0.0064	<0.0138	<0.0126	<0.0076	-	
C3 substituted naphthalenes	µg/L	-	-	-	-	-	-	0.0061	-	-	-	-	<0.0053	<0.0037	<0.0066	<0.0058	0.0020	-	
C4 substituted naphthalenes	µg/L	-	-	-	-	-	-	0.0022	-	-	-	-	<0.0026	0.00028	<0.0028	0.00023	<0.00573	-	
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	0.0017	-	-	-	-	<0.00107	<0.00085	<0.00167	<0.00166	<0.0023	-	
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	<0.0081	-	-	-	-	<0.0023	<0.00181	<0.0118	<0.00939	<0.0068	-	
1,2-Dimethylnaphthalene	µg/L	-	-	-	-	-	-	0.00052	-	-	-	-	<0.00027	<0.00119	<0.00050	<0.00042	<0.00048	-	
2,6-Dimethylnaphthalene	µg/L	-	-	-	-	-	-	0.0017	-	-	-	-	<0.00031	<0.00036	<0.00042	<0.00035	<0.00041	-	
C1 substituted acenaphthenes	µg/L	-	-	-	-	-	-	<0.00042	-	-	-	-	<0.00016	<0.00019	<0.00039	<0.00031	<0.00026	-	
C1 substituted biphenyls	µg/L	-	-	-	-	-	-	<0.0065	-	-	-	-	<0.0024	<0.0093	<0.0038	<0.00186	<0.00094	-	
C2 substituted biphenyls	µg/L	-	-	-	-	-	-	<0.023	-	-	-	-	<0.0104	<0.041	<0.0171	<0.0033	0.00041	-	
2,3,5-Trimethylnaphthalene	µg/L	-	-	-	-	-	-	0.0015	-	-	-	-	<0.00055	<0.00047	<0.00049	0.00020	<0.00081	-	
2,3,6-Trimethylnaphthalene	µg/L	-	-	-	-	-	-	0.0017	-	-	-	-	<0.00046	<0.00060	<0.00076	<0.00097	<0.00074	-	
C1 substituted fluorenes	µg/L	-	-	-	-	-	0.0019	<0.0015	-	-	-	-	<0.00210	<0.00103	<0.0015	0.00095	<0.00044	-	
C2 substituted fluorenes	µg/L	-	-	-	-	-	0.0056	0.0012	-	-	-	-	<0.00190	<0.00094	<0.00024	0.00098	<0.00017	-	
C3 substituted fluorenes	µg/L	-	-	-	-	-	0.0086	0.0017	-	-	-	-	<0.0112	<0.00390	<0.0026	<0.0053	<0.00085	-	
2-Methylfluorene	µg/L	-	-	-	-	-	<0.00070	0.00020	-	-	-	-	<0.00021	<0.00016	<0.00025	<0.00024	<0.00044	-	
1,4,6,7-Tetramethylnaphthalene	µg/L	-	-	-	-	-	-	<0.00056	-	-	-	-	<0.00020	<0.00013	<0.00023	<0.00011	<0.00030	-	
C1 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	0.012	0.0028	-	-	-	-	<0.00023	0.00041	<0.00024	<0.00014	0.0016	-	
C2 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	0.0050	0.0024	-	-	-	-	<0.00205	<0.00118	<0.00098	0.00027	0.00074	-	
C3 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	0.0029	0.0017	-	-	-	-	<0.00268	<0.00114	0.00054	<0.00058	0.00018	-	
C4 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	0.0028	0.0018	-	-	-	-	<0.0046	<0.00104	<0.0026	0.0014	0.0017	-	
1-Methylphenanthrene	µg/L	-	-	-	-	-	0.0026	0.00054	-	-	-	-	<0.00023	<0.00037	<0.00024	<0.00014	0.00042	-	
2-Methylphenanthrene	µg/L	-	-	-	-	-	0.0030	<0.00070	-	-	-	-	<0.00023	<0.00038	<0.00024	<0.00015	0.00037	-	
3-Methylphenanthrene	µg/L	-	-	-	-	-	0.0028	0.00063	-	-	-	-	<0.00023	0.00014	<0.00024	<0.00015	0.00032	-	
9/4-Methylphenanthrene	µg/L	-	-	-	-	-	0.0039	0.00099	-	-	-	-	<0.00023	0.00012	<0.00024	<0.00015	0.00048	-	
2-Methylanthracene	µg/L	-	-	-	-	-	<0.00037	<0.00017	-	-	-	-	<0.00024	<0.000076	<0.00024	<0.00015	<0.00014	-	
1,7-Dimethylfluorene	µg/L	-	-	-	-	-	<0.00056	<0.00023	-	-	-	-	<0.00022	<0.00035	<0.00024	<0.00023	<0.00017	-	
C1 substituted dibenzothiophenes	µg/L	-	-	-	-	-	0.0046	0.0017	-	-	-	-	<0.00020	0.00018	0.00016	<0.00014	<0.00019	-	
C2 substituted dibenzothiophenes	µg/L	-	-	-	-	-	0.0066	0.0024	-	-	-	-	<0.00236	<0.00056	<0.00210	0.00037	<0.00031	-	
C3 substituted dibenzothiophenes	µg/L	-	-	-	-	-	0.0037	0.0012	-	-	-	-	<0.00432	<0.00106	<0.00138	0.00029	<0.00119	-	
C4 substituted dibenzothiophenes	µg/L	-	-	-	-	-	<0.0019	<0.00103	-	-	-	-	<0.00226	<0.00102	<0.0028	<0.00232	<0.00194	-	
2/3-Methyldibenzothiophenes	µg/L	-	-	-	-	-	0.0019	0.00059	-	-	-	-	<0.00020	<0.00021	<0.00013	<0.00014	<0.00019	-	
1,7-Dimethylphenanthrene	µg/L	-	-	-	-	-	0.00065	0.00030	-	-	-	-	<0.00014	<0.00025	<0.000261	<0.000066	<0.00022	-	
1,8-Dimethylphenanthrene	µg/L	-	-	-	-	-	<0.00032	0.00013	-	-	-	-	<0.00014	<0.00024	<0.000082	<0.000067	<0.00022	-	
2,6-Dimethylphenanthrene	µg/L	-	-	-	-	-	0.00042	0.00021	-	-	-	-	<0.00014	<0.00032	<0.000144	<0.000067	<0.00022	-	
3,6-Dimethylphenanthrene	µg/L	-	-	-	-	-	0.00045	<0.00022	-	-	-	-	<0.00014	<0.00025	<0.000159	<0.000068	<0.00022	-	
2,4-Dimethyldibenzothiophene	µg/L	-	-	-	-	-	<0.0019	0.00027	-	-	-	-	<0.000076	<0.00031	<0.00029	<0.00020	<0.00031	-	
C1 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	-	0.0079	0.0020	-	-	-	-	<0.0013	<0.00108	<0.00165	<0.00071	0.0013	-	
C2 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	-	0.0084	0.0018	-	-	-	-	<0.0033	<0.00017	<0.00207	0.00029	0.00054	-	
C3 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	-	0.0020	<0.00023	-	-	-	-	<0.00122	<0.000423	<0.00085	<0.00014	<0.00016	-	
C4 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	-	<0.00036	<0.00023	-	-	-	-	<0.00082	<0.000074	0.00035	<0.000099	<0.00020	-	
1,2,6-Trimethylphenanthrene	µg/L	-	-	-	-	-	<0.00032	0.00010	-	-	-	-	<0.000084	<0.000033	<0.000095	<0.000089	<0.00012	-	
C1 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	-	0.0023	0.00045	-	-	-	-	0.00038	<0.000046	0.00021	<0.00011	0.00034	-	
C2 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	-	<0.00034	0.00044	-	-	-	-	<0.00102	<0.000069	<0.00044	<0.00012	<0.00016	-	
C3 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	-	<0.00041	<0.000076	-	-	-	-	<0.00109	<0.00054	<0.00018	0.00032	<0.00012	-	
C4 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	-	<0.00030	<0.000078	-	-	-	-	<0.000068	<0.000089	<0.00014	0.00076	<0.00012	-	
5/6-Methylchrysene	µg/L	-	-	-	-	-	0.00035	<0.000086	-	-	-	-	<0.00012	<0.000047	<0.00002	<0.00011	<0.00012	-	
5,9-Dimethylchrysene	µg/L	-	-	-	-	-	<0.00034	<0.000063	-	-	-	-	<0.000060	<0.000069	<0.00013	<0.00012	<0.00016	-	
C1 substituted benzo(a)fluoranthenes / benzopyrenes	µg/L	-	-	-	-	-	0.0018	<0.00016	-	-	-	-	<0.00106	<0.00066	<0.00047	0.00077	<0.00036	-	
C2 substituted benzo(a)fluoranthenes / benzopyrenes	µg/L	-	-	-	-	-	<0.00088	<0.00013	-	-	-	-	<0.00208	<0.00139	<0.00026	0.00073	<0.00021	-	
7-Methylbenzo(a)pyrene	µg/L	-	-	-	-	-	<0.0013	<0.00016	-	-	-	-	<0.000093	<0.00011	<0.00047	<0.00034	<0.00036	-	
1-methylchrysene	µg/L	-	-	-	-	-	0.00042	<0.000084	-	-	-	-	<0.00011	<0.000044	<0.00019	<0.00010	<0.00012	-	
3-methylfluoranthene / benzo(a)fluorene	µg/L	-	-	-	-	-	0.0030	0.00069	-	-	-	-	<0.00016	<0.00050	0.00037	<0.00059	0.00075	-	

APPENDIX B
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Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations												
							EAGL-t-003	EAGL-t-003	EAGL-t-003	EAGL-t-003	EAGL-t-003	EAGL-t-003	EAGL-t-003	McPL-001	McPL-001	McPL-001	McPL-001	McPL-001	McPL-001
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	18-Sep-15	16-Mar-16	21-Jun-16	20-Sep-16	7-Mar-17	27-Jun-17	20-Sep-17	29-Jul-13	22-Jul-14	21-Sep-14	5-Jun-15	19-Sep-15	10-May-16
Naphthenic Acid																			
C12H18O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	47	89	85	-	-	-
C12H20O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	29	39	41	-	-	-
C12H22O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	21	<15	<5.1	-	-	-
C12H24O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	78	<15	<5.1	-	-	-
C13H20O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	18	34	48	-	-	-
C13H22O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	32	30	46	-	-	-
C13H24O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	19	<15	<5.1	-	-	-
C13H26O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	111	34	38	-	-	-
C14H20O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	21	57	62	-	-	-
C14H22O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	26	62	71	-	-	-
C14H24O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	14	27	43	-	-	-
C14H26O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	15	<15	<5.1	-	-	-
C14H28O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	84	<15	<5.1	-	-	-
C15H18O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	18	18	26	-	-	-
C15H20O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	35	54	86	-	-	-
C15H22O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	143	306	419	-	-	-
C15H24O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	266	285	339	-	-	-
C15H26O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	29	37	65	-	-	-
C15H28O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	12	<15	<5.1	-	-	-
C15H30O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	66	<15	<5.1	-	-	-
C16H20O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	16	-	-	-
C16H22O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	32	-	-	-
C16H24O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	64	<15	<5.1	-	-	-
C16H26O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	121	38	62	-	-	-
C16H28O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.1	-	-	-
C16H30O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	12	<15	<5.1	-	-	-
C16H32O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	72	<15	<5.1	-	-	-
C17H22O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	22	<15	<5.1	-	-	-
C17H24O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<20	-	-	-
C17H26O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	14	23	15	-	-	-
C17H28O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	37	132	131	-	-	-
C17H30O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	8.4	20	26	-	-	-
C17H32O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	14	<15	<5.1	-	-	-
C17H34O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	<6.4	<15	<5.1	-	-	-
C18H24O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	124	58	37	-	-	-
C18H26O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	24	<15	<5.1	-	-	-
C18H28O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	423	<15	<5.1	-	-	-
C18H30O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	6.5	<15	<5.1	-	-	-
C18H32O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.1	-	-	-
C18H34O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.1	-	-	-
C18H36O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	86	<15	<5.1	-	-	-
C19H26O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	18	44	32	-	-	-
C19H28O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	14	<15	<5.1	-	-	-
C19H30O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	13	<15	<5.1	-	-	-
C19H32O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	9.2	<15	<5.1	-	-	-
C19H34O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	10	28	<5.1	-	-	-
C19H36O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	6.7	18	6.7	-	-	-
C19H38O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	<8.9	106	39	-	-	-
C20H28O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	94	<15	13	-	-	-
C20H30O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	173	203	118	-	-	-
C20H32O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	108	130	79	-	-	-
C20H34O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	6.8	<24	<5.1	-	-	-
C20H36O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.1	-	-	-
C20H38O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	10	-	-	-
C21H30O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	21	35	<9.6	-	-	-
C21H32O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	8.9	<15	<5.1	-	-	-
C21H34O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.1	-	-	-
C21H36O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.1	-	-	-
C21H38O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.1	-	-	-
C21H40O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.1	-	-	-

APPENDIX B
Table B-1: Surface Water Quality Summary for Eagle Plain Baseline Study, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations												
							EAGL-t-003	EAGL-t-003	EAGL-t-003	EAGL-t-003	EAGL-t-003	EAGL-t-003	EAGL-t-003	McPL-001	McPL-001	McPL-001	McPL-001	McPL-001	McPL-001
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	18-Sep-15	16-Mar-16	21-Jun-16	20-Sep-16	7-Mar-17	27-Jun-17	20-Sep-17	29-Jul-13	22-Jul-14	21-Sep-14	5-Jun-15	19-Sep-15	10-May-16
Radionuclides																			
Actinium-228	Bq/L	-	-	-	-	-	<1.0	0.80	<1.0	<0.8	< 0.9	< 0.4	-	-	-	-	-	<1.0	<0.6
Bismuth-212	Bq/L	-	-	-	-	-	<1.0	<0.9	<2.0	<1.0	< 2	< 2	-	-	-	-	-	<2.0	<2.0
Bismuth-214	Bq/L	-	-	-	-	-	0.70	<0.4	0.80	<0.5	< 0.6	0.9	-	-	-	-	-	<0.6	0.50
Lead-210	Bq/L	-	-	-	-	-	<6.0	4.0	<5.0	<3.0	< 4	< 4	-	-	-	-	-	<4.0	<3.0
Lead-211	Bq/L	-	-	-	-	-	<4.0	<4.0	<7.0	<3.0	< 1	< 5	-	-	-	-	-	5.0	<3.0
Lead-212	Bq/L	-	-	-	-	-	<0.3	<0.3	<0.4	<0.3	1.0	0.9	-	-	-	-	-	0.80	1.0
Lead-214	Bq/L	-	-	-	-	-	<0.4	0.40	<0.6	0.70	< 0.6	< 0.5	-	-	-	-	-	<0.5	<3.0
Potassium-40	Bq/L	-	-	-	-	-	<5.0	<4.0	<5.0	<4.0	10	< 5	-	-	-	-	-	<4.0	<3.0
Radium-223	Bq/L	-	-	-	-	-	<0.9	<0.5	<1.0	<0.7	< 1	< 0.8	-	-	-	-	-	<0.9	<0.7
Radium-226	Bq/L	-	-	-	-	-	0.0060	-	-	0.010	< 5	< 4	-	-	-	<0.005	<0.005	0.020	-
Radon-219	Bq/L	-	-	-	-	-	<1.0	<0.8	<1.0	<1.0	< 1	< 1	-	-	-	-	-	<1.0	<0.9
Thallium-208	Bq/L	-	-	-	-	-	<0.2	<0.2	<0.4	<0.2	0.5	< 0.3	-	-	-	-	-	<0.2	0.40
Thorium-227	Bq/L	-	-	-	-	-	<1.0	<0.9	<1.0	<1.0	< 0.8	< 1	-	-	-	-	-	<0.6	<0.7
Thorium-230	Bq/L	-	-	-	-	-	<30	<10	<30	<10	< 30	< 30	-	-	-	-	-	<30	<8.0
Thorium-234	Bq/L	-	-	-	-	-	<4.0	<3.0	<4.0	<3.0	< 4	< 4	-	-	-	-	-	<4.0	<2.0
Uranium-235	Bq/L	-	-	-	-	-	<0.8	<0.7	<1.0	<0.9	< 1	< 1	-	-	-	-	-	<1.0	<0.6
Isotopes																			
δ ¹⁸ O _{water} (VSMOW)	‰	-	-	-	-	-	-20.95	-21.78	-20.91	-20.68	-21.84	-20.11	-20.92	-	-	-	-	-21.95	-21.30
δ ² H _{water} (VSMOW)	‰	-	-	-	-	-	-163.9	-172.2	-166.6	-164.8	-171.0	-163.7	-163.9	-	-	-	-	-170.0	-163.9
δ ¹³ C-DIC (VPDB)	‰	-	-	-	-	-	-10.1	-20.5	-11.4	-9.4	-18.3	-7.4	-6.3	-	-	-	-	-21.2	-16.5
δ ³⁴ S-SO4 (CDT)	‰	-	-	-	-	-	-4.3	-1.9	-2.8	-3.3	-1.8	-2.1	-2.0	-	-	-	-	-4.6	-5.9
δ ¹⁸ O-SO4 (VSMOW)	‰	-	-	-	-	-	-11.05	-11.14	-14.14	-12.91	-10.42	-17.02	-12.04	-	-	-	-	-9.58	-8.73
Dissolved Gases																			
CH ₄	(mg/L)	-	-	-	-	-	0.0024 (s)	0.2292	0.004 (s)	0.0032	0.2722	-	0.0056 (s)	-	-	-	-	0.0053	0.0046 (s)
C ₂	(mg/L)	-	-	-	-	-	0 (s)	0.0000	0 (s)	0.0000	0.0000	-	0 (s)	-	-	-	-	0.0000	0 (s)
C ₃	(mg/L)	-	-	-	-	-	0 (s)	0.0000	0 (s)	0.0000	0.0000	-	0 (s)	-	-	-	-	0.0000	0 (s)
CO ₂	(mg/L)	-	-	-	-	-	4.11 (s)	69.05	5.94 (s)	6.78	59.43	-	5.68 (s)	-	-	-	-	4.36	4.81 (s)
N ₂	(mg/L)	-	-	-	-	-	28.15 (s)	26.44	29.61 (s)	30.98	32.59	-	113.31 (s)	-	-	-	-	21.44	45.83 (s)
O ₂	(mg/L)	-	-	-	-	-	14.96 (s)	0.97	12.13 (s)	15.13	2.17	-	37.97 (s)	-	-	-	-	10.04	18.17 (s)

APPENDIX B
Table B-1: Surface Water Quality Summary for Eagle Plain Baseline Study, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations																
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	McPL-001	McPL-001	McPL-001	McPL-001	McPL-001	McPL-001	McPL-002	McPL-002	McPL-002	McPL-002	McPL-002	McPL-002	McPL-002	MINE-001	MINE-001	MINE-001	MINE-001
							21-Jun-16	20-Sep-16	22-Sep-16	7-Mar-17	27-Jun-17	20-Sep-17	27-Aug-13	23-Jul-14	21-Sep-14	5-Jun-15	19-Sep-15	15-Mar-16	26-Aug-13	22-Jul-14	21-Sep-14	14-Mar-15	
Field Measured																							
pH	-	-	6.5 - 9.0		-	-	6.6	7.3	7.0	7.73	6.14 ^(Chronic)	7.8	7.1	6.5	7.0	6.7	6.7	7.8	8.1	7.7	8.0	7.5	
Specific conductivity	µS/cm	-	-		-	-	68	115	125	478	39.8	74.1	77	166	150	126	256	1200 ^(s)	346	297	353	431	
Temperature	°C	-	-		-	-	15	1.2	1.6	0	9.3	3.6	4.5	13	3.6	5.6	1.8	-0.1	5.7	8.9	5.0	1.0	
Dissolved oxygen	mg/L	-	5.5-9.5		-	-	9.4	14	13	1.88 ^(Chronic)	9.91	12.22	11	-	12	11	12	12	11	-	11	9.5	
Turbidity	NTU	-	-		-	-	7.2	17	12	-	-	-	8.9	-	-	4.8	23	1.6	2.7	-	-	-	
Conventional Parameters																							
Hardness, as CaCO ₃	mg/L	-	-		-	-	27	40	-	270	21	31	40	63	53	40	88	2,420	183	157	197	216	
Total alkalinity, as CaCO ₃	mg/L	-	-		20 ^(R)	-	12 ^(BC MOE mean)	14 ^(BC MOE mean)	-	132	10 ^(BC MOE mean)	16 ^(BC MOE mean)	30	32	14 ^(BC MOE mean)	7.0 ^(BC MOE mean)	16 ^(BC MOE mean)	238	134	110	141	171	
Total dissolved solids	mg/L	-	-		-	-	166	126	-	488	70	160	88	152	126	75200 ^(s)	84	5,180	228	177	211	254	
Total suspended solids	mg/L	-	-		-	-	3.0	8.0	-	3	5	2	4.0	<1.0	<1.0	5.0	24	104	<2.0	<1.0	<1.0	<2.0	
Total organic carbon	mg/L	-	-		-	-	23	24	-	46.5	28.5	23.1	-	-	22	18	22	60	-	-	2.4	1.3	
Dissolved organic carbon	mg/L	-	-		-	-	23	22	-	46.5	25.9	22.9	30	55	19	18	22	49	3.7	8.8	2.4	1.2	
Total inorganic carbon	mg/L	-	-		-	-	2.4	3.0	-	32.9	2.6	3.5	-	-	2.7	2.0	4.1	58	-	-	34	39	
Dissolved inorganic carbon	mg/L	-	-		-	-	1.8	2.8	-	31.3	1.2	2.9	6.0	6.2	2.7	1.8	3.5	53	32	23	35	38	
Major Ions																							
Bicarbonate, as CaCO ₃	mg/L	-	-		-	-	15	17	-	161	< 5	19	37	32	14	<5.0	19	290	164	110	141	171	
Bromide	mg/L	-	-		-	-	<0.02	<0.02	-	< 0.02	0.04	0.03	-	<0.1	<0.1	<0.02	<0.02	<0.02	-	<0.1	<0.1	<0.1	
Calcium	mg/L	-	-		-	-	6.0	8.4	-	60	4.9	7	8.3	12	10	7.8	17	431	56	44	56	56	
Carbonate, as CaCO ₃	mg/L	-	-		-	-	<6.0	<6.0	-	< 6	12	< 6	<6.0	<1.0	<1.0	8.0	<6.0	<6.0	<6.0	<1.0	<1.0	<1.0	
Chloride	mg/L	640	120		-	-	0.17	0.24	-	1.29	0.12	0.42	0.090	0.58	1.1	0.14	0.36	3.1	3.4	2.2	2.5	7.3	
Fluoride	mg/L	-	-	0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Magnesium	mg/L	-	-		-	-	3.0	4.6	-	29.2	2.1	3.3	4.6	7.0	5.6	5.1	11	325	10	8.0	9.7	12	
Potassium	mg/L	-	-		-	-	0.30	0.40	-	1.3	0.41	0.41	0.40	0.62	0.45	0.50	0.60	4.6	0.40	0.34	0.35	0.40	
Sodium	mg/L	-	-		-	-	4.3	7.7	-	42.8	1.6	3.7	3.7	10	8.7	9.6	21	545	4.6	3.2	4.1	6.5	
Sulphate	mg/L	-	-		128 - 429 ^(b, c)	-	15	33	-	193	2.7	12.1	5.1	40	48	44	86	<0.5	43	35	45	45	
Nutrients																							
Nitrate	mg-N/L	550	13.0		-	-	<0.01	<0.01	-	0.138	< 0.01	0.03	<0.01	<0.01	<0.01	<0.01	0.010	<0.01	0.030	0.030	0.050	0.50	
Nitrite	mg-N/L	-	0.060		-	-	<0.01	<0.01	-	< 0.01	< 0.01	< 0.01	<0.01	<0.01	<0.01	0.05	0.020	<0.01	<0.01	<0.01	<0.01	<0.01	
Nitrate + nitrite	mg-N/L	-	-		3.0	33	-	-	-	-	-	-	-	<0.01	<0.01	-	-	-	-	0.030	0.050	0.50	
Total ammonia	mg-N/L	-	0.50 - 198 ^(d)		-	-	0.010	<0.01	-	0.16	0.01	< 0.01	0.030	<0.02	<0.02	<0.01	0.010	1.5	0.020	<0.02	0.036	0.036	
Total kjeldahl nitrogen	mg-N/L	-	-		-	-	-	-	-	-	-	-	-	0.92	0.72	-	-	-	-	0.22	0.23	0.16	
Total nitrogen	mg-N/L	-	-		-	-	0.79	0.75	-	1.6	0.94	0.72	-	0.93	0.72	0.64	0.72	3.8	-	0.25	0.28	0.66	
Total nitrogen (calculated)	mg-N/L	-	-		-	-	-	-	-	-	-	-	-	0.92	0.72	-	-	-	-	0.25	0.28	0.66	
Total phosphorus	mg-P/L	-	-		-	-	-	-	-	-	-	-	-	0.037	0.019	-	-	-	-	<0.01	<0.01	<0.01	
Dissolved phosphorus	mg-P/L	-	-		-	-	-	-	-	-	-	-	-	0.038	0.023	-	-	-	-	<0.01	<0.01	<0.01	
Phosphorus (as phosphate)	mg-P/L	-	-		-	-	0.017	0.027	-	-	-	-	0.049	0.029	0.026	0.021	0.037	<0.003	<0.003	0.031	0.0050	<0.002	
Total Metals																							
Aluminum	µg/L	-	5.0 - 100 ^(e, f)		-	-	406 ^(Chronic)	818 ^(Chronic)	-	230 ^(Chronic)	650 ^(Chronic)	430 ^(Chronic)	335 ^(Chronic)	133 ^(Chronic)	216 ^(Chronic)	199 ^(Chronic)	807 ^(Chronic)	99	20	39	7.0	3.0	
Antimony	µg/L	-	-		9.0	-	0.20	0.17	-	0.54	0.17	0.21	<0.2	0.24	0.18	0.10	<0.2	0.30	<0.2	0.070	0.070	0.060	
Arsenic	µg/L	-	5.0		-	-	1.0	0.80	-	1	1.1	0.9	1.0	0.89	0.50	0.44	0.70	2.1	<0.2	0.24	0.17	0.16	
Barium	µg/L	-	-		1,000	-	100	106	-	453	120	110	83	122	104	101	146	67	67	60	69	96	
Beryllium	µg/L	-	-		0.13	-	0.13	0.11	-	< 0.25	0.07	0.06	<0.04	0.050	0.040	<0.05	0.090	0.060	<0.04	0.010	<0.01	<0.01	
Bismuth	µg/L	-	-		-	-	<0.1	<0.1	-	< 0.5	< 0.1	< 0.1	-	<0.01	<0.01	<0.1	-	-	-	<0.01	<0.01	<0.01	
Boron	µg/L	29,000	1,500		-	-	6.0	6.0	-	40	6	5	<5.0	11	16	11	13	38	9.0	12	22	12	
Cadmium	µg/L	0.11 - 7.7 ^(b)	0.040 - 0.37 ^(b)		-	-	0.040	0.040	-	0.42 ^(Chronic)	0.1 ^(Chronic)	0.05	0.040	0.026	0.030	0.030	0.080	0.40 ^(Chronic)	0.020	0.018	0.017	0.016	
Chromium	µg/L	-	1.0		-	-	1.5 ^(Chronic)	1.9 ^(Chronic)	-	1.3 ^(Chronic)	1.5 ^(Chronic)	1.3 ^(Chronic)	1.5 ^(Chronic)	1.0	1.0	0.80	1.4 ^(Chronic)	0.40	<0.4	0.30	0.20	0.20	
Cobalt	µg/L	-	-		4.0	110	0.25	0.56	-	0.75	0.77	0.34	0.23	0.17	0.18	0.10	0.86	72 ^(BC MOE mean)	0.10	0.053	0.031	0.012	
Copper	µg/L	-	2.0 - 4.0 ^(b)		-	-	6.7 ^(Chronic)	5.4 ^(Chronic)	-	13 ^(Chronic)	7.1 ^(Chronic)	5.1 ^(Chronic)	5.0 ^(Chronic)	5.3 ^(Chronic)	4.7 ^(Chronic)	4.2 ^(Chronic)	5.0 ^(Chronic)	3.0	<1.0	0.70	0.40	1.1	
Iron	µg/L	-	300		-	-	1,290 ^(Chronic)	1,540 ^(Chronic)	-	1,410 ^(Chronic)	2,200 ^(Chronic)	1,500 ^(Chronic)	2,040 ^(Chronic)	966 ^(Chronic)	667 ^(Chronic)	440 ^(Chronic)	1,540 ^(Chronic)	26,100 ^(Chronic)	62	73	27	7.0	
Lead	µg/L	-	1.0 - 7.0 ^(b)		-	-	0.23	0.40	-	0.17 ^(s)	1	0.34	0.30	0.17	0.16	0.10	0.60	<0.1	<0.1	<0.05	<0.05	0.060	
Lithium	µg/L	-	-		-	-	1.7	2.0	-	7.3	1.3	1.5	1.0	1.0	1.9	1.2	3.0	18	10	7.9	9.9	10	
Manganese	µg/L	-	-		768 - 2,585 ^(b)	816 - 3,394 ^(b)	26	67	-	720	99	43	17	20	17	13	105	29,100 ^(BC MOE mean, BC MOE max)	<5.0	4.2	3.5	1.6	
Mercury	µg/L	-	0.026		-	-	0.02	<0.01	-	0.01	< 0.01	< 0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.005	
Molybdenum																							

APPENDIX B
Table B-1: Surface Water Quality Summary for Eagle Plain Baseline Study, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations															
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	McPL-001 21-Jun-16	McPL-001 20-Sep-16	McPL-001 22-Sep-16	McPL-001 7-Mar-17	McPL-001 27-Jun-17	McPL-001 20-Sep-17	McPL-002 27-Aug-13	McPL-002 23-Jul-14	McPL-002 21-Sep-14	McPL-002 5-Jun-15	McPL-002 19-Sep-15	McPL-002 15-Mar-16	MINE-001 26-Aug-13	MINE-001 22-Jul-14	MINE-001 21-Sep-14	MINE-001 14-Mar-15
Dissolved Metals																						
Aluminum	µg/L	-	-		18 - 50 ⁽⁶⁾	44 - 100 ⁽⁶⁾	138 ^(BC MOE mean, BC MOE max)	191 ^(BC MOE mean, BC MOE max)	-	123.9 ^(BC MOE mean, BC MOE max)	139 ^(BC MOE mean, BC MOE max)	141 ^(BC MOE mean, BC MOE max)	100 ^(BC MOE mean)	51 ^(BC MOE mean)	102 ^(BC MOE mean, BC MOE max)	93 ^(BC MOE mean)	132 ^(BC MOE mean, BC MOE max)	62 ^(BC MOE mean)	8.0	15	5.0	<1.0
Antimony	µg/L	-	-		-	-	<0.2	<0.2	-	0.39	0.15	0.13	0.20	0.22	0.17	<0.2	<0.2	0.30	<0.2	0.12	0.10	0.060
Arsenic	µg/L	-	-		-	-	0.60	<1.0	-	1	0.7	0.6	1.7	0.69	0.40	0.40	0.40	1.9	<0.2	0.16	0.14	0.10
Barium	µg/L	-	-		-	-	61	86	-	387	65.5	98.7	72	106	94	92	121	66	68	55	66	79
Beryllium	µg/L	-	-		-	-	<0.04	<0.5	-	< 0.5	0.05	< 0.05	<0.04	0.040	0.040	<0.04	<0.04	<0.04	<0.04	0.010	0.010	<0.01
Bismuth	µg/L	-	-		-	-	<1.0	<1.0	-	< 1	< 0.1	< 0.1	<1.0	<0.01	<0.01	<1.0	<1.0	<1.0	<1.0	<0.01	<0.01	<0.01
Boron	µg/L	-	-		-	-	6.0	<20	-	20	6	5	<4.0	10	12	8.0	12	37	8.0	10	14	9.0
Cadmium	µg/L	-	-		0.044 - 0.46 ^(b)	0.066 - 2.8 ^(b)	0.020	<0.1	-	0.12	0.04	0.03	0.040	0.020	0.020	0.020	0.060	0.060	0.020	0.014	0.010	0.015
Chromium	µg/L	-	-		-	-	0.80	<0.5	-	1.37	0.85	0.97	1.1	0.80	0.70	0.60	<0.4	<0.4	0.40	0.30	0.20	0.10
Cobalt	µg/L	-	-		-	-	0.10	0.60	-	0.61	0.37	0.21	0.15	0.13	0.13	0.10	0.41	71	0.090	0.036	0.030	0.010
Copper	µg/L	-	-		-	-	4.8	<5.0	-	11	5.5	4.5	4.0	4.7	4.0	4.0	4.0	2.0	<1.0	0.50	0.40	0.30
Iron	µg/L	-	-		-	350	637 ^(BC MOE max)	820 ^(BC MOE max)	-	890 ^(BC MOE max)	638 ^(BC MOE max)	604 ^(BC MOE max)	1,190 ^(BC MOE max)	568 ^(BC MOE max)	376 ^(BC MOE max)	285	477 ^(BC MOE max)	29,600 ^(BC MOE max)	12	29	15	3.0
Lead	µg/L	-	-		-	-	<0.1	0.14	-	0.28 ⁽³⁾	0.17	0.09	0.10	0.090	0.18	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.05
Lithium	µg/L	-	-		-	-	<1.0	0.98	-	5	0.98	1.3	<1.0	0.86	1.7	1.0	9.5	18	10	7.1	9.5	7.6
Manganese	µg/L	-	-		-	-	20	90	-	670	52	37	12	15	13	12	89	35,300	<1.0	2.7	2.8	1.1
Mercury	µg/L	-	-		-	-	<0.01	<0.01	-	0.01	< 0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.005	<0.005
Molybdenum	µg/L	-	-		-	-	0.20	<0.2	-	1.22	0.23	0.28	0.38	0.42	0.18	0.18	0.22	0.90	0.58	0.65	0.65	0.54
Nickel	µg/L	-	-		-	-	3.0	5.0	-	13	4.2	5.3	7.0	5.5	4.7	4.0	5.0	44	2.0	0.75	0.72	0.40
Selenium	µg/L	-	-		-	-	<0.6	<2.0	-	< 2	0.4	0.4	<0.6	0.50	0.40	<0.6	1.2	1.8	<0.6	0.60	0.70	0.90
Silicon	µg/L	-	-		-	-	1,750	2,950	-	6440	2200	3100	1,880	479	2,060	1,310	2,890	7,590	1,670	1,740	1,310	1,880
Silver	µg/L	-	-		-	-	<0.01	<0.1	-	< 0.1	< 0.01	< 0.01	0.020	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Strontium	µg/L	-	-		-	-	22	44	-	240	23.7	38.9	34	51	42	34	57	919	171	146	177	178
Sulphur	µg/L	-	-		-	-	4,900	10,500	-	71300	1300	4300	2,400	13,500	13,100	15,600	34,700	1,190,000	13,600	11,400	13,100	13,300
Tellurium	µg/L	-	-		-	-	<0.1	<0.5	-	< 0.5	< 0.05	< 0.05	<0.1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.05
Thallium	µg/L	-	-		-	-	<0.01	<0.1	-	< 0.1	< 0.01	< 0.01	<0.01	<0.004	<0.004	<0.01	<0.01	<0.01	<0.01	0.0050	<0.004	<0.004
Thorium	µg/L	-	-		-	-	<0.4	<0.5	-	< 0.5	0.22	0.23	<0.4	0.080	0.12	<0.4	<0.4	1.4	<0.4	<0.01	<0.01	<0.01
Tin	µg/L	-	-		-	-	<0.1	<1.0	-	27	< 0.1	< 0.1	<0.1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.05
Titanium	µg/L	-	-		-	-	<10	4.0	-	13	2	3	<10	1.3	1.9	<10	<10	31	<10	<0.2	<0.2	<0.2
Uranium	µg/L	-	-		-	-	<0.4	0.33	-	0.46	0.095	0.08	<0.4	0.052	0.050	<0.4	<0.4	2.4	0.60	0.40	0.64	0.61
Vanadium	µg/L	-	-		-	-	0.50	<0.5	-	0.56	0.7	0.42	0.83	0.60	0.30	0.43	0.21	0.70	0.25	<0.2	<0.2	<0.2
Zinc	µg/L	-	-		-	-	2.4	<5.0	-	49 ⁽⁵⁾	3.3	2.7	5.0	2.0	3.0	5.0	7.0	11	2.0	<1.0	2.0	2.0
Zirconium	µg/L	-	-		-	-	1.4	<1.0	-	2	1.5	1.7	1.5	0.87	1.1	0.90	1.1	2.4	<0.1	0.050	0.070	0.020
Volatile Organics																						
Benzene	µg/L	-	-	370	-	-	<0.5	<0.5	-	< 500	< 500	< 500	-	-	<0.5	<0.5	<0.5	<0.5	-	-	<0.5	<0.5
Ethylbenzene	µg/L	-	-	90	-	-	<0.5	<0.5	-	< 500	< 500	< 500	-	-	<1.0	<0.5	<0.5	<0.5	-	-	<1.0	<1.0
Toluene	µg/L	-	-	2.0	-	-	<0.5	<0.5	-	< 500	< 500	< 500	-	-	<1.0	<0.5	<0.5	<0.5	-	-	<1.0	<1.0
Xylenes	µg/L	-	-	-	30	-	<0.5	<0.5	-	< 500	< 500	< 500	-	-	<2.0	<0.5	<0.5	<0.5	-	-	<2.0	<2.0
Styrene	µg/L	-	-	72	-	-	<0.5	<0.5	-	< 500	< 500	< 500	-	-	-	<0.5	<0.5	<0.5	-	-	-	<1.0
Extractable Petroleum Hydrocarbons (C10-C19)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Extractable Petroleum Hydrocarbons (C10-C32)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Volatile Hydrocarbons	µg/L	-	-	-	-	-	<50	<50	-	< 50000	< 50000	< 50000	-	-	<100	<50	<50	<50	-	-	<100	<100
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	-	-	<50	<50	-	< 50000	< 50000	< 50000	-	-	<100	<50	<50	<50	-	-	<100	<100
Methyl tert-Butyl Ether	µg/L	-	-	10000	-	-	<0.5	<0.5	-	< 500	< 500	< 500	-	-	-	<0.5	<0.5	<0.5	-	-	-	<1.0
Parent PAHs																						
Naphthalene	µg/L	-	-	1.1	-	-	-	-	-	-	-	-	<0.0072	<0.0035	<0.0056	<0.0077	<0.0128	<0.0041	<0.0072	<0.0035	<0.0056	<0.0045
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	<0.00018	<0.000069	<0.00024	<0.00012	<0.00035	<0.00023	<0.00014	<0.00016	<0.00012	<0.00031
Biphenyl	µg/L	-	-	-	-	-	-	-	-	-	-	-	<0.0016	<0.00224	<0.0018	<0.00157	<0.00119	<0.00145	<0.00157	<0.0022	<0.00184	<0.00187
Acenaphthene	µg/L	-	-	5.8	-	-	-	-	-	-	-	-	<0.00060	<0.00025	<0.00041	<0.00025	<0.00040	<0.00030	<0.00060	<0.00047		

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		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	McPL-001	McPL-001	McPL-001	McPL-001	McPL-001	McPL-001	McPL-002	McPL-002	McPL-002	McPL-002	McPL-002	McPL-002	MINE-001	MINE-001	MINE-001	MINE-001	
							21-Jun-16	20-Sep-16	22-Sep-16	7-Mar-17	27-Jun-17	20-Sep-17	27-Aug-13	23-Jul-14	21-Sep-14	5-Jun-15	19-Sep-15	15-Mar-16	26-Aug-13	22-Jul-14	21-Sep-14	14-Mar-15	
Alkylated PAHs																							
C1 substituted naphthalenes	µg/L	-	-	-	-	-	-	-	-	-	-	<0.0041	<0.0027	<0.0134	<0.0094	<0.0091	<0.0095	<0.0041	<0.0027	<0.0134	<0.0079		
C2 substituted naphthalenes	µg/L	-	-	-	-	-	-	-	-	-	-	<0.0085	<0.00642	<0.0138	<0.01257	<0.0076	<0.0131	<0.0085	<0.0064	<0.0138	<0.0073		
C3 substituted naphthalenes	µg/L	-	-	-	-	-	-	-	-	-	-	<0.0029	<0.0037	<0.0066	<0.0058	<0.00161	<0.00297	<0.0029	<0.0037	<0.0066	0.00055		
C4 substituted naphthalenes	µg/L	-	-	-	-	-	-	-	-	-	-	0.0024	<0.00033	<0.0028	0.00042	<0.0057	<0.00162	0.0013	<0.0049	<0.00280	<0.00028		
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	<0.0013	<0.00085	<0.00167	<0.00166	<0.0023	<0.00134	<0.00132	<0.00085	<0.00167	<0.00143		
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	<0.0028	<0.00181	<0.0118	<0.0094	<0.0068	<0.00813	<0.00276	<0.00181	<0.0118	<0.00648		
1,2-Dimethylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	<0.0018	<0.00119	<0.00085	<0.00065	<0.00039	<0.00045	<0.0018	<0.00119	<0.00053	<0.00049		
2,6-Dimethylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	0.00082	<0.00036	<0.00052	<0.00055	<0.00033	<0.00038	0.00032	<0.00053	<0.00045	<0.00042		
C1 substituted acenaphthenes	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00038	<0.00026	<0.00028	<0.00039	<0.00024	<0.00036	<0.00027	<0.00040	<0.00033	<0.00037		
C1 substituted biphenyls	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00149	<0.0093	<0.0038	<0.00186	<0.00094	<0.0065	<0.0015	<0.0093	<0.00375	<0.0038		
C2 substituted biphenyls	µg/L	-	-	-	-	-	-	-	-	-	-	<0.0037	<0.041	<0.0171	<0.0033	0.00036	<0.023	0.0055	<0.041	<0.01707	<0.0164		
2,3,5-Trimethylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	0.00053	<0.00047	<0.00049	0.00033	0.00037	<0.00034	<0.00044	<0.00047	<0.00049	<0.00020		
2,3,6-Trimethylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00065	<0.00060	<0.00076	<0.00097	0.00032	<0.00031	<0.00060	<0.00076	<0.00019			
C1 substituted fluorenes	µg/L	-	-	-	-	-	-	-	-	-	-	<0.0023	<0.00103	<0.00150	0.00083	0.00085	<0.00149	<0.0023	<0.00103	<0.00150	<0.00051		
C2 substituted fluorenes	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00155	<0.00094	<0.00015	0.00050	0.00049	<0.00155	<0.00155	<0.00094	<0.00029	<0.00038		
C3 substituted fluorenes	µg/L	-	-	-	-	-	-	-	-	-	-	<0.0041	<0.00390	<0.0026	<0.0053	0.0013	0.00060	<0.0041	<0.00390	<0.0026	<0.00049		
2-Methylfluorene	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00050	<0.00023	<0.00017	<0.00016	<0.00037	<0.00027	<0.00047	<0.00016	<0.00022	<0.00051		
1,4,6,7-Tetramethylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00026	<0.00033	<0.00027	<0.00021	<0.00034	<0.00017	<0.00028	<0.00049	<0.00024	<0.00028		
C1 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	-	-	-	-	-	0.00064	<0.000372	<0.0002	<0.00023	0.00077	<0.00165	<0.00034	0.00025	<0.00024			
C2 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00131	<0.00118	<0.00098	0.00021	0.00073	<0.00098	<0.00131	<0.00118	<0.00098	<0.00019		
C3 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	-	-	-	-	-	<0.0016	<0.00114	<0.00034	<0.00058	<0.00021	0.000053	<0.00164	<0.00114	0.00063	<0.00013		
C4 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	-	-	-	-	-	0.0048	<0.0010	<0.0026	0.00062	0.0009	<0.00033	<0.0021	<0.00104	<0.0026	<0.00040		
1-Methylphenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	0.00046	<0.000372	<0.0002	<0.00023	0.00024	<0.00044	<0.00034	<0.00037	<0.00021	<0.00024		
2-Methylphenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	0.00018	<0.00038	<0.00020	<0.00024	<0.00023	<0.00070	<0.00034	<0.00038	0.00025	<0.00024		
3-Methylphenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00016	<0.00011	<0.00020	<0.00024	0.00027	<0.00050	<0.00035	<0.00013	<0.00023	<0.00024		
9/4-Methylphenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00016	<0.000078	<0.00020	<0.00024	0.00026	<0.00013	<0.00035	<0.00021	<0.00024			
2-Methylanthracene	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00017	<0.000067	<0.00020	<0.00024	<0.00015	<0.00012	<0.00036	<0.000097	<0.00021	<0.00025		
1,7-Dimethylfluorene	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00035	<0.00022	<0.00015	<0.00020	<0.00044	<0.00013	<0.00030	<0.00029	<0.00038			
C1 substituted dibenzothiophenes	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00024	<0.000099	0.00022	<0.00013	<0.00022	<0.00016	<0.00018	<0.00018	0.00038	<0.00029		
C2 substituted dibenzothiophenes	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00019	<0.00056	<0.000210	0.00041	<0.00039	<0.00010	<0.00019	<0.00056	<0.00021	<0.00031		
C3 substituted dibenzothiophenes	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00021	<0.00106	<0.00138	0.00037	<0.00119	<0.00116	<0.00215	<0.00106	0.0016	<0.00022		
C4 substituted dibenzothiophenes	µg/L	-	-	-	-	-	-	-	-	-	-	<0.0032	<0.00102	<0.0028	<0.00232	<0.00194	<0.00103	<0.0032	<0.00102	<0.0028	<0.00135		
2/3-Methyldibenzothiophenes	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00024	<0.000207	<0.00017	<0.00013	<0.00022	<0.00016	<0.00018	<0.00021	0.00022	<0.00029		
1,7-Dimethylphenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00014	<0.000249	<0.000261	<0.000061	<0.00017	<0.000219	<0.00014	<0.00028	<0.000261	<0.00018		
1,8-Dimethylphenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00012	<0.000050	<0.000061	<0.000062	<0.00017	<0.000045	<0.00017	<0.00028	<0.000084	<0.00019		
2,6-Dimethylphenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00021	<0.000315	<0.000144	<0.000062	<0.00017	<0.000144	<0.00021	<0.00032	<0.000144	<0.00019		
3,6-Dimethylphenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00024	<0.000051	<0.000159	<0.000063	<0.00017	<0.000055	<0.00024	<0.00029	<0.000159	<0.00019		
2,4-Dimethyldibenzothiophene	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00022	<0.00020	<0.00027	<0.00011	<0.00039	<0.00010	<0.00025	<0.00025	<0.00024	<0.00031		
C1 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	-	-	-	-	-	-	<0.0013	<0.001080	<0.00165	<0.00071	0.00061	0.00021	<0.00131	<0.00108	<0.00165	<0.00027		
C2 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	-	-	-	-	-	-	<0.0012	<0.00011	<0.00207	<0.00010	0.00014	0.00011	<0.00125	<0.00017	<0.00207	<0.00018		
C3 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00089	<0.00042	<0.00085	<0.00010	<0.00015	<0.00072	<0.00089	<0.00042	<0.00085	<0.00031		
C4 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00056	<0.000081	0.00021	<0.000070	<0.00018	<0.000097	<0.00056	<0.00010	<0.00016	<0.00013		
1,2,6-Trimethylphenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00019	<0.00032	<0.00009	<0.000067	<0.00021	<0.000048	<0.000086	<0.00011	<0.00012	<0.00013		
C1 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00028	<0.000043	0.00013	<0.000083	<0.000084	0.00011	<0.00028	<0.000088	0.00017	<0.000093		
C2 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00051	<0.000048	<0.00044	<0.00077	<0.00014	<0.00012	<0.00051	<0.00012	<0.00044	<0.00018		
C3 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00080	<0.00054	<0.00022	0.00039	<0.00018	<0.00011	<0.00080	<0.00054	<0.00012	<0.000080		
C4 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00071	<0.000058	<0.00017	0.0012	<0.00013	<0.000080	<0.00071	<0.00013	<0.00010	<0.00010		
5/6-Methylchrysene	µg/L	-	-	-	-	-	-	-	-	-	-	<0.000072	<0.000045	<0.00011	<0.000085	<0.000087	<0.000055	<0.000056	<0.000091	<0.000082	<0.000096		
5,9-Dimethylchrysene	µg/L	-	-	-	-	-	-	-	-	-	-	<0.000097	<0.000048	<0.00011	<0.000077	<0.00014	<0.00012	<0.000095	<0.00012	<0.00012	<0.00018		
C1 substituted benzo(a)fluoranthenes / benzopyrenes	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00103	<0.00066	<0.00072	0.0011	<0.00025	<0.00022	<0.00103	<0.00066	<0.00028	<0.00021		
C2 substituted benzo(a)fluoranthenes / benzopyrenes	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00080	<0.00139	<0.00042	0.0012	<0.00019	<0.00016	<0.00080	<0.00139	<0.00021	<0.00014		
7-Methylbenzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00017	<0.00010	<0.00072	<0.00028	<0.00025	<0.00022	<0.00020	<0.00023	<0.00028	<0.00021		
1-methylchrysene	µg/L	-	-	-	-	-	-	-	-	-	-	<0.000066	<0.000042	<0.00011	<0.000080	<0.000081	<0.000053	<0.000051	<0.000085	<0.000079	<0.000090		
3-methylfluoranthene / benzo(a)fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	<0.00041	<0.000504	<0.00022	<0.00059	<0.00028	<0.00018	<0.00041	<0.00022	<0.00027			

Table B-1: Surface Water Quality Summary for Eagle Plain Baseline Study, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations															MINE-001	MINE-001	MINE-001	MINE-001
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	McPL-001	McPL-001	McPL-001	McPL-001	McPL-001	McPL-001	McPL-002	McPL-002	McPL-002	McPL-002	McPL-002	McPL-002	McPL-002						
							21-Jun-16	20-Sep-16	22-Sep-16	7-Mar-17	27-Jun-17	20-Sep-17	27-Aug-13	23-Jul-14	21-Sep-14	5-Jun-15	19-Sep-15	15-Mar-16	26-Aug-13	22-Jul-14	21-Sep-14				
Naphthenic Acid																									
C12H18O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	88	104	52	-	-	-	<5.0	<4.7	<5.3	<5.0			
C12H20O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	33	26	25	-	-	-	<5.0	<4.7	8.7	<5.0			
C12H22O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.5	-	-	-	<5.0	<4.7	<5.3	<5.0			
C12H24O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.5	-	-	-	<5.0	<4.7	<5.3	<5.0			
C13H20O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	27	<28	27	-	-	-	<5.0	<4.7	<5.3	<5.0			
C13H22O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	29	40	29	-	-	-	<5.0	<4.7	<5.3	<5.0			
C13H24O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.5	-	-	-	<5.0	<4.7	<5.3	<5.0			
C13H26O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	17	43	36	-	-	-	10	13	22	<5.0			
C14H20O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	31	41	60	-	-	-	<5.0	5.0	<5.3	<5.0			
C14H22O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	43	56	35	-	-	-	<5.0	<4.7	<5.3	<5.0			
C14H24O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<21	33	17	-	-	-	<5.0	<4.7	<5.3	<5.0			
C14H26O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.5	-	-	-	<5.0	<4.7	<5.3	<5.0			
C14H28O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.5	-	-	-	<5.0	<4.7	<5.3	<5.0			
C15H18O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	6.7	19	15	-	-	-	<5.0	<4.7	5.9	6.3			
C15H20O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	58	78	53	-	-	-	<5.0	<4.7	<5.3	<5.0			
C15H22O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	218	249	255	-	-	-	7.6	9.4	7.4	<5.0			
C15H24O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	152	288	169	-	-	-	6.3	11	38	<5.0			
C15H26O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	22	17	30	-	-	-	<5.0	<4.7	<5.3	<5.0			
C15H28O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.5	-	-	-	<5.0	<4.7	<5.3	<5.0			
C15H30O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.5	-	-	-	<5.0	<4.7	<5.3	<5.0			
C16H20O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	14	<22	22	-	-	-	13	9.6	10	25			
C16H22O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	19	<15	18	-	-	-	<5.0	<4.7	<5.3	<5.0			
C16H24O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	21	<35	<5.5	-	-	-	<5.0	<4.7	<5.3	<5.0			
C16H26O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	37	58	33	-	-	-	<5.0	<4.7	<5.3	<5.0			
C16H28O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.5	-	-	-	<5.0	<4.7	<5.3	<5.0			
C16H30O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.5	-	-	-	<5.0	<4.7	<5.3	<5.0			
C16H32O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<13	-	-	-	<5.0	<4.7	<5.3	<5.0			
C17H22O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<6.5	-	-	-	<5.0	<4.7	<5.3	<5.0			
C17H24O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.5	-	-	-	<5.0	<4.7	<5.3	<5.0			
C17H26O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	15	31	<5.5	-	-	-	<5.0	<4.7	<5.3	<5.0			
C17H28O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	101	529	84	-	-	-	<5.0	<4.7	<5.3	<5.0			
C17H30O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	74	12	-	-	-	<5.0	<4.7	<5.3	<5.0			
C17H32O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.5	-	-	-	<5.7	<4.7	<5.3	<5.0			
C17H34O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<18	<5.5	-	-	-	<5.0	<4.7	12	<5.0			
C18H24O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	28	<40	56	-	-	-	26	24	30	52			
C18H26O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.5	-	-	-	<5.0	<4.7	5.7	<5.0			
C18H28O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<33	11	-	-	-	<5.0	<4.7	<5.3	<5.0			
C18H30O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.5	-	-	-	<5.0	<4.7	<5.3	<5.0			
C18H32O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.5	-	-	-	<5.0	<4.7	<5.3	<5.0			
C18H34O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.5	-	-	-	<5.0	<4.7	<5.3	<5.0			
C18H36O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.5	-	-	-	<5.0	<4.7	<5.3	<5.0			
C19H26O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	16	39	63	-	-	-	6.5	13	20	<5.0			
C19H28O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	9.0	50	<5.5	-	-	-	<5.0	<4.7	<5.3	<5.0			
C19H30O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.5	-	-	-	<5.0	<4.7	<5.3	<5.0			
C19H32O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.5	-	-	-	<5.0	<4.7	<5.3	<5.0			
C19H34O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	26	<5.5	-	-	-	<5.0	12	<5.3	<5.0			
C19H36O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.5	-	-	-	<5.0	<4.7	<5.3	<5.0			
C19H38O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	101	25	-	-	-	<5.0	13	5.4	<5.0			
C20H28O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	55	<15	11	-	-	-	82	<4.7	<16	5.9			
C20H30O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	58	312	111	-	-	-	41	57	60	75			
C20H32O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	15	389	50	-	-	-	<5.0	26	49	13			
C20H34O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	6.2	<42	9.8	-	-	-	<5.0	<4.7	<5.3	<5.0			
C20H36O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.5	-	-	-	<5.0	<4.7	<5.3	<5.0			
C20H38O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.5	-	-	-	<5.0	<4.7	<5.3	<5.0			
C21H30O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<16	18	-	-	-	<5.0	<4.7	<5.3	<5.0			
C21H32O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.5	-	-	-	<5.0	<4.7	<5.3	<5.0			
C21H34O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.5	-	-	-	<5.0	<4.7	<5.3	<5.0			
C21H36O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.5	-	-	-	<5.0	<4.7	<5.3	<5.0			
C21H38O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.5	-	-	-	<5.0	<4.7	<5.3	<5.0			
C21H40O2	ng/L	-	-	-	-	-	-	-	-	-	-	-	<5.1	<15	<5.5	-	-	-	<5.0	<4.7	<5.3	<5.0			

APPENDIX B
Table B-1: Surface Water Quality Summary for Eagle Plain Baseline Study, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations																
							McPL-001	McPL-001	McPL-001	McPL-001	McPL-001	McPL-001	McPL-002	McPL-002	McPL-002	McPL-002	McPL-002	McPL-002	MINE-001	MINE-001	MINE-001	MINE-001	
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	21-Jun-16	20-Sep-16	22-Sep-16	7-Mar-17	27-Jun-17	20-Sep-17	27-Aug-13	23-Jul-14	21-Sep-14	5-Jun-15	19-Sep-15	15-Mar-16	26-Aug-13	22-Jul-14	21-Sep-14	14-Mar-15	
Radionuclides																							
Actinium-228	Bq/L	-	-	-	-	-	<1.0	1.0	-	< 0.9	< 1	-	-	-	-	-	1.0	<1.0	-	-	-	-	
Bismuth-212	Bq/L	-	-	-	-	-	<2.0	<2.0	-	< 2	< 2	-	-	-	-	-	<1.0	<0.9	-	-	-	-	
Bismuth-214	Bq/L	-	-	-	-	-	<0.8	0.60	-	< 0.5	< 0.8	-	-	-	-	-	<0.6	<0.7	-	-	-	-	
Lead-210	Bq/L	-	-	-	-	-	<4.0	<3.0	-	< 4	< 4	-	-	-	-	-	<4.0	<4.0	-	-	-	-	
Lead-211	Bq/L	-	-	-	-	-	<5.0	<3.0	-	< 6	< 6	-	-	-	-	-	<5.0	<4.0	-	-	-	-	
Lead-212	Bq/L	-	-	-	-	-	<0.4	<0.3	-	< 0.4	0.4	-	-	-	-	-	0.40	<0.4	-	-	-	-	
Lead-214	Bq/L	-	-	-	-	-	<0.6	0.60	-	< 0.4	< 0.7	-	-	-	-	-	<0.5	<0.6	-	-	-	-	
Potassium-40	Bq/L	-	-	-	-	-	5.0	<4.0	-	10	6	-	-	-	-	-	<6.0	<5.0	-	-	-	-	
Radium-223	Bq/L	-	-	-	-	-	<0.5	<0.9	-	< 1	< 1	-	-	-	-	-	<0.6	<1.0	-	-	-	-	
Radium-226	Bq/L	-	-	-	-	-	-	0.010	-	< 4	< 5	-	-	-	<0.005	<0.005	0.0050	-	-	-	<0.005	0.0080	
Radon-219	Bq/L	-	-	-	-	-	<2.0	<1.0	-	< 0.9	< 2	-	-	-	-	-	<1.0	<1.0	-	-	-	-	
Thallium-208	Bq/L	-	-	-	-	-	<0.4	<0.2	-	0.4	< 0.3	-	-	-	-	-	<0.3	<0.3	-	-	-	-	
Thorium-227	Bq/L	-	-	-	-	-	<1.0	<1.0	-	< 0.6	< 1	-	-	-	-	-	<1.0	<1.0	-	-	-	-	
Thorium-230	Bq/L	-	-	-	-	-	<20	<10	-	< 30	< 30	-	-	-	-	-	<30	<30	-	-	-	-	
Thorium-234	Bq/L	-	-	-	-	-	<4.0	<3.0	-	< 4	< 4	-	-	-	-	-	<4.0	<4.0	-	-	-	-	
Uranium-235	Bq/L	-	-	-	-	-	<1.0	<1.0	-	< 1	< 1	-	-	-	-	-	<1.0	<1.0	-	-	-	-	
Isotopes																							
δ ¹⁸ O _{water} (VSMOW)	‰	-	-	-	-	-	-21.14	-20.96	-	-23.98	-20.81	-20.63	-	-	-	-	-21.47	-21.55	-25.43	-	-	-	-21.86
δ ² H _{water} (VSMOW)	‰	-	-	-	-	-	-166.7	-165.6	-	-180.9	-166.0	-162.0	-	-	-	-	-167.4	-169.0	-193.7	-	-	-	-168.7
δ ¹³ C-DIC (VPDB)	‰	-	-	-	-	-	-15.9	-13.0	-	-15.5	-19.1	-12.0	-	-	-	-	-19.1	-14.5	-11.2	-	-	-	-10.52
δ ³⁴ S-SO4 (CDT)	‰	-	-	-	-	-	-4.1	-5.2	-	-4.4	-3.2	-3.2	-	-	-	-	-4.6	-6.5	-6.3	-	-	-	-8.6
δ ¹⁸ O-SO4 (VSMOW)	‰	-	-	-	-	-	-10.76	-13.63	-	-12.97	4.60	-6.74	-	-	-	-	-10.08	-13.63	-16.52	-	-	-	-10.39
Dissolved Gases																							
CH ₄	(mg/L)	-	-	-	-	-	0.0062	0.0045	-	-	0.0063	0.0037	-	-	-	0.0035	0.0037	2.4343	-	-	-	-	
C ₂	(mg/L)	-	-	-	-	-	0.0000	0.0000	-	-	0.0000	0.0000	-	-	-	0.0000	0.0000	0.0000	-	-	-	-	
C ₃	(mg/L)	-	-	-	-	-	0.0000	0.0000	-	-	0.0000	0.0000	-	-	-	0.0000	0.0000	0.0012	-	-	-	-	
CO ₂	(mg/L)	-	-	-	-	-	7.30	6.15	-	-	9.43	4.91	-	-	-	4.45	6.50	97.43	-	-	-	-	
N ₂	(mg/L)	-	-	-	-	-	25.58	30.60	-	-	25.10	23.81	-	-	-	23.21	20.61	27.14	-	-	-	-	
O ₂	(mg/L)	-	-	-	-	-	10.31	14.31	-	-	8.74	11.03	-	-	-	11.10	11.11	0.54	-	-	-	-	

APPENDIX B

Table B-1: Surface Water Quality Summary for Eagle Plain Baseline Study, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations																					
							MINE-001	MINE-001	MINE-001	MINE-t-002	MINE-t-002	MINE-t-002	MINE-t-002	NCY-PT19	NCY-PT19	NCY-PT19	NCY-PT19	NCY-PT19	WHST-001	WHST-001	WHST-001	WHST-001	WHST-001	WHST-001	WHST-001	WHST-002	WHST-002	WHST-002
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	6-Jun-15	16-Mar-16	20-Sep-17	26-Aug-13	22-Jul-14	21-Sep-14	6-Jun-15	27-Aug-13	22-Jul-14	21-Sep-14	6-Jun-15	18-Sep-15	29-Jul-13	22-Jul-14	21-Sep-14	14-Mar-15	5-Jun-15	19-Sep-15	15-Mar-16	29-Jul-13	22-Jul-14	21-Sep-14
Field Measured																												
pH	-	-	6.5 - 9.0		-	-	8.1	7.7	8.08	7.7	6.8	7.7	7.6	7.1	6.7	6.8	6.8	7.2	8.0	8.2	8.2	7.6	8.1	7.6	7.9	7.8	7.3	8.1
Specific conductivity	µS/cm	-	-		-	-	289	439	387	386	433	643	468	250	324	198	315	413	314	354	396	522	338	266	540	216	321	310
Temperature	°C	-	-		-	-	6.6	0.0	5.6	2.0	5.7	2.5	3.9	5.2	15	4.0	9.3	2.2	13	13	5.7	-	9.2	2.7	0.0	14	13	5.6
Dissolved oxygen	mg/L	-	5.5-9.5		-	-	11	9.8	11.84	13	-	12	12	11	-	12	10	12	9.6	-	12	11	11	12	8.5	9.4	-	12
Turbidity	NTU	-	-		-	-	2.0	0.30	-	2.6	-	-	1.1	13	-	-	3.3	10	4.3	-	-	-	1.1	22	0.30	11	-	-
Conventional Parameters																												
Hardness, as CaCO ₃	mg/L	-	-		-	-	141	245	200	171	185	253	141	91	117	66	101	142	170	195	221	302	169	137	342	116	176	169
Total alkalinity, as CaCO ₃	mg/L	-	-		20 ^(a)	-	109	175	159	84	89	76	42	21	27	12 ^(BC MOE mean)	13 ^(BC MOE mean)	36	108	122	128	186	115	73	192	74	111	98
Total dissolved solids	mg/L	-	-		-	-	160	144	270	266	279	463	240	214	250	173	130	146	218	229	253	328	168	184	262	164	227	208
Total suspended solids	mg/L	-	-		-	-	<3.0	<2.0	<2	4.0	<1.0	<1.0	<3.0	6.0	<1.0	<1.0	5.0	11	<2.0	<1.0	1.0	<2.0	<3.0	42	<2.0	10	<1.0	3.0
Total organic carbon	mg/L	-	-		-	-	3.8	1.6	2.1	-	-	13	13	-	-	21	17	22	-	-	6.5	3.2	5.3	15	2.0	-	-	12
Dissolved organic carbon	mg/L	-	-		-	-	3.7	1.5	1.6	14	36	13	13	26	57	20	17	22	9.0	18	6.1	1.6	5.3	14	1.7	15	22	10
Total inorganic carbon	mg/L	-	-		-	-	28	43	32.1	-	-	18	10	-	-	2.5	3.6	7.9	-	-	32	51	29	17	46	-	-	24
Dissolved inorganic carbon	mg/L	-	-		-	-	27	42	32.1	19	18	18	10	4.7	5.3	2.3	3.3	7.4	27	25	34	44	29	9.6	46	18	22	24
Major Ions																												
Bicarbonate, as CaCO ₃	mg/L	-	-		-	-	133	214	193	102	89	76	51	26	27	12	16	44	132	122	128	186	141	89	235	90	111	98
Bromide	mg/L	-	-		-	-	<0.02	<0.02	0.03	-	<0.1	<0.1	<0.02	-	<0.1	<0.1	<0.02	<0.02	-	<0.1	<0.1	<0.1	<0.02	<0.02	<0.02	-	<0.1	<0.1
Calcium	mg/L	-	-		-	-	42	75	60	54	51	60	34	15	18	11	15	23	53	53	63	71	51	40	107	35	48	49
Carbonate, as CaCO ₃	mg/L	-	-		-	-	<6.0	<6.0	<6	<6.0	<1.0	<1.0	<6.0	<6.0	<1.0	<1.0	<6.0	<6.0	<6.0	<1.0	<1.0	<1.0	<6.0	<6.0	<6.0	<1.0	<1.0	<1.0
Chloride	mg/L	640	120		-	-	2.5	6.4	3.54	0.11	0.41	1.1	0.13	0.35	0.46	0.49	0.20	0.48	0.32	0.44	0.30	0.63	0.36	0.23	0.45	0.24	0.82	0.32
Fluoride	mg/L	-	-	0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	mg/L	-	-		-	-	8.5	14	12	8.7	10	18	14	13	16	8.4	16	21	9.2	10.0	12	14	10	9.2	18	6.8	9.2	9.5
Potassium	mg/L	-	-		-	-	0.30	0.40	0.41	0.20	0.22	0.44	0.40	0.70	0.76	0.46	0.80	1.1	0.50	0.46	0.47	0.43	0.40	0.40	0.50	0.50	0.46	0.44
Sodium	mg/L	-	-		-	-	3.9	7.4	4.8	15	22	49	46	17	21	13	25	36	4.6	3.5	4.4	3.2	3.9	4.4	4.4	4.2	3.4	4.2
Sulphate	mg/L	-	-		128 - 429 ^(b, c)	-	36	44	57.7	106	129	241	176	91	121	70	122	145	60	59	79	84	59	55	94	40	51	63
Nutrients																												
Nitrate	mg-N/L	550	13.0		-	-	0.060	0.18	<0.01	0.080	0.059	0.060	0.060	0.040	<0.01	0.060	0.12	0.050	0.090	0.055	0.17	0.59	0.13	0.12	0.24	0.070	0.049	0.12
Nitrite	mg-N/L	-	0.060		-	-	0.13 ^(Chronic)	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	<0.01	<0.01	<0.01	0.04	0.010	<0.01	<0.01	<0.01	0.12 ^(Chronic)	0.04	0.14 ^(Chronic)	<0.01	<0.01	<0.01	
Nitrate + nitrite	mg-N/L	-	-		3.0	33	-	-	-	-	0.059	0.060	-	-	<0.01	0.060	-	-	-	0.055	0.17	0.59	-	-	-	-	0.049	0.12
Total ammonia	mg-N/L	-	0.50 - 198 ^(d)		-	-	<0.01	<0.01	<0.01	0.030	<0.02	<0.02	<0.01	<0.01	<0.02	0.020	0.020	0.020	<0.01	<0.02	<0.02	0.035	<0.01	0.010	<0.01	0.040	<0.02	<0.02
Total kjeldahl nitrogen	mg-N/L	-	-		-	-	-	-	-	-	0.59	0.62	-	-	1.0	0.72	-	-	-	0.23	0.39	0.23	-	-	-	-	0.28	0.57
Total nitrogen	mg-N/L	-	-		-	-	0.17	0.33	0.2	-	0.65	0.68	0.51	-	1.00	0.78	0.66	0.83	-	0.28	0.55	0.82	0.30	0.56	0.50	-	0.33	0.69
Total nitrogen (calculated)	mg-N/L	-	-		-	-	-	-	-	-	0.65	0.68	-	-	1.0	0.78	-	-	-	0.29	0.56	0.82	-	-	-	-	0.33	0.69
Total phosphorus	mg-P/L	-	-		-	-	-	-	-	-	0.020	0.015	-	-	0.050	0.021	-	-	0.0060	<0.01	<0.01	<0.01	-	-	-	0.025	0.012	0.015
Dissolved phosphorus	mg-P/L	-	-		-	-	-	-	-	-	0.014	0.014	-	-	0.019	0.013	-	-	-	<0.01	<0.01	<0.01	-	-	-	-	<0.01	<0.01
Phosphorus (as phosphate)	mg-P/L	-	-		-	-	0.0070	<0.003	-	0.017	0.010	0.018	0.013	0.043	0.035	0.030	0.021	0.025	0.0060	0.020	0.0050	0.0020	0.0060	0.047	<0.003	0.025	0.011	0.022
Total Metals																												
Aluminum	µg/L	-	5.0 - 100 ^(e, f)		-	-	49	7.0	22	73	37	41	38	295 ^(Chronic)	163 ^(Chronic)	298 ^(Chronic)	140 ^(Chronic)	398 ^(Chronic)	136 ^(Chronic)	152 ^(Chronic)	43	6.0	35	901 ^(Chronic)	<5.0	448 ^(Chronic)	148 ^(Chronic)	214 ^(Chronic)
Antimony	µg/L	-	-	9.0	-	-	<0.1	<0.2	0.05	<0.2	0.080	0.080	<0.1	<0.2	0.18	0.15	0.10	<0.2	<0.2	0.16	0.12	0.12	0.10	<0.2	<0.2	0.10	0.19	0.15
Arsenic	µg/L	-	5.0	-	-	-	0.19	<0.2	0.2	0.40	0.53	0.52	0.31	2.2	0.99	0.54	0.42	0.60	0.44	0.35	0.28	0.15	0.26	0.80	<0.2	0.79	0.42	0.46
Barium	µg/L	-	-	1,000	-	-	57	82	78	57	56	65	41	85	110	86	75	90	126	105	106	126	93	121	117	125	107	111
Beryllium	µg/L	-	-	0.13	-	-	<0.05	<0.05	<0.05	<0.04	0.020	0.020	<0.05	<0.04	0.050	0.050	<0.05	0.040	<0.1	0.020	0.010	<0.01	<0.05	0.060	<0.05	0.070	0.020	0.030
Bismuth	µg/L	-	-	-	-	-	<0.1	-	<0.1	-	<0.01	<0.01	<0.1	-	<0.01	<0.01	<0.1	-	<0.2	<0.01	<0.01	<0.01	<0.1	-	-	<0.1	<0.01	<0.01
Boron	µg/L	29,000	1,500	-	-	-	10	10	10	5.0	8.0	21	20	10	19	17	18	23	14	13	20	12	12	10	9.0	11	12	16
Cadmium	µg/L	0.11 - 7.7 ^(b)	0.040 - 0.37 ^(b)	-	-	-	0.010	0.020	0.02	0.020	0.02																	

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Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations																					
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	MINE-001 6-Jun-15	MINE-001 16-Mar-16	MINE-001 20-Sep-17	MINE-t-002 26-Aug-13	MINE-t-002 22-Jul-14	MINE-t-002 21-Sep-14	MINE-t-002 6-Jun-15	NCY-PT19 27-Aug-13	NCY-PT19 22-Jul-14	NCY-PT19 21-Sep-14	NCY-PT19 6-Jun-15	NCY-PT19 18-Sep-15	WHST-001 29-Jul-13	WHST-001 22-Jul-14	WHST-001 21-Sep-14	WHST-001 14-Mar-15	WHST-001 5-Jun-15	WHST-001 19-Sep-15	WHST-001 15-Mar-16	WHST-002 29-Jul-13	WHST-002 22-Jul-14	WHST-002 21-Sep-14
Dissolved Metals																												
Aluminum	µg/L	-	-		18 - 50 ⁽⁶⁾	44 - 100 ⁽⁶⁾	13	<5.0	13	29 ⁽⁵⁾	28	26	27	113 ^(BC MOE mean, BC MOE max)	89 ^(BC MOE mean)	151 ^(BC MOE mean, BC MOE max)	84 ^(BC MOE mean)	144 ^(BC MOE mean, BC MOE max)	35	26	24	2.0	12	83 ^(BC MOE mean)	<5.0	74 ^(BC MOE mean)	37	49
Antimony	µg/L	-	-		-	-	<0.2	<0.2	0.03	< 0.2 ⁽⁶⁾	0.12	0.090	<0.2	<0.2	0.16	0.14	<0.2	<0.2	<0.2	0.14	0.16	0.11	<0.2	<0.2	<0.2	<0.2	0.20	0.15
Arsenic	µg/L	-	-		-	-	0.20	<0.2	0.2	< 0.2 ⁽⁶⁾	0.43	0.42	0.40	2.0	0.74	0.41	0.40	0.40	0.40	0.24	0.22	0.10	0.30	0.30	<0.2	0.60	0.29	0.31
Barium	µg/L	-	-		-	-	55	85	75.1	52 ⁽⁵⁾	52	59	39	71	98	78	72	81	114	92	104	106	92	95	129	108	93	101
Beryllium	µg/L	-	-		-	-	<0.04	<0.04	< 0.05	< 0.04 ⁽⁵⁾	0.020	0.020	<0.04	<0.04	0.040	0.050	<0.04	0.050	<0.04	0.010	0.010	<0.01	<0.04	<0.04	<0.04	<0.04	0.020	0.030
Bismuth	µg/L	-	-		-	-	<1.0	<1.0	< 0.1	< 1 ⁽⁵⁾	<0.01	<0.01	<1.0	<1.0	<0.01	<0.01	<1.0	<1.0	<1.0	<0.01	<0.01	<0.01	<1.0	<1.0	<1.0	<0.01	<0.01	<0.01
Boron	µg/L	-	-		-	-	7.0	11	11	4 ⁽⁵⁾	7.0	15	15	9.0	18	14	15	22	13	12	14	8.0	8.0	12	10	10	11	13
Cadmium	µg/L	-	-		0.044 - 0.46 ^(b)	0.066 - 2.8 ^(b)	<0.01	0.020	0.01	< 0.01 ⁽⁵⁾	0.019	0.016	<0.01	0.030	0.032	0.042	0.020	0.060	0.020	0.018	0.017	0.018	<0.01	0.040	0.020	0.020	0.016	0.018
Chromium	µg/L	-	-		-	-	<0.4	<0.4	0.08	0.6 ⁽⁶⁾	0.60	0.50	0.50	1.0	0.90	0.90	0.60	<0.4	<0.4	0.30	0.30	<0.1	<0.4	<0.4	<0.4	0.60	0.30	0.60
Cobalt	µg/L	-	-		-	-	0.060	<0.02	0.02	0.38 ⁽⁵⁾	0.20	0.49	0.11	0.41	0.31	0.53	0.28	1.1	0.12	0.073	0.12	0.019	0.090	0.45	0.020	0.14	0.091	0.16
Copper	µg/L	-	-		-	-	<1.0	<1.0	< 0.5	< 1 ⁽⁵⁾	1.0	1.0	1.0	7.0	3.8	3.4	3.0	3.0	2.0	1.4	1.3	0.40	1.0	3.0	2.0	3.0	1.7	2.1
Iron	µg/L	-	-		-	350	18	<5.0	12	374 ⁽⁵⁾	330	470 ^(BC MOE max)	128	1,170 ^(BC MOE max)	1,070 ^(BC MOE max)	562 ^(BC MOE max)	388 ^(BC MOE max)	695 ^(BC MOE max)	228	92	128	7.0	52	349	<5.0	481 ^(BC MOE max)	117	220
Lead	µg/L	-	-		-	-	<0.1	<0.1	< 0.01	< 0.1 ⁽⁵⁾	<0.05	<0.05	<0.1	<0.1	0.13	0.17	<0.1	<0.1	1.5	0.15	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05
Lithium	µg/L	-	-		-	-	8.0	10	9.5	2 ⁽⁵⁾	2.9	8.2	7.0	8.0	9.3	7.0	13	16	7.0	7.1	8.8	5.4	7.0	5.0	8.0	5.0	6.4	7.0
Manganese	µg/L	-	-		-	-	2.0	3.0	3	63 ⁽⁵⁾	23	102	6.0	37	42	45	28	130	30	14	30	12	13	84	10	28	17	32
Mercury	µg/L	-	-		-	-	<0.01	<0.01	< 0.01	< 0.01 ⁽⁵⁾	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Molybdenum	µg/L	-	-		-	-	0.54	0.60	0.62	0.21 ⁽⁵⁾	0.34	0.25	0.17	0.20	0.28	0.13	0.11	0.22	0.96	1.1	1.1	0.97	0.95	0.55	1.0	0.76	0.99	0.85
Nickel	µg/L	-	-		-	-	1.0	<1.0	1.7	3 ⁽⁵⁾	2.3	2.9	2.0	8.0	6.8	6.1	4.0	8.0	2.0	1.6	2.1	0.49	2.0	4.0	1.0	4.0	2.0	2.9
Selenium	µg/L	-	-		-	-	0.70	1.0	0.7	< 0.6 ⁽⁶⁾	0.20	0.40	<0.6	3.4	0.40	0.40	<0.6	<0.6	0.70	0.60	1.0	1.9	1.1	1.0	2.1	<0.6	0.60	0.80
Silicon	µg/L	-	-		-	-	1,690	2,010	1600	1790 ⁽⁵⁾	1,590	1,730	1,720	1,990	887	2,400	1,580	2,890	1,750	1,580	1,450	1,700	1,500	2,740	1,920	1,970	1,620	1,670
Silver	µg/L	-	-		-	-	<0.01	<0.01	< 0.01	< 0.01 ⁽⁵⁾	<0.01	<0.01	<0.01	0.010	<0.01	<0.01	<0.01	0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Strontium	µg/L	-	-		-	-	147	183	181.4	152 ⁽⁵⁾	147	185	116	33	40	28	32	46	155	144	184	199	147	114	225	110	135	137
Sulphur	µg/L	-	-		-	-	12,800	16,300	20000	3,300,000- ⁽⁶⁾	40,400	73,700	66,600	28,800	38,200	19,300	44,900	56,300	18,800	18,700	24,700	27,300	20,900	22,200	36,300	12,300	16,900	18,200
Tellurium	µg/L	-	-		-	-	<0.1	<0.1	< 0.05	< 0.1 ⁽⁵⁾	<0.05	<0.05	<0.1	<0.1	<0.05	<0.05	<0.1	<0.1	-	<0.05	<0.05	<0.05	<0.1	<0.1	<0.1	-	<0.05	<0.05
Thallium	µg/L	-	-		-	-	<0.01	<0.01	< 0.01	< 0.01 ⁽⁵⁾	<0.004	<0.004	<0.01	<0.01	<0.004	<0.004	<0.01	<0.01	<0.01	0.0050	<0.004	<0.004	<0.01	<0.01	<0.01	<0.01	0.0050	<0.004
Thorium	µg/L	-	-		-	-	<0.4	<0.4	0.09	< 0.4 ⁽⁵⁾	0.030	0.040	<0.4	<0.4	0.11	0.17	<0.4	<0.4	<0.4	0.020	0.020	<0.01	<0.4	<0.4	<0.4	<0.4	0.030	0.050
Tin	µg/L	-	-		-	-	<0.1	<0.1	< 0.1	< 0.1 ⁽⁵⁾	<0.05	<0.05	<0.1	0.10	<0.05	<0.05	<0.1	<0.1	<0.1	<0.05	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05
Titanium	µg/L	-	-		-	-	<10	13	6	< 10 ⁽⁵⁾	0.50	0.40	<10	<10	2.1	1.5	<10	<10	14	0.40	0.50	<0.2	<10	<10	17	11	0.30	0.60
Uranium	µg/L	-	-		-	-	0.50	0.80	0.67	< 0.4 ⁽⁵⁾	0.11	0.092	<0.4	<0.4	0.073	0.12	<0.4	<0.4	0.70	0.75	1.1	1.3	0.90	0.60	1.8	0.50	0.68	0.82
Vanadium	µg/L	-	-		-	-	0.28	<0.1	0.06	0.74 ⁽⁵⁾	0.50	0.30	0.32	0.71	0.90	0.40	0.38	0.21	0.36	0.30	0.20	<0.2	0.31	0.18	0.10	0.55	0.30	0.20
Zinc	µg/L	-	-		-	-	1.0	<1.0	< 0.5	12 ⁽⁵⁾	<1.0	2.0	2.0	8.0	5.0	7.0	6.0	9.0	2.0	1.0	3.0	2.0	1.0	3.0	2.0	2.0	<1.0	2.0
Zirconium	µg/L	-	-		-	-	<0.1	<0.1	0.2	0.4 ⁽⁵⁾	0.23	0.30	0.28	1.3	1.1	1.1	0.75	1.3	0.26	0.20	0.21	0.040	0.12	0.69	<0.1	0.68	0.30	0.50
Volatile Organics																												
Benzene	µg/L	-	-	370	-	-	<0.5	<0.5	< 500	<1.0	<0.5	<0.5	<0.5	-	-	<0.5	<0.5	<0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	<0.5
Ethylbenzene	µg/L	-	-	90	-	-	<0.5	<0.5	< 500	<1.0	<1.0	<1.0	<0.5	-	-	<1.0	<0.5	<0.5	-	-	<1.0	<1.0	<0.5	<0.5	<0.5	-	-	<1.0
Toluene	µg/L	-	-	2.0	-	-	<0.5	<0.5	< 500	<1.0	<1.0																	

APPENDIX B
Table B-1: Surface Water Quality Summary for Eagle Plain Baseline Study, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations																					
							MINE-001	MINE-001	MINE-001	MINE-t-002	MINE-t-002	MINE-t-002	MINE-t-002	NCY-PT19	NCY-PT19	NCY-PT19	NCY-PT19	NCY-PT19	WHST-001	WHST-001	WHST-001	WHST-001	WHST-001	WHST-001	WHST-001	WHST-001	WHST-002	WHST-002
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	6-Jun-15	16-Mar-16	20-Sep-17	26-Aug-13	22-Jul-14	21-Sep-14	6-Jun-15	27-Aug-13	22-Jul-14	21-Sep-14	6-Jun-15	18-Sep-15	29-Jul-13	22-Jul-14	21-Sep-14	14-Mar-15	5-Jun-15	19-Sep-15	15-Mar-16	29-Jul-13	22-Jul-14	21-Sep-14
Alkylated PAHs																												
C1 substituted naphthalenes	µg/L	-	-	-	-	-	<0.0094	<0.0095	-	<0.0041	<0.0027	<0.0134	<0.0094	<0.0041	<0.0027	<0.0134	<0.0094	<0.0091	<0.0033	<0.0027	<0.0134	<0.0079	<0.0094	<0.0091	<0.00945	<0.0033	<0.0027	<0.0134
C2 substituted naphthalenes	µg/L	-	-	-	-	-	<0.0126	<0.0131	-	<0.0085	<0.0064	<0.0138	<0.0126	<0.0085	<0.0064	<0.0138	<0.0126	<0.0076	<0.0095	<0.0064	<0.0138	<0.00732	<0.0126	<0.0076	<0.0131	<0.0095	<0.0064	<0.0138
C3 substituted naphthalenes	µg/L	-	-	-	-	-	<0.0058	<0.00297	-	<0.0029	<0.0037	<0.0066	<0.0058	<0.0029	<0.0037	<0.0066	<0.0058	<0.0016	<0.0053	<0.0037	<0.0066	<0.00027	<0.0058	0.0035	<0.00297	<0.0053	<0.0037	<0.0066
C4 substituted naphthalenes	µg/L	-	-	-	-	-	0.00023	<0.0016	-	0.0013	<0.00033	<0.0028	0.00040	0.0029	<0.00021	<0.0028	<0.00024	<0.0057	<0.0026	<0.00058	<0.00280	<0.00022	0.00062	<0.0057	<0.00162	<0.0026	<0.00017	<0.00280
1-Methylnaphthalene	µg/L	-	-	-	-	-	<0.00166	<0.00134	-	<0.00132	<0.00085	<0.0017	<0.00166	<0.00132	<0.00085	<0.00167	<0.00166	<0.00233	<0.00107	<0.00085	<0.00167	<0.00143	<0.00166	<0.0023	<0.00134	<0.00107	<0.00085	<0.00167
2-Methylnaphthalene	µg/L	-	-	-	-	-	<0.0094	<0.00813	-	<0.0028	<0.00181	<0.0118	<0.00939	<0.00276	<0.00181	<0.0118	<0.00939	<0.0068	<0.00225	<0.00181	<0.01176	<0.0065	<0.00939	<0.0068	<0.00813	<0.0023	<0.0018	<0.01176
1,2-Dimethylnaphthalene	µg/L	-	-	-	-	-	<0.00050	<0.00032	-	<0.00177	<0.00119	<0.00098	<0.00062	<0.0018	<0.00119	<0.00086	<0.00064	<0.00046	<0.00028	<0.00119	<0.00087	<0.00098	<0.00045	<0.00055	<0.00034	<0.00027	<0.00119	<0.00085
2,6-Dimethylnaphthalene	µg/L	-	-	-	-	-	<0.00042	<0.00027	-	0.00057	<0.00042	0.00055	<0.00053	<0.00049	<0.00054	<0.00036	<0.00054	<0.00039	<0.00031	<0.00037	<0.00039	<0.00083	<0.00038	0.00084	<0.00029	<0.00031	<0.00036	<0.00072
C1 substituted acenaphthenes	µg/L	-	-	-	-	-	<0.00034	<0.00045	-	<0.00034	<0.00028	<0.00045	<0.00026	<0.00025	<0.00022	<0.00018	<0.00051	<0.00022	<0.00013	<0.00015	<0.00024	<0.00036	<0.00035	<0.00021	<0.00025	<0.00016	<0.000088	<0.00036
C1 substituted biphenyls	µg/L	-	-	-	-	-	<0.00186	<0.0065	-	<0.0015	<0.0093	<0.00375	<0.00186	0.0018	<0.0093	<0.0038	<0.00186	<0.00094	<0.0024	<0.0093	<0.00375	<0.0038	<0.00186	<0.00094	<0.0065	<0.0024	<0.0093	<0.00375
C2 substituted biphenyls	µg/L	-	-	-	-	-	<0.0033	<0.023	-	0.0038	<0.041	<0.0171	<0.0033	0.0082	<0.041	<0.0171	<0.0033	0.00021	<0.010	<0.041	<0.01707	<0.0164	<0.0033	0.00068	<0.023	<0.0104	<0.041	<0.01707
2,3,5-Trimethylnaphthalene	µg/L	-	-	-	-	-	0.00033	<0.00025	-	<0.00044	<0.00047	<0.00049	<0.00019	<0.00044	<0.00048	<0.00049	<0.00030	0.00030	<0.00055	<0.00047	<0.00049	<0.00028	0.00029	0.00096	<0.00023	<0.00055	<0.00047	<0.00049
2,3,6-Trimethylnaphthalene	µg/L	-	-	-	-	-	<0.00097	<0.00023	-	<0.00065	<0.00060	<0.00076	<0.00097	<0.00065	<0.00060	<0.00076	<0.00097	0.00029	<0.00046	<0.00060	<0.00076	<0.00026	<0.00097	0.00094	<0.00021	<0.00046	<0.00060	<0.00076
C1 substituted fluorenes	µg/L	-	-	-	-	-	0.00065	<0.00149	-	<0.00226	<0.00103	<0.00150	0.00058	<0.00226	<0.00103	<0.00150	0.00076	0.00039	<0.00210	<0.00103	<0.00150	<0.00079	0.00046	0.00052	<0.00149	<0.00210	<0.00103	<0.00150
C2 substituted fluorenes	µg/L	-	-	-	-	-	0.00082	0.00079	-	<0.00155	<0.00094	0.00074	0.00094	<0.00155	<0.00094	<0.00023	0.00074	0.00042	<0.00190	<0.00094	<0.00027	<0.00081	0.00052	0.00096	0.00094	<0.00019	<0.00094	<0.00019
C3 substituted fluorenes	µg/L	-	-	-	-	-	<0.0053	0.00076	-	<0.0041	<0.00390	<0.0026	<0.0053	<0.0041	<0.00390	<0.0026	<0.0053	<0.00085	<0.0112	<0.00390	<0.0026	<0.00069	<0.0053	0.0016	0.00037	<0.0112	<0.0039	<0.0026
2-Methylfluorene	µg/L	-	-	-	-	-	<0.00020	<0.00044	-	<0.0004	<0.00012	<0.00023	<0.00020	<0.00040	<0.00014	<0.00017	<0.00017	<0.00033	<0.00019	<0.00013	<0.00024	<0.00079	<0.00011	<0.00028	<0.00030	<0.00018	<0.00016	<0.00032
1,4,6,7-Tetramethylnaphthalene	µg/L	-	-	-	-	-	<0.00019	<0.000067	-	<0.00027	<0.00033	<0.00032	<0.00018	<0.00034	<0.00021	<0.00019	<0.00024	<0.00022	<0.00013	<0.00058	<0.00021	<0.00022	<0.00018	<0.00037	<0.00012	<0.00017	<0.00017	<0.00030
C1 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	<0.00028	<0.00165	-	<0.00031	<0.00037	<0.00013	<0.00022	<0.00038	<0.00037	<0.00020	<0.00037	0.00088	0.00040	<0.00037	0.00040	<0.00023	0.00021	0.0035	<0.00165	0.00031	<0.00037	<0.00020
C2 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	0.00084	<0.00098	-	<0.00131	<0.00118	<0.00098	0.00037	<0.00131	<0.00118	<0.00098	0.00027	0.00068	<0.00205	<0.00118	<0.00098	<0.00015	0.00060	0.00023	<0.00098	<0.00205	<0.00118	<0.00098
C3 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	<0.00058	<0.00011	-	<0.00164	<0.00114	0.00041	0.00066	<0.00164	<0.00114	<0.00034	<0.00058	0.00040	<0.00268	<0.00114	<0.00034	<0.00017	<0.00058	0.00092	<0.00010	<0.00268	<0.00114	<0.00034
C4 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	0.0012	<0.00033	-	<0.0021	<0.00104	<0.0026	0.0011	<0.0021	0.0015	<0.00262	0.0011	<0.00059	<0.0046	<0.00104	<0.00262	<0.00041	0.00077	0.0020	<0.00033	<0.0046	<0.00104	<0.0026
1-Methylphenanthrene	µg/L	-	-	-	-	-	<0.00028	<0.00044	-	<0.00031	<0.00037	<0.00013	<0.00022	<0.00038	<0.00037	<0.00020	<0.00037	0.00024	<0.00012	<0.00037	<0.00018	<0.00023	<0.00021	0.00085	<0.00044	<0.00017	<0.00037	<0.00020
2-Methylphenanthrene	µg/L	-	-	-	-	-	<0.00028	<0.00070	-	<0.00031	<0.00038	<0.00013	<0.00022	<0.00038	<0.00038	<0.00019	<0.00037	<0.00021	0.00020	<0.00038	<0.00020	<0.00023	<0.00021	0.00080	<0.00070	0.00017	<0.00038	<0.00020
3-Methylphenanthrene	µg/L	-	-	-	-	-	<0.00029	<0.00050	-	<0.00031	<0.00013	<0.00013	<0.00022	<0.00039	<0.00023	<0.00022	<0.00037	0.00029	<0.00013	0.00020	0.00020	<0.00023	<0.00021	0.00074	<0.00050	0.00015	0.00019	<0.00020
9/4-Methylphenanthrene	µg/L	-	-	-	-	-	<0.00029	0.00017	-	<0.00031	<0.00088	<0.00013	<0.00022	<0.00039	<0.00023	<0.00019	<0.00037	0.00036	0.00020	<0.00016	<0.00018	<0.00023	<0.00021	0.0011	<0.00017	<0.00017	<0.00020	<0.00020
2-Methylanthracene	µg/L	-	-	-	-	-	<0.00029	<0.00016	-	<0.00032	<0.00087	<0.00013	<0.00023	<0.00040	<0.00023	<0.00019	<0.00038	<0.00022	<0.00013	<0.00014	<0.00018	<0.00024	<0.00022	<0.00021	<0.00017	<0.00012	<0.00011	<0.00020
1,7-Dimethylfluorene	µg/L	-	-	-	-	-	<0.00017	<0.00018	-	<0.00042	<0.00017	<0.00031	<0.00021	<0.														

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Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations																					
							MINE-001	MINE-001	MINE-001	MINE-t-002	MINE-t-002	MINE-t-002	MINE-t-002	NCY-PT19	NCY-PT19	NCY-PT19	NCY-PT19	NCY-PT19	WHST-001	WHST-001	WHST-001	WHST-001	WHST-001	WHST-001	WHST-001	WHST-002	WHST-002	WHST-002
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	6-Jun-15	16-Mar-16	20-Sep-17	26-Aug-13	22-Jul-14	21-Sep-14	6-Jun-15	27-Aug-13	22-Jul-14	21-Sep-14	6-Jun-15	18-Sep-15	29-Jul-13	22-Jul-14	21-Sep-14	14-Mar-15	5-Jun-15	19-Sep-15	15-Mar-16	29-Jul-13	22-Jul-14	21-Sep-14
Naphthenic Acid																												
C12H18O2	ng/L	-	-	-	-	-	-	-	-	12	11	28	-	110	78	89	-	-	20	9.1	11	<5.0	-	-	-	33	17	26
C12H20O2	ng/L	-	-	-	-	-	-	-	-	31	23	49	-	138	42	148	-	-	84	7.4	13	<5.0	-	-	-	70	<14	13
C12H22O2	ng/L	-	-	-	-	-	-	-	-	16	15	22	-	51	<26	74	-	-	208	7.1	<4.8	<5.0	-	-	-	154	<14	<5.2
C12H24O2	ng/L	-	-	-	-	-	-	-	-	<5.0	<5.3	<5.4	-	<4.9	<16	<5.3	-	-	660	<5.1	<4.8	<5.0	-	-	-	600	<14	<5.2
C13H20O2	ng/L	-	-	-	-	-	-	-	-	5.5	6.2	<12	-	80	38	111	-	-	16	5.3	<4.8	<5.0	-	-	-	16	<14	15
C13H22O2	ng/L	-	-	-	-	-	-	-	-	21	23	38	-	134	74	188	-	-	79	<5.1	14	<5.0	-	-	-	56	<14	<15
C13H24O2	ng/L	-	-	-	-	-	-	-	-	11	11	18	-	28	21	58	-	-	162	<5.1	<4.8	<5.0	-	-	-	118	<14	<5.2
C13H26O2	ng/L	-	-	-	-	-	-	-	-	12	17	31	-	16	<19	<5.3	-	-	1,000	45	<4.8	<5.0	-	-	-	650	27	<5.2
C14H20O2	ng/L	-	-	-	-	-	-	-	-	7.2	13	23	-	52	49	96	-	-	28	9.6	11	8.8	-	-	-	22	<14	17
C14H22O2	ng/L	-	-	-	-	-	-	-	-	11	18	24	-	131	82	178	-	-	21	10	19	<5.0	-	-	-	20	<14	24
C14H24O2	ng/L	-	-	-	-	-	-	-	-	14	12	17	-	128	78	186	-	-	63	<7.1	<11	<5.0	-	-	-	35	<14	16
C14H26O2	ng/L	-	-	-	-	-	-	-	-	<5.0	32	<5.4	-	<14	<16	<21	-	-	142	<5.1	<4.8	<5.0	-	-	-	87	<14	<5.2
C14H28O2	ng/L	-	-	-	-	-	-	-	-	<5.0	<5.3	<5.4	-	<4.9	<16	<5.3	-	-	696	<5.1	<4.8	<5.0	-	-	-	377	<14	<5.2
C15H18O2	ng/L	-	-	-	-	-	-	-	-	6.5	9.7	13	-	25	23	24	-	-	155	<5.1	11	5.1	-	-	-	129	<14	8.9
C15H20O2	ng/L	-	-	-	-	-	-	-	-	12	15	23	-	93	71	107	-	-	<4.9	8.2	<12	<5.0	-	-	-	18	<14	25
C15H22O2	ng/L	-	-	-	-	-	-	-	-	26	34	75	-	246	157	332	-	-	47	25	51	<5.0	-	-	-	59	41	102
C15H24O2	ng/L	-	-	-	-	-	-	-	-	30	45	184	-	213	236	311	-	-	160	40	62	<5.0	-	-	-	295	62	99
C15H26O2	ng/L	-	-	-	-	-	-	-	-	14	20	25	-	89	61	119	-	-	78	9.2	15	<5.0	-	-	-	55	<14	21
C15H28O2	ng/L	-	-	-	-	-	-	-	-	<5.0	<5.3	<5.4	-	<4.9	<16	<5.3	-	-	93	<5.1	<4.8	<5.0	-	-	-	64	<14	<5.2
C15H30O2	ng/L	-	-	-	-	-	-	-	-	<5.0	<5.3	<5.4	-	<4.9	<16	<5.3	-	-	505	<5.1	<4.8	<5.0	-	-	-	295	<14	<5.2
C16H20O2	ng/L	-	-	-	-	-	-	-	-	17	10.0	26	-	33	38	43	-	-	<12	6.9	11	9.4	-	-	-	<5.1	<14	8.5
C16H22O2	ng/L	-	-	-	-	-	-	-	-	<5.0	<9.6	<5.4	-	50	37	56	-	-	<4.9	<5.1	<4.8	<5.0	-	-	-	<5.1	<14	<5.2
C16H24O2	ng/L	-	-	-	-	-	-	-	-	8.7	12	16	-	45	<31	60	-	-	53	<5.1	<4.8	<5.0	-	-	-	61	<14	<13
C16H26O2	ng/L	-	-	-	-	-	-	-	-	22	22	24	-	75	73	112	-	-	137	8.2	18	<5.0	-	-	-	110	<14	22
C16H28O2	ng/L	-	-	-	-	-	-	-	-	<5.0	<5.3	<5.4	-	20	45	41	-	-	37	<5.1	<4.8	<5.0	-	-	-	23	<23	<5.2
C16H30O2	ng/L	-	-	-	-	-	-	-	-	<5.0	<5.3	<5.4	-	<4.9	<16	<5.3	-	-	100	<5.1	<4.8	<5.0	-	-	-	<5.1	<14	<5.2
C16H32O2	ng/L	-	-	-	-	-	-	-	-	<5.0	<5.3	<5.4	-	<4.9	<16	<5.3	-	-	<6.0	<5.1	<4.8	<5.0	-	-	-	<10	<14	<5.2
C17H22O2	ng/L	-	-	-	-	-	-	-	-	7.6	10	19	-	19	<27	27	-	-	77	<5.1	8.0	<5.0	-	-	-	63	<14	<7.8
C17H24O2	ng/L	-	-	-	-	-	-	-	-	<5.0	7.1	<5.4	-	23	29	40	-	-	<4.9	<5.1	<4.8	<5.0	-	-	-	<5.1	<14	<5.2
C17H26O2	ng/L	-	-	-	-	-	-	-	-	7.1	15	12	-	26	35	41	-	-	21	<5.1	<4.8	<5.0	-	-	-	18	<14	8.3
C17H28O2	ng/L	-	-	-	-	-	-	-	-	13	23	41	-	59	290	73	-	-	18	21	32	<5.0	-	-	-	27	22	42
C17H30O2	ng/L	-	-	-	-	-	-	-	-	10	<5.3	6.0	-	13	61	18	-	-	36	8.2	13	<5.0	-	-	-	21	<14	14
C17H32O2	ng/L	-	-	-	-	-	-	-	-	<5.0	<5.3	<5.4	-	<4.9	<16	<5.3	-	-	49	<5.1	<4.8	<5.0	-	-	-	33	<14	<5.2
C17H34O2	ng/L	-	-	-	-	-	-	-	-	<5.0	<5.3	<5.4	-	<4.9	<16	<77	-	-	268	<5.1	<4.8	<5.0	-	-	-	169	<14	<5.2
C18H24O2	ng/L	-	-	-	-	-	-	-	-	44	65	63	-	36	68	62	-	-	447	19	30	36	-	-	-	344	27	34
C18H26O2	ng/L	-	-	-	-	-	-	-	-	<5.0	13	<5.4	-	<16	22	<5.3	-	-	29	<5.1	<4.8	<5.0	-	-	-	27	<14	<5.2
C18H28O2	ng/L	-	-	-	-	-	-	-	-	<5.0	<5.3	<5.4	-	8.8	31	15	-	-	270	<5.1	<4.8	<5.0	-	-	-	232	<14	<5.2
C18H30O2	ng/L	-	-	-	-	-	-	-	-	<5.0	<5.3	<5.4	-	6.6	<16	<5.3	-	-	11	<5.1	<4.8	<5.0	-	-	-	8.0	<14	<5.2
C18H32O2	ng/L	-	-	-	-	-	-	-	-	<5.0	<5.3	<5.4	-	<4.9	<16	<5.3	-	-	<4.9	<7.9	<4.8	<5.0	-	-	-	<5.1	<14	<5.2
C18H34O2	ng/L	-	-	-	-	-	-	-	-	<5.0	<5.3	<5.4	-	<4.9	<16	<5.3	-	-	<4.9	<5.1	<4.8	<5.0	-	-	-	<5.1	<14	<5.2
C18H36O2	ng/L	-	-	-	-	-	-	-	-	<5.0	<5.3	<5.4	-	<4.9	<16	<6.8	-	-	227	<5.1	<4.8	<5.0	-	-	-	91	<14	<5.2
C19H26O2	ng/L	-	-	-	-	-	-	-	-	15	33	54	-	24	41	74	-	-	83	16	31	<5.0	-	-	-	79	14	40
C19H28O2	ng/L	-	-	-	-	-	-	-	-	<5.0	7.2	7.4	-	7.0	35	<5.3	-	-	8.0	<5.1	<4.8	<5.0	-	-	-	8.2	<14	<8.6
C19H30O2	ng/L	-	-	-	-	-	-	-	-	<5.0	15	<5.4	-	7.8	27	<5.3	-	-	16	<5.1	<4.8	&						

APPENDIX B
Table B-1: Surface Water Quality Summary for Eagle Plain Baseline Study, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations																						
							MINE-001	MINE-001	MINE-001	MINE-t-002	MINE-t-002	MINE-t-002	MINE-t-002	NCY-PT19	NCY-PT19	NCY-PT19	NCY-PT19	NCY-PT19	WHST-001	WHST-001	WHST-001	WHST-001	WHST-001	WHST-001	WHST-001	WHST-001	WHST-002	WHST-002	WHST-002
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	6-Jun-15	16-Mar-16	20-Sep-17	26-Aug-13	22-Jul-14	21-Sep-14	6-Jun-15	27-Aug-13	22-Jul-14	21-Sep-14	6-Jun-15	18-Sep-15	29-Jul-13	22-Jul-14	21-Sep-14	14-Mar-15	5-Jun-15	19-Sep-15	15-Mar-16	29-Jul-13	22-Jul-14	21-Sep-14	
Radionuclides																													
Actinium-228	Bq/L	-	-	-	-	-	-	<0.7	-	-	-	-	-	-	-	-	<0.7	-	-	-	-	-	-	1.0	<0.8	-	-	-	
Bismuth-212	Bq/L	-	-	-	-	-	-	<2.0	-	-	-	-	-	-	-	-	<1.0	-	-	-	-	-	-	<2.0	<1.0	-	-	-	
Bismuth-214	Bq/L	-	-	-	-	-	-	<0.6	-	-	-	-	-	-	-	-	<0.4	-	-	-	-	-	-	<0.7	0.70	-	-	-	
Lead-210	Bq/L	-	-	-	-	-	-	<3.0	-	-	-	-	-	-	-	-	<4.0	-	-	-	-	-	-	<4.0	<3.0	-	-	-	
Lead-211	Bq/L	-	-	-	-	-	-	<4.0	-	-	-	-	-	-	-	-	<3.0	-	-	-	-	-	-	<6.0	<4.0	-	-	-	
Lead-212	Bq/L	-	-	-	-	-	-	<0.3	-	-	-	-	-	-	-	-	0.70	-	-	-	-	-	-	0.50	<0.3	-	-	-	
Lead-214	Bq/L	-	-	-	-	-	-	<0.4	-	-	-	-	-	-	-	-	<0.4	-	-	-	-	-	-	<0.6	0.70	-	-	-	
Potassium-40	Bq/L	-	-	-	-	-	-	<4.0	-	-	-	-	-	-	-	-	<4.0	-	-	-	-	-	-	6.0	<4.0	-	-	-	
Radium-223	Bq/L	-	-	-	-	-	-	<0.6	-	-	-	-	-	-	-	-	<0.6	-	-	-	-	-	-	<1.0	<0.7	-	-	-	
Radium-226	Bq/L	-	-	-	-	-	<0.005	-	-	-	-	<0.005	<0.005	-	-	<0.005	<0.005	0.0070	-	-	<0.005	0.0090	<0.005	<0.005	-	-	-	<0.005	
Radon-219	Bq/L	-	-	-	-	-	-	<1.0	-	-	-	-	-	-	-	-	<1.0	-	-	-	-	-	-	<1.0	1.0	-	-	-	
Thallium-208	Bq/L	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	0.30	-	-	-	-	-	-	<0.3	<0.2	-	-	-	
Thorium-227	Bq/L	-	-	-	-	-	-	<0.9	-	-	-	-	-	-	-	-	<0.9	-	-	-	-	-	-	<0.6	<0.7	-	-	-	
Thorium-230	Bq/L	-	-	-	-	-	-	<10	-	-	-	-	-	-	-	-	<30	-	-	-	-	-	-	<30	<10	-	-	-	
Thorium-234	Bq/L	-	-	-	-	-	-	<3.0	-	-	-	-	-	-	-	-	<3.0	-	-	-	-	-	-	<4.0	<3.0	-	-	-	
Uranium-235	Bq/L	-	-	-	-	-	-	<0.8	-	-	-	-	-	-	-	-	<0.8	-	-	-	-	-	-	<1.0	<0.8	-	-	-	
Isotopes																													
$\delta^{18}\text{O}_{\text{water}}$ (VSMOW)	‰	-	-	-	-	-	-21.72	-21.29	-20.60	-	-	-	-21.52	-	-	-	-21.83	-21.52	-	-	-	-	-22.45	-22.35	-21.07	-21.93	-	-	-
$\delta^2\text{H}_{\text{water}}$ (VSMOW)	‰	-	-	-	-	-	-168.1	-167.1	-161.3	-	-	-	-167.34	-	-	-	-168.9	-167.3	-	-	-	-	-174.0	-172.6	-163.4	-171.0	-	-	-
$\delta^{13}\text{C-DIC}$ (VPDB)	‰	-	-	-	-	-	-9.18	-10.6	-9.0	-	-	-	-12.8	-	-	-	-16.0	-9.6	-	-	-	-	-10.9	-9.6	-10.0	-11.4	-	-	-
$\delta^{34}\text{S-SO4}$ (CDT)	‰	-	-	-	-	-	-11.4	-8.7	-10.4	-	-	-	-18.6	-	-	-	-6.3	-6.6	-	-	-	-	-8.2	-10.4	-10.9	-8.6	-	-	-
$\delta^{18}\text{O-SO4}$ (VSMOW)	‰	-	-	-	-	-	-11.07	-11.06	-9.48	-	-	-	-15.51	-	-	-	-12.04	-12.34	-	-	-	-	-11.25	-11.80	-10.39	-12.05	-	-	-
Dissolved Gases																													
CH ₄	(mg/L)	-	-	-	-	-	0.0010	0.0097	0.001 (s)	-	-	-	0.0017	-	-	-	0.0059	0.0035	-	-	-	-	-	0.0027 (s)	0.0037	-	-	-	-
C ₂	(mg/L)	-	-	-	-	-	0.0000	0.0000	0 (s)	-	-	-	0.0003	-	-	-	0.0003	0.0000	-	-	-	-	-	0 (s)	0.0000	-	-	-	-
C ₃	(mg/L)	-	-	-	-	-	0.0000	0.0000	0 (s)	-	-	-	0.0000	-	-	-	0.0000	0.0000	-	-	-	-	-	0 (s)	0.0000	-	-	-	-
CO ₂	(mg/L)	-	-	-	-	-	2.65	8.02	2.85 (s)	-	-	-	2.94	-	-	-	5.19	5.83	-	-	-	-	-	3.19 (s)	3.65	-	-	-	-
N ₂	(mg/L)	-	-	-	-	-	20.30	22.58	46.75 (s)	-	-	-	18.81	-	-	-	21.80	24.61	-	-	-	-	-	26.87 (s)	23.54	-	-	-	-
O ₂	(mg/L)	-	-	-	-	-	11.24	9.35	18.45 (s)	-	-	-	10.28	-	-	-	11.15	12.55	-	-	-	-	-	13.55 (s)	12.60	-	-	-	-

APPENDIX B
Table B-1: Surface Water Quality Summary for Eagle Plain Baseline Study, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
							WHST-002	WHST-002	WHST-002	WHST-002	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003

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Table B-1: Surface Water Quality Summary for Eagle Plain Baseline Study, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
							WHST-002	WHST-002	WHST-002	WHST-002	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004

APPENDIX B
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Parameter	Unit	Guidelines for the Protection of Aquatic Life					Sampling Stations																						
							WHST-002	WHST-002	WHST-002	WHST-002	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	14-Mar-15	5-Jun-15	19-Sep-15	15-Mar-16	29-Jul-13	22-Jul-14	22-Sep-14	15-Mar-15	6-Jun-15	18-Sep-15	16-Mar-16	29-Jul-13	22-Jul-14	22-Sep-14	14-Mar-15	6-Jun-15	18-Sep-15	16-Mar-16	21-Jun-16	20-Sep-16	7-Mar-17	27-Jun-17	20-Sep-17
Naphthenic Acid																													
C12H18O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	21	13	23	<4.9	-	-	-	21	14	23	<5.1	-	-	-	-	-	-	-
C12H20O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	39	8.2	20	<4.9	-	-	-	29	9.6	14	<5.1	-	-	-	-	-	-	-
C12H22O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	79	<5.3	<4.7	<4.9	-	-	-	50	<5.2	<4.9	<5.1	-	-	-	-	-	-	-
C12H24O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	293	<5.3	<4.7	<4.9	-	-	-	194	<5.2	<4.9	<5.1	-	-	-	-	-	-	-
C13H20O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	12	<5.3	16	<4.9	-	-	-	9.7	6.8	14	<5.1	-	-	-	-	-	-	-
C13H22O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	44	6.0	16	<4.9	-	-	-	25	8.2	13	<5.1	-	-	-	-	-	-	-
C13H24O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	71	<5.3	11	<4.9	-	-	-	40	<5.2	10	<5.1	-	-	-	-	-	-	-
C13H26O2	ng/L	-	-	-	-	-	47	-	-	-	-	384	17	24	<4.9	-	-	-	170	22	<4.9	28	-	-	-	-	-	-	-
C14H20O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	17	8.3	22	<4.9	-	-	-	15	7.8	13	10	-	-	-	-	-	-	-
C14H22O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	<5.0	<11	23	<4.9	-	-	-	14	<8.2	<16	<5.1	-	-	-	-	-	-	-
C14H24O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	25	<6.9	<5.3	<4.9	-	-	-	18	6.4	11	<5.1	-	-	-	-	-	-	-
C14H26O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	71	<5.3	<4.7	<4.9	-	-	-	24	20	<4.9	<5.1	-	-	-	-	-	-	-
C14H28O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	317	<5.3	<4.7	<4.9	-	-	-	135	<5.2	<4.9	<5.1	-	-	-	-	-	-	-
C15H18O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	17	<5.3	12	<4.9	-	-	-	14	<5.2	9.5	6.0	-	-	-	-	-	-	-
C15H20O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	10	6.8	<4.7	<4.9	-	-	-	10	9.3	22	7.7	-	-	-	-	-	-	-
C15H22O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	41	41	94	5.2	-	-	-	40	40	78	5.9	-	-	-	-	-	-	-
C15H24O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	81	68	152	<6.0	-	-	-	73	64	124	7.2	-	-	-	-	-	-	-
C15H26O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	42	10	24	<4.9	-	-	-	18	13	18	<5.1	-	-	-	-	-	-	-
C15H28O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	36	<5.3	<4.7	<4.9	-	-	-	16	<5.2	<4.9	<5.1	-	-	-	-	-	-	-
C15H30O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	214	<5.3	<4.7	<4.9	-	-	-	98	<5.2	<4.9	<5.1	-	-	-	-	-	-	-
C16H20O2	ng/L	-	-	-	-	-	8.0	-	-	-	-	<5.0	<5.3	12	11	-	-	-	<5.0	<5.2	15	8.8	-	-	-	-	-	-	-
C16H22O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	<5.0	<5.3	<4.7	<4.9	-	-	-	<5.0	<5.2	<4.9	<5.1	-	-	-	-	-	-	-
C16H24O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	37	<5.3	<4.7	<4.9	-	-	-	58	<5.2	<4.9	<5.1	-	-	-	-	-	-	-
C16H26O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	195	12	19	<4.9	-	-	-	345	11	15	<5.1	-	-	-	-	-	-	-
C16H28O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	19	<5.3	<4.7	<4.9	-	-	-	9.6	<5.2	<4.9	<5.1	-	-	-	-	-	-	-
C16H30O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	31	<5.3	<4.7	<4.9	-	-	-	14	<5.2	<4.9	<5.1	-	-	-	-	-	-	-
C16H32O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	165	<5.3	46	<4.9	-	-	-	<7.5	<5.2	<4.9	<5.1	-	-	-	-	-	-	-
C17H22O2	ng/L	-	-	-	-	-	5.1	-	-	-	-	17	<5.3	<6.0	6.2	-	-	-	18	<5.2	7.7	7.3	-	-	-	-	-	-	-
C17H24O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	<5.0	<5.3	<4.7	<4.9	-	-	-	<5.0	<5.2	6.5	<5.1	-	-	-	-	-	-	-
C17H26O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	12	<5.3	10	<4.9	-	-	-	6.5	<5.2	6.7	<5.1	-	-	-	-	-	-	-
C17H28O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	11	15	45	<4.9	-	-	-	16	21	28	<5.1	-	-	-	-	-	-	-
C17H30O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	20	<5.3	13	<4.9	-	-	-	11	<5.2	7.7	<5.1	-	-	-	-	-	-	-
C17H32O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	27	<5.3	<4.7	<4.9	-	-	-	12	<5.2	<4.9	<5.1	-	-	-	-	-	-	-
C17H34O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	174	<5.3	<4.7	<4.9	-	-	-	66	<5.2	<5.0	<5.1	-	-	-	-	-	-	-
C18H24O2	ng/L	-	-	-	-	-	34	-	-	-	-	127	16	28	38	-	-	-	110	25	59	38	-	-	-	-	-	-	-
C18H26O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	15	<5.3	<4.7	<4.9	-	-	-	18	<5.2	5.3	<5.1	-	-	-	-	-	-	-
C18H28O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	81	<5.3	<4.7	<4.9	-	-	-	247	<5.2	<4.9	<5.1	-	-	-	-	-	-	-
C18H30O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	5.7	<5.3	<4.7	<4.9	-	-	-	<5.0	<5.2	<4.9	<5.1	-	-	-	-	-	-	-
C18H32O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	10	<5.3	<4.7	<4.9	-	-	-	<5.0	<5.2	<4.9	<5.1	-	-	-	-	-	-	-
C18H34O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	<5.0	<5.3	<4.7	<4.9	-	-	-	<5.0	<5.2	<4.9	<5.1	-	-	-	-	-	-	-
C18H36O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	147	<5.3	<4.7	<4.9	-	-	-	102	<5.2	<4.9	<5.1	-	-	-	-	-	-	-
C19H26O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	21	7.6	31	<4.9	-	-	-	18	17	28	<5.1	-	-	-	-	-	-	-
C19H28O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	5.4	<5.3	<4.7	<4.9	-	-	-	<5.0	<5.2	<4.9	<5.1	-	-	-	-	-	-	-
C19H30O2	ng/L	-	-	-	-	-	<5.0	-	-	-	-	11	<5.3	<4.7	<4.9	-	-	-	9.4	<5.2	<4.9	<5.1	-	-	-	-	-	-	-
C19H32O2	ng/L	-	-	-	-																								

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							WHST-002	WHST-002	WHST-002	WHST-002	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-003	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004	WHST-004
		Acute (CCME)	Chronic (CCME)	Interim (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	14-Mar-15	5-Jun-15	19-Sep-15	15-Mar-16	29-Jul-13	22-Jul-14	22-Sep-14	15-Mar-15	6-Jun-15	18-Sep-15	16-Mar-16	29-Jul-13	22-Jul-14	22-Sep-14	14-Mar-15	6-Jun-15	18-Sep-15	16-Mar-16	21-Jun-16	20-Sep-16	7-Mar-17	27-Jun-17	20-Sep-17	
Radionuclides																														
Actinium-228	Bq/L	-	-	-	-	-	-	-	1.0	<0.6	-	-	-	-	-	1.0	<0.7	-	-	-	-	-	-	<0.9	<0.7	<1.0	<0.7	<1	<1	-
Bismuth-212	Bq/L	-	-	-	-	-	-	-	<1.0	<1.0	-	-	-	-	-	2.0	<1.0	-	-	-	-	-	-	<2.0	2.0	<1.0	<2.0	<2	<2	-
Bismuth-214	Bq/L	-	-	-	-	-	-	-	<0.6	0.90	-	-	-	-	-	<0.4	<0.4	-	-	-	-	-	-	<0.6	0.60	<0.5	<0.4	<0.7	<0.8	-
Lead-210	Bq/L	-	-	-	-	-	-	-	<4.0	<3.0	-	-	-	-	-	<5.0	<3.0	-	-	-	-	-	-	<3.0	<3.0	<3.0	<3.0	<4	<4	-
Lead-211	Bq/L	-	-	-	-	-	-	-	<3.0	<3.0	-	-	-	-	-	<3.0	<4.0	-	-	-	-	-	-	<5.0	<4.0	<5.0	<3.0	<2	<5	-
Lead-212	Bq/L	-	-	-	-	-	-	-	0.50	0.30	-	-	-	-	-	0.30	<0.3	-	-	-	-	-	-	0.50	0.40	<0.3	<0.3	0.8	1.1	-
Lead-214	Bq/L	-	-	-	-	-	-	-	<0.4	0.50	-	-	-	-	-	<0.4	<0.3	-	-	-	-	-	-	<0.5	0.50	<0.5	<0.4	<0.6	<0.6	-
Potassium-40	Bq/L	-	-	-	-	-	-	-	<5.0	<4.0	-	-	-	-	-	<4.0	<4.0	-	-	-	-	-	-	<4.0	<4.0	<4.0	<4.0	11	<7	-
Radium-223	Bq/L	-	-	-	-	-	-	-	<1.0	<0.7	-	-	-	-	-	<0.9	<0.7	-	-	-	-	-	-	<0.6	<0.8	<1.0	<1.0	<0.6	<1	-
Radium-226	Bq/L	-	-	-	-	-	<0.005	<0.005	<0.005	-	-	-	<0.005	<0.005	0.010	0.010	-	-	-	<0.005	0.0090	0.0070	0.0060	-	-	0.010	<5	<5	-	
Radon-219	Bq/L	-	-	-	-	-	-	-	<0.8	<1.0	-	-	-	-	-	<0.9	<1.0	-	-	-	-	-	-	<0.9	<1.0	<1.0	<1.0	<1	<1	-
Thallium-208	Bq/L	-	-	-	-	-	-	-	0.20	<0.2	-	-	-	-	-	0.30	<0.2	-	-	-	-	-	-	0.30	<0.2	<0.2	<0.2	0.4	<0.3	-
Thorium-227	Bq/L	-	-	-	-	-	-	-	<0.8	<0.8	-	-	-	-	-	<0.8	<0.5	-	-	-	-	-	-	<0.8	<0.9	<1.0	<0.7	<1	<1	-
Thorium-230	Bq/L	-	-	-	-	-	-	-	<20	<10	-	-	-	-	-	<10	<10	-	-	-	-	-	-	<10	<20	<10	<10	<20	<20	-
Thorium-234	Bq/L	-	-	-	-	-	-	-	<3.0	<3.0	-	-	-	-	-	<4.0	<3.0	-	-	-	-	-	-	<3.0	<3.0	<3.0	<3.0	<4	<4	-
Uranium-235	Bq/L	-	-	-	-	-	-	-	<1.0	<0.9	-	-	-	-	-	<0.9	<0.8	-	-	-	-	-	-	<0.9	<0.8	<1.0	<1.0	<1	<1	-
Isotopes																														
δ ¹⁸ O _{water} (VSMOW)	‰	-	-	-	-	-	-22.44	-22.25	-21.33	-22.12	-	-	-	-22.24	-22.23	-20.81	-22.14	-	-	-	-	-22.23	-22.43	-20.81	-22.15	-20.86	-20.21	-22.18	-21.49	-20.31
δ ² H _{water} (VSMOW)	‰	-	-	-	-	-	-173.9	-172.5	-165.5	-172.2	-	-	-	-173.4	-172.2	-163.3	-172.3	-	-	-	-	-173.3	-173.6	-162.0	-171.1	-167.0	-165.5	-171.9	-170.5	-162.7
δ ¹³ C-DIC (VPDB)	‰	-	-	-	-	-	-11.0	-9.8	-10.9	-11.0	-	-	-	-11.6	-10.0	-10.2	-12.0	-	-	-	-	-11.8	-10.8	-10.9	-12.1	-9.8	-9.8	-11.5	-9.6	-9.4
δ ³⁴ S-SO4 (CDT)	‰	-	-	-	-	-	-8.1	-10.3	-9.6	-8.4	-	-	-	-7.7	-9.8	-8.9	-8.2	-	-	-	-	-7.8	-9.7	-8.6	-8.2	-9.3	-8.5	-7.4	-8.7	-10.5
δ ¹⁸ O-SO4 (VSMOW)	‰	-	-	-	-	-	-11.43	-11.49	-13.79	-11.68	-	-	-	-10.02	-10.88	-12.60	-11.58	-	-	-	-	-10.85	-11.40	-11.42	-11.79	-12.72	-14.03	-10.92	-14.14	-10.17
Dissolved Gases																														
CH ₄	(mg/L)	-	-	-	-	-	-	0.0024	0.0040	-	-	-	-	-	0.0062	0.0040	0.0000	-	-	-	-	-	0.0089	0.0036 (s)	0.0046	0.0050	0.0048	0.0033	0.0027 (s)	0.0023
C ₂	(mg/L)	-	-	-	-	-	-	0.0000	0.0000	-	-	-	-	-	0.0000	0.0000	0.0000	-	-	-	-	-	0.0000	0 (s)	0.0000	0.0000	0.0000	0.0000	0 (s)	0.0000
C ₃	(mg/L)	-	-	-	-	-	-	0.0000	0.0000	-	-	-	-	-	0.0000	0.0000	0.0000	-	-	-	-	-	0.0000	0 (s)	0.0000	0.0000	0.0000	0.0000	0 (s)	0.0000
CO ₂	(mg/L)	-	-	-	-	-	-	3.22	5.38	-	-	-	-	-	3.44	3.62	0.00	-	-	-	-	-	3.55	5.05 (s)	11.85	5.61	4.06	8.32	3.05 (s)	3.44
N ₂	(mg/L)	-	-	-	-	-	-	22.54	29.10	-	-	-	-	-	18.85	24.38	35.32	-	-	-	-	-	25.01	50.51 (s)	24.17	21.33	25.83	34.12	53.83 (s)	19.75
O ₂	(mg/L)	-	-	-	-	-	-	12.34	14.78	-	-	-	-	-	10.14	12.27	13.80	-	-	-	-	-	11.30	19.88 (s)	5.68	7.79	13.65	7.14	19.96 (s)	9.57

Surface Water Quality Summary for Eagle Plain Baseline Study, 2012 to 2017

(a) = guideline is a minimum value, unless the background concentration or value is lower.

(b) = guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (12 to 2,420 mg/L). The guideline is calculated based on the individual hardness value for each sample.

(c) = for some samples, water hardness was greater than 250 mg/L. At this hardness, no BC MOE water quality guideline has been established for sulphate; however, the observed data were screened against the guideline for very hard water (i.e., 429 mg/L) for comparative purposes.

guideline (0.5049 mg-N/L) is based on the combination of field pH (8.2) and water temperature (12.5°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.

(e) = guideline is pH dependent. The guideline range shown is based on the pH range observed in the dataset (5.9 to 8.2). T

(f) = guideline is pH dependent: 5 µg/L at pH < 6.5 and 100 µg/L at pH ≥ 6.5.

(s) = results have been invalidated due to data quality issues and have not been included in the data analysis. See Appendix

(t) = results have been flagged based on comparison of dissolved sulphate to dissolved sulphur, but not invalidated. See Appendix

(Chronic) = concentration is higher than the chronic aquatic life CCME guideline or outside the recommended pH, DO or total

(BC MOE mean) = concentration is higher than the 30-day mean BC MOE guideline or outside the recommended pH, DO or total

(BC MOE max) = concentration is higher than the maximum BC MOE guideline or outside the recommended pH, DO or total alk

(DL>Chronic) = analytical detection limit is higher than the chronic aquatic life CCME guideline.

(DL>BC MOE mean) = analytical detection limit is higher than the 30-day mean BC MOE guideline.

VSMOW = Vienna Standard Mean Ocean Water, CDT = Canyon Diablo Troilite, VPDB = Vienna Pee-Dee Belemnite

Bolded concentrations are higher than water quality guidelines.

Bolded total alkalinity values indicate moderate to high level of acid sensitivity.

Water quality data and guidelines shown in this table were rounded to reflect laboratory or field instrument precision *after* comparisons to guidelines. Therefore, values slightly above guidelines may be displayed as being equal to the guidelines and identified as exceedances. Concentrations equal to the guideline values were not identified as exceedances.

< = less than; - = no guideline or no data; n/c = not calculated; µS/cm = microSiemens per centimetre; °C = degree celsius; mV = milli-volts; NTU = formazin nephelometric unit; ng/L = nanogram per litre; µg/L = micrograms per litre; mg/L = milligrams per litre; mg-N/L = milligrams nitrogen per litre; mg-P/L = milligrams phosphorus per litre; Bq/L = becquerel per litre; CaCO₃ = calcium carbonate.

Source: CCME (Canadian Council of Ministers of the Environment). 1999, with updates to 2017. Canadian Environmental

Source: BC MOE Guidelines (British Columbia Ministry of Environment Guidelines). 2017. British Columbia Approved Water

APPENDIX B
Table B-2: Seasonal Surface Water Quality Summary of Chance Creek, 2013 to 2017

Table B-2: Seasonal Surface Water Quality Summary of Chance Creek, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
						Ice Cover (March)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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APPENDIX B
Table B-2: Seasonal Surface Water Quality Summary of Chance Creek, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary														
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Ice Cover (March)								Standard Deviation	nd	Count	% Above Guideline			
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Acute	Chronic				BC MOE mean	BC MOE max		
Dissolved Metals																				
Aluminum	µg/L	-	-	18 - 50 ^(h)	43 - 100 ^(h)	9.5	238 ^(BC MOE Mean, BC MOE Max)	242 ^(BC MOE Mean, BC MOE Max)	792 ^(BC MOE Mean, BC MOE Max)	4.4	930 ^(BC MOE Mean, BC MOE Max)	461	0	4	-	-	25	25		
Antimony	µg/L	-	-	-	-	0.090	0.31	<2.0	<2.0	0.050	<2.0	0.46	2	4	-	-	-	-		
Arsenic	µg/L	-	-	-	-	0.47	2.1	2.2	6.0	0.30	7.0	3.3	0	4	-	-	-	-		
Barium	µg/L	-	-	-	-	468	497	514	609	421	633	93	0	4	-	-	-	-		
Beryllium	µg/L	-	-	-	-	<0.05	0.064	<0.4	<0.4	0.010	<0.4	0.091	3	4	-	-	-	-		
Bismuth	µg/L	-	-	-	-	<1.0	1.4	<10	<10	<0.01	<10	2.4	4	4	-	-	-	-		
Boron	µg/L	-	-	-	-	13	15	13	13	12	<40	3.7	1	4	-	-	-	-		
Cadmium	µg/L	-	-	0.044 - 0.46 ^(b)	0.066 - 1.7 ^(b)	0.090	0.15	0.17	0.33 ^(BC MOE Mean)	0.050	0.37 ^(BC MOE Mean)	0.15	0	4	-	-	25	-		
Chromium	µg/L	-	-	-	-	0.30	0.65	<4.0	<4.0	0.11	<4.0	0.90	2	4	-	-	-	-		
Cobalt	µg/L	-	-	-	-	0.94	7.3	7.6	23	0.31	27	13	0	4	-	-	-	-		
Copper	µg/L	-	-	-	-	0.90	3.7	13	13	<0.5	13	6.2	2	4	-	-	-	-		
Iron	µg/L	-	-	-	350	266	9,395 ^(BC MOE Max)	9,431 ^(BC MOE Max)	31,406 ^(BC MOE Max)	147	36,900 ^(BC MOE Max)	18,337	0	4	-	-	-	25		
Lead	µg/L	-	-	-	-	<0.1	0.27	1.0	1.0	<0.01	1.0	0.49	3	4	-	-	-	-		
Lithium	µg/L	-	-	-	-	5.1	4.5	5.1	5.1	2.8	<10	1.1	1	4	-	-	-	-		
Manganese	µg/L	-	-	-	-	1,935	2,296	2,675	4,151	792	4,520	1,581	0	4	-	-	-	-		
Mercury	µg/L	-	-	-	-	<0.01	0.0056	0.010	0.010	<0.005	0.010	0.0031	3	4	-	-	-	-		
Molybdenum	µg/L	-	-	-	-	1.1	1.1	1.2	1.3	1.0	1.4	0.16	0	4	-	-	-	-		
Nickel	µg/L	-	-	-	-	3.3	14	14	39	3.0	45	21	0	4	-	-	-	-		
Selenium	µg/L	-	-	-	-	0.30	0.93	<6.0	<6.0	<0.2	<6.0	1.4	3	4	-	-	-	-		
Silicon	µg/L	-	-	-	-	2,735	5,018	5,088	10,698	2,500	12,100	4,723	0	4	-	-	-	-		
Silver	µg/L	-	-	-	-	<0.01	0.016	<0.1	<0.1	<0.01	<0.1	0.023	4	4	-	-	-	-		
Strontium	µg/L	-	-	-	-	184	181	233	234	121	234	61	0	4	-	-	-	-		
Sulphur	µg/L	-	-	-	-	19,080	18,940	30,350	33,830	2,900	34,700	15,260	0	4	-	-	-	-		
Tellurium	µg/L	-	-	-	-	<0.1	0.15	<1.0	<1.0	<0.05	<1.0	0.23	4	4	-	-	-	-		
Thallium	µg/L	-	-	-	-	<0.01	0.016	<0.1	<0.1	<0.004	<0.1	0.023	4	4	-	-	-	-		
Thorium	µg/L	-	-	-	-	<0.4	0.56	<4.0	<4.0	0.020	<4.0	0.96	3	4	-	-	-	-		
Tin	µg/L	-	-	-	-	<0.1	0.16	<1.0	<1.0	<0.05	<1.0	0.23	4	4	-	-	-	-		
Titanium	µg/L	-	-	-	-	15	16	19	29	0.30	32	13	0	4	-	-	-	-		
Uranium	µg/L	-	-	-	-	0.64	0.88	0.90	0.90	0.23	<4.0	0.80	1	4	-	-	-	-		
Vanadium	µg/L	-	-	-	-	0.40	4.6	4.8	15	0.079	18	8.9	1	4	-	-	-	-		
Zinc	µg/L	-	-	-	-	3.5	10	11	28	2.1	32	15	0	4	-	-	-	-		
Zirconium	µg/L	-	-	-	-	0.38	2.8	2.8	8.6	0.30	10	4.8	0	4	-	-	-	-		
Volatile Organics																				
Benzene	µg/L	-	370 ^(l)	40	-	<0.5	63 ^(BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	125	4	4	-	-	-	-		
Ethylbenzene	µg/L	-	90 ^(l)	200	-	<1.0	63	<500 ^(DL>Chronic, DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	125	4	4	-	-	-	-		
Toluene	µg/L	-	2 ^(l)	0.50	-	1.0 ^(BC MOE Mean)	63 ^(Chronic, BC MOE Mean)	1.0 ^(BC MOE Mean)	1.0 ^(BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	125	3	4	-	-	25	-		
Xylenes	µg/L	-	-	30	-	<2.0	63 ^(BC MOE Mean)	<500 ^(DL>BC MOE Mean)	<500 ^(DL>BC MOE Mean)	<0.5	<500 ^(DL>BC MOE Mean)	125	4	4	-	-	-	-		
Styrene	µg/L	-	72 ^(l)	72	-	<1.0	63	<500 ^(DL>Chronic, DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	125	4	4	-	-	-	-		
Extractable Petroleum Hydrocarbons (C10-C19)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Extractable Petroleum Hydrocarbons (C10-C32)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Volatile Hydrocarbons	µg/L	-	-	-	-	<100	6,275	<50,000	<50,000	<50	<50,000	12,483	4	4	-	-	-	-		
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	-	<100	6,275	<50,000	<50,000	<50	<50,000	12,483	4	4	-	-	-	-		
Methyl tertiary-butyl ether	µg/L	-	-	-	-	<1.0	63	<500	<500	<0.5	<500	125	4	4	-	-	-	-		
Parent PAHs																				
Naphthalene	µg/L	-	1.1 ^(l)	1.0	-	<0.00414	0.099	0.29	0.29	<0.00414	0.29	0.17	2	3	-	-	-	-		
Acenaphthylene	µg/L	-	-	-	-	<0.000236	0.0067	0.020	0.020	<0.000131	0.020	0.011	2	3	-	-	-	-		
Biphenyl	µg/L	-	-	-	-	<0.001449	0.0018	0.0038	0.0038	<0.001449	0.0038	0.0018	2	3	-	-	-	-		
Acenaphthene	µg/L	-	5.8 ^(l)	6.0	-	<0.000462	0.00062	0.0015	0.0015	<0.000189	0.0015	0.00080	2	3	-	-	-	-		
Fluorene	µg/L	-	3 ^(l)	12	-	<0.00111	0.0015	0.0039	0.0039	<0.000318	0.0039	0.0020	2	3	-	-	-	-		
Phenanthrene	µg/L	-	0.4 ^(l)	0.30	-	<0.00318	0.0044	0.010	0.010	<0.00318	0.010	0.0049	2	3	-	-	-	-		
Anthracene	µg/L	-	0.012 ^(l)	0.10	-	<0.000117	0.00069	0.0020	0.0020	<0.0000702	0.0020	0.0011	2	3	-	-	-	-		
Dibenzothiophene	µg/L	-	-	-	-	<0.000321	0.00023	<0.000751	<0.000751	<0.000321	<0.000751	0.00012	3	3	-	-	-	-		
Pyrene	µg/L	-	0.025 ^(l)	0.020	-	<0.000711	0.0015	0.0038	0.0038	<0.000711	0.0038	0.0020	2	3	-	-	-	-		
Fluoranthene	µg/L	-	0.04 ^(l)	0.20	-	<0.001101	0.0016	0.0036	0.0036	<0.001101	0.0036	0.0018	2	3	-	-	-	-		
Benzo(a)anthracene	µg/L	-	0.018 ^(l)	0.10	-	<0.000129	0.00017	<0.000785	<0.000785	<0.000129	<0.000785	0.00019	3	3	-	-	-	-		
Chrysene	µg/L	-	-	-	-	<0.000285	0.00036	0.00079	0.00079	<0.000285	0.00079	0.00037	2	3	-	-	-	-		
1-Methyl-7-isopropyl-phenanthrene (Retene)	µg/L	-	-	-	-	<0.00112	0.0092	0.027	0.027	<0.000429	0.027	0.015	2	3	-	-	-	-		
Benzo(b)fluoranthene	µg/L	-	-	-	-	<0.0000909	0.00015	0.00036	0.00036	<0.0000765	0.00036	0.00019	2	3	-	-	-	-		
Benzo(j,k)fluoranthenes	µg/L	-	-	-	-	<0.0000952	0.00018	0.00044	0.00044	<0.0000784	0.00044	0.00023	2	3	-	-	-	-		
Benzo(b,j,k)fluoranthenes	µg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Benzo(a)pyrene	µg/L	-	0.015 ^(l)	0.010	-	<0.00014	0.00023	0.00057	0.00057	<0.000111	0.00057	0.00029	2	3	-	-	-	-		
Benzo(e)pyrene	µg/L	-	-	-	-	<0.000141	0.00015	0.00032	0.00032	<0.000112	0.00032	0.00015	2	3	-	-	-	-		
Perylene	µg/L	-	-	-	-	<0.000143	0.000075	<0.000189	<0.000189	<0.000117	<0.000189	0.000018	3	3	-	-	-	-		
Benzo(g,h,i)perylene	µg/L	-	-	-	-	<0.000255	0.00031	0.00068	0.00068	<0.000255	0.00068	0.00032	2	3	-	-	-	-		
Indeno(c,d-123)pyrene	µg/L	-	-	-	-	<0.000309	0.00020	<0.0006	<0.0006	<0.000309	<0.0006	0.000084	3	3	-	-	-	-		
Dibenzo(a,h)anthracene	µg/L	-	-	-	-	<0.000118	0.00012	<0.000498	<0.000498	<0.0000903	<0.000498	0.00011	3	3	-	-	-	-		

APPENDIX B
Table B-2: Seasonal Surface Water Quality Summary of Chance Creek, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary														
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Ice Cover (March)								Standard Deviation	nd	Count	% Above Guideline			
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Acute	Chronic				BC MOE mean	BC MOE max		
Alkylated PAHs																				
C1 substituted naphthalenes	µg/L	-	-	-	-	<0.00945	0.12	0.35	0.35	<0.00945	0.35	0.20	2	3	-	-	-	-		
1-Methylnaphthalene	µg/L	-	-	-	-	<0.001335	0.043	0.13	0.13	<0.001335	0.13	0.074	2	3	-	-	-	-		
2-Methylnaphthalene	µg/L	-	-	-	-	<0.00813	0.077	0.22	0.22	<0.00813	0.22	0.13	2	3	-	-	-	-		
C2 substituted naphthalenes	µg/L	-	-	-	-	<0.01314	0.036	0.093	0.093	<0.01314	0.093	0.050	2	3	-	-	-	-		
1,2-Dimethylnaphthalene	µg/L	-	-	-	-	<0.000432	0.0027	0.0077	0.0077	<0.000353	0.0077	0.0043	2	3	-	-	-	-		
2,6-Dimethylnaphthalene	µg/L	-	-	-	-	0.00040	0.0079	0.012	0.021	<0.0003	0.023	0.013	1	3	-	-	-	-		
C1 substituted acenaphthenes	µg/L	-	-	-	-	<0.000314	0.00017	<0.000462	<0.000462	<0.000222	<0.000462	0.000061	3	3	-	-	-	-		
C1 substituted biphenyls	µg/L	-	-	-	-	<0.00645	0.0037	<0.00645	<0.00645	0.0046	<0.00645	0.00078	2	3	-	-	-	-		
C3 substituted naphthalenes	µg/L	-	-	-	-	<0.002967	0.0093	0.025	0.025	<0.002967	0.025	0.013	2	3	-	-	-	-		
2,3,5-Trimethylnaphthalene	µg/L	-	-	-	-	<0.000564	0.0010	<0.00533	<0.00533	<0.000237	<0.00533	0.0014	3	3	-	-	-	-		
2,3,6-Trimethylnaphthalene	µg/L	-	-	-	-	<0.000519	0.0021	0.0057	0.0057	0.00023	0.0057	0.0032	1	3	-	-	-	-		
C1 substituted fluorenes	µg/L	-	-	-	-	<0.001491	0.0019	0.0043	0.0043	<0.001491	0.0043	0.0021	2	3	-	-	-	-		
2-Methylfluorene	µg/L	-	-	-	-	<0.000174	0.00074	0.0020	0.0020	<0.000157	0.0020	0.0011	2	3	-	-	-	-		
C2 substituted biphenyls	µg/L	-	-	-	-	<0.02328	0.010	<0.02328	<0.02328	<0.01635	<0.02328	0.0020	3	3	-	-	-	-		
C4 substituted naphthalenes	µg/L	-	-	-	-	<0.001623	0.0024	0.0057	0.0057	<0.001623	0.0057	0.0028	2	3	-	-	-	-		
1,4,6,7-Tetramethylnaphthalene	µg/L	-	-	-	-	<0.000364	0.00034	<0.00154	<0.00154	<0.000162	<0.00154	0.00037	3	3	-	-	-	-		
C1 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.001647	0.0035	0.0088	0.0088	<0.001647	0.0088	0.0046	2	3	-	-	-	-		
1-Methylphenanthrene	µg/L	-	-	-	-	<0.000441	0.00058	0.0013	0.0013	<0.000441	0.0013	0.00063	2	3	-	-	-	-		
2-Methylphenanthrene	µg/L	-	-	-	-	<0.000702	0.00096	0.0022	0.0022	<0.000702	0.0022	0.0011	2	3	-	-	-	-		
3-Methylphenanthrene	µg/L	-	-	-	-	<0.000504	0.00088	0.0021	0.0021	<0.000504	0.0021	0.0011	2	3	-	-	-	-		
9/4-Methylphenanthrene	µg/L	-	-	-	-	<0.000257	0.00070	0.0019	0.0019	<0.00012	0.0019	0.0010	2	3	-	-	-	-		
2-Methylantracene	µg/L	-	-	-	-	<0.000263	0.00048	0.0012	0.0012	<0.000122	0.0012	0.00066	2	3	-	-	-	-		
C2 substituted fluorenes	µg/L	-	-	-	-	0.0033	0.0036	0.0050	0.0063	0.00080	0.0066	0.0029	0	3	-	-	-	-		
1,7-Dimethylfluorene	µg/L	-	-	-	-	<0.000409	0.00027	<0.00107	<0.00107	<0.000123	<0.00107	0.00024	3	3	-	-	-	-		
C1 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.000275	0.00014	<0.000408	<0.000408	<0.00017	<0.000408	0.000060	3	3	-	-	-	-		
2/3-Methyldibenzothiophenes	µg/L	-	-	-	-	<0.000275	0.00014	<0.000408	<0.000408	<0.00017	<0.000408	0.000060	3	3	-	-	-	-		
C2 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.000978	0.0015	0.0036	0.0036	<0.000978	0.0036	0.0018	2	3	-	-	-	-		
1,7-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000219	0.00012	<0.000281	<0.000281	<0.000219	<0.000281	0.000018	3	3	-	-	-	-		
1,8-Dimethylphenanthrene	µg/L	-	-	-	-	<0.0000923	0.000069	<0.000285	<0.000285	<0.0000348	<0.000285	0.000066	3	3	-	-	-	-		
2,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000144	0.00025	0.00060	0.00060	<0.000144	0.00060	0.00031	2	3	-	-	-	-		
3,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.0000929	0.00020	0.00054	0.00054	<0.0000351	0.00054	0.00029	2	3	-	-	-	-		
C3 substituted fluorenes	µg/L	-	-	-	-	0.0011	0.0015	0.0018	0.0024	0.00082	0.0026	0.00094	0	3	-	-	-	-		
C2 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.000357	0.00021	0.00038	0.00038	<0.000155	0.00038	0.00015	2	3	-	-	-	-		
2,4-Dimethyldibenzothiophene	µg/L	-	-	-	-	<0.000267	0.00013	<0.000357	<0.000357	<0.000155	<0.000357	0.000051	3	3	-	-	-	-		
C1 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.00089	0.0020	0.0030	0.0046	<0.000187	0.0050	0.0027	1	3	-	-	-	-		
C3 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.00025	0.00087	0.0013	0.0021	0.00011	0.0023	0.0012	0	3	-	-	-	-		
1,2,6-Trimethylphenanthrene	µg/L	-	-	-	-	<0.000108	0.000078	<0.00027	<0.00027	<0.0000922	<0.00027	0.000049	3	3	-	-	-	-		
C3 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.001161	0.00041	<0.001161	<0.001161	<0.00014	<0.001161	0.00029	3	3	-	-	-	-		
C2 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.00036	0.0013	0.0019	0.0032	<0.000112	0.0035	0.0019	1	3	-	-	-	-		
C4 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.00112	0.0093	0.027	0.027	<0.00033	0.027	0.016	2	3	-	-	-	-		
C4 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.001032	0.00057	<0.00135	<0.00135	<0.001032	<0.00135	0.000092	3	3	-	-	-	-		
C1 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.00012	0.00021	0.00030	0.00044	<0.0000702	0.00048	0.00024	1	3	-	-	-	-		
5/6-Methylchrysenes	µg/L	-	-	-	-	<0.0000821	0.000044	<0.00011	<0.00011	<0.0000711	<0.00011	0.000010	3	3	-	-	-	-		
C3 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.00014	0.00017	0.00014	0.00014	<0.000131	<0.000609	0.00012	2	3	-	-	-	-		
C2 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.0000898	0.000078	<0.000301	<0.000301	<0.0000775	<0.000301	0.000063	3	3	-	-	-	-		
5,9-Dimethylchrysene	µg/L	-	-	-	-	<0.0000898	0.000078	<0.000301	<0.000301	<0.0000775	<0.000301	0.000063	3	3	-	-	-	-		
C4 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.000123	0.000083	<0.000256	<0.000256	<0.000117	<0.000256	0.000039	3	3	-	-	-	-		
C1 substituted benzo(a)anthracenes / benzopyrenes	µg/L	-	-	-	-	<0.000196	0.00011	<0.000278	<0.000278	<0.000195	<0.000278	0.000024	3	3	-	-	-	-		
7-Methylbenzo(a)pyrene	µg/L	-	-	-	-	<0.000196	0.00011	<0.000278	<0.000278	<0.000195	<0.000278	0.000024	3	3	-	-	-	-		
C3 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.0001	0.000054	<0.000137	<0.000137	<0.0000898	<0.000137	0.000012	3	3	-	-	-	-		
C2 substituted benzo(a)anthracenes / benzopyrenes	µg/L	-	-	-	-	<0.000195	0.00010	<0.000314	<0.000314	<0.0000939	<0.000314	0.000055	3	3	-	-	-	-		
C4 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.0000869	0.000052	<0.000157	<0.000157	<0.0000689	<0.000157	0.000023	3	3	-	-	-	-		
1-methylchrysene	µg/L	-	-	-	-	<0.0000799	0.000042	<0.000103	<0.000103	<0.0000692	<0.000103	0.0000086	3	3	-	-	-	-		
3-methylfluoranthene / benzo(a)fluorene	µg/L	-	-	-	-	<0.000941	0.0011	0.0028	0.0028	<0.000187	0.0028	0.0015	2	3	-	-	-	-		

APPENDIX B
Table B-2: Seasonal Surface Water Quality Summary of Chance Creek, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary											
						Ice Cover (March)								Standard Deviation	nd	Count	% Above Guideline
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Acute	Chronic				BC MOE mean
Naphthenic Acid																	
C12h18o2	ng/L	-	-	-	-	69	-	69	69	-	-	-	0	1	-	-	-
C12h20o2	ng/L	-	-	-	-	71	-	71	71	-	-	-	0	1	-	-	-
C12h22o2	ng/L	-	-	-	-	<31	-	<31	<31	-	-	-	1	1	-	-	-
C12h24o2	ng/L	-	-	-	-	43	-	43	43	-	-	-	0	1	-	-	-
C13h20o2	ng/L	-	-	-	-	70	-	70	70	-	-	-	0	1	-	-	-
C13h22o2	ng/L	-	-	-	-	95	-	95	95	-	-	-	0	1	-	-	-
C13h24o2	ng/L	-	-	-	-	36	-	36	36	-	-	-	0	1	-	-	-
C13h26o2	ng/L	-	-	-	-	56	-	56	56	-	-	-	0	1	-	-	-
C14h20o2	ng/L	-	-	-	-	53	-	53	53	-	-	-	0	1	-	-	-
C14h22o2	ng/L	-	-	-	-	98	-	98	98	-	-	-	0	1	-	-	-
C14h24o2	ng/L	-	-	-	-	106	-	106	106	-	-	-	0	1	-	-	-
C14h26o2	ng/L	-	-	-	-	<25	-	<25	<25	-	-	-	1	1	-	-	-
C14h28o2	ng/L	-	-	-	-	<15	-	<15	<15	-	-	-	1	1	-	-	-
C15h18o2	ng/L	-	-	-	-	19	-	19	19	-	-	-	0	1	-	-	-
C15h20o2	ng/L	-	-	-	-	59	-	59	59	-	-	-	0	1	-	-	-
C15h22o2	ng/L	-	-	-	-	137	-	137	137	-	-	-	0	1	-	-	-
C15h24o2	ng/L	-	-	-	-	138	-	138	138	-	-	-	0	1	-	-	-
C15h26o2	ng/L	-	-	-	-	119	-	119	119	-	-	-	0	1	-	-	-
C15h28o2	ng/L	-	-	-	-	47	-	47	47	-	-	-	0	1	-	-	-
C15h30o2	ng/L	-	-	-	-	<15	-	<15	<15	-	-	-	1	1	-	-	-
C16h20o2	ng/L	-	-	-	-	32	-	32	32	-	-	-	0	1	-	-	-
C16h22o2	ng/L	-	-	-	-	<26	-	<26	<26	-	-	-	1	1	-	-	-
C16h24o2	ng/L	-	-	-	-	45	-	45	45	-	-	-	0	1	-	-	-
C16h26o2	ng/L	-	-	-	-	89	-	89	89	-	-	-	0	1	-	-	-
C16h28o2	ng/L	-	-	-	-	131	-	131	131	-	-	-	0	1	-	-	-
C16h30o2	ng/L	-	-	-	-	<15	-	<15	<15	-	-	-	1	1	-	-	-
C16h32o2	ng/L	-	-	-	-	<15	-	<15	<15	-	-	-	1	1	-	-	-
C17h22o2	ng/L	-	-	-	-	25	-	25	25	-	-	-	0	1	-	-	-
C17h24o2	ng/L	-	-	-	-	<15	-	<15	<15	-	-	-	1	1	-	-	-
C17h26o2	ng/L	-	-	-	-	42	-	42	42	-	-	-	0	1	-	-	-
C17h28o2	ng/L	-	-	-	-	119	-	119	119	-	-	-	0	1	-	-	-
C17h30o2	ng/L	-	-	-	-	68	-	68	68	-	-	-	0	1	-	-	-
C17h32o2	ng/L	-	-	-	-	<15	-	<15	<15	-	-	-	1	1	-	-	-
C17h34o2	ng/L	-	-	-	-	<15	-	<15	<15	-	-	-	1	1	-	-	-
C18h24o2	ng/L	-	-	-	-	60	-	60	60	-	-	-	0	1	-	-	-
C18h26o2	ng/L	-	-	-	-	27	-	27	27	-	-	-	0	1	-	-	-
C18h28o2	ng/L	-	-	-	-	41	-	41	41	-	-	-	0	1	-	-	-
C18h30o2	ng/L	-	-	-	-	<44	-	<44	<44	-	-	-	1	1	-	-	-
C18h32o2	ng/L	-	-	-	-	<15	-	<15	<15	-	-	-	1	1	-	-	-
C18h34o2	ng/L	-	-	-	-	<15	-	<15	<15	-	-	-	1	1	-	-	-
C18h36o2	ng/L	-	-	-	-	<15	-	<15	<15	-	-	-	1	1	-	-	-
C19h26o2	ng/L	-	-	-	-	<15	-	<15	<15	-	-	-	1	1	-	-	-
C19h28o2	ng/L	-	-	-	-	40	-	40	40	-	-	-	0	1	-	-	-
C19h30o2	ng/L	-	-	-	-	43	-	43	43	-	-	-	0	1	-	-	-
C19h32o2	ng/L	-	-	-	-	46	-	46	46	-	-	-	0	1	-	-	-
C19h34o2	ng/L	-	-	-	-	22	-	22	22	-	-	-	0	1	-	-	-
C19h36o2	ng/L	-	-	-	-	<15	-	<15	<15	-	-	-	1	1	-	-	-
C19h38o2	ng/L	-	-	-	-	<15	-	<15	<15	-	-	-	1	1	-	-	-
C20h28o2	ng/L	-	-	-	-	<15	-	<15	<15	-	-	-	1	1	-	-	-
C20h30o2	ng/L	-	-	-	-	247	-	247	247	-	-	-	0	1	-	-	-
C20h32o2	ng/L	-	-	-	-	80	-	80	80	-	-	-	0	1	-	-	-
C20h34o2	ng/L	-	-	-	-	45	-	45	45	-	-	-	0	1	-	-	-
C20h36o2	ng/L	-	-	-	-	<15	-	<15	<15	-	-	-	1	1	-	-	-
C20h38o2	ng/L	-	-	-	-	<15	-	<15	<15	-	-	-	1	1	-	-	-
C21h30o2	ng/L	-	-	-	-	33	-	33	33	-	-	-	0	1	-	-	-
C21h32o2	ng/L	-	-	-	-	<15	-	<15	<15	-	-	-	1	1	-	-	-
C21h34o2	ng/L	-	-	-	-	<15	-	<15	<15	-	-	-	1	1	-	-	-
C21h36o2	ng/L	-	-	-	-	<15	-	<15	<15	-	-	-	1	1	-	-	-
C21h38o2	ng/L	-	-	-	-	<15	-	<15	<15	-	-	-	1	1	-	-	-
C21h40o2	ng/L	-	-	-	-	<15	-	<15	<15	-	-	-	1	1	-	-	-
Radionuclides																	
Actinium-228	Bq/L	-	-	-	-	0.80	0.48	0.80	0.80	<0.4	<0.9	0.30	2	3	-	-	-
Bismuth-212	Bq/L	-	-	-	-	<2.0	1.0	<2.0	<2.0	1.0	<2.0	0	2	3	-	-	-
Bismuth-214	Bq/L	-	-	-	-	<0.5	0.40	0.80	0.80	<0.3	0.80	0.35	2	3	-	-	-
Lead-210	Bq/L	-	-	-	-	<4.0	1.7	<4.0	<4.0	<2.0	<4.0	0.58	3	3	-	-	-
Lead-211	Bq/L	-	-	-	-	<6.0	2.5	<7.0	<7.0	<2.0	<7.0	1.3	3	3	-	-	-
Lead-212	Bq/L	-	-	-	-	0.40	0.40	0.50	0.58	<0.4	0.60	0.20	1	3	-	-	-
Lead-214	Bq/L	-	-	-	-	<0.5	0.28	0.50	0.50	<0.2	0.50	0.20	2	3	-	-	-
Potassium-40	Bq/L	-	-	-	-	<6.0	6.0	14	14	<2.0	14	7.0	2	3	-	-	-
Radium-223	Bq/L	-	-	-	-	<0.8	0.35	<0.9	<0.9	<0.4	<0.9	0.13	3	3	-	-	-
Radium-226	Bq/L	-	-	-	-	<4.0	1.0	<4.0	<4.0	<0.005	<4.0	1.4	2	2	-	-	-
Radon-219	Bq/L	-	-	-	-	<1.0	0.40	<1.0	<1.0	<0.4	<1.0	0.17	3	3	-	-	-
Thallium-208	Bq/L	-	-	-	-	0.20	0.23	0.30	0.38	<0.2	0.40	0.15	1	3	-	-	-
Thorium-227	Bq/L	-	-	-	-	<0.9	0.38	<1.0	<1.0	<0.4	<1.0	0.16	3	3	-	-	-
Thorium-230	Bq/L	-	-	-	-	<20	10	<30	<30	<10	<30	5.0	3	3	-	-	-
Thorium-234	Bq/L	-	-	-	-	<4.0	1.5	<4.0	<4.0	<1.0	<4.0	0.87	3	3	-	-	-
Uranium-235	Bq/L	-	-	-	-	<1.0	0.40	<1.0	<1.0	<0.4	<1.0	0.17	3	3	-	-	-

APPENDIX B
Table B-2: Seasonal Surface Water Quality Summary of Chance Creek, 2013 to 2017

Table B-2: Seasonal Surface Water Quality Summary of Chance Creek, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary												Median	
						Freshet (April to early-June)													
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline				
														Acute	Chronic	BC MOE mean	BC MOE max		
Field Measured																			
pH	-	-	6.5 - 9.0	6.5 - 9.0	6.5 - 9.0	6.4 ^(Chronic, BC MOE Mean, BC MOE Max)	6.6	6.7	7.0	6.2 ^(Chronic, BC MOE Mean, BC MOE Max)	7.1	0.46	0	3	-	67	67	67	6.8
Specific conductivity	µS/cm	-	-	-	-	29	38	44	56	25	60	19	0	3	-	-	-	-	53
Temperature	°C	-	-	-	-	8.6	9.2	9.7	11	8.3	11	1.4	0	3	-	-	-	-	5.5
Dissolved oxygen	mg/L	-	6.5	8.0	5.0	10	10	10	10	10	10	0.066	0	3	-	-	-	-	12
Turbidity	NTU	-	-	-	-	7.2	8.5	9.9	12	5.9	13	3.5	0	3	-	-	-	-	17
Conventional Parameters																			
Hardness, as CaCO ₃	mg/L	-	-	-	-	13	16	19	23	12	24	6.7	0	3	-	-	-	-	28
Total alkalinity, as CaCO ₃	mg/L	-	-	20 ^(a)	-	5.0 ^(BC MOE Mean)	7.2 ^(BC MOE Mean)	9.5 ^(BC MOE Mean)	13 ^(BC MOE Mean)	<5.0 ^(DL>BC MOE Mean)	14 ^(BC MOE Mean)	6.0	1	3	-	-	67	-	14 ^(BC MOE Mean)
Total dissolved solids	mg/L	-	-	-	-	32	25	36	39	<5.0	40	20	1	3	-	-	-	-	87
Total suspended solids	mg/L	-	-	-	-	<3.0	2.3	4.0	4.0	<3.0	4.0	1.4	2	3	-	-	-	-	5.0
Total organic carbon	mg/L	-	-	-	-	23	23	23	23	21	23	1.0	0	3	-	-	-	-	24
Dissolved organic carbon	mg/L	-	-	-	-	23	23	24	24	22	24	1.1	0	3	-	-	-	-	25
Dissolved inorganic carbon	mg/L	-	-	-	-	1.3	1.8	2.3	3.0	1.0	3.2	1.2	0	3	-	-	-	-	2.8
Total inorganic carbon	mg/L	-	-	-	-	1.7	2.3	2.7	3.4	1.5	3.6	1.2	0	3	-	-	-	-	2.6
Major Ions																			
Bicarbonate, as CaCO ₃	mg/L	-	-	-	-	<5.0	7.3	17	17	<5.0	17	8.4	2	3	-	-	-	-	18
Bromide	mg/L	-	-	-	-	<0.02	0.010	<0.02	<0.02	<0.02	<0.02	0	3	3	-	-	-	-	<0.02
Calcium	mg/L	-	-	-	-	3.1	3.9	4.5	5.6	2.6	5.9	1.8	0	3	-	-	-	-	6.4
Carbonate, as CaCO ₃	mg/L	-	-	-	-	<6.0	4.3	7.0	7.0	<6.0	7.0	2.3	2	3	-	-	-	-	<6.0
Chloride	mg/L	640	120	150	600	0.060	0.055	0.070	0.078	<0.05	0.080	0.028	1	3	-	-	-	-	0.10
Fluoride	mg/L	-	0.12 ^(f)	-	0.48 - 1.8 ^(b)	-	-	-	-	-	-	-	0	0	-	-	-	-	-
Magnesium	mg/L	-	-	-	-	1.3	1.6	1.8	2.1	1.3	2.2	0.52	0	3	-	-	-	-	2.4
Potassium	mg/L	-	-	-	-	0.30	0.33	0.35	0.39	0.30	0.40	0.058	0	3	-	-	-	-	0.40
Sodium	mg/L	-	-	-	-	1.1	1.7	2.2	3.1	0.80	3.3	1.4	0	3	-	-	-	-	1.8
Sulphate	mg/L	-	-	128 - 429 ^(h, c)	-	2.2	4.3	5.7	8.4	1.7	9.1	4.1	0	3	-	-	-	-	3.3
Nutrients																			
Nitrate	mg-N/L	124	2.9	3.0	33	0.010	0.033	0.045	0.073	0.010	0.080	0.040	0	3	-	-	-	-	<0.01
Nitrite	mg-N/L	-	0.060	0.020 - 0.040 ^(d)	0.060 - 0.12 ^(d)	0.050 ^(BC MOE Mean)	0.050 ^(BC MOE Mean)	0.055 ^(BC MOE Mean)	0.059 ^(BC MOE Mean)	0.040 ^(BC MOE Mean)	0.060 ^(BC MOE Mean)	0.010	0	3	-	-	100	-	<0.01
Nitrate + nitrite	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	0.010
Total ammonia	mg-N/L	-	1.3 - 212 ^(e)	0.80 - 2.1 ^(f)	4.2 - 28 ^(g)	0.010	0.0083	0.010	0.010	<0.01	0.010	0.0029	1	3	-	-	-	-	0.020
Total kjeldahl nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	0.95
Total nitrogen (calculated)	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	0.95
Total nitrogen	mg-N/L	-	-	-	-	0.63	0.63	0.66	0.68	0.58	0.69	0.055	0	3	-	-	-	-	0.72
Total phosphorus	mg-P/L	-	-	0.010	-	-	-	-	-	-	-	-	0	0	-	-	-	-	0.033
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	0.013
Phosphorus (as phosphate)	mg-P/L	-	-	-	-	0.039	0.038	0.039	0.039	0.035	0.039	0.0023	0	3	-	-	-	-	0.056
Total Metals																			
Aluminum	µg/L	-	5.0 - 100 ^(h, i)	-	-	396 ^(Chronic)	439 ^(Chronic)	474 ^(Chronic)	536 ^(Chronic)	368 ^(Chronic)	552 ^(Chronic)	99	0	3	-	100	-	-	552 ^(Chronic)
Antimony	µg/L	-	-	9.0	-	0.20	0.17	0.20	0.20	0.10	0.20	0.058	0	3	-	-	-	-	<0.2
Arsenic	µg/L	-	5.0	-	5.0	0.62	0.62	0.63	0.64	0.61	0.64	0.015	0	3	-	-	-	-	0.88
Barium	µg/L	-	-	1,000	-	73	79	83	91	71	93	12	0	3	-	-	-	-	106
Beryllium	µg/L	-	-	0.13	-	0.070	0.070	0.075	0.079	0.060	0.080	0.010	0	3	-	-	-	-	0.080
Bismuth	µg/L	-	-	-	-	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	3	3	-	-	-	-	<0.1
Boron	µg/L	29,000	1,500	-	1,200	7.0	7.3	7.5	7.9	7.0	8.0	0.58	0	3	-	-	-	-	7.0
Cadmium	µg/L	0.24 - 6.1 ^(b)	0.040 - 0.37 ^(b)	-	-	0.050 ^(Chronic)	0.050 ^(Chronic)	0.055 ^(Chronic)	0.059 ^(Chronic)	0.040	0.060 ^(Chronic)	0.010	0	3	-	67	-	-	0.060 ^(Chronic)
Chromium	µg/L	-	1.0	1.0 ^(j)	-	1.2 ^(Chronic, BC MOE Mean)	1.2 ^(Chronic, BC MOE Mean)	1.2 ^(Chronic, BC MOE Mean)	1.3 ^(Chronic, BC MOE Mean)	1.1 ^(Chronic, BC MOE Mean)	1.3 ^(Chronic, BC MOE Mean)	0.10	0	3	-	100	100	-	1.8 ^(Chronic, BC MOE Mean)
Cobalt	µg/L	-	-	4.0	110	0.20	0.23	0.25	0.29	0.20	0.30	0.058	0	3	-	-	-	-	0.58
Copper	µg/L	-	2.0 - 4.0 ^(b)	2.0 - 10 ^(b)	3.2 - 29 ^(b)	5.5 ^(Chronic, BC MOE Mean, BC MOE Max)	5.5 ^(Chronic, BC MOE Mean, BC MOE Max)	5.8 ^(Chronic, BC MOE Mean, BC MOE Max)	6.0 ^(Chronic, BC MOE Mean, BC MOE Max)	5.0 ^(Chronic, BC MOE Mean, BC MOE Max)	6.0 ^(Chronic, BC MOE Mean, BC MOE Max)	0.50	0	3	-	100	100	100	6.2 ^(Chronic, BC MOE Mean, BC MOE Max)
Iron	µg/L	-	300	-	1,000	886 ^(Chronic)	994 ^(Chronic)	1,078 ^(Chronic, BC MOE Max)	1,232 ^(Chronic, BC MOE Max)	827 ^(Chronic)	1,270 ^(Chronic, BC MOE Max)	241	0	3	-	100	-	33	1,725 ^(Chronic, BC MOE Max)
Lead	µg/L	-	1.0 - 7.0 ^(b)	3.5 - 15 ^(b)	5.5 - 311 ^(b)	0.30	0.27	0.30	0.30	0.20	0.30	0.058	0	3	-	-	-	-	0.52
Lithium	µg/L	-	-	-	-	1.5	1.4	1.6	1.6	1.2	1.6	0.21	0	3	-	-	-	-	2.1
Manganese	µg/L	-	-	768 - 1,863 ^(b)	816 - 3,394 ^(b)	27	32	37	45	23	47	13	0	3	-	-	-	-	54
Mercury	µg/L	-	0.026	0.010	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	3	3	-	-	-	-	<0.01
Molybdenum	µg/L	-	73	1,000	2,000	0.19	0.18	0.19	0.19	0.17	0.19	0.012	0	3	-	-	-	-	0.30
Nickel	µg/L	-	25 - 150 ^(b)	25 - 150 ^(b)	-	5.0	4.9	5.1	5.2	4.5	5.2	0.36	0	3	-	-	-	-	6.8
Selenium	µg/L	-	1.0	2.0	-	0.20	0.23	0.25	0.29	0.20	0.30	0.058	0	3	-	-	-	-	0.50
Silicon	µg/L	-	-	-	-	2,320	2,393	2,470	2,590	2,240	2,620	200	0	3	-	-	-	-	3,180
Silver	µg/L	-	0.25	0.050 - 1.5 ^(b)	0.10 - 3.0 ^(b)	<0.05	0.025	<0.05	<0.05	<0.05	<0.05	0	3	3	-	-	-	-	0.026
Strontium	µg/L	-	-	-	-	20	21	26	30	13	31	9.0	0	3	-	-	-	-	33
Sulphur	µg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	1,300
Tellurium	µg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<0.05
Thallium	µg/L	-	0.80	0.80	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	3	3	-	-	-	-	<0.01
Thorium	µg/L	-	-	-	-	0.19	0.19	0.20	0.20	0.19	0.20	0.0058	0	3	-	-	-	-	0.25
Tin	µg																		

APPENDIX B
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Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary														Median
						Freshet (April to early-June)														
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline					
														Acute	Chronic	BC MOE mean	BC MOE max			
Dissolved Metals																				
Aluminum	µg/L	-	-	18 - 50 ^(h)	43 - 100 ^(h)	155 ^(BC MOE Mean, BC MOE Max)	152 ^(BC MOE Mean, BC MOE Max)	164 ^(BC MOE Mean, BC MOE Max)	171 ^(BC MOE Mean, BC MOE Max)	127 ^(BC MOE Mean, BC MOE Max)	173 ^(BC MOE Mean, BC MOE Max)	23	0	3	-	-	100	100	176 ^(BC MOE Mean, BC MOE Max)	
Antimony	µg/L	-	-	-	-	<0.2	0.10	<0.2	<0.2	<0.2	<0.2	0	3	3	-	-	-	-	0.19	
Arsenic	µg/L	-	-	-	-	0.50	0.53	0.55	0.59	0.50	0.60	0.058	0	3	-	-	-	-	0.60	
Barium	µg/L	-	-	-	-	64	68	72	78	61	79	9.6	0	3	-	-	-	-	80	
Beryllium	µg/L	-	-	-	-	0.070	0.077	0.085	0.097	0.060	0.10	0.021	0	3	-	-	-	-	0.060	
Bismuth	µg/L	-	-	-	-	<1.0	0.50	<1.0	<1.0	<1.0	<1.0	0	3	3	-	-	-	-	<0.1	
Boron	µg/L	-	-	-	-	<4.0	2.7	4.0	4.0	<4.0	4.0	1.2	2	3	-	-	-	-	6.0	
Cadmium	µg/L	-	-	0.044 - 0.46 ^(b)	0.066 - 1.7 ^(b)	0.030	0.027	0.030	0.030	0.020	0.030	0.0058	0	3	-	-	-	-	0.046	
Chromium	µg/L	-	-	-	-	0.80	0.80	0.85	0.89	0.70	0.90	0.10	0	3	-	-	-	-	0.90	
Cobalt	µg/L	-	-	-	-	0.17	0.17	0.20	0.22	0.11	0.22	0.055	0	3	-	-	-	-	0.35	
Copper	µg/L	-	-	-	-	5.0	5.0	5.0	5.0	5.0	5.0	0	0	3	-	-	-	-	5.0	
Iron	µg/L	-	-	-	350	496 ^(BC MOE Max)	514 ^(BC MOE Max)	595 ^(BC MOE Max)	674 ^(BC MOE Max)	353 ^(BC MOE Max)	694 ^(BC MOE Max)	171	0	3	-	-	-	100	606 ^(BC MOE Max)	
Lead	µg/L	-	-	-	-	0.10	0.10	0.10	0.10	0.10	0.10	0	0	3	-	-	-	-	0.10	
Lithium	µg/L	-	-	-	-	1.0	1.0	1.0	1.0	1.0	1.0	0	0	3	-	-	-	-	1.4	
Manganese	µg/L	-	-	-	-	24	25	27	29	20	30	5.0	0	3	-	-	-	-	43	
Mercury	µg/L	-	-	-	-	0.010	0.010	0.010	0.010	0.010	0.010	0	0	3	-	-	-	-	<0.01	
Molybdenum	µg/L	-	-	-	-	0.18	0.18	0.19	0.19	0.17	0.19	0.010	0	3	-	-	-	-	0.22	
Nickel	µg/L	-	-	-	-	4.0	4.3	4.5	4.9	4.0	5.0	0.58	0	3	-	-	-	-	5.7	
Selenium	µg/L	-	-	-	-	<0.6	0.30	<0.6	<0.6	<0.6	<0.6	0	3	3	-	-	-	-	0.40	
Silicon	µg/L	-	-	-	-	1,690	1,787	1,845	1,969	1,670	2,000	185	0	3	-	-	-	-	2,450	
Silver	µg/L	-	-	-	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	3	3	-	-	-	-	<0.01	
Strontium	µg/L	-	-	-	-	19	21	25	29	13	30	8.6	0	3	-	-	-	-	30	
Sulphur	µg/L	-	-	-	-	1,000	1,700	2,150	3,070	800	3,300	1,389	0	3	-	-	-	-	1,450	
Tellurium	µg/L	-	-	-	-	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	3	3	-	-	-	-	<0.05	
Thallium	µg/L	-	-	-	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	3	3	-	-	-	-	<0.01	
Thorium	µg/L	-	-	-	-	<0.4	0.20	<0.4	<0.4	<0.4	<0.4	0	3	3	-	-	-	-	0.28	
Tin	µg/L	-	-	-	-	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	3	3	-	-	-	-	<0.1	
Titanium	µg/L	-	-	-	-	<10	5.0	<10	<10	<10	<10	0	3	3	-	-	-	-	2.9	
Uranium	µg/L	-	-	-	-	<0.4	0.20	<0.4	<0.4	<0.4	<0.4	0	3	3	-	-	-	-	0.13	
Vanadium	µg/L	-	-	-	-	0.64	0.64	0.71	0.77	0.49	0.78	0.15	0	3	-	-	-	-	0.52	
Zinc	µg/L	-	-	-	-	6.0	6.0	7.0	7.8	4.0	8.0	2.0	0	3	-	-	-	-	5.5	
Zirconium	µg/L	-	-	-	-	1.3	1.3	1.3	1.3	1.3	1.4	0.042	0	3	-	-	-	-	1.6	
Volatile Organics																				
Benzene	µg/L	-	370 ^(l)	40	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	3	3	-	-	-	-	<0.5	
Ethylbenzene	µg/L	-	90 ^(l)	200	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	3	3	-	-	-	-	<1.0	
Toluene	µg/L	-	2 ^(l)	0.50	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	3	3	-	-	-	-	<1.0 ^(DL>BC MOE Mean)	
Xylenes	µg/L	-	-	30	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	3	3	-	-	-	-	<2.0	
Styrene	µg/L	-	72 ^(l)	72	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	3	3	-	-	-	-	<0.5	
Extractable Petroleum Hydrocarbons (C10-C19)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
Extractable Petroleum Hydrocarbons (C10-C32)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
Volatile Hydrocarbons	µg/L	-	-	-	-	<50	25	<50	<50	<50	<50	0	3	3	-	-	-	-	<100	
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	-	<50	25	<50	<50	<50	<50	0	3	3	-	-	-	-	<100	
Methyl tertiary-butyl ether	µg/L	-	-	-	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	3	3	-	-	-	-	<0.5	
Parent PAHs																				
Naphthalene	µg/L	-	1.1 ^(l)	1.0	-	<0.00765	0.0038	<0.00765	<0.00765	<0.00765	<0.00765	0	3	3	-	-	-	-	<0.00564	
Acenaphthylene	µg/L	-	-	-	-	<0.000135	0.000074	<0.000219	<0.000219	<0.0000879	<0.000219	0.000033	3	3	-	-	-	-	<0.000192	
Biphenyl	µg/L	-	-	-	-	<0.00468	0.0023	<0.00468	<0.00468	<0.00468	<0.00468	0	3	3	-	-	-	-	<0.001836	
Acenaphthene	µg/L	-	5.8 ^(l)	6.0	-	<0.00024	0.00012	<0.000247	<0.000247	<0.000231	<0.000247	0.0000040	3	3	-	-	-	-	<0.000514	
Fluorene	µg/L	-	3 ^(l)	12	-	<0.000144	0.000081	<0.000218	<0.000218	<0.000124	<0.000218	0.000025	3	3	-	-	-	-	0.00025	
Phenanthrene	µg/L	-	0.4 ^(l)	0.30	-	<0.0033	0.0017	<0.0033	<0.0033	<0.0033	<0.0033	0	3	3	-	-	-	-	<0.002298	
Anthracene	µg/L	-	0.012 ^(l)	0.10	-	<0.0000806	0.000040	<0.00009	<0.00009	<0.0000715	<0.00009	0.0000046	3	3	-	-	-	-	<0.000205	
Dibenzothiophene	µg/L	-	-	-	-	<0.0000836	0.000045	<0.000117	<0.000117	<0.0000669	<0.000117	0.000013	3	3	-	-	-	-	<0.00048	
Pyrene	µg/L	-	0.025 ^(l)	0.020	-	<0.001467	0.00073	<0.001467	<0.001467	<0.001467	<0.001467	0	3	3	-	-	-	-	0.00098	
Fluoranthene	µg/L	-	0.04 ^(l)	0.20	-	<0.001131	0.00057	<0.001131	<0.001131	<0.001131	<0.001131	0	3	3	-	-	-	-	<0.001149	
Benzo(a)anthracene	µg/L	-	0.018 ^(l)	0.10	-	<0.00111	0.00056	<0.00111	<0.00111	<0.00111	<0.00111	0	3	3	-	-	-	-	0.00020	
Chrysene	µg/L	-	-	-	-	<0.000429	0.00021	<0.000429	<0.000429	<0.000429	<0.000429	0	3	3	-	-	-	-	0.00063	
1-Methyl-7-isopropyl-phenanthrene (Retene)	µg/L	-	-	-	-	0.0012	0.0011	0.0013	0.0015	0.00076	0.0015	0.00037	0	3	-	-	-	-	0.0019	
Benzo(b)fluoranthene	µg/L	-	-	-	-	<0.000189	0.00010	<0.000248	<0.000248	<0.000163	<0.000248	0.000022	3	3	-	-	-	-	0.00031	
Benzo(j,k)fluoranthenes	µg/L	-	-	-	-	<0.000154	0.000080	<0.000178	<0.000178	<0.00015	<0.000178	0.0000076	3	3	-	-	-	-	<0.000138	
Benzo(b,j,k)fluoranthenes	µg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
Benzo(a)pyrene	µg/L	-	0.015 ^(l)	0.010	-	<0.000215	0.00011	<0.000261	<0.000261	<0.00021	<0.000261	0.000014	3	3	-	-	-	-	<0.000189</	

APPENDIX B
Table B-2: Seasonal Surface Water Quality Summary of Chance Creek, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary													
						Freshet (April to early-June)													
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline				
														Acute	Chronic	BC MOE mean	BC MOE max		
Alkylated PAHs																			
C1 substituted naphthalenes	µg/L	-	-	-	-	<0.00939	0.0047	<0.00939	<0.00939	<0.00939	<0.00939	0	3	3	-	-	-	-	<0.00906
1-Methylnaphthalene	µg/L	-	-	-	-	<0.001656	0.00083	<0.001656	<0.001656	<0.001656	<0.001656	0	3	3	-	-	-	-	<0.001674
2-Methylnaphthalene	µg/L	-	-	-	-	<0.00939	0.0047	<0.00939	<0.00939	<0.00939	<0.00939	0	3	3	-	-	-	-	<0.00675
C2 substituted naphthalenes	µg/L	-	-	-	-	<0.01257	0.0063	<0.01257	<0.01257	<0.01257	<0.01257	0	3	3	-	-	-	-	<0.00846
1,2-Dimethylnaphthalene	µg/L	-	-	-	-	<0.0006	0.00030	<0.000602	<0.000602	<0.000589	<0.000602	0.0000035	3	3	-	-	-	-	<0.001188
2,6-Dimethylnaphthalene	µg/L	-	-	-	-	<0.000507	0.00025	<0.000509	<0.000509	<0.000498	<0.000509	0.0000029	3	3	-	-	-	-	0.00048
C1 substituted acenaphthenes	µg/L	-	-	-	-	<0.000403	0.00017	<0.000417	<0.000417	<0.000221	<0.000417	0.000055	3	3	-	-	-	-	<0.000283
C1 substituted biphenyls	µg/L	-	-	-	-	<0.001857	0.00093	<0.001857	<0.001857	<0.001857	<0.001857	0	3	3	-	-	-	-	<0.00375
C3 substituted naphthalenes	µg/L	-	-	-	-	<0.00582	0.0029	<0.00582	<0.00582	<0.00582	<0.00582	0	3	3	-	-	-	-	0.0040
2,3,5-Trimethylnaphthalene	µg/L	-	-	-	-	0.00038	0.00037	0.00039	0.00039	0.00032	0.00040	0.000038	0	3	-	-	-	-	<0.000539
2,3,6-Trimethylnaphthalene	µg/L	-	-	-	-	<0.000972	0.00049	<0.000972	<0.000972	<0.000972	<0.000972	0	3	3	-	-	-	-	<0.000756
C1 substituted fluorenes	µg/L	-	-	-	-	0.00079	0.00073	0.00084	0.00088	0.00049	0.00089	0.00021	0	3	-	-	-	-	<0.001497
2-Methylfluorene	µg/L	-	-	-	-	<0.000157	0.000080	<0.000193	<0.000193	<0.000132	<0.000193	0.000015	3	3	-	-	-	-	<0.000273
C2 substituted biphenyls	µg/L	-	-	-	-	<0.0033	0.0017	<0.0033	<0.0033	<0.0033	<0.0033	0	3	3	-	-	-	-	<0.01707
C4 substituted naphthalenes	µg/L	-	-	-	-	0.00039	0.00055	0.00063	0.00082	0.00038	0.00087	0.00028	0	3	-	-	-	-	0.0031
1,4,6,7-Tetramethylnaphthalene	µg/L	-	-	-	-	<0.000183	0.00010	<0.000258	<0.000258	<0.000176	<0.000258	0.000023	3	3	-	-	-	-	<0.000317
C1 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.000127	0.000061	<0.000136	<0.000136	<0.000102	<0.000136	0.0000088	3	3	-	-	-	-	0.00044
1-Methylphenanthrene	µg/L	-	-	-	-	<0.000136	0.000070	<0.000183	<0.000183	<0.000102	<0.000183	0.000020	3	3	-	-	-	-	<0.000372
2-Methylphenanthrene	µg/L	-	-	-	-	<0.000128	0.000062	<0.000138	<0.000138	<0.000104	<0.000138	0.0000087	3	3	-	-	-	-	<0.000378
3-Methylphenanthrene	µg/L	-	-	-	-	<0.000139	0.000076	<0.000212	<0.000212	<0.000104	<0.000212	0.000028	3	3	-	-	-	-	<0.000296
9/4-Methylphenanthrene	µg/L	-	-	-	-	<0.000139	0.000084	<0.000258	<0.000258	<0.000104	<0.000258	0.000040	3	3	-	-	-	-	<0.000214
2-Methylantracene	µg/L	-	-	-	-	<0.000132	0.000064	<0.000143	<0.000143	<0.000107	<0.000143	0.0000092	3	3	-	-	-	-	<0.000203
C2 substituted fluorenes	µg/L	-	-	-	-	0.00051	0.00038	0.00052	0.00052	<0.000223	0.00053	0.00023	1	3	-	-	-	-	<0.000939
1,7-Dimethylfluorene	µg/L	-	-	-	-	<0.000205	0.00010	<0.000223	<0.000223	<0.000185	<0.000223	0.0000095	3	3	-	-	-	-	<0.000317
C1 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.000138	0.000069	<0.000172	<0.000172	<0.000106	<0.000172	0.000017	3	3	-	-	-	-	0.00018
2/3-Methyldibenzothiophenes	µg/L	-	-	-	-	<0.000138	0.000069	<0.000172	<0.000172	<0.000106	<0.000172	0.000017	3	3	-	-	-	-	<0.000207
C2 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.00044	0.00041	0.00051	0.00057	0.00020	0.00058	0.00019	0	3	-	-	-	-	<0.001182
1,7-Dimethylphenanthrene	µg/L	-	-	-	-	<0.00007	0.000037	<0.000084	<0.000084	<0.0000654	<0.000084	0.0000048	3	3	-	-	-	-	<0.000249
1,8-Dimethylphenanthrene	µg/L	-	-	-	-	<0.0000712	0.000037	<0.0000854	<0.0000854	<0.0000665	<0.0000854	0.0000049	3	3	-	-	-	-	0.000087
2,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.0000712	0.000037	<0.0000854	<0.0000854	<0.0000665	<0.0000854	0.0000049	3	3	-	-	-	-	0.00015
3,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.0000724	0.000038	<0.0000869	<0.0000869	<0.0000676	<0.0000869	0.0000050	3	3	-	-	-	-	<0.000159
C3 substituted fluorenes	µg/L	-	-	-	-	<0.00534	0.0027	<0.00534	<0.00534	<0.00534	<0.00534	0	3	3	-	-	-	-	<0.0039
C2 substituted dibenzothiophenes	µg/L	-	-	-	-	0.00030	0.00033	0.00038	0.00044	0.00022	0.00046	0.00012	0	3	-	-	-	-	0.0011
2,4-Dimethyldibenzothiophene	µg/L	-	-	-	-	<0.0000982	0.000057	<0.000164	<0.000164	<0.0000787	<0.000164	0.000022	3	3	-	-	-	-	<0.000334
C1 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.000708	0.00035	<0.000708	<0.000708	<0.000708	<0.000708	0	3	3	-	-	-	-	<0.001653
C3 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.000576	0.00029	<0.000576	<0.000576	<0.000576	<0.000576	0	3	3	-	-	-	-	<0.00114
1,2,6-Trimethylphenanthrene	µg/L	-	-	-	-	<0.0000824	0.000041	<0.0000873	<0.0000873	<0.000077	<0.0000873	0.0000026	3	3	-	-	-	-	<0.000119
C3 substituted dibenzothiophenes	µg/L	-	-	-	-	0.00041	0.00040	0.00049	0.00056	0.00020	0.00058	0.00019	0	3	-	-	-	-	<0.001377
C2 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.00076	0.00064	0.00080	0.00083	0.00032	0.00084	0.00028	0	3	-	-	-	-	0.0015
C4 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.0013	0.0016	0.0018	0.0022	0.0013	0.0023	0.00054	0	3	-	-	-	-	0.0027
C4 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.002319	0.0012	<0.002319	<0.002319	<0.002319	<0.002319	0	3	3	-	-	-	-	<0.002262
C1 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.00021	0.00016	0.00022	0.00023	<0.000096	0.00024	0.00010	1	3	-	-	-	-	<0.000276
5/6-Methylchrysenes	µg/L	-	-	-	-	<0.0000989	0.000045	<0.000101	<0.000101	<0.0000711	<0.000101	0.0000083	3	3	-	-	-	-	<0.0000925
C3 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.000134	0.000075	<0.000189	<0.000189	<0.000125	<0.000189	0.000017	3	3	-	-	-	-	<0.000846
C2 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000132	0.000073	<0.000184	<0.000184	<0.000123	<0.000184	0.000016	3	3	-	-	-	-	<0.000438
5,9-Dimethylchrysene	µg/L	-	-	-	-	<0.000132	0.000073	<0.000184	<0.000184	<0.000123	<0.000184	0.000016	3	3	-	-	-	-	0.00012
C4 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.0000944	0.000051	<0.000125	<0.000125	<0.0000859	<0.000125	0.000010	3	3	-	-	-	-	<0.000223
C1 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	<0.00037	0.00034	0.00069	0.00069	<0.000317	0.00069	0.00030	2	3	-	-	-	-	<0.000663
7-Methylbenzo[a]pyrene	µg/L	-	-	-	-	<0.000332	0.00017	<0.00037	<0.00037	<0.000317	<0.00037	0.000014	3	3	-	-	-	-	<0.000222
C3 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.00024	0.00021	0.00029	0.00032	<0.000139	0.00033	0.00013	1	3	-	-	-	-	<0.000537
C2 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	<0.000456	0.00037	0.00066	0.00066	<0.000456	0.00066	0.00025	2	3	-	-	-	-	0.00039
C4 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000414	0.00038	0.00071	0.00071	<0.000414	0.00071	0.00029	2	3	-	-	-	-	<0.000135
1-methylchrysene	µg/L	-	-	-	-	<0.0000932	0.000043	<0.0000954	<0.0000954	<0.000067	<0.0000954	0.0000079	3	3	-	-	-	-	<0.0000954
3-methylfluoranthene / benzo(a)fluorene	µg/L	-	-	-	-	<0.000588	0.00029	<0.000588	<0.000588	<0.000588	<0.000588	0	3	3	-	-	-	-	<0.000504

APPENDIX B
Table B-2: Seasonal Surface Water Quality Summary of Chance Creek, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary														Median
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Freshet (April to early-June)														
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline					
Naphthenic Acid																				
C12h18o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	66	
C12h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	46	
C12h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<16	
C12h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<5.3	
C13h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	35	
C13h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	39	
C13h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<16	
C13h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<25	
C14h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	62	
C14h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	48	
C14h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	29	
C14h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<8.8	
C14h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<5.3	
C15h18o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<16	
C15h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	59	
C15h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	164	
C15h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	234	
C15h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	44	
C15h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<5.3	
C15h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<16	
C16h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	18	
C16h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<16	
C16h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<16	
C16h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	45	
C16h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<16	
C16h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<5.3	
C16h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<10	
C17h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<16	
C17h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	12	
C17h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<16	
C17h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	73	
C17h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	17	
C17h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<5.3	
C17h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<13	
C18h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	58	
C18h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<5.3	
C18h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	12	
C18h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<5.3	
C18h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<5.1	
C18h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<5.3	
C18h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<5.3	
C19h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	41	
C19h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<5.3	
C19h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	12	
C19h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<5.3	
C19h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	13	
C19h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<13	
C19h38o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	26	
C20h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<16	
C20h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	95	
C20h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	74	
C20h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	16	
C20h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<5.3	
C20h38o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	10	
C21h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<16	
C21h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<5.1	
C21h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<7.6	
C21h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<5.1	
C21h38o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<5.1	
C21h40o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<5.3	
Radionuclides																				
Actinium-228	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<1.0	
Bismuth-212	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<2.0	
Bismuth-214	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<0.6	
Lead-210	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<4.0	
Lead-211	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<3.0	
Lead-212	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	0.50	
Lead-214	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<0.5	
Potassium-40	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<6.0	
Radium-223	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<0.9	
Radium-226	Bq/L	-	-	-	-	0.010	0.014	0.020	0.028	<0.005	0.030	0.014	1	3	-	-	-	-	<0.01	
Radon-219	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<1.0	
Thallium-208	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<0.3	
Thorium-227	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<1.0	
Thorium-230	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<20	
Thorium-234	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<4.0	
Uranium-235	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	<1.0	

APPENDIX B
Table B-2: Seasonal Surface Water Quality Summary of Chance Creek, 2013 to 2017

Table B-2: Seasonal Surface Water Quality Summary of Chance Creek, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary														
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Open Water (late June to September)								Standard Deviation	nd	Count	% Above Guideline			
						Mean	75 th Percentile	95 th Percentile	Min	Max	Acute	Chronic	BC MOE mean				BC MOE max			
Field Measured																				
pH	-	-	6.5 - 9.0	6.5 - 9.0	6.5 - 9.0	6.7	7.0	7.5	5.9 ^(Chronic, BC MOE Mean, BC MOE Max)				7.6	0.51	0	18	-	33	33	33
Specific conductivity	µS/cm	-	-	-	-	64	72	137	27				140	35	0	18	-	-	-	-
Temperature	°C	-	-	-	-	8.2	15	16	1.4				17	6.4	0	18	-	-	-	-
Dissolved oxygen	mg/L	-	6.5	8.0	5.0	11	12	13	6.8 ^(BC MOE Mean)				14	2.0	0	15	-	-	7.0	-
Turbidity	NTU	-	-	-	-	34	63	80	0.80				88	33	0	9	-	-	-	-
Conventional Parameters																				
Hardness, as CaCO ₃	mg/L	-	-	-	-	30	33	49	16				53	12	0	18	-	-	-	-
Total alkalinity, as CaCO ₃	mg/L	-	-	20 ^(a)	-	16 ^(BC MOE Mean)	22	30	<5.0 ^(DL>BC MOE Mean)				37	8.8	1	18	-	-	67	-
Total dissolved solids	mg/L	-	-	-	-	90	101	188	<5.0				210	53	1	18	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	17	14	82	<2.0				88	27	2	18	-	-	-	-
Total organic carbon	mg/L	-	-	-	-	25	26	29	23				30	2.2	0	12	-	-	-	-
Dissolved organic carbon	mg/L	-	-	-	-	31	31	62	22				66	14	0	18	-	-	-	-
Dissolved inorganic carbon	mg/L	-	-	-	-	3.2	4.5	6.2	0.60				8.7	2.0	0	18	-	-	-	-
Total inorganic carbon	mg/L	-	-	-	-	3.4	4.8	7.4	0.70				9.3	2.5	0	12	-	-	-	-
Major Ions																				
Bicarbonate, as CaCO ₃	mg/L	-	-	-	-	18	26	34	<5.0				45	11	2	18	-	-	-	-
Bromide	mg/L	-	-	-	-	0.027	<0.1	<0.1	<0.02				<0.1	0.020	14	15	-	-	-	-
Calcium	mg/L	-	-	-	-	7.1	7.8	12	3.7				13	2.9	0	18	-	-	-	-
Carbonate, as CaCO ₃	mg/L	-	-	-	-	2.4	<6.0	8.0	<1.0				8.0	1.8	17	18	-	-	-	-
Chloride	mg/L	640	120	150	600	0.21	0.22	0.69	<0.05				1.1	0.28	4	18	-	-	-	-
Fluoride	mg/L	-	0.12 ^(l)	-	0.48 - 1.8 ^(b)	-	-	-	-				-	-	0	0	-	-	-	-
Magnesium	mg/L	-	-	-	-	2.7	3.2	4.7	1.6				4.7	1.0	0	18	-	-	-	-
Potassium	mg/L	-	-	-	-	0.38	0.43	0.59	0.17				0.71	0.14	0	18	-	-	-	-
Sodium	mg/L	-	-	-	-	3.0	3.2	9.4	0.72				9.4	2.9	0	18	-	-	-	-
Sulphate	mg/L	-	-	128 - 429 ^(b, c)	-	8.6	10	28	0.84				34	10	2	18	-	-	-	-
Nutrients																				
Nitrate	mg-N/L	124	2.9	3.0	33	0.0094	0.010	0.032	<0.01				0.040	0.0097	12	18	-	-	-	-
Nitrite	mg-N/L	-	0.060	0.020 - 0.040 ^(d)	0.060 - 0.12 ^(d)	0.010	<0.01	0.040 ^(BC MOE Mean)	<0.01				0.040 ^(BC MOE Mean)	0.012	15	18	-	-	17	-
Nitrate + nitrite	mg-N/L	-	-	-	-	0.013	0.010	0.033	<0.01				0.040	0.014	3	6	-	-	-	-
Total ammonia	mg-N/L	-	1.3 - 212 ^(e)	0.80 - 2.1 ^(f)	4.2 - 28 ^(g)	0.021	0.030	0.042	<0.01				0.050	0.014	7	18	-	-	-	-
Total kjeldahl nitrogen	mg-N/L	-	-	-	-	0.93	1.0	1.1	0.70				1.1	0.15	0	6	-	-	-	-
Total nitrogen (calculated)	mg-N/L	-	-	-	-	0.94	1.0	1.1	0.70				1.1	0.16	0	6	-	-	-	-
Total nitrogen	mg-N/L	-	-	-	-	0.84	0.95	1.2	0.59				1.5	0.25	0	15	-	-	-	-
Total phosphorus	mg-P/L	-	-	0.010	-	0.038	0.038	0.072	0.020				0.085	0.022	0	7	-	-	-	-
Dissolved phosphorus	mg-P/L	-	-	-	-	0.016	0.015	0.029	0.010				0.034	0.0091	0	6	-	-	-	-
Phosphorus (as phosphate)	mg-P/L	-	-	-	-	0.055	0.068	0.10	0.016				0.11	0.030	0	15	-	-	-	-
Total Metals																				
Aluminum	µg/L	-	5.0 - 100 ^(h, i)	-	-	805 ^(Chronic)	908 ^(Chronic)	2,428 ^(Chronic)	120 ^(Chronic)				3,210 ^(Chronic)	809	0	18	-	100	-	-
Antimony	µg/L	-	-	9.0	-	0.17	0.22	0.23	0.10				<0.4	0.047	4	18	-	-	-	-
Arsenic	µg/L	-	5.0	-	5.0	1.1	1.4	1.7	0.70				2.0	0.40	0	18	-	-	-	-
Barium	µg/L	-	-	1,000	-	111	118	151	79				170	23	0	18	-	-	-	-
Beryllium	µg/L	-	-	0.13	-	0.083	0.080	0.13	<0.04				0.23 ^(BC MOE Mean)	0.041	1	18	-	-	6.0	-
Bismuth	µg/L	-	-	-	-	0.032	<0.1	<0.1	<0.01				<0.1	0.021	9	13	-	-	-	-
Boron	µg/L	29,000	1,500	-	1,200	6.4	9.0	10	2.0				11	2.7	3	18	-	-	-	-
Cadmium	µg/L	0.24 - 6.1 ^(b)	0.040 - 0.37 ^(b)	-	-	0.069 ^(Chronic)	0.088 ^(Chronic)	0.12 ^(Chronic)	0.027				0.15 ^(Chronic)	0.033	0	18	-	61	-	-
Chromium	µg/L	-	1.0	1.0 ^(l)	-	2.3 ^(Chronic, BC MOE Mean)	2.2 ^(Chronic, BC MOE Mean)	5.4 ^(Chronic, BC MOE Mean)	1.1 ^(Chronic, BC MOE Mean)				7.0 ^(Chronic, BC MOE Mean)	1.5	0	17	-	100	100	-
Cobalt	µg/L	-	-	4.0	110	0.75	0.90	2.0	0.15				2.4	0.62	0	18	-	-	-	-
Copper	µg/L	-	2.0 - 4.0 ^(b)	2.0 - 10 ^(b)	3.2 - 29 ^(b)	6.6 ^(Chronic, BC MOE Mean, BC MOE Max)	7.0 ^(Chronic, BC MOE Mean, BC MOE Max)	10 ^(Chronic, BC MOE Mean, BC MOE Max)	5.1 ^(Chronic, BC MOE Mean)				10 ^(Chronic, BC MOE Mean, BC MOE Max)	1.4	0	18	-	100	100	83
Iron	µg/L	-	300	-	1,000	2,110 ^(Chronic, BC MOE Max)	3,050 ^(Chronic, BC MOE Max)	4,145 ^(Chronic, BC MOE Max)	750 ^(Chronic)				4,400 ^(Chronic, BC MOE Max)	1,177	0	18	-	100	-	83
Lead	µg/L	-	1.0 - 7.0 ^(b)	3.5 - 15 ^(b)	5.5 - 311 ^(b)	0.65	0.72	1.7 ^(Chronic)	0.16				2.0 ^(Chronic)	0.49	0	18	-	17	-	-
Lithium	µg/L	-	-	-	-	2.3	2.5	4.2	1.0				5.0	1.2	0	18	-	-	-	-
Manganese	µg/L	-	-	768 - 1,863 ^(b)	816 - 3,394 ^(b)	71	102	132	28				170	41	0	18	-	-	-	-
Mercury	µg/L	-	0.026	0.010	-	0.0083	<0.01	0.020 ^(BC MOE Mean)	<0.01				0.020 ^(BC MOE Mean)	0.0064	14	18	-	-	22	-
Molybdenum	µg/L	-	73	1,000	2,000	0.34	0.39	0.52	0.18				0.62	0.12	0	18	-	-	-	-
Nickel	µg/L	-	25 - 150 ^(b)	25 - 150 ^(b)	-	7.5	9.0	10	4.2				13	2.3	0	18	-	-	-	-
Selenium	µg/L	-	1.0	2.0	-	0.50	0.70	0.80	0.30				<1.0	0.16	2	18	-	-	-	-
Silicon	µg/L	-	-	-	-	3,666	5,400	7,266	1,600				7,580	1,980	0	18	-	-	-	-
Silver	µg/L	-	0.25	0.050 - 1.5 ^(b)	0.10 - 3.0 ^(b)	0.027	0.030	0.052 ^(BC MOE Mean)	<0.01				0.060 ^(BC MOE Mean)	0.014	2	18	-	-	6.0	-
Strontium	µg/L	-	-	-	-	34	44	48	18				50	9.7	0	18	-	-	-	-
Sulphur	µg/L	-	-	-	-	3,166	3,900	10,180	<500				12,100	3,759	3	17	-	-	-	-
Tellurium	µg/L	-	-	-	-	0.035	<0.1	<0.2	<0.05				<0.2	0.020	17	17	-	-	-	-
Thallium	µg/L	-	0.80	0.80	-	0.013	0.015	0.043	0.0040				0.060	0.015	6	18	-	-	-	-
Thorium	µg/L	-	-	-	-	0.27	<0.4	0.78	0.089				<0.8	0.16	4	18	-	-	-	-
Tin	µg/L	-	-	-	-	0.046	<0.1	<0.2	<0.05				<0.2	0.018	17	18	-	-	-	-
Titanium	µg/L	-	-	-	-	21	38	59	3.9				62	20	0	18	-	-	-	-
Uranium	µg/L	33	15	8.5	-	0.16	0.25	<0.8	0.093				<0.8	0.074	5	18	-	-	-	-
Vanadium	µg/L	-	-	-	-	3.0	3.1	7.3	0.64				11	2.5	0	18	-	-	-	-
Zinc	µg/L	-	30	7.5 - 155 ^(b)	33 - 180 ^(b)	8.8 ^(BC MOE Mean)	11 ^(BC MOE Mean)	21 ^(BC MOE Mean)	1.9				26 ^(BC MOE Mean)	6.1	0	18	-	-	56	-
Zirconium	µg/L	-	-	-	-	1.6	1.7	2.1	1.0				2.5	0.33	0	18	-	-	-	-

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Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary													
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Open Water (late June to September)													
						Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline					
Dissolved Metals																			
Aluminum	µg/L	-	-	18 - 50 ^(h)	43 - 100 ^(h)	175 ^(BC MOE Mean, BC MOE Max)	200 ^(BC MOE Mean, BC MOE Max)	286 ^(BC MOE Mean, BC MOE Max)	78 ^(BC MOE Mean)	301 ^(BC MOE Mean, BC MOE Max)	63	0	18	-	-	-	100	94	
Antimony	µg/L	-	-	-	-	0.15	<0.2	0.20	0.13	0.20	0.040	6	18	-	-	-	-	-	
Arsenic	µg/L	-	-	-	-	0.74	0.80	1.8	0.47	2.0	0.44	1	18	-	-	-	-	-	
Barium	µg/L	-	-	-	-	83	95	108	65	115	16	0	18	-	-	-	-	-	
Beryllium	µg/L	-	-	-	-	0.069	0.070	0.10	<0.04	<0.5	0.049	3	18	-	-	-	-	-	
Bismuth	µg/L	-	-	-	-	0.24	<1.0	<1.0	<0.01	<1.0	0.24	18	18	-	-	-	-	-	
Boron	µg/L	-	-	-	-	6.1	6.8	12	<4.0	<20	2.4	3	18	-	-	-	-	-	
Cadmium	µg/L	-	-	0.044 - 0.46 ^(h)	0.066 - 1.7 ^(h)	0.042	0.059	0.060 ^(BC MOE Mean)	0.017	<0.1	0.015	1	18	-	-	-	11	-	
Chromium	µg/L	-	-	-	-	0.94	1.1	1.3	<0.5	1.5	0.28	1	17	-	-	-	-	-	
Cobalt	µg/L	-	-	-	-	0.38	0.55	0.83	0.078	0.83	0.23	0	18	-	-	-	-	-	
Copper	µg/L	-	-	-	-	5.3	6.0	7.0	4.5	7.0	1.1	1	18	-	-	-	-	-	
Iron	µg/L	-	-	-	350	821 ^(BC MOE Max)	786 ^(BC MOE Max)	1,979 ^(BC MOE Max)	349	2,540 ^(BC MOE Max)	550	0	18	-	-	-	-	94	
Lead	µg/L	-	-	-	-	0.13	0.17	0.31	<0.01	0.35	0.094	4	18	-	-	-	-	-	
Lithium	µg/L	-	-	-	-	1.4	1.8	2.0	0.90	<5.0	0.53	2	18	-	-	-	-	-	
Manganese	µg/L	-	-	-	-	52	68	98	15	122	29	0	18	-	-	-	-	-	
Mercury	µg/L	-	-	-	-	0.0061	<0.01	0.010	<0.01	0.010	0.0021	14	18	-	-	-	-	-	
Molybdenum	µg/L	-	-	-	-	0.27	0.37	0.46	0.10	0.49	0.12	0	18	-	-	-	-	-	
Nickel	µg/L	-	-	-	-	6.1	6.1	9.5	4.0	12	2.0	0	18	-	-	-	-	-	
Selenium	µg/L	-	-	-	-	0.48	0.60	1.4	0.30	<2.0	0.30	5	18	-	-	-	-	-	
Silicon	µg/L	-	-	-	-	2,366	2,883	3,319	1,270	3,370	720	0	18	-	-	-	-	-	
Silver	µg/L	-	-	-	-	0.010	<0.01	0.020	<0.01	<0.1	0.012	15	18	-	-	-	-	-	
Strontium	µg/L	-	-	-	-	31	39	46	15	49	9.8	0	18	-	-	-	-	-	
Sulphur	µg/L	-	-	-	-	3,016	3,533	10,450	<500	11,300	3,619	3	18	-	-	-	-	-	
Tellurium	µg/L	-	-	-	-	0.049	<0.1	<0.5	<0.05	<0.5	0.053	16	17	-	-	-	-	-	
Thallium	µg/L	-	-	-	-	0.0068	<0.01	0.011	<0.004	<0.1	0.011	17	18	-	-	-	-	-	
Thorium	µg/L	-	-	-	-	0.19	<0.4	<0.5	<0.05	<0.5	0.061	9	18	-	-	-	-	-	
Tin	µg/L	-	-	-	-	0.067	<0.1	<1.0	<0.05	<1.0	0.11	18	18	-	-	-	-	-	
Titanium	µg/L	-	-	-	-	3.4	<10	<10	1.1	<10	1.5	7	18	-	-	-	-	-	
Uranium	µg/L	-	-	-	-	0.14	<0.4	<0.4	0.068	<0.4	0.057	7	18	-	-	-	-	-	
Vanadium	µg/L	-	-	-	-	0.63	0.75	1.5	0.053	1.6	0.40	1	18	-	-	-	-	-	
Zinc	µg/L	-	-	-	-	5.9	7.0	12	1.0	17	3.6	1	18	-	-	-	-	-	
Zirconium	µg/L	-	-	-	-	1.5	1.8	1.9	<1.0	2.0	0.34	1	18	-	-	-	-	-	
Volatile Organics																			
Benzene	µg/L	-	370 ^(l)	40	-	63 ^(BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	113	12	12	-	-	-	-	-	
Ethylbenzene	µg/L	-	90 ^(h)	200	-	63	<500 ^(DL>Chronic, DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	113	12	12	-	-	-	-	-	
Toluene	µg/L	-	2 ^(l)	0.50	-	63 ^(Chronic, BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	113	12	12	-	-	-	-	-	
Xylenes	µg/L	-	-	30	-	63 ^(BC MOE Mean)	<500 ^(DL>BC MOE Mean)	<500 ^(DL>BC MOE Mean)	<0.5	<500 ^(DL>BC MOE Mean)	113	12	12	-	-	-	-	-	
Styrene	µg/L	-	72 ^(h)	72	-	84 ^(Chronic, BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	125	9	9	-	-	-	-	-	
Extractable Petroleum Hydrocarbons (C10-C19)	mg/L	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
Extractable Petroleum Hydrocarbons (C10-C32)	mg/L	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
Volatile Hydrocarbons	µg/L	-	-	-	-	6,275	<50,000	<50,000	<50	<50,000	11,292	12	12	-	-	-	-	-	
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	-	6,275	<50,000	<50,000	<50	<50,000	11,292	12	12	-	-	-	-	-	
Methyl tertiary-butyl ether	µg/L	-	-	-	-	84	<500	<500	<0.5	<500	125	9	9	-	-	-	-	-	
Parent PAHs																			
Naphthalene	µg/L	-	1.1 ^(h)	1.0	-	0.0042	<0.01275	0.014	<0.00354	0.014	0.0033	11	12	-	-	-	-	-	
Acenaphthylene	µg/L	-	-	-	-	0.00010	<0.000302	<0.000401	<0.0000537	<0.000401	0.000055	12	12	-	-	-	-	-	
Biphenyl	µg/L	-	-	-	-	0.00089	<0.002241	<0.002463	<0.001191	<0.002463	0.00023	12	12	-	-	-	-	-	
Acenaphthene	µg/L	-	5.8 ^(h)	6.0	-	0.00023	<0.000603	<0.000654	<0.000188	<0.000654	0.000073	12	12	-	-	-	-	-	
Fluorene	µg/L	-	3 ^(h)	12	-	0.00017	0.00028	0.00035	0.00012	<0.000421	0.000085	7	12	-	-	-	-	-	
Phenanthrene	µg/L	-	0.4 ^(h)	0.30	-	0.0013	<0.002607	<0.002607	<0.00198	<0.002607	0.00038	10	12	-	-	-	-	-	
Anthracene	µg/L	-	0.012 ^(h)	0.10	-	0.000098	<0.00023	<0.000368	<0.0000923	<0.000368	0.000039	12	12	-	-	-	-	-	
Dibenzothiophene	µg/L	-	-	-	-	0.00023	<0.000633	<0.00084	<0.000133	<0.00084	0.000093	10	12	-	-	-	-	-	
Pyrene	µg/L	-	0.025 ^(h)	0.020	-	0.00051	<0.001383	<0.001383	<0.000573	<0.001383	0.00022	11	12	-	-	-	-	-	
Fluoranthene	µg/L	-	0.04 ^(h)	0.20	-	0.00063	<0.001752	<0.001752	<0.00093	<0.001752	0.00016	12	12	-	-	-	-	-	
Benzo(a)anthracene	µg/L	-	0.018 ^(h)	0.10	-	0.00015	0.00027	<0.000495	<0.000096	<0.000495	0.00010	9	12	-	-	-	-	-	
Chrysene	µg/L	-	-	-	-	0.00041	<0.000747	0.0011	<0.000303	0.0014	0.00038	9	12	-	-	-	-	-	
1-Methyl-7-isopropyl-phenanthrene (Retene)	µg/L	-	-	-	-	0.0023	0.0031	0.0056	0.00058	0.0070	0.0019	2	12	-	-	-	-	-	
Benzo(b)fluoranthene	µg/L	-	-	-	-	0.00034	0.00095	<0.001131	<0.0000407	<0.001131	0.00031	7	12	-	-	-	-	-	
Benzo(j,k)fluoranthenes	µg/L	-	-	-	-	0.000073	<0.000212	<0.000303	<0.0000433	<0.000303	0.000043	12	12	-	-	-	-	-	
Benzo(b,j,k)fluoranthenes	µg/L	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
Benzo(a)pyrene	µg/L	-	0.015 ^(h)	0.010	-	0.00010	<0.000281	<0.000422	<0.0000608	<0.000422	0.000061	12	12	-	-	-	-	-	
Benzo(e)pyrene	µg/L	-	-	-	-	0.00024	0.00049	0.00077	0.000077	0.0011	0.00031	8	12	-	-	-	-	-	
Perylene	µg/L	-	-	-	-	0.00058	0.00092	0.0021	<0.0000866	0.0025	0.00083	7	12	-	-	-	-	-	
Benzo(g,h,i)perylene	µg/L	-	-	-	-	0.00018	0.00036	0.00050	<0.00007	0.00059	0.00018	8	12	-	-	-	-	-	
Indeno(c,d-123)pyrene	µg/L	-	-	-	-	0.00013	<0.000357	<0.000416	<0.0000693	<0.000416	0.000064	12	12	-	-	-	-	-	
Dibenzo(a,h)anthracene	µg/L	-	-	-	-	0.00010	<0.000299	<0.000373	<0.0000432	<0.000373	0.000054	11	12	-	-	-	-	-	

APPENDIX B
Table B-2: Seasonal Surface Water Quality Summary of Chance Creek, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary														
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Open Water (late June to September)								Standard Deviation	nd	Count	% Above Guideline			
						Mean	75 th Percentile	95 th Percentile	Min	Max	Acute	Chronic	BC MOE mean				BC MOE max			
Alkylated PAHs																				
C1 substituted naphthalenes	µg/L	-	-	-	-	0.0036	<0.01344	<0.01344	<0.002661	<0.01344	0.0023	12	12	-	-	-	-			
1-Methylnaphthalene	µg/L	-	-	-	-	0.00091	<0.002328	<0.000849	<0.00071	11	12	-	-	-	-	-	-			
2-Methylnaphthalene	µg/L	-	-	-	-	0.0029	<0.01176	<0.01176	<0.001812	<0.01176	0.0021	12	12	-	-	-	-			
C2 substituted naphthalenes	µg/L	-	-	-	-	0.0046	<0.01377	<0.01377	<0.00642	<0.01377	0.0015	12	12	-	-	-	-			
1,2-Dimethylnaphthalene	µg/L	-	-	-	-	0.00049	<0.00124	<0.001773	<0.000267	<0.001773	0.00025	12	12	-	-	-	-			
2,6-Dimethylnaphthalene	µg/L	-	-	-	-	0.00040	0.00083	0.00100	<0.000309	<0.00106	0.00027	8	12	-	-	-	-			
C1 substituted acenaphthenes	µg/L	-	-	-	-	0.00016	<0.000372	<0.000961	<0.000911	<0.000961	0.00011	12	12	-	-	-	-			
C1 substituted biphenyls	µg/L	-	-	-	-	0.0022	<0.00927	<0.00927	<0.000936	<0.00927	0.0016	9	12	-	-	-	-			
C3 substituted naphthalenes	µg/L	-	-	-	-	0.0027	<0.00663	<0.00663	0.0027	<0.00663	0.0011	9	12	-	-	-	-			
2,3,5-Trimethylnaphthalene	µg/L	-	-	-	-	0.00048	0.00093	0.0012	<0.000441	0.0013	0.00041	9	12	-	-	-	-			
2,3,6-Trimethylnaphthalene	µg/L	-	-	-	-	0.00052	0.00087	0.0012	<0.000456	0.0013	0.00036	9	12	-	-	-	-			
C1 substituted fluorenes	µg/L	-	-	-	-	0.00086	0.0016	<0.002262	0.00075	<0.002262	0.00031	9	12	-	-	-	-			
2-Methylfluorene	µg/L	-	-	-	-	0.00016	<0.00047	<0.000736	0.000075	<0.000736	0.000094	11	12	-	-	-	-			
C2 substituted biphenyls	µg/L	-	-	-	-	0.0092	<0.0414	<0.0414	0.00028	<0.0414	0.0077	7	12	-	-	-	-			
C4 substituted naphthalenes	µg/L	-	-	-	-	0.0030	0.0034	0.016	<0.000141	0.016	0.0044	8	12	-	-	-	-			
1,4,6,7-Tetramethylnaphthalene	µg/L	-	-	-	-	0.00018	<0.000489	<0.000741	<0.000141	<0.000741	0.000095	12	12	-	-	-	-			
C1 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.00097	0.0014	0.0033	<0.000194	0.0035	0.0012	5	12	-	-	-	-			
1-Methylphenanthrene	µg/L	-	-	-	-	0.00031	0.00054	0.00084	<0.000194	0.00085	0.00028	8	12	-	-	-	-			
2-Methylphenanthrene	µg/L	-	-	-	-	0.00029	0.00047	0.00073	<0.000193	0.00084	0.00024	7	12	-	-	-	-			
3-Methylphenanthrene	µg/L	-	-	-	-	0.00027	0.00041	0.00074	<0.000141	0.00077	0.00024	7	12	-	-	-	-			
9/4-Methylphenanthrene	µg/L	-	-	-	-	0.00030	0.00040	0.00096	<0.000088	0.00100	0.00035	8	12	-	-	-	-			
2-Methylanthracene	µg/L	-	-	-	-	0.000093	<0.000256	<0.000301	<0.0000578	<0.000301	0.000038	12	12	-	-	-	-			
C2 substituted fluorenes	µg/L	-	-	-	-	0.00055	0.0010	<0.001899	<0.000277	<0.001899	0.00029	9	12	-	-	-	-			
1,7-Dimethylfluorene	µg/L	-	-	-	-	0.00016	<0.000444	<0.000605	<0.000165	<0.000605	0.000070	12	12	-	-	-	-			
C1 substituted dibenzothiophenes	µg/L	-	-	-	-	0.00023	0.00030	0.00069	<0.000111	0.00083	0.00025	6	12	-	-	-	-			
2/3-Methyldibenzothiophenes	µg/L	-	-	-	-	0.00012	<0.00024	0.00032	<0.000111	<0.00033	0.000070	11	12	-	-	-	-			
C2 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.00091	<0.001314	0.0033	<0.000981	0.0033	0.00078	9	12	-	-	-	-			
1,7-Dimethylphenanthrene	µg/L	-	-	-	-	0.00015	<0.000261	0.00039	<0.000138	0.00039	0.000084	9	12	-	-	-	-			
1,8-Dimethylphenanthrene	µg/L	-	-	-	-	0.000058	<0.000157	<0.000203	<0.0000374	<0.000203	0.000027	11	12	-	-	-	-			
2,6-Dimethylphenanthrene	µg/L	-	-	-	-	0.00010	<0.000315	<0.000315	<0.000066	<0.000315	0.000042	11	12	-	-	-	-			
3,6-Dimethylphenanthrene	µg/L	-	-	-	-	0.000088	<0.00024	<0.000248	<0.0000381	<0.000248	0.000038	11	12	-	-	-	-			
C3 substituted fluorenes	µg/L	-	-	-	-	0.0019	<0.00411	<0.01116	<0.000846	<0.01116	0.0013	10	12	-	-	-	-			
C2 substituted dibenzothiophenes	µg/L	-	-	-	-	0.00080	<0.002103	<0.002364	<0.000555	<0.002364	0.00035	9	12	-	-	-	-			
2,4-Dimethyldibenzothiophene	µg/L	-	-	-	-	0.00016	<0.000415	<0.000732	<0.0000507	<0.000732	0.000095	12	12	-	-	-	-			
C1 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.0012	0.0019	0.0032	<0.00108	0.0038	0.0010	9	12	-	-	-	-			
C3 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.00064	0.0012	<0.002682	0.00022	<0.002682	0.00039	8	12	-	-	-	-			
1,2,6-Trimethylphenanthrene	µg/L	-	-	-	-	0.000055	<0.00014	<0.000166	<0.0000499	<0.000166	0.000020	12	12	-	-	-	-			
C3 substituted dibenzothiophenes	µg/L	-	-	-	-	0.00091	0.0018	<0.00432	<0.001056	<0.00432	0.00054	11	12	-	-	-	-			
C2 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.0012	0.0025	0.0036	<0.000165	0.0036	0.0010	8	12	-	-	-	-			
C4 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.0030	0.0033	0.0078	<0.001035	0.011	0.0027	5	12	-	-	-	-			
C4 substituted dibenzothiophenes	µg/L	-	-	-	-	0.0011	<0.002763	<0.00315	<0.001017	<0.00315	0.00040	12	12	-	-	-	-			
C1 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.00033	0.00049	0.00087	<0.0000723	0.0012	0.00034	5	12	-	-	-	-			
5/6-Methylchrysenes	µg/L	-	-	-	-	0.000059	<0.000168	<0.000269	<0.0000457	<0.000269	0.000036	12	12	-	-	-	-			
C3 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.00033	<0.000885	<0.001221	<0.000243	<0.001221	0.00015	12	12	-	-	-	-			
C2 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.00019	<0.000513	<0.00102	<0.0000516	<0.00102	0.00013	12	12	-	-	-	-			
5,9-Dimethylchrysene	µg/L	-	-	-	-	0.000085	<0.000236	<0.000399	<0.0000516	<0.000399	0.000052	11	12	-	-	-	-			
C4 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.00015	0.00027	<0.000822	<0.0000571	<0.000822	0.00012	11	12	-	-	-	-			
C1 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	0.00038	<0.001029	<0.001062	<0.000174	<0.001062	0.00017	10	12	-	-	-	-			
7-Methylbenzo[a]pyrene	µg/L	-	-	-	-	0.00013	<0.000333	<0.000852	<0.000112	<0.000852	0.00010	12	12	-	-	-	-			
C3 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.00022	<0.000801	<0.001092	<0.0000992	<0.001092	0.00017	12	12	-	-	-	-			
C2 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	0.00043	<0.001392	<0.002082	0.00023	<0.002082	0.00029	10	12	-	-	-	-			
C4 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.00012	<0.000176	<0.000705	<0.0000655	<0.000705	0.00011	11	12	-	-	-	-			
1-methylchrysene	µg/L	-	-	-	-	0.000076	<0.000215	0.00026	<0.0000419	0.00026	0.000069	10	12	-	-	-	-			
3-methylfluoranthene / benzo(a)fluorene	µg/L	-	-	-	-	0.00057	0.00074	0.0016	<0.000238	0.0019	0.00056	6	12	-	-	-	-			

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Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary															
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Open Water (late June to September)									Standard Deviation	nd	Count	% Above Guideline			
						Mean	75 th Percentile	95 th Percentile	Min	Max	Acute	Chronic	BC MOE mean	BC MOE max							
Naphthenic Acid																					
C12h18o2	ng/L	-	-	-	-	84	106	148	42	157	40	0	9	-	-	-	-				
C12h20o2	ng/L	-	-	-	-	49	61	77	22	83	20	0	9	-	-	-	-				
C12h22o2	ng/L	-	-	-	-	18	<16	68	<4.9	96	30	6	9	-	-	-	-				
C12h24o2	ng/L	-	-	-	-	38	<16	305	<4.9	305	100	8	9	-	-	-	-				
C13h20o2	ng/L	-	-	-	-	40	43	74	21	81	20	0	9	-	-	-	-				
C13h22o2	ng/L	-	-	-	-	39	56	62	<24	64	17	1	9	-	-	-	-				
C13h24o2	ng/L	-	-	-	-	17	<16	65	<5.0	97	30	7	9	-	-	-	-				
C13h26o2	ng/L	-	-	-	-	66	35	283	<5.0	449	144	4	9	-	-	-	-				
C14h20o2	ng/L	-	-	-	-	72	82	130	31	157	37	0	9	-	-	-	-				
C14h22o2	ng/L	-	-	-	-	63	74	104	41	114	25	0	9	-	-	-	-				
C14h24o2	ng/L	-	-	-	-	32	39	58	18	66	16	1	9	-	-	-	-				
C14h26o2	ng/L	-	-	-	-	12	<16	72	<5.0	72	22	8	9	-	-	-	-				
C14h28o2	ng/L	-	-	-	-	39	<16	317	<4.9	317	104	8	9	-	-	-	-				
C15h18o2	ng/L	-	-	-	-	23	18	69	12	94	28	3	9	-	-	-	-				
C15h20o2	ng/L	-	-	-	-	62	62	125	25	152	39	0	9	-	-	-	-				
C15h22o2	ng/L	-	-	-	-	213	217	447	67	559	144	0	9	-	-	-	-				
C15h24o2	ng/L	-	-	-	-	252	255	426	130	500	107	0	9	-	-	-	-				
C15h26o2	ng/L	-	-	-	-	43	48	76	19	94	22	0	9	-	-	-	-				
C15h28o2	ng/L	-	-	-	-	8.6	<16	41	<4.9	41	13	8	9	-	-	-	-				
C15h30o2	ng/L	-	-	-	-	35	45	213	<5.0	213	68	7	9	-	-	-	-				
C16h20o2	ng/L	-	-	-	-	21	24	42	<4.9	51	14	2	9	-	-	-	-				
C16h22o2	ng/L	-	-	-	-	8.7	16	22	<4.9	22	6.8	7	9	-	-	-	-				
C16h24o2	ng/L	-	-	-	-	33	26	136	<4.9	208	66	6	9	-	-	-	-				
C16h26o2	ng/L	-	-	-	-	50	61	85	26	92	22	0	9	-	-	-	-				
C16h28o2	ng/L	-	-	-	-	7.6	<18	18	<5.0	<30	5.8	8	9	-	-	-	-				
C16h30o2	ng/L	-	-	-	-	4.3	<16	<16	<4.9	<16	2.6	9	9	-	-	-	-				
C16h32o2	ng/L	-	-	-	-	18	<16	125	<5.0	125	40	8	9	-	-	-	-				
C17h22o2	ng/L	-	-	-	-	16	18	41	<4.9	44	15	5	9	-	-	-	-				
C17h24o2	ng/L	-	-	-	-	7.7	<16	24	<4.9	24	6.9	7	9	-	-	-	-				
C17h26o2	ng/L	-	-	-	-	13	17	29	<4.9	35	10.0	4	9	-	-	-	-				
C17h28o2	ng/L	-	-	-	-	87	100	156	17	172	44	0	9	-	-	-	-				
C17h30o2	ng/L	-	-	-	-	15	17	32	<4.9	37	11	4	9	-	-	-	-				
C17h32o2	ng/L	-	-	-	-	7.3	<16	29	<4.9	29	8.6	8	9	-	-	-	-				
C17h34o2	ng/L	-	-	-	-	22	<16	160	<5.0	160	52	8	9	-	-	-	-				
C18h24o2	ng/L	-	-	-	-	94	103	239	40	316	88	0	9	-	-	-	-				
C18h26o2	ng/L	-	-	-	-	8.4	<16	39	<4.9	39	12	8	9	-	-	-	-				
C18h28o2	ng/L	-	-	-	-	68	<16	568	<4.9	568	187	7	9	-	-	-	-				
C18h30o2	ng/L	-	-	-	-	5.7	<16	<16	<4.9	<16	4.3	8	9	-	-	-	-				
C18h32o2	ng/L	-	-	-	-	4.3	<16	<16	<4.9	<16	2.6	9	9	-	-	-	-				
C18h34o2	ng/L	-	-	-	-	4.3	<16	<16	<4.9	<16	2.6	9	9	-	-	-	-				
C18h36o2	ng/L	-	-	-	-	22	<16	165	<4.9	165	54	8	9	-	-	-	-				
C19h26o2	ng/L	-	-	-	-	48	61	91	<5.3	104	29	1	9	-	-	-	-				
C19h28o2	ng/L	-	-	-	-	4.6	<16	<16	<4.9	<16	2.6	8	9	-	-	-	-				
C19h30o2	ng/L	-	-	-	-	6.5	<16	<16	<4.9	<16	4.2	7	9	-	-	-	-				
C19h32o2	ng/L	-	-	-	-	5.0	<16	<16	<4.9	<16	2.9	8	9	-	-	-	-				
C19h34o2	ng/L	-	-	-	-	9.9	17	26	<4.9	<30	8.5	6	9	-	-	-	-				
C19h36o2	ng/L	-	-	-	-	12	19	28	<4.9	32	10	4	9	-	-	-	-				
C19h38o2	ng/L	-	-	-	-	31	33	79	<5.0	84	29	3	9	-	-	-	-				
C20h28o2	ng/L	-	-	-	-	140	<84	601	13	810	267	5	9	-	-	-	-				
C20h30o2	ng/L	-	-	-	-	124	139	251	41	253	78	0	9	-	-	-	-				
C20h32o2	ng/L	-	-	-	-	87	118	181	11	221	66	0	9	-	-	-	-				
C20h34o2	ng/L	-	-	-	-	8.4	<16	17	<5.0	17	5.4	6	9	-	-	-	-				
C20h36o2	ng/L	-	-	-	-	4.9	<16	<16	<4.9	<16	2.8	8	9	-	-	-	-				
C20h38o2	ng/L	-	-	-	-	6.8	<16	17	<4.9	17	4.9	7	9	-	-	-	-				
C21h30o2	ng/L	-	-	-	-	20	20	55	<5.0	76	22	2	9	-	-	-	-				
C21h32o2	ng/L	-	-	-	-	4.3	<16	<16	<4.9	<16	2.6	9	9	-	-	-	-				
C21h34o2	ng/L	-	-	-	-	4.7	<16	<16	<4.9	<16	2.4	9	9	-	-	-	-				
C21h36o2	ng/L	-	-	-	-	4.3	<16	<16	<4.9	<16	2.6	9	9	-	-	-	-				
C21h38o2	ng/L	-	-	-	-	4.3	<16	<16	<4.9	<16	2.6	9	9	-	-	-	-				
C21h40o2	ng/L	-	-	-	-	4.7	<16	<16	<4.9	<16	2.6	8	9	-	-	-	-				
Radionuclides																					
Actinium-228	Bq/L	-	-	-	-	0.50	<1.0	1.0	<0.6	1.0	0.22	7	8	-	-	-	-				
Bismuth-212	Bq/L	-	-	-	-	0.88	<2.0	<2.0	<1.0	<2.0	0.23	8	8	-	-	-	-				
Bismuth-214	Bq/L	-	-	-	-	0.33	0.70	0.70	<0.3	<0.8	0.17	7	8	-	-	-	-				
Lead-210	Bq/L	-	-	-	-	1.9	<5.0	<5.0	<3.0	<5.0	0.42	8	8	-	-	-	-				
Lead-211	Bq/L	-	-	-	-	1.7	<5.0	<7.0	<2.0	<7.0	0.88	8	8	-	-	-	-				
Lead-212	Bq/L	-	-	-	-	0.51	0.65	1.2	<0.3	1.2	0.42	3	8	-	-	-	-				
Lead-214	Bq/L	-	-	-	-	0.39	0.70	0.77	<0.4	0.80	0.23	5	8	-	-	-	-				
Potassium-40	Bq/L	-	-	-	-	2.5	<6.0	<6.0	<3.0	<6.0	0.60	8	8	-	-	-	-				
Radium-223	Bq/L	-	-	-	-	0.41	<1.0	<1.0	<0.4	<1.0	0.11	8	8	-	-	-	-				
Radium-226	Bq/L	-	-	-	-	0.56	0.020	<5.0	<0.005	<5.0	1.1	5	9	-	-	-	-				
Radon-219	Bq/L	-	-	-	-	0.56	<1.0	<2.0	<0.9	<2.0	0.18	8	8	-	-	-	-				
Thallium-208	Bq/L	-	-	-	-	0.23	0.33	0.53	<0.2	0.60	0.19	5	8	-	-	-	-				
Thorium-227	Bq/L	-	-	-	-	0.45	<1.0	<1.0	<0.6	<1.0	0.080	8	8	-	-	-	-				
Thorium-230	Bq/L	-	-	-	-	9.4	<20	<30	<10	<30	3.2	8	8	-	-	-	-				
Thorium-234	Bq/L	-	-	-	-	1.7	<4.0	<4.0	<2.0	<4.0	0.37	8	8	-	-	-	-				
Uranium-235	Bq/L	-	-	-	-	0.53	<1.0	1.0	<0.8	1.0	0.19	7	8	-	-	-	-				

Seasonal Surface Water Quality Summary of Chance Creek, 2013 to 2017

^(a) = guideline is a minimum value, unless the background concentration or value is lower.

^(b) = guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (12 to 286 mg/L). The guideline is calculated based on the individual hardness value for each sample.

^(c) = for some samples, water hardness was greater than 250 mg/L. At this hardness, no BC MOE water quality guideline has been established for sulphate; however, the observed data were screened against the guideline for very hard water

^(d) = guideline is chloride dependent. The guideline range shown is based on the chloride concentration range observed in the dataset (0.0500 to 2.6800 mg/L). The guideline is calculated based on the individual chloride concentration in each

^(e) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (1.2694 mg-N/L) is based on the combination of field pH (8.2) and water temperature (0.0°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.

^(f) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.7990 mg-N/L) is based on the combination of field pH (8.2) and water temperature (0.0°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.

^(g) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (4.1500 mg-N/L) is based on the combination of field pH (8.2) and water temperature (0.0°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.

^(h) = guideline is pH dependent. The guideline range shown is based on the pH range observed in the dataset (5.9 to 8.2). The guideline is calculated based on the individual pH for each sample.

⁽ⁱ⁾ = guideline is pH dependent: 5 µg/L at pH < 6.5 and 100 µg/L at pH ≥ 6.5.

^(j) = guideline is for chromium VI.

^(l) = interim guideline

(Chronic) = concentration is higher than the chronic aquatic life CCME guideline or outside the recommended pH, DO or

(BC MOE Mean) = concentration is higher than the 30-day mean BC MOE guideline or outside the recommended pH, DO or total alkalinity range.

(BC MOE Max) = concentration is higher than the maximum BC MOE guideline or outside the recommended pH, DO or

(DL>Chronic) = analytical detection limit is higher than the chronic aquatic life CCME guideline.

(DL>BC MOE Mean) = analytical detection limit is higher than the 30-day mean BC MOE guideline.

Bolded concentrations are higher than water quality guidelines.

Bolded total alkalinity values indicate moderate to high level of acid sensitivity.

Water quality data and guidelines shown in this table were rounded to reflect laboratory or field instrument precision *after* comparisons to guidelines. Therefore, values slightly above guidelines may be displayed as being equal to the guidelines and identified as exceedances. Concentrations equal to the guideline values were not identified as exceedances.

- = no guideline or no data.

APPENDIX B
Table B-3: Seasonal Surface Water Quality Summary of Dalglish Creek, 2012 to 2017

Table B-3: Seasonal Surface Water Quality Summary of Dalglish Creek, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary													
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Ice-Cover (March)													
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline				
																Acute	Chronic	BC MOE Mean	BC MOE Max
Field Measured																			
pH	-	-	6.5 - 9.0	6.5 - 9.0	6.5 - 9.0	7.8	7.8	7.9	7.9	7.7	7.9	0.16	0	2	-	-	-	-	
Specific conductivity	µS/cm	-	-	-	-	380	-	380	380	-	-	-	0	1	-	-	-	-	
Temperature	°C	-	-	-	-	-0.05	-0.05	-0.025	-0.005	-0.1	0	0.071	0	2	-	-	-	-	
Dissolved oxygen	mg/L	-	6.5	8.0	5.0	4.1 ^(Chronic, BC MOE Mean, BC MOE Max)	4.1 ^(Chronic, BC MOE Mean, BC MOE Max)	5.6 ^(Chronic, BC MOE Mean)	6.7 ^(BC MOE Mean)	1.2 ^(Chronic, BC MOE Mean, BC MOE Max)	7.0 ^(BC MOE Mean)	4.1	0	2	-	50	100	50	
Turbidity	NTU	-	-	-	-	26	-	26	26	-	-	-	0	1	-	-	-	-	
Conventional Parameters																			
Hardness, as CaCO ₃	mg/L	-	-	-	-	410	451	476	528	403	541	78	0	3	-	-	-	-	
Total alkalinity, as CaCO ₃	mg/L	-	-	20 ^(B)	-	141	147	155	165	133	168	18	0	3	-	-	-	-	
Total dissolved solids	mg/L	-	-	-	-	577	565	578	578	540	578	22	0	3	-	-	-	-	
Total suspended solids	mg/L	-	-	-	-	83	74	110	131	<5.0	136	67	1	3	-	-	-	-	
Total organic carbon	mg/L	-	-	-	-	21	21	23	24	17	25	5.2	0	2	-	-	-	-	
Dissolved organic carbon	mg/L	-	-	-	-	12	12	13	14	11	14	1.5	0	3	-	-	-	-	
Dissolved inorganic carbon	mg/L	-	-	-	-	34	35	35	37	33	37	2.0	0	3	-	-	-	-	
Total inorganic carbon	mg/L	-	-	-	-	34	34	34	34	34	34	0.14	0	2	-	-	-	-	
Major Ions																			
Bicarbonate, as CaCO ₃	mg/L	-	-	-	-	167	167	170	172	162	172	7.1	0	2	-	-	-	-	
Bromide	mg/L	-	-	-	-	<0.02	0.010	<0.02	<0.02	<0.02	<0.02	0	2	2	-	-	-	-	
Calcium	mg/L	-	-	-	-	155	155	166	175	133	177	31	0	2	-	-	-	-	
Carbonate, as CaCO ₃	mg/L	-	-	-	-	<6.0	3.0	<6.0	<6.0	<6.0	<6.0	0	2	2	-	-	-	-	
Chloride	mg/L	640	120	150	600	0.19	0.29	0.34	0.47	0.18	0.50	0.18	0	3	-	-	-	-	
Fluoride	mg/L	-	0.12 ^(I)	-	0.73 - 2.0 ^(B)	0.37 ^(Chronic)	-	0.37 ^(Chronic)	0.37 ^(Chronic)	-	-	-	0	1	-	100	-	-	
Magnesium	mg/L	-	-	-	-	21	21	23	24	19	24	3.7	0	2	-	-	-	-	
Potassium	mg/L	-	-	-	-	1.8	1.8	1.8	1.9	1.6	1.9	0.21	0	2	-	-	-	-	
Sodium	mg/L	-	-	-	-	16	16	17	18	13	19	3.8	0	2	-	-	-	-	
Sulphate	mg/L	-	-	128 - 429 ^(B, C)	-	287	293	322	349	237	356	60	0	3	-	-	-	-	
Nutrients																			
Nitrate	mg-N/L	124	2.9	3.0	33	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	2	2	-	-	-	-	
Nitrite	mg-N/L	-	0.060	0.020 ^(D)	0.060 ^(D)	<0.01	0.012	0.030 ^(BC MOE Mean)	0.030 ^(BC MOE Mean)	<0.002	0.030 ^(BC MOE Mean)	0.016	2	3	-	-	33	-	
Nitrate + nitrite	mg-N/L	-	-	-	-	0.0080	-	0.0080	0.0080	-	-	-	0	1	-	-	-	-	
Total ammonia	mg-N/L	-	0.92 - 52 ^(E)	1.4 - 2.1 ^(F)	7.4 - 28 ^(G)	0.34	0.29	0.39	0.43	0.090	0.44	0.18	0	3	-	-	-	-	
Total kjeldahl nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
Total nitrogen (calculated)	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
Total nitrogen	mg-N/L	-	-	-	-	1.0	1.0	1.1	1.1	0.93	1.2	0.16	0	2	-	-	-	-	
Total phosphorus	mg-P/L	-	-	0.010	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
Phosphorus (as phosphate)	mg-P/L	-	-	-	-	0.059	0.030	0.059	0.059	<0.002	0.059	0.041	1	2	-	-	-	-	
Total Metals																			
Aluminum	µg/L	-	100 ^(B, I)	-	-	226 ^(Chronic)	480 ^(Chronic)	718 ^(Chronic)	1,112 ^(Chronic)	4.8	1,210 ^(Chronic)	642	0	3	-	67	-	-	
Antimony	µg/L	-	-	9.0	-	<0.2	0.20	0.42	0.42	0.070	0.42	0.19	1	3	-	-	-	-	
Arsenic	µg/L	-	5.0	-	5.0	1.6	2.4	3.5	4.9	0.20	5.3 ^(Chronic, BC MOE Max)	2.6	0	3	-	33	-	33	
Barium	µg/L	-	-	1,000	-	78	93	126	164	28	174	74	0	3	-	-	-	-	
Beryllium	µg/L	-	-	0.13	-	<0.05	0.11	0.29 ^(BC MOE Mean)	0.29 ^(BC MOE Mean)	0.0030	0.29 ^(BC MOE Mean)	0.16	1	3	-	-	33	-	
Bismuth	µg/L	-	-	-	-	<0.5	0.13	<0.5	<0.5	<0.02	<0.5	0.17	2	2	-	-	-	-	
Boron	µg/L	29,000	1,500	-	1,200	40	40	40	40	40	40	0	0	2	-	-	-	-	
Cadmium	µg/L	0.45 - 7.7 ^(B)	0.045 - 0.37 ^(B)	-	-	0.18	0.23	0.35	0.48 ^(Chronic)	<0.01	0.51 ^(Chronic)	0.26	1	3	-	33	-	-	
Chromium	µg/L	-	1.0	1.0 ^(J)	-	0.50	0.82	1.2 ^(Chronic, BC MOE Mean)	1.7 ^(Chronic, BC MOE Mean)	<0.2	1.9 ^(Chronic, BC MOE Mean)	0.92	1	3	-	33	33	-	
Cobalt	µg/L	-	-	4.0	110	17 ^(BC MOE Mean)	13 ^(BC MOE Mean)	19 ^(BC MOE Mean)	21 ^(BC MOE Mean)	2.0	21 ^(BC MOE Mean)	10	0	3	-	-	67	-	
Copper	µg/L	-	2.0 - 4.0 ^(B)	2.0 - 10 ^(B)	4.1 - 40 ^(B)	1.0	2.1	3.0	4.6 ^(Chronic)	0.30	5.0 ^(Chronic)	2.5	0	3	-	33	-	-	
Iron	µg/L	-	300	-	1,000	40,800 ^(Chronic, BC MOE Max)	40,800 ^(Chronic, BC MOE Max)	52,100 ^(Chronic, BC MOE Max)	61,140 ^(Chronic, BC MOE Max)	18,200 ^(Chronic, BC MOE Max)	63,400 ^(Chronic, BC MOE Max)	31,961	0	2	-	100	-	100	
Lead	µg/L	-	1.0 - 7.0 ^(B)	3.8 - 20 ^(B)	12 - 417 ^(B)	0.20	0.60	0.89	1.4	0.020	1.6	0.85	0	3	-	-	-	-	
Lithium	µg/L	-	-	-	-	9.5	9.4	10	11	8.0	11	1.4	0	3	-	-	-	-	
Manganese	µg/L	-	-	768 - 2,585 ^(B)	816 - 3,394 ^(B)	4,150 ^(BC MOE Mean, BC MOE Max)	3,443 ^(BC MOE Mean, BC MOE Max)	4,510 ^(BC MOE Mean, BC MOE Max)	4,798 ^(BC MOE Mean, BC MOE Max)	1,310	4,870 ^(BC MOE Mean, BC MOE Max)	1,882	0	3	-	-	67	67	
Mercury	µg/L	-	0.026	0.010	-	<0.01	0.0067	<0.02 ^(DL>BC MOE Mean)	<0.02 ^(DL>BC MOE Mean)	<0.01	<0.02 ^(DL>BC MOE Mean)	0.0029	3	3	-	-	-	-	
Molybdenum	µg/L	-	73	1,000	2,000	0.78	1.1	1.2	1.6	0.72	1.7	0.53	0	3	-	-	-	-	
Nickel	µg/L	-	25 - 150 ^(B)	25 - 150 ^(B)	-	46	40	53	58	14	59	23	0	3	-	-	-	-	
Selenium	µg/L	-	1.0	2.0	-	<0.6	0.57	1.0	1.0	0.40	1.0	0.38	1	3	-	-	-	-	
Silicon	µg/L	-	-	-	-	3,925	3,925	4,438	4,848	2,900	4,950	1,450	0	2	-	-	-	-	
Silver	µg/L	-	0.25	0.050 - 1.5 ^(C)	0.10 - 3.0 ^(B)	<0.02	0.015	<0.05	<0.05	0.010	<0.05	0.0087	2	3	-	-	-	-	
Strontium	µg/L	-	-	-	-	264	268	281	295	241	298	29	0	3	-	-	-	-	
Sulphur	µg/L	-	-	-	-	126,500	126,500	137,750	146,750	104,000	149,000	31,820	0	2	-	-	-	-	
Tellurium	µg/L	-	-	-	-	<0.25	0.088	<0.25	<0.25	<0.1	<0.25	0.053	2	2	-	-	-	-	
Thallium	µg/L	-	0.80	0.80	-	0.020	0.015	0.020	0.020	<0.002	<0.05	0.013	2	3	-	-	-	-	
Thorium	µg/L	-	-	-	-	0.63	0.63	0.70	0.75	0.50	0.77	0.19	0	2	-	-	-	-	
Tin	µg/L	-	-	-	-	<0.1	0.11	<0.5	<0.5	<0.05	<0.5	0.12	3	3	-	-	-	-	
Titanium	µg/L	-	-	-	-	42	42	56	66	15	69	38	0	2	-	-	-	-	
Uranium	µg/L	33	15	8.5	-	1.7	1.3	1.7	1.7	0.41	1.7	0.76	0	3	-	-	-	-	
Vanadium	µg/L	-	-	-	-	1.9	3.3	4.8	7.1	0.26	7.7	3.9	0	3	-	-	-	-	
Zinc	µg/L	-	30	7.5 - 188 ^(B)	33 - 341 ^(B)	34 ^(Chronic)	45 ^(Chronic)	63 ^(Chronic)	86 ^(Chronic)	11	91 ^(Chronic)	42	0	3	-	67	-	-	
Zirconium	µg/L	-	-	-	-	1.5	1.5	1.8	2.0	1.0	2.0	0.71	0	2	-	-	-	-	

APPENDIX B
Table B-3: Seasonal Surface Water Quality Summary of Dalglish Creek, 2012 to 2017

Table B-3: Seasonal Surface Water Quality Summary of Dalglish Creek, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary														
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Ice-Cover (March)														
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline					
																	Acute	Chronic	BC MOE Mean	BC MOE Max
Dissolved Metals																				
Aluminum	µg/L	-	-	50 ⁽ⁿ⁾	100 ⁽ⁿ⁾	3.4	4.0	4.7	5.7	2.7	6.0	1.7	0	3	-	-	-	-	-	-
Antimony	µg/L	-	-	-	-	0.12	0.096	0.12	0.12	0.070	<0.2	0.024	1	3	-	-	-	-	-	-
Arsenic	µg/L	-	-	-	-	0.30	0.30	0.35	0.39	0.20	0.40	0.10	0	3	-	-	-	-	-	-
Barium	µg/L	-	-	-	-	58	51	62	65	28	66	20	0	3	-	-	-	-	-	-
Beryllium	µg/L	-	-	-	-	<0.04	0.016	<0.05	<0.05	0.0040	<0.05	0.011	2	3	-	-	-	-	-	-
Bismuth	µg/L	-	-	-	-	<0.1	0.19	<1.0	<1.0	<0.02	<1.0	0.27	3	3	-	-	-	-	-	-
Boron	µg/L	-	-	-	-	38	38	38	39	36	39	2.1	0	2	-	-	-	-	-	-
Cadmium	µg/L	-	-	0.069 - 0.46 ⁽ⁿ⁾	0.12 - 2.8 ⁽ⁿ⁾	0.035	0.033	0.048	0.058	<0.01	0.060	0.028	1	3	-	-	-	-	-	-
Chromium	µg/L	-	-	-	-	<0.2	0.14	<0.4	<0.4	0.12	<0.4	0.053	2	3	-	-	-	-	-	-
Cobalt	µg/L	-	-	-	-	16	11	16	16	2.0	16	8.0	0	3	-	-	-	-	-	-
Copper	µg/L	-	-	-	-	<0.5	0.35	<1.0	<1.0	0.31	<1.0	0.13	2	3	-	-	-	-	-	-
Iron	µg/L	-	-	-	350	2,520 ^(BC MOE Max)	2,520 ^(BC MOE Max)	3,250 ^(BC MOE Max)	3,834 ^(BC MOE Max)	1,060 ^(BC MOE Max)	3,980 ^(BC MOE Max)	2,065	0	2	-	-	-	-	-	100
Lead	µg/L	-	-	-	-	<0.01	0.020	<0.1	<0.1	<0.01	<0.1	0.026	3	3	-	-	-	-	-	-
Lithium	µg/L	-	-	-	-	8.0	8.5	8.9	9.7	7.7	9.9	1.2	0	3	-	-	-	-	-	-
Manganese	µg/L	-	-	-	-	4,040	3,441	4,500	4,868	1,324	4,960	1,890	0	3	-	-	-	-	-	-
Mercury	µg/L	-	-	-	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	2	2	-	-	-	-	-	-
Molybdenum	µg/L	-	-	-	-	0.68	0.64	0.71	0.73	0.50	0.74	0.13	0	3	-	-	-	-	-	-
Nickel	µg/L	-	-	-	-	33	29	37	40	14	41	14	0	3	-	-	-	-	-	-
Selenium	µg/L	-	-	-	-	0.40	0.33	0.40	0.40	0.30	<0.6	0.058	1	3	-	-	-	-	-	-
Silicon	µg/L	-	-	-	-	2,390	2,390	2,410	2,426	2,350	2,430	57	0	2	-	-	-	-	-	-
Silver	µg/L	-	-	-	-	<0.02	0.026	0.064	0.064	<0.01	0.064	0.033	2	3	-	-	-	-	-	-
Strontium	µg/L	-	-	-	-	252	257	269	282	233	285	26	0	3	-	-	-	-	-	-
Sulphur	µg/L	-	-	-	-	123,000	123,000	136,000	146,400	97,000	149,000	36,770	0	2	-	-	-	-	-	-
Tellurium	µg/L	-	-	-	-	0.27	0.16	0.27	0.27	<0.1	0.27	0.15	1	2	-	-	-	-	-	-
Thallium	µg/L	-	-	-	-	<0.01	0.0063	0.013	0.013	<0.002	0.013	0.0061	2	3	-	-	-	-	-	-
Thorium	µg/L	-	-	-	-	0.39	0.29	0.39	0.39	0.39	<0.4	0.13	1	2	-	-	-	-	-	-
Tin	µg/L	-	-	-	-	<0.1	0.058	0.10	0.10	<0.05	0.10	0.038	2	3	-	-	-	-	-	-
Titanium	µg/L	-	-	-	-	22	22	22	22	22	22	0	0	2	-	-	-	-	-	-
Uranium	µg/L	-	-	-	-	1.1	0.97	1.2	1.4	0.42	1.4	0.50	0	3	-	-	-	-	-	-
Vanadium	µg/L	-	-	-	-	0.20	0.23	0.30	0.37	0.10	0.39	0.15	0	3	-	-	-	-	-	-
Zinc	µg/L	-	-	-	-	21	15	21	21	3.6	21	9.9	0	3	-	-	-	-	-	-
Zirconium	µg/L	-	-	-	-	0.45	0.45	0.48	0.50	0.40	0.50	0.071	0	2	-	-	-	-	-	-
Volatile Organics																				
Benzene	µg/L	-	370 ^(l)	40	-	<500 ^(DL>Chronic, DL>BC MOE Mean)	125 ^(BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	177	2	2	-	-	-	-	-	-
Ethylbenzene	µg/L	-	90 ^(l)	200	-	<500 ^(DL>Chronic, DL>BC MOE Mean)	125 ^(Chronic)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	177	2	2	-	-	-	-	-	-
Toluene	µg/L	-	2 ^(l)	0.50	-	<500 ^(DL>Chronic, DL>BC MOE Mean)	125 ^(Chronic, BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	177	2	2	-	-	-	-	-	-
Xylenes	µg/L	-	-	30	-	<500 ^(DL>BC MOE Mean)	125 ^(BC MOE Mean)	<500 ^(DL>BC MOE Mean)	<500 ^(DL>BC MOE Mean)	<0.5	<500 ^(DL>BC MOE Mean)	177	2	2	-	-	-	-	-	-
Styrene	µg/L	-	72 ^(l)	72	-	<500 ^(DL>Chronic, DL>BC MOE Mean)	125 ^(Chronic, BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	177	2	2	-	-	-	-	-	-
Extractable Petroleum Hydrocarbons (C10-C19)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	-
Extractable Petroleum Hydrocarbons (C10-C32)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	-
Volatile Hydrocarbons	µg/L	-	-	-	-	<50,000	12,513	<50,000	<50,000	<50	<50,000	17,660	2	2	-	-	-	-	-	-
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	-	<50,000	12,513	<50,000	<50,000	<50	<50,000	17,660	2	2	-	-	-	-	-	-
Methyl tertiary-butyl ether	µg/L	-	-	-	-	<500	125	<500	<500	<0.5	<500	177	2	2	-	-	-	-	-	-
Parent PAHs																				
Naphthalene	µg/L	-	1.1 ^(l)	1.0	-	<0.00414	-	<0.00414	<0.00414	-	-	-	1	1	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	<0.000257	0.00012	<0.000257	<0.000257	<0.000203	<0.000257	0.000019	2	2	-	-	-	-	-	-
Biphenyl	µg/L	-	-	-	-	<0.00348	0.0012	<0.00348	<0.00348	<0.001449	<0.00348	0.00072	2	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	5.8 ^(l)	6.0	-	0.00022	0.00092	0.00022	0.00022	0.00022	<0.00324	0.00099	1	2	-	-	-	-	-	-
Fluorene	µg/L	-	3 ^(l)	12	-	0.00044	0.00027	0.00044	0.00044	<0.000187	0.00044	0.00025	1	2	-	-	-	-	-	-
Phenanthrene	µg/L	-	0.4 ^(l)	0.30	-	<0.00318	0.0012	<0.00318	<0.00318	<0.001458	<0.00318	0.00061	2	2	-	-	-	-	-	-
Anthracene	µg/L	-	0.012 ^(l)	0.10	-	<0.000162	0.000065	<0.000162	<0.000162	<0.0000999	<0.000162	0.000022	2	2	-	-	-	-	-	-
Dibenzothiophene	µg/L	-	-	-	-	0.00071	0.0011	0.00071	0.00071	0.00071	<0.002904	0.00052	1	2	-	-	-	-	-	-
Pyrene	µg/L	-	0.025 ^(l)	0.020	-	<0.000711	0.00029	<0.000711	<0.000711	<0.000432	<0.000711	0.000099	2	2	-	-	-	-	-	-
Fluoranthene	µg/L	-	0.04 ^(l)	0.20	-	<0.001101	0.00034	<0.001101	<0.001101	<0.000246	<0.001101	0.00030	2	2	-	-	-	-	-	-
Benzo(a)anthracene	µg/L	-	0.018 ^(l)	0.10	-	<0.000219	0.000087	<0.000219	<0.000219	<0.000129	<0.000219	0.000032	2	2	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	0.00057	0.00036	0.00057	0.00057	<0.000306	0.00057	0.00030	1	2	-	-	-	-	-	-
1-Methyl-7-isopropyl-phenanthrene (Retene)	µg/L	-	-	-	-	0.00069	0.00047	0.00069	0.00069	<0.000514	0.00069	0.00031	1	2	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	0.00023	0.00016	0.00023	0.00023	<0.000153	0.00023	0.00011	1	2	-	-	-	-	-	-
Benzo(j,k)fluoranthenes	µg/L	-	-	-	-	<0.000175	0.000086	<0.000175	<0.000175	<0.00017	<0.000175	0.0000018	2	2	-	-	-	-	-	-
Benzo(b,j,k)fluoranthenes	µg/L	-	-	-	-	<0.000153	-	<0.000153	<0.000153	-	-	-	1	1	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	0.015 ^(l)	0.010	-	<0.000266	0.00013	<0.000266	<0.000266	<0.00025	<0.000266	0.0000057	2	2	-	-	-	-	-	-
Benzo(e)pyrene	µg/L	-	-	-	-	0.00081	0.00046	0.00081	0.00081	<0.000229	0.00081	0.00049	1	2	-	-	-	-	-	-
Perylene	µg/L	-	-	-	-	0.00032	0.00023	0.00032	0.00032	<0.000271	0.00032	0.00013	1	2	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	0.00088	0.00060	0.00088	0.00088	<0.000627	0.00088	0.00040	1	2	-	-	-	-	-	-
Indeno(1,2,3-c,h)pyrene	µg/L	-	-	-	-	<0.000561	0.00022	<0.000561												

Table B-3: Seasonal Surface Water Quality Summary of Dalglish Creek, 2012 to 2017

Table B-3: Seasonal Surface Water Quality Summary of Dalglish Creek, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary												
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Ice-Cover (March)												
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline			
															Acute	Chronic	BC MOE Mean	BC MOE Max
Alkylated PAHs																		
C1 substituted naphthalenes	µg/L	-	-	-	-	<0.00945	0.0035	<0.00945	<0.00945	<0.00456	<0.00945	0.0017	2	2	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-	0.0031	0.0020	0.0031	0.0031	<0.001815	0.0031	0.0015	1	2	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	<0.00813	0.0027	<0.00813	<0.00813	<0.002742	<0.00813	0.0019	2	2	-	-	-	-
C2 substituted naphthalenes	µg/L	-	-	-	-	<0.01314	0.0054	<0.01314	<0.01314	<0.00831	<0.01314	0.0017	2	2	-	-	-	-
1,2-Dimethylnaphthalene	µg/L	-	-	-	-	0.0014	0.0010	0.0014	0.0014	<0.00135	0.0014	0.00050	1	2	-	-	-	-
2,6-Dimethylnaphthalene	µg/L	-	-	-	-	0.0028	0.0017	0.0028	0.0028	<0.0011	0.0028	0.0016	1	2	-	-	-	-
C1 substituted acenaphthenes	µg/L	-	-	-	-	<0.000361	0.00016	<0.000361	<0.000361	<0.000272	<0.000361	0.000031	2	2	-	-	-	-
C1 substituted biphenyls	µg/L	-	-	-	-	<0.02457	0.0078	<0.02457	<0.02457	<0.00645	<0.02457	0.0064	2	2	-	-	-	-
C3 substituted naphthalenes	µg/L	-	-	-	-	0.014	0.0083	0.014	0.014	<0.00582	0.014	0.0076	1	2	-	-	-	-
2,3,5-Trimethylnaphthalene	µg/L	-	-	-	-	0.0019	0.0019	0.0026	0.0031	0.00061	0.0032	0.0019	0	2	-	-	-	-
2,3,6-Trimethylnaphthalene	µg/L	-	-	-	-	0.0033	0.0018	0.0033	0.0033	<0.000558	0.0033	0.0021	1	2	-	-	-	-
C1 substituted fluorenes	µg/L	-	-	-	-	<0.00798	0.0024	<0.00798	<0.00798	<0.001491	<0.00798	0.0023	2	2	-	-	-	-
2-Methylfluorene	µg/L	-	-	-	-	<0.000501	0.00021	<0.000501	<0.000501	<0.000329	<0.000501	0.000061	2	2	-	-	-	-
C2 substituted biphenyls	µg/L	-	-	-	-	<0.02328	-	<0.02328	<0.02328	-	-	-	1	1	-	-	-	-
C4 substituted naphthalenes	µg/L	-	-	-	-	0.0079	0.0067	0.0079	0.0079	0.0079	<0.01116	0.0016	1	2	-	-	-	-
1,4,6,7-Tetramethylnaphthalene	µg/L	-	-	-	-	0.0012	0.0050	0.0012	0.0012	0.0012	<0.01746	0.0053	1	2	-	-	-	-
C1 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.0034	0.0034	0.0046	0.0056	0.00097	0.0058	0.0034	0	2	-	-	-	-
1-Methylphenanthrene	µg/L	-	-	-	-	0.00086	0.00086	0.0011	0.0014	0.00030	0.0014	0.00079	0	2	-	-	-	-
2-Methylphenanthrene	µg/L	-	-	-	-	0.00080	0.00080	0.0010	0.0012	0.00034	0.0012	0.00064	0	2	-	-	-	-
3-Methylphenanthrene	µg/L	-	-	-	-	0.0012	0.00067	0.0012	0.0012	<0.000305	0.0012	0.00073	1	2	-	-	-	-
9/4-Methylphenanthrene	µg/L	-	-	-	-	0.0011	0.0011	0.0016	0.0019	0.00032	0.0020	0.0012	0	2	-	-	-	-
2-Methylantracene	µg/L	-	-	-	-	<0.00032	0.00013	<0.00032	<0.00032	<0.000188	<0.00032	0.000047	2	2	-	-	-	-
C2 substituted fluorenes	µg/L	-	-	-	-	0.0026	0.0026	0.0028	0.0030	0.0022	0.0030	0.00056	0	2	-	-	-	-
1,7-Dimethylfluorene	µg/L	-	-	-	-	<0.000478	0.00022	<0.000478	<0.000478	<0.000391	<0.000478	0.000031	2	2	-	-	-	-
C1 substituted dibenzothiophenes	µg/L	-	-	-	-	0.0026	0.0014	0.0026	0.0026	<0.000254	0.0026	0.0018	1	2	-	-	-	-
2/3-Methyldibenzothiophenes	µg/L	-	-	-	-	0.00089	0.00051	0.00089	0.00089	<0.000254	0.00089	0.00054	1	2	-	-	-	-
C2 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.0029	0.0029	0.0035	0.0040	0.0016	0.0041	0.0018	0	2	-	-	-	-
1,7-Dimethylphenanthrene	µg/L	-	-	-	-	0.00055	0.00032	0.00055	0.00055	<0.000186	0.00055	0.00032	1	2	-	-	-	-
1,8-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000203	0.000094	<0.000203	<0.000203	<0.000171	<0.000203	0.000011	2	2	-	-	-	-
2,6-Dimethylphenanthrene	µg/L	-	-	-	-	0.00016	0.00013	0.00016	0.00016	0.00016	<0.000172	0.000055	1	2	-	-	-	-
3,6-Dimethylphenanthrene	µg/L	-	-	-	-	0.00066	0.00044	0.00066	0.00066	<0.000432	0.00066	0.00032	1	2	-	-	-	-
C3 substituted fluorenes	µg/L	-	-	-	-	0.0027	0.0023	0.0027	0.0027	0.0027	<0.00393	0.00049	1	2	-	-	-	-
C2 substituted dibenzothiophenes	µg/L	-	-	-	-	0.0042	0.0026	0.0042	0.0042	<0.001866	0.0042	0.0023	1	2	-	-	-	-
2,4-Dimethyldibenzothiophene	µg/L	-	-	-	-	<0.000435	0.00018	<0.000435	<0.000435	<0.000293	<0.000435	0.000050	2	2	-	-	-	-
C1 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.0034	0.0021	0.0034	0.0034	<0.001737	0.0034	0.0018	1	2	-	-	-	-
C3 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.0029	0.0017	0.0029	0.0029	<0.000918	0.0029	0.0017	1	2	-	-	-	-
1,2,6-Trimethylphenanthrene	µg/L	-	-	-	-	0.00020	0.00015	0.00020	0.00020	<0.000199	0.00020	0.000071	1	2	-	-	-	-
C3 substituted dibenzothiophenes	µg/L	-	-	-	-	0.0027	0.0017	0.0027	0.0027	<0.001584	0.0027	0.0013	1	2	-	-	-	-
C2 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.0049	0.0029	0.0049	0.0049	<0.001935	0.0049	0.0028	1	2	-	-	-	-
C4 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.0038	0.0028	0.0038	0.0038	<0.00363	0.0038	0.0014	1	2	-	-	-	-
C4 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.00351	0.0011	<0.00351	<0.00351	<0.001032	<0.00351	0.00088	2	2	-	-	-	-
C1 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.00078	0.00046	0.00078	0.00078	<0.000261	0.00078	0.00046	1	2	-	-	-	-
5/6-Methylchrysenes	µg/L	-	-	-	-	0.00012	0.00010	0.00012	0.00012	0.00012	<0.000175	0.000024	1	2	-	-	-	-
C3 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.0010	0.0011	0.0010	0.0010	0.0010	<0.002334	0.00010	1	2	-	-	-	-
C2 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.00062	0.00049	0.00062	0.00062	0.00062	<0.00072	0.00018	1	2	-	-	-	-
5,9-Dimethylchrysene	µg/L	-	-	-	-	0.00011	0.000094	0.00011	0.00011	0.00011	<0.000149	0.000027	1	2	-	-	-	-
C4 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.000241	0.00010	<0.000241	<0.000241	<0.00017	<0.000241	0.000025	2	2	-	-	-	-
C1 substituted benzo(a)fluoranthenes / benzopyrenes	µg/L	-	-	-	-	0.00036	0.00054	0.00036	0.00036	0.00036	<0.001434	0.00025	1	2	-	-	-	-
7-Methylbenzo[a]pyrene	µg/L	-	-	-	-	<0.000293	0.00012	<0.000293	<0.000293	<0.000198	<0.000293	0.000034	2	2	-	-	-	-
C3 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000183	0.000078	<0.000183	<0.000183	<0.000128	<0.000183	0.000019	2	2	-	-	-	-
C2 substituted benzo(a)fluoranthenes / benzopyrenes	µg/L	-	-	-	-	<0.000346	0.00012	<0.000346	<0.000346	<0.000135	<0.000346	0.000075	2	2	-	-	-	-
C4 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000143	0.000055	<0.000143	<0.000143	<0.0000782	<0.000143	0.000023	2	2	-	-	-	-
1-methylchrysene	µg/L	-	-	-	-	0.00012	0.00011	0.00012	0.00012	0.00012	<0.000185	0.000019	1	2	-	-	-	-
3-methylfluoranthene / benzo(a)fluorene	µg/L	-	-	-	-	0.0014	0.00083	0.0014	0.0014	<0.000495	0.0014	0.00083	1	2	-	-	-	-

Table B-3: Seasonal Surface Water Quality Summary of Dalglish Creek, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary													
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Ice-Cover (March)													
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline				
																Acute	Chronic	BC MOE Mean	BC MOE Max
Naphthenic Acid																			
C12h18o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C12h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C12h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C12h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C13h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C13h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C13h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C13h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C14h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C14h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C14h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C14h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C14h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C15h18o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C15h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C15h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C15h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C15h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C15h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C15h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C16h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C16h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C16h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C16h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C16h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C16h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C16h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C17h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C17h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C17h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C17h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C17h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C17h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C17h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C18h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C18h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C18h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C18h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C18h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C18h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C18h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C19h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C19h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C19h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C19h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C19h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C19h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C19h38o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C20h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C20h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C20h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C20h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C20h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C20h38o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C21h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C21h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C21h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C21h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C21h38o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
C21h40o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
Radionuclides																			
Actinium-228	Bq/L	-	-	-	-	<0.9	0.45	<0.9	<0.9	<0.9	<0.9	0	2	2	-	-	-	-	-
Bismuth-212	Bq/L	-	-	-	-	<2.0	1.0	<2.0	<2.0	<2.0	<2.0	0	2	2	-	-	-	-	-
Bismuth-214	Bq/L	-	-	-	-	0.60	0.45	0.60	0.60	<0.6	0.60	0.21	1	2	-	-	-	-	-
Lead-210	Bq/L	-	-	-	-	<4.0	2.0	<4.0	<4.0	<4.0	<4.0	0	2	2	-	-	-	-	-
Lead-211	Bq/L	-	-	-	-	<4.0	2.0	<4.0	<4.0	<4.0	<4.0	0	2	2	-	-	-	-	-
Lead-212	Bq/L	-	-	-	-	0.70	0.45	0.70	0.70	<0.4	0.70	0.35	1	2	-	-	-	-	-
Lead-214	Bq/L	-	-	-	-	<0.6	0.28	<0.6	<0.6	<0.5	<0.6	0.035	2	2	-	-	-	-	-
Potassium-40	Bq/L	-	-	-	-	6.0	4.3	6.0	6.0	<5.0	6.0	2.5	1	2	-	-	-	-	-
Radium-223	Bq/L	-	-	-	-	<1.0	0.48	<1.0	<1.0	<0.9	<1.0	0.035	2	2	-	-	-	-	-
Radium-226	Bq/L	-	-	-	-	<4.0	-	<4.0	<4.0	-	-	-	1	1	-	-	-	-	-
Radon-219	Bq/L	-	-	-	-	<1.0	0.50	<1.0	<1.0	<1.0	<1.0	0	2	2	-	-	-	-	-
Thallium-208	Bq/L	-	-	-	-	0.70	0.40	0.70	0.70	<0.2	0.70	0.42	1	2	-	-	-	-	-
Thorium-227	Bq/L	-	-	-	-	<1.0	0.40	<1.0	<1.0	<0.6	<1.0	0.14	2	2	-	-	-	-	-
Thorium-230	Bq/L	-	-	-	-	<20	10	<20	<20	<20	<20	0	2	2	-	-	-	-	-
Thorium-234	Bq/L	-	-	-	-	<4.0	2.0	<4.0	<4.0	<4.0	<4.0	0	2	2	-	-	-	-	-
Uranium-235	Bq/L	-	-	-	-	<1.0	0.50	<1.0	<1.0	<1.0	<1.0	0	2	2	-	-	-	-	-

APPENDIX B
Table B-3: Seasonal Surface Water Quality Summary of Dalglish Creek, 2012 to 2017

Table B-3: Seasonal Surface Water Quality Summary of Dalglish Creek, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary													
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Freshet (April to early June)													
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline				
																Acute	Chronic	BC MOE Mean	BC MOE Max
Field Measured																			
pH	-	-	6.5 - 9.0	6.5 - 9.0	6.5 - 9.0	6.9	6.9	7.1	7.3	6.5	7.3	0.59	0	2	-	-	-	-	
Specific conductivity	µS/cm	-	-	-	-	96	96	113	128	60	131	50	0	2	-	-	-	-	
Temperature	°C	-	-	-	-	6.4	6.4	8.7	11	1.8	11	6.5	0	2	-	-	-	-	
Dissolved oxygen	mg/L	-	6.5	8.0	5.0	12	12	13	13	11	13	1.9	0	2	-	-	-	-	
Turbidity	NTU	-	-	-	-	28	28	39	48	5.7	50	31	0	2	-	-	-	-	
Conventional Parameters																			
Hardness, as CaCO ₃	mg/L	-	-	-	-	36	36	42	48	22	49	19	0	2	-	-	-	-	
Total alkalinity, as CaCO ₃	mg/L	-	-	20 ^(a)	-	12 ^(BC MOE Mean)	12 ^(BC MOE Mean)	14 ^(BC MOE Mean)	16 ^(BC MOE Mean)	7.0 ^(BC MOE Mean)	17 ^(BC MOE Mean)	7.1	0	2	-	-	100	-	
Total dissolved solids	mg/L	-	-	-	-	<5.0	2.5	<5.0	<5.0	<5.0	<5.0	0	2	2	-	-	-	-	
Total suspended solids	mg/L	-	-	-	-	41	41	58	72	7.0	75	48	0	2	-	-	-	-	
Total organic carbon	mg/L	-	-	-	-	22	22	23	24	19	24	4.1	0	2	-	-	-	-	
Dissolved organic carbon	mg/L	-	-	-	-	18	18	18	19	18	19	0.49	0	2	-	-	-	-	
Dissolved inorganic carbon	mg/L	-	-	-	-	2.9	2.9	3.6	4.1	1.6	4.2	1.8	0	2	-	-	-	-	
Total inorganic carbon	mg/L	-	-	-	-	3.2	3.2	3.8	4.3	2.0	4.4	1.7	0	2	-	-	-	-	
Major Ions																			
Bicarbonate, as CaCO ₃	mg/L	-	-	-	-	21	12	21	21	<5.0	21	13	1	2	-	-	-	-	
Bromide	mg/L	-	-	-	-	<0.02	0.010	<0.02	<0.02	<0.02	<0.02	0	2	2	-	-	-	-	
Calcium	mg/L	-	-	-	-	7.9	7.9	9.5	11	4.8	11	4.4	0	2	-	-	-	-	
Carbonate, as CaCO ₃	mg/L	-	-	-	-	8.0	5.5	8.0	8.0	<6.0	8.0	3.5	1	2	-	-	-	-	
Chloride	mg/L	640	120	150	600	0.24	0.24	0.34	0.41	0.050	0.43	0.27	0	2	-	-	-	-	
Fluoride	mg/L	-	0.12 ⁽ⁱ⁾	-	0.73 - 2.0 ^(b)	-	-	-	-	-	-	-	0	0	-	-	-	-	
Magnesium	mg/L	-	-	-	-	3.8	3.8	4.6	5.1	2.4	5.3	2.0	0	2	-	-	-	-	
Potassium	mg/L	-	-	-	-	0.90	0.90	1.0	1.1	0.70	1.1	0.28	0	2	-	-	-	-	
Sodium	mg/L	-	-	-	-	5.7	5.7	6.8	7.6	3.6	7.8	3.0	0	2	-	-	-	-	
Sulphate	mg/L	-	-	128 - 429 ^(b, c)	-	15	15	16	16	15	16	1.1	0	2	-	-	-	-	
Nutrients																			
Nitrate	mg-N/L	124	2.9	3.0	33	0.020	0.013	0.020	0.020	<0.01	0.020	0.011	1	2	-	-	-	-	
Nitrite	mg-N/L	-	0.060	0.020 ^(d)	0.060 ^(d)	0.050 ^(BC MOE Mean)	0.028 ^(BC MOE Mean)	0.050 ^(BC MOE Mean)	0.050 ^(BC MOE Mean)	<0.01	0.050 ^(BC MOE Mean)	0.032	1	2	-	-	50	-	
Nitrate + nitrite	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
Total ammonia	mg-N/L	-	0.92 - 52 ^(e)	1.4 - 2.1 ^(f)	7.4 - 28 ^(g)	0.040	0.023	0.040	0.040	<0.01	0.040	0.025	1	2	-	-	-	-	
Total kjeldahl nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
Total nitrogen (calculated)	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
Total nitrogen	mg-N/L	-	-	-	-	0.71	0.71	0.74	0.77	0.63	0.78	0.11	0	2	-	-	-	-	
Total phosphorus	mg-P/L	-	-	0.010	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
Phosphorus (as phosphate)	mg-P/L	-	-	-	-	0.070	0.070	0.091	0.11	0.029	0.11	0.058	0	2	-	-	-	-	
Total Metals																			
Aluminum	µg/L	-	100 ^(h, i)	-	-	1,005 ^(Chronic)	1,005 ^(Chronic)	1,388 ^(Chronic)	1,694 ^(Chronic)	240 ^(Chronic)	1,770 ^(Chronic)	1,082	0	2	-	100	-	-	
Antimony	µg/L	-	-	9.0	-	0.10	0.10	0.10	0.10	0.10	0.10	0	0	2	-	-	-	-	
Arsenic	µg/L	-	5.0	-	5.0	1.00	1.00	1.2	1.4	0.59	1.4	0.57	0	2	-	-	-	-	
Barium	µg/L	-	-	1,000	-	94	94	102	108	79	110	22	0	2	-	-	-	-	
Beryllium	µg/L	-	-	0.13	-	0.12	0.073	0.12	0.12	<0.05	0.12	0.067	1	2	-	-	-	-	
Bismuth	µg/L	-	-	-	-	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	2	2	-	-	-	-	
Boron	µg/L	29,000	1,500	-	1,200	24	24	27	29	19	29	7.1	0	2	-	-	-	-	
Cadmium	µg/L	0.45 - 7.7 ^(b)	0.045 - 0.37 ^(b)	-	-	0.070 ^(Chronic)	0.070 ^(Chronic)	0.090 ^(Chronic)	0.11 ^(Chronic)	0.030	0.11 ^(Chronic)	0.057	0	2	-	50	-	-	
Chromium	µg/L	-	1.0	1.0 ^(j)	-	2.2 ^(Chronic, BC MOE Mean)	2.2 ^(Chronic, BC MOE Mean)	2.8 ^(Chronic, BC MOE Mean)	3.3 ^(Chronic, BC MOE Mean)	0.90	3.4 ^(Chronic, BC MOE Mean)	1.8	0	2	-	50	50	-	
Cobalt	µg/L	-	-	4.0	110	1.4	1.4	2.0	2.4	0.40	2.5	1.5	0	2	-	-	-	-	
Copper	µg/L	-	2.0 - 4.0 ^(b)	2.0 - 10 ^(b)	4.1 - 40 ^(b)	4.6 ^(Chronic, BC MOE Mean)	4.6 ^(Chronic, BC MOE Mean)	5.0 ^(Chronic, BC MOE Mean)	5.4 ^(Chronic, BC MOE Mean)	3.7 ^(Chronic, BC MOE Mean)	5.5 ^(Chronic, BC MOE Mean, BC MOE Max)	1.3	0	2	-	100	100	50	
Iron	µg/L	-	300	-	1,000	1,882 ^(Chronic, BC MOE Max)	1,882 ^(Chronic, BC MOE Max)	2,401 ^(Chronic, BC MOE Max)	2,816 ^(Chronic, BC MOE Max)	844 ^(Chronic)	2,920 ^(Chronic, BC MOE Max)	1,468	0	2	-	100	-	50	
Lead	µg/L	-	1.0 - 7.0 ^(b)	3.8 - 20 ^(b)	12 - 417 ^(b)	0.70	0.70	0.95	1.2 ^(Chronic)	0.20	1.2 ^(Chronic)	0.71	0	2	-	50	-	-	
Lithium	µg/L	-	-	-	-	4.1	4.1	4.1	4.1	4.0	4.1	0.071	0	2	-	-	-	-	
Manganese	µg/L	-	-	768 - 2,585 ^(b)	816 - 3,394 ^(b)	106	106	151	186	17	195	126	0	2	-	-	-	-	
Mercury	µg/L	-	0.026	0.010	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	2	2	-	-	-	-	
Molybdenum	µg/L	-	73	1,000	2,000	0.23	0.23	0.24	0.24	0.22	0.24	0.014	0	2	-	-	-	-	
Nickel	µg/L	-	25 - 150 ^(b)	25 - 150 ^(b)	-	7.1	7.1	7.3	7.5	6.7	7.5	0.57	0	2	-	-	-	-	
Selenium	µg/L	-	1.0	2.0	-	0.45	0.45	0.53	0.59	0.30	0.60	0.21	0	2	-	-	-	-	
Silicon	µg/L	-	-	-	-	3,895	3,895	4,723	5,385	2,240	5,550	2,341	0	2	-	-	-	-	
Silver	µg/L	-	0.25	0.050 - 1.5 ^(b)	0.10 - 3.0 ^(b)	0.020	0.023	0.020	0.020	0.020	<0.05	0.0035	1	2	-	-	-	-	
Strontium	µg/L	-	-	-	-	27	27	32	36	18	37	13	0	2	-	-	-	-	
Sulphur	µg/L	-	-	-	-	5,200	-	5,200	5,200	-	-	-	0	1	-	-	-	-	
Tellurium	µg/L	-	-	-	-	<0.05	-	<0.05	<0.05	-	-	-	1	1	-	-	-	-	
Thallium	µg/L	-	0.80	0.80	-	0.030	0.018	0.030	0.030	<0.01	0.030	0.018	1	2	-	-	-	-	
Thorium	µg/L	-	-	-	-	0.28	0.28	0.34	0.38	0.17	0.39	0.16	0	2	-	-	-	-	
Tin	µg/L	-	-	-	-	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	2	2	-	-	-	-	
Titanium	µg/L	-	-	-	-	47	47	66	82	7.6	86	55	0	2	-	-	-	-	
Uranium	µg/L	33	15	8.5	-	0.18	0.18	0.21	0.23	0.13	0.23	0.071	0	2	-	-	-	-	
Vanadium	µg/L	-	-	-	-	3.9	3.9	5.2	6.3	1.2	6.6	3.8	0	2	-	-	-	-	
Zinc	µg/L	-	30	7.5 - 188 ^(b)	33 - 341 ^(b)	16 ^(BC MOE Mean)	16 ^(BC MOE Mean)	18 ^(BC MOE Mean)	20 ^(BC MOE Mean)	11 ^(BC MOE Mean)	21 ^(BC MOE Mean)	7.1	0	2	-	-	100	-	
Zirconium	µg/L	-	-	-	-	1.2	1.2	1.2	1.3	1.0	1.3	0.21	0	2	-	-	-	-	

APPENDIX B
Table B-3: Seasonal Surface Water Quality Summary of Dalglish Creek, 2012 to 2017

Table B-3: Seasonal Surface Water Quality Summary of Dalglish Creek, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary												
						Freshet (April to early June)												
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline			
														Acute	Chronic	BC MOE Mean	BC MOE Max	
Dissolved Metals																		
Aluminum	µg/L	-	-	50 ⁽ⁿ⁾	100 ⁽ⁿ⁾	128 ^(BC MOE Mean, BC MOE Max)	128 ^(BC MOE Mean, BC MOE Max)	150 ^(BC MOE Mean, BC MOE Max)	167 ^(BC MOE Mean, BC MOE Max)	86 ^(BC MOE Mean)	171 ^(BC MOE Mean, BC MOE Max)	60	0	2	-	-	100	50
Antimony	µg/L	-	-	-	-	<0.2	0.10	<0.2	<0.2	<0.2	<0.2	0	2	2	-	-	-	-
Arsenic	µg/L	-	-	-	-	0.50	0.50	0.50	0.50	0.50	0.50	0	0	2	-	-	-	-
Barium	µg/L	-	-	-	-	56	56	62	67	44	68	17	0	2	-	-	-	-
Beryllium	µg/L	-	-	-	-	0.040	0.030	0.040	0.040	<0.04	0.040	0.014	1	2	-	-	-	-
Bismuth	µg/L	-	-	-	-	<1.0	0.50	<1.0	<1.0	<1.0	<1.0	0	2	2	-	-	-	-
Boron	µg/L	-	-	-	-	21	21	23	24	18	24	4.2	0	2	-	-	-	-
Cadmium	µg/L	-	-	0.069 - 0.46 ^(b)	0.12 - 2.8 ^(b)	0.040	0.040	0.050	0.058	0.020	0.060	0.028	0	2	-	-	-	-
Chromium	µg/L	-	-	-	-	0.50	0.50	0.55	0.59	0.40	0.60	0.14	0	2	-	-	-	-
Cobalt	µg/L	-	-	-	-	0.95	0.95	1.2	1.5	0.35	1.5	0.84	0	2	-	-	-	-
Copper	µg/L	-	-	-	-	3.7	3.7	3.9	4.0	3.4	4.0	0.42	0	2	-	-	-	-
Iron	µg/L	-	-	-	350	678 ^(BC MOE Max)	678 ^(BC MOE Max)	747 ^(BC MOE Max)	801 ^(BC MOE Max)	542 ^(BC MOE Max)	815 ^(BC MOE Max)	193	0	2	-	-	-	100
Lead	µg/L	-	-	-	-	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	2	2	-	-	-	-
Lithium	µg/L	-	-	-	-	3.0	3.0	3.5	3.9	2.0	4.0	1.4	0	2	-	-	-	-
Manganese	µg/L	-	-	-	-	101	101	143	177	17	185	119	0	2	-	-	-	-
Mercury	µg/L	-	-	-	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	2	2	-	-	-	-
Molybdenum	µg/L	-	-	-	-	0.18	0.18	0.21	0.24	0.10	0.25	0.11	0	2	-	-	-	-
Nickel	µg/L	-	-	-	-	5.5	5.5	5.8	6.0	5.0	6.0	0.71	0	2	-	-	-	-
Selenium	µg/L	-	-	-	-	<0.6	0.30	<0.6	<0.6	<0.6	<0.6	0	2	2	-	-	-	-
Silicon	µg/L	-	-	-	-	1,290	1,290	1,555	1,767	760	1,820	750	0	2	-	-	-	-
Silver	µg/L	-	-	-	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	2	2	-	-	-	-
Strontium	µg/L	-	-	-	-	26	26	31	36	14	37	16	0	2	-	-	-	-
Sulphur	µg/L	-	-	-	-	9,300	9,300	11,350	12,990	5,200	13,400	5,798	0	2	-	-	-	-
Tellurium	µg/L	-	-	-	-	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	2	2	-	-	-	-
Thallium	µg/L	-	-	-	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	2	2	-	-	-	-
Thorium	µg/L	-	-	-	-	<0.4	0.20	<0.4	<0.4	<0.4	<0.4	0	2	2	-	-	-	-
Tin	µg/L	-	-	-	-	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	2	2	-	-	-	-
Titanium	µg/L	-	-	-	-	<10	5.0	<10	<10	<10	<10	0	2	2	-	-	-	-
Uranium	µg/L	-	-	-	-	<0.4	0.20	<0.4	<0.4	<0.4	<0.4	0	2	2	-	-	-	-
Vanadium	µg/L	-	-	-	-	0.47	0.47	0.48	0.50	0.43	0.50	0.049	0	2	-	-	-	-
Zinc	µg/L	-	-	-	-	11	11	12	12	10	12	1.4	0	2	-	-	-	-
Zirconium	µg/L	-	-	-	-	0.73	0.73	0.80	0.85	0.60	0.86	0.18	0	2	-	-	-	-
Volatile Organics																		
Benzene	µg/L	-	370 ^(b)	40	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	2	2	-	-	-	-
Ethylbenzene	µg/L	-	90 ^(b)	200	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	2	2	-	-	-	-
Toluene	µg/L	-	2 ^(b)	0.50	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	2	2	-	-	-	-
Xylenes	µg/L	-	-	30	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	2	2	-	-	-	-
Styrene	µg/L	-	72 ^(b)	72	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	2	2	-	-	-	-
Extractable Petroleum Hydrocarbons (C10-C19)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Extractable Petroleum Hydrocarbons (C10-C32)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Volatile Hydrocarbons	µg/L	-	-	-	-	<50	25	<50	<50	<50	<50	0	2	2	-	-	-	-
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	-	<50	25	<50	<50	<50	<50	0	2	2	-	-	-	-
Methyl tertiary-butyl ether	µg/L	-	-	-	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	2	2	-	-	-	-
Parent PAHs																		
Naphthalene	µg/L	-	1.1 ^(b)	1.0	-	<0.00765	-	<0.00765	<0.00765	-	-	-	1	1	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	<0.000206	-	<0.000206	<0.000206	-	-	-	1	1	-	-	-	-
Biphenyl	µg/L	-	-	-	-	<0.00468	-	<0.00468	<0.00468	-	-	-	1	1	-	-	-	-
Acenaphthene	µg/L	-	5.8 ^(b)	6.0	-	<0.000463	-	<0.000463	<0.000463	-	-	-	1	1	-	-	-	-
Fluorene	µg/L	-	3 ^(b)	12	-	<0.000195	-	<0.000195	<0.000195	-	-	-	1	1	-	-	-	-
Phenanthrene	µg/L	-	0.4 ^(b)	0.30	-	<0.0033	-	<0.0033	<0.0033	-	-	-	1	1	-	-	-	-
Anthracene	µg/L	-	0.012 ^(b)	0.10	-	<0.0000899	-	<0.0000899	<0.0000899	-	-	-	1	1	-	-	-	-
Dibenzothiophene	µg/L	-	-	-	-	<0.000215	-	<0.000215	<0.000215	-	-	-	1	1	-	-	-	-
Pyrene	µg/L	-	0.025 ^(b)	0.020	-	<0.001467	-	<0.001467	<0.001467	-	-	-	1	1	-	-	-	-
Fluoranthene	µg/L	-	0.04 ^(b)	0.20	-	<0.001131	-	<0.001131	<0.001131	-	-	-	1	1	-	-	-	-
Benzo(a)anthracene	µg/L	-	0.018 ^(b)	0.10	-	<0.00111	-	<0.00111	<0.00111	-	-	-	1	1	-	-	-	-
Chrysene	µg/L	-	-	-	-	<0.000429	-	<0.000429	<0.000429	-	-	-	1	1	-	-	-	-
1-Methyl-7-isopropyl-phenanthrene (Retene)	µg/L	-	-	-	-	0.00066	-	0.00066	0.00066	-	-	-	0	1	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	<0.000295	-	<0.000295	<0.000295	-	-	-	1	1	-	-	-	-
Benzo(j,k)fluoranthenes	µg/L	-	-	-	-	<0.0000941	-	<0.0000941	<0.0000941	-	-	-	1	1	-	-	-	-
Benzo(b,j,k)fluoranthenes	µg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Benzo(a)pyrene	µg/L	-	0.015 ^(b)	0.010	-	<0.000135	-	<0.000135	<0.000135	-	-	-	1	1	-	-	-	-
Benzo(e)pyrene	µg/L	-	-	-	-	<0.000366	-	<0.000366	<0.000366	-	-	-	1	1	-	-	-	-
Perylene	µg/L	-	-	-	-	<0.000305	-	<0.000305	<0.000305	-	-	-	1	1	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	<0.000504	-	<0.000504	<0.000504	-	-	-	1	1	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	<0.000255	-	<0.000255	<0.000255	-	-	-	1	1	-	-	-	-
Dibenzo(a,h)anthracene	µg/L	-	-	-	-	<0.000195	-	<0.000195	<0.000195	-	-	-	1	1	-	-	-	-

Table B-3: Seasonal Surface Water Quality Summary of Dalglish Creek, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary												
						Freshet (April to early June)												
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline			
														Acute	Chronic	BC MOE Mean	BC MOE Max	
Alkylated PAHs																		
C1 substituted naphthalenes	µg/L	-	-	-	-	<0.00939	-	<0.00939	<0.00939	-	-	-	1	1	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-	<0.001656	-	<0.001656	<0.001656	-	-	-	1	1	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	<0.00939	-	<0.00939	<0.00939	-	-	-	1	1	-	-	-	-
C2 substituted naphthalenes	µg/L	-	-	-	-	<0.01257	-	<0.01257	<0.01257	-	-	-	1	1	-	-	-	-
1,2-Dimethylnaphthalene	µg/L	-	-	-	-	<0.000923	-	<0.000923	<0.000923	-	-	-	1	1	-	-	-	-
2,6-Dimethylnaphthalene	µg/L	-	-	-	-	<0.000781	-	<0.000781	<0.000781	-	-	-	1	1	-	-	-	-
C1 substituted acenaphthenes	µg/L	-	-	-	-	<0.000404	-	<0.000404	<0.000404	-	-	-	1	1	-	-	-	-
C1 substituted biphenyls	µg/L	-	-	-	-	<0.001857	-	<0.001857	<0.001857	-	-	-	1	1	-	-	-	-
C3 substituted naphthalenes	µg/L	-	-	-	-	<0.00582	-	<0.00582	<0.00582	-	-	-	1	1	-	-	-	-
2,3,5-Trimethylnaphthalene	µg/L	-	-	-	-	0.00082	-	0.00082	0.00082	-	-	-	0	1	-	-	-	-
2,3,6-Trimethylnaphthalene	µg/L	-	-	-	-	<0.000972	-	<0.000972	<0.000972	-	-	-	1	1	-	-	-	-
C1 substituted fluorenes	µg/L	-	-	-	-	0.00079	-	0.00079	0.00079	-	-	-	0	1	-	-	-	-
2-Methylfluorene	µg/L	-	-	-	-	<0.000195	-	<0.000195	<0.000195	-	-	-	1	1	-	-	-	-
C2 substituted biphenyls	µg/L	-	-	-	-	<0.0033	-	<0.0033	<0.0033	-	-	-	1	1	-	-	-	-
C4 substituted naphthalenes	µg/L	-	-	-	-	0.0012	-	0.0012	0.0012	-	-	-	0	1	-	-	-	-
1,4,6,7-Tetramethylnaphthalene	µg/L	-	-	-	-	<0.000343	-	<0.000343	<0.000343	-	-	-	1	1	-	-	-	-
C1 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.00037	-	0.00037	0.00037	-	-	-	0	1	-	-	-	-
1-Methylphenanthrene	µg/L	-	-	-	-	<0.000285	-	<0.000285	<0.000285	-	-	-	1	1	-	-	-	-
2-Methylphenanthrene	µg/L	-	-	-	-	<0.000294	-	<0.000294	<0.000294	-	-	-	1	1	-	-	-	-
3-Methylphenanthrene	µg/L	-	-	-	-	<0.000228	-	<0.000228	<0.000228	-	-	-	1	1	-	-	-	-
9/4-Methylphenanthrene	µg/L	-	-	-	-	0.00037	-	0.00037	0.00037	-	-	-	0	1	-	-	-	-
2-Methylantracene	µg/L	-	-	-	-	<0.000234	-	<0.000234	<0.000234	-	-	-	1	1	-	-	-	-
C2 substituted fluorenes	µg/L	-	-	-	-	0.00096	-	0.00096	0.00096	-	-	-	0	1	-	-	-	-
1,7-Dimethylfluorene	µg/L	-	-	-	-	<0.000238	-	<0.000238	<0.000238	-	-	-	1	1	-	-	-	-
C1 substituted dibenzothiophenes	µg/L	-	-	-	-	0.00026	-	0.00026	0.00026	-	-	-	0	1	-	-	-	-
2/3-Methyldibenzothiophenes	µg/L	-	-	-	-	<0.000162	-	<0.000162	<0.000162	-	-	-	1	1	-	-	-	-
C2 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.00086	-	0.00086	0.00086	-	-	-	0	1	-	-	-	-
1,7-Dimethylphenanthrene	µg/L	-	-	-	-	0.00011	-	0.00011	0.00011	-	-	-	0	1	-	-	-	-
1,8-Dimethylphenanthrene	µg/L	-	-	-	-	<0.0000648	-	<0.0000648	<0.0000648	-	-	-	1	1	-	-	-	-
2,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.0000648	-	<0.0000648	<0.0000648	-	-	-	1	1	-	-	-	-
3,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.0000659	-	<0.0000659	<0.0000659	-	-	-	1	1	-	-	-	-
C3 substituted fluorenes	µg/L	-	-	-	-	<0.00534	-	<0.00534	<0.00534	-	-	-	1	1	-	-	-	-
C2 substituted dibenzothiophenes	µg/L	-	-	-	-	0.0011	-	0.0011	0.0011	-	-	-	0	1	-	-	-	-
2,4-Dimethyldibenzothiophene	µg/L	-	-	-	-	<0.000193	-	<0.000193	<0.000193	-	-	-	1	1	-	-	-	-
C1 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.00092	-	0.00092	0.00092	-	-	-	0	1	-	-	-	-
C3 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.000576	-	<0.000576	<0.000576	-	-	-	1	1	-	-	-	-
1,2,6-Trimethylphenanthrene	µg/L	-	-	-	-	<0.000125	-	<0.000125	<0.000125	-	-	-	1	1	-	-	-	-
C3 substituted dibenzothiophenes	µg/L	-	-	-	-	0.00081	-	0.00081	0.00081	-	-	-	0	1	-	-	-	-
C2 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.0012	-	0.0012	0.0012	-	-	-	0	1	-	-	-	-
C4 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.0018	-	0.0018	0.0018	-	-	-	0	1	-	-	-	-
C4 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.002319	-	<0.002319	<0.002319	-	-	-	1	1	-	-	-	-
C1 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.00037	-	0.00037	0.00037	-	-	-	0	1	-	-	-	-
5/6-Methylchrysenes	µg/L	-	-	-	-	<0.000113	-	<0.000113	<0.000113	-	-	-	1	1	-	-	-	-
C3 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.00040	-	0.00040	0.00040	-	-	-	0	1	-	-	-	-
C2 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.00014	-	<0.00014	<0.00014	-	-	-	1	1	-	-	-	-
5,9-Dimethylchrysene	µg/L	-	-	-	-	<0.00014	-	<0.00014	<0.00014	-	-	-	1	1	-	-	-	-
C4 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.000106	-	<0.000106	<0.000106	-	-	-	1	1	-	-	-	-
C1 substituted benzo(a)fluoranthenes / benzopyrenes	µg/L	-	-	-	-	<0.000317	-	<0.000317	<0.000317	-	-	-	1	1	-	-	-	-
7-Methylbenzo[a]pyrene	µg/L	-	-	-	-	<0.000317	-	<0.000317	<0.000317	-	-	-	1	1	-	-	-	-
C3 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000134	-	<0.000134	<0.000134	-	-	-	1	1	-	-	-	-
C2 substituted benzo(a)fluoranthenes / benzopyrenes	µg/L	-	-	-	-	<0.000456	-	<0.000456	<0.000456	-	-	-	1	1	-	-	-	-
C4 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000414	-	<0.000414	<0.000414	-	-	-	1	1	-	-	-	-
1-methylchrysene	µg/L	-	-	-	-	<0.000107	-	<0.000107	<0.000107	-	-	-	1	1	-	-	-	-
3-methylfluoranthene / benzo(a)fluorene	µg/L	-	-	-	-	<0.000588	-	<0.000588	<0.000588	-	-	-	1	1	-	-	-	-

Table B-3: Seasonal Surface Water Quality Summary of Dalglish Creek, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary												
						Freshet (April to early June)												
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline			
															Acute	Chronic	BC MOE Mean	BC MOE Max
Naphthenic Acid																		
C12h18o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C12h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C12h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C12h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C13h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C13h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C13h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C13h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C14h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C14h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C14h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C14h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C14h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C15h18o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C15h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C15h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C15h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C15h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C15h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C15h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C16h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C16h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C16h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C16h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C16h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C16h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C16h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C17h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C17h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C17h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C17h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C17h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C17h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C17h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C18h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C18h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C18h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C18h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C18h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C18h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C18h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C19h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C19h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C19h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C19h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C19h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C19h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C19h38o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C20h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C20h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C20h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C20h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C20h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C20h38o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C21h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C21h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C21h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C21h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C21h38o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C21h40o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Radionuclides																		
Actinium-228	Bq/L	-	-	-	-	0.80	-	0.80	0.80	-	-	-	0	1	-	-	-	-
Bismuth-212	Bq/L	-	-	-	-	1.0	-	1.0	1.0	-	-	-	0	1	-	-	-	-
Bismuth-214	Bq/L	-	-	-	-	<0.4	-	<0.4	<0.4	-	-	-	1	1	-	-	-	-
Lead-210	Bq/L	-	-	-	-	<3.0	-	<3.0	<3.0	-	-	-	1	1	-	-	-	-
Lead-211	Bq/L	-	-	-	-	<3.0	-	<3.0	<3.0	-	-	-	1	1	-	-	-	-
Lead-212	Bq/L	-	-	-	-	0.50	-	0.50	0.50	-	-	-	0	1	-	-	-	-
Lead-214	Bq/L	-	-	-	-	<0.3	-	<0.3	<0.3	-	-	-	1	1	-	-	-	-
Potassium-40	Bq/L	-	-	-	-	<4.0	-	<4.0	<4.0	-	-	-	1	1	-	-	-	-
Radium-223	Bq/L	-	-	-	-	<0.5	-	<0.5	<0.5	-	-	-	1	1	-	-	-	-
Radium-226	Bq/L	-	-	-	-	0.0090	-	0.0090	0.0090	-	-	-	0	1	-	-	-	-
Radon-219	Bq/L	-	-	-	-	<0.8	-	<0.8	<0.8	-	-	-	1	1	-	-	-	-
Thallium-208	Bq/L	-	-	-	-	0.30	-	0.30	0.30	-	-	-	0	1	-	-	-	-
Thorium-227	Bq/L	-	-	-	-	<0.7	-	<0.7	<0.7	-	-	-	1	1	-	-	-	-
Thorium-230	Bq/L	-	-	-	-	<20	-	<20	<20	-	-	-	1	1	-	-	-	-
Thorium-234	Bq/L	-	-	-	-	<2.0	-	<2.0	<2.0	-	-	-	1	1	-	-	-	-
Uranium-235	Bq/L	-	-	-	-	<1.0	-	<1.0	<1.0	-	-	-	1	1	-	-	-	-

APPENDIX B
Table B-3: Seasonal Surface Water Quality Summary of Dalglish Creek, 2012 to 2017

Table B-3: Seasonal Surface Water Quality Summary of Dalglish Creek, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary											
						Open Water (late June to September)											
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline		
															Acute	Chronic	BC MOE Mean
Field Measured																	
pH	-	-	6.5 - 9.0	6.5 - 9.0	6.5 - 9.0	7.3	7.3	7.5	7.8	6.7	7.9	0.41	0	9	-	-	-
Specific conductivity	µS/cm	-	-	-	-	200	216	281	309	138	313	68	0	9	-	-	-
Temperature	°C	-	-	-	-	4.2	8.0	15	17	1.9	17	6.4	0	9	-	-	-
Dissolved oxygen	mg/L	-	6.5	8.0	5.0	13	12	13	14	9.3	14	1.7	0	8	-	-	-
Turbidity	NTU	-	-	-	-	13	15	20	28	3.8	30	10.0	0	5	-	-	-
Conventional Parameters																	
Hardness, as CaCO ₃	mg/L	-	-	-	-	76	76	87	96	58	99	15	0	8	-	-	-
Total alkalinity, as CaCO ₃	mg/L	-	-	20 ^(a)	-	30	31	35	43	17 ^(BC MOE Mean)	46	9.1	0	8	-	-	13
Total dissolved solids	mg/L	-	-	-	-	152	195	247	309	118	340	76	0	8	-	-	-
Total suspended solids	mg/L	-	-	-	-	4.5	30	19	126	1.0	169	58	0	8	-	-	-
Total organic carbon	mg/L	-	-	-	-	21	21	22	23	19	23	1.7	0	6	-	-	-
Dissolved organic carbon	mg/L	-	-	-	-	21	24	22	41	18	50	10	0	8	-	-	-
Dissolved inorganic carbon	mg/L	-	-	-	-	6.3	6.3	6.9	9.4	3.8	10	2.0	0	8	-	-	-
Total inorganic carbon	mg/L	-	-	-	-	6.3	6.1	6.8	7.9	4.2	8.2	1.4	0	6	-	-	-
Major Ions																	
Bicarbonate, as CaCO ₃	mg/L	-	-	-	-	37	36	42	47	21	47	10.0	0	8	-	-	-
Bromide	mg/L	-	-	-	-	<0.02	0.024	0.030	<0.1	<0.02	<0.1	0.019	6	7	-	-	-
Calcium	mg/L	-	-	-	-	18	17	19	20	12	21	3.1	0	8	-	-	-
Carbonate, as CaCO ₃	mg/L	-	-	-	-	<6.0	2.4	<6.0	<6.0	<1.0	<6.0	1.2	8	8	-	-	-
Chloride	mg/L	640	120	150	600	0.13	0.21	0.36	0.50	<0.05	0.55	0.20	2	8	-	-	-
Fluoride	mg/L	-	0.12 ⁽ⁱ⁾	-	0.73 - 2.0 ^(b)	-	-	-	-	-	-	-	0	0	-	-	-
Magnesium	mg/L	-	-	-	-	6.9	7.8	10.0	11	5.4	12	2.5	0	8	-	-	-
Potassium	mg/L	-	-	-	-	0.72	0.72	0.80	0.87	0.50	0.90	0.12	0	8	-	-	-
Sodium	mg/L	-	-	-	-	11	11	14	16	6.9	17	3.8	0	8	-	-	-
Sulphate	mg/L	-	-	128 - 429 ^(b, c)	-	52	60	77	102	32	105	28	0	8	-	-	-
Nutrients																	
Nitrate	mg-N/L	124	2.9	3.0	33	0.080	0.081	0.12	0.18	<0.01	0.20	0.068	2	8	-	-	-
Nitrite	mg-N/L	-	0.060	0.020 ^(d)	0.060 ^(d)	<0.01	0.0081	<0.01	0.030 ^(BC MOE Mean)	<0.01	0.030 ^(BC MOE Mean)	0.0088	7	8	-	-	13
Nitrate + nitrite	mg-N/L	-	-	-	-	0.13	0.068	0.13	0.13	<0.01	0.13	0.088	1	2	-	-	-
Total ammonia	mg-N/L	-	0.92 - 52 ^(e)	1.4 - 2.1 ⁽ⁱ⁾	7.4 - 28 ^(g)	0.020	0.024	0.030	0.066	<0.01	0.080	0.026	4	8	-	-	-
Total kjeldahl nitrogen	mg-N/L	-	-	-	-	1.0	1.0	1.2	1.3	0.73	1.4	0.44	0	2	-	-	-
Total nitrogen (calculated)	mg-N/L	-	-	-	-	1.1	1.1	1.3	1.4	0.73	1.5	0.53	0	2	-	-	-
Total nitrogen	mg-N/L	-	-	-	-	0.80	0.90	0.91	1.3	0.73	1.5	0.27	0	7	-	-	-
Total phosphorus	mg-P/L	-	-	0.010	-	0.032	0.052	0.071	0.10	<0.03	0.11	0.051	1	3	-	-	-
Dissolved phosphorus	mg-P/L	-	-	-	-	0.015	0.015	0.016	0.016	0.014	0.016	0.0014	0	2	-	-	-
Phosphorus (as phosphate)	mg-P/L	-	-	-	-	0.046	0.074	0.052	0.23	0.020	0.29	0.11	1	6	-	-	-
Total Metals																	
Aluminum	µg/L	-	100 ^(h, i)	-	-	432 ^(Chronic)	463 ^(Chronic)	712 ^(Chronic)	794 ^(Chronic)	97	798 ^(Chronic)	270	0	8	-	88	-
Antimony	µg/L	-	-	9.0	-	0.17	0.16	0.20	0.21	0.13	0.21	0.040	1	8	-	-	-
Arsenic	µg/L	-	5.0	-	5.0	0.91	0.99	1.1	1.4	0.70	1.6	0.28	0	8	-	-	-
Barium	µg/L	-	-	1,000	-	96	105	108	143	85	158	23	0	8	-	-	-
Beryllium	µg/L	-	-	0.13	-	0.050	0.058	0.070	0.11	0.040	0.13	0.034	2	8	-	-	-
Bismuth	µg/L	-	-	-	-	<0.1	0.039	<0.1	<0.1	<0.01	<0.1	0.019	6	7	-	-	-
Boron	µg/L	29,000	1,500	-	1,200	34	34	36	42	27	45	5.5	0	8	-	-	-
Cadmium	µg/L	0.45 - 7.7 ^(b)	0.045 - 0.37 ^(b)	-	-	0.055	0.069	0.073	0.15 ^(Chronic)	0.030	0.19 ^(Chronic)	0.052	0	8	-	13	-
Chromium	µg/L	-	1.0	1.0 ^(j)	-	1.1 ^(Chronic, BC MOE Mean)	1.3 ^(Chronic, BC MOE Mean)	1.8 ^(Chronic, BC MOE Mean)	1.9 ^(Chronic, BC MOE Mean)	0.69	1.9 ^(Chronic, BC MOE Mean)	0.51	0	8	-	50	50
Cobalt	µg/L	-	-	4.0	110	0.78	1.1	1.2	2.8	0.35	3.4	1.0	0	8	-	-	-
Copper	µg/L	-	2.0 - 4.0 ^(b)	2.0 - 10 ^(b)	4.1 - 40 ^(b)	4.0 ^(Chronic, BC MOE Mean)	4.4 ^(Chronic, BC MOE Mean)	5.0 ^(Chronic, BC MOE Mean)	6.6 ^(Chronic, BC MOE Mean)	2.9 ^(Chronic)	7.4 ^(Chronic, BC MOE Mean)	1.4	0	8	-	100	75
Iron	µg/L	-	300	-	1,000	1,460 ^(Chronic, BC MOE Max)	1,879 ^(Chronic, BC MOE Max)	2,002 ^(Chronic, BC MOE Max)	3,458 ^(Chronic, BC MOE Max)	1,160 ^(Chronic, BC MOE Max)	4,140 ^(Chronic, BC MOE Max)	976	0	8	-	100	100
Lead	µg/L	-	1.0 - 7.0 ^(b)	3.8 - 20 ^(b)	12 - 417 ^(b)	0.47	0.62	0.76	1.5	0.10	1.7 ^(Chronic)	0.55	0	8	-	13	-
Lithium	µg/L	-	-	-	-	6.2	6.5	8.1	8.7	4.7	8.9	1.7	0	8	-	-	-
Manganese	µg/L	-	-	768 - 2,585 ^(b)	816 - 3,394 ^(b)	65	95	111	235	27	298	88	0	8	-	-	-
Mercury	µg/L	-	0.026	0.010	-	<0.01	0.0075	0.010	0.016 ^(BC MOE Mean)	<0.01	0.020 ^(BC MOE Mean)	0.0053	6	8	-	-	13
Molybdenum	µg/L	-	73	1,000	2,000	0.30	0.36	0.42	0.59	0.21	0.64	0.15	0	8	-	-	-
Nickel	µg/L	-	25 - 150 ^(b)	25 - 150 ^(b)	-	7.8	8.3	9.0	11	6.3	12	1.6	0	8	-	-	-
Selenium	µg/L	-	1.0	2.0	-	0.60	0.63	0.63	0.83	0.50	0.90	0.13	0	8	-	-	-
Silicon	µg/L	-	-	-	-	2,850	2,883	3,745	4,091	1,500	4,140	1,006	0	8	-	-	-
Silver	µg/L	-	0.25	0.050 - 1.5 ^(b)	0.10 - 3.0 ^(b)	0.011	0.018	0.030	0.050	<0.01	0.050	0.016	3	8	-	-	-
Strontium	µg/L	-	-	-	-	53	53	57	69	36	73	11	0	8	-	-	-
Sulphur	µg/L	-	-	-	-	20,300	22,100	29,700	35,310	11,000	36,000	10,136	0	7	-	-	-
Tellurium	µg/L	-	-	-	-	<0.05	<0.029	<0.05	<0.1	<0.05	<0.1	0.0094	7	7	-	-	-
Thallium	µg/L	-	0.80	0.80	-	0.010	0.011	0.013	0.027	0.0050	0.030	0.0092	3	8	-	-	-
Thorium	µg/L	-	-	-	-	0.29	0.31	0.38	0.68	<0.05	0.80	0.24	1	8	-	-	-
Tin	µg/L	-	-	-	-	<0.1	0.050	<0.1	0.10	<0.05	0.10	0.023	7	8	-	-	-
Titanium	µg/L	-	-	-	-	15	15	20	26	1.9	27	7.9	0	8	-	-	-
Uranium	µg/L	33	15	8.5	-	0.17	0.18	0.22	0.28	0.14	<0.4	0.044	1	8	-	-	-
Vanadium	µg/L	-	-	-	-	1.7	2.3	3.3	4.3	1.1	4.7	1.3	0	8	-	-	-
Zinc	µg/L	-	30	7.5 - 188 ^(b)	33 - 341 ^(b)	9.4 ^(BC MOE Mean)	11 ^(BC MOE Mean)	11	21 ^(BC MOE Mean)	5.0	24 ^(BC MOE Mean)	5.9	0	8	-	-	63
Zirconium	µg/L	-	-	-	-	1.2	1.2	1.4	1.6	0.90	1.7	0.29	0	8	-	-	-

APPENDIX B
Table B-3: Seasonal Surface Water Quality Summary of Dalglish Creek, 2012 to 2017

Table B-3: Seasonal Surface Water Quality Summary of Dalglish Creek, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary												
						Open Water (late June to September)												
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline			
															Acute	Chronic	BC MOE Mean	BC MOE Max
Dissolved Metals																		
Aluminum	µg/L	-	-	50 ⁽ⁿ⁾	100 ⁽ⁿ⁾	94 ^(BC MOE Mean)	92 ^(BC MOE Mean)	109 ^(BC MOE Mean, BC MOE Max)	117 ^(BC MOE Mean, BC MOE Max)	59 ^(BC MOE Mean)	117 ^(BC MOE Mean, BC MOE Max)	22	0	8	-	-	100	50
Antimony	µg/L	-	-	-	-	0.18	0.12	<0.2	<0.2	0.12	<0.2	0.030	4	8	-	-	-	-
Arsenic	µg/L	-	-	-	-	0.51	0.56	0.71	0.73	0.50	<1.0	0.099	1	8	-	-	-	-
Barium	µg/L	-	-	-	-	78	74	81	82	59	82	9.0	0	8	-	-	-	-
Beryllium	µg/L	-	-	-	-	0.040	0.054	<0.05	<0.5	0.030	<0.5	0.080	6	8	-	-	-	-
Bismuth	µg/L	-	-	-	-	<1.0	0.26	<1.0	<1.0	<0.01	<1.0	0.25	8	8	-	-	-	-
Boron	µg/L	-	-	-	-	31	30	34	36	25	36	4.4	0	8	-	-	-	-
Cadmium	µg/L	-	-	0.069 - 0.46 ⁽ⁿ⁾	0.12 - 2.8 ⁽ⁿ⁾	0.030	0.034	0.042	0.046	0.020	<0.1	0.010	1	8	-	-	-	-
Chromium	µg/L	-	-	-	-	0.64	0.60	0.73	0.80	<0.5	0.80	0.18	1	8	-	-	-	-
Cobalt	µg/L	-	-	-	-	0.57	0.62	0.89	1.0	0.25	1.1	0.31	0	8	-	-	-	-
Copper	µg/L	-	-	-	-	3.4	3.2	3.7	4.0	2.3	<5.0	0.57	1	8	-	-	-	-
Iron	µg/L	-	-	-	350	676 ^(BC MOE Max)	703 ^(BC MOE Max)	788 ^(BC MOE Max)	902 ^(BC MOE Max)	503 ^(BC MOE Max)	927 ^(BC MOE Max)	142	0	8	-	-	-	100
Lead	µg/L	-	-	-	-	<0.1	0.11	0.20	0.29	0.050	0.34	0.10	3	8	-	-	-	-
Lithium	µg/L	-	-	-	-	5.0	5.9	7.3	8.7	4.0	9.0	1.8	0	8	-	-	-	-
Manganese	µg/L	-	-	-	-	53	61	92	101	23	102	32	0	8	-	-	-	-
Mercury	µg/L	-	-	-	-	<0.01	0.0056	<0.01	0.010	<0.01	0.010	0.0018	7	8	-	-	-	-
Molybdenum	µg/L	-	-	-	-	0.26	0.31	0.34	0.56	0.19	0.62	0.15	0	8	-	-	-	-
Nickel	µg/L	-	-	-	-	6.4	6.3	7.1	7.8	5.0	8.0	1.1	0	8	-	-	-	-
Selenium	µg/L	-	-	-	-	<0.6	0.54	0.68	0.90	0.40	<2.0	0.27	3	8	-	-	-	-
Silicon	µg/L	-	-	-	-	2,030	1,964	2,278	2,696	1,310	2,860	551	0	8	-	-	-	-
Silver	µg/L	-	-	-	-	<0.01	0.011	<0.01	<0.1	<0.01	<0.1	0.016	8	8	-	-	-	-
Strontium	µg/L	-	-	-	-	49	48	51	63	33	67	11	0	8	-	-	-	-
Sulphur	µg/L	-	-	-	-	18,250	19,913	28,200	31,510	10,100	32,000	9,010	0	8	-	-	-	-
Tellurium	µg/L	-	-	-	-	<0.05	0.064	<0.1	<0.5	<0.05	<0.5	0.083	7	7	-	-	-	-
Thallium	µg/L	-	-	-	-	<0.01	0.010	<0.01	<0.1	<0.004	<0.1	0.016	7	8	-	-	-	-
Thorium	µg/L	-	-	-	-	0.21	0.20	<0.4	<0.5	0.11	<0.5	0.039	4	8	-	-	-	-
Tin	µg/L	-	-	-	-	<0.1	0.10	<0.1	<1.0	<0.05	<1.0	0.16	8	8	-	-	-	-
Titanium	µg/L	-	-	-	-	4.5	3.8	<10	<10	1.0	<10	1.6	3	8	-	-	-	-
Uranium	µg/L	-	-	-	-	0.14	0.15	<0.4	<0.4	0.089	<0.4	0.046	3	8	-	-	-	-
Vanadium	µg/L	-	-	-	-	0.40	0.46	0.75	0.78	0.29	0.80	0.20	1	8	-	-	-	-
Zinc	µg/L	-	-	-	-	5.5	5.7	6.5	8.7	4.0	9.0	2.1	1	8	-	-	-	-
Zirconium	µg/L	-	-	-	-	1.1	0.94	1.1	1.1	0.70	1.1	0.23	1	8	-	-	-	-
Volatile Organics																		
Benzene	µg/L	-	370 ^(l)	40	-	<0.5	84 ^(BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	129	6	6	-	-	-	-
Ethylbenzene	µg/L	-	90 ^(l)	200	-	<1.0	84	<500 ^(DL>Chronic, DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	129	6	6	-	-	-	-
Toluene	µg/L	-	2 ^(l)	0.50	-	<1.0 ^(DL>BC MOE Mean)	84 ^(Chronic, BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	129	6	6	-	-	-	-
Xylenes	µg/L	-	-	30	-	<2.0	84 ^(BC MOE Mean)	<500 ^(DL>BC MOE Mean)	<500 ^(DL>BC MOE Mean)	<0.5	<500 ^(DL>BC MOE Mean)	129	6	6	-	-	-	-
Styrene	µg/L	-	72 ^(l)	72	-	<0.5	100 ^(Chronic, BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	137	5	5	-	-	-	-
Extractable Petroleum Hydrocarbons (C10-C19)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Extractable Petroleum Hydrocarbons (C10-C32)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Volatile Hydrocarbons	µg/L	-	-	-	-	<100	8,354	<50,000	<50,000	<50	<50,000	12,894	6	6	-	-	-	-
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	-	<100	8,354	<50,000	<50,000	<50	<50,000	12,894	6	6	-	-	-	-
Methyl tertiary-butyl ether	µg/L	-	-	-	-	<0.5	100	<500	<500	<0.5	<500	137	5	5	-	-	-	-
Parent PAHs																		
Naphthalene	µg/L	-	1.1 ^(l)	1.0	-	<0.00564	0.0034	<0.01275	<0.01275	<0.00354	<0.01275	0.0020	4	4	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	<0.00033	0.00011	<0.000344	<0.000344	<0.000102	<0.000344	0.000063	4	4	-	-	-	-
Biphenyl	µg/L	-	-	-	-	<0.002241	0.0012	<0.002463	<0.002463	0.0014	<0.002463	0.00018	3	4	-	-	-	-
Acenaphthene	µg/L	-	5.8 ^(l)	6.0	-	<0.00047	0.00021	<0.000595	<0.000595	<0.000291	<0.000595	0.000074	4	4	-	-	-	-
Fluorene	µg/L	-	3 ^(l)	12	-	0.00042	0.00040	0.00054	0.00062	<0.000255	0.00064	0.00022	1	4	-	-	-	-
Phenanthrene	µg/L	-	0.4 ^(l)	0.30	-	0.0056	0.0046	0.0065	0.0087	0.0023	0.0092	0.0036	1	4	-	-	-	-
Anthracene	µg/L	-	0.012 ^(l)	0.10	-	<0.000236	0.00010	<0.000291	<0.000291	<0.000133	<0.000291	0.000037	4	4	-	-	-	-
Dibenzothiophene	µg/L	-	-	-	-	<0.00084	0.00057	0.0014	0.0014	<0.00048	0.0014	0.00053	3	4	-	-	-	-
Pyrene	µg/L	-	0.025 ^(l)	0.020	-	0.0014	0.0011	0.0016	0.0020	<0.000573	0.0021	0.00086	2	4	-	-	-	-
Fluoranthene	µg/L	-	0.04 ^(l)	0.20	-	<0.001215	0.00065	<0.001752	<0.001752	<0.001077	<0.001752	0.00015	4	4	-	-	-	-
Benzo(a)anthracene	µg/L	-	0.018 ^(l)	0.10	-	0.00021	0.00035	0.00043	0.00080	<0.00012	0.00090	0.00038	1	4	-	-	-	-
Chrysene	µg/L	-	-	-	-	0.0017	0.0018	0.0027	0.0034	<0.000303	0.0036	0.0015	1	4	-	-	-	-
1-Methyl-7-isopropyl-phenanthrene (Retene)	µg/L	-	-	-	-	0.0023	0.0035	0.0045	0.0080	<0.000744	0.0089	0.0038	1	4	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	0.00088	0.00096	0.0014	0.0019	<0.0000797	0.0020	0.00084	1	4	-	-	-	-
Benzo(i,k)fluoranthenes	µg/L	-	-	-	-	0.00029	0.00019	0.00032	0.00037	<0.0000847	0.00038	0.00017	2	4	-	-	-	-
Benzo(b,j,k)fluoranthenes	µg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Benzo(a)pyrene	µg/L	-	0.015 ^(l)	0.010	-	0.00027	0.00017	0.00027	0.00027	<0.000133	<0.000539	0.00011	3	4	-	-	-	-
Benzo(e)pyrene	µg/L	-	-	-	-	0.0014	0.0015	0.0022	0.0027	0.0015	0.0028	0.0012	0	4	-	-	-	-
Perylene	µg/L	-	-	-	-	0.0019	0.0013	0.0022	0.0030	<0.000142	0.0032	0.0015	2	4	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	0.0012	0.0014	0.0021	0.0030	<0.000102	0.0032	0.0014	1	4	-	-	-	-
Indeno(1,2,3-c,d)pyrene	µg/L	-	-	-	-	0.00034	0.00018	0.00034	0.00034	<0.000067	<0.000509	0.00014	3	4	-	-	-	-
Dibenzo(a,h)anthracene	µg/L	-	-	-	-	<0.00026	0.000084	<0.000304	<0.000304	<0.0000415	<0.000304	0.000066	4	4	-	-	-	-

Table B-3: Seasonal Surface Water Quality Summary of Dalglish Creek, 2012 to 2017

Table B-3: Seasonal Surface Water Quality Summary of Dalglish Creek, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary														
						Open Water (late June to September)														
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline					
															Acute	Chronic	BC MOE Mean	BC MOE Max		
Alkylated PAHs																				
C1 substituted naphthalenes	µg/L	-	-	-	-	0.0040	0.0042	<0.01344	<0.01344	<0.002661	<0.01344	0.0022	3	4	-	-	-	-		
1-Methylnaphthalene	µg/L	-	-	-	-	0.0027	0.0029	0.0038	0.0049	0.0012	0.0051	0.0017	0	4	-	-	-	-		
2-Methylnaphthalene	µg/L	-	-	-	-	<0.00675	0.0028	<0.01176	<0.01176	<0.001812	<0.01176	0.0023	4	4	-	-	-	-		
C2 substituted naphthalenes	µg/L	-	-	-	-	0.013	0.010	0.015	0.020	<0.00642	0.021	0.0082	2	4	-	-	-	-		
1,2-Dimethylnaphthalene	µg/L	-	-	-	-	<0.001188	0.0010	0.0027	0.0027	<0.000595	0.0027	0.0011	3	4	-	-	-	-		
2,6-Dimethylnaphthalene	µg/L	-	-	-	-	0.0022	0.0021	0.0034	0.0038	<0.000357	0.0039	0.0017	1	4	-	-	-	-		
C1 substituted acenaphthenes	µg/L	-	-	-	-	<0.000559	0.00024	<0.000927	<0.000927	<0.000186	<0.000927	0.00017	4	4	-	-	-	-		
C1 substituted biphenyls	µg/L	-	-	-	-	0.0034	0.0032	0.0043	0.0043	<0.0024	<0.00927	0.0016	2	4	-	-	-	-		
C3 substituted naphthalenes	µg/L	-	-	-	-	0.012	0.014	0.019	0.026	<0.00372	0.028	0.011	1	4	-	-	-	-		
2,3,5-Trimethylnaphthalene	µg/L	-	-	-	-	0.0021	0.0028	0.0040	0.0059	0.00050	0.0064	0.0027	0	4	-	-	-	-		
2,3,6-Trimethylnaphthalene	µg/L	-	-	-	-	0.0026	0.0030	0.0046	0.0061	<0.000597	0.0065	0.0028	1	4	-	-	-	-		
C1 substituted fluorenes	µg/L	-	-	-	-	0.0018	0.0016	0.0030	0.0030	<0.001029	0.0030	0.0011	2	4	-	-	-	-		
2-Methylfluorene	µg/L	-	-	-	-	<0.000532	0.00025	<0.00109	<0.00109	<0.000129	<0.00109	0.00022	4	4	-	-	-	-		
C2 substituted biphenyls	µg/L	-	-	-	-	<0.01707	0.0092	<0.0414	<0.0414	0.0022	<0.0414	0.0081	3	4	-	-	-	-		
C4 substituted naphthalenes	µg/L	-	-	-	-	0.0054	0.0075	0.010	0.017	0.0011	0.018	0.0076	0	4	-	-	-	-		
1,4,6,7-Tetramethylnaphthalene	µg/L	-	-	-	-	<0.00122	0.00095	0.0030	0.0030	<0.000166	0.0030	0.0013	3	4	-	-	-	-		
C1 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.0078	0.0083	0.013	0.016	0.00090	0.017	0.0072	0	4	-	-	-	-		
1-Methylphenanthrene	µg/L	-	-	-	-	0.0018	0.0020	0.0031	0.0042	<0.000372	0.0044	0.0019	1	4	-	-	-	-		
2-Methylphenanthrene	µg/L	-	-	-	-	0.0021	0.0019	0.0031	0.0034	<0.000378	0.0034	0.0015	1	4	-	-	-	-		
3-Methylphenanthrene	µg/L	-	-	-	-	0.0017	0.0017	0.0028	0.0032	0.00022	0.0033	0.0015	0	4	-	-	-	-		
9/4-Methylphenanthrene	µg/L	-	-	-	-	0.0023	0.0025	0.0038	0.0049	0.00031	0.0051	0.0022	0	4	-	-	-	-		
2-Methylantracene	µg/L	-	-	-	-	0.00020	0.00012	0.00020	0.00020	<0.0000937	<0.00037	0.000080	3	4	-	-	-	-		
C2 substituted fluorenes	µg/L	-	-	-	-	0.0033	0.0029	0.0042	0.0065	<0.000939	0.0071	0.0030	2	4	-	-	-	-		
1,7-Dimethylfluorene	µg/L	-	-	-	-	<0.000935	0.00031	<0.00115	<0.00115	<0.000165	<0.00115	0.00025	4	4	-	-	-	-		
C1 substituted dibenzothiophenes	µg/L	-	-	-	-	0.0020	0.0018	0.0028	0.0029	<0.00028	0.0030	0.0013	1	4	-	-	-	-		
2/3-Methyldibenzothiophenes	µg/L	-	-	-	-	0.00071	0.00071	0.0011	0.0012	<0.00028	0.0013	0.00051	1	4	-	-	-	-		
C2 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.0050	0.0080	0.011	0.019	<0.001182	0.021	0.0093	1	4	-	-	-	-		
1,7-Dimethylphenanthrene	µg/L	-	-	-	-	0.00081	0.00097	0.0014	0.0020	<0.000249	0.0021	0.00088	1	4	-	-	-	-		
1,8-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000414	0.00023	0.00061	0.00061	<0.0000759	0.00061	0.00027	3	4	-	-	-	-		
2,6-Dimethylphenanthrene	µg/L	-	-	-	-	0.00048	0.00039	0.00055	0.00071	<0.000303	0.00075	0.00029	2	4	-	-	-	-		
3,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000686	0.00025	<0.000977	<0.000977	<0.0000773	<0.000977	0.00020	4	4	-	-	-	-		
C3 substituted fluorenes	µg/L	-	-	-	-	0.0076	0.0057	0.010	0.010	<0.0039	<0.01116	0.0035	2	4	-	-	-	-		
C2 substituted dibenzothiophenes	µg/L	-	-	-	-	0.0068	0.0049	0.0079	0.011	<0.000555	0.011	0.0052	2	4	-	-	-	-		
2,4-Dimethyldibenzothiophene	µg/L	-	-	-	-	<0.00151	0.00046	<0.00167	<0.00167	<0.000225	<0.00167	0.00039	4	4	-	-	-	-		
C1 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.0062	0.0064	0.0095	0.012	<0.00108	0.013	0.0053	1	4	-	-	-	-		
C3 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.0049	0.0040	0.0060	0.0087	<0.00114	0.0093	0.0040	2	4	-	-	-	-		
1,2,6-Trimethylphenanthrene	µg/L	-	-	-	-	0.00032	0.00018	0.00032	0.00032	<0.0000754	<0.000604	0.00016	3	4	-	-	-	-		
C3 substituted dibenzothiophenes	µg/L	-	-	-	-	0.0045	0.0044	0.0060	0.0095	<0.001056	0.010	0.0043	2	4	-	-	-	-		
C2 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.011	0.0084	0.013	0.020	0.00033	0.021	0.0096	1	4	-	-	-	-		
C4 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.0072	0.0094	0.012	0.021	<0.001035	0.023	0.0095	1	4	-	-	-	-		
C4 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.002262	0.0016	0.0040	0.0040	<0.001017	0.0040	0.0016	3	4	-	-	-	-		
C1 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.0021	0.0022	0.0033	0.0042	<0.000102	0.0044	0.0019	1	4	-	-	-	-		
5/6-Methylchrysenes	µg/L	-	-	-	-	0.00024	0.00025	0.00024	0.00024	0.000083	<0.00122	0.00026	2	4	-	-	-	-		
C3 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.0016	0.0020	0.0026	0.0042	<0.000423	0.0046	0.0019	1	4	-	-	-	-		
C2 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.0019	0.0012	0.0020	0.0024	<0.0000746	0.0025	0.0012	2	4	-	-	-	-		
5,9-Dimethylchrysene	µg/L	-	-	-	-	<0.000411	0.00025	0.00060	0.00060	<0.0000746	0.00060	0.00025	3	4	-	-	-	-		
C4 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.000559	0.00025	<0.000822	<0.000822	<0.000104	<0.000822	0.00015	4	4	-	-	-	-		
C1 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	0.0027	0.0020	0.0032	0.0042	<0.000663	0.0045	0.0020	2	4	-	-	-	-		
7-Methylbenzo[a]pyrene	µg/L	-	-	-	-	<0.000288	0.00016	<0.000581	<0.000581	<0.000184	<0.000581	0.000090	4	4	-	-	-	-		
C3 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.00025	0.00029	<0.001092	<0.001092	<0.000168	<0.001092	0.00019	3	4	-	-	-	-		
C2 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	<0.002082	0.0010	0.0023	0.0023	<0.000203	0.0023	0.00093	3	4	-	-	-	-		
C4 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.00022	0.00015	0.00024	0.00027	<0.000068	0.00027	0.00012	2	4	-	-	-	-		
1-methylchrysene	µg/L	-	-	-	-	0.00025	0.00028	0.00036	0.00036	<0.0000988	<0.00118	0.00024	2	4	-	-	-	-		
3-methylfluoranthene / benzo(a)fluorene	µg/L	-	-	-	-	0.0025	0.0029	0.0044	0.0060	<0.000504	0.0064	0.0027	1	4	-	-	-	-		

APPENDIX B
Table B-3: Seasonal Surface Water Quality Summary of Dalglish Creek, 2012 to 2017

Table B-3: Seasonal Surface Water Quality Summary of Dalglish Creek, 2012 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary															
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Open Water (late June to September)									Standard Deviation	nd	Count	% Above Guideline			
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Acute	Chronic	BC MOE Mean				BC MOE Max			
Naphthenic Acid																					
C12h18o2	ng/L	-	-	-	-	45	49	53	60	41	62	11	0	3	-	-	-	-			
C12h20o2	ng/L	-	-	-	-	92	77	95	96	41	97	31	0	3	-	-	-	-			
C12h22o2	ng/L	-	-	-	-	49	54	71	90	19	94	38	0	3	-	-	-	-			
C12h24o2	ng/L	-	-	-	-	<15	65	184	184	<5.2	184	103	2	3	-	-	-	-			
C13h20o2	ng/L	-	-	-	-	46	49	61	73	24	76	26	0	3	-	-	-	-			
C13h22o2	ng/L	-	-	-	-	120	114	148	170	48	175	64	0	3	-	-	-	-			
C13h24o2	ng/L	-	-	-	-	47	44	63	75	<15	79	35	1	3	-	-	-	-			
C13h26o2	ng/L	-	-	-	-	29	122	173	288	19	317	169	0	3	-	-	-	-			
C14h20o2	ng/L	-	-	-	-	41	43	49	56	31	58	13	0	3	-	-	-	-			
C14h22o2	ng/L	-	-	-	-	77	86	105	127	49	133	43	0	3	-	-	-	-			
C14h24o2	ng/L	-	-	-	-	111	112	139	161	57	167	55	0	3	-	-	-	-			
C14h26o2	ng/L	-	-	-	-	27	31	43	56	<15	59	26	1	3	-	-	-	-			
C14h28o2	ng/L	-	-	-	-	<15	86	248	248	<5.2	248	140	2	3	-	-	-	-			
C15h18o2	ng/L	-	-	-	-	41	39	45	48	27	49	11	0	3	-	-	-	-			
C15h20o2	ng/L	-	-	-	-	67	74	87	103	47	107	30	0	3	-	-	-	-			
C15h22o2	ng/L	-	-	-	-	116	182	233	326	82	349	146	0	3	-	-	-	-			
C15h24o2	ng/L	-	-	-	-	180	200	221	253	160	261	53	0	3	-	-	-	-			
C15h26o2	ng/L	-	-	-	-	89	82	99	107	49	109	30	0	3	-	-	-	-			
C15h28o2	ng/L	-	-	-	-	18	22	31	42	<5.2	44	21	1	3	-	-	-	-			
C15h30o2	ng/L	-	-	-	-	<25	72	200	200	<5.2	200	111	2	3	-	-	-	-			
C16h20o2	ng/L	-	-	-	-	34	39	57	76	<5.0	81	39	1	3	-	-	-	-			
C16h22o2	ng/L	-	-	-	-	48	51	59	69	35	71	18	0	3	-	-	-	-			
C16h24o2	ng/L	-	-	-	-	59	91	119	168	33	180	79	0	3	-	-	-	-			
C16h26o2	ng/L	-	-	-	-	103	93	107	109	66	110	24	0	3	-	-	-	-			
C16h28o2	ng/L	-	-	-	-	61	57	64	66	45	67	11	0	3	-	-	-	-			
C16h30o2	ng/L	-	-	-	-	<15	19	46	46	<5.2	46	24	2	3	-	-	-	-			
C16h32o2	ng/L	-	-	-	-	<15	43	120	120	<5.2	120	66	2	3	-	-	-	-			
C17h22o2	ng/L	-	-	-	-	48	53	59	68	40	70	16	0	3	-	-	-	-			
C17h24o2	ng/L	-	-	-	-	34	42	47	57	32	59	15	0	3	-	-	-	-			
C17h26o2	ng/L	-	-	-	-	30	34	37	42	28	43	8.6	0	3	-	-	-	-			
C17h28o2	ng/L	-	-	-	-	82	119	148	200	63	213	82	0	3	-	-	-	-			
C17h30o2	ng/L	-	-	-	-	32	35	41	49	24	51	14	0	3	-	-	-	-			
C17h32o2	ng/L	-	-	-	-	<15	13	27	27	<5.2	27	13	2	3	-	-	-	-			
C17h34o2	ng/L	-	-	-	-	<15	46	129	129	<5.2	129	72	2	3	-	-	-	-			
C18h24o2	ng/L	-	-	-	-	111	99	122	131	53	133	41	0	3	-	-	-	-			
C18h26o2	ng/L	-	-	-	-	34	29	34	34	19	34	8.6	0	3	-	-	-	-			
C18h28o2	ng/L	-	-	-	-	38	120	168	272	23	298	155	0	3	-	-	-	-			
C18h30o2	ng/L	-	-	-	-	21	24	29	35	14	36	12	0	3	-	-	-	-			
C18h32o2	ng/L	-	-	-	-	<5.2	8.4	20	20	<5.0	20	10	2	3	-	-	-	-			
C18h34o2	ng/L	-	-	-	-	<5.2	4.3	<15	<15	<5.0	<15	3.0	3	3	-	-	-	-			
C18h36o2	ng/L	-	-	-	-	<15	56	157	157	<5.9	157	88	2	3	-	-	-	-			
C19h26o2	ng/L	-	-	-	-	39	49	61	78	26	83	30	0	3	-	-	-	-			
C19h28o2	ng/L	-	-	-	-	18	23	27	34	15	36	11	0	3	-	-	-	-			
C19h30o2	ng/L	-	-	-	-	21	23	24	27	20	28	4.5	0	3	-	-	-	-			
C19h32o2	ng/L	-	-	-	-	16	20	23	29	13	30	9.1	0	3	-	-	-	-			
C19h34o2	ng/L	-	-	-	-	<15	12	25	25	<5.2	25	12	2	3	-	-	-	-			
C19h36o2	ng/L	-	-	-	-	<15	9.8	19	19	<5.2	19	8.5	2	3	-	-	-	-			
C19h38o2	ng/L	-	-	-	-	24	15	24	24	<15	<27	8.4	2	3	-	-	-	-			
C20h28o2	ng/L	-	-	-	-	17	44	62	99	<15	108	56	1	3	-	-	-	-			
C20h30o2	ng/L	-	-	-	-	300	261	340	372	104	380	142	0	3	-	-	-	-			
C20h32o2	ng/L	-	-	-	-	101	104	120	135	72	139	34	0	3	-	-	-	-			
C20h34o2	ng/L	-	-	-	-	16	14	16	16	11	17	3.0	0	3	-	-	-	-			
C20h36o2	ng/L	-	-	-	-	<5.2	4.3	<15	<15	<5.0	<15	3.0	3	3	-	-	-	-			
C20h38o2	ng/L	-	-	-	-	<5.2	4.3	<15	<15	<5.0	<15	3.0	3	3	-	-	-	-			
C21h30o2	ng/L	-	-	-	-	16	20	26	33	<15	35	14	1	3	-	-	-	-			
C21h32o2	ng/L	-	-	-	-	<5.2	4.3	<15	<15	<5.0	<15	3.0	3	3	-	-	-	-			
C21h34o2	ng/L	-	-	-	-	<7.1	4.6	<15	<15	<5.2	<15	2.7	3	3	-	-	-	-			
C21h36o2	ng/L	-	-	-	-	<5.2	4.3	<15	<15	<5.0	<15	3.0	3	3	-	-	-	-			
C21h38o2	ng/L	-	-	-	-	<5.2	4.3	<15	<15	<5.0	<15	3.0	3	3	-	-	-	-			
C21h40o2	ng/L	-	-	-	-	5.9	5.4	5.9	5.9	<5.2	<15	2.6	2	3	-	-	-	-			
Radionuclides																					
Actinium-228	Bq/L	-	-	-	-	1.0	0.96	1.3	1.9	<0.7	2.0	0.75	2	4	-	-	-	-			
Bismuth-212	Bq/L	-	-	-	-	<3.0	1.9	4.0	4.0	<2.0	4.0	1.4	3	4	-	-	-	-			
Bismuth-214	Bq/L	-	-	-	-	1.0	0.66	1.0	1.0	<0.6	1.0	0.39	2	4	-	-	-	-			
Lead-210	Bq/L	-	-	-	-	<4.0	2.3	<6.0	<6.0	<4.0	<6.0	0.50	4	4	-	-	-	-			
Lead-211	Bq/L	-	-	-	-	<6.0	3.0	<7.0	<7.0	<5.0	<7.0	0.41	4	4	-	-	-	-			
Lead-212	Bq/L	-	-	-	-	0.75	0.68	0.85	0.97	<0.4	1.0	0.34	1	4	-	-	-	-			
Lead-214	Bq/L	-	-	-	-	0.70	0.54	0.73	0.79	<0.6	0.80	0.25	2	4	-	-	-	-			
Potassium-40	Bq/L	-	-	-	-	<5.0	2.8	<7.0	<7.0	<5.0	<7.0	0.50	4	4	-	-	-	-			
Radium-223	Bq/L	-	-	-	-	<1.0	0.46	<1.0	<1.0	<0.7	<1.0	0.075	4	4	-	-	-	-			
Radium-226	Bq/L	-	-	-	-	0.0095	0.51	0.010	0.010	0.0060	<4.0	1.00	1	4	-	-	-	-			
Radon-219	Bq/L	-	-	-	-	<2.0	0.83	<2.0	<2.0	<0.6	<2.0	0.35	4	4	-	-	-	-			
Thallium-208	Bq/L	-	-	-	-	<0.4	0.23	0.40	0.40	<0.2	0.40	0.13	3	4	-	-	-	-			
Thorium-227	Bq/L	-	-	-	-	<1.0	0.49	<1.0	<1.0	<0.9	<1.0	0.025	4	4	-	-	-	-			
Thorium-230	Bq/L	-	-	-	-	<20	11	<30	<30	<20	<30	2.5	4	4	-	-	-	-			
Thorium-234	Bq/L	-	-	-	-	<4.0	2.1	<5.0	<5.0	<4.0	<5.0	0.25	4	4	-	-	-	-			
Uranium-235	Bq/L	-	-	-	-	<1.0	0.63	<2.0	<2.0	<1.0	<2.0	0.25	4	4	-	-	-	-			

Seasonal Surface Water Quality Summary of Dagleish Creek, 2013 to 2017

^(a) = guideline is a minimum value, unless the background concentration or value is lower.

^(b) = guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (22 to 541 mg/L). The guideline is calculated based on the individual hardness value for each sample.

^(c) = for some samples, water hardness was greater than 250 mg/L. At this hardness, no BC MOE water quality guideline has been established for sulphate; however, the observed data were screened against the guideline for very hard water

^(d) = guideline is chloride dependent. The guideline range shown is based on the chloride concentration range observed in the dataset (0.0250 to 0.5500 mg/L). The guideline is calculated based on the individual chloride concentration in each

^(e) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.9165 mg-N/L) is based on the combination of field pH (7.8) and water temperature (15.1°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.

^(f) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (1.4300 mg-N/L) is based on the combination of field pH (7.9) and water temperature (4.2°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.

^(g) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (7.4200 mg-N/L) is based on the combination of field pH (7.9) and water temperature (4.2°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.

^(h) = guideline is pH dependent. The guideline range shown is based on the pH range observed in the dataset (6.5 to 7.9). The guideline is calculated based on the individual pH for each sample.

⁽ⁱ⁾ = guideline is pH dependent: 5 µg/L at pH < 6.5 and 100 µg/L at pH ≥ 6.5.

^(j) = guideline is for chromium VI.

^(l) = interim guideline

(Chronic) = concentration is higher than the chronic aquatic life CCME guideline or outside the recommended pH, DO or

(BC MOE Mean) = concentration is higher than the 30-day mean BC MOE guideline or outside the recommended pH, DO or total alkalinity range.

(BC MOE Max) = concentration is higher than the maximum BC MOE guideline or outside the recommended pH, DO or

(DL>Chronic) = analytical detection limit is higher than the chronic aquatic life CCME guideline.

(DL>BC MOE Mean) = analytical detection limit is higher than the 30-day mean BC MOE guideline.

Bolded concentrations are higher than water quality guidelines.

Bolded total alkalinity values indicate moderate to high level of acid sensitivity.

Water quality data and guidelines shown in this table were rounded to reflect laboratory or field instrument precision *after* comparisons to guidelines. Therefore, values slightly above guidelines may be displayed as being equal to the guidelines and identified as exceedances. Concentrations equal to the guideline values were not identified as exceedances.

- = no guideline or no data.

APPENDIX B
Table B-4: Seasonal Surface Water Quality Summary of Eagle River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary														
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Ice-Cover (March)								Standard Deviation	nd	Count	% Above Guideline			
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Acute	Chronic				BC MOE Mean	BC MOE Max		
Field Measured																				
pH	-	-	6.5 - 9.0	6.5 - 9.0	6.5 - 9.0	7.8	7.5	8.0	8.0	6.6	8.1	0.67	0	5	-	-	-	-		
Specific conductivity	µS/cm	-	-	-	-	355	421	564	730	135	772	324	0	3	-	-	-	-		
Temperature	°C	-	-	-	-	0	0.040	0.10	0.10	0	0.10	0.055	0	5	-	-	-	-		
Dissolved oxygen	mg/L	-	6.5	8.0	5.0	6.2 ^(Chronic, BC MOE Mean)	7.1 ^(BC MOE Mean)	8.8	11	3.1 ^(Chronic, BC MOE Mean, BC MOE Max)	11	3.1	0	5	-	60	60	20		
Turbidity	NTU	-	-	-	-	10	10	14	18	1.5	19	12	0	2	-	-	-	-		
Conventional Parameters																				
Hardness, as CaCO ₃	mg/L	-	-	-	-	178	235	339	381	126	391	122	0	5	-	-	-	-		
Total alkalinity, as CaCO ₃	mg/L	-	-	20 ^(a)	-	37	73	129	131	34	131	52	0	5	-	-	-	-		
Total dissolved solids	mg/L	-	-	-	-	320	392	486	622	240	656	177	0	5	-	-	-	-		
Total suspended solids	mg/L	-	-	-	-	20	49	39	153	3.0	182	76	0	5	-	-	-	-		
Total organic carbon	mg/L	-	-	-	-	14	14	16	26	4.8	28	9.6	0	5	-	-	-	-		
Dissolved organic carbon	mg/L	-	-	-	-	12	9.6	13	14	4.2	14	4.9	0	5	-	-	-	-		
Dissolved inorganic carbon	mg/L	-	-	-	-	9.9	16	29	30	4.7	30	12	0	5	-	-	-	-		
Total inorganic carbon	mg/L	-	-	-	-	12	18	30	32	4.9	33	12	0	5	-	-	-	-		
Major Ions																				
Bicarbonate, as CaCO ₃	mg/L	-	-	-	-	45	82	131	152	34	157	57	0	5	-	-	-	-		
Bromide	mg/L	-	-	-	-	<0.02	0.026	<0.1	<0.1	<0.02	<0.1	0.022	5	5	-	-	-	-		
Calcium	mg/L	-	-	-	-	41	60	89	108	26	113	39	0	5	-	-	-	-		
Carbonate, as CaCO ₃	mg/L	-	-	-	-	<6.0	2.0	<6.0	<6.0	<1.0	<6.0	1.4	5	5	-	-	-	-		
Chloride	mg/L	640	120	150	600	3.0	3.0	4.3	4.4	1.5	4.5	1.4	0	5	-	-	-	-		
Fluoride	mg/L	-	0.12 ^(f)	-	1.1 - 1.9 ^(b)	-	-	-	-	-	-	-	0	0	-	-	-	-		
Magnesium	mg/L	-	-	-	-	19	19	22	25	11	26	5.9	0	5	-	-	-	-		
Potassium	mg/L	-	-	-	-	1.1	1.2	1.4	1.4	0.80	1.5	0.28	0	5	-	-	-	-		
Sodium	mg/L	-	-	-	-	12	18	26	31	8.8	32	11	0	5	-	-	-	-		
Sulphate	mg/L	-	-	218 - 429 ^(h, c)	-	153	184	243	289	107	300	85	0	5	-	-	-	-		
Nutrients																				
Nitrate	mg-N/L	124	2.9	3.0	33	0.010	0.026	0.020	0.076	<0.01	0.090	0.036	2	5	-	-	-	-		
Nitrite	mg-N/L	-	0.060	0.020 - 0.20 ^(d)	0.060 - 0.60 ^(d)	<0.01	0.0080	<0.01	0.020	<0.01	0.020	0.0067	4	5	-	-	-	-		
Nitrate + nitrite	mg-N/L	-	-	-	-	0.055	0.055	0.073	0.087	0.020	0.090	0.049	0	2	-	-	-	-		
Total ammonia	mg-N/L	-	0.61 - 47 ^(e)	0.88 - 2.1 ^(f)	4.6 - 28 ^(g)	0.14	0.20	0.15	0.41	0.11	0.47	0.15	0	5	-	-	-	-		
Total kjeldahl nitrogen	mg-N/L	-	-	-	-	0.50	0.50	0.53	0.55	0.44	0.56	0.085	0	2	-	-	-	-		
Total nitrogen (calculated)	mg-N/L	-	-	-	-	0.56	0.56	0.57	0.58	0.53	0.58	0.035	0	2	-	-	-	-		
Total nitrogen	mg-N/L	-	-	-	-	0.52	0.54	0.57	0.75	0.34	0.80	0.17	0	5	-	-	-	-		
Total phosphorus	mg-P/L	-	-	0.010	-	0.014	0.0095	0.014	0.014	<0.01	0.014	0.0064	1	2	-	-	-	-		
Dissolved phosphorus	mg-P/L	-	-	-	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	2	2	-	-	-	-		
Phosphorus (as phosphate)	mg-P/L	-	-	-	-	0.0070	0.0059	0.0088	0.013	<0.002	0.014	0.0061	2	4	-	-	-	-		
Total Metals																				
Aluminum	µg/L	-	100 ^(h, i)	-	-	69	392 ^(Chronic)	215 ^(Chronic)	1,299 ^(Chronic)	41	1,570 ^(Chronic)	662	0	5	-	40	-	-		
Antimony	µg/L	-	-	9.0	-	<0.2	0.13	<0.2	0.30	0.070	0.30	0.094	2	5	-	-	-	-		
Arsenic	µg/L	-	5.0	-	5.0	0.80	1.5	1.0	4.2	0.27	5.0	2.0	0	5	-	-	-	-		
Barium	µg/L	-	-	1,000	-	71	87	98	159	44	174	53	0	5	-	-	-	-		
Beryllium	µg/L	-	-	0.13	-	<0.05	0.048	0.060	0.060	0.010	<0.25 ^(DL>BC MOE Mean)	0.047	2	5	-	-	-	-		
Bismuth	µg/L	-	-	-	-	<0.01	0.087	<0.5	<0.5	<0.01	<0.5	0.14	3	3	-	-	-	-		
Boron	µg/L	29,000	1,500	-	1,200	30	29	31	33	24	33	3.7	0	5	-	-	-	-		
Cadmium	µg/L	1.1 - 7.7 ^(b)	0.094 - 0.37 ^(b)	-	-	0.17	0.22	0.20	0.42 ^(Chronic)	0.11	0.48 ^(Chronic)	0.15	0	5	-	20	-	-		
Chromium	µg/L	-	1.0	1.0 ^(j)	-	0.60	0.81	0.70	2.1 ^(Chronic, BC MOE Mean)	0.10	2.5 ^(Chronic, BC MOE Mean)	0.96	1	5	-	20	20	-		
Cobalt	µg/L	-	-	4.0	110	13 ^(BC MOE Mean)	14 ^(BC MOE Mean)	15 ^(BC MOE Mean)	17 ^(BC MOE Mean)	10 ^(BC MOE Mean)	17 ^(BC MOE Mean)	2.6	0	5	-	-	100	-		
Copper	µg/L	-	2.0 - 4.0 ^(b)	2.1 - 10 ^(b)	7.0 - 39 ^(b)	1.9	4.6 ^(Chronic)	3.0	14 ^(Chronic, BC MOE Mean)	0.80	17 ^(Chronic, BC MOE Mean, BC MOE Max)	7.0	1	5	-	20	20	20		
Iron	µg/L	-	300	-	1,000	9,110 ^(Chronic, BC MOE Max)	17,716 ^(Chronic, BC MOE Max)	18,900 ^(Chronic, BC MOE Max)	49,460 ^(Chronic, BC MOE Max)	1,340 ^(Chronic, BC MOE Max)	57,100 ^(Chronic, BC MOE Max)	23,117	0	5	-	100	-	100		
Lead	µg/L	-	1.0 - 7.0 ^(b)	4.7 - 20 ^(b)	36 - 417 ^(b)	<0.1	0.36	0.20	1.2	<0.05	1.5	0.63	3	5	-	-	-	-		
Lithium	µg/L	-	-	-	-	6.1	9.7	14	16	5.7	17	5.3	0	5	-	-	-	-		
Manganese	µg/L	-	-	838 - 2,325 ^(b)	1,124 - 3,394 ^(b)	773	739	780	910	541	943	150	0	5	-	-	-	-		
Mercury	µg/L	-	0.026	0.010	-	<0.01	0.0040	<0.01	<0.01	<0.005	<0.01	0.0014	5	5	-	-	-	-		
Molybdenum	µg/L	-	73	1,000	2,000	0.59	0.45	0.69	0.71	<0.1	0.72	0.31	1	5	-	-	-	-		
Nickel	µg/L	-	25 - 150 ^(b)	25 - 150 ^(b)	-	32	33	37	38	25	38	5.3	0	5	-	-	-	-		
Selenium	µg/L	-	1.0	2.0	-	<0.6	0.46	<0.6	1.0	0.30	1.0	0.30	2	5	-	-	-	-		
Silicon	µg/L	-	-	-	-	2,900	3,682	3,900	5,980	2,510	6,500	1,669	0	5	-	-	-	-		
Silver	µg/L	-	0.25	0.050 - 1.5 ^(b)	0.10 - 3.0 ^(b)	<0.01	0.010	0.010	0.010	<0.01	<0.05	0.0087	4	5	-	-	-	-		
Strontium	µg/L	-	-	-	-	117	194	316	328	101	331	118	0	5	-	-	-	-		
Sulphur	µg/L	-	-	-	-	57,300	67,260	85,000	110,600	37,000	117,000	33,715	0	5	-	-	-	-		
Tellurium	µg/L	-	-	-	-	<0.1	0.055	<0.1	<0.25	<0.05	<0.25	0.041	5	5	-	-	-	-		
Thallium	µg/L	-	0.80	0.80	-	0.020	0.024	0.020	0.044	0.011	0.050	0.015	0	5	-	-	-	-		
Thorium	µg/L	-	-	-	-	<0.4	0.29	<0.4	0.97	<0.01	0.97	0.39	3	5	-	-	-	-		
Tin	µg/L	-	-	-	-	<0.1	0.080	<0.1	<0.5	<0.05	<0.5	0.096	5	5	-	-	-	-		
Titanium	µg/L	-	-	-	-	6.0	11	7.0	33	<0.2	40	17	1	5	-	-	-	-		
Uranium	µg/L	33	15	8.5	-	0.58	0.41	0.59	0.60	0.079	0.60	0.25	1	5	-	-	-	-		
Vanadium	µg/L	-	-	-	-	0.50	1.7	0.91	5.7	<0.1	6.9	2.9	1	5	-	-	-	-		
Zinc	µg/L	-	30	7.5 - 188 ^(b)	33 - 259 ^(b)	61 ^(Chronic)	69 ^(Chronic)	75 ^(Chronic, BC MOE Mean)	96 ^(Chronic, BC MOE Mean)	50 ^(Chronic, BC MOE Mean)	101 ^(Chronic, BC MOE Mean, BC MOE Max)	20	0	5	-	100	60	20		
Zirconium	µg/L	-	-	-	-	0.48	0.71	0.80	1.8	0.070	2.0	0.77	0	5	-	-	-	-		

APPENDIX B
Table B-4: Seasonal Surface Water Quality Summary of Eagle River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary																
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Ice-Cover (March)										Standard Deviation	nd	Count	% Above Guideline			
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Acute	Chronic	BC MOE Mean	BC MOE Max							
Dissolved Metals																						
Aluminum	µg/L	-	-	50 ^(h)	100 ^(h)	41	38	62 ^(BC MOE Mean)	79 ^(BC MOE Mean)	3.0	83 ^(BC MOE Mean)	36	1	5	-	-	40	-				
Antimony	µg/L	-	-	-	-	0.086	0.089	<0.2	<0.2	0.080	<0.2	0.010	2	5	-	-	-	-				
Arsenic	µg/L	-	-	-	-	0.40	0.40	0.50	0.71	0.16	0.76	0.24	0	5	-	-	-	-				
Barium	µg/L	-	-	-	-	61	63	78	86	43	88	20	0	5	-	-	-	-				
Beryllium	µg/L	-	-	-	-	<0.04	0.016	<0.04	<0.05	<0.01	<0.05	0.0082	4	5	-	-	-	-				
Bismuth	µg/L	-	-	-	-	<0.1	0.21	<1.0	<1.0	<0.01	<1.0	0.26	5	5	-	-	-	-				
Boron	µg/L	-	-	-	-	25	24	26	29	19	30	4.3	0	5	-	-	-	-				
Cadmium	µg/L	-	-	0.13 - 0.46 ^(h)	0.31 - 2.4 ^(h)	0.12	0.13	0.16	0.17	0.075	0.17	0.041	0	5	-	-	-	-				
Chromium	µg/L	-	-	-	-	<0.4	0.38	0.40	0.80	<0.1	0.90	0.32	2	5	-	-	-	-				
Cobalt	µg/L	-	-	-	-	12	12	14	15	9.1	15	2.6	0	5	-	-	-	-				
Copper	µg/L	-	-	-	-	1.0	1.3	2.0	2.1	0.70	2.1	0.74	1	5	-	-	-	-				
Iron	µg/L	-	-	-	350	5,770 ^(BC MOE Max)	6,072 ^(BC MOE Max)	8,350 ^(BC MOE Max)	14,550 ^(BC MOE Max)	12	16,100 ^(BC MOE Max)	6,669	0	5	-	-	-	60				
Lead	µg/L	-	-	-	-	<0.05	0.034	<0.1	<0.1	0.021	<0.1	0.015	4	5	-	-	-	-				
Lithium	µg/L	-	-	-	-	6.0	8.5	11	15	4.7	16	4.9	0	5	-	-	-	-				
Manganese	µg/L	-	-	-	-	711	715	775	892	502	921	153	0	5	-	-	-	-				
Mercury	µg/L	-	-	-	-	<0.01	0.0040	<0.01	<0.01	<0.005	<0.01	0.0014	5	5	-	-	-	-				
Molybdenum	µg/L	-	-	-	-	0.15	0.29	0.50	0.62	<0.1	0.65	0.27	1	5	-	-	-	-				
Nickel	µg/L	-	-	-	-	29	28	30	36	22	37	6.1	0	5	-	-	-	-				
Selenium	µg/L	-	-	-	-	0.30	0.30	<0.6	<0.6	0.30	<0.6	0	2	5	-	-	-	-				
Silicon	µg/L	-	-	-	-	2,810	3,034	3,640	3,736	2,430	3,760	625	0	5	-	-	-	-				
Silver	µg/L	-	-	-	-	<0.01	0.010	<0.01	0.031	<0.01	0.031	0.012	4	5	-	-	-	-				
Strontium	µg/L	-	-	-	-	110	183	305	306	94	306	112	0	5	-	-	-	-				
Sulphur	µg/L	-	-	-	-	54,700	66,120	82,700	109,340	37,300	116,000	33,209	0	5	-	-	-	-				
Tellurium	µg/L	-	-	-	-	0.067	0.043	<0.1	<0.1	<0.05	<0.1	0.018	4	5	-	-	-	-				
Thallium	µg/L	-	-	-	-	0.012	0.013	0.015	0.019	0.0080	0.020	0.0047	0	5	-	-	-	-				
Thorium	µg/L	-	-	-	-	0.19	0.12	<0.4	<0.4	<0.01	<0.4	0.098	3	5	-	-	-	-				
Tin	µg/L	-	-	-	-	<0.1	0.040	<0.1	<0.1	<0.05	<0.1	0.014	5	5	-	-	-	-				
Titanium	µg/L	-	-	-	-	7.0	5.8	<10	17	<0.2	17	6.9	3	5	-	-	-	-				
Uranium	µg/L	-	-	-	-	<0.4	0.26	0.48	0.50	0.052	0.50	0.21	1	5	-	-	-	-				
Vanadium	µg/L	-	-	-	-	<0.2	0.13	0.20	0.20	<0.1	0.20	0.066	2	5	-	-	-	-				
Zinc	µg/L	-	-	-	-	58	60	64	74	48	77	11	0	5	-	-	-	-				
Zirconium	µg/L	-	-	-	-	0.42	0.36	0.60	0.68	0.040	0.70	0.31	1	5	-	-	-	-				
Volatile Organics																						
Benzene	µg/L	-	370 ^(l)	40	-	<0.5	50 ^(BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	112	5	5	-	-	-	-				
Ethylbenzene	µg/L	-	90 ^(l)	200	-	<1.0	50	<1.0	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	112	5	5	-	-	-	-				
Toluene	µg/L	-	2 ^(l)	0.50	-	<1.0 ^(DL>BC MOE Mean)	50 ^(Chronic, BC MOE Mean)	<1.0 ^(DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	112	5	5	-	-	-	-				
Xylenes	µg/L	-	-	30	-	<2.0	50 ^(BC MOE Mean)	<2.0	<500 ^(DL>BC MOE Mean)	<0.5	<500 ^(DL>BC MOE Mean)	112	5	5	-	-	-	-				
Styrene	µg/L	-	72 ^(l)	72	-	<1.0	50	<1.0	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	112	5	5	-	-	-	-				
Extractable Petroleum Hydrocarbons (C10-C19)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-				
Extractable Petroleum Hydrocarbons (C10-C32)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-				
Volatile Hydrocarbons	µg/L	-	-	-	-	<100	5,030	<100	<50,000	<50	<50,000	11,164	5	5	-	-	-	-				
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	-	<100	5,030	<100	<50,000	<50	<50,000	11,164	5	5	-	-	-	-				
Methyl tertiary-butyl ether	µg/L	-	-	-	-	<1.0	50	<1.0	<500	<0.5	<500	112	5	5	-	-	-	-				
Parent PAHs																						
Naphthalene	µg/L	-	1.1 ^(l)	1.0	-	<0.00447	0.0071	0.022	0.022	<0.00414	0.022	0.010	3	4	-	-	-	-				
Acenaphthylene	µg/L	-	-	-	-	<0.000251	0.00016	<0.000612	<0.000612	<0.000203	<0.000612	0.000096	4	4	-	-	-	-				
Biphenyl	µg/L	-	-	-	-	<0.001866	0.00083	<0.001866	<0.001866	<0.001449	<0.001866	0.00012	4	4	-	-	-	-				
Acenaphthene	µg/L	-	5.8 ^(l)	6.0	-	<0.000237	0.00016	<0.000696	<0.000696	<0.000153	<0.000696	0.00012	4	4	-	-	-	-				
Fluorene	µg/L	-	3 ^(l)	12	-	<0.000357	0.00019	<0.000513	<0.000513	<0.000318	<0.000513	0.000046	4	4	-	-	-	-				
Phenanthrene	µg/L	-	0.4 ^(l)	0.30	-	<0.00318	0.0014	<0.00318	<0.00318	<0.002328	<0.00318	0.00025	4	4	-	-	-	-				
Anthracene	µg/L	-	0.012 ^(l)	0.10	-	<0.000163	0.000067	<0.000238	<0.000238	<0.0000511	<0.000238	0.000042	4	4	-	-	-	-				
Dibenzothiophene	µg/L	-	-	-	-	<0.000321	0.00021	0.00048	0.00048	<0.000189	0.00048	0.00018	3	4	-	-	-	-				
Pyrene	µg/L	-	0.025 ^(l)	0.020	-	<0.001077	0.00045	<0.001077	<0.001077	<0.000711	<0.001077	0.00011	4	4	-	-	-	-				
Fluoranthene	µg/L	-	0.04 ^(l)	0.20	-	<0.001263	0.00059	<0.001263	<0.001263	<0.001101	<0.001263	0.000047	4	4	-	-	-	-				
Benzo(a)anthracene	µg/L	-	0.018 ^(l)	0.10	-	<0.000186	0.00011	0.00020	0.00020	<0.000129	0.00020	0.000066	3	4	-	-	-	-				
Chrysene	µg/L	-	-	-	-	0.00033	0.00027	<0.00063	<0.00063	<0.000285	<0.00063	0.000088	3	4	-	-	-	-				
1-Methyl-7-isopropyl-phenanthrene (Retene)	µg/L	-	-	-	-	<0.000429	0.00022	<0.000561	<0.000561	<0.000314	<0.000561	0.000050	4	4	-	-	-	-				
Benzo(b)fluoranthene	µg/L	-	-	-	-	<0.000118	0.000064	<0.00018	<0.00018	<0.000104	<0.00018	0.000017	4	4	-	-	-	-				
Benzo(j,k)fluoranthenes	µg/L	-	-	-	-	<0.000128	0.000068	<0.000195	<0.000195	<0.000107	<0.000195	0.000020	4	4	-	-	-	-				
Benzo(b,j,k)fluoranthenes	µg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-				
Benzo(a)pyrene	µg/L	-	0.015 ^(l)	0.010	-	<0.000177	0.000095	<0.000269	<0.000269	<0.000156	<0.000269	0.000027	4	4	-	-	-	-				
Benzo(e)pyrene	µg/L	-	-	-	-	<0.000272	0.00017	0.00037	0.00037	<0.000157	0.00037	0.00014	3	4	-	-	-	-				
Perylene	µg/L	-	-	-	-	0.00019	0.00013	0.00019	0.00019	<0.000169	<0.000279	0.000050	3	4	-	-	-	-				
Benzo(g,h,i)perylene	µg/L	-	-	-	-	<0.000255	0.00010	<0.000255	<0.000255	<0.000132	<0.000255	0.000030	4	4	-	-	-	-				
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	<0.000309	0.00013	<0.000309	<0.000309	<0.000188	<0.000309	0.000033	4	4	-	-	-	-				
Dibenzo(a,h)anthracene	µg/L	-	-	-	-	<0.000332	0.00011	<0.000406	<0.000406	<0.0000538	<0.000406	0.000085	4	4	-	-	-	-				

APPENDIX B
Table B-4: Seasonal Surface Water Quality Summary of Eagle River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary													
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Ice-Cover (March)													
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline				
																Acute	Chronic	BC MOE Mean	BC MOE Max
Alkylated PAHs																			
C1 substituted naphthalenes	µg/L	-	-	-	-	<0.00945	0.0084	0.020	0.020	<0.00792	0.020	0.0078	3	4	-	-	-	-	
1-Methylnaphthalene	µg/L	-	-	-	-	0.0017	0.0028	0.0033	0.0071	<0.001335	0.0081	0.0036	2	4	-	-	-	-	
2-Methylnaphthalene	µg/L	-	-	-	-	<0.00813	0.0058	0.012	0.012	<0.00648	0.012	0.0041	3	4	-	-	-	-	
C2 substituted naphthalenes	µg/L	-	-	-	-	<0.01314	0.0051	<0.01314	<0.01314	<0.00732	<0.01314	0.0017	4	4	-	-	-	-	
1,2-Dimethylnaphthalene	µg/L	-	-	-	-	0.00052	0.00033	0.00052	0.00052	<0.000297	<0.000977	0.00020	3	4	-	-	-	-	
2,6-Dimethylnaphthalene	µg/L	-	-	-	-	0.0017	0.00093	0.0017	0.0018	<0.000251	0.0018	0.00092	2	4	-	-	-	-	
C1 substituted acenaphthenes	µg/L	-	-	-	-	<0.000355	0.00018	<0.000421	<0.000421	<0.000289	<0.000421	0.000027	4	4	-	-	-	-	
C1 substituted biphenyls	µg/L	-	-	-	-	<0.00645	0.0026	<0.00645	<0.00645	<0.00384	<0.00645	0.00075	4	4	-	-	-	-	
C3 substituted naphthalenes	µg/L	-	-	-	-	0.0023	0.0026	0.0061	0.0061	0.00051	0.0061	0.0024	1	4	-	-	-	-	
2,3,5-Trimethylnaphthalene	µg/L	-	-	-	-	<0.000936	0.00058	0.0015	0.0015	0.00017	0.0015	0.00065	2	4	-	-	-	-	
2,3,6-Trimethylnaphthalene	µg/L	-	-	-	-	<0.000864	0.00062	0.0017	0.0017	0.00024	0.0017	0.00072	2	4	-	-	-	-	
C1 substituted fluorenes	µg/L	-	-	-	-	<0.001491	0.00060	<0.001491	<0.001491	<0.000485	<0.001491	0.00024	4	4	-	-	-	-	
2-Methylfluorene	µg/L	-	-	-	-	<0.000485	0.00030	<0.00131	<0.00131	0.00020	<0.00131	0.00024	3	4	-	-	-	-	
C2 substituted biphenyls	µg/L	-	-	-	-	<0.02328	0.0099	<0.02328	<0.02328	<0.01635	<0.02328	0.0020	4	4	-	-	-	-	
C4 substituted naphthalenes	µg/L	-	-	-	-	<0.001623	0.00082	0.0022	0.0022	<0.000236	0.0022	0.00098	3	4	-	-	-	-	
1,4,6,7-Tetramethylnaphthalene	µg/L	-	-	-	-	<0.000319	0.00017	<0.000561	<0.000561	<0.000205	<0.000561	0.000081	4	4	-	-	-	-	
C1 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.001647	0.00098	0.0028	0.0028	<0.000245	0.0028	0.0013	3	4	-	-	-	-	
1-Methylphenanthrene	µg/L	-	-	-	-	<0.000441	0.00026	0.00054	0.00054	<0.000245	0.00054	0.00019	3	4	-	-	-	-	
2-Methylphenanthrene	µg/L	-	-	-	-	<0.000702	0.00025	<0.000702	<0.000702	<0.000248	<0.000702	0.00012	4	4	-	-	-	-	
3-Methylphenanthrene	µg/L	-	-	-	-	<0.000504	0.00029	0.00063	0.00063	<0.00025	0.00063	0.00023	3	4	-	-	-	-	
9/4-Methylphenanthrene	µg/L	-	-	-	-	<0.000323	0.00037	0.00099	0.00099	0.00019	0.00099	0.00042	2	4	-	-	-	-	
2-Methylanthracene	µg/L	-	-	-	-	<0.000256	0.00012	<0.000331	<0.000331	<0.000171	<0.000331	0.000036	4	4	-	-	-	-	
C2 substituted fluorenes	µg/L	-	-	-	-	0.00061	0.00060	0.0012	0.0012	<0.000423	0.0012	0.00044	2	4	-	-	-	-	
1,7-Dimethylfluorene	µg/L	-	-	-	-	<0.000423	0.00019	<0.00074	<0.00074	<0.000168	<0.00074	0.00013	4	4	-	-	-	-	
C1 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.000435	0.00053	0.0017	0.0017	0.00014	0.0017	0.00077	2	4	-	-	-	-	
2/3-Methyldibenzothiophenes	µg/L	-	-	-	-	<0.000435	0.00024	0.00059	0.00059	<0.000116	0.00059	0.00024	3	4	-	-	-	-	
C2 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.000978	0.00079	0.0024	0.0024	0.00018	0.0024	0.0011	2	4	-	-	-	-	
1,7-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000263	0.00016	0.00030	0.00030	<0.000172	0.00030	0.000095	3	4	-	-	-	-	
1,8-Dimethylphenanthrene	µg/L	-	-	-	-	0.00013	0.000094	<0.000268	<0.000268	<0.000053	<0.000268	0.000049	3	4	-	-	-	-	
2,6-Dimethylphenanthrene	µg/L	-	-	-	-	0.00021	0.00012	0.00021	0.00021	<0.000144	<0.000268	0.000060	3	4	-	-	-	-	
3,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000217	0.000090	<0.000272	<0.000272	<0.000054	<0.000272	0.000046	4	4	-	-	-	-	
C3 substituted fluorenes	µg/L	-	-	-	-	0.00073	0.00071	0.00098	0.0016	<0.000379	0.0017	0.00073	2	4	-	-	-	-	
C2 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.000685	0.00077	0.0024	0.0024	0.00015	0.0024	0.0011	2	4	-	-	-	-	
2,4-Dimethyldibenzothiophene	µg/L	-	-	-	-	0.00027	0.00020	<0.000685	<0.000685	<0.000102	<0.000685	0.00013	3	4	-	-	-	-	
C1 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.00064	0.00076	0.00099	0.0018	0.00016	0.0020	0.00088	1	4	-	-	-	-	
C3 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.00020	0.00052	0.0017	0.0017	<0.00013	0.0017	0.00079	2	4	-	-	-	-	
1,2,6-Trimethylphenanthrene	µg/L	-	-	-	-	0.00010	0.000083	<0.000266	<0.000266	<0.0000635	<0.000266	0.000044	3	4	-	-	-	-	
C3 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.001161	0.00050	0.0012	0.0012	<0.000155	0.0012	0.00053	3	4	-	-	-	-	
C2 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.000244	0.00056	0.0018	0.0018	0.00020	0.0018	0.00085	2	4	-	-	-	-	
C4 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.000561	0.00061	0.0018	0.0018	<0.000314	0.0018	0.00082	3	4	-	-	-	-	
C4 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.00135	0.00060	<0.00135	<0.00135	<0.001032	<0.00135	0.000092	4	4	-	-	-	-	
C1 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000163	0.00015	0.00045	0.00045	<0.0000478	0.00045	0.00020	3	4	-	-	-	-	
5/6-Methylchrysenes	µg/L	-	-	-	-	<0.000128	0.000054	<0.000168	<0.000168	<0.0000484	<0.000168	0.000026	4	4	-	-	-	-	
C3 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.000243	0.00014	<0.000273	<0.000273	0.00018	<0.000273	0.000027	3	4	-	-	-	-	
C2 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.0002	0.00016	0.00044	0.00044	<0.0000523	0.00044	0.00019	3	4	-	-	-	-	
5,9-Dimethylchrysene	µg/L	-	-	-	-	<0.000179	0.000062	<0.0002	<0.0002	<0.0000523	<0.0002	0.000038	4	4	-	-	-	-	
C4 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.00023	0.000091	<0.000244	<0.000244	<0.0000971	<0.000244	0.000034	4	4	-	-	-	-	
C1 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	<0.000177	0.000094	<0.00033	<0.00033	<0.0000842	<0.00033	0.000052	4	4	-	-	-	-	
7-Methylbenzo(a)pyrene	µg/L	-	-	-	-	<0.000177	0.000094	<0.00033	<0.00033	<0.0000842	<0.00033	0.000052	4	4	-	-	-	-	
C3 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000113	0.000057	<0.00016	<0.00016	<0.0000759	<0.00016	0.000017	4	4	-	-	-	-	
C2 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	<0.0002	0.000094	<0.00036	<0.00036	<0.0000579	<0.00036	0.000064	4	4	-	-	-	-	
C4 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000126	0.000050	<0.000136	<0.000136	<0.0000584	<0.000136	0.000019	4	4	-	-	-	-	
1-methylchrysene	µg/L	-	-	-	-	<0.000121	0.000051	<0.000158	<0.000158	<0.0000471	<0.000158	0.000024	4	4	-	-	-	-	
3-methylfluoranthene / benzo(a)fluorene	µg/L	-	-	-	-	0.00032	0.00032	0.00069	0.00069	<0.000151	0.00069	0.00026	2	4	-	-	-	-	

APPENDIX B
Table B-4: Seasonal Surface Water Quality Summary of Eagle River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary																
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Ice-Cover (March)										Standard Deviation	nd	Count	% Above Guideline			
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Acute	Chronic	BC MOE Mean	BC MOE Max							
Naphthenic Acid																						
C12h18o2	ng/L	-	-	-	-	62	62	83	100	19	104	60	0	2	-	-	-	-				
C12h20o2	ng/L	-	-	-	-	110	110	138	161	52	167	81	0	2	-	-	-	-				
C12h22o2	ng/L	-	-	-	-	39	39	48	55	22	57	25	0	2	-	-	-	-				
C12h24o2	ng/L	-	-	-	-	34	18	34	34	<5.0	34	22	1	2	-	-	-	-				
C13h20o2	ng/L	-	-	-	-	66	66	85	101	27	105	55	0	2	-	-	-	-				
C13h22o2	ng/L	-	-	-	-	79	79	99	115	38	119	57	0	2	-	-	-	-				
C13h24o2	ng/L	-	-	-	-	22	22	27	30	14	31	12	0	2	-	-	-	-				
C13h26o2	ng/L	-	-	-	-	22	12	22	22	<5.2	22	14	1	2	-	-	-	-				
C14h20o2	ng/L	-	-	-	-	65	65	83	98	28	102	53	0	2	-	-	-	-				
C14h22o2	ng/L	-	-	-	-	87	87	113	134	34	139	74	0	2	-	-	-	-				
C14h24o2	ng/L	-	-	-	-	79	79	95	108	46	111	46	0	2	-	-	-	-				
C14h26o2	ng/L	-	-	-	-	27	16	27	27	<8.9	27	16	1	2	-	-	-	-				
C14h28o2	ng/L	-	-	-	-	<5.2	2.6	<5.2	<5.2	<5.0	<5.2	0.053	2	2	-	-	-	-				
C15h18o2	ng/L	-	-	-	-	23	23	27	30	14	31	12	0	2	-	-	-	-				
C15h20o2	ng/L	-	-	-	-	49	49	61	70	27	72	32	0	2	-	-	-	-				
C15h22o2	ng/L	-	-	-	-	87	87	112	132	37	137	71	0	2	-	-	-	-				
C15h24o2	ng/L	-	-	-	-	105	105	138	164	38	171	94	0	2	-	-	-	-				
C15h26o2	ng/L	-	-	-	-	61	61	78	91	27	94	47	0	2	-	-	-	-				
C15h28o2	ng/L	-	-	-	-	10	6.6	10	10	<6.5	10	4.8	1	2	-	-	-	-				
C15h30o2	ng/L	-	-	-	-	<5.2	2.6	<5.2	<5.2	<5.0	<5.2	0.053	2	2	-	-	-	-				
C16h20o2	ng/L	-	-	-	-	26	26	32	36	15	37	16	0	2	-	-	-	-				
C16h22o2	ng/L	-	-	-	-	28	28	33	37	17	38	15	0	2	-	-	-	-				
C16h24o2	ng/L	-	-	-	-	35	35	46	55	14	57	30	0	2	-	-	-	-				
C16h26o2	ng/L	-	-	-	-	45	45	57	68	19	70	36	0	2	-	-	-	-				
C16h28o2	ng/L	-	-	-	-	21	21	25	29	13	30	11	0	2	-	-	-	-				
C16h30o2	ng/L	-	-	-	-	<5.2	2.6	<5.2	<5.2	<5.0	<5.2	0.053	2	2	-	-	-	-				
C16h32o2	ng/L	-	-	-	-	<5.2	2.6	<5.2	<5.2	<5.0	<5.2	0.053	2	2	-	-	-	-				
C17h22o2	ng/L	-	-	-	-	23	23	28	32	12	33	15	0	2	-	-	-	-				
C17h24o2	ng/L	-	-	-	-	24	24	29	34	13	35	15	0	2	-	-	-	-				
C17h26o2	ng/L	-	-	-	-	39	39	53	64	12	67	39	0	2	-	-	-	-				
C17h28o2	ng/L	-	-	-	-	35	35	39	42	27	43	11	0	2	-	-	-	-				
C17h30o2	ng/L	-	-	-	-	8.8	8.8	10	12	5.6	12	4.4	0	2	-	-	-	-				
C17h32o2	ng/L	-	-	-	-	<5.2	2.6	<5.2	<5.2	<5.0	<5.2	0.053	2	2	-	-	-	-				
C17h34o2	ng/L	-	-	-	-	<5.2	2.6	<5.2	<5.2	<5.0	<5.2	0.053	2	2	-	-	-	-				
C18h24o2	ng/L	-	-	-	-	44	44	48	51	36	52	11	0	2	-	-	-	-				
C18h26o2	ng/L	-	-	-	-	17	17	20	24	8.7	24	11	0	2	-	-	-	-				
C18h28o2	ng/L	-	-	-	-	7.6	7.6	8.8	9.8	5.2	10	3.4	0	2	-	-	-	-				
C18h30o2	ng/L	-	-	-	-	9.9	6.2	9.9	9.9	<5.0	9.9	5.2	1	2	-	-	-	-				
C18h32o2	ng/L	-	-	-	-	<5.2	2.6	<5.2	<5.2	<5.0	<5.2	0.053	2	2	-	-	-	-				
C18h34o2	ng/L	-	-	-	-	<5.2	2.6	<5.2	<5.2	<5.0	<5.2	0.053	2	2	-	-	-	-				
C18h36o2	ng/L	-	-	-	-	<5.2	2.6	<5.2	<5.2	<5.0	<5.2	0.053	2	2	-	-	-	-				
C19h26o2	ng/L	-	-	-	-	<5.2	2.6	<5.2	<5.2	<5.0	<5.2	0.053	2	2	-	-	-	-				
C19h28o2	ng/L	-	-	-	-	7.5	7.5	8.1	8.6	6.3	8.8	1.8	0	2	-	-	-	-				
C19h30o2	ng/L	-	-	-	-	7.2	4.8	7.2	7.2	<5.0	7.2	3.3	1	2	-	-	-	-				
C19h32o2	ng/L	-	-	-	-	<5.2	2.6	<5.2	<5.2	<5.0	<5.2	0.053	2	2	-	-	-	-				
C19h34o2	ng/L	-	-	-	-	7.6	5.0	7.6	7.6	<5.0	7.6	3.6	1	2	-	-	-	-				
C19h36o2	ng/L	-	-	-	-	<5.2	2.6	<5.2	<5.2	<5.0	<5.2	0.053	2	2	-	-	-	-				
C19h38o2	ng/L	-	-	-	-	<5.2	2.6	<5.2	<5.2	<5.0	<5.2	0.053	2	2	-	-	-	-				
C20h28o2	ng/L	-	-	-	-	<5.2	2.6	<5.2	<5.2	<5.0	<5.2	0.053	2	2	-	-	-	-				
C20h30o2	ng/L	-	-	-	-	108	108	116	122	92	124	23	0	2	-	-	-	-				
C20h32o2	ng/L	-	-	-	-	18	18	19	20	16	21	3.6	0	2	-	-	-	-				
C20h34o2	ng/L	-	-	-	-	<5.2	2.6	<5.2	<5.2	<5.0	<5.2	0.053	2	2	-	-	-	-				
C20h36o2	ng/L	-	-	-	-	<5.2	2.6	<5.2	<5.2	<5.0	<5.2	0.053	2	2	-	-	-	-				
C20h38o2	ng/L	-	-	-	-	<5.2	2.6	<5.2	<5.2	<5.0	<5.2	0.053	2	2	-	-	-	-				
C21h30o2	ng/L	-	-	-	-	7.2	4.9	7.2	7.2	<5.2	7.2	3.3	1	2	-	-	-	-				
C21h32o2	ng/L	-	-	-	-	<5.2	2.6	<5.2	<5.2	<5.0	<5.2	0.053	2	2	-	-	-	-				
C21h34o2	ng/L	-	-	-	-	<5.2	2.6	<5.2	<5.2	<5.0	<5.2	0.053	2	2	-	-	-	-				
C21h36o2	ng/L	-	-	-	-	<5.2	2.6	<5.2	<5.2	<5.0	<5.2	0.053	2	2	-	-	-	-				
C21h38o2	ng/L	-	-	-	-	<5.2	2.6	<5.2	<5.2	<5.0	<5.2	0.053	2	2	-	-	-	-				
C21h40o2	ng/L	-	-	-	-	<5.2	2.6	<5.2	<5.2	<5.0	<5.2	0.053	2	2	-	-	-	-				
Radionuclides																						
Actinium-228	Bq/L	-	-	-	-	<0.9	0.75	1.0	1.0	0.80	1.0	0.28	1	3	-	-	-	-				
Bismuth-212	Bq/L	-	-	-	-	<2.0	0.82	<2.0	<2.0	<0.9	<2.0	0.32	3	3	-	-	-	-				
Bismuth-214	Bq/L	-	-	-	-	<0.4	0.23	<0.6	<0.6	<0.4	<0.6	0.058	3	3	-	-	-	-				
Lead-210	Bq/L	-	-	-	-	<4.0	2.5	4.0	4.0	<3.0	4.0	1.3	2	3	-	-	-	-				
Lead-211	Bq/L	-	-	-	-	<3.0	1.3	<4.0	<4.0	<1.0	<4.0	0.76	3	3	-	-	-	-				
Lead-212	Bq/L	-	-	-	-	<0.3	0.43	1.0	1.0	<0.3	1.0	0.49	2	3	-	-	-	-				
Lead-214	Bq/L	-	-	-	-	0.40	0.30	0.40	0.40	<0.4	<0.6	0.10	2	3	-	-	-	-				
Potassium-40	Bq/L	-	-	-	-	<4.0	4.7	10	10	<4.0	10	4.6	2	3	-	-	-	-				
Radium-223	Bq/L	-	-	-	-	<0.9	0.40	<1.0	<1.0	<0.5	<1.0	0.13	3	3	-	-	-	-				
Radium-226	Bq/L	-	-	-	-	0.0080	0.84	0.0080	0.0080	<0.005	<5.0	1.4	2	3	-	-	-	-				
Radon-219	Bq/L	-	-	-	-	<1.0	0.47	<1.0	<1.0	<1.0	<1.0	0.058	3	3	-	-	-	-				
Thallium-208	Bq/L	-	-	-	-	<0.2	0.23	0.50	0.50	<0.2	0.50	0.23	2	3	-	-	-	-				
Thorium-227	Bq/L	-	-	-	-	<0.8	0.38	<0.9	<0.9	<0.6	<0.9	0.076	3	3	-	-	-	-				
Thorium-230	Bq/L	-	-	-	-	<20	10	<30	<30	<10	<30	5.0	3	3	-	-	-	-				
Thorium-234	Bq/L	-	-	-	-	<3.0	1.7	<4.0	<4.0	<3.0	<4.0	0.29	3	3	-	-	-	-				
Uranium-235	Bq/L	-	-	-	-	<0.7	0.38	<1.0	<1.0	<0.6	<1.0	0.10	3	3	-	-	-	-				

APPENDIX B
Table B-4: Seasonal Surface Water Quality Summary of Eagle River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary												
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Freshet (April to early June)												
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline			
															Acute	Chronic	BC MOE Mean	BC MOE Max
Field Measured																		
pH	-	-	6.5 - 9.0	6.5 - 9.0	6.5 - 9.0	7.0	7.1	7.2	7.5	6.9	7.5	0.37	0	3	-	-	-	-
Specific conductivity	µS/cm	-	-	-	-	371	368	432	481	240	493	127	0	3	-	-	-	-
Temperature	°C	-	-	-	-	9.3	9.3	10	11	7.4	11	1.9	0	3	-	-	-	-
Dissolved oxygen	mg/L	-	6.5	8.0	5.0	11	10	11	11	10	11	0.33	0	3	-	-	-	-
Turbidity	NTU	-	-	-	-	16	16	21	24	6.2	25	9.6	0	3	-	-	-	-
Conventional Parameters																		
Hardness, as CaCO ₃	mg/L	-	-	-	-	124	146	176	218	87	228	73	0	3	-	-	-	-
Total alkalinity, as CaCO ₃	mg/L	-	-	20 ^(a)	-	17 ^(BC MOE Mean)	36	46	69	15 ^(BC MOE Mean)	75	34	0	3	-	-	67	-
Total dissolved solids	mg/L	-	-	-	-	224	201	231	237	142	238	52	0	3	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	6.0	11	16	24	<3.0	26	13	1	3	-	-	-	-
Total organic carbon	mg/L	-	-	-	-	13	12	15	16	5.9	16	5.1	0	3	-	-	-	-
Dissolved organic carbon	mg/L	-	-	-	-	13	11	15	16	4.6	16	5.9	0	3	-	-	-	-
Dissolved inorganic carbon	mg/L	-	-	-	-	4.2	8.8	11	17	3.7	18	8.3	0	3	-	-	-	-
Total inorganic carbon	mg/L	-	-	-	-	4.5	9.1	12	17	4.2	19	8.3	0	3	-	-	-	-
Major Ions																		
Bicarbonate, as CaCO ₃	mg/L	-	-	-	-	20	43	56	84	18	91	42	0	3	-	-	-	-
Bromide	mg/L	-	-	-	-	<0.02	0.010	<0.02	<0.02	<0.02	<0.02	0	3	3	-	-	-	-
Calcium	mg/L	-	-	-	-	20	32	39	55	19	58	23	0	3	-	-	-	-
Carbonate, as CaCO ₃	mg/L	-	-	-	-	<6.0	3.0	<6.0	<6.0	<6.0	<6.0	0	3	3	-	-	-	-
Chloride	mg/L	640	120	150	600	1.5	1.4	1.7	1.8	0.79	1.9	0.55	0	3	-	-	-	-
Fluoride	mg/L	-	0.12 ^(b)	-	1.1 - 1.9 ^(b)	-	-	-	-	-	-	-	0	0	-	-	-	-
Magnesium	mg/L	-	-	-	-	19	16	19	20	9.1	20	5.9	0	3	-	-	-	-
Potassium	mg/L	-	-	-	-	0.80	1.0	1.1	1.3	0.80	1.4	0.35	0	3	-	-	-	-
Sodium	mg/L	-	-	-	-	15	19	21	26	14	28	7.6	0	3	-	-	-	-
Sulphate	mg/L	-	-	218 - 429 ^(b, c)	-	147	136	160	170	88	172	43	0	3	-	-	-	-
Nutrients																		
Nitrate	mg-N/L	124	2.9	3.0	33	0.060	0.080	0.11	0.14	0.030	0.15	0.062	0	3	-	-	-	-
Nitrite	mg-N/L	-	0.060	0.020 - 0.20 ^(d)	0.060 - 0.60 ^(d)	0.050 ^(BC MOE Mean)	0.050 ^(BC MOE Mean)	0.055 ^(BC MOE Mean)	0.059 ^(BC MOE Mean)	0.040 ^(BC MOE Mean)	0.060 ^(BC MOE Mean)	0.010	0	3	-	-	100	-
Nitrate + nitrite	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Total ammonia	mg-N/L	-	0.61 - 47 ^(e)	0.88 - 2.1 ^(f)	4.6 - 28 ^(g)	0.030	0.027	0.030	0.030	0.020	0.030	0.0058	0	3	-	-	-	-
Total kjeldahl nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Total nitrogen (calculated)	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Total nitrogen	mg-N/L	-	-	-	-	0.66	0.56	0.68	0.70	0.31	0.70	0.21	0	3	-	-	-	-
Total phosphorus	mg-P/L	-	-	0.010	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Phosphorus (as phosphate)	mg-P/L	-	-	-	-	0.023	0.026	0.031	0.037	0.016	0.038	0.011	0	3	-	-	-	-
Total Metals																		
Aluminum	µg/L	-	100 ^(h, i)	-	-	346 ^(Chronic)	626 ^(Chronic)	788 ^(Chronic)	1,142 ^(Chronic)	302 ^(Chronic)	1,230 ^(Chronic)	524	0	3	-	100	-	-
Antimony	µg/L	-	-	9.0	-	<0.1	0.10	0.20	0.20	<0.1	0.20	0.087	2	3	-	-	-	-
Arsenic	µg/L	-	5.0	-	5.0	0.53	0.59	0.64	0.73	0.50	0.75	0.14	0	3	-	-	-	-
Barium	µg/L	-	-	1,000	-	63	64	67	70	60	71	5.8	0	3	-	-	-	-
Beryllium	µg/L	-	-	0.13	-	0.070	0.075	0.10	0.12	<0.05	0.13	0.053	1	3	-	-	-	-
Bismuth	µg/L	-	-	-	-	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	3	3	-	-	-	-
Boron	µg/L	29,000	1,500	-	1,200	31	35	40	46	25	48	12	0	3	-	-	-	-
Cadmium	µg/L	1.1 - 7.7 ^(b)	0.094 - 0.37 ^(b)	-	-	0.14	0.17	0.24	0.31 ^(Chronic)	0.030	0.33 ^(Chronic)	0.15	0	3	-	33	-	-
Chromium	µg/L	-	1.0	1.0 ^(j)	-	0.80	0.83	0.90	0.98	0.70	1.0	0.15	0	3	-	-	-	-
Cobalt	µg/L	-	-	4.0	110	4.1 ^(BC MOE Mean)	4.4 ^(BC MOE Mean)	6.4 ^(BC MOE Mean)	8.2 ^(BC MOE Mean)	0.50	8.7 ^(BC MOE Mean)	4.1	0	3	-	-	67	-
Copper	µg/L	-	2.0 - 4.0 ^(b)	2.1 - 10 ^(b)	7.0 - 39 ^(b)	3.5 ^(Chronic)	3.9 ^(Chronic)	4.2 ^(Chronic)	4.8 ^(Chronic)	3.3 ^(Chronic)	4.9 ^(Chronic)	0.87	0	3	-	100	33	-
Iron	µg/L	-	300	-	1,000	1,610 ^(Chronic, BC MOE Max)	1,760 ^(Chronic, BC MOE Max)	2,085 ^(Chronic, BC MOE Max)	2,465 ^(Chronic, BC MOE Max)	1,110 ^(Chronic, BC MOE Max)	2,560 ^(Chronic, BC MOE Max)	737	0	3	-	100	-	100
Lead	µg/L	-	1.0 - 7.0 ^(b)	4.7 - 20 ^(b)	36 - 417 ^(b)	0.20	0.23	0.25	0.29	0.20	0.30	0.058	0	3	-	-	-	-
Lithium	µg/L	-	-	-	-	11	11	13	14	6.7	15	4.1	0	3	-	-	-	-
Manganese	µg/L	-	-	838 - 2,325 ^(b)	1,124 - 3,394 ^(b)	153	130	162	169	67	171	56	0	3	-	-	-	-
Mercury	µg/L	-	0.026	0.010	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	3	3	-	-	-	-
Molybdenum	µg/L	-	73	1,000	2,000	0.14	0.29	0.39	0.58	0.10	0.63	0.30	0	3	-	-	-	-
Nickel	µg/L	-	25 - 150 ^(b)	25 - 150 ^(b)	-	21	24	33	42	6.0	44	19	0	3	-	-	-	-
Selenium	µg/L	-	1.0	2.0	-	0.30	0.47	0.60	0.84	0.20	0.90	0.38	0	3	-	-	-	-
Silicon	µg/L	-	-	-	-	2,490	2,633	2,745	2,949	2,410	3,000	320	0	3	-	-	-	-
Silver	µg/L	-	0.25	0.050 - 1.5 ^(b)	0.10 - 3.0 ^(b)	<0.05	0.025	<0.05	<0.05	<0.05	<0.05	0	3	3	-	-	-	-
Strontium	µg/L	-	-	-	-	70	107	140	197	42	211	91	0	3	-	-	-	-
Sulphur	µg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Tellurium	µg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Thallium	µg/L	-	0.80	0.80	-	0.010	0.018	0.025	0.037	<0.01	0.040	0.019	1	3	-	-	-	-
Thorium	µg/L	-	-	-	-	0.11	0.12	0.13	0.15	0.10	0.15	0.026	0	3	-	-	-	-
Tin	µg/L	-	-	-	-	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	3	3	-	-	-	-
Titanium	µg/L	-	-	-	-	12	9.2	12	12	3.6	12	4.9	0	3	-	-	-	-
Uranium	µg/L	33	15	8.5	-	0.12	0.30	0.42	0.66	0.070	0.72	0.36	0	3	-	-	-	-
Vanadium	µg/L	-	-	-	-	1.6	1.5	1.9	2.1	0.80	2.2	0.70	0	3	-	-	-	-
Zinc	µg/L	-	30	7.5 - 188 ^(b)	33 - 259 ^(b)	38 ^(Chronic, BC MOE Mean)	49 ^(Chronic, BC MOE Mean)	70 ^(Chronic)	96 ^(Chronic)	8.2	102 ^(Chronic)	48	0	3	-	67	33	33
Zirconium	µg/L	-	-	-	-	0.50	0.55	0.70	0.86	<0.5	0.90	0.33	1	3	-	-	-	-

APPENDIX B
Table B-4: Seasonal Surface Water Quality Summary of Eagle River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary													
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Freshet (April to early June)													
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline				
																Acute	Chronic	BC MOE Mean	BC MOE Max
Dissolved Metals																			
Aluminum	µg/L	-	-	50 ⁽ⁿ⁾	100 ⁽ⁿ⁾	66 ^(BC MOE Mean)	86 ^(BC MOE Mean)	108 ^(BC MOE Mean, BC MOE Max)	141 ^(BC MOE Mean, BC MOE Max)	42	149 ^(BC MOE Mean, BC MOE Max)	56	0	3	3	-	-	67	33
Antimony	µg/L	-	-	-	-	<0.2	0.10	<0.2	<0.2	<0.2	<0.2	0	3	3	3	-	-	-	-
Arsenic	µg/L	-	-	-	-	0.40	0.33	0.40	0.40	0.20	0.40	0.12	0	3	3	-	-	-	-
Barium	µg/L	-	-	-	-	55	50	56	57	39	57	9.9	0	3	3	-	-	-	-
Beryllium	µg/L	-	-	-	-	<0.04	0.033	0.060	0.060	<0.04	0.060	0.023	2	3	3	-	-	-	-
Bismuth	µg/L	-	-	-	-	<1.0	0.50	<1.0	<1.0	<1.0	<1.0	0	3	3	3	-	-	-	-
Boron	µg/L	-	-	-	-	25	29	34	41	20	43	12	0	3	3	-	-	-	-
Cadmium	µg/L	-	-	0.13 - 0.46 ⁽ⁿ⁾	0.31 - 2.4 ⁽ⁿ⁾	0.12	0.11	0.15	0.17	0.020	0.18	0.081	0	3	3	-	-	-	-
Chromium	µg/L	-	-	-	-	0.50	0.40	0.50	0.50	<0.4	0.50	0.17	1	3	3	-	-	-	-
Cobalt	µg/L	-	-	-	-	3.9	3.9	5.7	7.1	0.46	7.4	3.5	0	3	3	-	-	-	-
Copper	µg/L	-	-	-	-	3.0	2.7	3.0	3.0	2.0	3.0	0.58	0	3	3	-	-	-	-
Iron	µg/L	-	-	-	350	408 ^(BC MOE Max)	527 ^(BC MOE Max)	789 ^(BC MOE Max)	1,094 ^(BC MOE Max)	<5.0	1,170 ^(BC MOE Max)	593	1	3	3	-	-	-	67
Lead	µg/L	-	-	-	-	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	3	3	3	-	-	-	-
Lithium	µg/L	-	-	-	-	11	11	14	16	7.0	16	4.5	0	3	3	-	-	-	-
Manganese	µg/L	-	-	-	-	156	127	160	163	61	164	57	0	3	3	-	-	-	-
Mercury	µg/L	-	-	-	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	3	3	3	-	-	-	-
Molybdenum	µg/L	-	-	-	-	0.11	0.26	0.34	0.52	0.10	0.56	0.26	0	3	3	-	-	-	-
Nickel	µg/L	-	-	-	-	19	20	27	33	5.0	35	15	0	3	3	-	-	-	-
Selenium	µg/L	-	-	-	-	<0.6	0.47	0.80	0.80	<0.6	0.80	0.29	2	3	3	-	-	-	-
Silicon	µg/L	-	-	-	-	1,840	1,947	2,010	2,146	1,820	2,180	202	0	3	3	-	-	-	-
Silver	µg/L	-	-	-	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	3	3	3	-	-	-	-
Strontium	µg/L	-	-	-	-	71	107	141	196	40	210	91	0	3	3	-	-	-	-
Sulphur	µg/L	-	-	-	-	53,000	49,467	58,400	62,720	31,600	63,800	16,388	0	3	3	-	-	-	-
Tellurium	µg/L	-	-	-	-	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	3	3	3	-	-	-	-
Thallium	µg/L	-	-	-	-	<0.01	0.0067	0.010	0.010	<0.01	0.010	0.0029	2	3	3	-	-	-	-
Thorium	µg/L	-	-	-	-	<0.4	0.20	<0.4	<0.4	<0.4	<0.4	0	3	3	3	-	-	-	-
Tin	µg/L	-	-	-	-	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	3	3	3	-	-	-	-
Titanium	µg/L	-	-	-	-	<10	5.0	<10	<10	<10	<10	0	3	3	3	-	-	-	-
Uranium	µg/L	-	-	-	-	<0.4	0.30	0.50	0.50	<0.4	0.50	0.17	2	3	3	-	-	-	-
Vanadium	µg/L	-	-	-	-	0.31	0.26	0.33	0.34	0.12	0.34	0.12	0	3	3	-	-	-	-
Zinc	µg/L	-	-	-	-	32	25	34	35	7.0	35	15	0	3	3	-	-	-	-
Zirconium	µg/L	-	-	-	-	0.44	0.41	0.59	0.70	<0.1	0.73	0.34	1	3	3	-	-	-	-
Volatile Organics																			
Benzene	µg/L	-	370 ⁽ⁿ⁾	40	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	3	3	3	-	-	-	-
Ethylbenzene	µg/L	-	90 ⁽ⁿ⁾	200	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	3	3	3	-	-	-	-
Toluene	µg/L	-	2 ⁽ⁿ⁾	0.50	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	3	3	3	-	-	-	-
Xylenes	µg/L	-	-	30	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	3	3	3	-	-	-	-
Styrene	µg/L	-	72 ⁽ⁿ⁾	72	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	3	3	3	-	-	-	-
Extractable Petroleum Hydrocarbons (C10-C19)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	0	-	-	-	-
Extractable Petroleum Hydrocarbons (C10-C32)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	0	-	-	-	-
Volatile Hydrocarbons	µg/L	-	-	-	-	<50	25	<50	<50	<50	<50	0	3	3	3	-	-	-	-
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	-	<50	25	<50	<50	<50	<50	0	3	3	3	-	-	-	-
Methyl tertiary-butyl ether	µg/L	-	-	-	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	3	3	3	-	-	-	-
Parent PAHs																			
Naphthalene	µg/L	-	1.1 ⁽ⁿ⁾	1.0	-	<0.00765	0.0038	<0.00765	<0.00765	<0.00765	<0.00765	0	3	3	3	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	<0.0002	0.00023	0.00055	0.00055	<0.000104	0.00055	0.00027	2	3	3	-	-	-	-
Biphenyl	µg/L	-	-	-	-	<0.00468	0.0023	<0.00468	<0.00468	<0.00468	<0.00468	0	3	3	3	-	-	-	-
Acenaphthene	µg/L	-	5.8 ⁽ⁿ⁾	6.0	-	<0.000479	0.00023	<0.000565	<0.000565	<0.000324	<0.000565	0.000061	3	3	3	-	-	-	-
Fluorene	µg/L	-	3 ⁽ⁿ⁾	12	-	0.00021	0.00013	0.00021	0.00021	<0.0000978	<0.000264	0.000080	2	3	3	-	-	-	-
Phenanthrene	µg/L	-	0.4 ⁽ⁿ⁾	0.30	-	<0.0033	0.0017	<0.0033	<0.0033	<0.0033	<0.0033	0	3	3	3	-	-	-	-
Anthracene	µg/L	-	0.012 ⁽ⁿ⁾	0.10	-	<0.0000835	0.000056	<0.00017	<0.00017	<0.000083	<0.00017	0.000025	3	3	3	-	-	-	-
Dibenzothiophene	µg/L	-	-	-	-	<0.000366	0.00019	<0.000463	<0.000463	<0.000327	<0.000463	0.000035	3	3	3	-	-	-	-
Pyrene	µg/L	-	0.025 ⁽ⁿ⁾	0.020	-	<0.001467	0.0012	0.0021	0.0021	<0.001467	0.0021	0.00078	2	3	3	-	-	-	-
Fluoranthene	µg/L	-	0.04 ⁽ⁿ⁾	0.20	-	<0.001131	0.00057	<0.001131	<0.001131	<0.001131	<0.001131	0	3	3	3	-	-	-	-
Benzo(a)anthracene	µg/L	-	0.018 ⁽ⁿ⁾	0.10	-	<0.00111	0.00056	<0.00111	<0.00111	<0.00111	<0.00111	0	3	3	3	-	-	-	-
Chrysene	µg/L	-	-	-	-	0.00096	0.0011	0.0014	0.0018	0.00048	0.0019	0.00074	0	3	3	-	-	-	-
1-Methyl-7-isopropyl-phenanthrene (Retene)	µg/L	-	-	-	-	<0.000827	0.00067	0.00091	0.00091	0.00069	0.00091	0.00025	1	3	3	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	<0.000615	0.00038	<0.00126	<0.00126	<0.000385	<0.00126	0.00023	3	3	3	-	-	-	-
Benzo(j,k)fluoranthenes	µg/L	-	-	-	-	<0.000177	0.00012	<0.000398	<0.000398	<0.000141	<0.000398	0.000070	3	3	3	-	-	-	-
Benzo(b,j,k)fluoranthenes	µg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	0	-	-	-	-
Benzo(a)pyrene	µg/L	-	0.015 ⁽ⁿ⁾	0.010	-	<0.000192	0.00015	<0.000564	<0.000564	<0.00016	<0.000564	0.00011	3	3	3	-	-	-	-
Benzo(e)pyrene	µg/L	-	-	-	-	<0.000876	0.0011	0.0026	0.0026	<0.000627	0.0026	0.0013	2	3	3	-	-	-	-
Perylene	µg/L	-	-	-	-	<0.000413	0.0013	0.0033	0.0033	0.00041	0.0033	0.0017	1	3	3	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	<0.00113	0.00074	<0.0025	<0.0025	<0.000821	<0.0025	0.00045	3	3	3	-	-	-	-
Indeno(1,2,3-c,d)pyrene	µg/L	-	-	-	-	<0.000285	0.00024	0.00045	0.00045	<0.000243	0.00045	0.00019	2	3	3	-	-	-	-
Dibenzo(a,h)anthracene	µg/L	-	-	-	-	<0.000268	0.00012	<0.000281	<0.000281	<0.000181	<0.000281	0.000027	3	3	3	-	-	-	-

APPENDIX B
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Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary												
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Freshet (April to early June)												
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline			
															Acute	Chronic	BC MOE Mean	BC MOE Max
Alkylated PAHs																		
C1 substituted naphthalenes	µg/L	-	-	-	-	<0.00939	0.0047	<0.00939	<0.00939	<0.00939	<0.00939	0	3	3	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-	0.0019	0.0017	0.0021	0.0023	<0.001656	0.0023	0.00077	1	3	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	<0.00939	0.0047	<0.00939	<0.00939	<0.00939	<0.00939	0	3	3	-	-	-	-
C2 substituted naphthalenes	µg/L	-	-	-	-	<0.01257	0.0063	<0.01257	<0.01257	<0.01257	<0.01257	0	3	3	-	-	-	-
1,2-Dimethylnaphthalene	µg/L	-	-	-	-	<0.000617	0.00035	<0.00102	<0.00102	<0.000439	<0.00102	0.00015	3	3	-	-	-	-
2,6-Dimethylnaphthalene	µg/L	-	-	-	-	0.0018	0.0017	0.0021	0.0023	0.00086	0.0023	0.00074	0	3	-	-	-	-
C1 substituted acenaphthenes	µg/L	-	-	-	-	<0.000349	0.00019	<0.000468	<0.000468	<0.000306	<0.000468	0.000042	3	3	-	-	-	-
C1 substituted biphenyls	µg/L	-	-	-	-	<0.001857	0.00093	<0.001857	<0.001857	<0.001857	<0.001857	0	3	3	-	-	-	-
C3 substituted naphthalenes	µg/L	-	-	-	-	0.0060	0.0067	0.0085	0.011	<0.00582	0.011	0.0041	1	3	-	-	-	-
2,3,5-Trimethylnaphthalene	µg/L	-	-	-	-	0.0016	0.0018	0.0022	0.0026	0.00093	0.0027	0.00091	0	3	-	-	-	-
2,3,6-Trimethylnaphthalene	µg/L	-	-	-	-	0.0016	0.0018	0.0022	0.0026	0.0010	0.0027	0.00088	0	3	-	-	-	-
C1 substituted fluorenes	µg/L	-	-	-	-	0.0011	0.0011	0.0012	0.0013	0.00096	0.0013	0.00018	0	3	-	-	-	-
2-Methylfluorene	µg/L	-	-	-	-	<0.000199	0.00010	<0.000253	<0.000253	<0.000163	<0.000253	0.000023	3	3	-	-	-	-
C2 substituted biphenyls	µg/L	-	-	-	-	<0.0033	0.0017	<0.0033	<0.0033	<0.0033	<0.0033	0	3	3	-	-	-	-
C4 substituted naphthalenes	µg/L	-	-	-	-	0.0027	0.0038	0.0066	0.0066	0.0018	0.0071	0.0028	0	3	-	-	-	-
1,4,6,7-Tetramethylnaphthalene	µg/L	-	-	-	-	0.00039	0.00032	0.00039	0.00039	<0.000212	<0.000924	0.00019	2	3	-	-	-	-
C1 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.0022	0.0038	0.0050	0.0072	0.0014	0.0078	0.0035	0	3	-	-	-	-
1-Methylphenanthrene	µg/L	-	-	-	-	0.00080	0.0011	0.0014	0.0019	0.00051	0.0020	0.00081	0	3	-	-	-	-
2-Methylphenanthrene	µg/L	-	-	-	-	<0.000668	0.00092	0.0022	0.0022	<0.000557	0.0022	0.0011	2	3	-	-	-	-
3-Methylphenanthrene	µg/L	-	-	-	-	0.00046	0.00071	0.00088	0.0012	0.00038	0.0013	0.00050	0	3	-	-	-	-
9/4-Methylphenanthrene	µg/L	-	-	-	-	0.00089	0.0012	0.0016	0.0021	0.00055	0.0023	0.00091	0	3	-	-	-	-
2-Methylantracene	µg/L	-	-	-	-	<0.00029	0.00015	<0.000382	<0.000382	<0.000232	<0.000382	0.000038	3	3	-	-	-	-
C2 substituted fluorenes	µg/L	-	-	-	-	0.0011	0.0012	0.0015	0.0018	0.00063	0.0019	0.00065	0	3	-	-	-	-
1,7-Dimethylfluorene	µg/L	-	-	-	-	<0.000318	0.00018	<0.000513	<0.000513	<0.00024	<0.000513	0.000070	3	3	-	-	-	-
C1 substituted dibenzothiophenes	µg/L	-	-	-	-	0.00078	0.00076	0.00083	0.00088	0.00060	0.00089	0.00015	0	3	-	-	-	-
2/3-Methyldibenzothiophenes	µg/L	-	-	-	-	<0.000388	0.00018	<0.000485	<0.000485	<0.000197	<0.000485	0.000073	3	3	-	-	-	-
C2 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.0026	0.0044	0.0055	0.0079	0.0021	0.0085	0.0036	0	3	-	-	-	-
1,7-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000266	0.00044	0.0011	0.0011	<0.00021	0.0011	0.00056	2	3	-	-	-	-
1,8-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000107	0.000082	<0.000326	<0.000326	<0.0000586	<0.000326	0.000071	3	3	-	-	-	-
2,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000107	0.000072	<0.000263	<0.000263	<0.000064	<0.000263	0.000052	3	3	-	-	-	-
3,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000168	0.00011	<0.000377	<0.000377	<0.000139	<0.000377	0.000065	3	3	-	-	-	-
C3 substituted fluorenes	µg/L	-	-	-	-	<0.00534	0.0027	<0.00534	<0.00534	<0.00534	<0.00534	0	3	3	-	-	-	-
C2 substituted dibenzothiophenes	µg/L	-	-	-	-	0.0029	0.0026	0.0030	0.0030	0.0018	0.0030	0.00065	0	3	-	-	-	-
2,4-Dimethyldibenzothiophene	µg/L	-	-	-	-	<0.000164	0.000095	<0.000225	<0.000225	<0.00012	<0.000225	0.000026	3	3	-	-	-	-
C1 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.0024	0.0028	0.0038	0.0048	0.00096	0.0051	0.0021	0	3	-	-	-	-
C3 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.0018	0.0030	0.0039	0.0056	0.0012	0.0060	0.0026	0	3	-	-	-	-
1,2,6-Trimethylphenanthrene	µg/L	-	-	-	-	<0.000119	0.00015	0.00033	0.00033	<0.000097	0.00033	0.00016	2	3	-	-	-	-
C3 substituted dibenzothiophenes	µg/L	-	-	-	-	0.0019	0.0018	0.0019	0.0019	0.0018	0.0019	0.000040	0	3	-	-	-	-
C2 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.0024	0.0035	0.0042	0.0057	0.0020	0.0060	0.0022	0	3	-	-	-	-
C4 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.0030	0.0049	0.0059	0.0082	0.0030	0.0088	0.0034	0	3	-	-	-	-
C4 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.002319	0.0012	<0.002319	<0.002319	<0.002319	<0.002319	0	3	3	-	-	-	-
C1 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.00068	0.0012	0.0015	0.0022	0.00061	0.0024	0.00099	0	3	-	-	-	-
5/6-Methylchrysenes	µg/L	-	-	-	-	<0.000108	0.00010	0.00020	0.00020	<0.000106	0.00020	0.000086	2	3	-	-	-	-
C3 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.0016	0.0023	0.0029	0.0039	0.0011	0.0042	0.0017	0	3	-	-	-	-
C2 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.00046	0.00085	0.0011	0.0016	0.00031	0.0018	0.00080	0	3	-	-	-	-
5,9-Dimethylchrysene	µg/L	-	-	-	-	<0.000177	0.00015	0.00031	0.00031	<0.0000918	0.00031	0.00014	2	3	-	-	-	-
C4 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.00033	0.00045	0.00065	0.00091	<0.000126	0.00097	0.00047	1	3	-	-	-	-
C1 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	<0.000288	0.0011	0.0027	0.0027	0.00027	0.0027	0.0015	1	3	-	-	-	-
7-Methylbenzo[a]pyrene	µg/L	-	-	-	-	<0.000288	0.00015	<0.000416	<0.000416	<0.000217	<0.000416	0.000050	3	3	-	-	-	-
C3 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000121	0.00016	0.00039	0.00039	<0.0000914	0.00039	0.00019	2	3	-	-	-	-
C2 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	<0.000456	0.00049	0.0010	0.0010	<0.000456	0.0010	0.00046	2	3	-	-	-	-
C4 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000414	0.00029	0.00044	0.00044	<0.000414	0.00044	0.00014	2	3	-	-	-	-
1-methylchrysene	µg/L	-	-	-	-	<0.000102	0.00014	0.00031	0.00031	<0.0001	0.00031	0.00015	2	3	-	-	-	-
3-methylfluoranthene / benzo(a)fluorene	µg/L	-	-	-	-	0.00059	0.00079	0.0010	0.0014	<0.000588	0.0015	0.00062	1	3	-	-	-	-

APPENDIX B
Table B-4: Seasonal Surface Water Quality Summary of Eagle River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary														
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Freshet (April to early June)								Standard Deviation	nd	Count	% Above Guideline			
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Acute	Chronic				BC MOE Mean	BC MOE Max		
Naphthenic Acid																				
C12h18o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C12h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C12h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C12h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C13h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C13h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C13h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C13h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C14h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C14h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C14h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C14h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C14h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C15h18o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C15h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C15h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C15h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C15h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C15h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C15h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C16h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C16h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C16h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C16h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C16h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C16h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C16h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C17h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C17h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C17h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C17h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C17h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C17h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C17h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C18h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C18h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C18h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C18h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C18h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C18h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C18h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C19h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C19h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C19h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C19h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C19h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C19h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C19h38o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C20h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C20h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C20h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C20h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C20h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C20h38o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C21h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C21h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C21h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C21h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C21h38o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C21h40o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Radionuclides																				
Actinium-228	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Bismuth-212	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Bismuth-214	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Lead-210	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Lead-211	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Lead-212	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Lead-214	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Potassium-40	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Radium-223	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Radium-226	Bq/L	-	-	-	-	<0.005	0.0025	<0.005	<0.005	<0.005	<0.005	0	3	3	-	-	-	-		
Radon-219	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Thallium-208	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Thorium-227	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Thorium-230	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Thorium-234	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Uranium-235	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		

APPENDIX B
Table B-4: Seasonal Surface Water Quality Summary of Eagle River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary												
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Open Water (late June to September)												
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline			
															Acute	Chronic	BC MOE Mean	BC MOE Max
Field Measured																		
pH	-	-	6.5 - 9.0	6.5 - 9.0	6.5 - 9.0	7.1	7.2	7.3	7.8	6.6	8.1	0.37	0	19	-	-	-	-
Specific conductivity	µS/cm	-	-	-	-	476	454	580	737	149	1,221	259	0	19	-	-	-	-
Temperature	°C	-	-	-	-	4.2	6.8	11	15	0.40	17	5.2	0	19	-	-	-	-
Dissolved oxygen	mg/L	-	6.5	8.0	5.0	12	12	12	14	8.9	14	1.6	0	16	-	-	-	-
Turbidity	NTU	-	-	-	-	12	21	30	51	6.7	66	18	0	11	-	-	-	-
Conventional Parameters																		
Hardness, as CaCO ₃	mg/L	-	-	-	-	153	163	254	274	53	280	86	0	19	-	-	-	-
Total alkalinity, as CaCO ₃	mg/L	-	-	20 ^(a)	-	37	42	50	95	12 ^(BC MOE Mean)	105	26	0	19	-	-	21	-
Total dissolved solids	mg/L	-	-	-	-	268	280	403	522	68	524	144	0	19	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	6.0	10	15	34	<1.0	38	12	5	19	-	-	-	-
Total organic carbon	mg/L	-	-	-	-	19	16	19	22	7.0	23	5.0	0	13	-	-	-	-
Dissolved organic carbon	mg/L	-	-	-	-	17	18	20	37	6.0	50	10	0	19	-	-	-	-
Dissolved inorganic carbon	mg/L	-	-	-	-	7.9	9.0	11	20	2.4	25	6.0	0	19	-	-	-	-
Total inorganic carbon	mg/L	-	-	-	-	7.8	7.8	10	15	2.8	16	4.2	0	13	-	-	-	-
Major Ions																		
Bicarbonate, as CaCO ₃	mg/L	-	-	-	-	45	48	61	97	14	128	30	0	19	-	-	-	-
Bromide	mg/L	-	-	-	-	0.050	0.037	<0.1	<0.2	<0.02	<0.2	0.027	13	16	-	-	-	-
Calcium	mg/L	-	-	-	-	32	33	39	66	11	77	20	0	19	-	-	-	-
Carbonate, as CaCO ₃	mg/L	-	-	-	-	<6.0	2.2	<6.0	<6.0	<1.0	<6.0	1.2	19	19	-	-	-	-
Chloride	mg/L	640	120	150	600	1.6	3.0	2.7	9.7	0.080	22	4.9	0	19	-	-	-	-
Fluoride	mg/L	-	0.12 ^(b)	-	1.1 - 1.9 ^(b)	-	-	-	-	-	-	-	0	0	-	-	-	-
Magnesium	mg/L	-	-	-	-	19	18	23	38	5.1	41	11	0	19	-	-	-	-
Potassium	mg/L	-	-	-	-	0.80	1.2	1.4	2.4	0.43	2.6	0.69	0	19	-	-	-	-
Sodium	mg/L	-	-	-	-	14	21	30	47	6.5	48	14	0	19	-	-	-	-
Sulphate	mg/L	-	-	218 - 429 ^(b, c)	-	119	138	197	271	13	291	88	0	19	-	-	-	-
Nutrients																		
Nitrate	mg-N/L	124	2.9	3.0	33	0.040	0.085	0.15	0.24	<0.01	0.25	0.091	4	19	-	-	-	-
Nitrite	mg-N/L	-	0.060	0.020 - 0.20 ^(d)	0.060 - 0.60 ^(d)	<0.01	0.010	<0.01	0.030 ^(BC MOE Mean)	<0.01	<0.1 ^(DL>Chronic, DL=BC MOE Mean, DL>BC MOE Max)	0.012	17	19	-	-	11	-
Nitrate + nitrite	mg-N/L	-	-	-	-	0.063	0.081	0.081	0.19	0.028	0.22	0.072	0	6	-	-	-	-
Total ammonia	mg-N/L	-	0.61 - 47 ^(e)	0.88 - 2.1 ^(f)	4.6 - 28 ^(g)	0.030	0.031	0.040	0.051	0.010	0.060	0.012	1	19	-	-	-	-
Total kjeldahl nitrogen	mg-N/L	-	-	-	-	0.55	0.56	0.73	0.78	0.29	0.78	0.20	0	6	-	-	-	-
Total nitrogen (calculated)	mg-N/L	-	-	-	-	0.58	0.64	0.81	0.95	0.34	0.98	0.24	0	6	-	-	-	-
Total nitrogen	mg-N/L	-	-	-	-	0.65	0.68	0.85	1.0	0.34	1.2	0.23	0	16	-	-	-	-
Total phosphorus	mg-P/L	-	-	0.010	-	0.023	0.028	0.029	0.050	0.014	0.057	0.015	0	6	-	-	-	-
Dissolved phosphorus	mg-P/L	-	-	-	-	0.011	0.0082	0.011	0.012	<0.01	0.012	0.0035	3	6	-	-	-	-
Phosphorus (as phosphate)	mg-P/L	-	-	-	-	0.030	0.031	0.042	0.055	0.010	0.059	0.015	0	16	-	-	-	-
Total Metals																		
Aluminum	µg/L	-	100 ^(h, i)	-	-	494 ^(Chronic)	746 ^(Chronic)	944 ^(Chronic)	2,059 ^(Chronic)	130 ^(Chronic)	2,320 ^(Chronic)	648	0	19	-	100	-	-
Antimony	µg/L	-	-	9.0	-	0.15	0.12	<0.2	0.24	0.090	0.24	0.039	6	19	-	-	-	-
Arsenic	µg/L	-	5.0	-	5.0	0.71	0.81	0.90	1.3	0.40	1.5	0.28	0	19	-	-	-	-
Barium	µg/L	-	-	1,000	-	69	69	80	87	47	93	13	0	19	-	-	-	-
Beryllium	µg/L	-	-	0.13	-	0.10	0.096	0.11	0.28 ^(BC MOE Mean)	<0.04	0.32 ^(BC MOE Mean)	0.082	6	19	-	-	16	-
Bismuth	µg/L	-	-	-	-	<0.1	0.030	<0.1	<0.1	<0.01	0.023	0.023	12	13	-	-	-	-
Boron	µg/L	29,000	1,500	-	1,200	40	42	53	67	17	86	18	0	19	-	-	-	-
Cadmium	µg/L	1.1 - 7.7 ^(b)	0.094 - 0.37 ^(b)	-	-	0.16	0.19	0.23	0.63 ^(Chronic)	0.030	0.65 ^(Chronic)	0.18	0	19	-	42	-	-
Chromium	µg/L	-	1.0	1.0 ^(j)	-	1.1 ^(Chronic, BC MOE Mean)	1.2 ^(Chronic, BC MOE Mean)	1.2 ^(Chronic, BC MOE Mean)	2.6 ^(Chronic, BC MOE Mean)	0.23	3.4 ^(Chronic, BC MOE Mean)	0.75	0	19	-	53	53	-
Cobalt	µg/L	-	-	4.0	110	4.1 ^(BC MOE Mean)	4.9 ^(BC MOE Mean)	6.4 ^(BC MOE Mean)	14 ^(BC MOE Mean)	0.57	16 ^(BC MOE Mean)	4.3	0	19	-	-	53	-
Copper	µg/L	-	2.0 - 4.0 ^(b)	2.1 - 10 ^(b)	7.0 - 39 ^(b)	4.0 ^(Chronic)	4.6 ^(Chronic)	5.0 ^(Chronic, BC MOE Mean)	8.5 ^(Chronic)	2.4	9.0 ^(Chronic)	1.7	0	19	-	63	32	-
Iron	µg/L	-	300	-	1,000	2,510 ^(Chronic, BC MOE Max)	2,706 ^(Chronic, BC MOE Max)	3,275 ^(Chronic, BC MOE Max)	4,592 ^(Chronic, BC MOE Max)	880 ^(Chronic)	5,060 ^(Chronic, BC MOE Max)	1,099	0	19	-	100	-	95
Lead	µg/L	-	1.0 - 7.0 ^(b)	4.7 - 20 ^(b)	36 - 417 ^(b)	0.22	0.31	0.54	0.71	0.060	0.76	0.24	2	19	-	-	-	-
Lithium	µg/L	-	-	-	-	12	16	19	35	6.0	39	10	0	19	-	-	-	-
Manganese	µg/L	-	-	838 - 2,325 ^(b)	1,124 - 3,394 ^(b)	152	181	222	368	69	441	93	0	19	-	-	-	-
Mercury	µg/L	-	0.026	0.010	-	<0.01	0.0053	<0.01	0.010	<0.01	0.010	0.0011	18	19	-	-	-	-
Molybdenum	µg/L	-	73	1,000	2,000	0.20	0.33	0.29	0.81	0.090	0.94	0.26	0	19	-	-	-	-
Nickel	µg/L	-	25 - 150 ^(b)	25 - 150 ^(b)	-	18	24	28	70	5.7	77	20	0	19	-	-	-	-
Selenium	µg/L	-	1.0	2.0	-	<0.6	0.64	0.70	1.5 ^(Chronic)	0.30	1.5 ^(Chronic)	0.41	3	19	-	21	-	-
Silicon	µg/L	-	-	-	-	2,800	3,360	3,905	5,348	1,960	7,130	1,289	0	19	-	-	-	-
Silver	µg/L	-	0.25	0.050 - 1.5 ^(b)	0.10 - 3.0 ^(b)	0.010	0.013	0.020	0.025	<0.01	0.040	0.0087	4	19	-	-	-	-
Strontium	µg/L	-	-	-	-	70	99	116	242	34	264	74	0	19	-	-	-	-
Sulphur	µg/L	-	-	-	-	44,000	49,995	69,650	97,960	13,000	103,000	29,333	0	19	-	-	-	-
Tellurium	µg/L	-	-	-	-	<0.05	0.033	-	<0.1	<0.05	<0.1	0.012	19	19	-	-	-	-
Thallium	µg/L	-	0.80	0.80	-	0.010	0.016	0.023	0.038	0.0060	0.060	0.015	6	19	-	-	-	-
Thorium	µg/L	-	-	-	-	0.21	0.18	<0.4	0.43	<0.05	0.43	0.092	8	19	-	-	-	-
Tin	µg/L	-	-	-	-	<0.1	0.044	<0.1	<0.1	<0.05	<0.1	0.013	18	19	-	-	-	-
Titanium	µg/L	-	-	-	-	11	20	35	57	2.0	68	19	0	19	-	-	-	-
Uranium	µg/L	33	15	8.5	-	0.21	0.36	0.55	0.96	0.080	1.0	0.31	3	19	-	-	-	-
Vanadium	µg/L	-	-	-	-	1.6	2.0	2.4	4.9	0.22	6.3	1.5	0	19	-	-	-	-
Zinc	µg/L	-	30	7.5 - 188 ^(b)	33 - 259 ^(b)	37 ^(Chronic)	54 ^(Chronic)	45 ^(Chronic, BC MOE Mean, BC MOE Max)	185 ^(Chronic, BC MOE Mean, BC MOE Max)	5.1	237 ^(Chronic, BC MOE Mean, BC MOE Max)	62	0	19	-	63	47	37
Zirconium	µg/L	-	-	-	-	1.0	0.97	1.2	2.0	0.10	2.3	0.59	0	19	-	-	-	-

APPENDIX B
Table B-4: Seasonal Surface Water Quality Summary of Eagle River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary												
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Open Water (late June to September)												
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline			
															Acute	Chronic	BC MOE Mean	BC MOE Max
Dissolved Metals																		
Aluminum	µg/L	-	-	50 ^(b)	100 ^(b)	81 ^(BC MOE Mean)	113 ^(BC MOE Mean, BC MOE Max)	134 ^(BC MOE Mean, BC MOE Max)	266 ^(BC MOE Mean, BC MOE Max)	33	308 ^(BC MOE Mean, BC MOE Max)	82	0	18	-	-	83	33
Antimony	µg/L	-	-	-	-	<0.2	0.12	<0.2	0.22	0.080	0.24	0.045	8	18	-	-	-	-
Arsenic	µg/L	-	-	-	-	0.47	0.46	0.60	1.0	0.14	1.0	0.21	3	18	-	-	-	-
Barium	µg/L	-	-	-	-	53	56	63	74	40	74	11	0	18	-	-	-	-
Beryllium	µg/L	-	-	-	-	0.040	0.064	0.068	<0.5	0.020	<0.5	0.072	9	18	-	-	-	-
Bismuth	µg/L	-	-	-	-	<1.0	0.26	<1.0	<1.0	<0.01	<1.0	0.25	18	18	-	-	-	-
Boron	µg/L	-	-	-	-	37	39	49	63	18	70	16	1	18	-	-	-	-
Cadmium	µg/L	-	-	0.13 - 0.46 ^(b)	0.31 - 2.4 ^(b)	0.12	0.12	0.14	0.37	0.018	0.51 ^(BC MOE Mean)	0.12	1	18	-	-	6.0	-
Chromium	µg/L	-	-	-	-	0.54	0.47	0.70	0.80	<0.1	0.80	0.25	5	18	-	-	-	-
Cobalt	µg/L	-	-	-	-	3.3	3.9	5.3	12	0.47	13	3.6	0	18	-	-	-	-
Copper	µg/L	-	-	-	-	3.0	3.0	4.0	<5.0	2.0	<5.0	0.74	2	18	-	-	-	-
Iron	µg/L	-	-	-	350	1,055 ^(BC MOE Max)	916 ^(BC MOE Max)	1,318 ^(BC MOE Max)	1,508 ^(BC MOE Max)	28	1,610 ^(BC MOE Max)	501	0	18	-	-	-	83
Lead	µg/L	-	-	-	-	<0.1	0.063	<0.1	0.16	0.020	0.20	0.046	11	18	-	-	-	-
Lithium	µg/L	-	-	-	-	9.6	14	18	33	<5.0	35	9.8	1	18	-	-	-	-
Manganese	µg/L	-	-	-	-	135	165	208	346	50	357	85	0	18	-	-	-	-
Mercury	µg/L	-	-	-	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	18	18	-	-	-	-
Molybdenum	µg/L	-	-	-	-	0.18	0.25	0.23	0.63	0.070	0.82	0.20	1	18	-	-	-	-
Nickel	µg/L	-	-	-	-	15	19	23	59	5.0	60	16	0	18	-	-	-	-
Selenium	µg/L	-	-	-	-	<0.6	0.59	0.80	2.8	0.20	2.8	0.61	7	18	-	-	-	-
Silicon	µg/L	-	-	-	-	2,345	2,383	2,555	3,048	1,530	3,320	416	0	18	-	-	-	-
Silver	µg/L	-	-	-	-	<0.01	0.015	<0.01	0.12	<0.01	0.12	0.028	16	18	-	-	-	-
Strontium	µg/L	-	-	-	-	59	82	93	204	26	216	59	0	18	-	-	-	-
Sulphur	µg/L	-	-	-	-	40,250	49,389	73,375	98,780	12,900	110,000	30,889	0	18	-	-	-	-
Tellurium	µg/L	-	-	-	-	<0.1	0.097	<0.1	0.72	<0.05	0.72	0.17	16	18	-	-	-	-
Thallium	µg/L	-	-	-	-	<0.01	0.013	0.014	<0.1	<0.004	<0.1	0.015	11	18	-	-	-	-
Thorium	µg/L	-	-	-	-	<0.4	0.19	<0.4	0.73	<0.01	0.73	0.15	11	18	-	-	-	-
Tin	µg/L	-	-	-	-	<0.1	0.092	<0.1	<1.0	<0.05	<1.0	0.15	18	18	-	-	-	-
Titanium	µg/L	-	-	-	-	6.0	4.1	<10	10	<0.2	10	2.5	9	18	-	-	-	-
Uranium	µg/L	-	-	-	-	<0.4	0.26	0.50	0.59	0.050	0.59	0.19	5	18	-	-	-	-
Vanadium	µg/L	-	-	-	-	0.35	0.31	0.40	0.61	<0.1	0.66	0.18	4	18	-	-	-	-
Zinc	µg/L	-	-	-	-	24	28	32	95	3.7	111	29	0	18	-	-	-	-
Zirconium	µg/L	-	-	-	-	0.93	0.74	1.1	1.3	0.070	1.3	0.43	2	18	-	-	-	-
Volatile Organics																		
Benzene	µg/L	-	370 ^(b)	40	-	<0.5	58 ^(BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	110	13	13	-	-	-	-
Ethylbenzene	µg/L	-	90 ^(b)	200	-	<0.5	58	<1.0	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	109	13	13	-	-	-	-
Toluene	µg/L	-	2 ^(b)	0.50	-	<0.5	58 ^(Chronic, BC MOE Mean)	<1.0 ^(DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	109	13	13	-	-	-	-
Xylenes	µg/L	-	-	30	-	<0.5	58 ^(BC MOE Mean)	<2.0	<500 ^(DL>BC MOE Mean)	<0.5	<500 ^(DL>BC MOE Mean)	109	13	13	-	-	-	-
Styrene	µg/L	-	72 ^(b)	72	-	<0.5	75 ^(Chronic, BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	121	10	10	-	-	-	-
Extractable Petroleum Hydrocarbons (C10-C19)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Extractable Petroleum Hydrocarbons (C10-C32)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Volatile Hydrocarbons	µg/L	-	-	-	-	<50	5,794	<100	<50,000	<50	<50,000	10,949	13	13	-	-	-	-
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	-	<50	5,794	<100	<50,000	<50	<50,000	10,949	13	13	-	-	-	-
Methyl tertiary-butyl ether	µg/L	-	-	-	-	<0.5	75	<500	<500	<0.5	<500	121	10	10	-	-	-	-
Parent PAHs																		
Naphthalene	µg/L	-	1.1 ^(b)	1.0	-	<0.00564	0.0034	<0.00717	<0.01275	<0.00354	<0.01275	0.0016	11	11	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	<0.000199	0.00012	<0.000231	0.00034	<0.00012	<0.000386	0.000080	10	11	-	-	-	-
Biphenyl	µg/L	-	-	-	-	<0.001836	0.00088	<0.002241	<0.002241	<0.001191	<0.002241	0.00019	11	11	-	-	-	-
Acenaphthene	µg/L	-	5.8 ^(b)	6.0	-	<0.000432	0.00026	<0.000603	<0.000603	<0.000277	<0.000603	0.000084	9	11	-	-	-	-
Fluorene	µg/L	-	3 ^(b)	12	-	<0.000255	0.00026	0.00035	0.00069	<0.0000804	0.00074	0.00023	7	12	-	-	-	-
Phenanthrene	µg/L	-	0.4 ^(b)	0.30	-	<0.002394	0.0024	0.0030	0.0065	0.0022	0.0082	0.0022	8	12	-	-	-	-
Anthracene	µg/L	-	0.012 ^(b)	0.10	-	<0.000153	0.00012	<0.00039	<0.000475	0.00012	<0.000475	0.000061	11	12	-	-	-	-
Dibenzothiophene	µg/L	-	-	-	-	<0.000525	0.00041	<0.000633	0.0011	0.00031	0.0017	0.00041	9	12	-	-	-	-
Pyrene	µg/L	-	0.025 ^(b)	0.020	-	<0.001002	0.00082	<0.001383	0.0028	<0.000573	0.0028	0.00068	8	12	-	-	-	-
Fluoranthene	µg/L	-	0.04 ^(b)	0.20	-	<0.001149	0.00072	<0.001752	0.0019	<0.00093	0.0019	0.00039	11	12	-	-	-	-
Benzo(a)anthracene	µg/L	-	0.018 ^(b)	0.10	-	0.00029	0.00022	<0.000495	0.00069	<0.000114	0.00069	0.00019	8	12	-	-	-	-
Chrysene	µg/L	-	-	-	-	<0.000747	0.0011	0.0016	0.0029	<0.000312	0.0037	0.0011	4	12	-	-	-	-
1-Methyl-7-isopropyl-phenanthrene (Retene)	µg/L	-	-	-	-	<0.000744	0.00070	0.0012	0.0021	<0.000459	0.0021	0.00054	7	12	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	0.00093	0.00066	<0.001131	0.0015	<0.0000866	0.0016	0.00049	4	12	-	-	-	-
Benzo(j,k)fluoranthenes	µg/L	-	-	-	-	<0.000151	0.000086	<0.000204	<0.000318	0.000070	<0.000318	0.000036	11	12	-	-	-	-
Benzo(b,j,k)fluoranthenes	µg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Benzo(a)pyrene	µg/L	-	0.015 ^(b)	0.010	-	<0.000211	0.00013	<0.000281	0.00039	<0.000056	<0.000452	0.000095	11	12	-	-	-	-
Benzo(e)pyrene	µg/L	-	-	-	-	0.00081	0.0012	0.0013	0.0036	<0.000189	0.0038	0.0012	2	12	-	-	-	-
Perylene	µg/L	-	-	-	-	0.00072	0.0017	0.0016	0.0065	0.00021	0.011	0.0031	4	12	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	0.00077	0.0012	0.0013	0.0040	<0.000232	0.0043	0.0014	4	12	-	-	-	-
Indeno(1,2,3-c,d)pyrene	µg/L	-	-	-	-	<0.000357	0.00017	<0.000508	<0.000628	<0.000131	<0.000628	0.000072	12	12	-	-	-	-
Dibenzo(a,h)anthracene	µg/L	-	-	-	-	0.00018	0.00011	<0.000315	<0.000408	<0.0000735	<0.000408	0.000060	10	12	-	-	-	-

APPENDIX B
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Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary												
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Open Water (late June to September)												
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline			
															Acute	Chronic	BC MOE Mean	BC MOE Max
Alkylated PAHs																		
C1 substituted naphthalenes	µg/L	-	-	-	-	0.0056	0.0047	0.011	<0.01344	<0.002661	<0.01344	0.0030	8	11	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-	<0.001674	0.0015	<0.002328	0.0041	0.0012	0.0057	0.0015	7	11	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	0.0030	0.0030	<0.01176	<0.01176	<0.001812	<0.01176	0.0020	10	11	-	-	-	-
C2 substituted naphthalenes	µg/L	-	-	-	-	<0.00846	0.0073	<0.01377	0.024	<0.00642	0.024	0.0059	8	11	-	-	-	-
1,2-Dimethylnaphthalene	µg/L	-	-	-	-	<0.001188	0.00075	<0.001773	0.0020	<0.000767	0.0020	0.00044	10	11	-	-	-	-
2,6-Dimethylnaphthalene	µg/L	-	-	-	-	0.00095	0.0013	0.0015	0.0035	<0.000491	0.0049	0.0013	3	11	-	-	-	-
C1 substituted acenaphthenes	µg/L	-	-	-	-	<0.000321	0.00016	<0.00039	<0.000602	<0.000137	<0.000602	0.000076	11	11	-	-	-	-
C1 substituted biphenyls	µg/L	-	-	-	-	<0.00375	0.0023	<0.00927	<0.00927	0.0011	<0.00927	0.0016	8	11	-	-	-	-
C3 substituted naphthalenes	µg/L	-	-	-	-	<0.00663	0.0083	0.0100	0.023	<0.002877	0.034	0.0092	4	11	-	-	-	-
2,3,5-Trimethylnaphthalene	µg/L	-	-	-	-	0.0010	0.0016	0.0021	0.0051	0.00048	0.0078	0.0022	4	11	-	-	-	-
2,3,6-Trimethylnaphthalene	µg/L	-	-	-	-	<0.00119	0.0019	0.0021	0.0056	<0.000651	0.0080	0.0022	4	11	-	-	-	-
C1 substituted fluorenes	µg/L	-	-	-	-	<0.001497	0.0012	<0.002262	0.0029	<0.000511	0.0029	0.00070	8	12	-	-	-	-
2-Methylfluorene	µg/L	-	-	-	-	<0.000293	0.00018	<0.000511	<0.000698	<0.000144	<0.000698	0.000090	11	12	-	-	-	-
C2 substituted biphenyls	µg/L	-	-	-	-	<0.01707	0.0092	<0.0414	<0.0414	0.0014	<0.0414	0.0079	8	11	-	-	-	-
C4 substituted naphthalenes	µg/L	-	-	-	-	0.0041	0.0047	0.0066	0.013	0.0017	0.018	0.0048	3	11	-	-	-	-
1,4,6,7-Tetramethylnaphthalene	µg/L	-	-	-	-	<0.000531	0.00065	0.0011	0.0028	<0.000347	0.0028	0.00077	8	11	-	-	-	-
C1 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.0028	0.0062	0.0074	0.019	0.00060	0.028	0.0076	0	12	-	-	-	-
1-Methylphenanthrene	µg/L	-	-	-	-	0.00074	0.0016	0.0020	0.0046	0.00022	0.0072	0.0020	1	12	-	-	-	-
2-Methylphenanthrene	µg/L	-	-	-	-	0.00079	0.0014	0.0015	0.0042	0.00029	0.0057	0.0016	1	12	-	-	-	-
3-Methylphenanthrene	µg/L	-	-	-	-	0.00065	0.0013	0.0014	0.0037	0.00020	0.0049	0.0013	0	12	-	-	-	-
9/4-Methylphenanthrene	µg/L	-	-	-	-	0.00078	0.0020	0.0023	0.0066	<0.000175	0.0099	0.0027	1	12	-	-	-	-
2-Methylanthracene	µg/L	-	-	-	-	<0.00027	0.00014	<0.00037	<0.000567	<0.000125	<0.000567	0.000063	12	12	-	-	-	-
C2 substituted fluorenes	µg/L	-	-	-	-	<0.001554	0.0017	0.0020	0.0057	<0.000376	0.0060	0.0020	6	12	-	-	-	-
1,7-Dimethylfluorene	µg/L	-	-	-	-	0.00041	0.00022	<0.000499	<0.000739	<0.000199	<0.000739	0.000095	11	12	-	-	-	-
C1 substituted dibenzothiophenes	µg/L	-	-	-	-	0.0010	0.0013	0.0013	0.0036	0.00028	0.0046	0.0013	0	12	-	-	-	-
2/3-Methyldibenzothiophenes	µg/L	-	-	-	-	0.00039	0.00048	0.00057	0.0013	<0.000152	0.0019	0.00049	4	12	-	-	-	-
C2 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.0025	0.0046	0.0053	0.013	<0.001182	0.021	0.0055	2	12	-	-	-	-
1,7-Dimethylphenanthrene	µg/L	-	-	-	-	0.00036	0.00068	0.00070	0.0023	0.00015	0.0038	0.0010	3	12	-	-	-	-
1,8-Dimethylphenanthrene	µg/L	-	-	-	-	0.00013	0.00022	0.00031	0.00070	<0.0000705	0.0012	0.00031	5	12	-	-	-	-
2,6-Dimethylphenanthrene	µg/L	-	-	-	-	0.00025	0.00022	<0.000384	0.00062	<0.000144	0.00087	0.00022	9	12	-	-	-	-
3,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.00024	0.00022	<0.000415	0.00045	0.00015	<0.00125	0.00017	9	12	-	-	-	-
C3 substituted fluorenes	µg/L	-	-	-	-	0.0039	0.0035	<0.00411	0.0084	<0.002589	0.0086	0.0025	7	12	-	-	-	-
C2 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.002103	0.0028	0.0043	0.0069	0.0014	0.0073	0.0024	5	12	-	-	-	-
2,4-Dimethyldibenzothiophene	µg/L	-	-	-	-	0.00029	0.00025	<0.000474	<0.0019	<0.000165	<0.0019	0.00024	10	12	-	-	-	-
C1 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.0018	0.0033	0.0047	0.010	<0.001308	0.013	0.0038	5	12	-	-	-	-
C3 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.0020	0.0030	0.0032	0.0096	<0.000339	0.016	0.0044	4	12	-	-	-	-
1,2,6-Trimethylphenanthrene	µg/L	-	-	-	-	<0.000243	0.00040	<0.000333	0.0011	<0.0000677	<0.00521	0.00075	9	12	-	-	-	-
C3 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.002145	0.0021	0.0032	0.0049	<0.001056	0.0050	0.0016	6	12	-	-	-	-
C2 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.0022	0.0041	0.0052	0.011	<0.001248	0.015	0.0042	3	12	-	-	-	-
C4 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.0031	0.0052	0.0055	0.014	0.0012	0.021	0.0055	1	12	-	-	-	-
C4 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.002763	0.0011	<0.00315	<0.00315	<0.001017	<0.00315	0.00043	12	12	-	-	-	-
C1 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.00088	0.0014	0.0016	0.0036	<0.000276	0.0052	0.0014	1	12	-	-	-	-
5/6-Methylchrysenes	µg/L	-	-	-	-	0.00021	0.00019	0.00027	0.00050	<0.0000843	0.00068	0.00018	6	12	-	-	-	-
C3 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.0012	0.0013	0.0019	0.0034	<0.000423	0.0044	0.0012	6	12	-	-	-	-
C2 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000513	0.00066	0.00061	0.0024	<0.000117	0.0036	0.00099	7	12	-	-	-	-
5,9-Dimethylchrysene	µg/L	-	-	-	-	0.00022	0.00017	<0.000343	0.00073	<0.000117	0.00073	0.00018	9	12	-	-	-	-
C4 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.000372	0.00035	<0.000558	0.0011	<0.000167	0.0013	0.00037	9	12	-	-	-	-
C1 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	<0.001029	0.0012	0.0016	0.0037	<0.000258	0.0056	0.0016	7	12	-	-	-	-
7-Methylbenzo(a)pyrene	µg/L	-	-	-	-	<0.000293	0.00022	0.00039	<0.00134	<0.000152	<0.00134	0.00018	11	12	-	-	-	-
C3 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000537	0.00023	<0.000801	<0.000801	<0.000147	<0.000801	0.00013	12	12	-	-	-	-
C2 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	<0.000804	0.00051	<0.001392	<0.001392	<0.000249	<0.001392	0.00022	8	12	-	-	-	-
C4 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.00021	0.00016	<0.000705	<0.000705	<0.0000728	<0.000705	0.00013	11	12	-	-	-	-
1-methylchrysene	µg/L	-	-	-	-	0.00024	0.00022	0.00030	0.00063	<0.0000911	0.00090	0.00024	5	12	-	-	-	-
3-methylfluoranthene / benzo(a)fluorene	µg/L	-	-	-	-	0.00069	0.0012	0.0013	0.0036	<0.000414	0.0042	0.0012	3	12	-	-	-	-

APPENDIX B
Table B-4: Seasonal Surface Water Quality Summary of Eagle River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary												
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Open Water (late June to September)												
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline			
															Acute	Chronic	BC MOE Mean	BC MOE Max
Naphthenic Acid																		
C12h18o2	ng/L	-	-	-	-	58	53	70	110	7.0	113	39	0	9	-	-	-	-
C12h20o2	ng/L	-	-	-	-	60	103	159	249	13	293	93	0	9	-	-	-	-
C12h22o2	ng/L	-	-	-	-	34	51	80	122	<7.5	147	46	2	9	-	-	-	-
C12h24o2	ng/L	-	-	-	-	<5.1	6.1	<5.6	30	<4.9	30	9.1	8	9	-	-	-	-
C13h20o2	ng/L	-	-	-	-	44	65	106	162	<4.9	193	63	1	9	-	-	-	-
C13h22o2	ng/L	-	-	-	-	84	120	195	289	12	344	108	0	9	-	-	-	-
C13h24o2	ng/L	-	-	-	-	30	41	59	86	6.9	91	31	1	9	-	-	-	-
C13h26o2	ng/L	-	-	-	-	29	31	41	70	<4.9	79	25	2	9	-	-	-	-
C14h20o2	ng/L	-	-	-	-	40	49	53	110	8.4	112	37	0	9	-	-	-	-
C14h22o2	ng/L	-	-	-	-	90	111	168	287	8.6	355	110	0	9	-	-	-	-
C14h24o2	ng/L	-	-	-	-	88	122	180	299	8.4	341	110	0	9	-	-	-	-
C14h26o2	ng/L	-	-	-	-	<26	38	60	85	<4.9	102	33	3	9	-	-	-	-
C14h28o2	ng/L	-	-	-	-	<5.0	3.1	<5.5	<14	<4.9	<14	1.5	9	9	-	-	-	-
C15h18o2	ng/L	-	-	-	-	21	23	23	47	5.2	52	15	0	9	-	-	-	-
C15h20o2	ng/L	-	-	-	-	53	57	69	119	7.5	120	40	0	9	-	-	-	-
C15h22o2	ng/L	-	-	-	-	88	147	208	324	16	330	119	0	9	-	-	-	-
C15h24o2	ng/L	-	-	-	-	176	200	239	416	45	418	140	0	9	-	-	-	-
C15h26o2	ng/L	-	-	-	-	91	103	130	203	11	219	65	0	9	-	-	-	-
C15h28o2	ng/L	-	-	-	-	15	26	26	82	<4.9	115	35	3	9	-	-	-	-
C15h30o2	ng/L	-	-	-	-	<5.6	7.6	<14	37	<4.9	37	11	8	9	-	-	-	-
C16h20o2	ng/L	-	-	-	-	34	35	44	60	15	66	17	0	9	-	-	-	-
C16h22o2	ng/L	-	-	-	-	32	33	42	79	<6.5	81	28	3	9	-	-	-	-
C16h24o2	ng/L	-	-	-	-	45	45	57	98	<4.9	113	35	2	9	-	-	-	-
C16h26o2	ng/L	-	-	-	-	82	94	115	199	8.1	218	69	0	9	-	-	-	-
C16h28o2	ng/L	-	-	-	-	38	47	65	108	<4.9	130	39	2	9	-	-	-	-
C16h30o2	ng/L	-	-	-	-	<5.0	3.1	<5.5	<14	<4.9	<14	1.5	9	9	-	-	-	-
C16h32o2	ng/L	-	-	-	-	<5.1	16	<14	70	<4.9	98	32	7	9	-	-	-	-
C17h22o2	ng/L	-	-	-	-	25	26	29	49	10	52	14	0	9	-	-	-	-
C17h24o2	ng/L	-	-	-	-	27	30	35	67	<4.9	72	23	2	9	-	-	-	-
C17h26o2	ng/L	-	-	-	-	37	38	47	78	5.1	87	26	0	9	-	-	-	-
C17h28o2	ng/L	-	-	-	-	61	80	115	169	6.8	195	61	0	9	-	-	-	-
C17h30o2	ng/L	-	-	-	-	24	32	27	87	<4.9	95	32	2	9	-	-	-	-
C17h32o2	ng/L	-	-	-	-	<5.5	7.6	8.4	37	<4.9	37	11	7	9	-	-	-	-
C17h34o2	ng/L	-	-	-	-	<5.1	4.3	<5.6	11	<4.9	<20	3.5	8	9	-	-	-	-
C18h24o2	ng/L	-	-	-	-	61	80	95	161	29	179	49	0	9	-	-	-	-
C18h26o2	ng/L	-	-	-	-	18	21	29	42	<5.5	48	14	2	9	-	-	-	-
C18h28o2	ng/L	-	-	-	-	18	19	21	44	<4.9	59	17	2	9	-	-	-	-
C18h30o2	ng/L	-	-	-	-	17	17	20	35	<4.9	46	13	3	9	-	-	-	-
C18h32o2	ng/L	-	-	-	-	<5.1	3.8	<5.6	9.2	<4.9	<14	2.5	8	9	-	-	-	-
C18h34o2	ng/L	-	-	-	-	<5.1	3.1	<5.5	<14	<4.9	<14	1.5	9	9	-	-	-	-
C18h36o2	ng/L	-	-	-	-	<5.1	3.1	<5.6	<14	<4.9	<14	1.5	9	9	-	-	-	-
C19h26o2	ng/L	-	-	-	-	42	50	56	95	28	107	27	0	9	-	-	-	-
C19h28o2	ng/L	-	-	-	-	16	14	16	33	<4.9	43	12	3	9	-	-	-	-
C19h30o2	ng/L	-	-	-	-	15	16	16	37	<4.9	47	13	2	9	-	-	-	-
C19h32o2	ng/L	-	-	-	-	10	13	<14	35	<4.9	42	13	3	9	-	-	-	-
C19h34o2	ng/L	-	-	-	-	7.3	11	17	26	5.4	29	9.0	2	9	-	-	-	-
C19h36o2	ng/L	-	-	-	-	<5.1	4.1	<5.6	12	<4.9	<14	3.3	8	9	-	-	-	-
C19h38o2	ng/L	-	-	-	-	17	19	28	51	<4.9	56	19	3	9	-	-	-	-
C20h28o2	ng/L	-	-	-	-	<21	122	45	586	<5.6	928	303	4	9	-	-	-	-
C20h30o2	ng/L	-	-	-	-	72	153	142	441	52	552	166	0	9	-	-	-	-
C20h32o2	ng/L	-	-	-	-	33	57	46	173	14	244	72	0	9	-	-	-	-
C20h34o2	ng/L	-	-	-	-	9.6	8.1	11	15	<4.9	17	5.2	3	9	-	-	-	-
C20h36o2	ng/L	-	-	-	-	<5.0	3.1	<5.5	<14	<4.9	<14	1.5	9	9	-	-	-	-
C20h38o2	ng/L	-	-	-	-	<5.1	4.6	<5.6	17	<4.9	17	4.8	8	9	-	-	-	-
C21h30o2	ng/L	-	-	-	-	14	15	16	31	<5.5	32	9.7	1	9	-	-	-	-
C21h32o2	ng/L	-	-	-	-	<5.5	3.6	<5.8	7.2	<4.9	<14	2.0	8	9	-	-	-	-
C21h34o2	ng/L	-	-	-	-	<5.0	3.1	<5.5	<14	<4.9	<14	1.5	9	9	-	-	-	-
C21h36o2	ng/L	-	-	-	-	<5.0	3.1	<5.5	<14	<4.9	<14	1.5	9	9	-	-	-	-
C21h38o2	ng/L	-	-	-	-	<5.0	3.1	<5.5	<14	<4.9	<14	1.5	9	9	-	-	-	-
C21h40o2	ng/L	-	-	-	-	<5.0	3.1	<5.5	<14	<4.9	<14	1.5	9	9	-	-	-	-
Radionuclides																		
Actinium-228	Bq/L	-	-	-	-	<1.0	0.61	<1.0	2.0	<0.4	2.0	0.57	7	8	-	-	-	-
Bismuth-212	Bq/L	-	-	-	-	<2.0	0.88	<2.0	<2.0	<1.0	<2.0	0.23	8	8	-	-	-	-
Bismuth-214	Bq/L	-	-	-	-	<0.6	0.47	0.73	0.87	<0.5	0.90	0.28	5	8	-	-	-	-
Lead-210	Bq/L	-	-	-	-	<4.0	2.1	<5.0	<6.0	<3.0	<6.0	0.52	8	8	-	-	-	-
Lead-211	Bq/L	-	-	-	-	<4.0	2.2	<6.0	<7.0	<2.0	<7.0	0.80	8	8	-	-	-	-
Lead-212	Bq/L	-	-	-	-	<0.4	0.36	0.50	0.76	<0.3	0.90	0.26	4	8	-	-	-	-
Lead-214	Bq/L	-	-	-	-	<0.5	0.33	<0.6	0.70	<0.4	0.70	0.16	6	8	-	-	-	-
Potassium-40	Bq/L	-	-	-	-	<5.0	2.4	<5.0	<6.0	<4.0	<6.0	0.32	8	8	-	-	-	-
Radium-223	Bq/L	-	-	-	-	<1.0	0.46	<1.0	<1.0	<0.7	<1.0	0.056	8	8	-	-	-	-
Radium-226	Bq/L	-	-	-	-	0.0060	0.23	0.010	0.020	<0.005	<4.0	0.66	4	9	-	-	-	-
Radon-219	Bq/L	-	-	-	-	<1.0	0.47	<1.0	<1.0	<0.6	<1.0	0.070	8	8	-	-	-	-
Thallium-208	Bq/L	-	-	-	-	<0.3	0.16	0.30	<0.4	<0.2	<0.4	0.073	7	8	-	-	-	-
Thorium-227	Bq/L	-	-	-	-	<1.0	0.56	<1.0	<2.0	<0.9	<2.0	0.18	8	8	-	-	-	-
Thorium-230	Bq/L	-	-	-	-	<20	11	<30	<30	<10	<30	3.5	8	8	-	-	-	-
Thorium-234	Bq/L	-	-	-	-	<4.0	1.9	<4.0	<4.0	<3.0	<4.0	0.23	8	8	-	-	-	-
Uranium-235	Bq/L	-	-	-	-	<1.0	0.48	<1.0	<1.0	<0.8	<1.0	0.038	8	8	-	-	-	-

Seasonal Surface Water Quality Summary of Eagle River, 2013 to 2017

^(a) = guideline is a minimum value, unless the background concentration or value is lower.

^(b) = guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (53 to 391 mg/L). The guideline is calculated based on the individual hardness value for each sample.

^(c) = for some samples, water hardness was greater than 250 mg/L. At this hardness, no BC MOE water quality guideline has been established for sulphate; however, the observed data were screened against the guideline for very hard water

^(d) = guideline is chloride dependent. The guideline range shown is based on the chloride concentration range observed in the dataset (0.0800 to 21.8000 mg/L). The guideline is calculated based on the individual chloride concentration in

^(e) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.6070 mg-N/L) is based on the combination of field pH (8.1) and water temperature (13.1°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature

^(f) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.8820 mg-N/L) is based on the combination of field pH (8.1) and water temperature (13.1°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature

^(g) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (4.5900 mg-N/L) is based on the combination of field pH (8.1) and water temperature (13.1°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature

^(h) = guideline is pH dependent. The guideline range shown is based on the pH range observed in the dataset (6.6 to 8.1). The guideline is calculated based on the individual pH for each sample.

⁽ⁱ⁾ = guideline is pH dependent: 5 µg/L at pH < 6.5 and 100 µg/L at pH ≥ 6.5.

^(j) = guideline is for chromium VI.

^(l) = interim guideline

(Chronic) = concentration is higher than the chronic aquatic life CCME guideline or outside the recommended pH, DO or (BC MOE Mean) = concentration is higher than the 30-day mean BC MOE guideline or outside the recommended pH, DO or total alkalinity range.

(BC MOE Max) = concentration is higher than the maximum BC MOE guideline or outside the recommended pH, DO or

(DL>Chronic) = analytical detection limit is higher than the chronic aquatic life CCME guideline.

(DL>BC MOE Mean) = analytical detection limit is higher than the 30-day mean BC MOE guideline.

(DL>BC MOE Max) = analytical detection limit is higher than the maximum BC MOE guideline.

Bolded concentrations are higher than water quality guidelines.

Bolded total alkalinity values indicate moderate to high level of acid sensitivity.

Water quality data and guidelines shown in this table were rounded to reflect laboratory or field instrument precision *after* comparisons to guidelines. Therefore, values slightly above guidelines may be displayed as being equal to the guidelines and identified as exceedances. Concentrations equal to the guideline values were not identified as

- = no guideline or no data.

APPENDIX B
Table B-5: Seasonal Surface Water Quality Summary of McParlon Creek, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary														
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Ice Cover (March)								Standard Deviation	nd	Count	% Above Guideline			
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Acute	Chronic				BC MOE Mean	BC MOE Max		
Field Measured																				
pH	-	-	6.5 - 9.0	6.5 - 9.0	6.5 - 9.0	7.7	7.7	7.7	7.7	7.7	7.8	0.014	0	2	-	-	-	-		
Specific conductivity	µS/cm	-	-	-	-	478	-	478	478	-	-	-	0	1	-	-	-	-		
Temperature	°C	-	-	-	-	-0.05	-0.05	-0.025	-0.005	-0.1	0	0.071	0	2	-	-	-	-		
Dissolved oxygen	mg/L	-	6.5	8.0	5.0	7.1 ^(BC MOE Mean)	7.1 ^(BC MOE Mean)	9.7	12	1.9 ^(Chronic, BC MOE Mean, BC MOE Max)	12	7.3	0	2	-	50	50	50		
Turbidity	NTU	-	-	-	-	1.6	-	1.6	1.6	-	-	-	0	1	-	-	-	-		
Conventional Parameters																				
Hardness, as CaCO ₃	mg/L	-	-	-	-	1,345	1,345	1,883	2,313	270	2,420	1,520	0	2	-	-	-	-		
Total alkalinity, as CaCO ₃	mg/L	-	-	20 ^(a)	-	212	185	185	233	132	238	75	0	2	-	-	-	-		
Total dissolved solids	mg/L	-	-	-	-	2,834	2,834	4,007	4,945	488	5,180	3,318	0	2	-	-	-	-		
Total suspended solids	mg/L	-	-	-	-	54	54	79	99	3.0	104	71	0	2	-	-	-	-		
Total organic carbon	mg/L	-	-	-	-	53	53	57	59	47	60	9.5	0	2	-	-	-	-		
Dissolved organic carbon	mg/L	-	-	-	-	48	48	49	49	47	49	1.9	0	2	-	-	-	-		
Dissolved inorganic carbon	mg/L	-	-	-	-	42	42	48	52	31	53	16	0	2	-	-	-	-		
Total inorganic carbon	mg/L	-	-	-	-	45	45	52	57	33	58	18	0	2	-	-	-	-		
Major Ions																				
Bicarbonate, as CaCO ₃	mg/L	-	-	-	-	226	226	258	284	161	290	91	0	2	-	-	-	-		
Bromide	mg/L	-	-	-	-	<0.02	0.010	<0.02	<0.02	<0.02	<0.02	0	2	2	-	-	-	-		
Calcium	mg/L	-	-	-	-	246	246	338	412	60	431	262	0	2	-	-	-	-		
Carbonate, as CaCO ₃	mg/L	-	-	-	-	<6.0	3.0	<6.0	<6.0	<6.0	<6.0	0	2	2	-	-	-	-		
Chloride	mg/L	640	120	150	600	2.2	2.2	2.6	3.0	1.3	3.1	1.2	0	2	-	-	-	-		
Fluoride	mg/L	-	0.12 ^(b)	-	0.62 - 2.6 ^(b)	-	-	-	-	-	-	-	0	0	-	-	-	-		
Magnesium	mg/L	-	-	-	-	177	177	251	310	29	325	209	0	2	-	-	-	-		
Potassium	mg/L	-	-	-	-	3.0	3.0	3.8	4.4	1.3	4.6	2.3	0	2	-	-	-	-		
Sodium	mg/L	-	-	-	-	294	294	419	520	43	545	355	0	2	-	-	-	-		
Sulphate	mg/L	-	-	128 - 429 ^(b, c)	-	193	97	193	193	<0.5	193	136	1	2	-	-	-	-		
Nutrients																				
Nitrate	mg-N/L	124	2.9	3.0	33	0.14	0.072	0.14	0.14	<0.01	0.14	0.094	1	2	-	-	-	-		
Nitrite	mg-N/L	-	0.060	0.020 - 0.040 ^(d)	0.060 - 0.12 ^(d)	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	2	2	-	-	-	-		
Nitrate + nitrite	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Total ammonia	mg-N/L	-	2.2 - 147 ^(e)	1.7 - 2.1 ^(f)	8.8 - 29 ^(g)	0.83	0.83	1.2	1.4	0.16	1.5	0.94	0	2	-	-	-	-		
Total kjeldahl nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Total nitrogen (calculated)	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Total nitrogen	mg-N/L	-	-	-	-	2.7	2.7	3.3	3.7	1.6	3.8	1.6	0	2	-	-	-	-		
Total phosphorus	mg-P/L	-	-	0.010	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Phosphorus (as phosphate)	mg-P/L	-	-	-	-	<0.003	-	<0.003	<0.003	-	-	-	1	1	-	-	-	-		
Total Metals																				
Aluminum	µg/L	-	5.0 - 100 ^(h, i)	-	-	164 ^(Chronic)	164 ^(Chronic)	197 ^(Chronic)	223 ^(Chronic)	99	230 ^(Chronic)	93	0	2	-	50	-	-		
Antimony	µg/L	-	-	9.0	-	0.42	0.42	0.48	0.53	0.30	0.54	0.17	0	2	-	-	-	-		
Arsenic	µg/L	-	5.0	-	5.0	1.6	1.6	1.8	2.0	1.0	2.1	0.78	0	2	-	-	-	-		
Barium	µg/L	-	-	1,000	-	260	260	357	434	67	453	273	0	2	-	-	-	-		
Beryllium	µg/L	-	-	0.13	-	0.060	0.093	0.060	0.060	0.060	<0.25 ^(DL>BC MOE Mean)	0.046	1	2	-	-	-	-		
Bismuth	µg/L	-	-	-	-	<0.5	-	<0.5	<0.5	-	-	-	1	1	-	-	-	-		
Boron	µg/L	29,000	1,500	-	1,200	39	39	40	40	38	40	1.4	0	2	-	-	-	-		
Cadmium	µg/L	0.35 - 7.7 ^(b)	0.036 - 0.37 ^(b)	-	-	0.41 ^(Chronic)	0.41 ^(Chronic)	0.42 ^(Chronic)	0.42 ^(Chronic)	0.40 ^(Chronic)	0.42 ^(Chronic)	0.014	0	2	-	100	-	-		
Chromium	µg/L	-	1.0	1.0 ^(j)	-	0.85	0.85	1.1 ^(Chronic, BC MOE Mean)	1.3 ^(Chronic, BC MOE Mean)	0.40	1.3 ^(Chronic, BC MOE Mean)	0.64	0	2	-	50	50	-		
Cobalt	µg/L	-	-	4.0	110	36 ^(BC MOE Mean)	36 ^(BC MOE Mean)	54 ^(BC MOE Mean)	68 ^(BC MOE Mean)	0.75	72 ^(BC MOE Mean)	50	0	2	-	-	50	-		
Copper	µg/L	-	2.0 - 4.0 ^(b)	2.0 - 10 ^(b)	3.6 - 40 ^(b)	8.0 ^(Chronic)	8.0 ^(Chronic)	10 ^(Chronic)	12 ^(Chronic, BC MOE Mean)	3.0	13 ^(Chronic, BC MOE Mean)	7.1	0	2	-	50	50	-		
Iron	µg/L	-	300	-	1,000	13,755 ^(Chronic, BC MOE Max)	13,755 ^(Chronic, BC MOE Max)	19,928 ^(Chronic, BC MOE Max)	24,866 ^(Chronic, BC MOE Max)	1,410 ^(Chronic, BC MOE Max)	26,100 ^(Chronic, BC MOE Max)	17,458	0	2	-	100	-	100		
Lead	µg/L	-	1.0 - 7.0 ^(b)	3.6 - 20 ^(b)	8.6 - 417 ^(b)	<0.1	-	<0.1	<0.1	-	-	-	1	1	-	-	-	-		
Lithium	µg/L	-	-	-	-	13	13	15	17	7.3	18	7.6	0	2	-	-	-	-		
Manganese	µg/L	-	-	768 - 2,585 ^(b)	816 - 3,394 ^(b)	14,910 ^(BC MOE Mean, BC MOE Max)	14,910 ^(BC MOE Mean, BC MOE Max)	22,005 ^(BC MOE Mean, BC MOE Max)	27,681 ^(BC MOE Mean, BC MOE Max)	720	29,100 ^(BC MOE Mean, BC MOE Max)	20,068	0	2	-	-	50	50		
Mercury	µg/L	-	0.026	0.010	-	0.010	0.0075	0.010	0.010	<0.01	0.010	0.0035	1	2	-	-	-	-		
Molybdenum	µg/L	-	73	1,000	2,000	1.4	1.4	1.5	1.7	0.99	1.7	0.51	0	2	-	-	-	-		
Nickel	µg/L	-	25 - 150 ^(b)	25 - 150 ^(b)	-	30	30	38	44	14	46	23	0	2	-	-	-	-		
Selenium	µg/L	-	1.0	2.0	-	1.2 ^(Chronic)	1.2 ^(Chronic)	1.3 ^(Chronic)	1.4 ^(Chronic)	1.0	1.4 ^(Chronic)	0.28	0	2	-	50	-	-		
Silicon	µg/L	-	-	-	-	7,445	7,445	7,568	7,666	7,200	7,690	346	0	2	-	-	-	-		
Silver	µg/L	-	0.25	0.050 - 1.5 ^(b)	0.10 - 3.0 ^(b)	<0.05	0.015	<0.05	<0.05	<0.01	<0.05	0.014	2	2	-	-	-	-		
Strontium	µg/L	-	-	-	-	610	610	787	929	256	964	501	0	2	-	-	-	-		
Sulphur	µg/L	-	-	-	-	609,500	609,500	874,750	1,086,950	79,000	1,140,000	750,240	0	2	-	-	-	-		
Tellurium	µg/L	-	-	-	-	<0.25	0.088	<0.25	<0.25	<0.1	<0.25	0.053	2	2	-	-	-	-		
Thallium	µg/L	-	0.80	0.80	-	<0.05	0.015	<0.05	<0.05	<0.01	<0.05	0.014	2	2	-	-	-	-		
Thorium	µg/L	-	-	-	-	0.88	0.88	1.1	1.3	0.35	1.4	0.74	0	2	-	-	-	-		
Tin	µg/L	-	-	-	-	<0.5	0.15	<0.5	<0.5	<0.1	<0.5	0.14	2	2	-	-	-	-		
Titanium	µg/L	-	-	-	-	18	18	19	20	16	20	2.8	0	2	-	-	-	-		
Uranium	µg/L	33	15	8.5	-	1.5	1.5	2.0	2.4	0.54	2.5	1.4	0	2	-	-	-	-		
Vanadium	µg/L	-	-	-	-	1.0	1.0	1.1	1.2	0.88	1.2	0.22	0	2	-	-	-	-		
Zinc	µg/L	-	30	7.5 - 188 ^(b)	33 - 341 ^(b)	12	-	12	12	-	-	-	0	1	-	-	-	-		
Zirconium	µg/L	-	-	-	-	3.0	3.0	3.0	3.0	2.9	3.0	0.071	0	2	-	-	-	-		

APPENDIX B
Table B-5: Seasonal Surface Water Quality Summary of McParlon Creek, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary												
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Ice Cover (March)												
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline			
															Acute	Chronic	BC MOE Mean	BC MOE Max
Dissolved Metals																		
Aluminum	µg/L	-	-	24 - 50 ^(h)	52 - 100 ^(h)	93 ^(BC MOE Mean)	93 ^(BC MOE Mean)	108 ^(BC MOE Mean, BC MOE Max)	121 ^(BC MOE Mean, BC MOE Max)	62 ^(BC MOE Mean)	124 ^(BC MOE Mean, BC MOE Max)	44	0	2	-	-	100	50
Antimony	µg/L	-	-	-	-	0.35	0.35	0.37	0.39	0.30	0.39	0.064	0	2	-	-	-	-
Arsenic	µg/L	-	-	-	-	1.5	1.5	1.7	1.9	1.0	1.9	0.64	0	2	-	-	-	-
Barium	µg/L	-	-	-	-	227	227	307	371	66	387	227	0	2	-	-	-	-
Beryllium	µg/L	-	-	0.14	-	<0.5	0.14	<0.5	<0.5	<0.04	<0.5	0.16	2	2	-	-	-	-
Bismuth	µg/L	-	-	-	-	<1.0	0.50	<1.0	<1.0	<1.0	<1.0	0	2	2	-	-	-	-
Boron	µg/L	-	-	-	-	29	29	33	36	20	37	12	0	2	-	-	-	-
Cadmium	µg/L	-	-	0.057 - 0.46 ^(b)	0.095 - 2.8 ^(b)	0.090	0.090	0.11	0.12	0.060	0.12	0.042	0	2	-	-	-	-
Chromium	µg/L	-	-	-	-	1.4	0.79	1.4	1.4	<0.4	1.4	0.83	1	2	-	-	-	-
Cobalt	µg/L	-	-	-	-	36	36	53	67	0.61	71	49	0	2	-	-	-	-
Copper	µg/L	-	-	-	-	6.5	6.5	8.8	11	2.0	11	6.4	0	2	-	-	-	-
Iron	µg/L	-	-	-	350	15,245 ^(BC MOE Max)	15,245 ^(BC MOE Max)	22,422 ^(BC MOE Max)	28,164 ^(BC MOE Max)	890 ^(BC MOE Max)	29,600 ^(BC MOE Max)	20,301	0	2	-	-	-	100
Lead	µg/L	-	-	-	-	<0.1	-	<0.1	<0.1	-	-	-	1	1	-	-	-	-
Lithium	µg/L	-	-	-	-	12	12	15	17	5.0	18	9.2	0	2	-	-	-	-
Manganese	µg/L	-	-	-	-	17,985	17,985	26,643	33,569	670	35,300	24,487	0	2	-	-	-	-
Mercury	µg/L	-	-	-	-	0.010	0.0075	0.010	0.010	<0.01	0.010	0.0035	1	2	-	-	-	-
Molybdenum	µg/L	-	-	-	-	1.1	1.1	1.1	1.2	0.90	1.2	0.23	0	2	-	-	-	-
Nickel	µg/L	-	-	-	-	29	29	36	42	13	44	22	0	2	-	-	-	-
Selenium	µg/L	-	-	1.4	-	1.8	1.4	1.8	1.8	1.8	<2.0	0.57	1	2	-	-	-	-
Silicon	µg/L	-	-	-	-	7,015	7,015	7,303	7,533	6,440	7,590	813	0	2	-	-	-	-
Silver	µg/L	-	-	-	-	<0.1	0.028	<0.1	<0.1	<0.01	<0.1	0.032	2	2	-	-	-	-
Strontium	µg/L	-	-	-	-	580	580	749	885	240	919	480	0	2	-	-	-	-
Sulphur	µg/L	-	-	-	-	630,650	630,650	910,325	1,134,065	71,300	1,190,000	791,040	0	2	-	-	-	-
Tellurium	µg/L	-	-	0.15	-	<0.5	0.15	<0.5	<0.5	<0.1	<0.5	0.14	2	2	-	-	-	-
Thallium	µg/L	-	-	-	-	<0.1	0.028	<0.1	<0.1	<0.01	<0.1	0.032	2	2	-	-	-	-
Thorium	µg/L	-	-	-	-	1.4	0.83	1.4	1.4	<0.5	1.4	0.81	1	2	-	-	-	-
Tin	µg/L	-	-	-	-	27	14	27	27	<0.1	27	19	1	2	-	-	-	-
Titanium	µg/L	-	-	-	-	22	22	27	30	13	31	13	0	2	-	-	-	-
Uranium	µg/L	-	-	-	-	1.4	1.4	1.9	2.3	0.46	2.4	1.4	0	2	-	-	-	-
Vanadium	µg/L	-	-	-	-	0.63	0.63	0.67	0.69	0.56	0.70	0.099	0	2	-	-	-	-
Zinc	µg/L	-	-	-	-	11	-	11	11	-	-	-	0	1	-	-	-	-
Zirconium	µg/L	-	-	-	-	2.2	2.2	2.3	2.4	2.0	2.4	0.28	0	2	-	-	-	-
Volatile Organics																		
Benzene	µg/L	-	370 ^(l)	40	-	<500 ^(DL>Chronic, DL>BC MOE Mean)	125 ^(BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	177	2	2	-	-	-	-
Ethylbenzene	µg/L	-	90 ^(l)	200	-	<500 ^(DL>Chronic, DL>BC MOE Mean)	125 ^(Chronic)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	177	2	2	-	-	-	-
Toluene	µg/L	-	2 ^(l)	0.50	-	<500 ^(DL>Chronic, DL>BC MOE Mean)	125 ^(Chronic, BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	177	2	2	-	-	-	-
Xylenes	µg/L	-	-	30	-	<500 ^(DL>Chronic, DL>BC MOE Mean)	125 ^(BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	177	2	2	-	-	-	-
Styrene	µg/L	-	72 ^(l)	72	-	<500 ^(DL>Chronic, DL>BC MOE Mean)	125 ^(Chronic, BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	177	2	2	-	-	-	-
Extractable Petroleum Hydrocarbons (C10-C19)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Extractable Petroleum Hydrocarbons (C10-C32)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Volatile Hydrocarbons	µg/L	-	-	-	-	<50,000	12,513	<50,000	<50,000	<50	<50,000	17,660	2	2	-	-	-	-
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	-	<50,000	12,513	<50,000	<50,000	<50	<50,000	17,660	2	2	-	-	-	-
Methyl tertiary-butyl ether	µg/L	-	-	-	-	<500	125	<500	<500	<0.5	<500	177	2	2	-	-	-	-
Parent PAHs																		
Napthalene	µg/L	-	1.1 ^(l)	1.0	-	<0.00414	-	<0.00414	<0.00414	-	-	-	1	1	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	<0.000227	-	<0.000227	<0.000227	-	-	-	1	1	-	-	-	-
Biphenyl	µg/L	-	-	-	-	<0.001449	-	<0.001449	<0.001449	-	-	-	1	1	-	-	-	-
Acenaphthene	µg/L	-	5.8 ^(l)	6.0	-	<0.000295	-	<0.000295	<0.000295	-	-	-	1	1	-	-	-	-
Fluorene	µg/L	-	3 ^(l)	12	-	<0.000318	-	<0.000318	<0.000318	-	-	-	1	1	-	-	-	-
Phenanthrene	µg/L	-	0.4 ^(l)	0.30	-	<0.00318	-	<0.00318	<0.00318	-	-	-	1	1	-	-	-	-
Anthracene	µg/L	-	0.012 ^(l)	0.10	-	<0.000122	-	<0.000122	<0.000122	-	-	-	1	1	-	-	-	-
Dibenzothiophene	µg/L	-	-	-	-	<0.000321	-	<0.000321	<0.000321	-	-	-	1	1	-	-	-	-
Pyrene	µg/L	-	0.025 ^(l)	0.020	-	<0.000711	-	<0.000711	<0.000711	-	-	-	1	1	-	-	-	-
Fluoranthene	µg/L	-	0.04 ^(l)	0.20	-	<0.001101	-	<0.001101	<0.001101	-	-	-	1	1	-	-	-	-
Benzo(a)anthracene	µg/L	-	0.018 ^(l)	0.10	-	<0.000129	-	<0.000129	<0.000129	-	-	-	1	1	-	-	-	-
Chrysene	µg/L	-	-	-	-	<0.000285	-	<0.000285	<0.000285	-	-	-	1	1	-	-	-	-
1-Methyl-7-isopropyl-phenanthrene (Retene)	µg/L	-	-	-	-	<0.000429	-	<0.000429	<0.000429	-	-	-	1	1	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	<0.000122	-	<0.000122	<0.000122	-	-	-	1	1	-	-	-	-
Benzo(j,k)fluoranthenes	µg/L	-	-	-	-	<0.000128	-	<0.000128	<0.000128	-	-	-	1	1	-	-	-	-
Benzo(b,j,k)fluoranthenes	µg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Benzo(a)pyrene	µg/L	-	0.015 ^(l)	0.010	-	<0.000191	-	<0.000191	<0.000191	-	-	-	1	1	-	-	-	-
Benzo(e)pyrene	µg/L	-	-	-	-	<0.000193	-	<0.000193	<0.000193	-	-	-	1	1	-	-	-	-
Perylene	µg/L	-	-	-	-	<0.000197	-	<0.000197	<0.000197	-	-	-	1	1	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	<0.000255	-	<0.000255	<0.000255	-	-	-	1	1	-	-	-	-
Indeno(1,2,3-c,d)pyrene	µg/L	-	-	-	-	<0.000309	-	<0.000309	<0.000309	-	-	-	1	1	-	-	-	-
Dibenzo(a,h)anthracene	µg/L	-	-	-	-	<0.000112	-	<0.000112	<0.000112	-	-	-	1	1	-	-	-	-

APPENDIX B
Table B-5: Seasonal Surface Water Quality Summary of McParlon Creek, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary														
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Ice Cover (March)														
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline					
																	Acute	Chronic	BC MOE Mean	BC MOE Max
Alkylated PAHs																				
C1 substituted naphthalenes	µg/L	-	-	-	-	<0.00945	-	<0.00945	<0.00945	-	-	-	1	1	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-	<0.001335	-	<0.001335	<0.001335	-	-	-	1	1	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	<0.00813	-	<0.00813	<0.00813	-	-	-	1	1	-	-	-	-	-	-
C2 substituted naphthalenes	µg/L	-	-	-	-	<0.01314	-	<0.01314	<0.01314	-	-	-	1	1	-	-	-	-	-	-
1,2-Dimethylnaphthalene	µg/L	-	-	-	-	<0.000448	-	<0.000448	<0.000448	-	-	-	1	1	-	-	-	-	-	-
2,6-Dimethylnaphthalene	µg/L	-	-	-	-	<0.00038	-	<0.00038	<0.00038	-	-	-	1	1	-	-	-	-	-	-
C1 substituted acenaphthenes	µg/L	-	-	-	-	<0.000362	-	<0.000362	<0.000362	-	-	-	1	1	-	-	-	-	-	-
C1 substituted biphenyls	µg/L	-	-	-	-	<0.00645	-	<0.00645	<0.00645	-	-	-	1	1	-	-	-	-	-	-
C3 substituted naphthalenes	µg/L	-	-	-	-	<0.002967	-	<0.002967	<0.002967	-	-	-	1	1	-	-	-	-	-	-
2,3,5-Trimethylnaphthalene	µg/L	-	-	-	-	<0.00034	-	<0.00034	<0.00034	-	-	-	1	1	-	-	-	-	-	-
2,3,6-Trimethylnaphthalene	µg/L	-	-	-	-	<0.000313	-	<0.000313	<0.000313	-	-	-	1	1	-	-	-	-	-	-
C1 substituted fluorenes	µg/L	-	-	-	-	<0.001491	-	<0.001491	<0.001491	-	-	-	1	1	-	-	-	-	-	-
2-Methylfluorene	µg/L	-	-	-	-	<0.000267	-	<0.000267	<0.000267	-	-	-	1	1	-	-	-	-	-	-
C2 substituted biphenyls	µg/L	-	-	-	-	<0.02328	-	<0.02328	<0.02328	-	-	-	1	1	-	-	-	-	-	-
C4 substituted naphthalenes	µg/L	-	-	-	-	<0.001623	-	<0.001623	<0.001623	-	-	-	1	1	-	-	-	-	-	-
1,4,6,7-Tetramethylnaphthalene	µg/L	-	-	-	-	<0.000168	-	<0.000168	<0.000168	-	-	-	1	1	-	-	-	-	-	-
C1 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.001647	-	<0.001647	<0.001647	-	-	-	1	1	-	-	-	-	-	-
1-Methylphenanthrene	µg/L	-	-	-	-	<0.000441	-	<0.000441	<0.000441	-	-	-	1	1	-	-	-	-	-	-
2-Methylphenanthrene	µg/L	-	-	-	-	<0.000702	-	<0.000702	<0.000702	-	-	-	1	1	-	-	-	-	-	-
3-Methylphenanthrene	µg/L	-	-	-	-	<0.000504	-	<0.000504	<0.000504	-	-	-	1	1	-	-	-	-	-	-
9/4-Methylphenanthrene	µg/L	-	-	-	-	<0.000128	-	<0.000128	<0.000128	-	-	-	1	1	-	-	-	-	-	-
2-Methylantracene	µg/L	-	-	-	-	<0.00012	-	<0.00012	<0.00012	-	-	-	1	1	-	-	-	-	-	-
C2 substituted fluorenes	µg/L	-	-	-	-	0.00059	-	0.00059	0.00059	-	-	-	0	1	-	-	-	-	-	-
1,7-Dimethylfluorene	µg/L	-	-	-	-	<0.000132	-	<0.000132	<0.000132	-	-	-	1	1	-	-	-	-	-	-
C1 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.000164	-	<0.000164	<0.000164	-	-	-	1	1	-	-	-	-	-	-
2/3-Methyldibenzothiophenes	µg/L	-	-	-	-	<0.000164	-	<0.000164	<0.000164	-	-	-	1	1	-	-	-	-	-	-
C2 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.000978	-	<0.000978	<0.000978	-	-	-	1	1	-	-	-	-	-	-
1,7-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000219	-	<0.000219	<0.000219	-	-	-	1	1	-	-	-	-	-	-
1,8-Dimethylphenanthrene	µg/L	-	-	-	-	<0.0000445	-	<0.0000445	<0.0000445	-	-	-	1	1	-	-	-	-	-	-
2,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000144	-	<0.000144	<0.000144	-	-	-	1	1	-	-	-	-	-	-
3,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000055	-	<0.000055	<0.000055	-	-	-	1	1	-	-	-	-	-	-
C3 substituted fluorenes	µg/L	-	-	-	-	0.00060	-	0.00060	0.00060	-	-	-	0	1	-	-	-	-	-	-
C2 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.000102	-	<0.000102	<0.000102	-	-	-	1	1	-	-	-	-	-	-
2,4-Dimethyldibenzothiophene	µg/L	-	-	-	-	<0.000102	-	<0.000102	<0.000102	-	-	-	1	1	-	-	-	-	-	-
C1 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.00021	-	0.00021	0.00021	-	-	-	0	1	-	-	-	-	-	-
C3 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.000053	-	0.000053	0.000053	-	-	-	0	1	-	-	-	-	-	-
1,2,6-Trimethylphenanthrene	µg/L	-	-	-	-	<0.0000484	-	<0.0000484	<0.0000484	-	-	-	1	1	-	-	-	-	-	-
C3 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.001161	-	<0.001161	<0.001161	-	-	-	1	1	-	-	-	-	-	-
C2 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.00011	-	0.00011	0.00011	-	-	-	0	1	-	-	-	-	-	-
C4 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.00033	-	<0.00033	<0.00033	-	-	-	1	1	-	-	-	-	-	-
C4 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.001032	-	<0.001032	<0.001032	-	-	-	1	1	-	-	-	-	-	-
C1 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.00011	-	0.00011	0.00011	-	-	-	0	1	-	-	-	-	-	-
5/6-Methylchrysenes	µg/L	-	-	-	-	<0.0000549	-	<0.0000549	<0.0000549	-	-	-	1	1	-	-	-	-	-	-
C3 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.0000718	-	<0.0000718	<0.0000718	-	-	-	1	1	-	-	-	-	-	-
C2 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000119	-	<0.000119	<0.000119	-	-	-	1	1	-	-	-	-	-	-
5,9-Dimethylchrysene	µg/L	-	-	-	-	<0.000119	-	<0.000119	<0.000119	-	-	-	1	1	-	-	-	-	-	-
C4 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.0000967	-	<0.0000967	<0.0000967	-	-	-	1	1	-	-	-	-	-	-
C1 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	<0.000218	-	<0.000218	<0.000218	-	-	-	1	1	-	-	-	-	-	-
7-Methylbenzo[a]pyrene	µg/L	-	-	-	-	<0.000218	-	<0.000218	<0.000218	-	-	-	1	1	-	-	-	-	-	-
C3 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000109	-	<0.000109	<0.000109	-	-	-	1	1	-	-	-	-	-	-
C2 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	<0.00016	-	<0.00016	<0.00016	-	-	-	1	1	-	-	-	-	-	-
C4 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.0000801	-	<0.0000801	<0.0000801	-	-	-	1	1	-	-	-	-	-	-
1-methylchrysene	µg/L	-	-	-	-	<0.0000534	-	<0.0000534	<0.0000534	-	-	-	1	1	-	-	-	-	-	-
3-methylfluoranthene / benzo(a)fluorene	µg/L	-	-	-	-	<0.000175	-	<0.000175	<0.000175	-	-	-	1	1	-	-	-	-	-	-
Naphthenic Acid																				

APPENDIX B
Table B-5: Seasonal Surface Water Quality Summary of McParlon Creek, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary												
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Ice Cover (March)												
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline			
															Acute	Chronic	BC MOE Mean	BC MOE Max
C12h18o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C12h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C12h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C12h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C13h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C13h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C13h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C13h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C14h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C14h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C14h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C14h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C14h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C15h18o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C15h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C15h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C15h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C15h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C15h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C15h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C16h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C16h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C16h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C16h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C16h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C16h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C16h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C17h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C17h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C17h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C17h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C17h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C17h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C17h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C18h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C18h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C18h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C18h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C18h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C18h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C18h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C19h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C19h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C19h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C19h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C19h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C19h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C19h38o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C20h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C20h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C20h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C20h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C20h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C20h38o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C21h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C21h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C21h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C21h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C21h38o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
C21h40o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Radionuclides																		
Actinium-228	Bq/L	-	-	-	-	<1.0	0.48	<1.0	<1.0	<0.9	<1.0	0.035	2	2	-	-	-	-
Bismuth-212	Bq/L	-	-	-	-	<2.0	0.73	<2.0	<2.0	<0.9	<2.0	0.39	2	2	-	-	-	-
Bismuth-214	Bq/L	-	-	-	-	<0.7	0.30	<0.7	<0.7	<0.5	<0.7	0.071	2	2	-	-	-	-
Lead-210	Bq/L	-	-	-	-	<4.0	2.0	<4.0	<4.0	<4.0	<4.0	0	2	2	-	-	-	-
Lead-211	Bq/L	-	-	-	-	<6.0	2.5	<6.0	<6.0	<4.0	<6.0	0.71	2	2	-	-	-	-
Lead-212	Bq/L	-	-	-	-	<0.4	0.20	<0.4	<0.4	<0.4	<0.4	0	2	2	-	-	-	-
Lead-214	Bq/L	-	-	-	-	<0.6	0.25	<0.6	<0.6	<0.4	<0.6	0.071	2	2	-	-	-	-
Potassium-40	Bq/L	-	-	-	-	10	6.3	10	10	<5.0	10	5.3	1	2	-	-	-	-
Radium-223	Bq/L	-	-	-	-	<1.0	0.50	<1.0	<1.0	<1.0	<1.0	0	2	2	-	-	-	-
Radium-226	Bq/L	-	-	-	-	<4.0	-	<4.0	<4.0	-	-	-	1	1	-	-	-	-
Radon-219	Bq/L	-	-	-	-	<1.0	0.48	<1.0	<1.0	<0.9	<1.0	0.035	2	2	-	-	-	-
Thallium-208	Bq/L	-	-	-	-	0.40	0.28	0.40	0.40	<0.3	0.40	0.18	1	2	-	-	-	-
Thorium-227	Bq/L	-	-	-	-	<1.0	0.40	<1.0	<1.0	<0.6	<1.0	0.14	2	2	-	-	-	-
Thorium-230	Bq/L	-	-	-	-	<30	15	<30	<30	<30	<30	0	2	2	-	-	-	-
Thorium-234	Bq/L	-	-	-	-	<4.0	2.0	<4.0	<4.0	<4.0	<4.0	0	2	2	-	-	-	-
Uranium-235	Bq/L	-	-	-	-	<1.0	0.50	<1.0	<1.0	<1.0	<1.0	0	2	2	-	-	-	-

APPENDIX B
Table B-5: Seasonal Surface Water Quality Summary of McParlon Creek, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary														
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Freshet (April to early June)														
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline					
																	Acute	Chronic	BC MOE Mean	BC MOE Max
Field Measured																				
pH	-	-	6.5 - 9.0	6.5 - 9.0	6.5 - 9.0	6.6	6.5 ^(Chronic)	6.7	6.7	6.1 ^(Chronic, BC MOE Mean, BC MOE Max)	6.7	0.33	0	3	-	33	33	33		
Specific conductivity	µS/cm	-	-	-	-	57	75	91	119	42	126	45	0	3	-	-	-	-		
Temperature	°C	-	-	-	-	5.6	4.5	6.6	7.4	0.30	7.6	3.8	0	3	-	-	-	-		
Dissolved oxygen	mg/L	-	6.5	8.0	5.0	11	12	12	13	11	13	1.0	0	3	-	-	-	-		
Turbidity	NTU	-	-	-	-	12	13	17	21	4.8	22	8.4	0	3	-	-	-	-		
Conventional Parameters																				
Hardness, as CaCO ₃	mg/L	-	-	-	-	21	26	31	38	17	40	12	0	3	-	-	-	-		
Total alkalinity, as CaCO ₃	mg/L	-	-	20 ^(a)	-	7.0 ^(BC MOE Mean)	6.3 ^(BC MOE Mean)	7.0 ^(BC MOE Mean)	7.0 ^(BC MOE Mean)	5.0 ^(BC MOE Mean)	7.0 ^(BC MOE Mean)	1.2	0	3	-	-	100	-		
Total dissolved solids	mg/L	-	-	-	-	11	11	14	16	6.0	16	7.1	0	2	-	-	-	-		
Total suspended solids	mg/L	-	-	-	-	7.0	12	15	21	5.0	23	9.9	0	3	-	-	-	-		
Total organic carbon	mg/L	-	-	-	-	20	23	26	31	18	32	7.8	0	3	-	-	-	-		
Dissolved organic carbon	mg/L	-	-	-	-	21	22	23	26	18	26	4.4	0	3	-	-	-	-		
Dissolved inorganic carbon	mg/L	-	-	-	-	1.6	1.5	1.7	1.8	1.1	1.8	0.36	0	3	-	-	-	-		
Total inorganic carbon	mg/L	-	-	-	-	1.9	1.8	2.0	2.0	1.6	2.0	0.21	0	3	-	-	-	-		
Major Ions																				
Bicarbonate, as CaCO ₃	mg/L	-	-	-	-	<5.0	2.5	<5.0	<5.0	<5.0	<5.0	0	3	3	-	-	-	-		
Bromide	mg/L	-	-	-	-	<0.02	0.010	<0.02	<0.02	<0.02	<0.02	0	3	3	-	-	-	-		
Calcium	mg/L	-	-	-	-	4.5	5.4	6.2	7.5	4.0	7.8	2.1	0	3	-	-	-	-		
Carbonate, as CaCO ₃	mg/L	-	-	-	-	8.0	7.7	8.0	8.0	7.0	8.0	0.58	0	3	-	-	-	-		
Chloride	mg/L	640	120	150	600	0.15	0.24	0.30	0.41	0.14	0.44	0.17	0	3	-	-	-	-		
Fluoride	mg/L	-	0.12 ^(b)	-	0.62 - 2.6 ^(b)	-	-	-	-	-	-	-	0	0	-	-	-	-		
Magnesium	mg/L	-	-	-	-	2.4	3.1	3.7	4.8	1.8	5.1	1.7	0	3	-	-	-	-		
Potassium	mg/L	-	-	-	-	0.50	0.63	0.75	0.95	0.40	1.0	0.32	0	3	-	-	-	-		
Sodium	mg/L	-	-	-	-	3.7	5.2	6.7	9.0	2.4	9.6	3.8	0	3	-	-	-	-		
Sulphate	mg/L	-	-	128 - 429 ^(b, c)	-	13	21	28	41	7.0	44	20	0	3	-	-	-	-		
Nutrients																				
Nitrate	mg-N/L	124	2.9	3.0	33	<0.01	0.010	0.020	0.020	<0.01	0.020	0.0087	2	3	-	-	-	-		
Nitrite	mg-N/L	-	0.060	0.020 - 0.040 ^(d)	0.060 - 0.12 ^(d)	0.050 ^(BC MOE Mean)	0.035 ^(BC MOE Mean)	0.050 ^(BC MOE Mean)	0.050 ^(BC MOE Mean)	<0.01	0.050 ^(BC MOE Mean)	0.026	1	3	-	-	67	-		
Nitrate + nitrite	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Total ammonia	mg-N/L	-	2.2 - 147 ^(e)	1.7 - 2.1 ^(f)	8.8 - 29 ^(g)	<0.01	0.010	0.020	0.020	<0.01	0.020	0.0087	2	3	-	-	-	-		
Total kjeldahl nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Total nitrogen (calculated)	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Total nitrogen	mg-N/L	-	-	-	-	0.67	0.77	0.84	0.98	0.64	1.0	0.21	0	3	-	-	-	-		
Total phosphorus	mg-P/L	-	-	0.010	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Phosphorus (as phosphate)	mg-P/L	-	-	-	-	0.032	0.037	0.045	0.055	0.021	0.058	0.019	0	3	-	-	-	-		
Total Metals																				
Aluminum	µg/L	-	5.0 - 100 ^(h, i)	-	-	328 ^(Chronic)	592 ^(Chronic)	789 ^(Chronic)	1,158 ^(Chronic)	199 ^(Chronic)	1,250 ^(Chronic)	573	0	3	-	100	-	-		
Antimony	µg/L	-	-	9.0	-	0.10	0.13	0.15	0.080	0.064	0.20	0.064	0	3	-	-	-	-		
Arsenic	µg/L	-	5.0	-	5.0	0.61	0.62	0.71	0.78	0.44	0.80	0.18	0	3	-	-	-	-		
Barium	µg/L	-	-	1,000	-	101	100	105	107	92	108	8.0	0	3	-	-	-	-		
Beryllium	µg/L	-	-	0.13	-	0.050	0.048	0.060	0.068	<0.05	0.070	0.023	1	3	-	-	-	-		
Bismuth	µg/L	-	-	-	-	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	3	3	-	-	-	-		
Boron	µg/L	29,000	1,500	-	1,200	8.0	8.7	9.5	11	7.0	11	2.1	0	3	-	-	-	-		
Cadmium	µg/L	0.35 - 7.7 ^(b)	0.036 - 0.37 ^(b)	-	-	0.040	0.067 ^(Chronic)	0.085 ^(Chronic)	0.12 ^(Chronic)	0.030	0.13 ^(Chronic)	0.055	0	3	-	33	-	-		
Chromium	µg/L	-	1.0	1.0 ^(j)	-	1.0	1.3 ^(Chronic, BC MOE Mean)	1.6 ^(Chronic, BC MOE Mean)	2.1 ^(Chronic, BC MOE Mean)	0.80	2.2 ^(Chronic, BC MOE Mean)	0.76	0	3	-	33	33	-		
Cobalt	µg/L	-	-	4.0	110	0.20	0.67	0.96	1.6	0.10	1.7	0.90	0	3	-	-	-	-		
Copper	µg/L	-	2.0 - 4.0 ^(b)	2.0 - 10 ^(b)	3.6 - 40 ^(b)	5.1 ^(Chronic, BC MOE Mean, BC MOE Max)	5.1 ^(Chronic, BC MOE Mean, BC MOE Max)	5.5 ^(Chronic, BC MOE Mean, BC MOE Max)	5.8 ^(Chronic, BC MOE Mean, BC MOE Max)	4.2 ^(Chronic, BC MOE Mean)	5.9 ^(Chronic, BC MOE Mean, BC MOE Max)	0.85	0	3	-	100	100	67		
Iron	µg/L	-	300	-	1,000	788 ^(Chronic)	999 ^(Chronic)	1,279 ^(Chronic, BC MOE Max)	1,672 ^(Chronic, BC MOE Max)	440 ^(Chronic)	1,770 ^(Chronic, BC MOE Max)	690	0	3	-	100	-	33		
Lead	µg/L	-	1.0 - 7.0 ^(b)	3.6 - 20 ^(b)	8.6 - 417 ^(b)	0.20	0.32	0.44	0.62	0.10	0.67	0.30	0	3	-	-	-	-		
Lithium	µg/L	-	-	-	-	1.2	1.4	1.5	1.7	1.2	1.8	0.35	0	3	-	-	-	-		
Manganese	µg/L	-	-	768 - 2,585 ^(b)	816 - 3,394 ^(b)	16	106	152	261	13	288	158	0	3	-	-	-	-		
Mercury	µg/L	-	0.026	0.010	-	<0.01	0.0067	0.010	0.010	<0.01	0.010	0.0029	2	3	-	-	-	-		
Molybdenum	µg/L	-	73	1,000	2,000	0.17	0.17	0.18	0.19	0.14	0.19	0.025	0	3	-	-	-	-		
Nickel	µg/L	-	25 - 150 ^(b)	25 - 150 ^(b)	-	4.6	4.9	5.4	6.0	4.0	6.2	1.1	0	3	-	-	-	-		
Selenium	µg/L	-	1.0	2.0	-	0.30	0.30	0.35	0.39	0.20	0.40	0.10	0	3	-	-	-	-		
Silicon	µg/L	-	-	-	-	2,320	2,527	2,950	3,454	1,680	3,580	967	0	3	-	-	-	-		
Silver	µg/L	-	0.25	0.050 - 1.5 ^(b)	0.10 - 3.0 ^(b)	<0.05	0.020	<0.05	<0.05	0.010	<0.05	0.0087	2	3	-	-	-	-		
Strontium	µg/L	-	-	-	-	25	26	30	33	19	34	7.5	0	3	-	-	-	-		
Sulphur	µg/L	-	-	-	-	2,600	-	2,600	2,600	-	-	-	0	1	-	-	-	-		
Tellurium	µg/L	-	-	-	-	<0.05	-	<0.05	<0.05	-	-	-	1	1	-	-	-	-		
Thallium	µg/L	-	0.80	0.80	-	<0.01	0.010	0.020	0.020	<0.01	0.020	0.0087	2	3	-	-	-	-		
Thorium	µg/L	-	-	-	-	0.15	0.20	0.25	0.32	0.11	0.34	0.12	0	3	-	-	-	-		
Tin	µg/L	-	-	-	-	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	3	3	-	-	-	-		
Titanium	µg/L	-	-	-	-	8.1	22	30	48	5.8	52	26	0	3	-	-	-	-		
Uranium	µg/L	33	15	8.5	-	0.080	0.097	0.12	0.15	0.050	0.16	0.057	0	3	-	-	-	-		
Vanadium	µg/L	-	-	-	-	1.3	1.8	2.3	3.0	0.90	3.2	1.2	0	3	-	-	-	-		
Zinc	µg/L	-	30	7.5 - 188 ^(b)	33 - 341 ^(b)	4.5	7.2	8.8 ^(BC MOE Mean)	12 ^(BC MOE Mean)	4.2	13 ^(BC MOE Mean)	5.0	0	3	-	-	33	-		
Zirconium	µg/L	-	-	-	-	1.1	1.0	1.1	1.1	0.90	1.1	0.12	0	3	-	-	-	-		

APPENDIX B
Table B-5: Seasonal Surface Water Quality Summary of McParlon Creek, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary													
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Freshet (April to early June)													
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline				
																Acute	Chronic	BC MOE Mean	BC MOE Max
Dissolved Metals																			
Aluminum	µg/L	-	-	24 - 50 ^(h)	52 - 100 ^(h)	126 ^(BC MOE Mean, BC MOE Max)	152 ^(BC MOE Mean, BC MOE Max)	182 ^(BC MOE Mean, BC MOE Max)	227 ^(BC MOE Mean, BC MOE Max)	93 ^(BC MOE Mean)	238 ^(BC MOE Mean, BC MOE Max)	76	0	3	3	-	-	100	67
Antimony	µg/L	-	-	-	-	<0.2	0.10	<0.2	<0.2	<0.2	<0.2	0	3	3	3	-	-	-	-
Arsenic	µg/L	-	-	-	-	0.50	0.47	0.50	0.50	0.40	0.50	0.058	0	3	3	-	-	-	-
Barium	µg/L	-	-	-	-	81	84	87	91	79	92	7.0	0	3	3	-	-	-	-
Beryllium	µg/L	-	-	-	-	0.050	0.060	0.080	0.10	<0.04	0.11	0.046	1	3	3	-	-	-	-
Bismuth	µg/L	-	-	-	-	<1.0	0.50	<1.0	<1.0	<1.0	<1.0	0	3	3	3	-	-	-	-
Boron	µg/L	-	-	-	-	6.0	6.3	7.0	7.8	5.0	8.0	1.5	0	3	3	-	-	-	-
Cadmium	µg/L	-	-	0.057 - 0.46 ^(b)	0.095 - 2.8 ^(b)	0.030	0.053	0.070 ^(BC MOE Mean)	0.10 ^(BC MOE Mean)	0.020	0.11 ^(BC MOE Mean, BC MOE Max)	0.049	0	3	3	-	-	33	33
Chromium	µg/L	-	-	-	-	0.60	0.60	0.65	0.69	0.50	0.70	0.10	0	3	3	-	-	-	-
Cobalt	µg/L	-	-	-	-	0.11	0.52	0.73	1.2	0.10	1.4	0.72	0	3	3	-	-	-	-
Copper	µg/L	-	-	-	-	5.0	4.7	5.1	5.2	4.0	5.2	0.64	0	3	3	-	-	-	-
Iron	µg/L	-	-	-	350	439 ^(BC MOE Max)	522 ^(BC MOE Max)	640 ^(BC MOE Max)	801 ^(BC MOE Max)	285	841 ^(BC MOE Max)	287	0	3	3	-	-	-	67
Lead	µg/L	-	-	-	-	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	3	3	3	-	-	-	-
Lithium	µg/L	-	-	-	-	1.0	0.83	1.0	1.0	<1.0	1.0	0.29	1	3	3	-	-	-	-
Manganese	µg/L	-	-	-	-	14	113	164	284	12	314	174	0	3	3	-	-	-	-
Mercury	µg/L	-	-	-	-	<0.01	0.0067	0.010	0.010	<0.01	0.010	0.0029	2	3	3	-	-	-	-
Molybdenum	µg/L	-	-	-	-	0.18	0.16	0.19	0.19	0.10	0.19	0.049	0	3	3	-	-	-	-
Nickel	µg/L	-	-	-	-	4.0	4.3	4.5	4.9	4.0	5.0	0.58	0	3	3	-	-	-	-
Selenium	µg/L	-	-	-	-	<0.6	0.30	<0.6	<0.6	<0.6	<0.6	0	3	3	3	-	-	-	-
Silicon	µg/L	-	-	-	-	1,310	1,337	1,575	1,787	860	1,840	491	0	3	3	-	-	-	-
Silver	µg/L	-	-	-	-	<0.01	0.010	0.020	0.020	<0.01	0.020	0.0087	2	3	3	-	-	-	-
Strontium	µg/L	-	-	-	-	25	26	30	33	18	34	8.0	0	3	3	-	-	-	-
Sulphur	µg/L	-	-	-	-	4,700	7,633	10,150	14,510	2,600	15,600	6,979	0	3	3	-	-	-	-
Tellurium	µg/L	-	-	-	-	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	3	3	3	-	-	-	-
Thallium	µg/L	-	-	-	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	3	3	3	-	-	-	-
Thorium	µg/L	-	-	-	-	<0.4	0.20	<0.4	<0.4	<0.4	<0.4	0	3	3	3	-	-	-	-
Tin	µg/L	-	-	-	-	<0.1	0.067	0.10	0.10	<0.1	0.10	0.029	2	3	3	-	-	-	-
Titanium	µg/L	-	-	-	-	<10	5.0	<10	<10	<10	<10	0	3	3	3	-	-	-	-
Uranium	µg/L	-	-	-	-	<0.4	0.20	<0.4	<0.4	<0.4	<0.4	0	3	3	3	-	-	-	-
Vanadium	µg/L	-	-	-	-	0.49	0.51	0.55	0.59	0.43	0.60	0.086	0	3	3	-	-	-	-
Zinc	µg/L	-	-	-	-	5.0	6.7	7.6	9.7	5.0	10	3.0	0	3	3	-	-	-	-
Zirconium	µg/L	-	-	-	-	1.0	1.00	1.0	1.1	0.90	1.1	0.095	0	3	3	-	-	-	-
Volatile Organics																			
Benzene	µg/L	-	370 ^(l)	40	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	3	3	3	-	-	-	-
Ethylbenzene	µg/L	-	90 ^(l)	200	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	3	3	3	-	-	-	-
Toluene	µg/L	-	2 ^(l)	0.50	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	3	3	3	-	-	-	-
Xylenes	µg/L	-	-	30	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	3	3	3	-	-	-	-
Styrene	µg/L	-	72 ^(l)	72	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	3	3	3	-	-	-	-
Extractable Petroleum Hydrocarbons (C10-C19)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	0	-	-	-	-
Extractable Petroleum Hydrocarbons (C10-C32)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	0	-	-	-	-
Volatile Hydrocarbons	µg/L	-	-	-	-	<50	25	<50	<50	<50	<50	0	3	3	3	-	-	-	-
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	-	<50	25	<50	<50	<50	<50	0	3	3	3	-	-	-	-
Methyl tertiary-butyl ether	µg/L	-	-	-	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	3	3	3	-	-	-	-
Parent PAHs																			
Naphthalene	µg/L	-	1.1 ^(l)	1.0	-	<0.00765	0.0038	<0.00765	<0.00765	<0.00765	<0.00765	0	2	2	2	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	<0.000115	0.000051	<0.000115	<0.000115	<0.0000878	<0.000115	0.0000096	2	2	2	-	-	-	-
Biphenyl	µg/L	-	-	-	-	<0.00468	0.0023	<0.00468	<0.00468	<0.00468	<0.00468	0	2	2	2	-	-	-	-
Acenaphthene	µg/L	-	5.8 ^(l)	6.0	-	<0.000252	0.00012	<0.000252	<0.000252	<0.000208	<0.000252	0.000016	2	2	2	-	-	-	-
Fluorene	µg/L	-	3 ^(l)	12	-	<0.000136	0.000062	<0.000136	<0.000136	<0.000112	<0.000136	0.0000085	2	2	2	-	-	-	-
Phenanthrene	µg/L	-	0.4 ^(l)	0.30	-	<0.0033	0.0017	<0.0033	<0.0033	<0.0033	<0.0033	0	2	2	2	-	-	-	-
Anthracene	µg/L	-	0.012 ^(l)	0.10	-	<0.0000844	0.000039	<0.0000844	<0.0000844	<0.0000717	<0.0000844	0.0000045	2	2	2	-	-	-	-
Dibenzothiophene	µg/L	-	-	-	-	<0.0000903	0.000045	<0.0000903	<0.0000903	<0.0000894	<0.0000903	0.00000032	2	2	2	-	-	-	-
Pyrene	µg/L	-	0.025 ^(l)	0.020	-	<0.001467	0.00073	<0.001467	<0.001467	<0.001467	<0.001467	0	2	2	2	-	-	-	-
Fluoranthene	µg/L	-	0.04 ^(l)	0.20	-	<0.001131	0.00057	<0.001131	<0.001131	<0.001131	<0.001131	0	2	2	2	-	-	-	-
Benzo(a)anthracene	µg/L	-	0.018 ^(l)	0.10	-	<0.00111	0.00056	<0.00111	<0.00111	<0.00111	<0.00111	0	2	2	2	-	-	-	-
Chrysene	µg/L	-	-	-	-	<0.000429	0.00021	<0.000429	<0.000429	<0.000429	<0.000429	0	2	2	2	-	-	-	-
1-Methyl-7-isopropyl-phenanthrene (Retene)	µg/L	-	-	-	-	0.00054	0.00054	0.00063	0.00070	0.00037	0.00072	0.00024	0	2	2	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	<0.000148	0.000062	<0.000148	<0.000148	<0.000101	<0.000148	0.000017	2	2	2	-	-	-	-
Benzo(j,k)fluoranthenes	µg/L	-	-	-	-	<0.000131	0.000061	<0.000131	<0.000131	<0.000111	<0.000131	0.0000071	2	2	2	-	-	-	-
Benzo(b,j,k)fluoranthenes	µg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	0	-	-	-	-
Benzo(a)pyrene	µg/L	-	0.015 ^(l)	0.010	-	<0.000186	0.000086	<0.000186	<0.000186	<0.000156	<0.000186	0.000011	2	2	2	-	-	-	-
Benzo(e)pyrene	µg/L	-	-	-	-	<0.000188	0.000086	<0.000188	<0.000188	<0.000157	<0.000188	0.000011	2	2	2	-	-	-	-
Perylene	µg/L	-	-	-	-	<0.000195	0.000091	<0.000195	<0.000195	<0.000169	<0.000195	0.0000092	2	2	2	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	<0.000504	0.00025	<0.000504	<0.000504	<0.000504	<0.000504	0	2	2	2	-	-	-	-
Indeno(c,d-123)pyrene	µg/L	-	-	-	-	<0.000203	0.000098	<0.000203	<0.000203	<0.000187	<0.000203	0.0000057	2	2	2	-	-	-	-
Dibenzo(a,h)anthracene	µg/L	-	-	-	-	<0.00031	0.00013	<0.00031											

APPENDIX B
Table B-5: Seasonal Surface Water Quality Summary of McParlon Creek, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary														
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Freshet (April to early June)								Standard Deviation	nd	Count	% Above Guideline			
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Acute	Chronic				BC MOE Mean	BC MOE Max		
Alkylated PAHs																				
C1 substituted naphthalenes	µg/L	-	-	-	-	<0.00939	0.0047	<0.00939	<0.00939	<0.00939	<0.00939	0	2	2	-	-	-	-		
1-Methylnaphthalene	µg/L	-	-	-	-	<0.001656	0.00083	<0.001656	<0.001656	<0.001656	<0.001656	0	2	2	-	-	-	-		
2-Methylnaphthalene	µg/L	-	-	-	-	<0.00939	0.0047	<0.00939	<0.00939	<0.00939	<0.00939	0	2	2	-	-	-	-		
C2 substituted naphthalenes	µg/L	-	-	-	-	<0.01257	0.0063	<0.01257	<0.01257	<0.01257	<0.01257	0	2	2	-	-	-	-		
1,2-Dimethylnaphthalene	µg/L	-	-	-	-	<0.000645	0.00027	<0.000645	<0.000645	<0.000418	<0.000645	0.000080	2	2	-	-	-	-		
2,6-Dimethylnaphthalene	µg/L	-	-	-	-	<0.000545	0.00022	<0.000545	<0.000545	<0.000353	<0.000545	0.000068	2	2	-	-	-	-		
C1 substituted acenaphthenes	µg/L	-	-	-	-	<0.000391	0.00017	<0.000391	<0.000391	<0.000307	<0.000391	0.000030	2	2	-	-	-	-		
C1 substituted biphenyls	µg/L	-	-	-	-	<0.001857	0.00093	<0.001857	<0.001857	<0.001857	<0.001857	0	2	2	-	-	-	-		
C3 substituted naphthalenes	µg/L	-	-	-	-	<0.00582	0.0029	<0.00582	<0.00582	<0.00582	<0.00582	0	2	2	-	-	-	-		
2,3,5-Trimethylnaphthalene	µg/L	-	-	-	-	0.00027	0.00027	0.00032	0.00020	0.00032	0.00020	0.000091	0	2	-	-	-	-		
2,3,6-Trimethylnaphthalene	µg/L	-	-	-	-	<0.000972	0.00049	<0.000972	<0.000972	<0.000972	<0.000972	0	2	2	-	-	-	-		
C1 substituted fluorenes	µg/L	-	-	-	-	0.00089	0.00089	0.00092	0.00095	0.00083	0.00095	0.000088	0	2	-	-	-	-		
2-Methylfluorene	µg/L	-	-	-	-	<0.000243	0.000100	<0.000243	<0.000243	<0.000155	<0.000243	0.000031	2	2	-	-	-	-		
C2 substituted biphenyls	µg/L	-	-	-	-	<0.0033	0.0017	<0.0033	<0.0033	<0.0033	<0.0033	0	2	2	-	-	-	-		
C4 substituted naphthalenes	µg/L	-	-	-	-	0.00033	0.00033	0.00037	0.00041	0.00023	0.00042	0.00013	0	2	-	-	-	-		
1,4,6,7-Tetramethylnaphthalene	µg/L	-	-	-	-	<0.00021	0.000080	<0.00021	<0.00021	<0.000111	<0.00021	0.000035	2	2	-	-	-	-		
C1 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.000234	0.000094	<0.000234	<0.000234	<0.000143	<0.000234	0.000032	2	2	-	-	-	-		
1-Methylphenanthrene	µg/L	-	-	-	-	<0.000234	0.000094	<0.000234	<0.000234	<0.000143	<0.000234	0.000032	2	2	-	-	-	-		
2-Methylphenanthrene	µg/L	-	-	-	-	<0.000237	0.000096	<0.000237	<0.000237	<0.000145	<0.000237	0.000033	2	2	-	-	-	-		
3-Methylphenanthrene	µg/L	-	-	-	-	<0.000239	0.000096	<0.000239	<0.000239	<0.000146	<0.000239	0.000033	2	2	-	-	-	-		
9/4-Methylphenanthrene	µg/L	-	-	-	-	<0.000239	0.000096	<0.000239	<0.000239	<0.000146	<0.000239	0.000033	2	2	-	-	-	-		
2-Methylantracene	µg/L	-	-	-	-	<0.000244	0.000098	<0.000244	<0.000244	<0.000149	<0.000244	0.000034	2	2	-	-	-	-		
C2 substituted fluorenes	µg/L	-	-	-	-	0.00074	0.00074	0.00095	0.00050	0.00098	0.00034	0	2	-	-	-	-	-		
1,7-Dimethylfluorene	µg/L	-	-	-	-	<0.000233	0.00011	<0.000233	<0.000233	<0.000201	<0.000233	0.000011	2	2	-	-	-	-		
C1 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.00014	0.000068	<0.00014	<0.00014	<0.00013	<0.00014	0.000035	2	2	-	-	-	-		
2/3-Methyldibenzothiophenes	µg/L	-	-	-	-	<0.00014	0.000068	<0.00014	<0.00014	<0.00013	<0.00014	0.000035	2	2	-	-	-	-		
C2 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.00024	0.00024	0.00026	0.00027	0.00021	0.00027	0.000042	0	2	-	-	-	-		
1,7-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000662	0.000032	<0.000662	<0.000662	<0.000061	<0.000662	0.000018	2	2	-	-	-	-		
1,8-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000673	0.000032	<0.000673	<0.000673	<0.000062	<0.000673	0.0000019	2	2	-	-	-	-		
2,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000673	0.000032	<0.000673	<0.000673	<0.000062	<0.000673	0.0000019	2	2	-	-	-	-		
3,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000684	0.000033	<0.000684	<0.000684	<0.000063	<0.000684	0.0000019	2	2	-	-	-	-		
C3 substituted fluorenes	µg/L	-	-	-	-	<0.00534	0.0027	<0.00534	<0.00534	<0.00534	<0.00534	0	2	2	-	-	-	-		
C2 substituted dibenzothiophenes	µg/L	-	-	-	-	0.00039	0.00039	0.00040	0.00041	0.00037	0.00041	0.000029	0	2	-	-	-	-		
2,4-Dimethyldibenzothiophene	µg/L	-	-	-	-	<0.000203	0.000079	<0.000203	<0.000203	<0.000114	<0.000203	0.000031	2	2	-	-	-	-		
C1 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.000708	0.00035	<0.000708	<0.000708	<0.000708	<0.000708	0	2	2	-	-	-	-		
C3 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.000576	0.00029	<0.000576	<0.000576	<0.000576	<0.000576	0	2	2	-	-	-	-		
1,2,6-Trimethylphenanthrene	µg/L	-	-	-	-	<0.0000891	0.000039	<0.0000891	<0.0000891	<0.000067	<0.0000891	0.0000078	2	2	-	-	-	-		
C3 substituted dibenzothiophenes	µg/L	-	-	-	-	0.00033	0.00033	0.00035	0.00036	0.00029	0.00037	0.000052	0	2	-	-	-	-		
C2 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.00029	0.00017	0.00029	0.00029	<0.000101	0.00029	0.00017	1	2	-	-	-	-		
C4 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.00100	0.00100	0.0012	0.0013	0.00062	0.0014	0.00053	0	2	-	-	-	-		
C4 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.002319	0.0012	<0.002319	<0.002319	<0.002319	<0.002319	0	2	2	-	-	-	-		
C1 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000106	0.000047	<0.000106	<0.000106	<0.0000828	<0.000106	0.0000082	2	2	-	-	-	-		
5/6-Methylchrysenes	µg/L	-	-	-	-	<0.000109	0.000049	<0.000109	<0.000109	<0.0000853	<0.000109	0.0000084	2	2	-	-	-	-		
C3 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.000136	0.000059	<0.000136	<0.000136	<0.000101	<0.000136	0.000012	2	2	-	-	-	-		
C2 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000117	0.000049	<0.000117	<0.000117	<0.0000774	<0.000117	0.000014	2	2	-	-	-	-		
5,9-Dimethylchrysene	µg/L	-	-	-	-	<0.000117	0.000049	<0.000117	<0.000117	<0.0000774	<0.000117	0.000014	2	2	-	-	-	-		
C4 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.0000994	0.000042	<0.0000994	<0.0000994	<0.0000699	<0.0000994	0.000010	2	2	-	-	-	-		
C1 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	0.00093	0.00093	0.0010	0.0011	0.00077	0.0011	0.00023	0	2	-	-	-	-		
7-Methylbenzo(a)pyrene	µg/L	-	-	-	-	<0.00034	0.00015	<0.00034	<0.00034	<0.000278	<0.00034	0.000022	2	2	-	-	-	-		
C3 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.00035	0.00035	0.00037	0.00039	0.00032	0.00039	0.000055	0	2	-	-	-	-		
C2 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	0.00097	0.00097	0.0011	0.0012	0.00073	0.0012	0.00034	0	2	-	-	-	-		
C4 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.00100	0.00100	0.0011	0.0012	0.00076	0.0012	0.00034	0	2	-	-	-	-		
1-methylchrysene	µg/L	-	-	-	-	<0.000103	0.000046	<0.000103	<0.000103	<0.0000804	<0.000103	0.0000080	2	2	-	-	-	-		
3-methylfluoranthene / benzo(a)fluorene	µg/L	-	-	-	-	<0.000588	0.00029	<0.000588	<0.000588	<0.000588	<0.000588	0	2	2	-	-	-	-		
Naphthenic Acid																				

APPENDIX B
Table B-5: Seasonal Surface Water Quality Summary of McParlon Creek, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary														
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Freshet (April to early June)								Standard Deviation	nd	Count	% Above Guideline			
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Acute	Chronic				BC MOE Mean	BC MOE Max		
C12h18o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C12h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C12h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C12h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C13h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C13h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C13h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C13h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C14h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C14h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C14h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C14h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C14h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C15h18o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C15h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C15h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C15h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C15h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C15h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C15h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C16h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C16h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C16h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C16h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C16h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C16h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C16h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C17h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C17h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C17h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C17h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C17h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C17h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C17h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C18h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C18h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C18h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C18h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C18h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C18h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C18h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C19h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C19h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C19h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C19h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C19h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C19h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C19h38o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C20h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C20h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C20h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C20h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C20h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C20h38o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C21h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C21h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C21h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C21h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C21h38o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
C21h40o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Radionuclides																				
Actinium-228	Bq/L	-	-	-	-	<0.6	-	<0.6	<0.6	-	-	-	1	1	-	-	-	-		
Bismuth-212	Bq/L	-	-	-	-	<2.0	-	<2.0	<2.0	-	-	-	1	1	-	-	-	-		
Bismuth-214	Bq/L	-	-	-	-	0.50	-	0.50	0.50	-	-	-	0	1	-	-	-	-		
Lead-210	Bq/L	-	-	-	-	<3.0	-	<3.0	<3.0	-	-	-	1	1	-	-	-	-		
Lead-211	Bq/L	-	-	-	-	<3.0	-	<3.0	<3.0	-	-	-	1	1	-	-	-	-		
Lead-212	Bq/L	-	-	-	-	1.0	-	1.0	1.0	-	-	-	0	1	-	-	-	-		
Lead-214	Bq/L	-	-	-	-	<3.0	-	<3.0	<3.0	-	-	-	1	1	-	-	-	-		
Potassium-40	Bq/L	-	-	-	-	<3.0	-	<3.0	<3.0	-	-	-	1	1	-	-	-	-		
Radium-223	Bq/L	-	-	-	-	<0.7	-	<0.7	<0.7	-	-	-	1	1	-	-	-	-		
Radium-226	Bq/L	-	-	-	-	<0.005	0.0025	<0.005	<0.005	<0.005	<0.005	0	2	2	-	-	-	-		
Radon-219	Bq/L	-	-	-	-	<0.9	-	<0.9	<0.9	-	-	-	1	1	-	-	-	-		
Thallium-208	Bq/L	-	-	-	-	0.40	-	0.40	0.40	-	-	-	0	1	-	-	-	-		
Thorium-227	Bq/L	-	-	-	-	<0.7	-	<0.7	<0.7	-	-	-	1	1	-	-	-	-		
Thorium-230	Bq/L	-	-	-	-	<8.0	-	<8.0	<8.0	-	-	-	1	1	-	-	-	-		
Thorium-234	Bq/L	-	-	-	-	<2.0	-	<2.0	<2.0	-	-	-	1	1	-	-	-	-		
Uranium-235	Bq/L	-	-	-	-	<0.6	-	<0.6	<0.6	-	-	-	1	1	-	-	-	-		

APPENDIX B
Table B-5: Seasonal Surface Water Quality Summary of McParlon Creek, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary														
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Open Water (late June to September)								Standard Deviation	nd	Count	% Above Guideline			
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Acute	Chronic				BC MOE Mean	BC MOE Max		
Field Measured																				
pH	-	-	6.5 - 9.0	6.5 - 9.0	6.5 - 9.0	7.0	6.9	7.1	7.5	6.1 ^(Chronic, BC MOE Mean, BC MOE Max)		7.8	0.43	0	13	-	8.0	8.0	8.0	
Specific conductivity	µS/cm	-	-	-	-	81	103	125	202	40	256		60	0	13	-	-	-	-	
Temperature	°C	-	-	-	-	3.9	6.6	13	14	1.2	15		5.3	0	13	-	-	-	-	
Dissolved oxygen	mg/L	-	6.5	8.0	5.0	12	11	12	13	9.4	14		1.4	0	11	-	-	-	-	
Turbidity	NTU	-	-	-	-	17	31	44	77	7.2	81		30	0	7	-	-	-	-	
Conventional Parameters																				
Hardness, as CaCO ₃	mg/L	-	-	-	-	35	40	43	74	21	88		19	0	12	-	-	-	-	
Total alkalinity, as CaCO ₃	mg/L	-	-	20 ^(a)	-	14 ^(BC MOE Mean)	16 ^(BC MOE Mean)	16 ^(BC MOE Mean)	31	10 ^(BC MOE Mean)	32		7.1	0	12	-	-	83	-	
Total dissolved solids	mg/L	-	-	-	-	111	109	133	163	20	166		42	0	12	-	-	-	-	
Total suspended solids	mg/L	-	-	-	-	6.5	22	14	99	<1.0	114		37	2	12	-	-	-	-	
Total organic carbon	mg/L	-	-	-	-	23	24	24	27	22	29		2.4	0	8	-	-	-	-	
Dissolved organic carbon	mg/L	-	-	-	-	23	26	26	41	13	55		10	0	12	-	-	-	-	
Dissolved inorganic carbon	mg/L	-	-	-	-	2.9	3.2	3.5	6.1	1.2	6.2		1.5	0	12	-	-	-	-	
Total inorganic carbon	mg/L	-	-	-	-	2.7	2.9	3.1	3.9	2.4	4.1		0.60	0	8	-	-	-	-	
Major Ions																				
Bicarbonate, as CaCO ₃	mg/L	-	-	-	-	16	18	19	34	<5.0	37		9.0	1	12	-	-	-	-	
Bromide	mg/L	-	-	-	-	0.035	0.031	<0.1	<0.1	<0.02	<0.1		0.019	8	10	-	-	-	-	
Calcium	mg/L	-	-	-	-	7.5	8.4	8.8	14	4.9	17		3.4	0	12	-	-	-	-	
Carbonate, as CaCO ₃	mg/L	-	-	-	-	<6.0	2.9	<6.0	12	<1.0	12		3.1	11	12	-	-	-	-	
Chloride	mg/L	640	120	150	600	0.31	0.35	0.41	0.79	0.090	1.1		0.27	0	12	-	-	-	-	
Fluoride	mg/L	-	0.12 ^(f)	-	0.62 - 2.6 ^(b)	-	-	-	-	-	-		-	0	0	-	-	-	-	
Magnesium	mg/L	-	-	-	-	3.7	4.4	4.9	8.8	2.1	11		2.5	0	12	-	-	-	-	
Potassium	mg/L	-	-	-	-	0.41	0.42	0.44	0.61	0.29	0.62		0.10	0	12	-	-	-	-	
Sodium	mg/L	-	-	-	-	4.2	6.3	7.9	15	1.6	21		5.3	0	12	-	-	-	-	
Sulphate	mg/L	-	-	128 - 429 ^(b, c)	-	16	24	35	65	2.7	86		25	0	12	-	-	-	-	
Nutrients																				
Nitrate	mg-N/L	124	2.9	3.0	33	<0.01	0.015	0.015	0.044	<0.01	0.060		0.017	7	12	-	-	-	-	
Nitrite	mg-N/L	-	0.060	0.020 - 0.040 ^(d)	0.060 - 0.12 ^(d)	<0.01	0.0083	<0.01	0.024 ^(BC MOE Mean)	<0.01	0.030 ^(BC MOE Mean)		0.0081	10	12	-	-	8.0	-	
Nitrate + nitrite	mg-N/L	-	-	-	-	<0.01	0.011	0.030	0.030	<0.01	0.030		0.013	3	4	-	-	-	-	
Total ammonia	mg-N/L	-	2.2 - 147 ^(e)	1.7 - 2.1 ^(f)	8.8 - 29 ^(g)	<0.02	0.016	0.021	0.039	<0.01	0.050		0.013	5	12	-	-	-	-	
Total kjeldahl nitrogen	mg-N/L	-	-	-	-	0.89	0.92	0.99	1.1	0.72	1.2		0.20	0	4	-	-	-	-	
Total nitrogen (calculated)	mg-N/L	-	-	-	-	0.89	0.93	1.00	1.2	0.72	1.2		0.21	0	4	-	-	-	-	
Total nitrogen	mg-N/L	-	-	-	-	0.77	0.84	0.91	1.1	0.72	1.2		0.16	0	10	-	-	-	-	
Total phosphorus	mg-P/L	-	-	0.010	-	0.037	0.043	0.039	0.077	0.019	0.086		0.025	0	5	-	-	-	-	
Dissolved phosphorus	mg-P/L	-	-	-	-	0.020	0.023	0.027	0.036	0.013	0.038		0.011	0	4	-	-	-	-	
Phosphorus (as phosphate)	mg-P/L	-	-	-	-	0.041	0.046	0.049	0.091	0.017	0.095		0.026	0	10	-	-	-	-	
Total Metals																				
Aluminum	µg/L	-	5.0 - 100 ^(h, i)	-	-	510 ^(Chronic)	804 ^(Chronic)	810 ^(Chronic)	2,400 ^(Chronic)	133 ^(Chronic)	2,570 ^(Chronic)		783	0	12	-	100	-	-	
Antimony	µg/L	-	-	9.0	-	0.20	0.17	0.20	0.22	0.17	0.24		0.048	3	12	-	-	-	-	
Arsenic	µg/L	-	5.0	-	5.0	0.95	1.1	1.0	1.9	0.50	2.3		0.47	0	12	-	-	-	-	
Barium	µg/L	-	-	1,000	-	115	123	128	176	83	179		29	0	12	-	-	-	-	
Beryllium	µg/L	-	-	0.13	-	0.080	0.089	0.12	0.17 ^(BC MOE Mean)	<0.04	0.18 ^(BC MOE Mean)		0.048	1	12	-	-	17	-	
Bismuth	µg/L	-	-	-	-	<0.1	0.031	<0.1	<0.1	<0.01	<0.1		0.022	7	9	-	-	-	-	
Boron	µg/L	29,000	1,500	-	1,200	6.5	7.9	9.5	14	<5.0	16		3.8	1	12	-	-	-	-	
Cadmium	µg/L	0.35 - 7.7 ^(b)	0.036 - 0.37 ^(b)	-	-	0.049	0.062	0.085	0.11 ^(Chronic)	0.026	0.13 ^(Chronic)		0.033	0	12	-	25	-	-	
Chromium	µg/L	-	1.0	1.0 ^(j)	-	1.5 ^(Chronic, BC MOE Mean)	2.0 ^(Chronic, BC MOE Mean)	1.7 ^(Chronic, BC MOE Mean)	4.9 ^(Chronic, BC MOE Mean)	1.0	4.9 ^(Chronic, BC MOE Mean)		1.4	0	12	-	83	83	-	
Cobalt	µg/L	-	-	4.0	110	0.42	0.65	0.79	1.8	0.17	1.9		0.58	0	12	-	-	-	-	
Copper	µg/L	-	2.0 - 4.0 ^(b)	2.0 - 10 ^(b)	3.6 - 40 ^(b)	5.6 ^(Chronic, BC MOE Mean, BC MOE Max)	6.2 ^(Chronic, BC MOE Mean, BC MOE Max)	6.8 ^(Chronic, BC MOE Mean, BC MOE Max)	9.1 ^(Chronic, BC MOE Mean, BC MOE Max)	4.7 ^(Chronic, BC MOE Mean)	9.3 ^(Chronic, BC MOE Mean, BC MOE Max)		1.6	0	12	-	100	100	58	
Iron	µg/L	-	300	-	1,000	1,545 ^(Chronic, BC MOE Max)	2,062 ^(Chronic, BC MOE Max)	2,080 ^(Chronic, BC MOE Max)	4,838 ^(Chronic, BC MOE Max)	667 ^(Chronic)	5,250 ^(Chronic, BC MOE Max)		1,386	0	12	-	100	-	83	
Lead	µg/L	-	1.0 - 7.0 ^(b)	3.6 - 20 ^(b)	8.6 - 417 ^(b)	0.40	0.68	0.70	2.0 ^(Chronic)	0.16	2.2 ^(Chronic)		0.68	0	12	-	17	-	-	
Lithium	µg/L	-	-	-	-	1.7	2.0	2.3	3.7	1.0	4.0		0.96	0	12	-	-	-	-	
Manganese	µg/L	-	-	768 - 2,585 ^(b)	816 - 3,394 ^(b)	45	59	83	124	17	147		41	0	12	-	-	-	-	
Mercury	µg/L	-	0.026	0.010	-	<0.01	0.0079	0.010	0.020 ^(BC MOE Mean)	<0.01	0.020 ^(BC MOE Mean)		0.0058	9	12	-	-	17	-	
Molybdenum	µg/L	-	73	1,000	2,000	0.31	0.34	0.36	0.53	0.21	0.60		0.11	0	12	-	-	-	-	
Nickel	µg/L	-	25 - 150 ^(b)	25 - 150 ^(b)	-	6.1	6.5	7.0	9.1	5.1	9.2		1.3	0	12	-	-	-	-	
Selenium	µg/L	-	1.0	2.0	-	0.50	0.56	0.70	0.85	0.40	0.90		0.18	1	12	-	-	-	-	
Silicon	µg/L	-	-	-	-	2,950	3,567	4,445	6,599	660	7,270		1,852	0	12	-	-	-	-	
Silver	µg/L	-	0.25	0.050 - 1.5 ^(b)	0.10 - 3.0 ^(b)	0.027	0.030	0.030	0.058 ^(BC MOE Mean)	0.010	0.080 ^(BC MOE Mean)		0.018	0	12	-	-	8.0	-	
Strontium	µg/L	-	-	-	-	39	41	44	55	28	56		8.1	0	12	-	-	-	-	
Sulphur	µg/L	-	-	-	-	5,300	8,891	12,500	23,050	1,100	32,100		9,030	0	11	-	-	-	-	
Tellurium	µg/L	-	-	-	-	<0.05	0.032	<0.1	<0.1	<0.05	<0.1		0.012	11	11	-	-	-	-	
Thallium	µg/L	-	0.80	0.80	-	<0.01	0.014	0.018	0.039	<0.004	0.050		0.014	5	12	-	-	-	-	
Thorium	µg/L	-	-	-	-	0.24	0.24	<0.4	0.52	0.090	0.52		0.14	3	12	-	-	-	-	
Tin	µg/L	-	-	-	-	<0.1	0.16	<0.1	0.68	<0.05	1.4		0.39	10	12	-	-	-	-	
Titanium	µg/L	-	-	-	-	14	21	31	50	4.1	66		18	0	12	-	-	-	-	
Uranium	µg/L	33	15	8.5	-	0.12	0.14	0.23	<0.4	0.05										

APPENDIX B
Table B-5: Seasonal Surface Water Quality Summary of McParlon Creek, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary												
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Open Water (late June to September)												
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline			
															Acute	Chronic	BC MOE Mean	BC MOE Max
Dissolved Metals																		
Aluminum	µg/L	-	-	24 - 50 ^(h)	52 - 100 ^(h)	140 ^(BC MOE Mean, BC MOE Max)	137 ^(BC MOE Mean, BC MOE Max)	146 ^(BC MOE Mean, BC MOE Max)	198 ^(BC MOE Mean, BC MOE Max)	51 ^(BC MOE Mean)	207 ^(BC MOE Mean, BC MOE Max)	41	0	12	-	-	100	83
Antimony	µg/L	-	-	-	-	<0.2	0.15	<0.2	0.21	0.13	0.22	0.046	5	12	-	-	-	-
Arsenic	µg/L	-	-	-	-	0.64	0.68	0.75	1.7	0.40	1.7	0.35	1	12	-	-	-	-
Barium	µg/L	-	-	-	-	86	88	97	113	61	121	17	0	12	-	-	-	-
Beryllium	µg/L	-	-	-	-	0.040	0.055	0.050	0.060	<0.04	<0.5	0.063	5	12	-	-	-	-
Bismuth	µg/L	-	-	-	-	<1.0	0.26	<1.0	<1.0	<0.01	<1.0	0.25	12	12	-	-	-	-
Boron	µg/L	-	-	-	-	6.5	7.3	11	12	<4.0	<20	3.1	2	12	-	-	-	-
Cadmium	µg/L	-	-	0.057 - 0.46 ^(h)	0.095 - 2.8 ^(h)	0.036	0.036	0.043	0.060	0.020	<0.1	0.013	1	12	-	-	-	-
Chromium	µg/L	-	-	-	-	0.83	0.78	0.98	1.1	<0.4	1.1	0.29	2	12	-	-	-	-
Cobalt	µg/L	-	-	-	-	0.24	0.28	0.38	0.55	0.10	0.60	0.16	0	12	-	-	-	-
Copper	µg/L	-	-	-	-	4.8	4.6	5.0	5.7	4.0	6.0	0.89	1	12	-	-	-	-
Iron	µg/L	-	-	-	350	636 ^(BC MOE Max)	681 ^(BC MOE Max)	688 ^(BC MOE Max)	1,076 ^(BC MOE Max)	376 ^(BC MOE Max)	1,190 ^(BC MOE Max)	221	0	12	-	-	-	100
Lead	µg/L	-	-	-	-	0.11	0.16	0.17	0.30	0.090	<1.0	0.13	3	12	-	-	-	-
Lithium	µg/L	-	-	-	-	1.0	1.2	1.5	2.0	0.86	<5.0	0.63	4	12	-	-	-	-
Manganese	µg/L	-	-	-	-	34	42	59	89	12	90	29	0	12	-	-	-	-
Mercury	µg/L	-	-	-	-	<0.01	0.0058	<0.01	0.010	<0.01	0.010	0.0019	10	12	-	-	-	-
Molybdenum	µg/L	-	-	-	-	0.25	0.27	0.33	0.43	0.18	0.45	0.10	1	12	-	-	-	-
Nickel	µg/L	-	-	-	-	5.1	5.1	5.4	6.5	3.0	7.0	0.96	0	12	-	-	-	-
Selenium	µg/L	-	-	-	-	0.50	0.48	<0.6	1.2	0.30	<2.0	0.30	5	12	-	-	-	-
Silicon	µg/L	-	-	-	-	2,360	2,302	2,905	3,240	479	3,410	786	0	12	-	-	-	-
Silver	µg/L	-	-	-	-	<0.01	0.010	0.020	0.020	<0.01	<0.1	0.013	11	12	-	-	-	-
Strontium	µg/L	-	-	-	-	36	38	42	53	22	57	9.9	0	12	-	-	-	-
Sulphur	µg/L	-	-	-	-	4,935	8,426	11,150	23,040	636	34,700	9,432	0	12	-	-	-	-
Tellurium	µg/L	-	-	-	-	<0.05	0.055	<0.1	<0.5	<0.05	<0.5	0.066	11	11	-	-	-	-
Thallium	µg/L	-	-	-	-	<0.01	0.0079	<0.01	<0.1	<0.004	<0.1	0.013	11	12	-	-	-	-
Thorium	µg/L	-	-	-	-	0.23	0.33	<0.4	0.080	<0.4	<4.0	0.53	6	12	-	-	-	-
Tin	µg/L	-	-	-	-	<0.1	0.079	<0.1	<1.0	<0.05	<1.0	0.13	12	12	-	-	-	-
Titanium	µg/L	-	-	-	-	3.5	4.2	<10	15	1.3	15	3.7	4	12	-	-	-	-
Uranium	µg/L	-	-	-	-	0.21	0.15	<0.4	<0.4	0.050	<0.4	0.087	5	12	-	-	-	-
Vanadium	µg/L	-	-	-	-	0.50	0.52	0.63	0.92	0.21	1.0	0.24	1	12	-	-	-	-
Zinc	µg/L	-	-	-	-	3.7	3.7	5.0	7.0	2.0	<10	1.4	2	12	-	-	-	-
Zirconium	µg/L	-	-	-	-	1.4	1.3	1.5	1.6	0.87	1.7	0.34	1	12	-	-	-	-
Volatile Organics																		
Benzene	µg/L	-	370 ^(l)	40	-	<0.5	63 ^(BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	116	8	8	-	-	-	-
Ethylbenzene	µg/L	-	90 ^(l)	200	-	<1.0	63	<500 ^(DL>Chronic, DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	116	8	8	-	-	-	-
Toluene	µg/L	-	2 ^(l)	0.50	-	<1.0 ^(DL>BC MOE Mean)	63 ^(Chronic, BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	116	8	8	-	-	-	-
Xylenes	µg/L	-	-	30	-	<2.0	63 ^(BC MOE Mean)	<500 ^(DL>BC MOE Mean)	<500 ^(DL>BC MOE Mean)	<0.5	<500 ^(DL>BC MOE Mean)	115	8	8	-	-	-	-
Styrene	µg/L	-	72 ^(l)	72	-	<0.5	84 ^(Chronic, BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	129	6	6	-	-	-	-
Extractable Petroleum Hydrocarbons (C10-C19)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Extractable Petroleum Hydrocarbons (C10-C32)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Volatile Hydrocarbons	µg/L	-	-	-	-	<100	6,275	<50,000	<50,000	<50	<50,000	11,557	8	8	-	-	-	-
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	-	<100	6,275	<50,000	<50,000	<50	<50,000	11,557	8	8	-	-	-	-
Methyl tertiary-butyl ether	µg/L	-	-	-	-	<0.5	84	<500	<500	<0.5	<500	129	6	6	-	-	-	-
Parent PAHs																		
Naphthalene	µg/L	-	1.1 ^(l)	1.0	-	<0.00564	0.0035	<0.01275	<0.01275	<0.00354	<0.01275	0.0019	8	8	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	<0.000181	0.000087	<0.00024	<0.000348	<0.000069	<0.000348	0.000046	8	8	-	-	-	-
Biphenyl	µg/L	-	-	-	-	<0.001836	0.00091	<0.002241	<0.002463	<0.001191	<0.002463	0.00024	8	8	-	-	-	-
Acenaphthene	µg/L	-	5.8 ^(l)	6.0	-	<0.000399	0.00019	<0.000412	<0.000603	<0.000246	<0.000603	0.000058	8	8	-	-	-	-
Fluorene	µg/L	-	3 ^(l)	12	-	0.00020	0.00013	0.00022	<0.000255	<0.0000826	<0.000255	0.000068	5	8	-	-	-	-
Phenanthrene	µg/L	-	0.4 ^(l)	0.30	-	<0.002298	0.0011	<0.002607	<0.002607	<0.00198	<0.002607	0.00013	8	8	-	-	-	-
Anthracene	µg/L	-	0.012 ^(l)	0.10	-	<0.000153	0.000080	<0.000177	<0.000291	<0.000099	<0.000291	0.000030	8	8	-	-	-	-
Dibenzothiophene	µg/L	-	-	-	-	<0.00048	0.00020	<0.000633	<0.00084	<0.000151	<0.00084	0.00012	7	8	-	-	-	-
Pyrene	µg/L	-	0.025 ^(l)	0.020	-	<0.000912	0.00046	<0.001383	<0.001383	<0.000573	<0.001383	0.00016	8	8	-	-	-	-
Fluoranthene	µg/L	-	0.04 ^(l)	0.20	-	<0.001149	0.00063	<0.001752	<0.001752	<0.00093	<0.001752	0.00016	8	8	-	-	-	-
Benzo(a)anthracene	µg/L	-	0.018 ^(h)	0.10	-	0.00012	0.00011	<0.000495	0.000065	<0.000495	<0.00065	0.000086	6	8	-	-	-	-
Chrysene	µg/L	-	-	-	-	<0.000393	0.00025	0.00042	<0.000747	<0.000303	<0.000747	0.00012	7	8	-	-	-	-
1-Methyl-7-isopropyl-phenanthrene (Retene)	µg/L	-	-	-	-	0.00074	0.00094	0.00096	0.0023	0.00020	0.0028	0.00084	1	8	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	0.00016	0.00022	0.00025	<0.001131	<0.0000826	<0.001131	0.00023	6	8	-	-	-	-
Benzo(j,k)fluoranthenes	µg/L	-	-	-	-	<0.000135	0.000092	<0.000313	<0.000412	<0.000051	<0.000412	0.000061	8	8	-	-	-	-
Benzo(b,j,k)fluoranthenes	µg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Benzo(a)pyrene	µg/L	-	0.015 ^(h)	0.010	-	<0.000185	0.00013	<0.000514	<0.000587	<0.000044	<0.000587	0.000096	8	8	-	-	-	-
Benzo(e)pyrene	µg/L	-	-	-	-	0.00017	0.00018	0.00046	<0.000575	<0.000064	<0.000575	0.00014	6	8	-	-	-	-
Perylene	µg/L	-	-	-	-	0.00042	0.00039	<0.000711	0.0014	<0.000154	0.0014	0.00043	6	8	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	<0.000301	0.00016	<0.000395	0.00040	<0.00005								

APPENDIX B
Table B-5: Seasonal Surface Water Quality Summary of McParlon Creek, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary														
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Open Water (late June to September)								Standard Deviation	nd	Count	% Above Guideline			
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Acute	Chronic				BC MOE Mean	BC MOE Max		
Alkylated PAHs																				
C1 substituted naphthalenes	µg/L	-	-	-	-	<0.00906	0.0036	<0.01344	<0.01344	<0.002661	<0.01344	0.0023	8	8	-	-	-	-		
1-Methylnaphthalene	µg/L	-	-	-	-	<0.001674	0.00076	<0.002328	<0.002328	<0.000849	<0.002328	0.00030	8	8	-	-	-	-		
2-Methylnaphthalene	µg/L	-	-	-	-	<0.00675	0.0029	<0.01176	<0.01176	<0.001812	<0.01176	0.0021	8	8	-	-	-	-		
C2 substituted naphthalenes	µg/L	-	-	-	-	<0.00846	0.0046	<0.01377	<0.01377	<0.00642	<0.01377	0.0015	8	8	-	-	-	-		
1,2-Dimethylnaphthalene	µg/L	-	-	-	-	<0.000851	0.00041	<0.001188	<0.001773	<0.000267	<0.001773	0.00026	8	8	-	-	-	-		
2,6-Dimethylnaphthalene	µg/L	-	-	-	-	<0.000405	0.00027	<0.000523	0.00082	<0.000309	0.00082	0.00023	7	8	-	-	-	-		
C1 substituted acenaphthenes	µg/L	-	-	-	-	<0.000258	0.00013	<0.000378	<0.000387	<0.000159	<0.000387	0.000040	8	8	-	-	-	-		
C1 substituted biphenyls	µg/L	-	-	-	-	<0.00375	0.0020	<0.00927	<0.00927	<0.000936	<0.00927	0.0017	8	8	-	-	-	-		
C3 substituted naphthalenes	µg/L	-	-	-	-	<0.00372	0.0022	<0.00663	<0.00663	<0.001614	<0.00663	0.00088	7	8	-	-	-	-		
2,3,5-Trimethylnaphthalene	µg/L	-	-	-	-	<0.000489	0.00032	0.00053	<0.000805	0.00037	<0.000805	0.00011	6	8	-	-	-	-		
2,3,6-Trimethylnaphthalene	µg/L	-	-	-	-	<0.000651	0.00032	<0.000756	<0.000756	0.00032	<0.000756	0.000051	7	8	-	-	-	-		
C1 substituted fluorenes	µg/L	-	-	-	-	<0.001497	0.00072	<0.0021	<0.002262	<0.000437	<0.002262	0.00030	7	8	-	-	-	-		
2-Methylfluorene	µg/L	-	-	-	-	<0.000249	0.00015	<0.000437	<0.000497	<0.000162	<0.000497	0.000064	8	8	-	-	-	-		
C2 substituted biphenyls	µg/L	-	-	-	-	<0.01707	0.0083	<0.0414	<0.0414	0.00036	<0.0414	0.0083	6	8	-	-	-	-		
C4 substituted naphthalenes	µg/L	-	-	-	-	<0.002802	0.0016	<0.00573	<0.00573	0.00028	<0.00573	0.0011	6	8	-	-	-	-		
1,4,6,7-Tetramethylnaphthalene	µg/L	-	-	-	-	<0.000267	0.00013	<0.000328	<0.000341	<0.000129	<0.000341	0.000035	8	8	-	-	-	-		
C1 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.00041	0.00049	0.00067	0.0013	<0.0002	0.0016	0.00051	4	8	-	-	-	-		
1-Methylphenanthrene	µg/L	-	-	-	-	<0.000372	0.00023	0.00042	0.00045	<0.0002	0.00046	0.00014	5	8	-	-	-	-		
2-Methylphenanthrene	µg/L	-	-	-	-	<0.000242	0.00017	0.00037	<0.000378	0.00018	<0.000378	0.000089	6	8	-	-	-	-		
3-Methylphenanthrene	µg/L	-	-	-	-	<0.000232	0.00015	0.00027	0.00030	<0.000111	0.00032	0.000093	5	8	-	-	-	-		
9/4-Methylphenanthrene	µg/L	-	-	-	-	<0.000232	0.00016	0.00026	0.00040	<0.000078	0.00048	0.00014	5	8	-	-	-	-		
2-Methylantracene	µg/L	-	-	-	-	<0.000168	0.000080	<0.00024	<0.000242	<0.0000671	<0.000242	0.000033	8	8	-	-	-	-		
C2 substituted fluorenes	µg/L	-	-	-	-	0.00049	0.00043	<0.001554	<0.001899	<0.000152	<0.001899	0.00032	7	8	-	-	-	-		
1,7-Dimethylfluorene	µg/L	-	-	-	-	<0.000237	0.00013	<0.000354	<0.000443	<0.000152	<0.000443	0.000051	8	8	-	-	-	-		
C1 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.000202	0.00013	0.00022	0.00022	<0.0000992	<0.000235	0.000054	5	8	-	-	-	-		
2/3-Methyldibenzothiophenes	µg/L	-	-	-	-	<0.000207	0.000098	<0.000221	<0.000235	<0.000126	<0.000235	0.000017	8	8	-	-	-	-		
C2 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.001182	0.00066	<0.001314	<0.002049	0.00073	<0.002049	0.00017	6	8	-	-	-	-		
1,7-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000249	0.00010	<0.000261	<0.000261	<0.000135	<0.000261	0.000027	8	8	-	-	-	-		
1,8-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000136	0.000067	<0.000217	<0.000244	<0.0000501	<0.000244	0.000036	8	8	-	-	-	-		
2,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000213	0.00010	<0.000315	<0.000315	<0.000136	<0.000315	0.000037	8	8	-	-	-	-		
3,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000171	0.000087	<0.00024	<0.000248	<0.000051	<0.000248	0.000032	8	8	-	-	-	-		
C3 substituted fluorenes	µg/L	-	-	-	-	<0.0039	0.0020	<0.00411	<0.01116	<0.000846	<0.01116	0.0015	7	8	-	-	-	-		
C2 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.001944	0.00065	<0.002103	<0.002364	<0.000306	<0.002364	0.00045	8	8	-	-	-	-		
2,4-Dimethyldibenzothiophene	µg/L	-	-	-	-	<0.00029	0.00013	<0.000314	<0.000393	<0.0000763	<0.000393	0.000047	8	8	-	-	-	-		
C1 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.001308	0.00075	0.0013	<0.001653	0.00061	<0.001653	0.00026	6	8	-	-	-	-		
C3 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.00054	0.00054	<0.001641	<0.002682	0.00018	<0.002682	0.00041	6	8	-	-	-	-		
1,2,6-Trimethylphenanthrene	µg/L	-	-	-	-	<0.000119	0.000072	<0.000212	<0.000324	<0.0000326	<0.000324	0.000047	8	8	-	-	-	-		
C3 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.001377	0.00086	<0.002145	<0.00432	<0.001056	<0.00432	0.00056	8	8	-	-	-	-		
C2 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.00054	0.00065	<0.00207	<0.0033	<0.000112	<0.0033	0.00057	6	8	-	-	-	-		
C4 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.0017	0.0017	<0.00459	0.0048	0.00090	0.0048	0.0014	5	8	-	-	-	-		
C4 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.002262	0.0011	<0.002763	<0.00315	<0.001017	<0.00315	0.00040	8	8	-	-	-	-		
C1 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.00017	0.00016	0.00034	0.00037	<0.0000431	0.00038	0.00014	4	8	-	-	-	-		
5/6-Methylchrysenes	µg/L	-	-	-	-	<0.000114	0.000050	<0.000124	<0.0002	<0.0000445	<0.0002	0.000025	8	8	-	-	-	-		
C3 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.000846	0.00031	<0.000885	<0.001221	<0.000147	<0.001221	0.00019	8	8	-	-	-	-		
C2 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000438	0.00018	<0.000513	<0.00102	<0.0000475	<0.00102	0.00016	8	8	-	-	-	-		
5,9-Dimethylchrysene	µg/L	-	-	-	-	<0.000111	0.000051	<0.000139	<0.00016	<0.0000475	<0.00016	0.000020	8	8	-	-	-	-		
C4 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.00021	0.00019	0.00035	<0.000822	<0.0000739	<0.000822	0.00014	6	8	-	-	-	-		
C1 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	<0.000663	0.00033	<0.001029	<0.001062	<0.000247	<0.001062	0.00015	8	8	-	-	-	-		
7-Methylbenzo[a]pyrene	µg/L	-	-	-	-	<0.000247	0.00014	<0.000469	<0.000715	<0.000093	<0.000715	0.00011	8	8	-	-	-	-		
C3 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000537	0.00023	<0.000801	<0.001092	<0.000123	<0.001092	0.00017	8	8	-	-	-	-		
C2 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	<0.000804	0.00042	<0.001392	<0.002082	<0.000192	<0.002082	0.00035	8	8	-	-	-	-		
C4 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000133	0.000093	<0.000167	<0.000705	<0.0000578	<0.000705	0.00011	8	8	-	-	-	-		
1-methylchrysene	µg/L	-	-	-	-	<0.000106	0.000047	<0.000116	<0.000193	<0.0000418	<0.000193	0.000025	8	8	-	-	-	-		
3-methylfluoranthene / benzo(a)fluorene	µg/L	-	-	-	-	0.00037	0.00027	<0.000504	0.00075	<0.000161	0.00075	0.00022	6	8	-	-	-	-		
Naphthenic Acid																				

APPENDIX B
Table B-5: Seasonal Surface Water Quality Summary of McParlon Creek, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary														
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Open Water (late June to September)								Standard Deviation	nd	Count	% Above Guideline			
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Acute	Chronic				BC MOE Mean	BC MOE Max		
C12h18o2	ng/L	-	-	-	-	86	78	89	100	47	104	23	0	6	-	-	-	-		
C12h20o2	ng/L	-	-	-	-	31	32	38	41	25	41	7.0	0	6	-	-	-	-		
C12h22o2	ng/L	-	-	-	-	<15	7.3	21	<5.1	21	21	7.0	5	6	-	-	-	-		
C12h24o2	ng/L	-	-	-	-	<15	17	<15	78	<5.1	78	30	5	6	-	-	-	-		
C13h20o2	ng/L	-	-	-	-	27	28	34	44	18	48	12	1	6	-	-	-	-		
C13h22o2	ng/L	-	-	-	-	31	34	38	45	29	46	7.2	0	6	-	-	-	-		
C13h24o2	ng/L	-	-	-	-	<15	7.0	<15	19	<5.1	19	6.3	5	6	-	-	-	-		
C13h26o2	ng/L	-	-	-	-	37	47	42	94	17	111	33	0	6	-	-	-	-		
C14h20o2	ng/L	-	-	-	-	49	45	60	62	21	62	17	0	6	-	-	-	-		
C14h22o2	ng/L	-	-	-	-	50	49	61	68	26	71	17	0	6	-	-	-	-		
C14h24o2	ng/L	-	-	-	-	27	24	31	40	14	43	12	1	6	-	-	-	-		
C14h26o2	ng/L	-	-	-	-	15	6.3	15	<15	<5.1	<15	4.8	5	6	-	-	-	-		
C14h28o2	ng/L	-	-	-	-	<15	18	<15	84	<5.1	84	33	5	6	-	-	-	-		
C15h18o2	ng/L	-	-	-	-	18	17	19	24	6.7	26	6.2	0	6	-	-	-	-		
C15h20o2	ng/L	-	-	-	-	56	61	73	84	35	86	19	0	6	-	-	-	-		
C15h22o2	ng/L	-	-	-	-	252	265	293	391	143	419	93	0	6	-	-	-	-		
C15h24o2	ng/L	-	-	-	-	276	250	287	326	152	339	73	0	6	-	-	-	-		
C15h26o2	ng/L	-	-	-	-	30	33	35	58	17	65	17	0	6	-	-	-	-		
C15h28o2	ng/L	-	-	-	-	12	5.9	12	<15	<5.1	<15	4.0	5	6	-	-	-	-		
C15h30o2	ng/L	-	-	-	-	<15	15	<15	66	<5.1	66	25	5	6	-	-	-	-		
C16h20o2	ng/L	-	-	-	-	12	12	16	22	<5.1	22	6.9	3	6	-	-	-	-		
C16h22o2	ng/L	-	-	-	-	18	15	19	29	<5.1	32	11	3	6	-	-	-	-		
C16h24o2	ng/L	-	-	-	-	21	19	21	64	<5.1	64	23	4	6	-	-	-	-		
C16h26o2	ng/L	-	-	-	-	48	58	61	106	33	121	33	0	6	-	-	-	-		
C16h28o2	ng/L	-	-	-	-	<5.5	4.2	<15	<15	<5.1	<15	2.6	6	6	-	-	-	-		
C16h30o2	ng/L	-	-	-	-	12	5.7	12	<15	<5.1	<15	3.7	5	6	-	-	-	-		
C16h32o2	ng/L	-	-	-	-	<15	16	<15	72	<5.1	72	27	5	6	-	-	-	-		
C17h22o2	ng/L	-	-	-	-	<15	7.5	<15	22	<5.1	22	7.3	5	6	-	-	-	-		
C17h24o2	ng/L	-	-	-	-	<15	5.5	<15	<20	<5.1	<20	3.3	6	6	-	-	-	-		
C17h26o2	ng/L	-	-	-	-	15	17	21	29	<5.5	31	9.4	1	6	-	-	-	-		
C17h28o2	ng/L	-	-	-	-	116	169	132	430	37	529	180	0	6	-	-	-	-		
C17h30o2	ng/L	-	-	-	-	16	24	24	62	<5.1	74	26	1	6	-	-	-	-		
C17h32o2	ng/L	-	-	-	-	14	6.1	14	<15	<5.1	<15	4.4	5	6	-	-	-	-		
C17h34o2	ng/L	-	-	-	-	<6.4	4.6	<15	<18	<5.1	<18	2.8	6	6	-	-	-	-		
C18h24o2	ng/L	-	-	-	-	56	54	57	108	28	124	37	1	6	-	-	-	-		
C18h26o2	ng/L	-	-	-	-	<15	7.9	<15	24	<5.1	24	8.4	5	6	-	-	-	-		
C18h28o2	ng/L	-	-	-	-	11	77	<33	423	<5.1	423	170	4	6	-	-	-	-		
C18h30o2	ng/L	-	-	-	-	6.5	4.9	6.5	<15	<5.1	<15	2.5	5	6	-	-	-	-		
C18h32o2	ng/L	-	-	-	-	<5.5	4.2	<15	<15	<5.1	<15	2.6	6	6	-	-	-	-		
C18h34o2	ng/L	-	-	-	-	<5.5	4.2	<15	<15	<5.1	<15	2.6	6	6	-	-	-	-		
C18h36o2	ng/L	-	-	-	-	<15	18	<15	86	<5.1	86	33	5	6	-	-	-	-		
C19h26o2	ng/L	-	-	-	-	35	35	43	59	16	63	18	0	6	-	-	-	-		
C19h28o2	ng/L	-	-	-	-	12	14	14	50	<5.1	50	18	3	6	-	-	-	-		
C19h30o2	ng/L	-	-	-	-	13	6.0	13	<15	<5.1	<15	4.1	5	6	-	-	-	-		
C19h32o2	ng/L	-	-	-	-	9.2	5.4	9.2	<15	<5.1	<15	3.1	5	6	-	-	-	-		
C19h34o2	ng/L	-	-	-	-	10	12	22	27	<5.1	28	12	3	6	-	-	-	-		
C19h36o2	ng/L	-	-	-	-	6.7	7.3	6.7	18	<5.1	18	5.5	3	6	-	-	-	-		
C19h38o2	ng/L	-	-	-	-	32	46	86	105	<5.1	106	46	2	6	-	-	-	-		
C20h28o2	ng/L	-	-	-	-	<15	31	55	84	11	94	36	2	6	-	-	-	-		
C20h30o2	ng/L	-	-	-	-	146	163	196	285	58	312	89	0	6	-	-	-	-		
C20h32o2	ng/L	-	-	-	-	94	129	125	324	15	389	134	0	6	-	-	-	-		
C20h34o2	ng/L	-	-	-	-	8.3	9.7	9.8	<42	<5.1	<42	6.4	3	6	-	-	-	-		
C20h36o2	ng/L	-	-	-	-	<5.5	4.2	<15	<15	<5.1	<15	2.6	6	6	-	-	-	-		
C20h38o2	ng/L	-	-	-	-	10	5.6	10	<15	<5.1	<15	3.4	5	6	-	-	-	-		
C21h30o2	ng/L	-	-	-	-	18	15	20	32	<5.1	35	12	3	6	-	-	-	-		
C21h32o2	ng/L	-	-	-	-	8.9	5.3	8.9	<15	<5.1	<15	3.0	5	6	-	-	-	-		
C21h34o2	ng/L	-	-	-	-	<5.5	4.2	<15	<15	<5.1	<15	2.6	6	6	-	-	-	-		
C21h36o2	ng/L	-	-	-	-	<5.5	4.2	<15	<15	<5.1	<15	2.6	6	6	-	-	-	-		
C21h38o2	ng/L	-	-	-	-	<5.5	4.2	<15	<15	<5.1	<15	2.6	6	6	-	-	-	-		
C21h40o2	ng/L	-	-	-	-	<5.5	4.2	<15	<15	<5.1	<15	2.6	6	6	-	-	-	-		
Radionuclides																				
Actinium-228	Bq/L	-	-	-	-	<1.0	0.70	1.0	1.0	<1.0	1.0	0.27	3	5	-	-	-	-		
Bismuth-212	Bq/L	-	-	-	-	<2.0	0.90	<2.0	<2.0	<1.0	<2.0	0.22	5	5	-	-	-	-		
Bismuth-214	Bq/L	-	-	-	-	0.60	0.40	<0.8	<0.8	<0.6	<0.8	0.12	4	5	-	-	-	-		
Lead-210	Bq/L	-	-	-	-	<4.0	1.9	<4.0	<4.0	<3.0	<4.0	0.22	5	5	-	-	-	-		
Lead-211	Bq/L	-	-	-	-	<5.0	2.9	5.0	5.0	<3.0	<6.0	1.3	4	5	-	-	-	-		
Lead-212	Bq/L	-	-	-	-	0.40	0.39	0.40	0.72	<0.3	0.80	0.26	2							

Seasonal Surface Water Quality Summary of McParlon Creek, 2013 to 2017

^(a) = guideline is a minimum value, unless the background concentration or value is lower.

^(b) = guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (17 to 2,420 mg/L). The guideline is calculated based on the individual hardness value for each sample.

^(c) = for some samples, water hardness was greater than 250 mg/L. At this hardness, no BC MOE water quality guideline has been established for sulphate; however, the observed data were screened against the guideline for very hard water

^(d) = guideline is chloride dependent. The guideline range shown is based on the chloride concentration range observed in the dataset (0.0900 to 3.0500 mg/L). The guideline is calculated based on the individual chloride concentration in each

^(e) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (2.2452 mg-N/L) is based on the combination of field pH (7.8) and water temperature (3.6°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature

^(e) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (2.2452 mg-N/L) is based on the combination of field pH (7.8) and water temperature (3.6°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature

^(g) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (8.7700 mg-N/L) is based on the combination of field pH (7.8) and water temperature (3.6°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature

^(h) = guideline is pH dependent. The guideline range shown is based on the pH range observed in the dataset (6.1 to 7.8). The guideline is calculated based on the individual pH for each sample.

⁽ⁱ⁾ = guideline is pH dependent: 5 µg/L at pH < 6.5 and 100 µg/L at pH ≥ 6.5.

^(j) = guideline is for chromium VI.

^(l) = interim guideline

(Chronic) = concentration is higher than the chronic aquatic life CCME guideline or outside the recommended pH, DO or (BC MOE Mean) = concentration is higher than the 30-day mean BC MOE guideline or outside the recommended pH, DO or total alkalinity range.

(BC MOE Max) = concentration is higher than the maximum BC MOE guideline or outside the recommended pH, DO or

(DL>Chronic) = analytical detection limit is higher than the chronic aquatic life CCME guideline.

(DL>BC MOE Mean) = analytical detection limit is higher than the 30-day mean BC MOE guideline.

Bolded concentrations are higher than water quality guidelines.

Bolded total alkalinity values indicate moderate to high level of acid sensitivity.

Water quality data and guidelines shown in this table were rounded to reflect laboratory or field instrument precision *after* comparisons to guidelines. Therefore, values slightly above guidelines may be displayed as being equal to the guidelines and identified as exceedances. Concentrations equal to the guideline values were not identified as

- = no guideline or no data.

Source: [add source if not from Golder]

Table B-6: Seasonal Surface Water Quality Summary of Miner River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary												
						Ice Cover (March)												
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	Acute			
Field Measured																		
pH	-	-	6.5 - 9.0	6.5 - 9.0	6.5 - 9.0	7.6	7.6	7.7	7.7	7.5	7.7	0.16	0	2	-	-	-	-
Specific conductivity	µS/cm	-	-	-	-	435	435	437	439	431	439	5.7	0	2	-	-	-	-
Temperature	°C	-	-	-	-	0.50	0.50	0.75	0.95	0	1.0	0.71	0	2	-	-	-	-
Dissolved oxygen	mg/L	-	6.5	8.0	5.0	9.6	9.6	9.7	9.7	9.5	9.8	0.18	0	2	-	-	-	-
Turbidity	NTU	-	-	-	-	0.30	-	0.30	0.30	-	-	-	0	1	-	-	-	-
Conventional Parameters																		
Hardness, as CaCO ₃	mg/L	-	-	-	-	231	231	238	244	216	245	21	0	2	-	-	-	-
Total alkalinity, as CaCO ₃	mg/L	-	-	20 ^(a)	-	173	173	174	175	171	175	2.8	0	2	-	-	-	-
Total dissolved solids	mg/L	-	-	-	-	199	199	227	249	144	254	78	0	2	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	<2.0	1.0	<2.0	<2.0	<2.0	<2.0	0	2	2	-	-	-	-
Total organic carbon	mg/L	-	-	-	-	1.5	1.5	1.5	1.6	1.3	1.6	0.21	0	2	-	-	-	-
Dissolved organic carbon	mg/L	-	-	-	-	1.4	1.4	1.4	1.5	1.2	1.5	0.21	0	2	-	-	-	-
Dissolved inorganic carbon	mg/L	-	-	-	-	40	40	41	42	38	42	2.7	0	2	-	-	-	-
Total inorganic carbon	mg/L	-	-	-	-	41	41	42	42	39	43	2.9	0	2	-	-	-	-
Major Ions																		
Bicarbonate, as CaCO ₃	mg/L	-	-	-	-	193	193	203	212	171	214	30	0	2	-	-	-	-
Bromide	mg/L	-	-	-	-	<0.1	0.030	<0.1	<0.1	<0.02	<0.1	0.028	2	2	-	-	-	-
Calcium	mg/L	-	-	-	-	65	65	70	74	56	75	14	0	2	-	-	-	-
Carbonate, as CaCO ₃	mg/L	-	-	-	-	<6.0	1.8	<6.0	<6.0	<1.0	<6.0	1.8	2	2	-	-	-	-
Chloride	mg/L	640	120	150	600	6.8	6.8	7.1	7.3	6.4	7.3	0.66	0	2	-	-	-	-
Fluoride	mg/L	-	0.12 ^(b)	-	1.5 - 1.7 ^(b)	-	-	-	-	-	-	-	0	0	-	-	-	-
Magnesium	mg/L	-	-	-	-	13	13	14	14	12	14	1.6	0	2	-	-	-	-
Potassium	mg/L	-	-	-	-	0.40	0.40	0.40	0.40	0.40	0.40	0.0014	0	2	-	-	-	-
Sodium	mg/L	-	-	-	-	7.0	7.0	7.2	7.4	6.5	7.4	0.61	0	2	-	-	-	-
Sulphate	mg/L	-	-	309 - 429 ^(b, c)	-	44	44	44	44	44	45	0.71	0	2	-	-	-	-
Nutrients																		
Nitrate	mg-N/L	124	2.9	3.0	33	0.34	0.34	0.42	0.48	0.18	0.50	0.23	0	2	-	-	-	-
Nitrite	mg-N/L	-	0.060	0.020 - 0.080 ^(d)	0.060 - 0.24 ^(d)	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	2	2	-	-	-	-
Nitrate + nitrite	mg-N/L	-	-	-	-	0.50	-	0.50	0.50	-	-	-	0	1	-	-	-	-
Total ammonia	mg-N/L	-	0.91 - 19 ^(e)	0.92 - 2.1 ^(f)	4.8 - 24 ^(g)	0.036	0.021	0.036	0.036	<0.01	0.036	0.022	1	2	-	-	-	-
Total kjeldahl nitrogen	mg-N/L	-	-	-	-	0.16	-	0.16	0.16	-	-	-	0	1	-	-	-	-
Total nitrogen (calculated)	mg-N/L	-	-	-	-	0.66	-	0.66	0.66	-	-	-	0	1	-	-	-	-
Total nitrogen	mg-N/L	-	-	-	-	0.50	0.50	0.58	0.64	0.33	0.66	0.23	0	2	-	-	-	-
Total phosphorus	mg-P/L	-	-	0.010	-	<0.01	-	<0.01	<0.01	-	-	-	1	1	-	-	-	-
Dissolved phosphorus	mg-P/L	-	-	-	-	<0.01	-	<0.01	<0.01	-	-	-	1	1	-	-	-	-
Phosphorus (as phosphate)	mg-P/L	-	-	-	-	<0.003	0.0013	<0.003	<0.003	<0.002	<0.003	0.00035	2	2	-	-	-	-
Total Metals																		
Aluminum	µg/L	-	100 ^(h, i)	-	-	5.0	5.0	6.0	6.8	3.0	7.0	2.8	0	2	-	-	-	-
Antimony	µg/L	-	-	9.0	-	0.060	0.080	0.060	0.060	0.060	<0.2	0.028	1	2	-	-	-	-
Arsenic	µg/L	-	5.0	-	5.0	0.16	0.13	0.16	0.16	0.16	<0.2	0.042	1	2	-	-	-	-
Barium	µg/L	-	-	1,000	-	89	89	92	95	82	96	9.8	0	2	-	-	-	-
Beryllium	µg/L	-	-	0.13	-	<0.05	0.015	<0.05	<0.05	<0.01	<0.05	0.014	2	2	-	-	-	-
Bismuth	µg/L	-	-	-	-	<0.01	-	<0.01	<0.01	-	-	-	1	1	-	-	-	-
Boron	µg/L	29,000	1,500	-	1,200	11	11	12	12	10	12	1.4	0	2	-	-	-	-
Cadmium	µg/L	3.0 - 5.4 ^(b)	0.21 - 0.34 ^(b)	-	-	0.018	0.018	0.019	0.020	0.016	0.020	0.0028	0	2	-	-	-	-
Chromium	µg/L	-	1.0	1.0 ^(j)	-	0.20	0.20	0.20	0.20	0.20	<0.4	0	1	2	-	-	-	-
Cobalt	µg/L	-	-	4.0	110	0.012	0.011	0.012	0.012	0.012	<0.02	0.0014	1	2	-	-	-	-
Copper	µg/L	-	3.2 - 4.0 ^(b)	5.6 - 10 ^(b)	15 - 26 ^(b)	1.1	0.80	1.1	1.1	<1.0	1.1	0.42	1	2	-	-	-	-
Iron	µg/L	-	300	-	1,000	7.0	6.0	7.0	7.0	7.0	<10	1.4	1	2	-	-	-	-
Lead	µg/L	-	4.9 - 7.0 ^(b)	8.2 - 14 ^(b)	126 - 266 ^(b)	0.060	0.055	0.060	0.060	0.060	<0.1	0.0071	1	2	-	-	-	-
Lithium	µg/L	-	-	-	-	10	10	10	10	10	10	0	0	2	-	-	-	-
Manganese	µg/L	-	-	1,225 - 1,718 ^(b)	2,094 - 3,328 ^(b)	1.8	1.8	1.9	2.0	1.6	2.0	0.25	0	2	-	-	-	-
Mercury	µg/L	-	0.026	0.010	-	<0.01	0.0038	<0.01	<0.01	<0.005	<0.01	0.0018	2	2	-	-	-	-
Molybdenum	µg/L	-	73	1,000	2,000	0.66	0.66	0.68	0.70	0.61	0.70	0.064	0	2	-	-	-	-
Nickel	µg/L	-	124 - 150 ^(b)	124 - 150 ^(b)	-	0.41	0.46	0.41	0.41	0.41	<1.0	0.064	1	2	-	-	-	-
Selenium	µg/L	-	1.0	2.0	-	0.95	0.95	0.98	1.00	0.90	1.0	0.071	0	2	-	-	-	-
Silicon	µg/L	-	-	-	-	2,000	2,000	2,050	2,090	1,900	2,100	141	0	2	-	-	-	-
Silver	µg/L	-	0.25	1.5 ^(b)	3.0 ^(b)	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	2	2	-	-	-	-
Strontium	µg/L	-	-	-	-	193	193	200	206	179	207	20	0	2	-	-	-	-
Sulphur	µg/L	-	-	-	-	15,550	15,550	15,825	16,045	15,000	16,100	778	0	2	-	-	-	-
Tellurium	µg/L	-	-	-	-	<0.1	0.038	<0.1	<0.1	<0.05	<0.1	0.018	2	2	-	-	-	-
Thallium	µg/L	-	0.80	0.80	-	<0.01	0.0035	<0.01	<0.01	<0.004	<0.01	0.0021	2	2	-	-	-	-
Thorium	µg/L	-	-	-	-	<0.4	0.10	<0.4	<0.4	<0.01	<0.4	0.14	2	2	-	-	-	-
Tin	µg/L	-	-	-	-	<0.1	0.038	<0.1	<0.1	<0.05	<0.1	0.018	2	2	-	-	-	-
Titanium	µg/L	-	-	-	-	5.0	2.6	5.0	5.0	<0.2	5.0	3.5	1	2	-	-	-	-
Uranium	µg/L	33	15	8.5	-	0.73	0.73	0.75	0.77	0.70	0.77	0.049	0	2	-	-	-	-
Vanadium	µg/L	-	-	-	-	0.30	0.18	0.30	0.30	<0.1	0.30	0.18	1	2	-	-	-	-
Zinc	µg/L	-	30	46 - 130 ^(b)	71 - 155 ^(b)	1.5	1.5	1.8	2.0	1.0	2.0	0.71	0	2	-	-	-	-
Zirconium	µg/L	-	-	-	-	0.040	0.045	0.040	0.040	0.040	<0.1	0.0071	1	2	-	-	-	-

Table B-6: Seasonal Surface Water Quality Summary of Miner River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary												
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Ice Cover (March)												
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline			
															Acute	Chronic	BC MOE Mean	BC MOE Max
Dissolved Metals																		
Aluminum	µg/L	-	-	50 ^(b)	100 ^(b)	<5.0	1.5	<5.0	<5.0	<1.0	<5.0	1.4	2	2	-	-	-	-
Antimony	µg/L	-	-	-	-	0.060	0.080	0.060	0.060	0.060	<0.2	0.028	1	2	-	-	-	-
Arsenic	µg/L	-	-	-	-	0.10	0.10	0.10	0.10	0.10	<0.2	0	1	2	-	-	-	-
Barium	µg/L	-	-	-	-	82	82	83	85	79	85	4.5	0	2	-	-	-	-
Beryllium	µg/L	-	-	-	-	<0.04	0.013	<0.04	<0.04	<0.01	<0.04	0.011	2	2	-	-	-	-
Bismuth	µg/L	-	-	-	-	<1.0	0.25	<1.0	<1.0	<0.01	<1.0	0.35	2	2	-	-	-	-
Boron	µg/L	-	-	-	-	10	10	11	11	9.0	11	1.4	0	2	-	-	-	-
Cadmium	µg/L	-	-	0.27 - 0.42 ^(b)	0.84 - 1.5 ^(b)	0.018	0.018	0.019	0.020	0.015	0.020	0.0035	0	2	-	-	-	-
Chromium	µg/L	-	-	-	-	0.10	0.15	0.10	0.10	0.10	<0.4	0.071	1	2	-	-	-	-
Cobalt	µg/L	-	-	-	-	0.010	0.010	0.010	0.010	0.010	<0.02	0	1	2	-	-	-	-
Copper	µg/L	-	-	-	-	0.30	0.40	0.30	0.30	0.30	<1.0	0.14	1	2	-	-	-	-
Iron	µg/L	-	-	-	350	3.0	2.8	3.0	3.0	3.0	<5.0	0.35	1	2	-	-	-	-
Lead	µg/L	-	-	-	-	<0.1	0.038	<0.1	<0.1	<0.05	<0.1	0.018	2	2	-	-	-	-
Lithium	µg/L	-	-	-	-	8.8	8.8	9.4	9.9	7.6	10	1.7	0	2	-	-	-	-
Manganese	µg/L	-	-	-	-	2.1	2.1	2.5	2.9	1.1	3.0	1.3	0	2	-	-	-	-
Mercury	µg/L	-	-	-	-	<0.01	0.0038	<0.01	<0.01	<0.005	<0.01	0.0018	2	2	-	-	-	-
Molybdenum	µg/L	-	-	-	-	0.57	0.57	0.59	0.60	0.54	0.60	0.042	0	2	-	-	-	-
Nickel	µg/L	-	-	-	-	0.40	0.45	0.40	0.40	0.40	<1.0	0.071	1	2	-	-	-	-
Selenium	µg/L	-	-	-	-	0.95	0.95	0.98	1.00	0.90	1.0	0.071	0	2	-	-	-	-
Silicon	µg/L	-	-	-	-	1,945	1,945	1,978	2,004	1,880	2,010	92	0	2	-	-	-	-
Silver	µg/L	-	-	-	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	2	2	-	-	-	-
Strontium	µg/L	-	-	-	-	181	181	182	183	178	183	3.5	0	2	-	-	-	-
Sulphur	µg/L	-	-	-	-	14,800	14,800	15,550	16,150	13,300	16,300	2,121	0	2	-	-	-	-
Tellurium	µg/L	-	-	-	-	<0.1	0.038	<0.1	<0.1	<0.05	<0.1	0.018	2	2	-	-	-	-
Thallium	µg/L	-	-	-	-	<0.01	0.0035	<0.01	<0.01	<0.004	<0.01	0.0021	2	2	-	-	-	-
Thorium	µg/L	-	-	-	-	<0.4	0.10	<0.4	<0.4	<0.01	<0.4	0.14	2	2	-	-	-	-
Tin	µg/L	-	-	-	-	<0.1	0.038	<0.1	<0.1	<0.05	<0.1	0.018	2	2	-	-	-	-
Titanium	µg/L	-	-	-	-	13	6.6	13	13	<0.2	13	9.1	1	2	-	-	-	-
Uranium	µg/L	-	-	-	-	0.70	0.70	0.75	0.79	0.61	0.80	0.14	0	2	-	-	-	-
Vanadium	µg/L	-	-	-	-	<0.2	0.075	<0.2	<0.2	<0.1	<0.2	0.035	2	2	-	-	-	-
Zinc	µg/L	-	-	-	-	2.0	1.3	2.0	2.0	<1.0	2.0	1.1	1	2	-	-	-	-
Zirconium	µg/L	-	-	-	-	0.020	0.035	0.020	0.020	0.020	<0.1	0.021	1	2	-	-	-	-
Volatile Organics																		
Benzene	µg/L	-	370 ^(b)	40	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	2	2	-	-	-	-
Ethylbenzene	µg/L	-	90 ^(b)	200	-	<1.0	0.38	<1.0	<1.0	<0.5	<1.0	0.18	2	2	-	-	-	-
Toluene	µg/L	-	2 ^(b)	0.50	-	<1.0 ^(DL>BC MOE Mean)	0.38	<1.0 ^(DL>BC MOE Mean)	<1.0 ^(DL>BC MOE Mean)	<0.5	<1.0 ^(DL>BC MOE Mean)	0.18	2	2	-	-	-	-
Xylenes	µg/L	-	-	30	-	<2.0	0.63	<2.0	<2.0	<0.5	<2.0	0.53	2	2	-	-	-	-
Styrene	µg/L	-	72 ^(b)	72	-	<1.0	0.38	<1.0	<1.0	<0.5	<1.0	0.18	2	2	-	-	-	-
Extractable Petroleum Hydrocarbons (C10-C19)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Extractable Petroleum Hydrocarbons (C10-C32)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Volatile Hydrocarbons	µg/L	-	-	-	-	<100	38	<100	<100	<50	<100	18	2	2	-	-	-	-
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	-	<100	38	<100	<100	<50	<100	18	2	2	-	-	-	-
Methyl tertiary-butyl ether	µg/L	-	-	-	-	<1.0	0.38	<1.0	<1.0	<0.5	<1.0	0.18	2	2	-	-	-	-
Parent PAHs																		
Naphthalene	µg/L	-	1.1 ^(b)	1.0	-	<0.00447	0.0022	<0.00447	<0.00447	<0.00414	<0.00447	0.00012	2	2	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	<0.00031	0.00014	<0.00031	<0.00031	<0.000267	<0.00031	0.000015	2	2	-	-	-	-
Biphenyl	µg/L	-	-	-	-	<0.001866	0.00083	<0.001866	<0.001866	<0.001449	<0.001866	0.00015	2	2	-	-	-	-
Acenaphthene	µg/L	-	5.8 ^(b)	6.0	-	<0.000239	0.000099	<0.000239	<0.000239	<0.000158	<0.000239	0.000029	2	2	-	-	-	-
Fluorene	µg/L	-	3 ^(b)	12	-	<0.000318	0.00012	<0.000318	<0.000318	<0.000158	<0.000318	0.000057	2	2	-	-	-	-
Phenanthrene	µg/L	-	0.4 ^(b)	0.30	-	<0.00318	0.0014	<0.00318	<0.00318	<0.002328	<0.00318	0.00030	2	2	-	-	-	-
Anthracene	µg/L	-	0.012 ^(b)	0.10	-	<0.000142	0.000064	<0.000142	<0.000142	<0.000114	<0.000142	0.0000099	2	2	-	-	-	-
Dibenzothiophene	µg/L	-	-	-	-	<0.000321	0.00011	<0.000321	<0.000321	<0.000123	<0.000321	0.000070	2	2	-	-	-	-
Pyrene	µg/L	-	0.025 ^(b)	0.020	-	<0.001077	0.00045	<0.001077	<0.001077	<0.000711	<0.001077	0.00013	2	2	-	-	-	-
Fluoranthene	µg/L	-	0.04 ^(b)	0.20	-	<0.001263	0.00059	<0.001263	<0.001263	<0.001101	<0.001263	0.000057	2	2	-	-	-	-
Benzo(a)anthracene	µg/L	-	0.018 ^(b)	0.10	-	<0.000186	0.000079	<0.000186	<0.000186	<0.000129	<0.000186	0.000020	2	2	-	-	-	-
Chrysene	µg/L	-	-	-	-	<0.00063	0.00023	<0.00063	<0.00063	<0.000285	<0.00063	0.00012	2	2	-	-	-	-
1-Methyl-7-isopropyl-phenanthrene (Retene)	µg/L	-	-	-	-	<0.000429	0.00021	<0.000429	<0.000429	<0.000402	<0.000429	0.0000095	2	2	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	<0.0000964	0.000044	<0.0000964	<0.0000964	<0.0000802	<0.0000964	0.0000057	2	2	-	-	-	-
Benzo(j,k)fluoranthenes	µg/L	-	-	-	-	<0.0000989	0.000046	<0.0000989	<0.0000989	<0.0000841	<0.0000989	0.0000052	2	2	-	-	-	-
Benzo(b,j,k)fluoranthenes	µg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Benzo(a)pyrene	µg/L	-	0.015 ^(b)	0.010	-	<0.000146	0.000066	<0.000146	<0.000146	<0.000118	<0.000146	0.0000099	2	2	-	-	-	-
Benzo(e)pyrene	µg/L	-	-	-	-	<0.000147	0.000067	<0.000147	<0.000147	<0.000119	<0.000147	0.0000099	2	2	-	-	-	-
Perylene	µg/L	-	-	-	-	<0.000154	0.000069	<0.000154	<0.000154	<0.00012	<0.000154	0.000012	2	2	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	<0.000255	0.000095	<0.000255	<0.000255	<0.000124	<0.000255	0.000046	2	2	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	<0.000309	0.00012	<0.000309	<0.000309	<0.000157	<0.000309	0.000054	2	2	-	-	-	-
Dibenzo(a,h)anthracene	µg/L	-	-	-	-	<0.000405	0.00012	<0.000405	<0.000405	<0.0000745	<0.000405	0.00012	2	2	-	-	-	-

Table B-6: Seasonal Surface Water Quality Summary of Miner River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary												
						Ice Cover (March)								% Above Guideline				
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	Acute	Chronic	BC MOE Mean	BC MOE Max
Alkylated PAHs																		
C1 substituted naphthalenes	µg/L	-	-	-	-	<0.00945	0.0043	<0.00945	<0.00945	<0.00792	<0.00945	0.00054	2	2	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-	<0.001425	0.00069	<0.001425	<0.001425	<0.001335	<0.001425	0.000032	2	2	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	<0.00813	0.0037	<0.00813	<0.00813	<0.00648	<0.00813	0.00058	2	2	-	-	-	-
C2 substituted naphthalenes	µg/L	-	-	-	-	<0.01314	0.0051	<0.01314	<0.01314	<0.00732	<0.01314	0.0021	2	2	-	-	-	-
1,2-Dimethylnaphthalene	µg/L	-	-	-	-	<0.000492	0.00020	<0.000492	<0.000492	<0.000321	<0.000492	0.000060	2	2	-	-	-	-
2,6-Dimethylnaphthalene	µg/L	-	-	-	-	<0.000416	0.00017	<0.000416	<0.000416	<0.000273	<0.000416	0.000051	2	2	-	-	-	-
C1 substituted acenaphthenes	µg/L	-	-	-	-	<0.000447	0.00020	<0.000447	<0.000447	<0.000369	<0.000447	0.000028	2	2	-	-	-	-
C1 substituted biphenyls	µg/L	-	-	-	-	<0.00645	0.0026	<0.00645	<0.00645	<0.00384	<0.00645	0.00092	2	2	-	-	-	-
C3 substituted naphthalenes	µg/L	-	-	-	-	0.00055	0.0010	0.00055	0.00055	0.00055	<0.002967	0.00066	1	2	-	-	-	-
2,3,5-Trimethylnaphthalene	µg/L	-	-	-	-	<0.000246	0.00011	<0.000246	<0.000246	<0.000202	<0.000246	0.000016	2	2	-	-	-	-
2,3,6-Trimethylnaphthalene	µg/L	-	-	-	-	<0.000227	0.00010	<0.000227	<0.000227	<0.000186	<0.000227	0.000014	2	2	-	-	-	-
C1 substituted fluorenes	µg/L	-	-	-	-	<0.001491	0.00050	<0.001491	<0.001491	<0.000507	<0.001491	0.00035	2	2	-	-	-	-
2-Methylfluorene	µg/L	-	-	-	-	<0.000507	0.00024	<0.000507	<0.000507	<0.000441	<0.000507	0.000023	2	2	-	-	-	-
C2 substituted biphenyls	µg/L	-	-	-	-	<0.02328	0.0099	<0.02328	<0.02328	<0.01635	<0.02328	0.0025	2	2	-	-	-	-
C4 substituted naphthalenes	µg/L	-	-	-	-	<0.001623	0.00048	<0.001623	<0.001623	<0.000278	<0.001623	0.00048	2	2	-	-	-	-
1,4,6,7-Tetramethylnaphthalene	µg/L	-	-	-	-	<0.000278	0.000086	<0.000278	<0.000278	<0.000067	<0.000278	0.000075	2	2	-	-	-	-
C1 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.001647	0.00047	<0.001647	<0.001647	<0.000236	<0.001647	0.00050	2	2	-	-	-	-
1-Methylphenanthrene	µg/L	-	-	-	-	<0.000441	0.00017	<0.000441	<0.000441	<0.000236	<0.000441	0.000072	2	2	-	-	-	-
2-Methylphenanthrene	µg/L	-	-	-	-	<0.000702	0.00024	<0.000702	<0.000702	<0.000239	<0.000702	0.00016	2	2	-	-	-	-
3-Methylphenanthrene	µg/L	-	-	-	-	<0.000504	0.00019	<0.000504	<0.000504	<0.000241	<0.000504	0.000093	2	2	-	-	-	-
9/4-Methylphenanthrene	µg/L	-	-	-	-	0.00017	0.00015	0.00017	0.00017	0.00017	<0.000241	0.000036	1	2	-	-	-	-
2-Methylantracene	µg/L	-	-	-	-	<0.000246	0.00010	<0.000246	<0.000246	<0.00016	<0.000246	0.000030	2	2	-	-	-	-
C2 substituted fluorenes	µg/L	-	-	-	-	0.00079	0.00049	0.00079	0.00079	<0.000384	0.00079	0.00042	1	2	-	-	-	-
1,7-Dimethylfluorene	µg/L	-	-	-	-	<0.000384	0.00014	<0.000384	<0.000384	<0.000182	<0.000384	0.000071	2	2	-	-	-	-
C1 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.000285	0.00013	<0.000285	<0.000285	<0.000238	<0.000285	0.000017	2	2	-	-	-	-
2/3-Methyldibenzothiophenes	µg/L	-	-	-	-	<0.000285	0.00013	<0.000285	<0.000285	<0.000238	<0.000285	0.000017	2	2	-	-	-	-
C2 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.000978	0.00029	<0.000978	<0.000978	<0.000186	<0.000978	0.00028	2	2	-	-	-	-
1,7-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000219	0.00010	<0.000219	<0.000219	<0.000183	<0.000219	0.000013	2	2	-	-	-	-
1,8-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000186	0.000057	<0.000186	<0.000186	<0.0000438	<0.000186	0.000050	2	2	-	-	-	-
2,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000186	0.000083	<0.000186	<0.000186	<0.000144	<0.000186	0.000015	2	2	-	-	-	-
3,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000189	0.000058	<0.000189	<0.000189	<0.0000441	<0.000189	0.000051	2	2	-	-	-	-
C3 substituted fluorenes	µg/L	-	-	-	-	0.00076	0.00050	0.00076	0.00076	<0.000489	0.00076	0.00037	1	2	-	-	-	-
C2 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.000313	0.00012	<0.000313	<0.000313	<0.000154	<0.000313	0.000056	2	2	-	-	-	-
2,4-Dimethyldibenzothiophene	µg/L	-	-	-	-	<0.000313	0.00012	<0.000313	<0.000313	<0.000154	<0.000313	0.000056	2	2	-	-	-	-
C1 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.000268	0.00011	<0.000268	<0.000268	<0.000178	<0.000268	0.000032	2	2	-	-	-	-
C3 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.000127	0.000060	<0.000127	<0.000127	<0.000114	<0.000127	0.0000046	2	2	-	-	-	-
1,2,6-Trimethylphenanthrene	µg/L	-	-	-	-	<0.000127	0.000060	<0.000127	<0.000127	<0.000114	<0.000127	0.0000046	2	2	-	-	-	-
C3 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.001161	0.00034	<0.001161	<0.001161	<0.000217	<0.001161	0.00033	2	2	-	-	-	-
C2 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.000175	0.000079	<0.000175	<0.000175	<0.00014	<0.000175	0.000012	2	2	-	-	-	-
C4 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.000402	0.00018	<0.000402	<0.000402	<0.00033	<0.000402	0.000025	2	2	-	-	-	-
C4 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.00135	0.00060	<0.00135	<0.00135	<0.001032	<0.00135	0.00011	2	2	-	-	-	-
C1 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.0000929	0.000043	<0.0000929	<0.0000929	<0.0000777	<0.0000929	0.0000054	2	2	-	-	-	-
5/6-Methylchrysenes	µg/L	-	-	-	-	<0.0000958	0.000044	<0.0000958	<0.0000958	<0.0000788	<0.0000958	0.0000060	2	2	-	-	-	-
C3 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.00018	0.00017	0.00018	0.00018	0.00018	<0.000309	0.000020	1	2	-	-	-	-
C2 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000176	0.000064	<0.000176	<0.000176	<0.0000783	<0.000176	0.000035	2	2	-	-	-	-
5,9-Dimethylchrysene	µg/L	-	-	-	-	<0.000176	0.000064	<0.000176	<0.000176	<0.0000783	<0.000176	0.000035	2	2	-	-	-	-
C4 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.000223	0.000089	<0.000223	<0.000223	<0.000134	<0.000223	0.000031	2	2	-	-	-	-
C1 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	<0.00021	0.000086	<0.00021	<0.00021	<0.000132	<0.00021	0.000028	2	2	-	-	-	-
7-Methylbenzo(a)pyrene	µg/L	-	-	-	-	<0.00021	0.000086	<0.00021	<0.00021	<0.000132	<0.00021	0.000028	2	2	-	-	-	-
C3 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000107	0.000047	<0.000107	<0.000107	<0.0000796	<0.000107	0.0000097	2	2	-	-	-	-
C2 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	<0.00019	0.000084	<0.00019	<0.00019	<0.000144	<0.00019	0.000016	2	2	-	-	-	-
C4 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000102	0.000041	<0.000102	<0.000102	<0.0000622	<0.000102	0.000014	2	2	-	-	-	-
1-methylchrysene	µg/L	-	-	-	-	<0.0000903	0.000042	<0.0000903	<0.0000903	<0.0000767	<0.0000903	0.0000048	2	2	-	-	-	-
3-methylfluoranthene / benzo(a)fluorene	µg/L	-	-	-	-	<0.000268	0.00011	<0.000268	<0.000268	<0.000178	<0.000268	0.000032	2	2	-	-	-	-

Table B-6: Seasonal Surface Water Quality Summary of Miner River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary													
						Ice Cover (March)										% Above Guideline			
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	Acute	Chronic	BC MOE Mean	BC MOE Max	
Naphthenic Acid																			
C12h18o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C12h20o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C12h22o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C12h24o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C13h20o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C13h22o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C13h24o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C13h26o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C14h20o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C14h22o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C14h24o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C14h26o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C14h28o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C15h18o2	ng/L	-	-	-	-	6.3	-	6.3	6.3	-	-	-	0	1	-	-	-	-	
C15h20o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C15h22o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C15h24o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C15h26o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C15h28o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C15h30o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C16h20o2	ng/L	-	-	-	-	25	-	25	25	-	-	-	0	1	-	-	-	-	
C16h22o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C16h24o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C16h26o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C16h28o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C16h30o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C16h32o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C17h22o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C17h24o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C17h26o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C17h28o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C17h30o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C17h32o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C17h34o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C18h24o2	ng/L	-	-	-	-	52	-	52	52	-	-	-	0	1	-	-	-	-	
C18h26o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C18h28o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C18h30o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C18h32o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C18h34o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C18h36o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C19h26o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C19h28o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C19h30o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C19h32o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C19h34o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C19h36o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C19h38o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C20h28o2	ng/L	-	-	-	-	5.9	-	5.9	5.9	-	-	-	0	1	-	-	-	-	
C20h30o2	ng/L	-	-	-	-	75	-	75	75	-	-	-	0	1	-	-	-	-	
C20h32o2	ng/L	-	-	-	-	13	-	13	13	-	-	-	0	1	-	-	-	-	
C20h34o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C20h36o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C20h38o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C21h30o2	ng/L	-	-	-	-	11	-	11	11	-	-	-	0	1	-	-	-	-	
C21h32o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C21h34o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C21h36o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C21h38o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
C21h40o2	ng/L	-	-	-	-	<5.0	-	<5.0	<5.0	-	-	-	1	1	-	-	-	-	
Radionuclides																			
Actinium-228	Bq/L	-	-	-	-	<0.7	-	<0.7	<0.7	-	-	-	1	1	-	-	-	-	
Bismuth-212	Bq/L	-	-	-	-	<2.0	-	<2.0	<2.0	-	-	-	1	1	-	-	-	-	
Bismuth-214	Bq/L	-	-	-	-	<0.6	-	<0.6	<0.6	-	-	-	1	1	-	-	-	-	
Lead-210	Bq/L	-	-	-	-	<3.0	-	<3.0	<3.0	-	-	-	1	1	-	-	-	-	
Lead-211	Bq/L	-	-	-	-	<4.0	-	<4.0	<4.0	-	-	-	1	1	-	-	-	-	
Lead-212	Bq/L	-	-	-	-	<0.3	-	<0.3	<0.3	-	-	-	1	1	-	-	-	-	
Lead-214	Bq/L	-	-	-	-	<0.4	-	<0.4	<0.4	-	-	-	1	1	-	-	-	-	
Potassium-40	Bq/L	-	-	-	-	<4.0	-	<4.0	<4.0	-	-	-	1	1	-	-	-	-	
Radium-223	Bq/L	-	-	-	-	<0.6	-	<0.6	<0.6	-	-	-	1	1	-	-	-	-	
Radium-226	Bq/L	-	-	-	-	0.0080	-	0.0080	0.0080	-	-	-	0	1	-	-	-	-	
Radon-219	Bq/L	-	-	-	-	<1.0	-	<1.0	<1.0	-	-	-	1	1	-	-	-	-	
Thallium-208	Bq/L	-	-	-	-	<0.2	-	<0.2	<0.2	-	-	-	1	1	-	-	-	-	
Thorium-227	Bq/L	-	-	-	-	<0.9	-	<0.9	<0.9	-	-	-	1	1	-	-	-	-	
Thorium-230	Bq/L	-	-	-	-	<10	-	<10	<10	-	-	-	1	1	-	-	-	-	
Thorium-234	Bq/L	-	-	-	-	<3.0	-	<3.0	<3.0	-	-	-	1	1	-	-	-	-	
Uranium-235	Bq/L	-	-	-	-	<0.8	-	<0.8	<0.8	-	-	-	1	1	-	-	-	-	

Table B-6: Seasonal Surface Water Quality Summary of Miner River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary												
						Freshet (April to early-June)												
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline			
															Acute	Chronic	BC MOE Mean	BC MOE Max
Field Measured																		
pH	-	-	6.5 - 9.0	6.5 - 9.0	6.5 - 9.0	7.9	7.9	8.0	8.1	7.6	8.1	0.34	0	2	-	-	-	-
Specific conductivity	µS/cm	-	-	-	-	378	378	423	459	289	468	126	0	2	-	-	-	-
Temperature	°C	-	-	-	-	5.3	5.3	5.9	6.5	3.9	6.6	1.9	0	2	-	-	-	-
Dissolved oxygen	mg/L	-	6.5	8.0	5.0	12	12	12	12	11	12	0.66	0	2	-	-	-	-
Turbidity	NTU	-	-	-	-	1.6	1.6	1.8	2.0	1.1	2.0	0.64	0	2	-	-	-	-
Conventional Parameters																		
Hardness, as CaCO ₃	mg/L	-	-	-	-	141	141	141	141	141	141	0	0	2	-	-	-	-
Total alkalinity, as CaCO ₃	mg/L	-	-	20 ^(a)	-	76	76	92	106	42	109	47	0	2	-	-	-	-
Total dissolved solids	mg/L	-	-	-	-	200	200	220	236	160	240	57	0	2	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	<3.0	1.5	<3.0	<3.0	<3.0	<3.0	0	2	2	-	-	-	-
Total organic carbon	mg/L	-	-	-	-	8.6	8.6	11	13	3.8	13	6.8	0	2	-	-	-	-
Dissolved organic carbon	mg/L	-	-	-	-	8.3	8.3	11	12	3.7	13	6.5	0	2	-	-	-	-
Dissolved inorganic carbon	mg/L	-	-	-	-	19	19	23	26	10	27	12	0	2	-	-	-	-
Total inorganic carbon	mg/L	-	-	-	-	19	19	23	27	10	28	12	0	2	-	-	-	-
Major Ions																		
Bicarbonate, as CaCO ₃	mg/L	-	-	-	-	92	92	113	129	51	133	58	0	2	-	-	-	-
Bromide	mg/L	-	-	-	-	<0.02	0.010	<0.02	<0.02	<0.02	<0.02	0	2	2	-	-	-	-
Calcium	mg/L	-	-	-	-	38	38	40	42	34	42	6.3	0	2	-	-	-	-
Carbonate, as CaCO ₃	mg/L	-	-	-	-	<6.0	3.0	<6.0	<6.0	<6.0	<6.0	0	2	2	-	-	-	-
Chloride	mg/L	640	120	150	600	1.3	1.3	1.9	2.4	0.13	2.5	1.7	0	2	-	-	-	-
Fluoride	mg/L	-	0.12 ^(b)	-	1.5 - 1.7 ^(b)	-	-	-	-	-	-	-	0	0	-	-	-	-
Magnesium	mg/L	-	-	-	-	11	11	13	14	8.5	14	4.0	0	2	-	-	-	-
Potassium	mg/L	-	-	-	-	0.35	0.35	0.38	0.40	0.30	0.40	0.071	0	2	-	-	-	-
Sodium	mg/L	-	-	-	-	25	25	35	43	3.9	46	29	0	2	-	-	-	-
Sulphate	mg/L	-	-	309 - 429 ^(b, c)	-	106	106	141	169	36	176	99	0	2	-	-	-	-
Nutrients																		
Nitrate	mg-N/L	124	2.9	3.0	33	0.060	0.060	0.060	0.060	0.060	0.060	0	0	2	-	-	-	-
Nitrite	mg-N/L	-	0.060	0.020 - 0.080 ^(d)	0.060 - 0.24 ^(d)	0.090 ^(Chronic, BC MOE Mean, BC MOE Max)	0.090 ^(Chronic, BC MOE Mean, BC MOE Max)	0.11 ^(Chronic, BC MOE Mean, BC MOE Max)	0.13 ^(Chronic, BC MOE Mean, BC MOE Max)	0.050 ^(BC MOE Mean)	0.13 ^(Chronic, BC MOE Mean, BC MOE Max)	0.057	0	2	-	50	100	50
Nitrate + nitrite	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Total ammonia	mg-N/L	-	0.91 - 19 ^(e)	0.92 - 2.1 ^(f)	4.8 - 24 ^(g)	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	2	2	-	-	-	-
Total kjeldahl nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Total nitrogen (calculated)	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Total nitrogen	mg-N/L	-	-	-	-	0.34	0.34	0.43	0.49	0.17	0.51	0.24	0	2	-	-	-	-
Total phosphorus	mg-P/L	-	-	0.010	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Phosphorus (as phosphate)	mg-P/L	-	-	-	-	0.010	0.010	0.012	0.013	0.0070	0.013	0.0042	0	2	-	-	-	-
Total Metals																		
Aluminum	µg/L	-	100 ^(h, i)	-	-	44	44	46	48	38	49	7.8	0	2	-	-	-	-
Antimony	µg/L	-	-	9.0	-	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	2	2	-	-	-	-
Arsenic	µg/L	-	5.0	-	5.0	0.25	0.25	0.28	0.30	0.19	0.31	0.085	0	2	-	-	-	-
Barium	µg/L	-	-	1,000	-	49	49	53	56	41	57	11	0	2	-	-	-	-
Beryllium	µg/L	-	-	0.13	-	<0.05	0.025	<0.05	<0.05	<0.05	<0.05	0	2	2	-	-	-	-
Bismuth	µg/L	-	-	-	-	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	2	2	-	-	-	-
Boron	µg/L	29,000	1,500	-	1,200	15	15	18	20	10	20	7.1	0	2	-	-	-	-
Cadmium	µg/L	3.0 - 5.4 ^(b)	0.21 - 0.34 ^(b)	-	-	0.010	0.010	0.010	0.010	0.010	0.010	0	0	2	-	-	-	-
Chromium	µg/L	-	1.0	1.0 ^(j)	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	2	2	-	-	-	-
Cobalt	µg/L	-	-	4.0	110	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	2	2	-	-	-	-
Copper	µg/L	-	3.2 - 4.0 ^(b)	5.6 - 10 ^(b)	15 - 26 ^(b)	0.70	0.70	0.90	1.1	0.30	1.1	0.57	0	2	-	-	-	-
Iron	µg/L	-	300	-	1,000	126	126	147	163	85	167	58	0	2	-	-	-	-
Lead	µg/L	-	4.9 - 7.0 ^(b)	8.2 - 14 ^(b)	126 - 266 ^(b)	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	2	2	-	-	-	-
Lithium	µg/L	-	-	-	-	7.1	7.1	7.1	7.2	6.9	7.2	0.21	0	2	-	-	-	-
Manganese	µg/L	-	-	1,225 - 1,718 ^(b)	2,094 - 3,328 ^(b)	6.1	6.1	7.1	7.9	4.0	8.1	2.9	0	2	-	-	-	-
Mercury	µg/L	-	0.026	0.010	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	2	2	-	-	-	-
Molybdenum	µg/L	-	73	1,000	2,000	0.35	0.35	0.45	0.52	0.16	0.54	0.27	0	2	-	-	-	-
Nickel	µg/L	-	124 - 150 ^(b)	124 - 150 ^(b)	-	1.4	1.4	1.6	1.8	0.80	1.9	0.78	0	2	-	-	-	-
Selenium	µg/L	-	1.0	2.0	-	0.50	0.50	0.60	0.68	0.30	0.70	0.28	0	2	-	-	-	-
Silicon	µg/L	-	-	-	-	1,835	1,835	1,838	1,840	1,830	1,840	7.1	0	2	-	-	-	-
Silver	µg/L	-	0.25	1.5 ^(b)	3.0 ^(b)	<0.05	0.025	<0.05	<0.05	<0.05	<0.05	0	2	2	-	-	-	-
Strontium	µg/L	-	-	-	-	134	134	141	147	119	148	21	0	2	-	-	-	-
Sulphur	µg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Tellurium	µg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Thallium	µg/L	-	0.80	0.80	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	2	2	-	-	-	-
Thorium	µg/L	-	-	-	-	0.040	0.023	0.040	0.040	<0.01	0.040	0.025	1	2	-	-	-	-
Tin	µg/L	-	-	-	-	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	2	2	-	-	-	-
Titanium	µg/L	-	-	-	-	0.65	0.65	0.68	0.70	0.60	0.70	0.071	0	2	-	-	-	-
Uranium	µg/L	33	15	8.5	-	0.30	0.30	0.42	0.52	0.050	0.54	0.35	0	2	-	-	-	-
Vanadium	µg/L	-	-	-	-	0.40	0.40	0.40	0.40	0.40	0.40	0	0	2	-	-	-	-
Zinc	µg/L	-	30	46 - 130 ^(b)	71 - 155 ^(b)	1.8	1.8	1.9	2.0	1.5	2.0	0.35	0	2	-	-	-	-
Zirconium	µg/L	-	-	-	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	2	2	-	-	-	-

Table B-6: Seasonal Surface Water Quality Summary of Miner River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary																
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Freshet (April to early-June)										Standard Deviation	nd	Count	% Above Guideline			
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Acute	Chronic	BC MOE Mean	BC MOE Max							
Dissolved Metals																						
Aluminum	µg/L	-	-	50 ^(h)	100 ^(h)	20	20	24	26	13	27	9.9	0	2	-	-	-	-				
Antimony	µg/L	-	-	-	-	<0.2	0.10	<0.2	<0.2	<0.2	<0.2	0	2	2	-	-	-	-				
Arsenic	µg/L	-	-	-	-	0.30	0.30	0.35	0.39	0.20	0.40	0.14	0	2	-	-	-	-				
Barium	µg/L	-	-	-	-	47	47	51	54	39	55	11	0	2	-	-	-	-				
Beryllium	µg/L	-	-	-	-	<0.04	0.020	<0.04	<0.04	<0.04	<0.04	0	2	2	-	-	-	-				
Bismuth	µg/L	-	-	-	-	<1.0	0.50	<1.0	<1.0	<1.0	<1.0	0	2	2	-	-	-	-				
Boron	µg/L	-	-	-	-	11	11	13	15	7.0	15	5.7	0	2	-	-	-	-				
Cadmium	µg/L	-	-	0.27 - 0.42 ^(b)	0.84 - 1.5 ^(b)	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	2	2	-	-	-	-				
Chromium	µg/L	-	-	-	-	0.50	0.35	0.50	0.50	<0.4	0.50	0.21	1	2	-	-	-	-				
Cobalt	µg/L	-	-	-	-	0.085	0.085	0.098	0.11	0.060	0.11	0.035	0	2	-	-	-	-				
Copper	µg/L	-	-	-	-	1.0	0.75	1.0	1.0	<1.0	1.0	0.35	1	2	-	-	-	-				
Iron	µg/L	-	-	-	350	73	73	101	123	18	128	78	0	2	-	-	-	-				
Lead	µg/L	-	-	-	-	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	2	2	-	-	-	-				
Lithium	µg/L	-	-	-	-	7.5	7.5	7.8	8.0	7.0	8.0	0.71	0	2	-	-	-	-				
Manganese	µg/L	-	-	-	-	4.0	4.0	5.0	5.8	2.0	6.0	2.8	0	2	-	-	-	-				
Mercury	µg/L	-	-	-	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	2	2	-	-	-	-				
Molybdenum	µg/L	-	-	-	-	0.36	0.36	0.45	0.52	0.17	0.54	0.26	0	2	-	-	-	-				
Nickel	µg/L	-	-	-	-	1.5	1.5	1.8	2.0	1.0	2.0	0.71	0	2	-	-	-	-				
Selenium	µg/L	-	-	-	-	0.70	0.50	0.70	0.70	<0.6	0.70	0.28	1	2	-	-	-	-				
Silicon	µg/L	-	-	-	-	1,705	1,705	1,713	1,719	1,690	1,720	21	0	2	-	-	-	-				
Silver	µg/L	-	-	-	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	2	2	-	-	-	-				
Strontium	µg/L	-	-	-	-	132	132	139	145	116	147	22	0	2	-	-	-	-				
Sulphur	µg/L	-	-	-	-	39,700	39,700	53,150	63,910	12,800	66,600	38,042	0	2	-	-	-	-				
Tellurium	µg/L	-	-	-	-	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	2	2	-	-	-	-				
Thallium	µg/L	-	-	-	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	2	2	-	-	-	-				
Thorium	µg/L	-	-	-	-	<0.4	0.20	<0.4	<0.4	<0.4	<0.4	0	2	2	-	-	-	-				
Tin	µg/L	-	-	-	-	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	2	2	-	-	-	-				
Titanium	µg/L	-	-	-	-	<10	5.0	<10	<10	<10	<10	0	2	2	-	-	-	-				
Uranium	µg/L	-	-	-	-	0.50	0.35	0.50	0.50	<0.4	0.50	0.21	1	2	-	-	-	-				
Vanadium	µg/L	-	-	-	-	0.30	0.30	0.31	0.32	0.28	0.32	0.028	0	2	-	-	-	-				
Zinc	µg/L	-	-	-	-	1.5	1.5	1.8	2.0	1.0	2.0	0.71	0	2	-	-	-	-				
Zirconium	µg/L	-	-	-	-	0.28	0.17	0.28	0.28	<0.1	0.28	0.16	1	2	-	-	-	-				
Volatile Organics																						
Benzene	µg/L	-	370 ^(b)	40	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	2	2	-	-	-	-				
Ethylbenzene	µg/L	-	90 ^(b)	200	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	2	2	-	-	-	-				
Toluene	µg/L	-	2 ^(b)	0.50	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	2	2	-	-	-	-				
Xylenes	µg/L	-	-	30	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	2	2	-	-	-	-				
Styrene	µg/L	-	72 ^(b)	72	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	2	2	-	-	-	-				
Extractable Petroleum Hydrocarbons (C10-C19)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-				
Extractable Petroleum Hydrocarbons (C10-C32)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-				
Volatile Hydrocarbons	µg/L	-	-	-	-	<50	25	<50	<50	<50	<50	0	2	2	-	-	-	-				
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	-	<50	25	<50	<50	<50	<50	0	2	2	-	-	-	-				
Methyl tertiary-butyl ether	µg/L	-	-	-	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	2	2	-	-	-	-				
Parent PAHs																						
Naphthalene	µg/L	-	1.1 ^(b)	1.0	-	<0.00765	0.0038	<0.00765	<0.00765	<0.00765	<0.00765	0	2	2	-	-	-	-				
Acenaphthylene	µg/L	-	-	-	-	<0.000147	0.000068	<0.000147	<0.000147	<0.000125	<0.000147	0.0000078	2	2	-	-	-	-				
Biphenyl	µg/L	-	-	-	-	<0.00468	0.0023	<0.00468	<0.00468	<0.00468	<0.00468	0	2	2	-	-	-	-				
Acenaphthene	µg/L	-	5.8 ^(b)	6.0	-	<0.000294	0.00014	<0.000294	<0.000294	<0.000255	<0.000294	0.000014	2	2	-	-	-	-				
Fluorene	µg/L	-	3 ^(b)	12	-	<0.000122	0.000060	<0.000122	<0.000122	<0.000119	<0.000122	0.0000011	2	2	-	-	-	-				
Phenanthrene	µg/L	-	0.4 ^(b)	0.30	-	<0.0033	0.0017	<0.0033	<0.0033	<0.0033	<0.0033	0	2	2	-	-	-	-				
Anthracene	µg/L	-	0.012 ^(b)	0.10	-	<0.0000846	0.000041	<0.0000846	<0.0000846	<0.0000793	<0.0000846	0.0000019	2	2	-	-	-	-				
Dibenzothiophene	µg/L	-	-	-	-	<0.000201	0.000072	<0.000201	<0.000201	<0.000086	<0.000201	0.000041	2	2	-	-	-	-				
Pyrene	µg/L	-	0.025 ^(b)	0.020	-	<0.001467	0.00073	<0.001467	<0.001467	<0.001467	<0.001467	0	2	2	-	-	-	-				
Fluoranthene	µg/L	-	0.04 ^(b)	0.20	-	<0.001131	0.00057	<0.001131	<0.001131	<0.001131	<0.001131	0	2	2	-	-	-	-				
Benzo(a)anthracene	µg/L	-	0.018 ^(b)	0.10	-	<0.00111	0.00056	<0.00111	<0.00111	<0.00111	<0.00111	0	2	2	-	-	-	-				
Chrysene	µg/L	-	-	-	-	<0.000429	0.00021	<0.000429	<0.000429	<0.000429	<0.000429	0	2	2	-	-	-	-				
1-Methyl-7-isopropyl-phenanthrene (Retene)	µg/L	-	-	-	-	0.00019	0.00014	0.00019	0.00019	0.00019	<0.000199	0.000063	1	2	-	-	-	-				
Benzo(b)fluoranthene	µg/L	-	-	-	-	<0.000142	0.000069	<0.000142	<0.000142	<0.000134	<0.000142	0.0000028	2	2	-	-	-	-				
Benzo(j,k)fluoranthenes	µg/L	-	-	-	-	<0.000154	0.000075	<0.000154	<0.000154	<0.000146	<0.000154	0.0000028	2	2	-	-	-	-				
Benzo(b,j,k)fluoranthenes	µg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-				
Benzo(a)pyrene	µg/L	-	0.015 ^(b)	0.010	-	<0.000215	0.00010	<0.000215	<0.000215	<0.000198	<0.000215	0.0000060	2	2	-	-	-	-				
Benzo(e)pyrene	µg/L	-	-	-	-	<0.000217	0.00010	<0.000217	<0.000217	<0.000199	<0.000217	0.0000064	2	2	-	-	-	-				
Perylene	µg/L	-	-	-	-	<0.000234	0.00011	<0.000234	<0.000234	<0.000224	<0.000234	0.0000049	2	2	-	-	-	-				
Benzo(g,h,i)perylene	µg/L	-	-	-	-	<0.000504	0.00025	<0.000504	<0.000504	<0.000504	<0.000504	0	2	2	-	-	-	-				
Indeno(1,2,3-c,d)pyrene	µg/L	-	-	-	-	<0.000143	0.000067	<0.000143	<0.000143	<0.000123	<0.000143	0.0000071	2	2	-	-	-	-				
Dibenzo(a,h)anthracene	µg/L	-	-	-	-	<0.000138	0.000067	<0.000138	<0.000138	<0.000129	<0.000138	0.0000032	2	2	-	-	-	-				

Table B-6: Seasonal Surface Water Quality Summary of Miner River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary													
						Freshet (April to early-June)													
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline				
															Acute	Chronic	BC MOE Mean	BC MOE Max	
Alkylated PAHs																			
C1 substituted naphthalenes	µg/L	-	-	-	-	<0.00939	0.0047	<0.00939	<0.00939	<0.00939	<0.00939	0	2	2	-	-	-	-	
1-Methylnaphthalene	µg/L	-	-	-	-	<0.001656	0.00083	<0.001656	<0.001656	<0.001656	<0.001656	0	2	2	-	-	-	-	
2-Methylnaphthalene	µg/L	-	-	-	-	<0.00939	0.0047	<0.00939	<0.00939	<0.00939	<0.00939	0	2	2	-	-	-	-	
C2 substituted naphthalenes	µg/L	-	-	-	-	<0.01257	0.0063	<0.01257	<0.01257	<0.01257	<0.01257	0	2	2	-	-	-	-	
1,2-Dimethylnaphthalene	µg/L	-	-	-	-	<0.000621	0.00028	<0.000621	<0.000621	<0.000498	<0.000621	0.000043	2	2	-	-	-	-	
2,6-Dimethylnaphthalene	µg/L	-	-	-	-	<0.000525	0.00024	<0.000525	<0.000525	<0.000421	<0.000525	0.000037	2	2	-	-	-	-	
C1 substituted acenaphthenes	µg/L	-	-	-	-	<0.000339	0.00015	<0.000339	<0.000339	<0.000262	<0.000339	0.000027	2	2	-	-	-	-	
C1 substituted biphenyls	µg/L	-	-	-	-	<0.001857	0.00093	<0.001857	<0.001857	<0.001857	<0.001857	0	2	2	-	-	-	-	
C3 substituted naphthalenes	µg/L	-	-	-	-	<0.00582	0.0029	<0.00582	<0.00582	<0.00582	<0.00582	0	2	2	-	-	-	-	
2,3,5-Trimethylnaphthalene	µg/L	-	-	-	-	0.00033	0.00021	0.00033	0.00033	<0.000185	0.00033	0.00017	1	2	-	-	-	-	
2,3,6-Trimethylnaphthalene	µg/L	-	-	-	-	<0.000972	0.00049	<0.000972	<0.000972	<0.000972	<0.000972	0	2	2	-	-	-	-	
C1 substituted fluorenes	µg/L	-	-	-	-	0.00062	0.00062	0.00063	0.00065	0.00058	0.00065	0.000052	0	2	-	-	-	-	
2-Methylfluorene	µg/L	-	-	-	-	<0.000202	0.000099	<0.000202	<0.000202	<0.000195	<0.000202	0.0000025	2	2	-	-	-	-	
C2 substituted biphenyls	µg/L	-	-	-	-	<0.0033	0.0017	<0.0033	<0.0033	<0.0033	<0.0033	0	2	2	-	-	-	-	
C4 substituted naphthalenes	µg/L	-	-	-	-	0.00032	0.00032	0.00036	0.00039	0.00023	0.00040	0.00012	0	2	-	-	-	-	
1,4,6,7-Tetramethylnaphthalene	µg/L	-	-	-	-	<0.000193	0.000094	<0.000193	<0.000193	<0.000182	<0.000193	0.0000039	2	2	-	-	-	-	
C1 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.00028	0.00012	<0.00028	<0.00028	<0.000217	<0.00028	0.000022	2	2	-	-	-	-	
1-Methylphenanthrene	µg/L	-	-	-	-	<0.00028	0.00012	<0.00028	<0.00028	<0.000217	<0.00028	0.000022	2	2	-	-	-	-	
2-Methylphenanthrene	µg/L	-	-	-	-	<0.000283	0.00013	<0.000283	<0.000283	<0.00022	<0.000283	0.000022	2	2	-	-	-	-	
3-Methylphenanthrene	µg/L	-	-	-	-	<0.000285	0.00013	<0.000285	<0.000285	<0.000221	<0.000285	0.000023	2	2	-	-	-	-	
9/4-Methylphenanthrene	µg/L	-	-	-	-	<0.000285	0.00013	<0.000285	<0.000285	<0.000221	<0.000285	0.000023	2	2	-	-	-	-	
2-Methylantracene	µg/L	-	-	-	-	<0.000292	0.00013	<0.000292	<0.000292	<0.000227	<0.000292	0.000023	2	2	-	-	-	-	
C2 substituted fluorenes	µg/L	-	-	-	-	0.00088	0.00088	0.00091	0.00093	0.00082	0.00094	0.000085	0	2	-	-	-	-	
1,7-Dimethylfluorene	µg/L	-	-	-	-	<0.000214	0.000095	<0.000214	<0.000214	<0.000167	<0.000214	0.000017	2	2	-	-	-	-	
C1 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.000161	0.000076	<0.000161	<0.000161	<0.000144	<0.000161	0.0000060	2	2	-	-	-	-	
2/3-Methyldibenzothiophenes	µg/L	-	-	-	-	<0.000161	0.000076	<0.000161	<0.000161	<0.000144	<0.000161	0.0000060	2	2	-	-	-	-	
C2 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.00060	0.00060	0.00072	0.00081	0.00037	0.00084	0.00033	0	2	-	-	-	-	
1,7-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000072	0.000036	<0.000072	<0.000072	<0.000071	<0.000072	0.00000035	2	2	-	-	-	-	
1,8-Dimethylphenanthrene	µg/L	-	-	-	-	<0.0000722	0.000030	<0.0000722	<0.0000722	<0.0000497	<0.0000722	0.0000080	2	2	-	-	-	-	
2,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.0000722	0.000030	<0.0000722	<0.0000722	<0.0000497	<0.0000722	0.0000080	2	2	-	-	-	-	
3,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.0000734	0.000031	<0.0000734	<0.0000734	<0.0000505	<0.0000734	0.0000081	2	2	-	-	-	-	
C3 substituted fluorenes	µg/L	-	-	-	-	<0.00534	0.0027	<0.00534	<0.00534	<0.00534	<0.00534	0	2	2	-	-	-	-	
C2 substituted dibenzothiophenes	µg/L	-	-	-	-	0.00067	0.00067	0.00069	0.00071	0.00062	0.00072	0.000066	0	2	-	-	-	-	
2,4-Dimethyldibenzothiophene	µg/L	-	-	-	-	<0.000243	0.000086	<0.000243	<0.000243	<0.0001	<0.000243	0.000051	2	2	-	-	-	-	
C1 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.000708	0.00035	<0.000708	<0.000708	<0.000708	<0.000708	0	2	2	-	-	-	-	
C3 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.00066	0.00047	0.00066	0.00066	<0.000576	0.00066	0.00026	1	2	-	-	-	-	
1,2,6-Trimethylphenanthrene	µg/L	-	-	-	-	<0.000105	0.000047	<0.000105	<0.000105	<0.0000836	<0.000105	0.0000076	2	2	-	-	-	-	
C3 substituted dibenzothiophenes	µg/L	-	-	-	-	0.00049	0.00049	0.00052	0.00055	0.00042	0.00056	0.000095	0	2	-	-	-	-	
C2 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.00051	0.00051	0.00061	0.00070	0.00029	0.00072	0.00031	0	2	-	-	-	-	
C4 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.0011	0.0011	0.0012	0.0012	0.0011	0.0012	0.000092	0	2	-	-	-	-	
C4 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.002319	0.0012	<0.002319	<0.002319	<0.002319	<0.002319	0	2	2	-	-	-	-	
C1 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.00026	0.00016	0.00026	0.00026	<0.0000995	0.00026	0.00015	1	2	-	-	-	-	
5/6-Methylchrysenes	µg/L	-	-	-	-	<0.000103	0.000045	<0.000103	<0.000103	<0.0000766	<0.000103	0.0000093	2	2	-	-	-	-	
C3 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.00025	0.00016	0.00025	0.00025	<0.000127	0.00025	0.00013	1	2	-	-	-	-	
C2 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000127	0.000058	<0.000127	<0.000127	<0.000103	<0.000127	0.0000085	2	2	-	-	-	-	
5,9-Dimethylchrysene	µg/L	-	-	-	-	<0.000127	0.000058	<0.000127	<0.000127	<0.000103	<0.000127	0.0000085	2	2	-	-	-	-	
C4 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.0000932	0.000045	<0.0000932	<0.0000932	<0.0000849	<0.0000932	0.0000029	2	2	-	-	-	-	
C1 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	0.00092	0.00092	0.0011	0.0012	0.00061	0.0012	0.00044	0	2	-	-	-	-	
7-Methylbenzo(a)pyrene	µg/L	-	-	-	-	<0.000285	0.00012	<0.000285	<0.000285	<0.000206	<0.000285	0.000028	2	2	-	-	-	-	
C3 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.00033	0.00033	0.00042	0.00049	0.00015	0.00051	0.00026	0	2	-	-	-	-	
C2 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	0.00090	0.00090	0.0011	0.0013	0.00050	0.0013	0.00057	0	2	-	-	-	-	
C4 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.0010	0.0010	0.0012	0.0014	0.00054	0.0015	0.00067	0	2	-	-	-	-	
1-methylchrysene	µg/L	-	-	-	-	<0.0000967	0.000042	<0.0000967	<0.0000967	<0.0000722	<0.0000967	0.0000087	2	2	-	-	-	-	
3-methylfluoranthene / benzo(a)fluorene	µg/L	-	-	-	-	<0.000588	0.00029	<0.000588	<0.000588	<0.000588	<0.000588	0	2	2	-	-	-	-	

Table B-6: Seasonal Surface Water Quality Summary of Miner River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary													
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Median	Mean	75 th Percentile	Freshet (April to early-June)				Standard Deviation	nd	Count	% Above Guideline			
									95 th Percentile	Min	Max	Acute				Chronic	BC MOE Mean	BC MOE Max	
Naphthenic Acid																			
C12h18o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C12h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C12h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C12h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C13h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C13h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C13h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C13h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C14h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C14h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C14h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C14h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C14h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C15h18o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C15h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C15h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C15h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C15h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C15h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C15h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C16h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C16h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C16h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C16h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C16h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C16h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C16h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C17h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C17h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C17h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C17h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C17h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C17h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C17h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C18h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C18h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C18h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C18h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C18h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C18h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C18h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C19h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C19h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C19h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C19h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C19h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C19h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C19h38o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C20h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C20h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C20h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C20h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C20h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C20h38o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C21h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C21h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C21h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C21h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C21h38o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
C21h40o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
Radionuclides																			
Actinium-228	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
Bismuth-212	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
Bismuth-214	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
Lead-210	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
Lead-211	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
Lead-212	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
Lead-214	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
Potassium-40	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
Radium-223	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
Radium-226	Bq/L	-	-	-	-	<0.005	0.0025	<0.005	<0.005	<0.005	<0.005	0	2	2	-	-	-	-	
Radon-219	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
Thallium-208	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
Thorium-227	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
Thorium-230	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
Thorium-234	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
Uranium-235	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	

Table B-6: Seasonal Surface Water Quality Summary of Miner River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary												
						Open Water (late June to September)												
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline			
															Acute	Chronic	BC MOE Mean	BC MOE Max
Field Measured																		
pH	-	-	6.5 - 9.0	6.5 - 9.0	6.5 - 9.0	7.7	7.7	8.0	8.1	6.8	8.1	0.44	0	7	-	-	-	-
Specific conductivity	µS/cm	-	-	-	-	386	406	410	580	297	643	113	0	7	-	-	-	-
Temperature	°C	-	-	-	-	5.6	5.1	5.7	8.0	2.0	8.9	2.3	0	7	-	-	-	-
Dissolved oxygen	mg/L	-	6.5	8.0	5.0	12	12	12	12	11	13	0.69	0	5	-	-	-	-
Turbidity	NTU	-	-	-	-	2.7	2.7	2.7	2.7	2.6	2.7	0.071	0	2	-	-	-	-
Conventional Parameters																		
Hardness, as CaCO ₃	mg/L	-	-	-	-	185	192	199	237	157	253	31	0	7	-	-	-	-
Total alkalinity, as CaCO ₃	mg/L	-	-	20 ^(a)	-	110	113	138	154	76	159	32	0	7	-	-	-	-
Total dissolved solids	mg/L	-	-	-	-	266	271	275	408	177	463	92	0	7	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	<1.0	1.1	<2.0	4.0	<1.0	4.0	1.3	6	7	-	-	-	-
Total organic carbon	mg/L	-	-	-	-	2.4	5.9	7.9	12	2.1	13	6.4	0	3	-	-	-	-
Dissolved organic carbon	mg/L	-	-	-	-	8.8	11	14	29	1.6	36	12	0	7	-	-	-	-
Dissolved inorganic carbon	mg/L	-	-	-	-	23	25	32	34	18	35	7.4	0	7	-	-	-	-
Total inorganic carbon	mg/L	-	-	-	-	32	28	33	33	18	34	8.7	0	3	-	-	-	-
Major Ions																		
Bicarbonate, as CaCO ₃	mg/L	-	-	-	-	110	125	153	184	76	193	43	0	7	-	-	-	-
Bromide	mg/L	-	-	-	-	<0.1	0.046	<0.1	<0.1	0.030	<0.1	0.0089	4	5	-	-	-	-
Calcium	mg/L	-	-	-	-	56	54	58	60	44	60	5.6	0	7	-	-	-	-
Carbonate, as CaCO ₃	mg/L	-	-	-	-	<1.0	1.6	<6.0	<6.0	<1.0	<6.0	1.3	7	7	-	-	-	-
Chloride	mg/L	640	120	150	600	2.2	1.9	2.9	3.5	0.11	3.5	1.4	0	7	-	-	-	-
Fluoride	mg/L	-	0.12 ^(f)	-	1.5 - 1.7 ^(b)	-	-	-	-	-	-	-	0	0	-	-	-	-
Magnesium	mg/L	-	-	-	-	10	11	11	16	8.0	18	3.3	0	7	-	-	-	-
Potassium	mg/L	-	-	-	-	0.35	0.34	0.41	0.43	0.20	0.44	0.094	0	7	-	-	-	-
Sodium	mg/L	-	-	-	-	4.8	15	18	41	3.2	49	17	0	7	-	-	-	-
Sulphate	mg/L	-	-	309 - 429 ^(b, c)	-	58	94	118	207	35	241	74	0	7	-	-	-	-
Nutrients																		
Nitrate	mg-N/L	124	2.9	3.0	33	0.050	0.045	0.060	0.074	<0.01	0.080	0.025	1	7	-	-	-	-
Nitrite	mg-N/L	-	0.060	0.020 - 0.080 ^(d)	0.060 - 0.24 ^(d)	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	7	7	-	-	-	-
Nitrate + nitrite	mg-N/L	-	-	-	-	0.055	0.050	0.059	0.060	0.030	0.060	0.014	0	4	-	-	-	-
Total ammonia	mg-N/L	-	0.91 - 19 ^(e)	0.92 - 2.1 ^(f)	4.8 - 24 ^(g)	<0.02	0.017	0.025	0.034	<0.01	0.036	0.012	4	7	-	-	-	-
Total kjeldahl nitrogen	mg-N/L	-	-	-	-	0.41	0.42	0.60	0.62	0.22	0.62	0.22	0	4	-	-	-	-
Total nitrogen (calculated)	mg-N/L	-	-	-	-	0.46	0.46	0.66	0.68	0.25	0.68	0.23	0	4	-	-	-	-
Total nitrogen	mg-N/L	-	-	-	-	0.28	0.41	0.65	0.67	0.20	0.68	0.23	0	5	-	-	-	-
Total phosphorus	mg-P/L	-	-	0.010	-	0.015	0.011	0.016	0.019	<0.01	0.020	0.0075	2	4	-	-	-	-
Dissolved phosphorus	mg-P/L	-	-	-	-	0.014	0.0095	0.014	0.014	<0.01	0.014	0.0052	2	4	-	-	-	-
Phosphorus (as phosphate)	mg-P/L	-	-	-	-	0.014	0.014	0.018	0.028	<0.003	0.031	0.011	1	6	-	-	-	-
Total Metals																		
Aluminum	µg/L	-	100 ^(h, i)	-	-	37	34	40	63	7.0	73	21	0	7	-	-	-	-
Antimony	µg/L	-	-	9.0	-	0.080	0.079	0.080	<0.2	0.050	<0.2	0.018	2	7	-	-	-	-
Arsenic	µg/L	-	5.0	-	5.0	0.24	0.31	0.46	0.53	0.17	0.53	0.17	1	7	-	-	-	-
Barium	µg/L	-	-	1,000	-	65	65	68	75	56	78	7.7	0	7	-	-	-	-
Beryllium	µg/L	-	-	0.13	-	0.020	0.017	<0.04	<0.05	<0.01	<0.05	0.0070	4	7	-	-	-	-
Bismuth	µg/L	-	-	-	-	<0.01	0.014	<0.01	<0.01	<0.01	<0.1	0.020	5	5	-	-	-	-
Boron	µg/L	29,000	1,500	-	1,200	10	12	17	22	5.0	22	6.6	0	7	-	-	-	-
Cadmium	µg/L	3.0 - 5.4 ^(b)	0.21 - 0.34 ^(b)	-	-	0.020	0.022	0.022	0.031	0.017	0.034	0.0058	0	7	-	-	-	-
Chromium	µg/L	-	1.0	1.0 ^(j)	-	<0.4	0.36	0.55	0.67	<0.05	0.70	0.24	2	7	-	-	-	-
Cobalt	µg/L	-	-	4.0	110	0.10	0.20	0.33	0.52	0.030	0.55	0.21	0	7	-	-	-	-
Copper	µg/L	-	3.2 - 4.0 ^(b)	5.6 - 10 ^(b)	15 - 26 ^(b)	<1.0	0.69	1.2	1.2	0.30	1.2	0.37	2	7	-	-	-	-
Iron	µg/L	-	300	-	1,000	73	248	443 ^(Chronic)	604 ^(Chronic)	27	654 ^(Chronic)	260	0	7	-	43	-	-
Lead	µg/L	-	4.9 - 7.0 ^(b)	8.2 - 14 ^(b)	126 - 266 ^(b)	<0.05	0.029	<0.1	<0.1	<0.01	<0.1	0.016	7	7	-	-	-	-
Lithium	µg/L	-	-	-	-	8.9	7.4	10.0	10	2.0	10	3.4	0	7	-	-	-	-
Manganese	µg/L	-	-	1,225 - 1,718 ^(b)	2,094 - 3,328 ^(b)	<5.0	31	45	99	3.5	114	43	1	7	-	-	-	-
Mercury	µg/L	-	0.026	0.010	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	7	7	-	-	-	-
Molybdenum	µg/L	-	73	1,000	2,000	0.60	0.50	0.66	0.72	0.20	0.74	0.21	0	7	-	-	-	-
Nickel	µg/L	-	124 - 150 ^(b)	124 - 150 ^(b)	-	2.0	2.1	2.9	3.8	0.76	4.0	1.3	0	7	-	-	-	-
Selenium	µg/L	-	1.0	2.0	-	<0.6	0.51	0.70	0.84	0.30	0.90	0.25	2	7	-	-	-	-
Silicon	µg/L	-	-	-	-	1,700	1,670	1,800	1,828	1,300	1,840	185	0	7	-	-	-	-
Silver	µg/L	-	0.25	1.5 ^(b)	3.0 ^(b)	<0.01	0.0079	0.010	0.017	<0.01	0.020	0.0057	5	7	-	-	-	-
Strontium	µg/L	-	-	-	-	172	176	195	206	150	208	23	0	7	-	-	-	-
Sulphur	µg/L	-	-	-	-	20,000	30,086	37,250	66,900	12,000	78,000	23,930	0	7	-	-	-	-
Tellurium	µg/L	-	-	-	-	<0.05	0.032	<0.1	<0.1	<0.05	<0.1	0.012	7	7	-	-	-	-
Thallium	µg/L	-	0.80	0.80	-	0.0050	0.0037	<0.01	<0.01	<0.004	<0.01	0.0016	6	7	-	-	-	-
Thorium	µg/L	-	-	-	-	0.050	0.081	0.080	<0.4	<0.01	<0.4	0.085	4	7	-	-	-	-
Tin	µg/L	-	-	-	-	<0.05	0.036	<0.1	<0.1	<0.05	<0.1	0.013	7	7	-	-	-	-
Titanium	µg/L	-	-	-	-	0.60	2.2	3.9	5.6	<0.2	6.0	2.4	1	7	-	-	-	-
Uranium	µg/L	33	15	8.5	-	0.47	0.41	0.65	0.69	0.10	0.69	0.26	1	7	-	-	-	-
Vanadium	µg/L	-	-	-	-	0.60	0.53	0.65	1.1	<0.05	1.3	0.42	1	7	-	-	-	-
Zinc	µg/L	-	30	46 - 130 ^(b)	71 - 155 ^(b)	2.0	1.9	2.5	3.0	0.50	3.0	1.0	1	7	-	-	-	-
Zirconium	µg/L	-	-	-	-	0.10	0.15	0.22	0.31	0.090	0.34	0.11	2	7	-	-	-	-

APPENDIX B
Table B-6: Seasonal Surface Water Quality Summary of Miner River, 2013 to 2017

Table B-6: Seasonal Surface Water Quality Summary of Miner River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary															
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Open Water (late June to September)										nd	Count	% Above Guideline			
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	Acute	Chronic	BC MOE Mean			BC MOE Max			
Dissolved Metals																					
Aluminum	µg/L	-	-	50 ⁽ⁿ⁾	100 ⁽ⁿ⁾	14	16	23	28	5.0	28	9.4	0	6	-	-	-	-			
Antimony	µg/L	-	-	-	-	0.11	0.093	0.12	0.12	0.030	<0.2	0.033	1	6	-	-	-	-			
Arsenic	µg/L	-	-	-	-	0.20	0.24	0.37	0.43	0.14	0.43	0.15	1	6	-	-	-	-			
Barium	µg/L	-	-	-	-	62	62	68	73	52	75	8.8	0	6	-	-	-	-			
Beryllium	µg/L	-	-	-	-	0.020	0.018	0.020	<0.05	0.010	<0.05	0.0061	2	6	-	-	-	-			
Bismuth	µg/L	-	-	-	-	<0.01	0.095	<0.1	<1.0	<0.01	<1.0	0.20	6	6	-	-	-	-			
Boron	µg/L	-	-	-	-	11	11	13	15	7.0	15	3.2	0	6	-	-	-	-			
Cadmium	µg/L	-	-	0.27 - 0.42 ^(b)	0.84 - 1.5 ^(b)	0.015	0.015	0.018	0.020	0.010	0.020	0.0043	0	6	-	-	-	-			
Chromium	µg/L	-	-	-	-	0.35	0.35	0.48	0.58	0.080	0.60	0.19	0	6	-	-	-	-			
Cobalt	µg/L	-	-	-	-	0.063	0.14	0.17	0.42	0.020	0.49	0.18	0	6	-	-	-	-			
Copper	µg/L	-	-	-	-	0.50	0.61	1.0	1.0	0.40	1.0	0.32	2	6	-	-	-	-			
Iron	µg/L	-	-	-	350	22	145	255	435 ^(BC MOE Max)	12	470 ^(BC MOE Max)	203	0	6	-	-	-	17			
Lead	µg/L	-	-	-	-	<0.05	0.026	<0.05	<0.1	<0.01	<0.1	0.014	6	6	-	-	-	-			
Lithium	µg/L	-	-	-	-	8.9	7.9	9.5	9.9	2.9	10	2.7	0	6	-	-	-	-			
Manganese	µg/L	-	-	-	-	2.9	22	18	82	<1.0	102	40	1	6	-	-	-	-			
Mercury	µg/L	-	-	-	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	6	6	-	-	-	-			
Molybdenum	µg/L	-	-	-	-	0.60	0.52	0.64	0.65	0.25	0.65	0.17	0	6	-	-	-	-			
Nickel	µg/L	-	-	-	-	1.9	1.7	2.2	2.7	0.72	2.9	0.86	0	6	-	-	-	-			
Selenium	µg/L	-	-	-	-	0.60	0.48	0.68	0.70	0.20	0.70	0.21	1	6	-	-	-	-			
Silicon	µg/L	-	-	-	-	1,635	1,607	1,715	1,738	1,310	1,740	158	0	6	-	-	-	-			
Silver	µg/L	-	-	-	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	6	6	-	-	-	-			
Strontium	µg/L	-	-	-	-	174	168	180	184	146	185	17	0	6	-	-	-	-			
Sulphur	µg/L	-	-	-	-	16,800	28,700	35,300	65,375	11,400	73,700	24,529	0	6	-	-	-	-			
Tellurium	µg/L	-	-	-	-	<0.05	0.029	<0.05	<0.1	<0.05	<0.1	0.010	6	6	-	-	-	-			
Thallium	µg/L	-	-	-	-	0.0050	0.0035	0.0050	<0.01	<0.004	<0.01	0.0016	5	6	-	-	-	-			
Thorium	µg/L	-	-	-	-	0.035	0.062	0.078	0.090	<0.01	<0.4	0.075	3	6	-	-	-	-			
Tin	µg/L	-	-	-	-	<0.05	0.033	<0.1	<0.1	<0.05	<0.1	0.013	6	6	-	-	-	-			
Titanium	µg/L	-	-	-	-	0.45	2.0	4.6	6.0	<0.2	<10	2.7	3	6	-	-	-	-			
Uranium	µg/L	-	-	-	-	0.50	0.42	0.63	0.66	0.092	0.67	0.26	0	6	-	-	-	-			
Vanadium	µg/L	-	-	-	-	0.25	0.22	0.29	0.45	0.060	0.50	0.17	2	6	-	-	-	-			
Zinc	µg/L	-	-	-	-	2.0	1.2	2.0	2.0	<0.5	2.0	0.87	3	6	-	-	-	-			
Zirconium	µg/L	-	-	-	-	0.20	0.15	0.22	0.28	0.050	0.30	0.11	1	6	-	-	-	-			
Volatile Organics																					
Benzene	µg/L	-	370 ^(b)	40	-	<0.5	50 ^(BC MOE Mean)	<1.0	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	112	5	5	-	-	-	-			
Ethylbenzene	µg/L	-	90 ^(b)	200	-	<1.0	50	<1.0	<500 ^(DL>Chronic, DL>BC MOE Mean)	<1.0	<500 ^(DL>Chronic, DL>BC MOE Mean)	112	5	5	-	-	-	-			
Toluene	µg/L	-	2 ^(b)	0.50	-	<1.0 ^(DL>BC MOE Mean)	50 ^(Chronic, BC MOE Mean)	<1.0 ^(DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<1.0 ^(DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	112	5	5	-	-	-	-			
Xylenes	µg/L	-	-	30	-	<2.0	51 ^(BC MOE Mean)	<2.0	<500 ^(DL>BC MOE Mean)	<1.0	<500 ^(DL>BC MOE Mean)	111	5	5	-	-	-	-			
Styrene	µg/L	-	72 ^(b)	72	-	<500 ^(DL>Chronic, DL>BC MOE Mean)	125 ^(Chronic, BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<1.0	<500 ^(DL>Chronic, DL>BC MOE Mean)	176	2	2	-	-	-	-			
Extractable Petroleum Hydrocarbons (C10-C19)	mg/L	-	-	-	-	<0.1	-	<0.1	<0.1	-	-	-	1	1	-	-	-	-			
Extractable Petroleum Hydrocarbons (C10-C32)	mg/L	-	-	-	-	<0.1	-	<0.1	<0.1	-	-	-	1	1	-	-	-	-			
Volatile Hydrocarbons	µg/L	-	-	-	-	<100	6,288	<50,000	<50,000	<100	<50,000	12,475	4	4	-	-	-	-			
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	-	<100	6,288	<50,000	<50,000	<100	<50,000	12,475	4	4	-	-	-	-			
Methyl tertiary-butyl ether	µg/L	-	-	-	-	<500	-	<500	<500	-	-	-	1	1	-	-	-	-			
Parent PAHs																					
Naphthalene	µg/L	-	1.1 ^(b)	1.0	-	<0.00564	0.0027	<0.00717	<0.00717	<0.00354	<0.00717	0.00082	6	6	-	-	-	-			
Acenaphthylene	µg/L	-	-	-	-	<0.000157	0.000076	<0.000171	<0.000198	0.000065	<0.000198	0.000015	5	6	-	-	-	-			
Biphenyl	µg/L	-	-	-	-	<0.001836	0.00094	<0.002241	<0.002241	<0.001566	<0.002241	0.00015	6	6	-	-	-	-			
Acenaphthene	µg/L	-	5.8 ^(b)	6.0	-	<0.000467	0.00024	<0.000603	<0.000603	<0.000366	<0.000603	0.000050	6	6	-	-	-	-			
Fluorene	µg/L	-	3 ^(b)	12	-	0.00025	0.00016	<0.000278	<0.000286	0.00020	<0.000286	0.000055	4	6	-	-	-	-			
Phenanthrene	µg/L	-	0.4 ^(b)	0.30	-	<0.002394	0.0012	<0.002607	<0.002607	<0.002298	<0.002607	0.000071	6	6	-	-	-	-			
Anthracene	µg/L	-	0.012 ^(b)	0.10	-	<0.000153	0.000070	<0.000163	<0.000178	<0.000074	<0.000178	0.000019	6	6	-	-	-	-			
Dibenzothiophene	µg/L	-	-	-	-	<0.00048	0.00021	<0.000633	<0.000633	<0.000103	<0.000633	0.00011	5	6	-	-	-	-			
Pyrene	µg/L	-	0.025 ^(b)	0.020	-	<0.001002	0.00049	<0.001383	<0.001383	<0.000573	<0.001383	0.00018	6	6	-	-	-	-			
Fluoranthene	µg/L	-	0.04 ^(b)	0.20	-	<0.001149	0.00064	<0.001752	<0.001752	<0.00093	<0.001752	0.00019	6	6	-	-	-	-			
Benzo(a)anthracene	µg/L	-	0.018 ^(b)	0.10	-	<0.00012	0.00012	<0.000495	<0.000495	<0.000114	<0.000495	0.000098	6	6	-	-	-	-			
Chrysene	µg/L	-	-	-	-	<0.000312	0.00023	<0.000747	<0.000747	<0.000303	<0.000747	0.00011	6	6	-	-	-	-			
1-Methyl-7-isopropyl-phenanthrene (Retene)	µg/L	-	-	-	-	<0.000495	0.00028	<0.000744	<0.000744	<0.000242	<0.000744	0.000099	5	6	-	-	-	-			
Benzo(b)fluoranthene	µg/L	-	-	-	-	<0.0000955	0.00021	<0.001131	<0.001131	<0.0000502	<0.001131	0.00027	6	6	-	-	-	-			
Benzo(k,j)fluoranthenes	µg/L	-	-	-	-	<0.0001	0.000064	<0.000179	<0.000239	<0.0000535	<0.000239	0.000034	6	6	-	-	-	-			
Benzo(b,j,k)fluoranthenes	µg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-			
Benzo(a)pyrene	µg/L	-	0.015 ^(b)	0.010	-	<0.000147	0.000091	<0.000276	<0.00033	<0.0000751	<0.00033	0.000049	6	6	-	-	-	-			
Benzo(e)pyrene	µg/L	-	-	-	-	<0.000151	0.000089	<0.00027	<0.000323	<0.0000769	<0.000323	0.000048	6	6	-	-	-	-			
Perylene	µg/L	-	-	-	-	<0.000163	0.000097	<0.000272	<0.000346	<0.0000793	<0.000346	0.000048	6	6	-	-	-	-			
Benzo(g,h,i)perylene	µg/L	-	-	-	-	<0.000124	0.000067	<0.000213	<0.000214	<0.0000563	<0.000214	0.000033	6	6	-	-	-	-			
Indeno(c,d-123)pyrene	µg/L	-	-	-	-	<0.000271	0.00011	<0.000357	<0.000357	<0.0000569	<0.000357	0.000065	6	6	-	-	-	-			
Dibenzo(a,h)anthracene	µg/L	-	-	-	-	<0.000171	0.000080	<0.000177	<0.000392	<0.0000601	<0.000392	0.000062	6	6	-	-	-	-			

Table B-6: Seasonal Surface Water Quality Summary of Miner River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary												
						Open Water (late June to September)												
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline			
															Acute	Chronic	BC MOE Mean	BC MOE Max
Alkylated PAHs																		
C1 substituted naphthalenes	µg/L	-	-	-	-	<0.00408	0.0034	<0.01344	<0.01344	<0.002661	<0.01344	0.0026	6	6	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-	<0.001317	0.00064	<0.001674	<0.001674	<0.000849	<0.001674	0.00019	6	6	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	<0.002757	0.0027	<0.01176	<0.01176	<0.001812	<0.01176	0.0025	6	6	-	-	-	-
C2 substituted naphthalenes	µg/L	-	-	-	-	<0.00846	0.0048	<0.01377	<0.01377	<0.00642	<0.01377	0.0017	6	6	-	-	-	-
1,2-Dimethylnaphthalene	µg/L	-	-	-	-	<0.001188	0.00062	<0.001773	<0.001773	<0.000526	<0.001773	0.00024	6	6	-	-	-	-
2,6-Dimethylnaphthalene	µg/L	-	-	-	-	<0.00053	0.00036	0.00055	0.00056	0.00032	0.00057	0.00016	3	6	-	-	-	-
C1 substituted acenaphthenes	µg/L	-	-	-	-	<0.000338	0.00017	<0.000404	<0.000451	<0.00027	<0.000451	0.000036	6	6	-	-	-	-
C1 substituted biphenyls	µg/L	-	-	-	-	<0.00375	0.0024	<0.00927	<0.00927	<0.001494	<0.00927	0.0018	6	6	-	-	-	-
C3 substituted naphthalenes	µg/L	-	-	-	-	<0.00372	0.0022	<0.00663	<0.00663	<0.002877	<0.00663	0.00088	6	6	-	-	-	-
2,3,5-Trimethylnaphthalene	µg/L	-	-	-	-	<0.000465	0.00023	<0.000489	<0.000489	<0.000441	<0.000489	0.000011	6	6	-	-	-	-
2,3,6-Trimethylnaphthalene	µg/L	-	-	-	-	<0.000651	0.00033	<0.000756	<0.000756	<0.000597	<0.000756	0.000036	6	6	-	-	-	-
C1 substituted fluorenes	µg/L	-	-	-	-	<0.001497	0.00080	<0.002262	<0.002262	<0.001029	<0.002262	0.00028	6	6	-	-	-	-
2-Methylfluorene	µg/L	-	-	-	-	<0.00023	0.00013	<0.0004	<0.000465	<0.00012	<0.000465	0.000068	6	6	-	-	-	-
C2 substituted biphenyls	µg/L	-	-	-	-	<0.01707	0.011	<0.0414	<0.0414	0.0038	<0.0414	0.0075	4	6	-	-	-	-
C4 substituted naphthalenes	µg/L	-	-	-	-	0.0013	0.00097	0.0013	<0.002802	<0.000331	<0.002802	0.00059	4	6	-	-	-	-
1,4,6,7-Tetramethylnaphthalene	µg/L	-	-	-	-	<0.00032	0.00016	<0.000331	<0.000491	<0.000242	<0.000491	0.000044	6	6	-	-	-	-
C1 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.000344	0.00017	<0.000372	<0.000372	<0.000127	<0.000372	0.000061	5	6	-	-	-	-
1-Methylphenanthrene	µg/L	-	-	-	-	<0.000344	0.00014	<0.000372	<0.000372	<0.000127	<0.000372	0.000050	6	6	-	-	-	-
2-Methylphenanthrene	µg/L	-	-	-	-	<0.000343	0.00017	<0.000378	<0.000378	<0.000126	<0.000378	0.000061	5	6	-	-	-	-
3-Methylphenanthrene	µg/L	-	-	-	-	<0.000227	0.00011	<0.000312	<0.000349	<0.00013	<0.000349	0.000049	6	6	-	-	-	-
9/4-Methylphenanthrene	µg/L	-	-	-	-	<0.000209	0.000100	<0.000312	<0.000349	<0.0000876	<0.000349	0.000055	6	6	-	-	-	-
2-Methylantracene	µg/L	-	-	-	-	<0.000208	0.000100	<0.000322	<0.00036	<0.0000872	<0.00036	0.000059	6	6	-	-	-	-
C2 substituted fluorenes	µg/L	-	-	-	-	<0.000939	0.00056	<0.001554	<0.001554	<0.000285	<0.001554	0.00025	5	6	-	-	-	-
1,7-Dimethylfluorene	µg/L	-	-	-	-	<0.000302	0.00014	<0.000311	<0.000424	<0.00017	<0.000424	0.000047	6	6	-	-	-	-
C1 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.000182	0.00013	<0.000184	0.00038	<0.000113	0.00038	0.00013	5	6	-	-	-	-
2/3-Methyldibenzothiophenes	µg/L	-	-	-	-	<0.000207	0.00011	<0.000207	0.00022	<0.000136	0.00022	0.000055	5	6	-	-	-	-
C2 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.001182	0.00058	<0.001314	<0.001314	<0.000981	<0.001314	0.000075	6	6	-	-	-	-
1,7-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000261	0.00011	<0.000261	<0.000277	<0.000138	<0.000277	0.000032	6	6	-	-	-	-
1,8-Dimethylphenanthrene	µg/L	-	-	-	-	<0.0000838	0.000073	0.00017	0.00017	<0.0000431	<0.000283	0.000064	5	6	-	-	-	-
2,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000213	0.00011	<0.000315	<0.000315	<0.000144	<0.000315	0.000038	6	6	-	-	-	-
3,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.00024	0.000094	<0.00024	<0.000288	<0.000044	<0.000288	0.000043	6	6	-	-	-	-
C3 substituted fluorenes	µg/L	-	-	-	-	<0.0039	0.0018	<0.00411	<0.00411	<0.002589	<0.00411	0.00037	6	6	-	-	-	-
C2 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.001944	0.00077	<0.002103	<0.002103	<0.000555	<0.002103	0.00038	6	6	-	-	-	-
2,4-Dimethyldibenzothiophene	µg/L	-	-	-	-	<0.000245	0.00011	<0.00025	<0.000281	<0.000163	<0.000281	0.000022	6	6	-	-	-	-
C1 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.001308	0.00067	<0.001653	<0.001653	<0.00108	<0.001653	0.00013	6	6	-	-	-	-
C3 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.00114	0.00064	<0.001641	<0.001641	0.00041	<0.001641	0.00016	4	6	-	-	-	-
1,2,6-Trimethylphenanthrene	µg/L	-	-	-	-	<0.000106	0.000054	<0.000117	<0.000157	<0.0000857	<0.000157	0.000013	6	6	-	-	-	-
C3 substituted dibenzothiophenes	µg/L	-	-	-	-	0.0016	0.00091	0.0016	<0.002145	<0.001056	<0.002145	0.00041	5	6	-	-	-	-
C2 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.001248	0.00058	<0.00207	<0.00207	<0.000098	<0.00207	0.00043	6	6	-	-	-	-
C4 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.00213	0.00096	<0.002622	<0.002622	<0.001035	<0.002622	0.00036	6	6	-	-	-	-
C4 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.002763	0.0012	<0.00315	<0.00315	<0.001017	<0.00315	0.00051	6	6	-	-	-	-
C1 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.00017	0.000096	0.00017	<0.000276	<0.0000374	<0.000276	0.000059	5	6	-	-	-	-
5/6-Methylchrysenes	µg/L	-	-	-	-	<0.0000816	0.000040	<0.0000907	<0.00015	<0.0000386	<0.00015	0.000020	6	6	-	-	-	-
C3 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.000846	0.00036	<0.000885	<0.000885	<0.000423	<0.000885	0.00011	6	6	-	-	-	-
C2 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000438	0.00017	<0.000513	<0.000513	<0.0000614	<0.000513	0.00010	6	6	-	-	-	-
5,9-Dimethylchrysene	µg/L	-	-	-	-	<0.000116	0.000053	<0.000117	<0.000148	<0.0000614	<0.000148	0.000014	6	6	-	-	-	-
C4 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.00028	0.00017	0.00028	<0.000558	<0.000077	<0.000558	0.00012	5	6	-	-	-	-
C1 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	<0.000663	0.00035	<0.001029	<0.001029	<0.000277	<0.001029	0.00015	6	6	-	-	-	-
7-Methylbenzo[a]pyrene	µg/L	-	-	-	-	<0.000234	0.00012	<0.000277	<0.00048	<0.000108	<0.00048	0.000065	6	6	-	-	-	-
C3 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000537	0.00025	<0.000801	<0.000801	<0.000123	<0.000801	0.00015	6	6	-	-	-	-
C2 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	<0.000804	0.00041	<0.001392	<0.001392	<0.000205	<0.001392	0.00025	6	6	-	-	-	-
C4 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000185	0.00016	<0.000705	<0.000705	<0.0000614	<0.000705	0.00015	6	6	-	-	-	-
1-methylchrysene	µg/L	-	-	-	-	<0.0000786	0.000037	<0.0000852	<0.000144	<0.0000362	<0.000144	0.000019	6	6	-	-	-	-
3-methylfluoranthene / benzo(a)fluorene	µg/L	-	-	-	-	<0.000414	0.00018	<0.000504	<0.000504	<0.000159	<0.000504	0.000074	6	6	-	-	-	-

Table B-6: Seasonal Surface Water Quality Summary of Miner River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary												
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Open Water (late June to September)												
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline			
															Acute	Chronic	BC MOE Mean	BC MOE Max
Naphthenic Acid																		
C12h18o2	ng/L	-	-	-	-	11	9.6	11	24	<4.7	28	9.8	3	6	-	-	-	-
C12h20o2	ng/L	-	-	-	-	16	19	29	44	<4.7	49	18	2	6	-	-	-	-
C12h22o2	ng/L	-	-	-	-	15	10.0	16	20	<4.7	22	8.6	3	6	-	-	-	-
C12h24o2	ng/L	-	-	-	-	<5.3	2.6	<5.3	<5.4	<4.7	<5.4	0.14	6	6	-	-	-	-
C13h20o2	ng/L	-	-	-	-	5.5	4.2	6.0	6.2	<4.7	<12	1.9	4	6	-	-	-	-
C13h22o2	ng/L	-	-	-	-	21	15	23	35	<4.7	38	15	3	6	-	-	-	-
C13h24o2	ng/L	-	-	-	-	11	7.9	11	16	<4.7	18	6.5	3	6	-	-	-	-
C13h26o2	ng/L	-	-	-	-	15	17	20	29	10	31	7.7	0	6	-	-	-	-
C14h20o2	ng/L	-	-	-	-	7.2	8.9	12	20	5.0	23	7.9	2	6	-	-	-	-
C14h22o2	ng/L	-	-	-	-	11	10.0	16	22	<4.7	24	9.2	3	6	-	-	-	-
C14h24o2	ng/L	-	-	-	-	12	8.4	13	16	<4.7	17	6.6	3	6	-	-	-	-
C14h26o2	ng/L	-	-	-	-	<5.3	7.4	<5.4	32	<4.7	32	12	5	6	-	-	-	-
C14h28o2	ng/L	-	-	-	-	<5.3	2.6	<5.3	<5.4	<4.7	<5.4	0.14	6	6	-	-	-	-
C15h18o2	ng/L	-	-	-	-	6.2	6.6	8.9	12	<4.7	13	4.1	2	6	-	-	-	-
C15h20o2	ng/L	-	-	-	-	12	9.7	14	21	<4.7	23	8.7	3	6	-	-	-	-
C15h22o2	ng/L	-	-	-	-	18	27	32	65	7.4	75	26	0	6	-	-	-	-
C15h24o2	ng/L	-	-	-	-	34	52	43	149	6.3	184	66	0	6	-	-	-	-
C15h26o2	ng/L	-	-	-	-	14	11	18	24	<4.7	25	10	3	6	-	-	-	-
C15h28o2	ng/L	-	-	-	-	<5.3	2.6	<5.3	<5.4	<4.7	<5.4	0.14	6	6	-	-	-	-
C15h30o2	ng/L	-	-	-	-	<5.3	2.6	<5.3	<5.4	<4.7	<5.4	0.14	6	6	-	-	-	-
C16h20o2	ng/L	-	-	-	-	12	14	16	24	9.6	26	6.3	0	6	-	-	-	-
C16h22o2	ng/L	-	-	-	-	<5.3	2.9	<5.4	<9.6	<4.7	<9.6	0.93	6	6	-	-	-	-
C16h24o2	ng/L	-	-	-	-	8.7	7.3	11	15	<4.7	16	5.8	3	6	-	-	-	-
C16h26o2	ng/L	-	-	-	-	22	13	22	23	<4.7	24	11	3	6	-	-	-	-
C16h28o2	ng/L	-	-	-	-	<5.3	2.6	<5.3	<5.4	<4.7	<5.4	0.14	6	6	-	-	-	-
C16h30o2	ng/L	-	-	-	-	<5.3	2.6	<5.3	<5.4	<4.7	<5.4	0.14	6	6	-	-	-	-
C16h32o2	ng/L	-	-	-	-	<5.3	2.6	<5.3	<5.4	<4.7	<5.4	0.14	6	6	-	-	-	-
C17h22o2	ng/L	-	-	-	-	7.6	7.4	9.6	17	<4.7	19	6.5	3	6	-	-	-	-
C17h24o2	ng/L	-	-	-	-	<5.3	3.3	<5.4	7.1	<4.7	7.1	1.8	5	6	-	-	-	-
C17h26o2	ng/L	-	-	-	-	7.1	6.9	11	14	<4.7	15	5.4	3	6	-	-	-	-
C17h28o2	ng/L	-	-	-	-	13	14	20	36	<4.7	41	15	3	6	-	-	-	-
C17h30o2	ng/L	-	-	-	-	<5.3	4.3	6.0	9.0	<4.7	10	3.1	4	6	-	-	-	-
C17h32o2	ng/L	-	-	-	-	<5.3	2.6	<5.4	<5.7	<4.7	<5.7	0.18	6	6	-	-	-	-
C17h34o2	ng/L	-	-	-	-	<5.3	4.2	<5.4	12	<4.7	12	4.0	5	6	-	-	-	-
C18h24o2	ng/L	-	-	-	-	37	42	58	64	24	65	18	0	6	-	-	-	-
C18h26o2	ng/L	-	-	-	-	<5.4	4.8	5.7	11	<4.7	13	4.2	4	6	-	-	-	-
C18h28o2	ng/L	-	-	-	-	<5.3	2.6	<5.3	<5.4	<4.7	<5.4	0.14	6	6	-	-	-	-
C18h30o2	ng/L	-	-	-	-	<5.3	2.6	<5.3	<5.4	<4.7	<5.4	0.14	6	6	-	-	-	-
C18h32o2	ng/L	-	-	-	-	<5.3	2.6	<5.3	<5.4	<4.7	<5.4	0.14	6	6	-	-	-	-
C18h34o2	ng/L	-	-	-	-	<5.3	2.6	<5.3	<5.4	<4.7	<5.4	0.14	6	6	-	-	-	-
C18h36o2	ng/L	-	-	-	-	<5.3	2.6	<5.3	<5.4	<4.7	<5.4	0.14	6	6	-	-	-	-
C19h26o2	ng/L	-	-	-	-	17	23	30	49	6.5	54	17	0	6	-	-	-	-
C19h28o2	ng/L	-	-	-	-	<5.3	4.1	7.2	7.3	<4.7	7.4	2.5	4	6	-	-	-	-
C19h30o2	ng/L	-	-	-	-	<5.3	4.5	<5.4	15	<4.7	15	4.9	5	6	-	-	-	-
C19h32o2	ng/L	-	-	-	-	<5.3	3.7	<5.4	9.3	<4.7	9.3	2.7	5	6	-	-	-	-
C19h34o2	ng/L	-	-	-	-	<5.4	6.4	12	15	<5.0	17	6.1	4	6	-	-	-	-
C19h36o2	ng/L	-	-	-	-	<5.3	3.4	<5.4	7.9	<4.7	7.9	2.2	5	6	-	-	-	-
C19h38o2	ng/L	-	-	-	-	6.4	12	12	32	<5.0	39	14	2	6	-	-	-	-
C20h28o2	ng/L	-	-	-	-	<16	114	82	455	<4.7	580	230	4	6	-	-	-	-
C20h30o2	ng/L	-	-	-	-	49	46	57	59	20	60	15	0	6	-	-	-	-
C20h32o2	ng/L	-	-	-	-	27	32	44	74	<5.0	82	30	2	6	-	-	-	-
C20h34o2	ng/L	-	-	-	-	<5.3	3.5	<5.4	8.6	<4.7	8.6	2.5	5	6	-	-	-	-
C20h36o2	ng/L	-	-	-	-	<5.3	2.6	<5.3	<5.4	<4.7	<5.4	0.14	6	6	-	-	-	-
C20h38o2	ng/L	-	-	-	-	<5.3	2.6	<5.3	<5.4	<4.7	<5.4	0.14	6	6	-	-	-	-
C21h30o2	ng/L	-	-	-	-	6.3	6.4	7.4	14	<5.0	16	5.4	3	6	-	-	-	-
C21h32o2	ng/L	-	-	-	-	<5.3	2.6	<5.3	<5.4	<4.7	<5.4	0.14	6	6	-	-	-	-
C21h34o2	ng/L	-	-	-	-	<5.3	2.6	<5.3	<5.4	<4.7	<5.4	0.14	6	6	-	-	-	-
C21h36o2	ng/L	-	-	-	-	<5.3	2.6	<5.3	<5.4	<4.7	<5.4	0.14	6	6	-	-	-	-
C21h38o2	ng/L	-	-	-	-	<5.3	2.6	<5.3	<5.4	<4.7	<5.4	0.14	6	6	-	-	-	-
C21h40o2	ng/L	-	-	-	-	<5.3	2.6	<5.3	<5.4	<4.7	<5.4	0.14	6	6	-	-	-	-
Radionuclides																		
Actinium-228	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Bismuth-212	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Bismuth-214	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Lead-210	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Lead-211	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Lead-212	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Lead-214	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Potassium-40	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Radium-223	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Radium-226	Bq/L	-	-	-	-	<0.005	0.0025	<0.005	<0.005	<0.005	<0.005	0	2	2	-	-	-	-
Radon-219	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Thallium-208	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Thorium-227	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Thorium-230	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Thorium-234	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Uranium-235	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-

Seasonal Surface Water Quality Summary of Miner River, 2013 to 2017

^(a) = guideline is a minimum value, unless the background concentration or value is lower.

^(b) = guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (141 to 253 mg/L). The guideline is calculated based on the individual hardness value for each sample.

^(c) = for some samples, water hardness was greater than 250 mg/L. At this hardness, no BC MOE water quality guideline has been established for sulphate; however, the observed data were screened against the guideline for very hard water

^(d) = guideline is chloride dependent. The guideline range shown is based on the chloride concentration range observed in the dataset (0.1100 to 7.3000 mg/L). The guideline is calculated based on the individual chloride concentration in each

^(e) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.9119 mg-N/L) is based on the combination of field pH (8.1) and water temperature (6.6°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature

^(f) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.9220 mg-N/L) is based on the combination of field pH (8.1) and water temperature (6.6°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature

^(g) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (4.8000 mg-N/L) is based on the combination of field pH (8.1) and water temperature (6.6°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature

^(h) = guideline is pH dependent. The guideline range shown is based on the pH range observed in the dataset (6.8 to 8.1). The guideline is calculated based on the individual pH for each sample.

⁽ⁱ⁾ = guideline is pH dependent: 5 µg/L at pH < 6.5 and 100 µg/L at pH ≥ 6.5.

^(j) = guideline is for chromium VI.

^(l) = interim guideline

(Chronic) = concentration is higher than the chronic aquatic life CCME guideline or outside the recommended pH, DO or (BC MOE Mean) = concentration is higher than the 30-day mean BC MOE guideline or outside the recommended pH, DO or total alkalinity range.

(BC MOE Max) = concentration is higher than the maximum BC MOE guideline or outside the recommended pH, DO or

(DL>Chronic) = analytical detection limit is higher than the chronic aquatic life CCME guideline.

(DL>BC MOE Mean) = analytical detection limit is higher than the 30-day mean BC MOE guideline.

Bolded concentrations are higher than water quality guidelines.

Water quality data and guidelines shown in this table were rounded to reflect laboratory or field instrument precision *after* comparisons to guidelines. Therefore, values slightly above guidelines may be displayed as being equal to the guidelines and identified as exceedances. Concentrations equal to the guideline values were not identified as

- = no guideline or no data.

APPENDIX B
Table B-7: Seasonal Surface Water Quality Summary in Whitestone River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary														
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Ice Cover (March)									Standard Deviation	nd	Count	% Above Guideline		
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Acute	Chronic	BC MOE Mean				BC MOE Max		
Field Measured																				
pH	-	-	6.5 - 9.0	6.5 - 9.0	6.5 - 9.0	7.6	7.7	7.9	8.1	7.3	8.2	0.29	0	9	-	-	-	-		
Specific conductivity	µS/cm	-	-	-	-	521	519	533	544	456	547	26	0	9	-	-	-	-		
Temperature	°C	-	-	-	-	0	0.10	0.13	0.40	0	0.50	0.18	0	8	-	-	-	-		
Dissolved oxygen	mg/L	-	6.5	8.0	5.0	7.5 ^(BC MOE Mean)	7.9 ^(BC MOE Mean)	8.8	11	5.4 ^(Chronic, BC MOE Mean)	11	1.9	0	9	-	22	56	-		
Turbidity	NTU	-	-	-	-	0.55	1.3	1.6	3.4	0.30	3.8	1.7	0	4	-	-	-	-		
Conventional Parameters																				
Hardness, as CaCO ₃	mg/L	-	-	-	-	301	304	306	344	272	346	25	0	9	-	-	-	-		
Total alkalinity, as CaCO ₃	mg/L	-	-	20 ^(a)	-	192	194	201	202	186	203	7.0	0	9	-	-	-	-		
Total dissolved solids	mg/L	-	-	-	-	321	300	326	358	224	378	49	0	9	-	-	-	-		
Total suspended solids	mg/L	-	-	-	-	<2.0	4.4	<2.0	19	<2.0	31	10.0	7	9	-	-	-	-		
Total organic carbon	mg/L	-	-	-	-	2.5	2.7	3.2	3.5	1.7	3.7	0.68	0	9	-	-	-	-		
Dissolved organic carbon	mg/L	-	-	-	-	1.9	2.1	2.5	2.6	1.6	2.7	0.44	0	9	-	-	-	-		
Dissolved inorganic carbon	mg/L	-	-	-	-	46	45	46	49	41	50	3.0	0	9	-	-	-	-		
Total inorganic carbon	mg/L	-	-	-	-	47	46	49	51	41	51	3.5	0	9	-	-	-	-		
Major Ions																				
Bicarbonate, as CaCO ₃	mg/L	-	-	-	-	235	218	245	246	186	247	30	0	9	-	-	-	-		
Bromide	mg/L	-	-	-	-	<0.1	0.038	<0.1	<0.2	<0.02	<0.2	0.031	9	9	-	-	-	-		
Calcium	mg/L	-	-	-	-	94	89	96	107	71	107	14	0	9	-	-	-	-		
Carbonate, as CaCO ₃	mg/L	-	-	-	-	<6.0	1.9	<6.0	<6.0	<1.0	<6.0	1.3	9	9	-	-	-	-		
Chloride	mg/L	640	120	150	600	0.51	0.52	0.57	0.63	0.41	0.63	0.084	0	9	-	-	-	-		
Fluoride	mg/L	-	0.12 ^(b)	-	1.3 - 1.8 ^(b)	-	-	-	-	-	-	-	0	0	-	-	-	-		
Magnesium	mg/L	-	-	-	-	16	16	16	19	14	19	1.9	0	9	-	-	-	-		
Potassium	mg/L	-	-	-	-	0.50	0.52	0.57	0.60	0.42	0.60	0.067	0	9	-	-	-	-		
Sodium	mg/L	-	-	-	-	4.4	4.2	4.9	5.1	3.2	5.1	0.74	0	9	-	-	-	-		
Sulphate	mg/L	-	-	309 - 429 ^(b, c)	-	94	92	98	106	83	110	9.4	0	9	-	-	-	-		
Nutrients																				
Nitrate	mg-N/L	124	2.9	3.0	33	0.25	0.33	0.49	0.59	0.14	0.59	0.18	0	9	-	-	-	-		
Nitrite	mg-N/L	-	0.060	0.020 ^(d)	0.060 ^(d)	<0.1 ^(DL>Chronic, DL>BC MOE Mean, DL>BC MOE Max)	0.063 ^(Chronic, BC MOE Mean, BC MOE Max)	0.12 ^(Chronic, BC MOE Mean, BC MOE Max)	0.13 ^(Chronic, BC MOE Mean, BC MOE Max)	<0.01	0.14 ^(Chronic, BC MOE Mean, BC MOE Max)	0.061	5	9	-	44	44	44		
Nitrate + nitrite	mg-N/L	-	-	-	-	0.54	0.48	0.59	0.59	0.26	0.59	0.16	0	4	-	-	-	-		
Total ammonia	mg-N/L	-	0.50 - 9.7 ^(e)	0.71 - 2.1 ^(f)	3.7 - 18 ^(g)	0.020	0.021	0.035	0.039	<0.01	0.041	0.015	3	9	-	-	-	-		
Total kjeldahl nitrogen	mg-N/L	-	-	-	-	0.31	0.29	0.32	0.33	0.23	0.33	0.045	0	4	-	-	-	-		
Total nitrogen (calculated)	mg-N/L	-	-	-	-	0.80	0.78	0.85	0.91	0.58	0.92	0.14	0	4	-	-	-	-		
Total nitrogen	mg-N/L	-	-	-	-	0.67	0.65	0.78	0.88	0.40	0.92	0.18	0	9	-	-	-	-		
Total phosphorus	mg-P/L	-	-	0.010	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	4	4	-	-	-	-		
Dissolved phosphorus	mg-P/L	-	-	-	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	4	4	-	-	-	-		
Phosphorus (as phosphate)	mg-P/L	-	-	-	-	<0.003	0.0039	0.0030	0.013	<0.002	0.019	0.0061	4	8	-	-	-	-		
Total Metals																				
Aluminum	µg/L	-	100 ^(h, i)	-	-	5.0	41	6.0	205 ^(Chronic)	4.0	338 ^(Chronic)	111	3	9	-	11	-	-		
Antimony	µg/L	-	-	9.0	-	<0.2	0.13	<0.2	0.21	0.10	0.22	0.047	3	9	-	-	-	-		
Arsenic	µg/L	-	5.0	-	5.0	0.20	0.21	0.24	0.36	0.14	0.40	0.099	2	9	-	-	-	-		
Barium	µg/L	-	-	1,000	-	172	156	187	196	115	200	35	0	9	-	-	-	-		
Beryllium	µg/L	-	-	0.13	-	<0.05	0.016	<0.05	<0.05	<0.01	<0.05	0.011	9	9	-	-	-	-		
Bismuth	µg/L	-	-	-	-	<0.01	0.014	<0.01	<0.1	<0.01	<0.1	0.020	5	5	-	-	-	-		
Boron	µg/L	29,000	1,500	-	1,200	9.0	9.7	10	11	9.0	12	1.0	0	9	-	-	-	-		
Cadmium	µg/L	1.8 - 7.4 ^(b)	0.14 - 0.37 ^(b)	-	-	0.014	0.019	0.020	0.039	0.010	0.050	0.013	0	9	-	-	-	-		
Chromium	µg/L	-	1.0	1.0 ^(j)	-	0.30	0.23	<0.4	0.70	<0.05	0.70	0.20	4	9	-	-	-	-		
Cobalt	µg/L	-	-	4.0	110	0.070	0.077	0.070	0.24	<0.02	0.35	0.11	2	9	-	-	-	-		
Copper	µg/L	-	2.0 - 4.0 ^(b)	3.4 - 10 ^(b)	9.9 - 35 ^(b)	0.60	0.70	<1.0	2.0	0.50	2.0	0.49	3	9	-	-	-	-		
Iron	µg/L	-	300	-	1,000	115	145	143	482 ^(Chronic)	12	706 ^(Chronic)	219	0	9	-	11	-	-		
Lead	µg/L	-	2.5 - 7.0 ^(b)	5.9 - 19 ^(b)	65 - 396 ^(b)	<0.05	0.062	<0.1	0.30	<0.01	0.30	0.091	8	9	-	-	-	-		
Lithium	µg/L	-	-	-	-	7.0	6.8	7.0	8.0	5.5	8.0	0.83	0	9	-	-	-	-		
Manganese	µg/L	-	-	975 - 2,127 ^(b)	1,466 - 3,394 ^(b)	71	50	78	91	9.0	93	37	0	9	-	-	-	-		
Mercury	µg/L	-	0.026	0.010	-	<0.01	0.0039	<0.01	<0.01	<0.005	<0.01	0.0013	9	9	-	-	-	-		
Molybdenum	µg/L	-	73	1,000	2,000	0.90	0.90	0.98	1.1	0.76	1.1	0.11	0	9	-	-	-	-		
Nickel	µg/L	-	84 - 150 ^(b)	84 - 150 ^(b)	-	0.81	0.77	<1.0	2.0	0.55	2.0	0.48	3	9	-	-	-	-		
Selenium	µg/L	-	1.0	2.0	-	1.6 ^(Chronic)	1.5 ^(Chronic)	1.6 ^(Chronic)	1.9 ^(Chronic)	1.1 ^(Chronic)	2.0 ^(Chronic)	0.27	0	9	-	100	-	-		
Silicon	µg/L	-	-	-	-	1,820	1,910	1,900	2,336	1,730	2,560	256	0	9	-	-	-	-		
Silver	µg/L	-	0.25	0.050 - 1.5 ^(b)	0.10 - 3.0 ^(b)	<0.01	0.0056	<0.01	0.010	<0.01	0.010	0.0017	8	9	-	-	-	-		
Strontium	µg/L	-	-	-	-	220	219	227	235	202	240	12	0	9	-	-	-	-		
Sulphur	µg/L	-	-	-	-	33,700	31,733	34,400	35,380	27,000	35,700	3,404	0	9	-	-	-	-		
Tellurium	µg/L	-	-	-	-	0.056	0.040	<0.1	<0.1	<0.05	<0.1	0.014	8	9	-	-	-	-		
Thallium	µg/L	-	0.80	0.80	-	<0.01	0.0042	<0.01	0.010	<0.004	0.010	0.0026	8	9	-	-	-	-		
Thorium	µg/L	-	-	-	-	0.12	0.13	<0.4	0.40	<0.01	0.40	0.14	7	9	-	-	-	-		
Tin	µg/L	-	-	-	-	<0.1	0.039	<0.1	<0.1	<0.05	<0.1	0.013	9	9	-	-	-	-		
Titanium	µg/L	-	-	-	-	7.0	5.9	8.0	15	<0.2	16	6.2	4	9	-	-	-	-		
Uranium	µg/L	33	15	8.5	-	1.5	1.5	1.6	1.8	1.3	1.8	0.16	0	9	-	-	-	-		
Vanadium	µg/L	-	-	-	-	0.30	0.31	0.30	0.94	<0.05	1.4	0.42	4	9	-	-	-	-		
Zinc	µg/L	-	30	7.5 - 188 ^(b)	33 - 225 ^(b)	1.0	1.6	1.1	4.2	<1.0	5.0	1.5	2	9	-	-	-	-		
Zirconium	µg/L	-	-	-	-	0.10	0.12	0.20	0.20	0.040	0.20	0.063	0	9	-	-	-	-		

APPENDIX B
Table B-7: Seasonal Surface Water Quality Summary in Whitestone River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary														
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Ice Cover (March)								Standard Deviation	nd	Count	% Above Guideline			
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Acute	Chronic				BC MOE Mean	BC MOE Max		
Dissolved Metals																				
Aluminum	µg/L	-	-	50 ^(h)	100 ^(h)	2.0	1.7	<5.0	<5.0	<1.0	<5.0	0.83	5	9	-	-	-	-		
Antimony	µg/L	-	-	-	-	0.11	0.098	<0.2	<0.2	0.090	<0.2	0.0061	4	9	-	-	-	-		
Arsenic	µg/L	-	-	-	-	<0.2	0.13	<0.2	0.20	0.090	0.20	0.045	3	9	-	-	-	-		
Barium	µg/L	-	-	-	-	162	147	173	178	106	179	30	0	9	-	-	-	-		
Beryllium	µg/L	-	-	-	-	<0.04	0.014	<0.04	<0.05	<0.01	<0.05	0.0086	9	9	-	-	-	-		
Bismuth	µg/L	-	-	-	-	<0.1	0.23	<1.0	<1.0	<0.01	<1.0	0.26	9	9	-	-	-	-		
Boron	µg/L	-	-	-	-	8.0	8.3	9.0	10	7.0	10	1.2	0	9	-	-	-	-		
Cadmium	µg/L	-	-	0.19 - 0.46 ^(h)	0.49 - 2.1 ^(h)	0.012	0.013	0.018	0.020	0.0080	0.020	0.0048	0	9	-	-	-	-		
Chromium	µg/L	-	-	-	-	0.10	0.12	<0.4	<0.4	<0.05	<0.4	0.079	8	9	-	-	-	-		
Cobalt	µg/L	-	-	-	-	0.020	0.036	0.062	0.068	0.016	0.070	0.026	2	9	-	-	-	-		
Copper	µg/L	-	-	-	-	0.50	0.62	<1.0	2.0	0.40	2.0	0.53	4	9	-	-	-	-		
Iron	µg/L	-	-	-	350	8.0	19	28	44	<5.0	48	17	2	9	-	-	-	-		
Lead	µg/L	-	-	-	-	<0.05	0.034	<0.1	<0.1	<0.01	<0.1	0.017	9	9	-	-	-	-		
Lithium	µg/L	-	-	-	-	6.0	6.1	6.3	8.0	4.7	8.0	1.2	0	9	-	-	-	-		
Manganese	µg/L	-	-	-	-	12	40	67	90	2.0	95	37	0	9	-	-	-	-		
Mercury	µg/L	-	-	-	-	<0.01	0.0039	<0.01	<0.01	<0.005	<0.01	0.0013	9	9	-	-	-	-		
Molybdenum	µg/L	-	-	-	-	0.85	0.89	0.97	1.1	0.80	1.1	0.11	0	9	-	-	-	-		
Nickel	µg/L	-	-	-	-	0.75	0.63	<1.0	1.0	0.48	1.0	0.18	3	9	-	-	-	-		
Selenium	µg/L	-	-	-	-	1.6	1.7	1.9	2.2	1.4	2.2	0.30	0	9	-	-	-	-		
Silicon	µg/L	-	-	-	-	1,870	1,839	1,910	1,950	1,640	1,970	107	0	9	-	-	-	-		
Silver	µg/L	-	-	-	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	9	9	-	-	-	-		
Strontium	µg/L	-	-	-	-	209	212	220	230	195	234	13	0	9	-	-	-	-		
Sulphur	µg/L	-	-	-	-	33,100	31,300	34,000	36,960	25,800	37,400	4,525	0	9	-	-	-	-		
Tellurium	µg/L	-	-	-	-	<0.05	0.036	<0.1	<0.1	<0.05	<0.1	0.013	9	9	-	-	-	-		
Thallium	µg/L	-	-	-	-	<0.01	0.0037	<0.01	<0.01	<0.004	<0.01	0.0016	9	9	-	-	-	-		
Thorium	µg/L	-	-	-	-	<0.05	0.094	<0.4	<0.4	<0.01	<0.4	0.10	9	9	-	-	-	-		
Tin	µg/L	-	-	-	-	<0.1	0.039	<0.1	<0.1	<0.05	<0.1	0.013	9	9	-	-	-	-		
Titanium	µg/L	-	-	-	-	15	9.2	17	17	<0.2	17	8.6	4	9	-	-	-	-		
Uranium	µg/L	-	-	-	-	1.4	1.4	1.4	1.8	1.1	1.8	0.24	0	9	-	-	-	-		
Vanadium	µg/L	-	-	-	-	0.10	0.081	<0.2	<0.2	<0.05	<0.2	0.030	7	9	-	-	-	-		
Zinc	µg/L	-	-	-	-	2.0	1.5	2.0	2.0	<1.0	2.0	0.67	2	9	-	-	-	-		
Zirconium	µg/L	-	-	-	-	<0.1	0.050	<0.1	<0.1	0.040	<0.1	0.0071	5	9	-	-	-	-		
Volatile Organics																				
Benzene	µg/L	-	370 ^(h)	40	-	<0.5	28	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	83	9	9	-	-	-	-		
Ethylbenzene	µg/L	-	90 ^(h)	200	-	<1.0	28	<1.0	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	83	9	9	-	-	-	-		
Toluene	µg/L	-	2 ^(h)	0.50	-	<1.0 ^(DL>BC MOE Mean)	28 ^(Chronic, BC MOE Mean)	<1.0 ^(DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	83	9	9	-	-	-	-		
Xylenes	µg/L	-	-	30	-	<2.0	28	<2.0	<500 ^(DL>BC MOE Mean)	<0.5	<500 ^(DL>BC MOE Mean)	83	9	9	-	-	-	-		
Styrene	µg/L	-	72 ^(h)	72	-	<1.0	28	<1.0	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	83	9	9	-	-	-	-		
Extractable Petroleum Hydrocarbons (C10-C19)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Extractable Petroleum Hydrocarbons (C10-C32)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Volatile Hydrocarbons	µg/L	-	-	-	-	<100	2,811	<100	<50,000	<50	<50,000	8,321	9	9	-	-	-	-		
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	-	<100	2,811	<100	<50,000	<50	<50,000	8,321	9	9	-	-	-	-		
Methyl tertiary-butyl ether	µg/L	-	-	-	-	<1.0	28	<1.0	<500	<0.5	<500	83	9	9	-	-	-	-		
Parent PAHs																				
Naphthalene	µg/L	-	1.1 ^(h)	1.0	-	<0.00447	0.0022	<0.00447	<0.00447	<0.00414	<0.00447	0.000088	8	8	-	-	-	-		
Acenaphthylene	µg/L	-	-	-	-	<0.000185	0.000099	<0.000308	<0.000359	<0.00011	<0.000359	0.000047	8	8	-	-	-	-		
Biphenyl	µg/L	-	-	-	-	<0.001866	0.00083	<0.001866	<0.001866	<0.001449	<0.001866	0.00011	8	8	-	-	-	-		
Acenaphthene	µg/L	-	5.8 ^(h)	6.0	-	<0.000222	0.00012	<0.000278	<0.000316	<0.000202	<0.000316	0.000020	8	8	-	-	-	-		
Fluorene	µg/L	-	3 ^(h)	12	-	<0.000318	0.00014	<0.000318	<0.000318	<0.000207	<0.000318	0.000024	8	8	-	-	-	-		
Phenanthrene	µg/L	-	0.4 ^(h)	0.30	-	<0.00318	0.0014	<0.00318	<0.00318	<0.002328	<0.00318	0.00023	8	8	-	-	-	-		
Anthracene	µg/L	-	0.012 ^(h)	0.10	-	0.00011	0.00010	<0.000358	<0.000375	<0.0000669	<0.000375	0.000056	6	8	-	-	-	-		
Dibenzothiophene	µg/L	-	-	-	-	<0.000321	0.00017	<0.000472	<0.000554	<0.000136	<0.000554	0.000067	8	8	-	-	-	-		
Pyrene	µg/L	-	0.025 ^(h)	0.020	-	<0.001077	0.00045	<0.001077	<0.001077	<0.000711	<0.001077	0.000098	8	8	-	-	-	-		
Fluoranthene	µg/L	-	0.04 ^(h)	0.20	-	<0.001263	0.00059	<0.001263	<0.001263	<0.001101	<0.001263	0.000043	8	8	-	-	-	-		
Benzo(a)anthracene	µg/L	-	0.018 ^(h)	0.10	-	<0.000186	0.000096	<0.000186	0.00020	<0.000129	0.00020	0.000044	7	8	-	-	-	-		
Chrysene	µg/L	-	-	-	-	0.00059	0.00028	<0.00063	<0.00063	<0.000285	<0.00063	0.00015	7	8	-	-	-	-		
1-Methyl-7-isopropyl-phenanthrene (Retene)	µg/L	-	-	-	-	<0.000429	0.00032	<0.000469	0.0011	<0.000295	0.0011	0.00032	7	8	-	-	-	-		
Benzo(b)fluoranthene	µg/L	-	-	-	-	<0.00012	0.000074	<0.00015	0.00021	<0.0000651	0.00021	0.000059	7	8	-	-	-	-		
Benzo(k)fluoranthenes	µg/L	-	-	-	-	<0.000126	0.000068	0.00015	<0.000161	<0.0000708	<0.000161	0.000037	7	8	-	-	-	-		
Benzo(b,j,k)fluoranthenes	µg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Benzo(a)pyrene	µg/L	-	0.015 ^(h)	0.010	-	0.00017	0.000093	<0.000228	<0.000235	<0.0000998	<0.000235	0.000039	7	8	-	-	-	-		
Benzo(e)pyrene	µg/L	-	-	-	-	<0.00019	0.00011	<0.000238	0.00032	<0.000101	0.00032	0.000086	7	8	-	-	-	-		
Perylene	µg/L	-	-	-	-	<0.000192	0.00016	<0.00024	0.00067	<0.000109	0.00067	0.00021	7	8	-	-	-	-		
Benzo(g,h,i)perylene	µg/L	-	-	-	-	<0.000255	0.00013	<0.000255	<0.000453	<0.000121	<0.000453	0.000049	7	8	-	-	-	-		
Indeno(c,d-123)pyrene	µg/L	-	-	-	-	<0.000309	0.00014	<0.000309	<0.000534	<0.000155	<0.000534	0.000062	8	8	-	-	-	-		
Dibenzo(a,h)anthracene	µg/L	-	-	-	-	<0.000264	0.00013	<0.00048	<0.000587	0.000060	<0.000587	0.000093	6	8	-	-	-	-		

Table B-7: Seasonal Surface Water Quality Summary in Whitestone River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary																
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Ice Cover (March)										Standard Deviation	nd	Count	% Above Guideline			
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Acute	Chronic	BC MOE Mean	BC MOE Max							
Alkylated PAHs																						
C1 substituted naphthalenes	µg/L	-	-	-	-	<0.00945	0.0043	<0.00945	<0.00945	<0.00792	<0.00945	0.00041	8	8	-	-	-	-				
1-Methylnaphthalene	µg/L	-	-	-	-	<0.001425	0.00069	<0.001425	<0.001425	<0.001335	<0.001425	0.000024	8	8	-	-	-	-				
2-Methylnaphthalene	µg/L	-	-	-	-	<0.00813	0.0037	<0.00813	<0.00648	<0.00813	0.00044	8	8	-	-	-	-					
C2 substituted naphthalenes	µg/L	-	-	-	-	<0.01314	0.0051	<0.01314	<0.01314	<0.00732	<0.01314	0.0016	8	8	-	-	-	-				
1,2-Dimethylnaphthalene	µg/L	-	-	-	-	<0.000601	0.00028	<0.000918	<0.00098	<0.000241	<0.00098	0.00014	8	8	-	-	-	-				
2,6-Dimethylnaphthalene	µg/L	-	-	-	-	0.00033	0.00031	0.00061	<0.000829	<0.000276	<0.000829	0.00016	6	8	-	-	-	-				
C1 substituted acenaphthenes	µg/L	-	-	-	-	<0.000257	0.00014	<0.000358	<0.000475	<0.000152	<0.000475	0.000048	8	8	-	-	-	-				
C1 substituted biphenyls	µg/L	-	-	-	-	<0.00645	0.0026	<0.00645	<0.00645	<0.00384	<0.00645	0.00070	8	8	-	-	-	-				
C3 substituted naphthalenes	µg/L	-	-	-	-	<0.002967	0.00083	<0.002967	<0.002967	<0.000166	<0.002967	0.00070	8	8	-	-	-	-				
2,3,5-Trimethylnaphthalene	µg/L	-	-	-	-	<0.000279	0.00019	0.00051	0.00051	<0.000142	<0.000668	0.00015	7	8	-	-	-	-				
2,3,6-Trimethylnaphthalene	µg/L	-	-	-	-	<0.000257	0.00020	<0.000617	0.00063	<0.000131	0.00063	0.00019	7	8	-	-	-	-				
C1 substituted fluorenes	µg/L	-	-	-	-	<0.001491	0.00052	<0.001491	<0.001491	<0.000446	<0.001491	0.00024	8	8	-	-	-	-				
2-Methylfluorene	µg/L	-	-	-	-	<0.000446	0.00021	<0.000663	<0.000789	<0.000124	<0.000789	0.00012	7	8	-	-	-	-				
C2 substituted biphenyls	µg/L	-	-	-	-	<0.02328	0.0099	<0.02328	<0.02328	<0.01635	<0.02328	0.0019	8	8	-	-	-	-				
C4 substituted naphthalenes	µg/L	-	-	-	-	<0.001623	0.00064	<0.001623	0.0023	<0.000174	0.0023	0.00076	7	8	-	-	-	-				
1,4,6,7-Tetramethylnaphthalene	µg/L	-	-	-	-	<0.000194	0.000090	<0.000216	<0.000306	<0.000111	<0.000306	0.000032	8	8	-	-	-	-				
C1 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.001647	0.00069	<0.001647	0.0025	<0.000227	0.0025	0.00079	7	8	-	-	-	-				
1-Methylphenanthrene	µg/L	-	-	-	-	<0.000441	0.00022	<0.000441	0.00051	<0.000227	0.00051	0.00013	7	8	-	-	-	-				
2-Methylphenanthrene	µg/L	-	-	-	-	<0.000702	0.00025	<0.000702	<0.000702	<0.00023	<0.000702	0.00011	8	8	-	-	-	-				
3-Methylphenanthrene	µg/L	-	-	-	-	<0.000504	0.00023	<0.000504	0.00051	<0.000232	0.00051	0.00013	7	8	-	-	-	-				
9/4-Methylphenanthrene	µg/L	-	-	-	-	<0.000242	0.00020	<0.000363	0.00078	<0.000168	0.00078	0.00024	7	8	-	-	-	-				
2-Methylanthracene	µg/L	-	-	-	-	<0.000238	0.00011	<0.000316	<0.000372	<0.000103	<0.000372	0.000043	8	8	-	-	-	-				
C2 substituted fluorenes	µg/L	-	-	-	-	0.00077	0.00065	0.00091	0.0012	<0.000431	0.0013	0.00040	4	8	-	-	-	-				
1,7-Dimethylfluorene	µg/L	-	-	-	-	<0.000431	0.00021	<0.000706	<0.000809	<0.000182	<0.000809	0.00012	8	8	-	-	-	-				
C1 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.000248	0.00013	<0.000277	<0.000431	<0.000197	<0.000431	0.000036	8	8	-	-	-	-				
2/3-Methyldibenzothiophenes	µg/L	-	-	-	-	<0.000248	0.00013	<0.000277	<0.000431	<0.000197	<0.000431	0.000036	8	8	-	-	-	-				
C2 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.000978	0.00042	<0.000978	0.0016	<0.000145	0.0016	0.00051	7	8	-	-	-	-				
1,7-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000219	0.00011	<0.000219	0.00026	<0.000142	0.00026	0.000060	7	8	-	-	-	-				
1,8-Dimethylphenanthrene	µg/L	-	-	-	-	0.000071	0.000058	<0.000174	<0.000181	<0.0000323	<0.000181	0.000030	7	8	-	-	-	-				
2,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000145	0.000076	<0.000174	<0.000181	<0.000144	<0.000181	0.0000077	8	8	-	-	-	-				
3,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000149	0.000064	<0.000177	<0.000184	0.000041	<0.000184	0.000028	7	8	-	-	-	-				
C3 substituted fluorenes	µg/L	-	-	-	-	<0.000691	0.00062	0.00078	0.0015	0.00037	0.0017	0.00051	4	8	-	-	-	-				
C2 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.000316	0.00027	0.00033	0.00090	<0.000104	0.00090	0.00027	5	8	-	-	-	-				
2,4-Dimethyldibenzothiophene	µg/L	-	-	-	-	<0.000274	0.00012	<0.000316	<0.000422	<0.000104	<0.000422	0.000054	8	8	-	-	-	-				
C1 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.000405	0.00048	0.00043	0.0016	<0.000154	0.0022	0.00069	5	8	-	-	-	-				
C3 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.000193	0.00025	0.00021	0.00083	<0.000103	0.0012	0.00037	5	8	-	-	-	-				
1,2,6-Trimethylphenanthrene	µg/L	-	-	-	-	<0.000169	0.000067	<0.000171	<0.000193	<0.0000737	<0.000193	0.000023	8	8	-	-	-	-				
C3 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.001161	0.00034	<0.001161	<0.001161	<0.000159	<0.001161	0.00026	8	8	-	-	-	-				
C2 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.00029	0.00045	0.00035	0.0023	<0.000103	0.0023	0.00076	5	8	-	-	-	-				
C4 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.00041	0.00051	0.00043	0.0023	<0.000295	0.0023	0.00073	5	8	-	-	-	-				
C4 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.00135	0.00060	<0.00135	<0.00135	<0.001032	<0.00135	0.000085	8	8	-	-	-	-				
C1 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.00012	0.00016	<0.000197	0.00073	0.000088	0.00073	0.00023	5	8	-	-	-	-				
5/6-Methylchrysenes	µg/L	-	-	-	-	<0.000118	0.000058	<0.000153	<0.000203	<0.0000514	<0.000203	0.000023	8	8	-	-	-	-				
C3 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.000315	0.00021	<0.000328	0.00077	0.00010	0.00077	0.00023	5	8	-	-	-	-				
C2 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000184	0.00016	<0.000241	0.00082	<0.0000636	0.00082	0.00027	7	8	-	-	-	-				
5,9-Dimethylchrysene	µg/L	-	-	-	-	<0.000184	0.000094	<0.000241	0.00026	<0.0000636	0.00026	0.000075	7	8	-	-	-	-				
C4 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.000201	0.00011	<0.000212	0.00021	<0.000126	0.00021	0.000045	7	8	-	-	-	-				
C1 substituted benzo(a)fluoranthenes / benzopyrenes	µg/L	-	-	-	-	<0.000217	0.00013	<0.000266	0.00034	<0.0000896	0.00034	0.000090	7	8	-	-	-	-				
7-Methylbenzo(a)pyrene	µg/L	-	-	-	-	<0.000217	0.00010	<0.000266	<0.000295	<0.0000896	<0.000295	0.000034	8	8	-	-	-	-				
C3 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000127	0.000053	<0.000151	<0.000154	<0.0000533	<0.000154	0.000020	8	8	-	-	-	-				
C2 substituted benzo(a)fluoranthenes / benzopyrenes	µg/L	-	-	-	-	<0.000217	0.00010	<0.000266	<0.000272	<0.000104	<0.000272	0.000034	7	8	-	-	-	-				
C4 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000119	0.000067	<0.000133	0.00019	<0.0000566	0.00019	0.000052	7	8	-	-	-	-				
1-methylchrysene	µg/L	-	-	-	-	<0.000115	0.000060	<0.000144	<0.000192	0.000058	<0.000192	0.000018	7	8	-	-	-	-				
3-methylfluoranthene / benzo(a)fluorene	µg/L	-	-	-	-	<0.000365	0.00025	<0.000405	0.00093	<0.000152	0.00093	0.00028	6	8	-	-	-	-				

APPENDIX B
Table B-7: Seasonal Surface Water Quality Summary in Whitestone River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary													
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Ice Cover (March)							Standard Deviation	nd	Count	% Above Guideline			
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Acute				Chronic	BC MOE Mean	BC MOE Max	
Naphthenic Acid																			
C12h18o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C12h20o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C12h22o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C12h24o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C13h20o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C13h22o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C13h24o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C13h26o2	ng/L	-	-	-	-	28	20	33	44	<4.9	47	22	2	4	-	-	-	-	
C14h20o2	ng/L	-	-	-	-	8.8	5.9	9.1	9.8	<4.9	10	4.0	2	4	-	-	-	-	
C14h22o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C14h24o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C14h26o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C14h28o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C15h18o2	ng/L	-	-	-	-	5.1	4.0	5.4	5.9	<4.9	6.0	1.8	2	4	-	-	-	-	
C15h20o2	ng/L	-	-	-	-	<5.0	3.8	7.7	7.7	<4.9	7.7	2.6	3	4	-	-	-	-	
C15h22o2	ng/L	-	-	-	-	5.2	4.0	5.4	5.8	<5.0	5.9	1.8	2	4	-	-	-	-	
C15h24o2	ng/L	-	-	-	-	<6.0	3.8	7.2	7.2	<5.0	7.2	2.3	3	4	-	-	-	-	
C15h26o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C15h28o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C15h30o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C16h20o2	ng/L	-	-	-	-	9.1	9.4	9.9	11	8.0	11	1.4	0	4	-	-	-	-	
C16h22o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C16h24o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C16h26o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C16h28o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C16h30o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C16h32o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C17h22o2	ng/L	-	-	-	-	5.7	5.3	6.5	7.1	<5.0	7.3	2.1	1	4	-	-	-	-	
C17h24o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C17h26o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C17h28o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C17h30o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C17h32o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C17h34o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C18h24o2	ng/L	-	-	-	-	37	38	38	34	<4.9	38	1.8	0	4	-	-	-	-	
C18h26o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C18h28o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C18h30o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C18h32o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C18h34o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C18h36o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C19h26o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C19h28o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C19h30o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C19h32o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C19h34o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C19h36o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C19h38o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C20h28o2	ng/L	-	-	-	-	<5.0	3.9	5.5	5.5	5.0	5.5	1.6	2	4	-	-	-	-	
C20h30o2	ng/L	-	-	-	-	62	69	74	94	54	99	20	0	4	-	-	-	-	
C20h32o2	ng/L	-	-	-	-	15	17	20	24	11	25	6.5	0	4	-	-	-	-	
C20h34o2	ng/L	-	-	-	-	5.3	4.2	5.7	6.4	<5.0	6.6	2.1	2	4	-	-	-	-	
C20h36o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C20h38o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C21h30o2	ng/L	-	-	-	-	10	11	11	14	8.5	14	2.5	0	4	-	-	-	-	
C21h32o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C21h34o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C21h36o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C21h38o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
C21h40o2	ng/L	-	-	-	-	<5.0	2.5	<5.1	<5.1	<4.9	<5.1	0.037	4	4	-	-	-	-	
Radionuclides																			
Actinium-228	Bq/L	-	-	-	-	<0.7	0.38	<0.8	<1.0	<0.6	<1.0	0.076	5	5	-	-	-	-	
Bismuth-212	Bq/L	-	-	-	-	<1.0	0.90	<2.0	2.0	<1.0	2.0	0.65	4	5	-	-	-	-	
Bismuth-214	Bq/L	-	-	-	-	<0.7	0.55	0.70	0.86	<0.4	0.90	0.28	2	5	-	-	-	-	
Lead-210	Bq/L	-	-	-	-	<3.0	1.6	<3.0	<4.0	<3.0	<4.0	0.22	5	5	-	-	-	-	
Lead-211	Bq/L	-	-	-	-	<4.0	1.7	<4.0	<4.0	<2.0	<4.0	0.45	5	5	-	-	-	-	
Lead-212	Bq/L	-	-	-	-	0.30	0.36	0.40	0.72	<0.3	0.80	0.27	2	5	-	-	-	-	
Lead-214	Bq/L	-	-	-	-	0.50	0.43	<0.6	0.70	<0.3	0.70	0.21	2	5	-	-	-	-	
Potassium-40	Bq/L	-	-	-	-	<4.0	3.8	<4.0	11	<4.0	11	4.0	4	5	-	-	-	-	
Radium-223	Bq/L	-	-	-	-	<0.7	0.35	<0.7	<0.8	<0.6	<0.8	0.035	5	5	-	-	-	-	
Radium-226	Bq/L	-	-	-	-	0.0090	0.50	0.0090	0.0090	<0.005	<5.0	1.1	3	5	-	-	-	-	
Radon-219																			

APPENDIX B
Table B-7: Seasonal Surface Water Quality Summary in Whitestone River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary														
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Freshet (April to early June)														
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline					
																	Acute	Chronic	BC MOE Mean	BC MOE Max
Field Measured																				
pH	-	-	6.5 - 9.0	6.5 - 9.0	6.5 - 9.0	8.0	8.0	8.0	8.1	7.9	8.1	0.073	0	4	-	-	-	-	-	-
Specific conductivity	µS/cm	-	-	-	-	307	309	316	333	284	338	22	0	4	-	-	-	-	-	-
Temperature	°C	-	-	-	-	9.1	8.9	9.1	9.2	8.3	9.2	0.42	0	4	-	-	-	-	-	-
Dissolved oxygen	mg/L	-	6.5	8.0	5.0	11	11	11	11	10	11	0.39	0	4	-	-	-	-	-	-
Turbidity	NTU	-	-	-	-	2.9	2.7	3.8	4.0	1.1	4.1	1.4	0	4	-	-	-	-	-	-
Conventional Parameters																				
Hardness, as CaCO ₃	mg/L	-	-	-	-	153	154	157	167	141	169	11	0	4	-	-	-	-	-	-
Total alkalinity, as CaCO ₃	mg/L	-	-	20 ^(a)	-	105	106	109	114	99	115	6.8	0	4	-	-	-	-	-	-
Total dissolved solids	mg/L	-	-	-	-	126	133	143	163	110	168	26	0	4	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	<3.0	1.9	3.0	3.0	<3.0	3.0	0.75	3	4	-	-	-	-	-	-
Total organic carbon	mg/L	-	-	-	-	6.9	7.5	8.0	10	5.3	11	2.4	0	4	-	-	-	-	-	-
Dissolved organic carbon	mg/L	-	-	-	-	7.3	7.3	8.1	9.1	5.3	9.3	1.7	0	4	-	-	-	-	-	-
Dissolved inorganic carbon	mg/L	-	-	-	-	26	26	27	28	25	29	1.8	0	4	-	-	-	-	-	-
Total inorganic carbon	mg/L	-	-	-	-	26	27	27	29	25	29	1.8	0	4	-	-	-	-	-	-
Major Ions																				
Bicarbonate, as CaCO ₃	mg/L	-	-	-	-	128	129	133	139	120	141	8.8	0	4	-	-	-	-	-	-
Bromide	mg/L	-	-	-	-	<0.02	0.010	<0.02	<0.02	<0.02	<0.02	0	4	4	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	46	46	48	50	43	51	3.5	0	4	-	-	-	-	-	-
Carbonate, as CaCO ₃	mg/L	-	-	-	-	<6.0	3.0	<6.0	<6.0	<6.0	<6.0	0	4	4	-	-	-	-	-	-
Chloride	mg/L	640	120	150	600	0.33	0.32	0.35	0.36	0.27	0.36	0.039	0	4	-	-	-	-	-	-
Fluoride	mg/L	-	0.12 ^(b)	-	1.3 - 1.8 ^(b)	-	-	-	-	-	-	-	0	0	-	-	-	-	-	-
Magnesium	mg/L	-	-	-	-	9.3	9.3	9.6	10	8.4	10	0.73	0	4	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	0.45	0.45	0.50	0.50	0.40	0.50	0.058	0	4	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	4.0	4.0	4.1	4.2	3.9	4.2	0.15	0	4	-	-	-	-	-	-
Sulphate	mg/L	-	-	309 - 429 ^(b, c)	-	52	51	55	58	44	59	6.7	0	4	-	-	-	-	-	-
Nutrients																				
Nitrate	mg-N/L	124	2.9	3.0	33	0.11	0.11	0.12	0.13	0.080	0.13	0.024	0	4	-	-	-	-	-	-
Nitrite	mg-N/L	-	0.060	0.020 ^(d)	0.060 ^(d)	0.12 ^(Chronic, BC MOE Mean, BC MOE Max)	0.12 ^(Chronic, BC MOE Mean, BC MOE Max)	0.12 ^(Chronic, BC MOE Mean, BC MOE Max)	0.12 ^(Chronic, BC MOE Mean, BC MOE Max)	0.12 ^(Chronic, BC MOE Mean, BC MOE Max)	0.12 ^(Chronic, BC MOE Mean, BC MOE Max)	0	0	4	-	-	100	100	100	100
Nitrate + nitrite	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	-
Total ammonia	mg-N/L	-	0.50 - 9.7 ^(e)	0.71 - 2.1 ^(f)	3.7 - 18 ^(g)	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	4	4	-	-	-	-	-	-
Total kjeldahl nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	-
Total nitrogen (calculated)	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	-
Total nitrogen	mg-N/L	-	-	-	-	0.35	0.35	0.37	0.39	0.30	0.40	0.042	0	4	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	0.010	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	-
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	-
Phosphorus (as phosphate)	mg-P/L	-	-	-	-	0.015	0.014	0.016	0.019	0.0060	0.020	0.0058	0	4	-	-	-	-	-	-
Total Metals																				
Aluminum	µg/L	-	100 ^(h, i)	-	-	69	70	80	100 ^(Chronic)	35	105 ^(Chronic)	29	0	4	-	25	-	-	-	-
Antimony	µg/L	-	-	9.0	-	0.10	0.10	0.10	0.10	0.10	0.10	0	0	4	-	-	-	-	-	-
Arsenic	µg/L	-	5.0	-	5.0	0.32	0.32	0.36	0.37	0.26	0.37	0.056	0	4	-	-	-	-	-	-
Barium	µg/L	-	-	1,000	-	106	106	118	118	93	118	14	0	4	-	-	-	-	-	-
Beryllium	µg/L	-	-	0.13	-	<0.05	0.025	<0.05	<0.05	<0.05	<0.05	0	4	4	-	-	-	-	-	-
Bismuth	µg/L	-	-	-	-	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	4	4	-	-	-	-	-	-
Boron	µg/L	29,000	1,500	-	1,200	12	12	12	12	11	12	0.58	0	4	-	-	-	-	-	-
Cadmium	µg/L	1.8 - 7.4 ^(b)	0.14 - 0.37 ^(b)	-	-	0.020	0.028	0.028	0.046	0.020	0.050	0.015	0	4	-	-	-	-	-	-
Chromium	µg/L	-	1.0	1.0 ^(j)	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	4	4	-	-	-	-	-	-
Cobalt	µg/L	-	-	4.0	110	0.10	0.075	0.10	0.10	<0.1	0.10	0.029	2	4	-	-	-	-	-	-
Copper	µg/L	-	2.0 - 4.0 ^(b)	3.4 - 10 ^(b)	9.9 - 35 ^(b)	1.9	2.0	2.2	2.4	1.5	2.5	0.44	0	4	-	-	-	-	-	-
Iron	µg/L	-	300	-	1,000	221	215	264	294	117	302 ^(Chronic)	80	0	4	-	25	-	-	-	-
Lead	µg/L	-	2.5 - 7.0 ^(b)	5.9 - 19 ^(b)	65 - 396 ^(b)	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	4	4	-	-	-	-	-	-
Lithium	µg/L	-	-	-	-	5.5	5.6	6.1	6.6	4.8	6.7	0.88	0	4	-	-	-	-	-	-
Manganese	µg/L	-	-	975 - 2,127 ^(b)	1,466 - 3,394 ^(b)	25	25	34	36	14	37	11	0	4	-	-	-	-	-	-
Mercury	µg/L	-	0.026	0.010	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	4	4	-	-	-	-	-	-
Molybdenum	µg/L	-	73	1,000	2,000	0.89	0.89	0.94	1.0	0.77	1.0	0.10	0	4	-	-	-	-	-	-
Nickel	µg/L	-	84 - 150 ^(b)	84 - 150 ^(b)	-	1.9	1.9	2.1	2.3	1.7	2.3	0.29	0	4	-	-	-	-	-	-
Selenium	µg/L	-	1.0	2.0	-	0.85	0.88	0.95	1.1 ^(Chronic)	0.70	1.1 ^(Chronic)	0.17	0	4	-	25	-	-	-	-
Silicon	µg/L	-	-	-	-	1,690	1,693	1,740	1,764	1,620	1,770	69	0	4	-	-	-	-	-	-
Silver	µg/L	-	0.25	0.050 - 1.5 ^(b)	0.10 - 3.0 ^(b)	<0.05	0.025	<0.05	<0.05	<0.05	<0.05	0	4	4	-	-	-	-	-	-
Strontium	µg/L	-	-	-	-	133	135	140	148	125	150	11	0	4	-	-	-	-	-	-
Sulphur	µg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	-
Tellurium	µg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	-
Thallium	µg/L	-	0.80	0.80	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	4	4	-	-	-	-	-	-
Thorium	µg/L	-	-	-	-	0.030	0.028	0.033	0.039	0.010	0.040	0.013	0	4	-	-	-	-	-	-
Tin	µg/L	-	-	-	-	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	4	4	-	-	-	-	-	-
Titanium	µg/L	-	-	-	-	1.2	1.2	1.3	1.6	0.60	1.7	0.45	0	4	-	-	-	-	-	-
Uranium	µg/L	33	15	8.5	-	0.81	0.83	0.87	0.95	0.74	0.97	0.10	0	4	-	-	-	-	-	-
Vanadium	µg/L	-	-	-	-	0.60	0.58	0.70	0.70	0.40	0.70	0.15	0	4	-	-	-	-	-	-
Zinc	µg/L	-	30	7.5 - 188 ^(b)	33 - 225 ^(b)	2.6	3.8	4.2	7.2	2.0	8.0	2.8	0	4	-	-	-	-	-	-
Zirconium	µg/L	-	-	-	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	4	4	-	-	-	-	-	-

APPENDIX B
Table B-7: Seasonal Surface Water Quality Summary in Whitestone River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary													
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Freshet (April to early June)													
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline				
																Acute	Chronic	BC MOE Mean	BC MOE Max
Dissolved Metals																			
Aluminum	µg/L	-	-	50 ^(h)	100 ^(h)	20	19	22	25	12	26	5.9	0	4	-	-	-	-	
Antimony	µg/L	-	-	-	-	<0.2	0.10	<0.2	<0.2	<0.2	<0.2	0	4	4	-	-	-	-	
Arsenic	µg/L	-	-	-	-	0.35	0.33	0.40	0.40	0.20	0.096	0	4	-	-	-	-		
Barium	µg/L	-	-	-	-	104	104	115	116	92	116	13	0	4	-	-	-	-	
Beryllium	µg/L	-	-	-	-	<0.04	0.020	<0.04	<0.04	<0.04	<0.04	0	4	4	-	-	-	-	
Bismuth	µg/L	-	-	-	-	<1.0	0.50	<1.0	<1.0	<1.0	<1.0	0	4	4	-	-	-	-	
Boron	µg/L	-	-	-	-	8.0	8.0	8.0	8.0	8.0	8.0	0	0	4	-	-	-	-	
Cadmium	µg/L	-	-	0.19 - 0.46 ^(h)	0.49 - 2.1 ^(h)	0.010	0.0088	0.010	0.010	<0.01	0.010	0.0025	1	4	-	-	-	-	
Chromium	µg/L	-	-	-	-	<0.4	0.20	<0.4	<0.4	<0.4	<0.4	0	4	4	-	-	-	-	
Cobalt	µg/L	-	-	-	-	0.10	0.10	0.11	0.12	0.090	0.12	0.015	0	4	-	-	-	-	
Copper	µg/L	-	-	-	-	1.5	1.5	2.0	2.0	1.0	2.0	0.58	0	4	-	-	-	-	
Iron	µg/L	-	-	-	350	75	77	97	103	52	104	26	0	4	-	-	-	-	
Lead	µg/L	-	-	-	-	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	4	4	-	-	-	-	
Lithium	µg/L	-	-	-	-	5.5	5.8	6.3	6.9	5.0	7.0	0.96	0	4	-	-	-	-	
Manganese	µg/L	-	-	-	-	22	21	28	29	13	29	8.4	0	4	-	-	-	-	
Mercury	µg/L	-	-	-	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	4	4	-	-	-	-	
Molybdenum	µg/L	-	-	-	-	0.83	0.85	0.87	0.93	0.78	0.95	0.074	0	4	-	-	-	-	
Nickel	µg/L	-	-	-	-	2.0	2.0	2.0	2.0	2.0	2.0	0	0	4	-	-	-	-	
Selenium	µg/L	-	-	-	-	0.95	0.98	1.0	1.1	0.90	1.1	0.096	0	4	-	-	-	-	
Silicon	µg/L	-	-	-	-	1,565	1,558	1,593	1,599	1,500	1,600	46	0	4	-	-	-	-	
Silver	µg/L	-	-	-	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	4	4	-	-	-	-	
Strontium	µg/L	-	-	-	-	134	135	138	145	126	147	8.7	0	4	-	-	-	-	
Sulphur	µg/L	-	-	-	-	18,350	18,475	19,700	20,660	16,300	20,900	2,037	0	4	-	-	-	-	
Tellurium	µg/L	-	-	-	-	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	4	4	-	-	-	-	
Thallium	µg/L	-	-	-	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	4	4	-	-	-	-	
Thorium	µg/L	-	-	-	-	<0.4	0.20	<0.4	<0.4	<0.4	<0.4	0	4	4	-	-	-	-	
Tin	µg/L	-	-	-	-	<0.1	0.050	<0.1	<0.1	<0.1	<0.1	0	4	4	-	-	-	-	
Titanium	µg/L	-	-	-	-	<10	5.0	<10	<10	<10	<10	0	4	4	-	-	-	-	
Uranium	µg/L	-	-	-	-	0.75	0.78	0.83	0.89	0.70	0.90	0.096	0	4	-	-	-	-	
Vanadium	µg/L	-	-	-	-	0.35	0.36	0.39	0.41	0.31	0.41	0.048	0	4	-	-	-	-	
Zinc	µg/L	-	-	-	-	1.5	1.4	2.0	2.0	<1.0	2.0	0.75	1	4	-	-	-	-	
Zirconium	µg/L	-	-	-	-	0.21	0.21	0.23	0.28	0.12	0.29	0.070	0	4	-	-	-	-	
Volatile Organics																			
Benzene	µg/L	-	370 ^(h)	40	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	4	4	-	-	-	-	
Ethylbenzene	µg/L	-	90 ^(h)	200	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	4	4	-	-	-	-	
Toluene	µg/L	-	2 ^(h)	0.50	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	4	4	-	-	-	-	
Xylenes	µg/L	-	-	30	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	4	4	-	-	-	-	
Styrene	µg/L	-	72 ^(h)	72	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	4	4	-	-	-	-	
Extractable Petroleum Hydrocarbons (C10-C19)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
Extractable Petroleum Hydrocarbons (C10-C32)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
Volatile Hydrocarbons	µg/L	-	-	-	-	<50	25	<50	<50	<50	<50	0	4	4	-	-	-	-	
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	-	<50	25	<50	<50	<50	<50	0	4	4	-	-	-	-	
Methyl tertiary-butyl ether	µg/L	-	-	-	-	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0	4	4	-	-	-	-	
Parent PAHs																			
Naphthalene	µg/L	-	1.1 ^(h)	1.0	-	<0.00765	0.0038	<0.00765	<0.00765	<0.00765	<0.00765	0	4	4	-	-	-	-	
Acenaphthylene	µg/L	-	-	-	-	<0.000135	0.000063	<0.000158	<0.000158	<0.0000992	<0.000158	0.000013	4	4	-	-	-	-	
Biphenyl	µg/L	-	-	-	-	<0.00468	0.0023	<0.00468	<0.00468	<0.00468	<0.00468	0	4	4	-	-	-	-	
Acenaphthene	µg/L	-	5.8 ^(h)	6.0	-	<0.000279	0.00013	<0.000282	<0.000282	<0.000226	<0.000282	0.000013	4	4	-	-	-	-	
Fluorene	µg/L	-	3 ^(h)	12	-	<0.00016	0.000080	<0.000213	<0.000213	<0.000117	<0.000213	0.000020	4	4	-	-	-	-	
Phenanthrene	µg/L	-	0.4 ^(h)	0.30	-	<0.0033	0.0017	<0.0033	<0.0033	<0.0033	<0.0033	0	4	4	-	-	-	-	
Anthracene	µg/L	-	0.012 ^(h)	0.10	-	<0.0000965	0.000043	<0.000108	<0.000108	<0.0000555	<0.000108	0.000011	4	4	-	-	-	-	
Dibenzothiophene	µg/L	-	-	-	-	<0.000115	0.000057	<0.000152	<0.000152	<0.000091	<0.000152	0.000014	4	4	-	-	-	-	
Pyrene	µg/L	-	0.025 ^(h)	0.020	-	<0.001467	0.00073	<0.001467	<0.001467	<0.001467	<0.001467	0	4	4	-	-	-	-	
Fluoranthene	µg/L	-	0.04 ^(h)	0.20	-	<0.001131	0.00057	<0.001131	<0.001131	<0.001131	<0.001131	0	4	4	-	-	-	-	
Benzo(a)anthracene	µg/L	-	0.018 ^(h)	0.10	-	<0.00111	0.00056	<0.00111	<0.00111	<0.00111	<0.00111	0	4	4	-	-	-	-	
Chrysene	µg/L	-	-	-	-	<0.000429	0.00021	<0.000429	<0.000429	<0.000429	<0.000429	0	4	4	-	-	-	-	
1-Methyl-7-isopropyl-phenanthrene (Retene)	µg/L	-	-	-	-	0.00046	0.00050	0.00064	0.00078	0.00028	0.00082	0.00025	0	4	-	-	-	-	
Benzo(b)fluoranthene	µg/L	-	-	-	-	<0.000247	0.00011	<0.000251	<0.000251	<0.000151	<0.000251	0.000024	4	4	-	-	-	-	
Benzo(k)fluoranthenes	µg/L	-	-	-	-	<0.000247	0.000092	<0.000281	<0.000281	<0.0000797	<0.000281	0.000047	4	4	-	-	-	-	
Benzo(b,j,k)fluoranthenes	µg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
Benzo(a)pyrene	µg/L	-	0.015 ^(h)	0.010	-	<0.000348	0.00013	<0.000398	<0.000398	<0.000109	<0.000398	0.000068	4	4	-	-	-	-	
Benzo(e)pyrene	µg/L	-	-	-	-	<0.000351	0.00016	<0.000402	<0.000402	<0.000178	<0.000402	0.000048	4	4	-	-	-	-	
Perylene	µg/L	-	-	-	-	<0.000543	0.00022	<0.000636	<0.000636	<0.000177	<0.000636	0.000099	4	4	-	-	-	-	
Benzo(g,h,i)perylene	µg/L	-	-	-	-	<0.000504	0.00025	<0.000504	<0.000504	<0.000504	<0.000504	0	4	4	-	-	-	-	
Indeno(c,d-123)pyrene	µg/L	-	-	-	-	<0.000188	0.000094	<0.000259	<0.000259	<0.000138	<0.000259	0.000026	4	4	-	-	-	-	
Dibenzo(a,h)anthracene	µg/L	-	-	-	-	<0.00019	0.000097	<0.000288	<0.000288	<0.000112	<0.000288	0.000036	4	4	-	-	-	-	

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		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Freshet (April to early June)								Standard Deviation	nd	Count	% Above Guideline			
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Acute	Chronic				BC MOE Mean	BC MOE Max		
Alkylated PAHs																				
C1 substituted naphthalenes	µg/L	-	-	-	-	<0.00939	0.0047	<0.00939	<0.00939	<0.00939	<0.00939	0	4	4	-	-	-	-	-	
1-Methylnaphthalene	µg/L	-	-	-	-	<0.001656	0.00083	<0.001656	<0.001656	<0.001656	<0.001656	0	4	4	-	-	-	-	-	
2-Methylnaphthalene	µg/L	-	-	-	-	<0.00939	0.0047	<0.00939	<0.00939	<0.00939	<0.00939	0	4	4	-	-	-	-	-	
C2 substituted naphthalenes	µg/L	-	-	-	-	<0.01257	0.0063	<0.01257	<0.01257	<0.01257	<0.01257	0	4	4	-	-	-	-	-	
1,2-Dimethylnaphthalene	µg/L	-	-	-	-	<0.000566	0.00025	<0.000617	<0.000617	<0.000373	<0.000617	0.000056	4	4	-	-	-	-	-	
2,6-Dimethylnaphthalene	µg/L	-	-	-	-	0.00052	0.00030	0.00052	0.00052	<0.000377	<0.000522	0.00015	3	4	-	-	-	-	-	
C1 substituted acenaphthenes	µg/L	-	-	-	-	<0.000309	0.00014	<0.000354	<0.000354	<0.000183	<0.000354	0.000037	4	4	-	-	-	-	-	
C1 substituted biphenyls	µg/L	-	-	-	-	<0.001857	0.00093	<0.001857	<0.001857	<0.001857	<0.001857	0	4	4	-	-	-	-	-	
C3 substituted naphthalenes	µg/L	-	-	-	-	<0.00582	0.0029	<0.00582	<0.00582	<0.00582	<0.00582	0	4	4	-	-	-	-	-	
2,3,5-Trimethylnaphthalene	µg/L	-	-	-	-	0.00031	0.00034	0.00057	0.00057	0.00029	0.00057	0.00016	1	4	-	-	-	-	-	
2,3,6-Trimethylnaphthalene	µg/L	-	-	-	-	<0.000972	0.00049	<0.000972	<0.000972	<0.000972	<0.000972	0	4	4	-	-	-	-	-	
C1 substituted fluorenes	µg/L	-	-	-	-	0.00078	0.00079	0.0011	0.0011	0.00046	0.0011	0.00034	0	4	-	-	-	-	-	
2-Methylfluorene	µg/L	-	-	-	-	<0.00018	0.000084	<0.000218	<0.000218	<0.000112	<0.000218	0.000022	4	4	-	-	-	-	-	
C2 substituted biphenyls	µg/L	-	-	-	-	<0.0033	0.0017	<0.0033	<0.0033	<0.0033	<0.0033	0	4	4	-	-	-	-	-	
C4 substituted naphthalenes	µg/L	-	-	-	-	0.00062	0.00064	0.00071	0.00090	0.00038	0.00095	0.00023	0	4	-	-	-	-	-	
1,4,6,7-Tetramethylnaphthalene	µg/L	-	-	-	-	<0.000208	0.000099	<0.000271	<0.000271	<0.000131	<0.000271	0.000029	4	4	-	-	-	-	-	
C1 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.00058	0.00036	0.00060	0.00065	<0.000191	0.00066	0.00030	2	4	-	-	-	-	-	
1-Methylphenanthrene	µg/L	-	-	-	-	0.00027	0.00015	0.00027	0.00027	<0.000191	<0.000301	0.000078	3	4	-	-	-	-	-	
2-Methylphenanthrene	µg/L	-	-	-	-	<0.000211	0.00016	0.00037	0.00037	<0.000169	0.00037	0.00014	3	4	-	-	-	-	-	
3-Methylphenanthrene	µg/L	-	-	-	-	<0.000247	0.00011	<0.000262	<0.000262	<0.000195	<0.000262	0.000015	4	4	-	-	-	-	-	
9/4-Methylphenanthrene	µg/L	-	-	-	-	0.00029	0.00020	0.00030	0.00031	<0.000195	0.00032	0.00012	2	4	-	-	-	-	-	
2-Methylanthracene	µg/L	-	-	-	-	<0.000199	0.000086	<0.000218	<0.000218	<0.000113	<0.000218	0.000023	4	4	-	-	-	-	-	
C2 substituted fluorenes	µg/L	-	-	-	-	0.00095	0.00087	0.0011	0.0011	0.00052	0.0011	0.00026	0	4	-	-	-	-	-	
1,7-Dimethylfluorene	µg/L	-	-	-	-	<0.000205	0.000087	<0.000205	<0.000205	<0.000105	<0.000205	0.000033	4	4	-	-	-	-	-	
C1 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.000111	0.000083	0.00018	0.00018	<0.0000936	0.00018	0.000062	3	4	-	-	-	-	-	
2/3-Methyldibenzothiophenes	µg/L	-	-	-	-	<0.000109	0.000052	<0.000111	<0.000111	<0.0000936	<0.000111	0.0000039	4	4	-	-	-	-	-	
C2 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.00075	0.00071	0.00092	0.00096	0.00035	0.00097	0.00028	0	4	-	-	-	-	-	
1,7-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000098	0.000054	<0.000185	<0.000185	<0.000089	<0.000185	0.000027	4	4	-	-	-	-	-	
1,8-Dimethylphenanthrene	µg/L	-	-	-	-	<0.0000644	0.000032	<0.0000784	<0.0000784	<0.0000549	<0.0000784	0.0000055	4	4	-	-	-	-	-	
2,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.0000644	0.000032	<0.0000784	<0.0000784	<0.0000549	<0.0000784	0.0000055	4	4	-	-	-	-	-	
3,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.0000655	0.000032	<0.0000797	<0.0000797	<0.0000558	<0.0000797	0.0000056	4	4	-	-	-	-	-	
C3 substituted fluorenes	µg/L	-	-	-	-	<0.00534	0.0027	<0.00534	<0.00534	<0.00534	<0.00534	0	4	4	-	-	-	-	-	
C2 substituted dibenzothiophenes	µg/L	-	-	-	-	0.00054	0.00059	0.00063	0.00076	0.00047	0.00079	0.00014	0	4	-	-	-	-	-	
2,4-Dimethyldibenzothiophene	µg/L	-	-	-	-	<0.000175	0.000077	<0.000193	<0.000193	<0.0000847	<0.000193	0.000024	4	4	-	-	-	-	-	
C1 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.00082	0.00060	0.00083	0.00085	<0.000708	0.00085	0.00028	2	4	-	-	-	-	-	
C3 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.000576	0.00037	0.00064	0.00064	<0.000576	0.00064	0.00017	3	4	-	-	-	-	-	
1,2,6-Trimethylphenanthrene	µg/L	-	-	-	-	<0.0000783	0.000037	<0.0000795	<0.0000795	<0.0000681	<0.0000795	0.0000028	4	4	-	-	-	-	-	
C3 substituted dibenzothiophenes	µg/L	-	-	-	-	0.00064	0.00065	0.00072	0.00089	0.00036	0.00093	0.00023	0	4	-	-	-	-	-	
C2 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.00080	0.00080	0.00090	0.0010	0.00058	0.0010	0.00019	0	4	-	-	-	-	-	
C4 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.0011	0.0011	0.0015	0.0017	0.00060	0.0018	0.00055	0	4	-	-	-	-	-	
C4 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.002319	0.0012	<0.002319	<0.002319	<0.002319	<0.002319	0	4	4	-	-	-	-	-	
C1 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.00026	0.00025	0.00032	0.00035	0.00012	0.00035	0.00011	0	4	-	-	-	-	-	
5/6-Methylchrysenes	µg/L	-	-	-	-	<0.000104	0.000046	<0.000121	<0.000121	<0.000061	<0.000121	0.000013	4	4	-	-	-	-	-	
C3 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.000221	0.00019	0.00048	0.00048	<0.000143	0.00048	0.00019	3	4	-	-	-	-	-	
C2 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000151	0.000067	<0.000181	<0.000181	<0.0000772	<0.000181	0.000022	4	4	-	-	-	-	-	
5,9-Dimethylchrysene	µg/L	-	-	-	-	<0.000151	0.000067	<0.000181	<0.000181	<0.0000772	<0.000181	0.000022	4	4	-	-	-	-	-	
C4 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.00011	0.000050	<0.000129	<0.000129	<0.000074	<0.000129	0.000012	4	4	-	-	-	-	-	
C1 substituted benzo(a)fluoranthenes / benzopyrenes	µg/L	-	-	-	-	0.00060	0.00062	0.00079	0.00093	0.00033	0.00096	0.00028	0	4	-	-	-	-	-	
7-Methylbenzo(a)pyrene	µg/L	-	-	-	-	<0.000308	0.00015	<0.000416	<0.000416	<0.000223	<0.000416	0.000042	4	4	-	-	-	-	-	
C3 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.00025	0.00025	0.00035	0.00040	0.000092	0.00041	0.00014	0	4	-	-	-	-	-	
C2 substituted benzo(a)fluoranthenes / benzopyrenes	µg/L	-	-	-	-	0.00066	0.00049	0.00070	0.00082	<0.000456	0.00084	0.00031	2	4	-	-	-	-	-	
C4 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.00059	0.00046	0.00065	0.00082	<0.000414	0.00086	0.00032	2	4	-	-	-	-	-	
1-methylchrysene	µg/L	-	-	-	-	<0.0000982	0.000043	<0.000114	<0.000114	<0.0000575	<0.000114	0.000012	4	4	-	-	-	-	-	
3-methylfluoranthene / benzo(a)fluorene	µg/L	-	-	-	-	<0.000588	0.00029	<0.000588	<0.000588	<0.000588	<0.000588	0	4	4	-	-	-	-	-	

APPENDIX B
Table B-7: Seasonal Surface Water Quality Summary in Whitestone River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary														
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Freshet (April to early June)								Standard Deviation	nd	Count	% Above Guideline			
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Acute	Chronic				BC MOE Mean	BC MOE Max		
Naphthenic Acid																				
C12h18o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C12h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C12h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C12h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C13h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C13h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C13h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C13h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C14h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C14h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C14h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C14h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C14h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C15h18o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C15h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C15h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C15h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C15h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C15h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C15h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C16h20o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C16h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C16h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C16h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C16h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C16h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C16h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C17h22o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C17h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C17h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C17h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C17h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C17h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C17h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C18h24o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C18h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C18h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C18h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C18h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C18h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C18h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C19h26o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C19h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C19h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C19h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C19h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C19h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C19h38o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C20h28o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C20h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C20h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C20h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C20h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C20h38o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C21h30o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C21h32o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C21h34o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C21h36o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C21h38o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
C21h40o2	ng/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
Radionuclides																				
Actinium-228	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
Bismuth-212	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
Bismuth-214	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
Lead-210	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
Lead-211	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
Lead-212	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
Lead-214	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
Potassium-40	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
Radium-223	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
Radium-226	Bq/L	-	-	-	-	0.0070	0.0055	0.0078	0.0096	<0.005	0.010	0.0037	2	4	-	-	-	-	-	
Radon-219	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
Thallium-208	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
Thorium-227	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
Thorium-230	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
Thorium-234	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
Uranium-235	Bq/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	

APPENDIX B
Table B-7: Seasonal Surface Water Quality Summary in Whitestone River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary														
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Open Water (late June to September)								Standard Deviation	nd	Count	% Above Guideline			
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Acute	Chronic				BC MOE Mean	BC MOE Max		
Field Measured																				
pH	-	-	6.5 - 9.0	6.5 - 9.0	6.5 - 9.0	7.8	7.8	8.0	8.2	7.3	8.2	0.25	0	20	-	-	-	-	-	
Specific conductivity	µS/cm	-	-	-	-	317	308	328	397	186	406	58	0	20	-	-	-	-	-	
Temperature	°C	-	-	-	-	9.6	9.3	14	15	2.4	16	5.0	0	20	-	-	-	-	-	
Dissolved oxygen	mg/L	-	6.5	8.0	5.0	11	11	12	13	9.0	13	1.5	0	17	-	-	-	-	-	
Turbidity	NTU	-	-	-	-	8.7	15	17	47	2.1	52	17	0	11	-	-	-	-	-	
Conventional Parameters																				
Hardness, as CaCO ₃	mg/L	-	-	-	-	166	159	173	201	84	221	33	0	20	-	-	-	-	-	
Total alkalinity, as CaCO ₃	mg/L	-	-	20 ^(a)	-	108	98	111	129	43	148	27	0	20	-	-	-	-	-	
Total dissolved solids	mg/L	-	-	-	-	219	201	230	254	64	278	59	0	20	-	-	-	-	-	
Total suspended solids	mg/L	-	-	-	-	2.5	9.4	7.0	43	<1.0	55	16	7	20	-	-	-	-	-	
Total organic carbon	mg/L	-	-	-	-	11	12	15	20	4.4	21	5.0	0	12	-	-	-	-	-	
Dissolved organic carbon	mg/L	-	-	-	-	12	13	18	21	3.8	22	5.6	0	20	-	-	-	-	-	
Dissolved inorganic carbon	mg/L	-	-	-	-	23	22	26	34	2.2	35	7.8	0	20	-	-	-	-	-	
Total inorganic carbon	mg/L	-	-	-	-	23	21	24	33	9.8	35	7.8	0	12	-	-	-	-	-	
Major Ions																				
Bicarbonate, as CaCO ₃	mg/L	-	-	-	-	109	110	131	147	52	180	30	0	20	-	-	-	-	-	
Bromide	mg/L	-	-	-	-	0.030	0.031	<0.1	<0.1	<0.02	<0.1	0.020	15	16	-	-	-	-	-	
Calcium	mg/L	-	-	-	-	48	46	52	63	22	63	10	0	20	-	-	-	-	-	
Carbonate, as CaCO ₃	mg/L	-	-	-	-	<6.0	2.0	<6.0	<6.0	<1.0	<6.0	1.3	20	20	-	-	-	-	-	
Chloride	mg/L	640	120	150	600	0.29	0.34	0.34	0.71	0.19	0.82	0.16	0	20	-	-	-	-	-	
Fluoride	mg/L	-	0.12 ^(b)	-	1.3 - 1.8 ^(b)	-	-	-	-	-	-	-	0	0	-	-	-	-	-	
Magnesium	mg/L	-	-	-	-	9.4	9.3	10	11	6.8	12	1.4	0	20	-	-	-	-	-	
Potassium	mg/L	-	-	-	-	0.50	0.49	0.50	0.60	0.40	0.62	0.061	0	20	-	-	-	-	-	
Sodium	mg/L	-	-	-	-	4.6	5.0	5.2	8.0	3.4	9.5	1.6	0	20	-	-	-	-	-	
Sulphate	mg/L	-	-	309 - 429 ^(b, c)	-	59	58	65	79	40	79	12	0	20	-	-	-	-	-	
Nutrients																				
Nitrate	mg-N/L	124	2.9	3.0	33	0.075	0.081	0.12	0.17	<0.01	0.17	0.054	3	20	-	-	-	-	-	
Nitrite	mg-N/L	-	0.060	0.020 ^(d)	0.060 ^(d)	<0.01	0.013	<0.01	0.040 ^(BC MOE Mean)	<0.01	0.050 ^(BC MOE Mean)	0.016	16	20	-	-	-	20	-	
Nitrate + nitrite	mg-N/L	-	-	-	-	0.088	0.097	0.14	0.16	0.049	0.17	0.051	0	8	-	-	-	-	-	
Total ammonia	mg-N/L	-	0.50 - 9.7 ^(e)	0.71 - 2.1 ^(f)	3.7 - 18 ^(g)	0.010	0.020	<0.02	0.046	<0.01	0.17	0.037	12	20	-	-	-	-	-	
Total kjeldahl nitrogen	mg-N/L	-	-	-	-	0.36	0.39	0.50	0.56	0.23	0.57	0.13	0	8	-	-	-	-	-	
Total nitrogen (calculated)	mg-N/L	-	-	-	-	0.47	0.49	0.64	0.69	0.29	0.69	0.17	0	8	-	-	-	-	-	
Total nitrogen	mg-N/L	-	-	-	-	0.56	0.53	0.68	0.73	0.21	0.75	0.17	0	16	-	-	-	-	-	
Total phosphorus	mg-P/L	-	-	0.010	-	0.012	0.010	0.014	0.020	0.0050	0.025	0.0062	3	12	-	-	-	-	-	
Dissolved phosphorus	mg-P/L	-	-	-	-	<0.01	0.0059	<0.01	0.012	<0.01	0.012	0.0025	7	8	-	-	-	-	-	
Phosphorus (as phosphate)	mg-P/L	-	-	-	-	0.016	0.021	0.025	0.054	0.0050	0.073	0.019	0	18	-	-	-	-	-	
Total Metals																				
Aluminum	µg/L	-	100 ^(h, i)	-	-	150 ^(Chronic)	354 ^(Chronic)	457 ^(Chronic)	1,370 ^(Chronic)	39	1,740 ^(Chronic)	463	0	20	-	75	-	-	-	
Antimony	µg/L	-	-	9.0	-	0.16	0.13	0.19	<0.2	0.10	<0.2	0.031	5	20	-	-	-	-	-	
Arsenic	µg/L	-	5.0	-	5.0	0.45	0.54	0.60	1.1	0.28	1.2	0.25	0	20	-	-	-	-	-	
Barium	µg/L	-	-	1,000	-	120	121	127	140	105	145	12	0	20	-	-	-	-	-	
Beryllium	µg/L	-	-	0.13	-	<0.05	0.035	0.060	0.10	0.010	0.10	0.023	8	20	-	-	-	-	-	
Bismuth	µg/L	-	-	-	-	<0.1	0.031	<0.1	<0.2	<0.01	<0.2	0.029	16	16	-	-	-	-	-	
Boron	µg/L	29,000	1,500	-	1,200	13	13	14	16	9.0	20	2.4	0	20	-	-	-	-	-	
Cadmium	µg/L	1.8 - 7.4 ^(b)	0.14 - 0.37 ^(b)	-	-	0.030	0.040	0.045	0.091	0.010	0.11	0.026	0	20	-	-	-	-	-	
Chromium	µg/L	-	1.0	1.0 ^(j)	-	0.50	0.76	1.1 ^(Chronic, BC MOE Mean)	2.6 ^(Chronic, BC MOE Mean)	<0.05	3.1 ^(Chronic, BC MOE Mean)	0.82	4	20	-	25	25	-	-	
Cobalt	µg/L	-	-	4.0	110	0.16	0.37	0.35	1.2	0.10	1.6	0.43	0	20	-	-	-	-	-	
Copper	µg/L	-	2.0 - 4.0 ^(b)	3.4 - 10 ^(b)	9.9 - 35 ^(b)	2.3	2.7	3.0	6.0 ^(Chronic, BC MOE Mean)	1.2	6.0 ^(Chronic, BC MOE Mean)	1.3	0	20	-	20	10	-	-	
Iron	µg/L	-	300	-	1,000	410 ^(Chronic)	785 ^(Chronic)	1,023 ^(Chronic, BC MOE Max)	2,332 ^(Chronic, BC MOE Max)	160	2,940 ^(Chronic, BC MOE Max)	772	0	20	-	70	-	-	25	
Lead	µg/L	-	2.5 - 7.0 ^(b)	5.9 - 19 ^(b)	65 - 396 ^(b)	0.15	0.29	0.41	0.92	<0.01	1.3	0.33	4	20	-	-	-	-	-	
Lithium	µg/L	-	-	-	-	6.6	6.6	7.0	8.1	5.0	9.0	1.0	0	20	-	-	-	-	-	
Manganese	µg/L	-	-	975 - 2,127 ^(b)	1,466 - 3,394 ^(b)	35	50	57	117	17	131	34	0	20	-	-	-	-	-	
Mercury	µg/L	-	0.026	0.010	-	<0.01	0.0065	<0.01	0.010	<0.01	<0.05 ^(DL-Chronic, DL-BC MOE Mean)	0.0046	18	20	-	-	-	-	-	
Molybdenum	µg/L	-	73	1,000	2,000	0.89	0.88	1.1	1.2	0.40	1.3	0.25	0	20	-	-	-	-	-	
Nickel	µg/L	-	84 - 150 ^(b)	84 - 150 ^(b)	-	2.6	3.3	4.0	7.0	1.2	7.0	1.7	0	20	-	-	-	-	-	
Selenium	µg/L	-	1.0	2.0	-	0.75	0.87	1.0	1.3 ^(Chronic)	0.50	2.0 ^(Chronic)	0.35	0	20	-	20	-	-	-	
Silicon	µg/L	-	-	-	-	1,850	2,385	3,145	4,688	990	5,600	1,265	0	20	-	-	-	-	-	
Silver	µg/L	-	0.25	0.050 - 1.5 ^(b)	0.10 - 3.0 ^(b)	0.016	0.017	0.033	<0.1	<0.01	<0.1	0.013	10	20	-	-	-	-	-	
Strontium	µg/L	-	-	-	-	144	135	152	161	71	185	29	0	20	-	-	-	-	-	
Sulphur	µg/L	-	-	-	-	20,000	20,513	23,925	27,325	14,800	28,300	4,030	0	16	-	-	-	-	-	
Tellurium	µg/L	-	-	-	-	<0.05	0.031	<0.1	<0.1	<0.05	<0.1	0.011	16	16	-	-	-	-	-	
Thallium	µg/L	-	0.80	0.80	-	<0.01	0.0093	0.011	0.031	<0.004	0.040	0.0098	9	20	-	-	-	-	-	
Thorium	µg/L	-	-	-	-	0.070	0.12	0.16	0.40	0.020	0.43	0.12	4	20	-	-	-	-	-	
Tin	µg/L	-	-	-	-	<0.1	0.059	<0.1	0.31	<0.05	0.31	0.063	18	20	-	-	-	-	-	
Titanium	µg/L	-	-	-	-	5.0	11	16	33	0.60	45	12	0	20	-	-	-	-	-	
Uranium	µg/L	33	15	8.5	-	0.71	0.72	0.83	1.0	<0.4	1.2	0.21	1	20	-	-	-	-	-	
Vanadium	µg/L	-	-	-	-	1.2	1.5	1.7	4.3	<0.05	5.3	1.3	1	20	-	-	-	-	-	
Zinc	µg/L	-	30	7.5 - 188 ^(b)	33 - 225 ^(b)	2.0	3.6	4.2	11 ^(BC MOE Mean)	0.70	14 ^(BC MOE Mean)	3.9	3	20	-	-	10	-	-	
Zirconium	µg/L	-	-	-	-	0.55	0.52	0.74	1.0	0.20	1.1	0.28	3	20	-	-	-	-	-	

APPENDIX B
Table B-7: Seasonal Surface Water Quality Summary in Whitestone River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary														
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Open Water (late June to September)								Standard Deviation	nd	Count	% Above Guideline			
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Acute	Chronic				BC MOE Mean	BC MOE Max		
Dissolved Metals																				
Aluminum	µg/L	-	-	50 ^(B)	100 ^(B)	37	49	66 ^(BC MOE Mean)	116 ^(BC MOE Mean, BC MOE Max)	9.0	130 ^(BC MOE Mean, BC MOE Max)	32	0	20	-	-	30	10		
Antimony	µg/L	-	-	-	-	<0.2	0.13	<0.2	0.20	0.11	0.20	0.032	10	20	-	-	-	-		
Arsenic	µg/L	-	-	-	-	0.36	0.37	0.40	0.60	0.22	<1.0	0.093	1	20	-	-	-	-		
Barium	µg/L	-	-	-	-	106	108	113	132	92	136	13	0	20	-	-	-	-		
Beryllium	µg/L	-	-	-	-	<0.04	0.034	0.040	0.060	0.010	<0.5	0.052	10	20	-	-	-	-		
Bismuth	µg/L	-	-	-	-	<1.0	0.26	<1.0	<1.0	<0.01	<1.0	0.25	20	20	-	-	-	-		
Boron	µg/L	-	-	-	-	12	12	13	14	9.0	<20	1.4	1	20	-	-	-	-		
Cadmium	µg/L	-	-	0.19 - 0.46 ^(B)	0.49 - 2.1 ^(B)	0.020	0.024	0.033	0.040	0.010	<0.1	0.011	1	20	-	-	-	-		
Chromium	µg/L	-	-	-	-	<0.4	0.29	0.40	0.60	0.070	0.60	0.13	7	20	-	-	-	-		
Cobalt	µg/L	-	-	-	-	0.12	0.18	0.19	0.43	0.040	0.45	0.13	0	20	-	-	-	-		
Copper	µg/L	-	-	-	-	2.0	2.2	2.4	4.0	1.0	<5.0	0.79	1	20	-	-	-	-		
Iron	µg/L	-	-	-	350	174	215	281	461 ^(BC MOE Max)	31	481 ^(BC MOE Max)	132	0	20	-	-	-	15		
Lead	µg/L	-	-	-	-	<0.1	0.13	<0.1	0.26	<0.01	1.5	0.33	16	20	-	-	-	-		
Lithium	µg/L	-	-	-	-	6.0	5.9	6.7	7.2	3.0	8.8	1.3	0	20	-	-	-	-		
Manganese	µg/L	-	-	-	-	31	39	47	84	14	86	22	0	20	-	-	-	-		
Mercury	µg/L	-	-	-	-	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	20	20	-	-	-	-		
Molybdenum	µg/L	-	-	-	-	0.88	0.82	0.98	1.1	0.37	1.1	0.22	0	20	-	-	-	-		
Nickel	µg/L	-	-	-	-	2.2	2.5	3.0	4.0	0.90	4.0	0.90	0	20	-	-	-	-		
Selenium	µg/L	-	-	-	-	0.80	0.80	1.0	1.5	0.50	<2.0	0.30	3	20	-	-	-	-		
Silicon	µg/L	-	-	-	-	1,590	1,782	2,030	2,975	900	3,060	602	0	20	-	-	-	-		
Silver	µg/L	-	-	-	-	<0.01	0.0080	<0.01	0.020	<0.01	<0.1	0.010	19	20	-	-	-	-		
Strontium	µg/L	-	-	-	-	137	131	145	156	74	184	26	0	20	-	-	-	-		
Sulphur	µg/L	-	-	-	-	18,600	19,430	22,400	26,000	12,300	26,000	3,890	0	20	-	-	-	-		
Tellurium	µg/L	-	-	-	-	<0.05	0.047	<0.1	<0.5	<0.05	<0.5	0.055	16	16	-	-	-	-		
Thallium	µg/L	-	-	-	-	<0.01	0.0079	<0.01	0.030	<0.004	<0.1	0.012	15	20	-	-	-	-		
Thorium	µg/L	-	-	-	-	0.090	0.12	<0.4	<0.5	0.020	<0.5	0.086	10	20	-	-	-	-		
Tin	µg/L	-	-	-	-	<0.1	0.063	<0.1	<1.0	<0.05	<1.0	0.10	20	20	-	-	-	-		
Titanium	µg/L	-	-	-	-	8.0	5.1	<10	14	0.30	20	5.3	6	20	-	-	-	-		
Uranium	µg/L	-	-	-	-	0.63	0.65	0.77	1.0	<0.4	1.1	0.22	2	20	-	-	-	-		
Vanadium	µg/L	-	-	-	-	0.30	0.27	0.36	0.55	0.096	0.55	0.11	1	20	-	-	-	-		
Zinc	µg/L	-	-	-	-	1.5	1.7	2.3	4.0	0.50	<5.0	1.2	6	20	-	-	-	-		
Zirconium	µg/L	-	-	-	-	0.36	0.49	0.68	1.2	0.20	1.4	0.32	1	20	-	-	-	-		
Volatile Organics																				
Benzene	µg/L	-	370 ^(B)	40	-	<0.5	42 ^(BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	97	12	12	-	-	-	-		
Ethylbenzene	µg/L	-	90 ^(B)	200	-	<1.0	42	<1.0	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	97	12	12	-	-	-	-		
Toluene	µg/L	-	2 ^(B)	0.50	-	<1.0 ^(DL>BC MOE Mean)	42 ^(Chronic, BC MOE Mean)	<1.0 ^(DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	97	12	12	-	-	-	-		
Xylenes	µg/L	-	-	30	-	<2.0	42 ^(BC MOE Mean)	<2.0	<500 ^(DL>BC MOE Mean)	<0.5	<500 ^(DL>BC MOE Mean)	97	12	12	-	-	-	-		
Styrene	µg/L	-	72 ^(B)	72	-	<0.5	63	<500 ^(DL>Chronic, DL>BC MOE Mean)	<500 ^(DL>Chronic, DL>BC MOE Mean)	<0.5	<500 ^(DL>Chronic, DL>BC MOE Mean)	116	8	8	-	-	-	-		
Extractable Petroleum Hydrocarbons (C10-C19)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Extractable Petroleum Hydrocarbons (C10-C32)	mg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Volatile Hydrocarbons	µg/L	-	-	-	-	<100	4,196	<100	<50,000	<50	<50,000	9,718	12	12	-	-	-	-		
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	-	<100	4,196	<100	<50,000	<50	<50,000	9,718	12	12	-	-	-	-		
Methyl tertiary-butyl ether	µg/L	-	-	-	-	<0.5	63	<500	<500	<0.5	<500	116	8	8	-	-	-	-		
Parent PAHs																				
Naphthalene	µg/L	-	1.1 ^(B)	1.0	-	<0.00564	0.0039	<0.01275	0.014	<0.00354	0.014	0.0033	15	16	-	-	-	-		
Acenaphthylene	µg/L	-	-	-	-	0.00010	0.000074	<0.000209	<0.00027	<0.0000571	<0.00027	0.000034	15	16	-	-	-	-		
Biphenyl	µg/L	-	-	-	-	<0.002241	0.00097	<0.002463	<0.002463	<0.001191	<0.002463	0.00025	16	16	-	-	-	-		
Acenaphthene	µg/L	-	5.8 ^(B)	6.0	-	<0.00032	0.00016	<0.000357	<0.000487	<0.000195	<0.000487	0.000038	16	16	-	-	-	-		
Fluorene	µg/L	-	3 ^(B)	12	-	0.00024	0.00013	<0.000255	0.00026	<0.0000756	<0.000283	0.000067	12	16	-	-	-	-		
Phenanthrene	µg/L	-	0.4 ^(B)	0.30	-	<0.002298	0.0011	<0.002607	<0.002607	<0.00198	<0.002607	0.00013	16	16	-	-	-	-		
Anthracene	µg/L	-	0.012 ^(B)	0.10	-	<0.000169	0.000097	<0.000291	<0.000295	<0.0000655	<0.000295	0.000039	16	16	-	-	-	-		
Dibenzothiophene	µg/L	-	-	-	-	<0.00048	0.00022	<0.00084	<0.00084	<0.000092	<0.00084	0.00014	16	16	-	-	-	-		
Pyrene	µg/L	-	0.025 ^(B)	0.020	-	<0.000912	0.00045	<0.001383	<0.001383	<0.000573	<0.001383	0.00016	16	16	-	-	-	-		
Fluoranthene	µg/L	-	0.04 ^(B)	0.20	-	<0.001215	0.00065	<0.001752	<0.001752	<0.001077	<0.001752	0.00014	16	16	-	-	-	-		
Benzo(a)anthracene	µg/L	-	0.018 ^(B)	0.10	-	0.00012	0.00014	0.00022	<0.000495	<0.000096	<0.000495	0.000090	12	16	-	-	-	-		
Chrysene	µg/L	-	-	-	-	0.00047	0.00034	<0.000747	0.00075	<0.000303	0.00076	0.00022	12	16	-	-	-	-		
1-Methyl-7-isopropyl-phenanthrene (Retene)	µg/L	-	-	-	-	<0.000744	0.00097	0.0012	0.0029	0.00028	0.0070	0.0017	9	16	-	-	-	-		
Benzo(b)fluoranthene	µg/L	-	-	-	-	<0.000119	0.00023	0.00039	<0.001131	<0.0000557	<0.001131	0.00024	13	16	-	-	-	-		
Benzo(g,k)fluoranthenes	µg/L	-	-	-	-	<0.000138	0.000067	<0.000189	<0.000251	<0.0000668	<0.000251	0.000028	16	16	-	-	-	-		
Benzo(b,j,k)fluoranthenes	µg/L	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-		
Benzo(a)pyrene	µg/L	-	0.015 ^(B)	0.010	-	<0.000195	0.000093	<0.000263	<0.000352	<0.0000952	<0.000352	0.000038	16	16	-	-	-	-		
Benzo(e)pyrene	µg/L	-	-	-	-	<0.000191	0.00017	<0.000344	0.00050	<0.0000869	0.00061	0.00018	13	16	-	-	-	-		
Perylene	µg/L	-	-	-	-	0.00025	0.00035	0.00095	0.0011	<0.000109	0.0013	0.00043	11	16	-	-	-	-		
Benzo(g,h,i)perylene	µg/L	-	-	-	-	<0.000115	0.00010	<0.000214	0.00033	<0.0000506	0.00034	0.000098	14	16	-	-	-	-		
Indeno(c,d-123)pyrene	µg/L	-	-	-	-	<0.000138	0.000081	<0.000285	<0.000319	<0.0000509	<0.000319	0.000048	16	16	-	-	-	-		
Dibenzo(a,h)anthracene	µg/L	-	-	-	-	<0.00013	0.000070	<0.00018	<0.000385	<0.000047	<0.000385	0.000047	16	16	-	-	-	-		

APPENDIX B
Table B-7: Seasonal Surface Water Quality Summary in Whitestone River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary														
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Open Water (late June to September)								Standard Deviation	nd	Count	% Above Guideline			
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Acute	Chronic				BC MOE Mean	BC MOE Max		
Alkylated PAHs																				
C1 substituted naphthalenes	µg/L	-	-	-	-	<0.00906	0.0036	<0.01344	<0.01344	<0.002661	<0.01344	0.0023	16	16	-	-	-	-	-	
1-Methylnaphthalene	µg/L	-	-	-	-	<0.001674	0.00085	<0.002328	0.0030	<0.000849	0.0030	0.00063	15	16	-	-	-	-	-	
2-Methylnaphthalene	µg/L	-	-	-	-	<0.00675	0.0028	<0.01176	<0.01176	<0.001812	<0.01176	0.0021	16	16	-	-	-	-	-	
C2 substituted naphthalenes	µg/L	-	-	-	-	<0.00951	0.0047	<0.01377	<0.01377	<0.00642	<0.01377	0.0014	16	16	-	-	-	-	-	
1,2-Dimethylnaphthalene	µg/L	-	-	-	-	<0.000651	0.00035	<0.001188	<0.001188	<0.000267	<0.001188	0.00017	16	16	-	-	-	-	-	
2,6-Dimethylnaphthalene	µg/L	-	-	-	-	<0.000366	0.00033	0.00070	0.00080	<0.000309	0.00084	0.00025	12	16	-	-	-	-	-	
C1 substituted acenaphthenes	µg/L	-	-	-	-	<0.00021	0.00012	<0.000357	<0.000415	<0.0000881	<0.000415	0.000052	16	16	-	-	-	-	-	
C1 substituted biphenyls	µg/L	-	-	-	-	<0.00375	0.0020	<0.00927	<0.00927	<0.000936	<0.00927	0.0016	16	16	-	-	-	-	-	
C3 substituted naphthalenes	µg/L	-	-	-	-	<0.00528	0.0027	<0.00663	<0.00663	0.0021	<0.00663	0.00063	12	16	-	-	-	-	-	
2,3,5-Trimethylnaphthalene	µg/L	-	-	-	-	<0.000552	0.00038	<0.000575	0.00097	<0.000465	0.0010	0.00027	13	16	-	-	-	-	-	
2,3,6-Trimethylnaphthalene	µg/L	-	-	-	-	0.00066	0.00045	<0.000756	0.00096	<0.000456	0.0011	0.00028	12	16	-	-	-	-	-	
C1 substituted fluorenes	µg/L	-	-	-	-	<0.001497	0.00079	0.0017	<0.0021	<0.00041	<0.0021	0.00036	13	16	-	-	-	-	-	
2-Methylfluorene	µg/L	-	-	-	-	<0.000202	0.00015	<0.000316	<0.0017	<0.000117	<0.0017	0.00019	16	16	-	-	-	-	-	
C2 substituted biphenyls	µg/L	-	-	-	-	<0.01707	0.0087	<0.0414	<0.0414	0.00055	<0.0414	0.0077	13	16	-	-	-	-	-	
C4 substituted naphthalenes	µg/L	-	-	-	-	<0.002802	0.0022	<0.00573	0.016	<0.000139	0.016	0.0038	15	16	-	-	-	-	-	
1,4,6,7-Tetramethylnaphthalene	µg/L	-	-	-	-	0.00030	0.00016	<0.000388	<0.000576	<0.000118	<0.000576	0.000079	15	16	-	-	-	-	-	
C1 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.00040	0.00096	0.0011	0.0032	0.00017	0.0035	0.0012	5	16	-	-	-	-	-	
1-Methylphenanthrene	µg/L	-	-	-	-	<0.000372	0.00029	0.00057	0.00083	<0.000124	0.00085	0.00029	11	16	-	-	-	-	-	
2-Methylphenanthrene	µg/L	-	-	-	-	<0.000378	0.00030	0.00047	0.00080	<0.000134	0.00081	0.00026	8	16	-	-	-	-	-	
3-Methylphenanthrene	µg/L	-	-	-	-	0.00020	0.00027	0.00057	0.00068	<0.000126	0.00074	0.00024	6	16	-	-	-	-	-	
9/4-Methylphenanthrene	µg/L	-	-	-	-	0.00020	0.00031	0.00075	0.00088	<0.00013	0.0011	0.00034	8	16	-	-	-	-	-	
2-Methylanthracene	µg/L	-	-	-	-	<0.000163	0.000091	<0.000212	<0.000388	<0.0000829	<0.000388	0.000045	16	16	-	-	-	-	-	
C2 substituted fluorenes	µg/L	-	-	-	-	<0.000939	0.00059	0.0012	<0.001899	<0.000183	<0.001899	0.00039	13	16	-	-	-	-	-	
1,7-Dimethylfluorene	µg/L	-	-	-	-	<0.000273	0.00016	<0.000351	<0.000923	<0.000139	<0.000923	0.00010	16	16	-	-	-	-	-	
C1 substituted dibenzothiophenes	µg/L	-	-	-	-	0.00018	0.00016	0.00031	0.00063	<0.0000808	0.00063	0.00015	11	16	-	-	-	-	-	
2/3-Methyldibenzothiophenes	µg/L	-	-	-	-	<0.000207	0.00011	<0.000272	<0.000449	<0.0000808	<0.000449	0.000049	16	16	-	-	-	-	-	
C2 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.001182	0.00081	0.0016	<0.002049	0.00023	<0.002049	0.00040	12	16	-	-	-	-	-	
1,7-Dimethylphenanthrene	µg/L	-	-	-	-	0.00026	0.00015	<0.000261	0.00032	<0.000123	<0.000359	0.000072	12	16	-	-	-	-	-	
1,8-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000977	0.000068	<0.000185	<0.000366	0.000044	<0.000366	0.000046	15	16	-	-	-	-	-	
2,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000144	0.000093	<0.000315	<0.000366	<0.000085	<0.000366	0.000046	16	16	-	-	-	-	-	
3,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.000159	0.000090	0.00016	<0.000373	<0.000069	<0.000373	0.000044	15	16	-	-	-	-	-	
C3 substituted fluorenes	µg/L	-	-	-	-	0.00029	0.00026	<0.01116	<0.01116	<0.000846	<0.01116	0.0018	13	16	-	-	-	-	-	
C2 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.002103	0.0010	<0.002364	0.0037	<0.000555	0.0037	0.00080	12	16	-	-	-	-	-	
2,4-Dimethyldibenzothiophene	µg/L	-	-	-	-	<0.000241	0.00014	<0.000395	<0.000828	<0.0000347	<0.000828	0.000099	16	16	-	-	-	-	-	
C1 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.001653	0.00100	0.0017	<0.00108	0.0026	<0.00108	0.00063	12	16	-	-	-	-	-	
C3 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.0010	0.00074	<0.002682	<0.002682	<0.000339	<0.002682	0.00045	12	16	-	-	-	-	-	
1,2,6-Trimethylphenanthrene	µg/L	-	-	-	-	<0.0000895	0.000047	<0.000101	<0.000195	<0.0000576	<0.000195	0.000018	16	16	-	-	-	-	-	
C3 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.001377	0.0014	<0.00432	0.0044	<0.001056	0.0044	0.0012	14	16	-	-	-	-	-	
C2 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.00020	0.0012	<0.0033	<0.0033	0.00018	<0.0033	0.00069	10	16	-	-	-	-	-	
C4 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	<0.002622	0.0021	<0.00459	0.0095	<0.001035	0.0095	0.0021	12	16	-	-	-	-	-	
C4 substituted dibenzothiophenes	µg/L	-	-	-	-	<0.002262	0.00100	<0.002763	<0.002763	<0.001017	<0.002763	0.00033	16	16	-	-	-	-	-	
C1 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.00022	0.00026	0.00036	0.00061	<0.0000465	0.00065	0.00020	4	16	-	-	-	-	-	
5/6-Methylchrysenes	µg/L	-	-	-	-	<0.0000974	0.000051	<0.000136	<0.000147	<0.0000388	<0.000147	0.000016	16	16	-	-	-	-	-	
C3 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.000846	0.00041	<0.001221	0.0014	<0.00024	0.0014	0.00031	14	16	-	-	-	-	-	
C2 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000438	0.00022	<0.00102	<0.00102	<0.0000582	<0.00102	0.00019	16	16	-	-	-	-	-	
5,9-Dimethylchrysene	µg/L	-	-	-	-	<0.000108	0.000059	<0.000164	<0.000235	<0.0000582	<0.000235	0.000027	16	16	-	-	-	-	-	
C4 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	<0.000225	0.00021	0.00041	<0.000822	<0.0000845	<0.000822	0.00015	12	16	-	-	-	-	-	
C1 substituted benzo(a)fluoranthenes / benzopyrenes	µg/L	-	-	-	-	<0.000663	0.00028	<0.001062	<0.001062	<0.000219	<0.001062	0.00017	16	16	-	-	-	-	-	
7-Methylbenzo(a)pyrene	µg/L	-	-	-	-	<0.000219	0.000099	<0.000282	<0.000319	<0.000109	<0.000319	0.000038	16	16	-	-	-	-	-	
C3 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000537	0.00024	<0.001092	<0.001092	<0.000113	<0.001092	0.00020	16	16	-	-	-	-	-	
C2 substituted benzo(a)fluoranthenes / benzopyrenes	µg/L	-	-	-	-	0.00036	0.00052	<0.002082	<0.002082	<0.000178	<0.002082	0.00039	15	16	-	-	-	-	-	
C4 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.000102	0.00011	<0.000172	0.00033	<0.0000701	0.00048	0.00012	12	16	-	-	-	-	-	
1-methylchrysene	µg/L	-	-	-	-	<0.0000919	0.000049	<0.000125	<0.000142	<0.0000355	<0.000142	0.000013	15	16	-	-	-	-	-	
3-methylfluoranthene / benzo(a)fluorene	µg/L	-	-	-	-	0.00037	0.00040	0.00087	0.0012	<0.000156	0.0013	0.00042	10	16	-	-	-	-	-	

APPENDIX B
Table B-7: Seasonal Surface Water Quality Summary in Whitestone River, 2013 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Seasonal Summary												
						Open Water (late June to September)								Standard Deviation	nd	Count	% Above Guideline	
		Acute (CCME)	Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Acute	Chronic				BC MOE Mean	BC MOE Max
Naphthenic Acid																		
C12h18o2	ng/L	-	-	-	-	21	19	23	29	9.1	33	6.9	0	12	-	-	-	-
C12h20o2	ng/L	-	-	-	-	14	26	31	76	7.4	84	26	1	12	-	-	-	-
C12h22o2	ng/L	-	-	-	-	7.1	43	57	178	<4.7	208	70	7	12	-	-	-	-
C12h24o2	ng/L	-	-	-	-	<5.3	148	219	627	<4.7	660	244	8	12	-	-	-	-
C13h20o2	ng/L	-	-	-	-	13	10	15	16	<4.8	16	5.1	3	12	-	-	-	-
C13h22o2	ng/L	-	-	-	-	<15	23	29	66	<5.1	79	24	3	12	-	-	-	-
C13h24o2	ng/L	-	-	-	-	10	36	47	138	<4.8	162	54	6	12	-	-	-	-
C13h26o2	ng/L	-	-	-	-	25	195	224	808	<4.8	1,000	323	3	12	-	-	-	-
C14h20o2	ng/L	-	-	-	-	15	15	18	25	7.8	28	6.6	1	12	-	-	-	-
C14h22o2	ng/L	-	-	-	-	<16	13	21	24	<5.0	24	7.9	5	12	-	-	-	-
C14h24o2	ng/L	-	-	-	-	<14	16	19	48	<5.3	63	18	5	12	-	-	-	-
C14h26o2	ng/L	-	-	-	-	<14	31	36	112	<4.7	142	45	7	12	-	-	-	-
C14h28o2	ng/L	-	-	-	-	<5.3	129	181	521	<4.7	696	223	8	12	-	-	-	-
C15h18o2	ng/L	-	-	-	-	12	31	17	141	<5.1	155	52	4	12	-	-	-	-
C15h20o2	ng/L	-	-	-	-	10	11	18	24	<4.7	25	7.3	4	12	-	-	-	-
C15h22o2	ng/L	-	-	-	-	44	55	64	97	25	102	24	0	12	-	-	-	-
C15h24o2	ng/L	-	-	-	-	77	107	131	221	40	295	70	0	12	-	-	-	-
C15h26o2	ng/L	-	-	-	-	18	26	29	66	9.2	78	22	1	12	-	-	-	-
C15h28o2	ng/L	-	-	-	-	<5.3	20	21	77	<4.7	93	30	8	12	-	-	-	-
C15h30o2	ng/L	-	-	-	-	<5.3	95	127	390	<4.7	505	162	8	12	-	-	-	-
C16h20o2	ng/L	-	-	-	-	7.7	6.6	12	15	<5.0	15	4.3	7	12	-	-	-	-
C16h22o2	ng/L	-	-	-	-	<5.1	2.9	<5.2	<14	<4.7	<14	1.4	12	12	-	-	-	-
C16h24o2	ng/L	-	-	-	-	<13	20	41	59	<4.7	61	25	8	12	-	-	-	-
C16h26o2	ng/L	-	-	-	-	18	75	117	263	8.2	345	106	1	12	-	-	-	-
C16h28o2	ng/L	-	-	-	-	<5.3	9.8	20	37	<4.7	37	11	8	12	-	-	-	-
C16h30o2	ng/L	-	-	-	-	<5.2	14	14	62	<4.7	100	28	9	12	-	-	-	-
C16h32o2	ng/L	-	-	-	-	<6.0	20	<14	99	<4.8	165	47	10	12	-	-	-	-
C17h22o2	ng/L	-	-	-	-	8.0	18	77	69	<5.1	77	25	6	12	-	-	-	-
C17h24o2	ng/L	-	-	-	-	<5.1	3.2	<5.3	6.5	<4.7	<14	1.7	11	12	-	-	-	-
C17h26o2	ng/L	-	-	-	-	7.5	8.2	12	19	<4.8	21	5.9	5	12	-	-	-	-
C17h28o2	ng/L	-	-	-	-	21	25	29	44	11	45	11	0	12	-	-	-	-
C17h30o2	ng/L	-	-	-	-	13	13	20	28	<5.2	36	9.2	3	12	-	-	-	-
C17h32o2	ng/L	-	-	-	-	<5.3	12	27	40	<4.7	49	16	8	12	-	-	-	-
C17h34o2	ng/L	-	-	-	-	<5.3	59	92	216	<4.7	268	92	8	12	-	-	-	-
C18h24o2	ng/L	-	-	-	-	32	105	114	390	16	447	142	0	12	-	-	-	-
C18h26o2	ng/L	-	-	-	-	5.3	9.7	16	28	<4.7	29	10.0	7	12	-	-	-	-
C18h28o2	ng/L	-	-	-	-	<5.3	71	119	257	<4.7	270	110	8	12	-	-	-	-
C18h30o2	ng/L	-	-	-	-	<5.2	4.3	6.3	11	<4.7	<14	2.9	9	12	-	-	-	-
C18h32o2	ng/L	-	-	-	-	<5.2	3.7	<7.9	10	<4.7	<14	2.5	11	12	-	-	-	-
C18h34o2	ng/L	-	-	-	-	<5.1	2.9	<5.2	<14	<4.7	<14	1.4	12	12	-	-	-	-
C18h36o2	ng/L	-	-	-	-	<5.3	49	94	183	<4.7	227	76	8	12	-	-	-	-
C19h26o2	ng/L	-	-	-	-	24	32	33	81	7.6	83	24	0	12	-	-	-	-
C19h28o2	ng/L	-	-	-	-	<5.3	4.2	8.0	<14	<4.7	<14	2.3	9	12	-	-	-	-
C19h30o2	ng/L	-	-	-	-	<5.3	6.4	11	16	<4.7	16	5.3	8	12	-	-	-	-
C19h32o2	ng/L	-	-	-	-	<5.2	4.9	9.6	12	<4.7	<14	3.6	9	12	-	-	-	-
C19h34o2	ng/L	-	-	-	-	11	7.9	15	22	<4.7	<25	6.5	8	12	-	-	-	-
C19h36o2	ng/L	-	-	-	-	6.0	6.4	15	17	<4.7	<19	5.1	8	12	-	-	-	-
C19h38o2	ng/L	-	-	-	-	18	17	30	<55	<5.3	<55	8.0	5	12	-	-	-	-
C20h28o2	ng/L	-	-	-	-	7.8	100	104	449	<4.9	460	172	5	12	-	-	-	-
C20h30o2	ng/L	-	-	-	-	141	162	214	318	45	327	99	0	12	-	-	-	-
C20h32o2	ng/L	-	-	-	-	44	53	75	86	17	87	24	0	12	-	-	-	-
C20h34o2	ng/L	-	-	-	-	6.9	6.1	7.9	9.1	<4.9	<14	2.3	4	12	-	-	-	-
C20h36o2	ng/L	-	-	-	-	<5.1	2.9	<5.2	<14	<4.7	<14	1.4	12	12	-	-	-	-
C20h38o2	ng/L	-	-	-	-	<5.1	3.2	<5.3	6.0	<4.7	<14	1.6	11	12	-	-	-	-
C21h30o2	ng/L	-	-	-	-	16	33	23	135	5.4	154	49	1	12	-	-	-	-
C21h32o2	ng/L	-	-	-	-	<5.1	3.1	<5.2	<14	<4.7	<14	1.5	11	12	-	-	-	-
C21h34o2	ng/L	-	-	-	-	<5.1	2.9	<5.2	<14	<4.7	<14	1.4	12	12	-	-	-	-
C21h36o2	ng/L	-	-	-	-	<5.1	2.9	<5.2	<14	<4.7	<14	1.4	12	12	-	-	-	-
C21h38o2	ng/L	-	-	-	-	<5.1	2.9	<5.2	<14	<4.7	<14	1.4	12	12	-	-	-	-
C21h40o2	ng/L	-	-	-	-	<5.1	3.2	<5.3	5.9	<4.7	<14	1.6	11	12	-	-	-	-
Radionuclides																		
Actinium-228	Bq/L	-	-	-	-	<1.0	0.69	1.0	1.0	<0.7	1.0	0.30	4	7	-	-	-	-
Bismuth-212	Bq/L	-	-	-	-	<2.0	1.0	<2.0	2.0	<1.0	2.0	0.50	6	7	-	-	-	-
Bismuth-214	Bq/L	-	-	-	-	<0.6	0.29	<0.7	<0.8	<0.4	<0.8	0.075	7	7	-	-	-	-
Lead-210	Bq/L	-	-	-	-	<4.0	1.9	<4.0	<5.0	<3.0	<5.0	0.38	7	7	-	-	-	-
Lead-211	Bq/L	-	-	-	-	<5.0	2.1	<5.0	<6.0	<3.0	<6.0	0.63	7	7	-	-	-	-
Lead-212	Bq/L	-	-	-	-	0.50	0.46	0.50	0.92	<0.3	1.1	0.32	2	7	-	-	-	-
Lead-214	Bq/L	-	-	-	-	<0.5	0.24	<0.6	<0.6	<0.4	<0.6	0.045	7	7	-	-	-	-
Potassium-40	Bq/L	-	-	-	-	<4.0	2.9	6.0	6.0	<4.0	<7.0	1.5	6	7	-	-	-	-
Radium-223	Bq/L	-	-	-	-	<1.0	0.46	<1.0	<1.0	<0.6	<1.0	0.075	7	7	-	-	-	-
Radium-226	Bq/L	-	-	-	-	<0.005	0.25	0.0090	0.010	<0.005	<5.0	0.79	7	10	-	-	-	-
Radon-219	Bq/L	-	-	-	-	<1.0	0.47	<1.0	<1.0	<0.8	<1.0	0.039	7	7	-	-	-	-
Thallium-208	Bq/L	-	-	-	-	<0.3	0.19	0.30	0.30	<0.2	0.30	0.085	4	7	-	-	-	-
Thorium-227	Bq/L	-	-	-	-	<0.8	0.41	<1.0	<1.0	<0.6	<1.0	0.073	7	7	-	-	-	-
Thorium-230	Bq/L	-	-	-	-	<10	7.9	<20	<30	<10	<30	3.9	7	7	-	-	-	-
Thorium-234	Bq/L	-	-	-	-	<3.0	1.7	<4.0	<4.0	<3.0	<4.0	0.27	7	7	-	-	-	-
Uranium-235	Bq/L	-	-	-	-	<1.0	0.49	<1.0	<1.0	<0.9	<1.0	0.024	7	7	-	-	-	-

Seasonal Surface Water Quality Summary in Whitestone River, 2013 to 2017

^(a) = guideline is a minimum value, unless the background concentration or value is lower.

^(b) = guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (84 to 346 mg/L). The guideline is calculated based on the individual hardness value for each sample.

^(c) = for some samples, water hardness was greater than 250 mg/L. At this hardness, no BC MOE water quality guideline has been established for sulphate; however, the observed data were screened against the guideline for very hard water

^(d) = guideline is chloride dependent. The guideline range shown is based on the chloride concentration range observed in the dataset (0.1900 to 0.8200 mg/L). The guideline is calculated based on the individual chloride concentration in each

^(e) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.5049 mg-N/L) is based on the combination of field pH (8.2) and water temperature (12.5°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature

^(f) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.7060 mg-N/L) is based on the combination of field pH (8.2) and water temperature (12.5°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature

^(g) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (3.6700 mg-N/L) is based on the combination of field pH (8.2) and water temperature (12.5°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature

^(h) = guideline is pH dependent. The guideline range shown is based on the pH range observed in the dataset (7.3 to 8.2). The guideline is calculated based on the individual pH for each sample.

⁽ⁱ⁾ = guideline is pH dependent: 5 µg/L at pH < 6.5 and 100 µg/L at pH ≥ 6.5.

^(j) = guideline is for chromium VI.

^(l) = interim guideline

(Chronic) = concentration is higher than the chronic aquatic life CCME guideline or outside the recommended pH, DO or (BC MOE Mean) = concentration is higher than the 30-day mean BC MOE guideline or outside the recommended pH, DO or total alkalinity range.

(BC MOE Max) = concentration is higher than the maximum BC MOE guideline or outside the recommended pH, DO or (DL>Chronic) = analytical detection limit is higher than the chronic aquatic life CCME guideline.

(DL>BC MOE Mean) = analytical detection limit is higher than the 30-day mean BC MOE guideline.

(DL>BC MOE Max) = analytical detection limit is higher than the maximum BC MOE guideline.

Bolded concentrations are higher than water quality guidelines.

Water quality data and guidelines shown in this table were rounded to reflect laboratory or field instrument precision *after* comparisons to guidelines. Therefore, values slightly above guidelines may be displayed as being equal to the guidelines and identified as exceedances. Concentrations equal to the guideline values were not identified as

- = no guideline or no data.

APPENDIX C

**Groundwater Quality Data
and Summary Statistics**

Table C-1: Groundwater Quality and Guidelines Comparison for the Eagle Plains Baseline Study, 2015 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life			Yukon CSR	Sampling Stations					
		Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)		DALG-DP1	DALG-DP1	DALG-DP2	DALG-DP2	DALG-DP2	EAGL-DP1
						22-Jun-16	22-Sep-16	22-Jun-16	22-Sep-16	21-Sep-17	16-Sep-15
Field Measured											
pH	-	6.5 - 9.0	-	-	-	6.3 ^(Chronic)	7.3	7.1	7.4	6.8	-
Specific conductivity	µS/cm	-	-	-	-	752	329	499	368	867	-
Temperature	°C	-	-	-	-	8.6	4.6	9.9	5.1	4.8	-
Dissolved oxygen	mg/L	5.5 - 9.5	-	-	-	3.3 ^(Chronic)	3.1 ^(Chronic)	2.5 ^(Chronic)	2.3 ^(Chronic)	0.31 ^(Chronic)	-
Redox potential	mV	-	-	-	-	49	-76	-54	-84		-
Total dissolved solids	mg/L	-	-	-	-	-	214	-	239		-
Conventional Parameters											
pH	-	6.5 - 9.0	-	-	-	7.0	7.7	6.4 ^(Chronic)	7.8	7.5	6.3 ^(Chronic)
Specific conductivity	µS/cm	-	-	-	-	566	320	488	355	843	307
Hardness, as CaCO ₃	mg/L	-	-	-	-	250	110	234	145	460	112
Total alkalinity, as CaCO ₃	mg/L	-	20 ^(a)	-	-	99	32	72	52	222	24
Total dissolved solids	mg/L	-	-	-	-	408	52 ^(s)	356	<5 ^(s)	650	102
Total suspended solids	mg/L	-	-	-	-	90	40	215	6.0	2.0	176
Total organic carbon	mg/L	-	-	-	-	17	17	29	17	11	10
Dissolved organic carbon	mg/L	-	-	-	-	15	18	15	18	9.2	7.0
Alkalinity, Phenolphthalein as CaCO ₃	mg/L	-	-	-	-	<5.0	<5.0	<5.0	<5.0		<5.0
Total inorganic carbon	mg/L	-	-	-	-	24	8.5	27	14		9.2
Dissolved inorganic carbon	mg/L	-	-	-	-	23	8.2	25	14		7.0
Major Ions											
Bicarbonate, as CaCO ₃	mg/L	-	-	-	-	120	39	87	64	271	30
Bromide	mg/L	-	-	-	-	<0.02	<0.02	<0.02	<0.02	-	101 ^(s)
Calcium	mg/L	-	-	-	-	74	31	68	42	150	27
Carbonate, as CaCO ₃	mg/L	-	-	-	-	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0
Chloride	mg/L	120	-		-	<0.05	<0.05	<0.05	0.20	<0.5	1.0
Hydroxide, as CaCO ₃	mg/L	-	-	-	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Magnesium	mg/L	-	-	-	-	16	9.1	15	9.9	23	11
Potassium	mg/L	-	-	-	-	2.4	0.90	1.9	1.1	1.6	1.2
Sodium	mg/L	-	-	-	-	34	18	23	17	15	14
Sulphate	mg/L	-	218 - 429 ^(b, c)	-	1,000	209	124	144	123	264	<0.5 ^(s)
Ion balance	%	-	-	-	-	-	97	-	101	-	-
Nutrients											
Nitrate	mg-N/L	13			400	<0.01	<0.01	<0.01	<0.01	<0.10	<0.01
Nitrite	mg-N/L	0.060			0.2 ^(g)	<0.01	<0.01	<0.01	<0.01	<0.10 ^(DL>Chronic)	0.03
Total ammonia	mg-N/L	0.134 - 73 ^(d)			1.3 - 18.4 ^(e)	0.46	0.18	0.26	0.090	-	0.11
Total nitrogen	mg-N/L	-	-	-	-	1.5	0.69	1.3	0.56	-	-
Total kjeldahl nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	0.61
Phosphorus (as phosphate)	mg-P/L	-	-	-	-	0.64	0.046	0.016	0.052	-	0.18

Table C-1: Groundwater Quality and Guidelines Comparison for the Eagle Plains Baseline Study, 2015 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life			Yukon CSR	Sampling Stations						Sampling Stations	
		Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)		McPL-DP1	McPL-DP1	McPL-DP2	McPL-DP2	McPL-DP2	McPL-DP3	YOWN-1401	
						16-Sep-15	22-Jun-16	22-Jun-16	22-Sep-16	20-Sep-17	22-Sep-16	27-Aug-13	
Field Measured													
pH	-	6.5 - 9.0	-	-	-	-	7.0	6.9	6.8	7.0	6.9	-	
Specific conductivity	µS/cm	-	-	-	-	-	199	178	183	182	199	-	
Temperature	°C	-	-	-	-	-	7.6	8.3	2.5	4.6	3.4	-	
Dissolved oxygen	mg/L	5.5 - 9.5	-	-	-	-	3.1 ^(Chronic)	3.6 ^(Chronic)	3.0 ^(Chronic)	0.26 ^(Chronic)	2.8 ^(Chronic)	-	
Redox potential	mV	-	-	-	-	-	-127	-98	-27	-	-63	-	
Total dissolved solids	mg/L	-	-	-	-	-	-	-	120	-	129	-	
Conventional Parameters													
pH	-	6.5 - 9.0	-	-	-	7.0	6.5 ^(Chronic)	6.5	6.4 ^(Chronic)	7.0	6.8	7.3	
Specific conductivity	µS/cm	-	-	-	-	252	148	141	145	135	156	11,410	
Hardness, as CaCO ₃	mg/L	-	-	-	-	120	64	63	62	41	66	3,670	
Total alkalinity, as CaCO ₃	mg/L	-	20 ^(a)	-	-	109	27	17 ^(BC MOE mean)	51	53	59	1,310	
Total dissolved solids	mg/L	-	-	-	-	<5 ^(s)	976 ^(s)	440 ^(s)	<5 ^(s)	210	144	13,000	
Total suspended solids	mg/L	-	-	-	-	154	381	135	504	5.5	8.0	18	
Total organic carbon	mg/L	-	-	-	-	40	46	39	23	21	23	-	
Dissolved organic carbon	mg/L	-	-	-	-	17	18	20	19	19	21	4.9	
Alkalinity, Phenolphthalein as CaCO ₃	mg/L	-	-	-	-	<5.0	<5.0	<5.0	<5.0	-	<5.0	-	
Total inorganic carbon	mg/L	-	-	-	-	28	11	13	14	-	15	-	
Dissolved inorganic carbon	mg/L	-	-	-	-	26	9.1	12	13	-	14	-	
Major Ions													
Bicarbonate, as CaCO ₃	mg/L	-	-	-	-	133	33	21	63	65	72	1,600	
Bromide	mg/L	-	-	-	-	<0.02	<0.02	<0.02	<0.02	-	<0.02	-	
Calcium	mg/L	-	-	-	-	37	17	17	17	11	18	240	
Carbonate, as CaCO ₃	mg/L	-	-	-	-	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	
Chloride	mg/L	120	-	-	-	0.20	0.38	0.37	0.27	0.3	0.28	1.9	
Hydroxide, as CaCO ₃	mg/L	-	-	-	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	
Magnesium	mg/L	-	-	-	-	6.6	5.3	4.9	5.1	3.4	5.1	746	
Potassium	mg/L	-	-	-	-	1.2	1.5	1.1	1.2	0.88	1.0	13	
Sodium	mg/L	-	-	-	-	3.3	5.6	4.6	5.4	3.8	4.9	2,490	
Sulphate	mg/L	-	218 - 429 ^(b, c)	-	1,000	14	25	20	21	14	19	7,990 ^(BC MOE mean, >Yukon CSR)	
Ion balance	%	-	-	-	-	-	-	-	100	-	100	-	
Nutrients													
Nitrate	mg-N/L	13			400	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Nitrite	mg-N/L	0.060			0.2 ^(g)	0.07 ^(Chronic)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Total ammonia	mg-N/L	0.134 - 73 ^(d)			1.3 - 18.4 ^(e)	0.22	0.55	0.46	0.26	-	0.33	6.1	
Total nitrogen	mg-N/L	-	-	-	-	-	2.5	1.6	1.0	-	1.0	-	
Total kjeldahl nitrogen	mg-N/L	-	-	-	-	0.82	-	-	-	-	-	-	
Phosphorus (as phosphate)	mg-P/L	-	-	-	-	1.5	0.0060	1.1	0.41	-	0.044	-	

Table C-1: Groundwater Quality and Guidelines Comparison for the Eagle Plains Baseline Study, 2015 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life			Yukon CSR					
		Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)		YOWN-1401	YOWN-1401	YOWN-1401	YOWN-1401	YOWN-1401
						15-Mar-15	18-Mar-16	22-Sep-16	5-Mar-17	21-Sep-17
Field Measured										
pH	-	6.5 - 9.0	-	-	-	-	6.9	8.0	8.4	9.0
Specific conductivity	µS/cm	-	-	-	-	-	10,411	9,389	9,280	9,102
Temperature	°C	-	-	-	-	-	-	3.3	-0.1	1.2
Dissolved oxygen	mg/L	5.5 - 9.5	-	-	-	-	4.9 ^(Chronic)	3.7 ^(Chronic)	2.0 ^(Chronic)	2.7 ^(Chronic)
Redox potential	mV	-	-	-	-	-	-38	-224	-	-
Total dissolved solids	mg/L	-	-	-	-	-	-	-	-	-
Conventional Parameters										
pH	-	6.5 - 9.0	-	-	-	-	7.4	8.0	8.1	9.0
Specific conductivity	µS/cm	-	-	-	-	-	10,200	9,540	8,970	8,720
Hardness, as CaCO ₃	mg/L	-	-	-	-	-	2,320	1,270	1,080	1,000
Total alkalinity, as CaCO ₃	mg/L	-	20 ^(a)	-	-	-	1,140	971	833	742
Total dissolved solids	mg/L	-	-	-	-	-	9,640	7,600	7,280	7,400
Total suspended solids	mg/L	-	-	-	-	-	170	91	184	103
Total organic carbon	mg/L	-	-	-	-	-	4.5	3.2	3.4	3.5
Dissolved organic carbon	mg/L	-	-	-	-	-	3.8	3.0	2.6	3.5
Alkalinity, Phenolphthalein as CaCO ₃	mg/L	-	-	-	-	-	<5.0	<5.0	-	-
Total inorganic carbon	mg/L	-	-	-	-	-	265	228	-	-
Dissolved inorganic carbon	mg/L	-	-	-	-	-	82	193	-	-
Major Ions										
Bicarbonate, as CaCO ₃	mg/L	-	-	-	-	-	1,390	1,180	1,020	577
Bromide	mg/L	-	-	-	-	-	<0.2	<0.02	-	-
Calcium	mg/L	-	-	-	-	-	216	83	27	22
Carbonate, as CaCO ₃	mg/L	-	-	-	-	-	<6.0	<6.0	<6.0	161
Chloride	mg/L	120	-	-	-	-	1.1	<0.05	<5.0	<5.0
Hydroxide, as CaCO ₃	mg/L	-	-	-	-	-	<5.0	<5.0	<5.0	<5.0
Magnesium	mg/L	-	-	-	-	-	433	259	246	230
Potassium	mg/L	-	-	-	-	-	10	8.9	9.2	8.6
Sodium	mg/L	-	-	-	-	-	2,500	2,110	2,150	2,300
Sulphate	mg/L	-	218 - 429 ^(b, c)	-	1,000	-	5,860 ^(BC MOE mean, >Yukon CSR)	4,620 ^(BC MOE mean, >Yukon CSR)	4,600 ^(BC MOE mean, >Yukon CSR)	4,450 ^(BC MOE mean, >Yukon CSR)
Ion balance	%	-	-	-	-	-	-	102		
Nutrients										
Nitrate	mg-N/L	13			400	-	<0.1	0.080	<1.0	<1.0
Nitrite	mg-N/L	0.060			0.2 ^(g)	-	<0.1 ^(DL>R)	<0.01	<1.0 ^(DL>Chronic)	<1.0 ^(DL>Chronic)
Total ammonia	mg-N/L	0.134 - 73 ^(d)			1.3 - 18.4 ^(e)	-	4.7	4.5 ^(Chronic)	0.108	0.415 ^(Chronic)
Total nitrogen	mg-N/L	-	-	-	-	-	6.0	5.3	-	-
Total kjeldahl nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-
Phosphorus (as phosphate)	mg-P/L	-	-	-	-	-	0.0040	0.012	-	-

Table C-1: Groundwater Quality and Guidelines Comparison for the Eagle Plains Baseline Study, 2015 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life			Yukon CSR	Sampling Stations					
		Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)		DALG-DP1	DALG-DP1	DALG-DP2	DALG-DP2	DALG-DP2	EAGL-DP1
						22-Jun-16	22-Sep-16	22-Jun-16	22-Sep-16	21-Sep-17	16-Sep-15
Total Metals											
Aluminum	µg/L	5.0 - 100 ^(e, f)	-	-	-	2,670 ^(Chronic)	215 ^(Chronic)	6,710 ^(Chronic)	44	56	2,520 ^(Chronic)
Antimony	µg/L	-	9.0	-	200	0.51	0.080	0.82	0.080	0.22	<0.2
Arsenic	µg/L	5.0	-	-	50	8.7 ^(Chronic)	1.6	20 ^(Chronic)	1.6	2.5	3.9
Barium	µg/L	-	1,000	-	10,000	242	50	458	46	110	164
Beryllium	µg/L	-	0.13	-	53	0.35 ^(BC MOE mean)	<0.05	0.84 ^(BC MOE mean)	<0.05	<0.05	0.16 ^(BC MOE mean)
Bismuth	µg/L	-	-	-	-	<0.1	<0.1	0.20	<0.1	<0.1	<1.0
Boron	µg/L	1,500	-	-	-	60	25	99	26	32	34
Cadmium	µg/L	0.11 - 0.37 ^(b)	-	-	0.3 - 0.6 ^(b)	1.0 ^(Chronic, >Yukon CSR)	0.020	1.8 ^(Chronic, >Yukon CSR)	<0.01	0.1	0.030
Calcium	µg/L	-	-	-	-	77,100	34,200	74,700	44,000	150,000	26,300
Chromium	µg/L	1.0	-	-	10	22 ^(Chronic, >Yukon CSR)	0.99	39 ^(Chronic, >Yukon CSR)	0.31	<0.05	4.8 ^(Chronic)
Cobalt	µg/L	-	4.0	110	9.0	8.9 ^(BC MOE mean)	3.2	11 ^(BC MOE mean, >Yukon CSR)	1.0	8.0 ^(BC MOE mean)	1.3
Copper	µg/L	2.0 - 4.0 ^(b)	-	-	30 - 90 ^(b)	14 ^(Chronic)	0.80	53 ^(Chronic)	0.30	1	5.0 ^(Chronic)
Iron	µg/L	300	-	-	-	26,200 ^(Chronic)	5,970 ^(Chronic)	35,200 ^(Chronic)	1,610 ^(Chronic)	6,400 ^(Chronic)	44,300 ^(Chronic)
Lead	µg/L	1.7 - 7.0 ^(b)	-	-	50 - 160 ^(b)	4.6	0.22	13 ^(Chronic)	0.053	0.13	2.2
Lithium	µg/L	-	-	-	-	14	6.6	19	6.0	8.5	10
Magnesium	µg/L	-	-	-	-	16,400	9,750	17,400	10,300	24,000	10,400
Manganese	µg/L	-	878 - 2,585 ^(b)	1,223 - 3,394 ^(b)	-	1,730 ^(BC MOE mean)	801	1,020	572	3,800 ^(BC MOE mean, BC MOE max)	259
Mercury	µg/L	0.026	-	-	1.0	0.02	<0.01	0.050 ^(Chronic)	<0.01	<0.01	0.010
Molybdenum	µg/L	73	-	-	10,000	2.4	1.2	4.2	1.6	0.88	1.1
Nickel	µg/L	66 - 150 ^(b)	-	-	650 - 1500 ^(b)	40	13	52	8.2	28	6.0
Potassium	µg/L	-	-	-	-	2,600	1,000	3,900	1,100	1,700	2,520
Selenium	µg/L	1.0	-	-	10	3.8 ^(Chronic)	0.40	11 ^(Chronic, >Yukon CSR)	0.30	0.4	<0.6
Silicon	µg/L	-	-	-	-	6,410	2,610	12,000	1,950	3,400	13,900
Silver	µg/L	0.25	-	-	0.5 - 15 ^(b)	0.50 ^(Chronic)	0.012	0.97 ^(Chronic)	<0.01	0.01	0.040
Sodium	µg/L	-	-	-	-	32,600	19,700	21,700	17,600	14,000	13,500
Strontium	µg/L	-	-	-	-	149	68	219	85	280	100
Sulphur	µg/L	-	-	-	-	70,100	40,800	55,800	38,700	93,000	35,400
Tellurium	µg/L	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1
Thallium	µg/L	0.80	-	-	3.0	0.13	<0.01	0.29	<0.01	<0.01	0.070
Thorium	µg/L	-	-	-	-	1.7	0.24	3.5	0.17	0.2	0.50
Tin	µg/L	-	-	-	-	0.50	<0.1	0.20	<0.1	<0.1	<0.1
Titanium	µg/L	-	-	-	1,000	18	8.0	24	6.0	15	175
Uranium	µg/L	15	-	-	3,000	1.4	0.12	3.8	0.26	2.0	<0.4
Vanadium	µg/L	-	-	-	-	32	2.4	66	1.3	0.7	15
Zinc	µg/L	30	-	-	75 - 2400 ^(b)	134 ^(Chronic)	6.3	275 ^(Chronic)	2.0	9.0	18
Zirconium	µg/L	-	-	-	-	4.6	0.60	4.4	0.50	1	2.5

Table C-1: Groundwater Quality and Guidelines Comparison for the Eagle Plains Baseline Study, 2015 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life			Yukon CSR	Sampling Stations						Sampling Stations
		Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)		McPL-DP1	McPL-DP1	McPL-DP2	McPL-DP2	McPL-DP2	McPL-DP3	YOWN-1401
						16-Sep-15	22-Jun-16	22-Jun-16	22-Sep-16	20-Sep-17	22-Sep-16	27-Aug-13
Total Metals												
Aluminum	µg/L	5.0 - 100 ^(e, f)	-	-	-	8,300 ^(Chronic)	108,000 ^(Chronic)	19,600 ^(Chronic)	10,400 ^(Chronic)	3,500 ^(Chronic)	495 ^(Chronic)	6.0
Antimony	µg/L	-	9.0	-	200	0.50	6.5	3.0	0.88	0.36	0.15	<0.2
Arsenic	µg/L	5.0	-	-	50	9.1 ^(Chronic)	108 ^(Chronic, >Yukon CSR)	24 ^(Chronic)	11 ^(Chronic)	6.4 ^(Chronic)	8.5 ^(Chronic)	2.3
Barium	µg/L	-	1,000	-	10,000	1,210 ^(BC MOE mean)	12,400 ^(Mn, Y)	7,240 ^(BC MOE mean)	767	790	322	3.0
Beryllium	µg/L	-	0.13	-	53	0.70 ^(BC MOE mean)	7.6 ^(BC MOE mean)	1.7 ^(BC MOE mean)	0.85 ^(BC MOE mean)	0.28 ^(BC MOE mean)	0.14 ^(BC MOE mean)	<0.04
Bismuth	µg/L	-	-	-	-	<1.0	2.0	<0.5	<1.0	<0.1	<0.1	<1.0
Boron	µg/L	1,500	-	-	-	22	117	45	30	14	10	268
Cadmium	µg/L	0.11 - 0.37 ^(b)	-	-	0.3 - 0.6 ^(b)	1.2 ^(Chronic, >Yukon CSR)	14 ^(Chronic, >Yukon CSR)	10 ^(Chronic, >Yukon CSR)	0.52 ^(Chronic, >Yukon CSR)	0.6 ^(Chronic, >Yukon CSR)	0.090	0.040
Calcium	µg/L	-	-	-	-	41,300	48,100	24,400	19,400	16,000	19,500	246,000
Chromium	µg/L	1.0	-	-	10	21 ^(Chronic, >Yukon CSR)	252 ^(Chronic, >Yukon CSR)	137 ^(Chronic, >Yukon CSR)	17 ^(Chronic, >Yukon CSR)	6.9 ^(Chronic)	1.4 ^(Chronic)	0.60
Cobalt	µg/L	-	4.0	110	9.0	13 ^(BC MOE mean, >Yukon CSR)	110 ^(BC MOE mean, >Yukon CSR)	18 ^(BC MOE mean, >Yukon CSR)	5.1 ^(BC MOE mean)	4.6 ^(BC MOE mean)	0.35	2.8
Copper	µg/L	2.0 - 4.0 ^(b)	-	-	30 - 90 ^(b)	45 ^(Chronic)	418 ^(Chronic, >Yukon CSR)	121 ^(Chronic, >Yukon CSR)	20 ^(Chronic)	15 ^(Chronic)	2.0	6.0 ^(Chronic)
Iron	µg/L	300	-	-	-	39,400 ^(Chronic)	223,000 ^(Chronic)	45,000 ^(Chronic)	22,100 ^(Chronic)	23,000 ^(Chronic)	14,200 ^(Chronic)	4,880 ^(Chronic)
Lead	µg/L	1.7 - 7.0 ^(b)	-	-	50 - 160 ^(b)	16 ^(Chronic)	124 ^(Chronic, >Yukon CSR)	72 ^(Chronic, >Yukon CSR)	6.8 ^(Chronic)	4.9 ^(Chronic)	0.85	0.20
Lithium	µg/L	-	-	-	-	15	172	36	14	6.4	3.9	161
Magnesium	µg/L	-	-	-	-	9,010	40,400	13,200	7,630	6,500	5,620	741,000
Manganese	µg/L	-	878 - 2,585 ^(b)	1,223 - 3,394 ^(b)	-	4,210 ^(BC MOE mean, BC MOE max)	6,020 ^(BC MOE mean, BC MOE max)	2,400 ^(BC MOE mean, BC MOE max)	2,340 ^(BC MOE mean, BC MOE max)	2,300 ^(BC MOE mean, BC MOE Max)	1,800 ^(BC MOE mean, BC MOE max)	-
Mercury	µg/L	0.026	-	-	1.0	0.050 ^(Chronic)	<0.01	<0.01	<0.01	<0.01	<0.01	-
Molybdenum	µg/L	73	-	-	10,000	3.0	30	18	2.1	2.0	2.5	5.7
Nickel	µg/L	66 - 150 ^(b)	-	-	650 - 1500 ^(b)	37	335 ^(Chronic)	110 ^(Chronic)	19	11	1.7	14
Potassium	µg/L	-	-	-	-	4,270	22,000	14,000	5,800	5,500	1,200	12,600
Selenium	µg/L	1.0	-	-	10	2.5 ^(Chronic)	61 ^(Chronic, >Yukon CSR)	18 ^(Chronic, >Yukon CSR)	3.0 ^(Chronic)	1.1 ^(Chronic)	0.60	4.4 ^(Chronic)
Silicon	µg/L	-	-	-	-	24,400	122,000	73,300	42,900	32,000	5,250	3,200
Silver	µg/L	0.25	-	-	0.5 - 15 ^(b)	0.44 ^(Chronic)	3.4 ^(Chronic, >Yukon CSR)	1.1 ^(Chronic, >Yukon CSR)	0.15	0.12	0.019	0.040
Sodium	µg/L	-	-	-	-	3,640	6,650	5,120	6,130	4,900	5,280	2,510,000
Strontium	µg/L	-	-	-	-	159	481	229	104	97	80	1,030
Sulphur	µg/L	-	-	-	-	5,800	16,000	9,400	7,600	5,400	7,000	2,440,000
Tellurium	µg/L	-	-	-	-	<0.1	<0.25	<0.25	<0.5	<0.05	<0.05	<0.1
Thallium	µg/L	0.80	-	-	3.0	0.26	1.9 ^(Chronic)	0.67	0.18	0.08	0.013	<0.01
Thorium	µg/L	-	-	-	-	3.3	31	5.3	1.9	1.0	0.34	<0.4
Tin	µg/L	-	-	-	-	0.10	3.0	0.70	<1.0	<0.1	<0.1	0.10
Titanium	µg/L	-	-	-	1,000	220	390	1,050 ^(>Yukon CSR)	707	510	29	-
Uranium	µg/L	15	-	-	3,000	1.3	12	2.3	0.92	0.37	0.14	16 ^(Chronic)
Vanadium	µg/L	-	-	-	-	37	470	98	37	16	4.1	0.40
Zinc	µg/L	30	-	-	75 - 2400 ^(b)	120 ^(Chronic)	2,000 ^(Chronic, >Yukon CSR)	417 ^(Chronic, >Yukon CSR)	78 ^(Chronic, >Yukon CSR)	49 ^(Chronic)	8.0	11
Zirconium	µg/L	-	-	-	-	3.3	20	7.0	5.0	1.8	2.2	8.5

Table C-1: Groundwater Quality and Guidelines Comparison for the Eagle Plains Baseline Study, 2015 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life			Yukon CSR					
		Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)		YOWN-1401	YOWN-1401	YOWN-1401	YOWN-1401	YOWN-1401
						15-Mar-15	18-Mar-16	22-Sep-16	5-Mar-17	21-Sep-17
Total Metals										
Aluminum	µg/L	5.0 - 100 ^(e, f)	-	-	-	-	51	<100	300 ^(Chronic)	30
Antimony	µg/L	-	9.0	-	200	-	1.5	<2.0	5.0	1.2
Arsenic	µg/L	5.0	-	-	50	-	2.0	<10 ^(DL>Chronic)	<10 ^(DL>Chronic)	1.0
Barium	µg/L	-	1,000	-	10,000	-	9.0	<10	20	5.0
Beryllium	µg/L	-	0.13	-	53	-	<0.5 ^(DL>BC MOE mean)	<5.0 ^(DL>BC MOE mean)	<5.0 ^(DL>BC MOE mean)	<0.5 ^(DL>BC MOE mean)
Bismuth	µg/L	-	-	-	-	-	<1.0	<10	<10	<1.0
Boron	µg/L	1,500	-	-	-	-	338	400	300	270
Cadmium	µg/L	0.11 - 0.37 ^(b)	-	-	0.3 - 0.6 ^(b)	-	<0.1	<1.0 ^(DL>Chronic, DL>Yukon CSR)	<1.0 ^(DL>Chronic, DL>Yukon CSR)	<0.1
Calcium	µg/L	-	-	-	-	-	219,000	89,400	33,900	17,000
Chromium	µg/L	1.0	-	-	10	-	2.3 ^(Chronic)	<5.0 ^(DL>Chronic)	<5.0 ^(DL>Chronic)	<0.50
Cobalt	µg/L	-	4.0	110	9.0	-	2.1	<2.0	5.7 ^(BC MOE mean)	0.97
Copper	µg/L	2.0 - 4.0 ^(b)	-	-	30 - 90 ^(b)	-	<5.0 ^(DL>Chronic)	<20 ^(DL>Chronic)	<20 ^(DL>Chronic)	3.0
Iron	µg/L	300	-	-	-	-	50,900 ^(Chronic)	30,700 ^(Chronic)	85,400 ^(Chronic)	45,000 ^(Chronic)
Lead	µg/L	1.7 - 7.0 ^(b)	-	-	50 - 160 ^(b)	-	0.30	<1.0	5.1	0.40
Lithium	µg/L	-	-	-	-	-	172	150	150	130
Magnesium	µg/L	-	-	-	-	-	437,000	271,000	234,000	220,000
Manganese	µg/L	-	878 - 2,585 ^(b)	1,223 - 3,394 ^(b)	-	-	1,060	11,200 ^(BC MOE mean, BC MOE max)	900	650
Mercury	µg/L	0.026	-	-	1.0	-	<0.01	<0.01	<0.01	<0.01
Molybdenum	µg/L	73	-	-	10,000	-	5.2	4.9	6.5	6.7
Nickel	µg/L	66 - 150 ^(b)	-	-	650 - 1500 ^(b)	-	9.0	<20	40	7.0
Potassium	µg/L	-	-	-	-	-	9,900	9,600	9,100	8,800
Selenium	µg/L	1.0	-	-	10	-	<2.0 ^(DL>Chronic)	<20 ^(DL>Chronic, DL>Yukon CSR)	<20 ^(DL>Chronic, DL>Yukon CSR)	<2.0 ^(DL>Chronic)
Silicon	µg/L	-	-	-	-	-	3,440	2,730	1,800	1,100
Silver	µg/L	0.25	-	-	0.5 - 15 ^(b)	-	<0.1	<1.0 ^(DL>Chronic)	1.0 ^(Chronic)	0.10
Sodium	µg/L	-	-	-	-	-	2,590,000	2,330,000	2,180,000	2,200,000
Strontium	µg/L	-	-	-	-	-	759	220	100	39
Sulphur	µg/L	-	-	-	-	-	2,060,000	1,960,000	1,640,000	1,600,000
Tellurium	µg/L	-	-	-	-	-	<0.5	<5.0	<5.0	<0.50
Thallium	µg/L	0.80	-	-	3.0	-	<0.1	<1.0 ^(DL>Chronic)	<1.0 ^(DL>Chronic)	<0.10
Thorium	µg/L	-	-	-	-	-	0.70	<5.0	<5.0	1.1
Tin	µg/L	-	-	-	-	-	<1.0	<10	1,000	7.0
Titanium	µg/L	-	-	-	1,000	-	11	9.0	8.0	<2.0
Uranium	µg/L	15	-	-	3,000	-	11	1.2	3.5	1.0
Vanadium	µg/L	-	-	-	-	-	<0.5	<5.0	<5.0	<0.5
Zinc	µg/L	30	-	-	75 - 2400 ^(b)	-	5.0	<50 ^(DL>Chronic)	430 ^(Chronic)	28
Zirconium	µg/L	-	-	-	-	-	5.0	<10	<10	<1.0

Table C-1: Groundwater Quality and Guidelines Comparison for the Eagle Plains Baseline Study, 2015 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life			Yukon CSR	Sampling Stations					
		Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)		DALG-DP1	DALG-DP1	DALG-DP2	DALG-DP2	DALG-DP2	EAGL-DP1
						22-Jun-16	22-Sep-16	22-Jun-16	22-Sep-16	21-Sep-17	16-Sep-15
Dissolved Metals											
Aluminum	µg/L	-	33 - 50 ^(e)	65 - 100 ^(e)	-	7.0	36	7.0	16	8.0	<50 ^(DL>BC MOE mean)
Antimony	µg/L	-	-	-	200	<0.2	0.23	0.60	0.091	0.2	<2.0
Arsenic	µg/L	-	-	-	50	0.90	2.0	1.3	1.7	2.5	<2.0
Barium	µg/L	-	-	-	10,000	66	60	78	46	101	90
Beryllium	µg/L	-	-	-	53	<0.04	<0.5	<0.04	<0.05	<0.05	<0.4
Bismuth	µg/L	-	-	-	-	<1.0	<1.0	<1.0	<0.1	<0.1	<10
Boron	µg/L	-	-	-	-	268	40	51	28	29	<40
Cadmium	µg/L	-	0.15 - 0.46 ^(b)	0.36 - 2.8 ^(b)	0.3 - 0.6 ^(b)	0.070	0.17	0.060	0.012	0.1	<0.1
Chromium	µg/L	-	-	-	10	<0.4	<0.5	<0.4	0.066	0.3	<4.0
Cobalt	µg/L	-	-	-	9.0	6.7	4.1	1.1	0.94	7.4	0.88
Copper	µg/L	-	-	-	30 - 90 ^(b)	0.40	<5.0	1.3	0.70	<0.5	<10
Iron	µg/L	-	-	350	-	3,890 ^(BC MOE max)	7,300 ^(BC MOE max)	87	2,230 ^(BC MOE max)	5,490 ^(BC MOE max)	22,000 ^(BC MOE max)
Lead	µg/L	-	-	-	50 - 160 ^(b)	<0.1	<0.1	<0.1	<0.01	0.1	<1.0
Lithium	µg/L	-	-	-	-	11	8.0	7.0	5.3	8.5	<10
Manganese	µg/L	-	-	-	-	2,100	1,070	836	613	3,630	273
Mercury	µg/L	-	-	-	1.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Molybdenum	µg/L	-	-	-	10,000	1.1	1.4	1.9	1.5	0.86	<1.0
Nickel	µg/L	-	-	-	650 - 1500 ^(b)	24	16	8.0	8.2	26	<10
Selenium	µg/L	-	-	-	10	<0.6	<2.0	<0.6	0.40	0.3	<6.0
Silicon	µg/L	-	-	-	-	2,920	1,990	2,530	1,760	3,200	3,320
Silver	µg/L	-	-	-	0.5 - 15 ^(b)	<0.01	<0.1	<0.01	<0.01	<0.01	<0.1
Strontium	µg/L	-	-	-	-	135	80	132	82	256	94
Sulphur	µg/L	-	-	-	-	73,900	37,100	49,100	37,000	95,000	38,000
Tellurium	µg/L	-	-	-	-	<0.1	<0.5	<0.1	<0.05	<0.05	<1.0
Thallium	µg/L	-	-	-	3.0	0.030	0.13	0.020	<0.01	<0.01	<0.1
Thorium	µg/L	-	-	-	-	<0.4	<0.5	<0.4	<0.05	0.2	-
Tin	µg/L	-	-	-	-	<0.1	<1.0	<0.1	<0.1	<0.1	<1.0
Titanium	µg/L	-	-	-	1,000	<10	4.0	<10	4.0	11	<10
Uranium	µg/L	-	-	-	3,000	0.70	0.24	1.4	0.26	1.9	<4.0
Vanadium	µg/L	-	-	-	-	0.40	2.0	1.2	1.1	0.6	<1.0
Zinc	µg/L	-	-	-	75 - 2400 ^(b)	12	<5.0	2.4	4.3	7.3	<10
Zirconium	µg/L	-	-	-	-	0.40	<1.0	0.50	0.50	1	<1.0
Volatile Organics											
Benzene	µg/L	370 ^(h)	-	-	4,000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	µg/L	90 ^(h)	-	-	2,000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	µg/L	2 ^(h)	-	-	390	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylenes	µg/L	-	30	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Styrene	µg/L	72 ^(h)	-	-	-	<0.5	<0.5	<0.5	<0.5	-	<0.5
Volatile Hydrocarbons	µg/L	-	-	-	15,000	<50	<50	<50	<50	-	<50
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	1,500	<50	<50	<50	<50	-	<50
Methyl tert-Butyl Ether	µg/L	10000 ^(h)	-	-	-	<0.5	<0.5	<0.5	<0.5	-	<0.5

Table C-1: Groundwater Quality and Guidelines Comparison for the Eagle Plains Baseline Study, 2015 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life			Yukon CSR	Sampling Stations						Sampling Stations
		Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)		McPL-DP1	McPL-DP1	McPL-DP2	McPL-DP2	McPL-DP2	McPL-DP3	YOWN-1401
						16-Sep-15	22-Jun-16	22-Jun-16	22-Sep-16	20-Sep-17	22-Sep-16	27-Aug-13
Dissolved Metals												
Aluminum	µg/L	-	33 - 50 ^(e)	65 - 100 ^(e)	-	<50	27	40	29	31	24	<5.0
Antimony	µg/L	-	-	-	200	<2.0	0.70	0.30	0.27	0.1	0.081	<0.2
Arsenic	µg/L	-	-	-	50	<2.0	6.6	4.0	7.7	3.0	8.9	3.9
Barium	µg/L	-	-	-	10,000	550	256	292	237	381	242	3.0
Beryllium	µg/L	-	-	-	53	<0.4	0.050	0.090	0.061	<0.05	0.090	<0.04
Bismuth	µg/L	-	-	-	-	<10	<1.0	<1.0	<0.1	<0.1	<0.1	<1.0
Boron	µg/L	-	-	-	-	<40	41	35	14	10	10	276
Cadmium	µg/L	-	0.15 - 0.46 ^(b)	0.36 - 2.8 ^(b)	0.3 - 0.6 ^(b)	<0.1	0.020	0.050	<0.01	0.02	0.014	0.040
Chromium	µg/L	-	-	-	10	<4.0	<0.4	<0.4	0.58	0.5	<0.05	21 ^(>Yukon CSR)
Cobalt	µg/L	-	-	-	9.0	2.8	0.64	0.20	0.40	1.7	0.061	2.7
Copper	µg/L	-	-	-	30 - 90 ^(b)	<10	1.2	2.5	0.50	0.5	<0.5	8.0
Iron	µg/L	-	-	350	-	1,500 ^(BC MOE max)	8,010 ^(BC MOE max)	3,870 ^(BC MOE max)	14,900 ^(BC MOE max)	12,000 ^(BC MOE max)	18,400 ^(BC MOE max)	4,570 ^(BC MOE max)
Lead	µg/L	-	-	-	50 - 160 ^(b)	<1.0	0.20	0.70	<0.01	0.3	0.14	<0.1
Lithium	µg/L	-	-	-	-	<10	4.0	3.0	3.5	2.5	3.1	150
Manganese	µg/L	-	-	-	-	3,570	2,190	1,690	2,700	2,000	2,300	927
Mercury	µg/L	-	-	-	1.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Molybdenum	µg/L	-	-	-	10,000	<1.0	2.4	2.5	1.0	1.3	2.2	5.7
Nickel	µg/L	-	-	-	650 - 1500 ^(b)	<10	3.0	1.0	2.1	2.1	0.60	15
Selenium	µg/L	-	-	-	10	<6.0	<0.6	<0.6	0.50	0.4	0.60	5.4
Silicon	µg/L	-	-	-	-	3,820	3,800	4,080	3,600	2,700	3,650	3,080
Silver	µg/L	-	-	-	0.5 - 15 ^(b)	<0.1	<0.01	0.010	<0.01	<0.01	<0.01	0.040
Strontium	µg/L	-	-	-	-	129	79	71	76	82	69	967
Sulphur	µg/L	-	-	-	-	5,800	8,900	7,300	6,900	4,700	6,400	2,420,000
Tellurium	µg/L	-	-	-	-	<1.0	<0.1	<0.1	<0.05	<0.05	<0.05	<0.1
Thallium	µg/L	-	-	-	3.0	<0.1	<0.01	0.010	<0.01	<0.01	<0.01	<0.01
Thorium	µg/L	-	-	-	-	-	<0.4	<0.4	<0.05	0.1	0.22	<0.4
Tin	µg/L	-	-	-	-	<1.0	<0.1	<0.1	0.70	<0.1	<0.1	<0.1
Titanium	µg/L	-	-	-	1,000	<10	<10	15	2.0	3.0	4.0	<10
Uranium	µg/L	-	-	-	3,000	<4.0	<0.4	<0.4	0.099	0.1	0.078	17
Vanadium	µg/L	-	-	-	-	<1.0	0.90	0.70	1.7	1.5	1.3	2.4
Zinc	µg/L	-	-	-	75 - 2400 ^(b)	<10	2.4	4.0	5.7	3.7	5.3	15
Zirconium	µg/L	-	-	-	-	<1.0	1.0	2.8	1.0	1.7	1.9	7.8
Volatile Organics												
Benzene	µg/L	370 ^(h)	-	-	4,000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-
Ethylbenzene	µg/L	90 ^(h)	-	-	2,000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-
Toluene	µg/L	2 ^(h)	-	-	390	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-
Xylenes	µg/L	-	30	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-
Styrene	µg/L	72 ^(h)	-	-	-	<0.5	<0.5	<0.5	<0.5	-	<0.5	-
Volatile Hydrocarbons	µg/L	-	-	-	15,000	<50	<50	<50	<50	-	<50	-
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	1,500	<50	<50	<50	<50	-	<50	-
Methyl tert-Butyl Ether	µg/L	10000 ^(h)	-	-	-	<0.5	<0.5	<0.5	<0.5	-	<0.5	-

Table C-1: Groundwater Quality and Guidelines Comparison for the Eagle Plains Baseline Study, 2015 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life			Yukon CSR					
		Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)		YOWN-1401	YOWN-1401	YOWN-1401	YOWN-1401	YOWN-1401
						15-Mar-15	18-Mar-16	22-Sep-16	5-Mar-17	21-Sep-17
Dissolved Metals										
Aluminum	µg/L	-	33 - 50 ^(e)	65 - 100 ^(e)	-	-	52 ^(BC MOE mean)	<100 ^(DL>BC MOE mean)	153 ^(BC MOE mean, BC MOE Max)	<10
Antimony	µg/L	-	-	-	200	-	<2.0	<2.0	<2.0	1
Arsenic	µg/L	-	-	-	50	-	<2.0	<10	<10	<1.0
Barium	µg/L	-	-	-	10,000	-	<10	<10	<10	3.0
Beryllium	µg/L	-	-	-	53	-	<0.4	-	<5.0	<0.50
Bismuth	µg/L	-	-	-	-	-	<10	<10	<10	<1.0
Boron	µg/L	-	-	-	-	-	380	500	400	300
Cadmium	µg/L	-	0.15 - 0.46 ^(b)	0.36 - 2.8 ^(b)	0.3 - 0.6 ^(b)	-	<0.1	<1.0 ^(DL>BC MOE mean, DL>Yukon CSR)	<1.0 ^(DL>BC MOE mean, DL>Yukon CSR)	<0.1
Chromium	µg/L	-	-	-	10	-	<4.0	<5.0	<5.0	<0.5
Cobalt	µg/L	-	-	-	9.0	-	1.2	<2.0	<2.0	<0.2
Copper	µg/L	-	-	-	30 - 90 ^(b)	-	3.0	<50 ^(DL>Yukon CSR)	<50 ^(DL>Yukon CSR)	<5.0
Iron	µg/L	-	-	350	-	-	21,700 ^(BC MOE max)	23,100 ^(BC MOE max)	500 ^(BC MOE max)	1,910 ^(BC MOE max)
Lead	µg/L	-	-	-	50 - 160 ^(b)	-	<1.0	<1.0	2.7	<0.1
Lithium	µg/L	-	-	-	-	-	177	210	180	132
Manganese	µg/L	-	-	-	-	-	949	1,200	400	320
Mercury	µg/L	-	-	-	1.0	-	<0.01	<0.01	<0.01	<0.01
Molybdenum	µg/L	-	-	-	10,000	-	5.0	7.7	7.1	4.8
Nickel	µg/L	-	-	-	650 - 1500 ^(b)	-	<10	<20	<20	7.0
Selenium	µg/L	-	-	-	10	-	<6.0	<20 ^(DL>Yukon CSR)	<20 ^(DL>Yukon CSR)	<2.0
Silicon	µg/L	-	-	-	-	-	2,930	2,400	1,390	1,400
Silver	µg/L	-	-	-	0.5 - 15 ^(b)	-	<0.1	-	<1.0 ^(DL>Yukon CSR)	0.20
Strontium	µg/L	-	-	-	-	-	768	260	60	42
Sulphur	µg/L	-	-	-	-	-	2,120,000	1,560,000	1,570,000	1,700,000
Tellurium	µg/L	-	-	-	-	-	<1.0	<5.0	<5.0	<0.50
Thallium	µg/L	-	-	-	3.0	-	<0.1	<1.0	<1.0	<0.10
Thorium	µg/L	-	-	-	-	-	-	-	<5.0	3.2
Tin	µg/L	-	-	-	-	-	<1.0	-	330	<1.0
Titanium	µg/L	-	-	-	1,000	-	<10	7.0	4.0	<2.0
Uranium	µg/L	-	-	-	3,000	-	10	1.6	<1.0	0.1
Vanadium	µg/L	-	-	-	-	-	<1.0	<5.0	<5.0	<0.5
Zinc	µg/L	-	-	-	75 - 2400 ^(b)	-	<5.0	<50	370	<5.0
Zirconium	µg/L	-	-	-	-	-	4.0	<10	<10	2.0
Volatile Organics										
Benzene	µg/L	370 ^(h)	-	-	4,000	-	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	µg/L	90 ^(h)	-	-	2,000	-	<0.5	<0.5	<0.5	<0.5
Toluene	µg/L	2 ^(h)	-	-	390	-	<0.5	<0.5	7.6 ^(Chronic)	5.5 ^(Chronic)
Xylenes	µg/L	-	30	-	-	-	<0.5	<0.5	<0.5	<0.5
Styrene	µg/L	72 ^(h)	-	-	-	-	<0.5	<0.5	-	-
Volatile Hydrocarbons	µg/L	-	-	-	15,000	-	<50	<50	-	-
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	1,500	-	<50	<50	-	-
Methyl tert-Butyl Ether	µg/L	10000 ^(h)	-	-	-	-	<0.5	<0.5	-	-

Table C-1: Groundwater Quality and Guidelines Comparison for the Eagle Plains Baseline Study, 2015 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life			Yukon CSR	Sampling Stations					
		Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)		DALG-DP1	DALG-DP1	DALG-DP2	DALG-DP2	DALG-DP2	EAGL-DP1
						22-Jun-16	22-Sep-16	22-Jun-16	22-Sep-16	21-Sep-17	16-Sep-15
Parent PAHs											
Naphthalene	µg/L	1.1 ^(h)	-	-	10	-	-	-	-	-	0.036
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	<0.00029
Biphenyl	µg/L	-	-	-	-	-	-	-	-	-	0.0032
Acenaphthene	µg/L	5.8 ^(h)	-	-	-	-	-	-	-	-	0.00081
Fluorene	µg/L	3 ^(h)	-	-	120	-	-	-	-	-	0.0013
Phenanthrene	µg/L	0.4 ^(h)	-	-	3.0	-	-	-	-	-	0.012
Anthracene	µg/L	0.012 ^(h)	-	-	1.0	-	-	-	-	-	<0.00050
Dibenzothiophene	µg/L	-	-	-	-	-	-	-	-	-	0.0036
Pyrene	µg/L	0.025 ^(h)	0.02	-	0.20	-	-	-	-	-	0.0088
Fluoranthene	µg/L	0.04 ^(h)	-	-	2.0	-	-	-	-	-	0.0039
Benzo(a)anthracene	µg/L	0.018 ^(h)	-	-	1.0	-	-	-	-	-	0.0013
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	0.0081
1-Methyl-7-isopropyl-phenanthrene (Retene)	µg/L	-	-	-	-	-	-	-	-	-	0.0033
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	0.0060
Benzo(j,k)fluoranthenes	µg/L	-	-	-	-	-	-	-	-	-	0.0018
Benzo(a)pyrene	µg/L	0.015 ^(h)	-	-	0.10	-	-	-	-	-	0.0011
Benzo(e)pyrene	µg/L	-	-	-	-	-	-	-	-	-	0.012
Perylene	µg/L	-	-	-	-	-	-	-	-	-	0.0051
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	0.011
Indeno(c,d-123)pyrene	µg/L	-	-	-	-	-	-	-	-	-	0.0015
Dibenzo(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	0.00084
Alkylated PAHs											
C1 substituted naphthalenes	µg/L	-	-	-	-	-	-	-	-	-	0.036
C2 substituted naphthalenes	µg/L	-	-	-	-	-	-	-	-	-	0.054
C3 substituted naphthalenes	µg/L	-	-	-	-	-	-	-	-	-	0.055
C4 substituted naphthalenes	µg/L	-	-	-	-	-	-	-	-	-	0.037
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	0.015
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	0.021
1,2-Dimethylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	0.0031
2,6-Dimethylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	0.012
C1 substituted acenaphthenes	µg/L	-	-	-	-	-	-	-	-	-	<0.00061
C1 substituted biphenyls	µg/L	-	-	-	-	-	-	-	-	-	0.0064
C2 substituted biphenyls	µg/L	-	-	-	-	-	-	-	-	-	0.0094
2,3,5-Trimethylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	0.012
2,3,6-Trimethylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	0.014
C1 substituted fluorenes	µg/L	-	-	-	-	-	-	-	-	-	0.0055
C2 substituted fluorenes	µg/L	-	-	-	-	-	-	-	-	-	0.013
C3 substituted fluorenes	µg/L	-	-	-	-	-	-	-	-	-	0.029
2-Methylfluorene	µg/L	-	-	-	-	-	-	-	-	-	<0.00095
1,4,6,7-Tetramethylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	<0.0042
C1 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	-	-	-	-	0.045
C2 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	-	-	-	-	0.042
C3 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	-	-	-	-	0.031
C4 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	-	-	-	-	0.035
1-Methylphenanthrene	µg/L	-	-	-	-	-	-	-	-	-	0.0089
2-Methylphenanthrene	µg/L	-	-	-	-	-	-	-	-	-	0.011
3-Methylphenanthrene	µg/L	-	-	-	-	-	-	-	-	-	0.0098
9/4-Methylphenanthrene	µg/L	-	-	-	-	-	-	-	-	-	0.015

Table C-1: Groundwater Quality and Guidelines Comparison for the Eagle Plains Baseline Study, 2015 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life			Yukon CSR	Sampling Stations						Sampling Stations
		Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)		McPL-DP1	McPL-DP1	McPL-DP2	McPL-DP2	McPL-DP2	McPL-DP3	YOWN-1401
						16-Sep-15	22-Jun-16	22-Jun-16	22-Sep-16	20-Sep-17	22-Sep-16	27-Aug-13
Parent PAHs												
Naphthalene	µg/L	1.1 ^(h)	-	-	10	0.030	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	<0.00025	-	-	-	-	-	-
Biphenyl	µg/L	-	-	-	-	0.0033	-	-	-	-	-	-
Acenaphthene	µg/L	5.8 ^(h)	-	-	-	0.0048	-	-	-	-	-	-
Fluorene	µg/L	3 ^(h)	-	-	120	0.0052	-	-	-	-	-	-
Phenanthrene	µg/L	0.4 ^(h)	-	-	3.0	0.022	-	-	-	-	-	-
Anthracene	µg/L	0.012 ^(h)	-	-	1.0	0.0031	-	-	-	-	-	-
Dibenzothiophene	µg/L	-	-	-	-	<0.0043	-	-	-	-	-	-
Pyrene	µg/L	0.025 ^(h)	0.02	-	0.20	0.022 ^(BC MOE mean)	-	-	-	-	-	-
Fluoranthene	µg/L	0.04 ^(h)	-	-	2.0	0.012	-	-	-	-	-	-
Benzo(a)anthracene	µg/L	0.018 ^(h)	-	-	1.0	0.0093	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	0.015	-	-	-	-	-	-
1-Methyl-7-isopropyl-phenanthrene (Retene)	µg/L	-	-	-	-	0.011	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	0.013	-	-	-	-	-	-
Benzo(j,k)fluoranthenes	µg/L	-	-	-	-	0.0029	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	0.015 ^(h)	-	-	0.10	0.0096	-	-	-	-	-	-
Benzo(e)pyrene	µg/L	-	-	-	-	0.019	-	-	-	-	-	-
Perylene	µg/L	-	-	-	-	0.051	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	0.027	-	-	-	-	-	-
Indeno(c,d-123)pyrene	µg/L	-	-	-	-	0.010	-	-	-	-	-	-
Dibenzo(a,h)anthracene	µg/L	-	-	-	-	0.0048	-	-	-	-	-	-
Alkylated PAHs												
C1 substituted naphthalenes	µg/L	-	-	-	-	0.054	-	-	-	-	-	-
C2 substituted naphthalenes	µg/L	-	-	-	-	0.059	-	-	-	-	-	-
C3 substituted naphthalenes	µg/L	-	-	-	-	0.050	-	-	-	-	-	-
C4 substituted naphthalenes	µg/L	-	-	-	-	0.020	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-	0.021	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	0.033	-	-	-	-	-	-
1,2-Dimethylnaphthalene	µg/L	-	-	-	-	0.0034	-	-	-	-	-	-
2,6-Dimethylnaphthalene	µg/L	-	-	-	-	0.011	-	-	-	-	-	-
C1 substituted acenaphthenes	µg/L	-	-	-	-	0.0010	-	-	-	-	-	-
C1 substituted biphenyls	µg/L	-	-	-	-	0.0068	-	-	-	-	-	-
C2 substituted biphenyls	µg/L	-	-	-	-	0.0080	-	-	-	-	-	-
2,3,5-Trimethylnaphthalene	µg/L	-	-	-	-	0.011	-	-	-	-	-	-
2,3,6-Trimethylnaphthalene	µg/L	-	-	-	-	0.012	-	-	-	-	-	-
C1 substituted fluorenes	µg/L	-	-	-	-	0.017	-	-	-	-	-	-
C2 substituted fluorenes	µg/L	-	-	-	-	0.024	-	-	-	-	-	-
C3 substituted fluorenes	µg/L	-	-	-	-	0.021	-	-	-	-	-	-
2-Methylfluorene	µg/L	-	-	-	-	0.0039	-	-	-	-	-	-
1,4,6,7-Tetramethylnaphthalene	µg/L	-	-	-	-	<0.0032	-	-	-	-	-	-
C1 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.048	-	-	-	-	-	-
C2 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.033	-	-	-	-	-	-
C3 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.017	-	-	-	-	-	-
C4 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	0.053	-	-	-	-	-	-
1-Methylphenanthrene	µg/L	-	-	-	-	0.0072	-	-	-	-	-	-
2-Methylphenanthrene	µg/L	-	-	-	-	0.012	-	-	-	-	-	-
3-Methylphenanthrene	µg/L	-	-	-	-	0.011	-	-	-	-	-	-
9/4-Methylphenanthrene	µg/L	-	-	-	-	0.014	-	-	-	-	-	-

Table C-1: Groundwater Quality and Guidelines Comparison for the Eagle Plains Baseline Study, 2015 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life			Yukon CSR					
		Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)		YOWN-1401	YOWN-1401	YOWN-1401	YOWN-1401	YOWN-1401
						15-Mar-15	18-Mar-16	22-Sep-16	5-Mar-17	21-Sep-17
Parent PAHs										
Naphthalene	µg/L	1.1 ^(h)	-	-	10	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-
Biphenyl	µg/L	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	5.8 ^(h)	-	-	-	-	-	-	-	-
Fluorene	µg/L	3 ^(h)	-	-	120	-	-	-	-	-
Phenanthrene	µg/L	0.4 ^(h)	-	-	3.0	-	-	-	-	-
Anthracene	µg/L	0.012 ^(h)	-	-	1.0	-	-	-	-	-
Dibenzothiophene	µg/L	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	0.025 ^(h)	0.02	-	0.20	-	-	-	-	-
Fluoranthene	µg/L	0.04 ^(h)	-	-	2.0	-	-	-	-	-
Benzo(a)anthracene	µg/L	0.018 ^(h)	-	-	1.0	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-
1-Methyl-7-isopropyl-phenanthrene (Retene)	µg/L	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(j,k)fluoranthenes	µg/L	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	0.015 ^(h)	-	-	0.10	-	-	-	-	-
Benzo(e)pyrene	µg/L	-	-	-	-	-	-	-	-	-
Perylene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-
Indeno(c,d-123)pyrene	µg/L	-	-	-	-	-	-	-	-	-
Dibenzo(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-
Alkylated PAHs										
C1 substituted naphthalenes	µg/L	-	-	-	-	-	-	-	-	-
C2 substituted naphthalenes	µg/L	-	-	-	-	-	-	-	-	-
C3 substituted naphthalenes	µg/L	-	-	-	-	-	-	-	-	-
C4 substituted naphthalenes	µg/L	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
1,2-Dimethylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
2,6-Dimethylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
C1 substituted acenaphthenes	µg/L	-	-	-	-	-	-	-	-	-
C1 substituted biphenyls	µg/L	-	-	-	-	-	-	-	-	-
C2 substituted biphenyls	µg/L	-	-	-	-	-	-	-	-	-
2,3,5-Trimethylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
2,3,6-Trimethylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
C1 substituted fluorenes	µg/L	-	-	-	-	-	-	-	-	-
C2 substituted fluorenes	µg/L	-	-	-	-	-	-	-	-	-
C3 substituted fluorenes	µg/L	-	-	-	-	-	-	-	-	-
2-Methylfluorene	µg/L	-	-	-	-	-	-	-	-	-
1,4,6,7-Tetramethylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
C1 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	-	-	-	-
C2 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	-	-	-	-
C3 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	-	-	-	-
C4 substituted phenanthrenes / anthracenes	µg/L	-	-	-	-	-	-	-	-	-
1-Methylphenanthrene	µg/L	-	-	-	-	-	-	-	-	-
2-Methylphenanthrene	µg/L	-	-	-	-	-	-	-	-	-
3-Methylphenanthrene	µg/L	-	-	-	-	-	-	-	-	-
9/4-Methylphenanthrene	µg/L	-	-	-	-	-	-	-	-	-

Table C-1: Groundwater Quality and Guidelines Comparison for the Eagle Plains Baseline Study, 2015 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life			Yukon CSR	Sampling Stations					
		Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)		DALG-DP1	DALG-DP1	DALG-DP2	DALG-DP2	DALG-DP2	EAGL-DP1
						22-Jun-16	22-Sep-16	22-Jun-16	22-Sep-16	21-Sep-17	16-Sep-15
2-Methylanthracene	µg/L	-	-	-	-	-	-	-	-	-	<0.00057
1,7-Dimethylfluorene	µg/L	-	-	-	-	-	-	-	-	-	<0.0011
C1 substituted dibenzothiophenes	µg/L	-	-	-	-	-	-	-	-	-	0.020
C2 substituted dibenzothiophenes	µg/L	-	-	-	-	-	-	-	-	-	0.044
C3 substituted dibenzothiophenes	µg/L	-	-	-	-	-	-	-	-	-	0.028
C4 substituted dibenzothiophenes	µg/L	-	-	-	-	-	-	-	-	-	0.0070
2/3-Methyldibenzothiophenes	µg/L	-	-	-	-	-	-	-	-	-	0.0064
2,4-Dimethyldibenzothiophene	µg/L	-	-	-	-	-	-	-	-	-	0.0049
1,7-Dimethylphenanthrene	µg/L	-	-	-	-	-	-	-	-	-	0.0055
1,8-Dimethylphenanthrene	µg/L	-	-	-	-	-	-	-	-	-	0.0018
2,6-Dimethylphenanthrene	µg/L	-	-	-	-	-	-	-	-	-	0.0027
3,6-Dimethylphenanthrene	µg/L	-	-	-	-	-	-	-	-	-	<0.0034
1,2,6-Trimethylphenanthrene	µg/L	-	-	-	-	-	-	-	-	-	0.0019
C1 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	-	-	-	-	-	0.0095
C2 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	-	-	-	-	-	0.031
C3 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	-	-	-	-	-	0.0060
C4 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	-	-	-	-	-	0.0028
C1 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	-	-	-	-	-	0.011
C2 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	-	-	-	-	-	0.0077
C3 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	-	-	-	-	-	<0.00038
C4 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	-	-	-	-	-	<0.00030
5/6-Methylchrysenes	µg/L	-	-	-	-	-	-	-	-	-	0.0011
5,9-Dimethylchrysene	µg/L	-	-	-	-	-	-	-	-	-	0.0013
C1 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	-	-	-	-	-	0.012
C2 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	-	-	-	-	-	0.0022
7-Methylbenzo[a]pyrene	µg/L	-	-	-	-	-	-	-	-	-	0.00096
1-methylchrysene	µg/L	-	-	-	-	-	-	-	-	-	0.0016
3-methylfluoranthene / benzo(a)fluorene	µg/L	-	-	-	-	-	-	-	-	-	0.0051
Radionuclides											
Actinium-228	Bq/L	-	-	-	-	<0.7	<0.6	0.90	<0.8	-	-
Bismuth-212	Bq/L	-	-	-	-	2.0	<1.0	<1.0	<2.0	-	-
Bismuth-214	Bq/L	-	-	-	-	<0.4	<0.4	<0.4	<0.4	-	-
Lead-210	Bq/L	-	-	-	-	<3.0	<3.0	<2.0	<3.0	-	-
Lead-211	Bq/L	-	-	-	-	<3.0	<4.0	<3.0	<3.0	-	-
Lead-212	Bq/L	-	-	-	-	0.30	<0.3	0.40	<0.3	-	-
Lead-214	Bq/L	-	-	-	-	<0.4	0.60	<0.3	<0.4	-	-
Potassium-40	Bq/L	-	-	-	-	<3.0	6.0	<4.0	<4.0	-	-
Radium-223	Bq/L	-	-	-	-	<0.9	<0.8	<0.5	<0.8	-	-
Radium-226	Bq/L	-	-	-	-	-	-	-	-	-	-
Radon-219	Bq/L	-	-	-	-	<0.6	<0.9	<0.8	<0.5	-	-
Thallium-208	Bq/L	-	-	-	-	<0.2	0.30	0.20	0.30	-	-
Thorium-227	Bq/L	-	-	-	-	<0.7	<0.5	<0.6	<0.7	-	-
Thorium-230	Bq/L	-	-	-	-	<10	<20	<10	<10	-	-
Thorium-234	Bq/L	-	-	-	-	<2.0	<3.0	<2.0	<3.0	-	-
Uranium-235	Bq/L	-	-	-	-	<0.6	<0.8	<0.9	<0.8	-	-
Isotopes											
δ ¹⁸ O _{water} (VSMOW)	‰	-	-	-	-	-22.005	-21.265	-23.329	-21.029	-21.167	-21.21
δ ² H _{water} (VSMOW)	‰	-	-	-	-	-171.8	-165.5	-180.93	-165.16	-166.99	-165.1
δ ¹³ C-DIC (VPDB)	‰	-	-	-	-	-9.5	-10.07	-10.89	-11.05	-14.1	-20.34
δ ³⁴ S-SO4 (CDT)	‰	-	-	-	-	-5.8	-7.22	-5.18	-8.38	-10.59	-0.61
δ ¹⁸ O-SO4 (VSMOW)	‰	-	-	-	-	-11.33	-15.14	-12.44	-14.70	-16.20	-6.76
Dissolved Gases											
CH ₄	(mg/L)	-	-	-	-	0.0000	0.0209	0.0001	0.0052	0.0438	-
C ₂	(mg/L)	-	-	-	-	0.0000	0.0000	0.0000	0.0000	0.0000	-
C ₃	(mg/L)	-	-	-	-	0.0000	0.0000	0.0000	0.0000	0.0000	-
CO ₂	(mg/L)	-	-	-	-	29.04	4.21	17.31	6.86	55.16	-
N ₂	(mg/L)	-	-	-	-	21.94	20.64	22.84	24.99	52.94	-
O ₂	(mg/L)	-	-	-	-	6.95	1.49	5.90	3.55	8.34	-

Table C-1: Groundwater Quality and Guidelines Comparison for the Eagle Plains Baseline Study, 2015 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life			Yukon CSR	Sampling Stations						Sampling Stations
		Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)		McPL-DP1	McPL-DP1	McPL-DP2	McPL-DP2	McPL-DP2	McPL-DP3	YOWN-1401
						16-Sep-15	22-Jun-16	22-Jun-16	22-Sep-16	20-Sep-17	22-Sep-16	27-Aug-13
2-Methylanthracene	µg/L	-	-	-	-	0.0036	-	-	-	-	-	-
1,7-Dimethylfluorene	µg/L	-	-	-	-	0.0018	-	-	-	-	-	-
C1 substituted dibenzothiophenes	µg/L	-	-	-	-	0.014	-	-	-	-	-	-
C2 substituted dibenzothiophenes	µg/L	-	-	-	-	0.022	-	-	-	-	-	-
C3 substituted dibenzothiophenes	µg/L	-	-	-	-	0.011	-	-	-	-	-	-
C4 substituted dibenzothiophenes	µg/L	-	-	-	-	0.0025	-	-	-	-	-	-
2/3-Methyl dibenzothiophenes	µg/L	-	-	-	-	0.0050	-	-	-	-	-	-
2,4-Dimethyldibenzothiophene	µg/L	-	-	-	-	<0.0028	-	-	-	-	-	-
1,7-Dimethylphenanthrene	µg/L	-	-	-	-	0.0023	-	-	-	-	-	-
1,8-Dimethylphenanthrene	µg/L	-	-	-	-	0.00087	-	-	-	-	-	-
2,6-Dimethylphenanthrene	µg/L	-	-	-	-	0.0015	-	-	-	-	-	-
3,6-Dimethylphenanthrene	µg/L	-	-	-	-	<0.0034	-	-	-	-	-	-
1,2,6-Trimethylphenanthrene	µg/L	-	-	-	-	0.00089	-	-	-	-	-	-
C1 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.090	-	-	-	-	-	-
C2 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.058	-	-	-	-	-	-
C3 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.010	-	-	-	-	-	-
C4 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	0.0027	-	-	-	-	-	-
C1 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.026	-	-	-	-	-	-
C2 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	0.013	-	-	-	-	-	-
C3 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.00039	-	-	-	-	-	-
C4 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	<0.00026	-	-	-	-	-	-
5/6-Methylchrysenes	µg/L	-	-	-	-	0.0021	-	-	-	-	-	-
5,9-Dimethylchrysene	µg/L	-	-	-	-	<0.0015	-	-	-	-	-	-
C1 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	0.038	-	-	-	-	-	-
C2 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	0.0086	-	-	-	-	-	-
7-Methylbenzo[a]pyrene	µg/L	-	-	-	-	<0.0014	-	-	-	-	-	-
1-methylchrysene	µg/L	-	-	-	-	0.0049	-	-	-	-	-	-
3-methylfluoranthene / benzo(a)fluorene	µg/L	-	-	-	-	0.037	-	-	-	-	-	-
Radionuclides												
Actinium-228	Bq/L	-	-	-	-	-	<0.6	<0.9	<0.7	-	<0.6	-
Bismuth-212	Bq/L	-	-	-	-	-	3.0	<2.0	<1.0	-	<1.0	-
Bismuth-214	Bq/L	-	-	-	-	-	1.1	1.0	<0.4	-	<0.4	-
Lead-210	Bq/L	-	-	-	-	-	<3.0	<3.0	<3.0	-	<2.0	-
Lead-211	Bq/L	-	-	-	-	-	<1.0	<5.0	<2.0	-	<4.0	-
Lead-212	Bq/L	-	-	-	-	-	1.4	1.2	<0.3	-	0.40	-
Lead-214	Bq/L	-	-	-	-	-	1.9	1.0	<0.3	-	0.40	-
Potassium-40	Bq/L	-	-	-	-	-	<4.0	9.0	<4.0	-	<4.0	-
Radium-223	Bq/L	-	-	-	-	-	<0.8	<0.9	<0.6	-	<0.6	-
Radium-226	Bq/L	-	-	-	-	-	-	-	-	-	-	-
Radon-219	Bq/L	-	-	-	-	-	<1.0	<1.0	<1.0	-	<0.9	-
Thallium-208	Bq/L	-	-	-	-	-	0.40	0.40	0.20	-	0.20	-
Thorium-227	Bq/L	-	-	-	-	-	<0.6	<1.0	<1.0	-	<0.7	-
Thorium-230	Bq/L	-	-	-	-	-	<9.0	<30	<20	-	<10	-
Thorium-234	Bq/L	-	-	-	-	-	<2.0	<4.0	<3.0	-	<3.0	-
Uranium-235	Bq/L	-	-	-	-	-	<0.8	<1.0	<0.8	-	<0.8	-
Isotopes												
δ ¹⁸ O _{water} (VSMOW)	‰	-	-	-	-	-21.3	-21.524	-21.218	-21.912	-20.258	-21.152	-
δ ² H _{water} (VSMOW)	‰	-	-	-	-	-167.23	-167.79	-166.32	-165.91	-162.57	-165.6	-
δ ¹³ C-DIC (VPDB)	‰	-	-	-	-	-20.55	-19.14	-16.1	-20.85	-21.16	-18.67	-
δ ³⁴ S-SO4 (CDT)	‰	-	-	-	-	2.6	-5.56	-5.78	-2.95	-0.03	3.01	-
δ ¹⁸ O-SO4 (VSMOW)	‰	-	-	-	-	4.02	-1.63	2.01	4.86	1.44	-2.22	-
Dissolved Gases												
CH ₄	(mg/L)	-	-	-	-	-	0.0000	0.0003	0.1959	0.1033	0.4767	-
C ₂	(mg/L)	-	-	-	-	-	0.0000	0.0000	0.0000	0.0000	0.0000	-
C ₃	(mg/L)	-	-	-	-	-	0.0000	0.0000	0.0000	0.0000	0.0000	-
CO ₂	(mg/L)	-	-	-	-	-	38.98	41.59	22.21	32.17	11.89	-
N ₂	(mg/L)	-	-	-	-	-	20.90	22.85	23.51	53.44	17.70	-
O ₂	(mg/L)	-	-	-	-	-	2.63	3.00	0.99	7.13	1.29	-

Table C-1: Groundwater Quality and Guidelines Comparison for the Eagle Plains Baseline Study, 2015 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life			Yukon CSR					
		Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)		YOWN-1401	YOWN-1401	YOWN-1401	YOWN-1401	YOWN-1401
						15-Mar-15	18-Mar-16	22-Sep-16	5-Mar-17	21-Sep-17
2-Methylanthracene	µg/L	-	-	-	-	-	-	-	-	-
1,7-Dimethylfluorene	µg/L	-	-	-	-	-	-	-	-	-
C1 substituted dibenzothiophenes	µg/L	-	-	-	-	-	-	-	-	-
C2 substituted dibenzothiophenes	µg/L	-	-	-	-	-	-	-	-	-
C3 substituted dibenzothiophenes	µg/L	-	-	-	-	-	-	-	-	-
C4 substituted dibenzothiophenes	µg/L	-	-	-	-	-	-	-	-	-
2/3-Methyldibenzothiophenes	µg/L	-	-	-	-	-	-	-	-	-
2,4-Dimethyldibenzothiophene	µg/L	-	-	-	-	-	-	-	-	-
1,7-Dimethylphenanthrene	µg/L	-	-	-	-	-	-	-	-	-
1,8-Dimethylphenanthrene	µg/L	-	-	-	-	-	-	-	-	-
2,6-Dimethylphenanthrene	µg/L	-	-	-	-	-	-	-	-	-
3,6-Dimethylphenanthrene	µg/L	-	-	-	-	-	-	-	-	-
1,2,6-Trimethylphenanthrene	µg/L	-	-	-	-	-	-	-	-	-
C1 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	-	-	-	-	-
C2 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	-	-	-	-	-
C3 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	-	-	-	-	-
C4 substituted fluoranthenes / pyrenes	µg/L	-	-	-	-	-	-	-	-	-
C1 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	-	-	-	-	-
C2 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	-	-	-	-	-
C3 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	-	-	-	-	-
C4 substituted benzo(a)anthracenes / chrysenes	µg/L	-	-	-	-	-	-	-	-	-
5/6-Methylchrysenes	µg/L	-	-	-	-	-	-	-	-	-
5,9-Dimethylchrysene	µg/L	-	-	-	-	-	-	-	-	-
C1 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	-	-	-	-	-
C2 substituted benzofluoranthenes / benzopyrenes	µg/L	-	-	-	-	-	-	-	-	-
7-Methylbenzo[a]pyrene	µg/L	-	-	-	-	-	-	-	-	-
1-methylchrysene	µg/L	-	-	-	-	-	-	-	-	-
3-methylfluoranthene / benzo(a)fluorene	µg/L	-	-	-	-	-	-	-	-	-
Radionuclides										
Actinium-228	Bq/L	-	-	-	-	-	<1.0	<0.8	-	-
Bismuth-212	Bq/L	-	-	-	-	-	<1.0	<2.0	-	-
Bismuth-214	Bq/L	-	-	-	-	-	<0.5	0.80	-	-
Lead-210	Bq/L	-	-	-	-	-	<3.0	<3.0	-	-
Lead-211	Bq/L	-	-	-	-	-	<3.0	<4.0	-	-
Lead-212	Bq/L	-	-	-	-	-	0.30	<0.3	-	-
Lead-214	Bq/L	-	-	-	-	-	<0.5	<0.4	-	-
Potassium-40	Bq/L	-	-	-	-	-	<4.0	<4.0	-	-
Radium-223	Bq/L	-	-	-	-	-	<0.6	<0.8	-	-
Radium-226	Bq/L	-	-	-	-	-	0.0050	-	-	-
Radon-219	Bq/L	-	-	-	-	-	<1.0	<0.5	-	-
Thallium-208	Bq/L	-	-	-	-	-	<0.2	0.90	-	-
Thorium-227	Bq/L	-	-	-	-	-	<0.6	<0.9	-	-
Thorium-230	Bq/L	-	-	-	-	-	<10	<20	-	-
Thorium-234	Bq/L	-	-	-	-	-	<3.0	<3.0	-	-
Uranium-235	Bq/L	-	-	-	-	-	<0.8	<0.9	-	-
Isotopes										
δ ¹⁸ O _{water} (VSMOW)	‰	-	-	-	-	-20.6	-20.55	-20.549	-	-20.524
δ ² H _{water} (VSMOW)	‰	-	-	-	-	-166.4	-168.12	-167.25	-	-166.53
δ ¹³ C-DIC (VPDB)	‰	-	-	-	-	-7.9	-8.64	-	-	-9.81
δ ³⁴ S-SO4 (CDT)	‰	-	-	-	-	-4.5	-5.94	-5.24	-	-5.52
δ ¹⁸ O-SO4 (VSMOW)	‰	-	-	-	-	-14.6	-15.75	-14.51	-	-14.40
Dissolved Gases										
CH ₄	(mg/L)	-	-	-	-	0.0664	0.1455	0.1705	-	0.1518
C ₂	(mg/L)	-	-	-	-	0.0037	0.0063	0.0071	-	0.0074
C ₃	(mg/L)	-	-	-	-	0.0004	0.0008	0.0016	-	0.0028
CO ₂	(mg/L)	-	-	-	-	161.43	99.46	43.27	-	6.33
N ₂	(mg/L)	-	-	-	-	28.83	24.28	43.38	-	44.87
O ₂	(mg/L)	-	-	-	-	7.95	0.57	2.18	-	2.15

Groundwater Quality and Guidelines Comparison for the Eagle Plains Baseline Study, 2013 to 2017

- a) Guideline is a minimum value, unless the background concentration or value is lower.
- b) Guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (41 to 3,670 mg/L). The guideline is calculated based on the individual hardness value for each sample.
- c) For some samples, water hardness was greater than 250 mg/L. At this hardness, no BC MOE water quality guideline has been established for sulphate; however, the observed data were screened against the guideline for very hard water (i.e., 429 mg/L) for comparative purposes.
- d) The ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (1.5255 mg-N/L) is based on the combination of field pH (8.0) and water temperature (3.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.
- e) Guideline is pH dependent. The guideline range shown is based on the pH range observed in the dataset (6.3 to 9.0). The guideline is calculated based on the individual pH for each sample.
- f) Guideline is pH dependent: 5 µg/L at pH < 6.5 and 100 µg/L at pH ≥ 6.5.
- g) guideline is chloride dependent. The guideline range shown is based on the chloride concentration range observed in the dataset (0.20 to 1.88 mg/L). The guideline is calculated based on the individual chloride concentration in each sample.

h) CCME guideline is an interim guideline

s) Value has been invalidated by QAQC procedures and will not be used for assessment purposes.

(Chronic) = concentration is higher than the chronic aquatic life CCME guideline or outside the recommended pH, DO or total alkalinity range.

(BC MOE mean) = concentration is higher than the 30-day mean BC MOE guideline or outside the recommended pH, DO or total alkalinity range.

(BC MOE max) = concentration is higher than the maximum BC MOE guideline or outside the recommended pH, DO or total alkalinity range.

(>Yukon CSR) = concentration is higher than the General Numerical Water Standards of the Yukon Contaminated Sites Regulation.

(DL>Chronic) = analytical detection limit is higher than the chronic aquatic life CCME guideline.

(DL>BC MOE mean) = analytical detection limit is higher than the 30-day mean BC MOE guideline.

(DL>Yukon CSR) = analytical detection limit is higher than the General Numerical Water Standards of the Yukon Contaminated Sites Regulation.

Bolded concentrations are higher than water quality guidelines.

Bolded total alkalinity values indicate moderate to high level of acid sensitivity.

Water quality data and guidelines shown in this table were rounded to reflect laboratory or field instrument precision *after* comparisons to guidelines. Therefore, values slightly above guidelines may be displayed as being equal to the guidelines and identified as exceedances. Concentrations equal to the guideline values were not identified as exceedances.

VSMOW = Vienna Standard Mean Ocean Water, CDT = Canyon Diablo Troilite, VPDB = Vienna Pee-Dee Belemnite

< = less than; - = no guideline or no data; µS/cm = microSiemens per centimetre; °C = degree celsius; mV = milli-volts; µg/L = micrograms per litre; mg/L = milligrams per litre; mg-N/L = milligrams nitrogen per litre; mg-P/L = milligrams phosphorus per litre; Bq/L = becquerel per litre; CaCO₃ = calcium carbonate.

Source: CCME (Canadian Council of Ministers of the Environment). 1999, with updates to 2017. Canadian Environmental Quality Guidelines. Winnipeg, MB, Canada.

Source: BC MOE Guidelines (British Columbia Ministry of Environment Guidelines). 2017. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture.

Source: Yukon Contaminated Sites Regulation, 2012.

APPENDIX C
Table C-2: Groundwater Quality Summary for McParlon Creek, 2015 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life			YuKon CSR	Summary												
		Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)		2015 - 2017												
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline			
															Chronic	BC MOE mean	BC MOE max	>Yukon CSR
Field Measured																		
pH	-	6.5 - 9.0	-	-	-	6.9	6.9	7.0	7.0	6.8	7.0	0.081	0	5	-	-	-	-
Specific conductivity	µS/cm	-	-	-	-	183	188	199	199	178	199	10	0	5	-	-	-	-
Temperature	°C	-	-	-	-	4.6	5.3	7.6	8.2	2.5	8.3	2.6	0	5	-	-	-	-
Dissolved oxygen	mg/L	5.5 - 9.5	-	-	-	3.0 ^(Chronic)	2.5 ^(Chronic)	3.1 ^(Chronic)	3.5 ^(Chronic)	0.26 ^(Chronic)	3.6 ^(Chronic)	1.30	0	5	100	-	-	-
Redox potential	mV	-	-	-	-	-98	-92	-63	-34	-143	-27	47	0	5	-	-	-	-
Total dissolved solids	mg/L	-	-	-	-	125	125	127	129	120	129	6.5	0	2	-	-	-	-
Conventional Parameters																		
pH	-	6.5 - 9.0	-	-	-	6.7	6.7	6.9	7.0	6.4 ^(Chronic)	7.0	0.28	0	6	33			-
Specific conductivity	µS/cm	-	-	-	-	147	163	154	228	135	252	44	0	6	-	-	-	-
Hardness, as CaCO ₃	mg/L	-	-	-	-	64	69	66	107	41	120	26	0	6	-	-	-	-
Total alkalinity, as CaCO ₃	mg/L	-	20 ^(a)	-	-	52	53	58	97	17 ^(BC MOE Mean)	109	32	0	6	-	17	-	-
Total dissolved solids	mg/L	-	-	-	-	177	296	383	842	<5.0	976	370	2	6	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	145	198	412	473	5.0	504	203	0	2	-	-	-	-
Total organic carbon	mg/L	-	-	-	-	31	32	40	45	21	46	11	0	6	-	-	-	-
Dissolved organic carbon	mg/L	-	-	-	-	19	19	20	21	17	21	1.6	0	6	-	-	-	-
Alkalinity, Phenolphthalein as CaCO ₃	mg/L	-	-	-	-	<5.0	2.5	<5.0	<5.0	<5.0	<5.0	0	6	6	-	-	-	-
Total inorganic carbon	mg/L	-	-	-	-	13	16	15	25	11	28	6.2	0	6	-	-	-	-
Dissolved inorganic carbon	mg/L	-	-	-	-	12	14	14	23	9.1	26	6.0	0	6	-	-	-	-
Major Ions																		
Bicarbonate, as CaCO ₃	mg/L	-	-	-	-	64	65	70	118	21	133	39	0	6	-	-	-	-
Bromide	mg/L	-	-	-	-	<0.02	0.013	<0.02	0.030	<0.02	0.030	0.0082	5	6	-	-	-	-
Calcium	mg/L	-	-	-	-	17	19	18	32	11	37	9.1	0	6	-	-	-	-
Carbonate, as CaCO ₃	mg/L	-	-	-	-	<6.0	3.0	<6.0	<6.0	<6.0	<6.0	0	6	6	-	-	-	-
Chloride	mg/L	120	-	-	-	0.28	0.29	0.35	0.38	0.20	0.38	0.070	0	6	-	-	-	-
Hydroxide, as CaCO ₃	mg/L	-	-	-	-	<5.0	2.5	<5.0	<5.0	<5.0	<5.0	0	6	6	-	-	-	-
Magnesium	mg/L	-	-	-	-	5.1	5.1	5.3	6.3	3.4	6.6	1.0	0	6	-	-	-	-
Potassium	mg/L	-	-	-	-	1.2	1.1	1.2	1.4	0.88	1.5	0.21	0	6	-	-	-	-
Sodium	mg/L	-	-	-	-	4.8	4.6	5.3	5.6	3.3	5.6	0.90	0	6	-	-	-	-
Sulphate	mg/L	-	218 - 309 ^(b)	-	1,000	19	19	21	24	14	25	4.3	0	6	-	-	-	-
Nutrients																		
Nitrate	mg-N/L	13.0	-	-	400	<0.01	0.0050	<0.01	<0.01	<0.01	<0.01	0	6	6	-	-	-	-
Nitrite	mg-N/L	0.060	-	-	0.2 ^(f)	<0.01	0.016	<0.01	0.070 ^(Chronic)	<0.01	0.070 ^(Chronic)	0.027	5	6	17	17	17	-
Total ammonia	mg-N/L	9.7 - 22 ^(c)	-	-	11.3 ^(e)	0.33	0.36	0.46	0.53	0.22	0.55	0.14	0	5	-	-	-	-
Total ammonia + ammonium	mg-N/L	-	-	-	-	0.26	-	0.26	0.26	-	-	-	0	1	-	-	-	-
Total nitrogen	mg-N/L	-	-	-	-	1.0	1.4	1.6	2.3	0.70	2.5	0.70	0	5	-	-	-	-
Nitrogen, kjeldahl	mg-N/L	-	-	-	-	0.82	-	0.82	0.82	-	-	-	0	1	-	-	-	-
Phosphorus (as phosphate)	mg-P/L	-	-	-	-	0.41	0.62	1.1	1.4	0.0060	1.5	0.67	0	5	-	-	-	-
Phosphate	mg/L	-	-	-	-	0.17	-	0.17	0.17	-	-	-	0	1	-	-	-	-
Total Metals																		
Aluminum	µg/L	100 ^(d, e)	-	-	-	9,350 ^(Chronic)	25,049 ^(Chronic)	17,300 ^(Chronic)	85,900 ^(Chronic)	495 ^(Chronic)	108,000 ^(Chronic)	41,165	0	6	100	-	-	-
Antimony	µg/L	-	9.0	-	200	0.69	1.9	2.5	5.6	0.15	6.5	2.5	0	6	-	-	-	-
Arsenic	µg/L	5.0	-	-	50	10 ^(Chronic)	28 ^(Chronic)	21 ^(Chronic)	87 ^(Chronic, YK)	6.4 ^(Chronic)	108 ^(Chronic, YK)	40	0	6	100	-	-	17
Barium	µg/L	-	1,000	-	10,000	1,000	3,788 ^(BC MOE Mean)	5,732 ^(BC MOE Mean)	11,110 ^(BC MOE Mean, YK)	322	12,400 ^(BC MOE Mean, YK)	4,957	0	6	-	50	-	17
Beryllium	µg/L	-	0.13	-	53	0.78 ^(BC MOE Mean)	1.9 ^(BC MOE Mean)	1.5 ^(BC MOE Mean)	6.1 ^(BC MOE Mean)	0.14 ^(BC MOE Mean)	7.6 ^(BC MOE Mean)	2.8	0	6	-	100	-	-
Bismuth	µg/L	-	-	-	-	<1.0	-	<1.0	2.0	<0.1	2.0	-	5	6	-	-	-	-
Boron	µg/L	1,500	-	-	-	26	40	41	99	10	117	40	0	6	-	-	-	-
Cadmium	µg/L	0.11 - 0.18 ^(b)	-	-	0.3 - 0.6 ^(b)	0.86 ^(Chronic, YK)	4.5 ^(Chronic, YK)	7.9 ^(Chronic, YK)	13 ^(Chronic, YK)	0.090	14 ^(Chronic, YK)	6.2	0	6	83	-	-	83
Chromium	µg/L	1.0	-	-	10	19 ^(Chronic, YK)	73 ^(Chronic, YK)	108 ^(Chronic, YK)	223 ^(Chronic, YK)	1.4 ^(Chronic)	252 ^(Chronic, YK)	101	0	6	100	-	-	67
Cobalt	µg/L	-	4.0	110	9.0	9.2 ^(BC MOE Mean, YK)	25 ^(BC MOE Mean, YK)	17 ^(BC MOE Mean, YK)	87 ^(BC MOE Mean, YK)	0.35	110 ^(BC MOE Mean, YK)	42	0	6	-	83	-	50
Copper	µg/L	2.0 - 2.8 ^(b)	-	-	30 - 90 ^(b)	32 ^(Chronic, YK)	104 ^(Chronic, YK)	102 ^(Chronic, YK)	344 ^(Chronic, YK)	2.0	418 ^(Chronic, YK)	160	0	6	83		-	33
Iron	µg/L	300	-	-	-	31,200 ^(Chronic)	61,117 ^(Chronic)	43,600 ^(Chronic)	178,500 ^(Chronic)	14,200 ^(Chronic)	223,000 ^(Chronic)	80,142	0	6	100		-	-
Lead	µg/L	1.7 - 4.0 ^(b)	-	-	50 - 160 ^(b)	11 ^(Chronic)	37 ^(Chronic)	58 ^(Chronic, YK)	111 ^(Chronic, YK)	0.85	124 ^(Chronic, YK)	50	0	6	83		-	33
Lithium	µg/L	-	-	-	-	15	41	31	138	3.9	172	65	0	6	-	-	-	-
Manganese	µg/L	-	878 - 1,133 ^(b)	1,223 - 1,862 ^(b)	-	2,370 ^(BC MOE Mean, BC MOE Max)	3,178 ^(BC MOE Mean, BC MOE Max)	3,758 ^(BC MOE Mean, BC MOE Max)	5,568 ^(BC MOE Mean, BC MOE Max)	1,800 ^(BC MOE Mean, BC MOE Max)	6,020 ^(BC MOE Mean, BC MOE Max)	1,620	0	6	-	100	100	-
Mercury	µg/L	0.026	-	-	1.0	<0.01	-	<0.01	0.050 ^(Chronic)	<0.01	0.050 ^(Chronic, BC MOE Mean)	-	5	6	17	-	-	-
Molybdenum	µg/L	73	-	-	10,000	2.8	9.6	14	27	2.0	30	12	0	6	-	-	-	-
Nickel	µg/L	66 - 110 ^(b)	-	-	650 - 1500 ^(b)	28	86 ^(Chronic)	92	279 ^(Chronic, YK)	1.7	335 ^(Chronic, YK)	128	0	6	33		-	-
Selenium	µg/L	1.0	-	-	10	2.8 ^(Chronic)	14 ^(Chronic, YK)	14 ^(Chronic, YK)	50 ^(Chronic, YK)	0.60	61 ^(Chronic, YK)	24	0	6	83		-	33
Silicon	µg/L	-	-	-	-	37,450	49,975	65,700	109,825	5,250	122,000	41,855	0	6	-	-	-	-
Silver	µg/L	0.25	-	-	0.5 - 15 ^(b)	0.30 ^(Chronic)	0.86 ^(Chronic, YK)	0.94 ^(Chronic, YK)	2.8 ^(Chronic, YK)	0.019	3.4 ^(Chronic, YK)	1.3	0	6	50		-	33
Strontium	µg/L	-	-	-	-	132	192	212	418	80	481	152	0	6	-	-	-	-
Sulphur	µg/L	-	-	-	-	7,300	8,533	8,950	14,350	5,400	16,000	3,925	0	6	-	-	-	-
Tellurium	µg/L	-	-	-	-	<0.25	-	<0.25	<0.5	<0.05	<0.5	-	6	6	-	-	-	-
Thallium	µg/L	0.80	-	-	3.0	0.22	0.52	0.57	1.6 ^(Chronic, BC MOE Mean)	0.013	1.9 ^(Chronic, BC MOE Mean)	0.71	0	6	17		-	-
Thorium	µg/L	-	-	-	-	2.6	7.1	4.8	24	0.34	31	12	0	6	-	-	-	-
Tin	µg/L	-	-	-	-	0.40	0.73	0.70	3.0	<0.1	3.0	1.1	3	6	-	-	-	-

APPENDIX C
Table C-2: Groundwater Quality Summary for McParlon Creek, 2015 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life			YuKon CSR	Summary												
		Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)		2015 - 2017												
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline			
															Chronic	BC MOE mean	BC MOE max	>Yukon CSR
Dissolved Metals																		
Aluminum	µg/L	-	50 ^(d)	100 ^(d)	-	30	29	38	40	24	<50	5.8	1	6	-	-	-	-
Antimony	µg/L	-	-	-	200	0.29	0.41	0.60	0.70	0.080	<2.0	0.37	1	6	-	-	-	-
Arsenic	µg/L	-	-	-	50	5.3	5.2	7.4	8.6	<2.0	8.9	3.0	1	6	-	-	-	-
Barium	µg/L	-	-	-	10,000	274	326	359	508	237	550	122	0	6	-	-	-	-
Beryllium	µg/L	-	-	-	53	0.076	0.086	0.090	0.090	<0.05	<0.4	0.061	2	6	-	-	-	-
Bismuth	µg/L	-	-	-	-	<1.0	-	<1.0	<10	<0.1	<10	-	6	6	-	-	-	-
Boron	µg/L	-	-	-	-	25	22	35	41	10	41	13	1	6	-	-	-	-
Cadmium	µg/L	-	0.15 - 0.24 ^(b)	0.36 - 0.71 ^(b)	0.30	0.020	0.027	0.043	0.050	<0.01	<0.1	0.019	2	6	-	-	-	-
Chromium	µg/L	-	-	-	10	0.53	-	0.57	0.58	<0.05	<4.0	-	4	6	-	-	-	-
Cobalt	µg/L	-	-	-	9.0	0.52	0.97	1.4	2.5	0.061	2.8	1.1	0	6	-	-	-	-
Copper	µg/L	-	-	-	30 - 90 ^(b)	0.85	1.7	2.2	2.5	<0.5	<10	1.8	2	6	-	-	-	-
Iron	µg/L	-	-	350	-	10,005 ^(BC MOE Max)	9,780 ^(BC MOE Max)	14,175 ^(BC MOE Max)	17,525 ^(BC MOE Max)	1,500 ^(BC MOE Max)	18,400 ^(BC MOE Max)	6,513	0	6	-	-	100	-
Lead	µg/L	-	-	-	50 - 160 ^(b)	0.24	0.30	0.59	0.70	<0.01	<1.0	0.26	2	6	-	-	-	-
Lithium	µg/L	-	-	-	-	3.3	3.5	3.9	4.0	2.5	<10	0.88	1	6	-	-	-	-
Manganese	µg/L	-	-	-	-	2,245	2,408	2,600	3,353	1,690	3,570	660	0	6	-	-	-	-
Mercury	µg/L	-	-	-	1.0	<0.01	-	<0.01	<0.01	<0.01	<0.01	-	6	6	-	-	-	-
Molybdenum	µg/L	-	-	-	10,000	1.7	1.6	2.3	2.5	<1.0	2.5	0.83	1	6	-	-	-	-
Nickel	µg/L	-	-	-	650 - 1500 ^(b)	2.1	2.3	2.8	3.0	0.60	<10	1.6	1	6	-	-	-	-
Selenium	µg/L	-	-	-	10	<0.6	0.85	0.60	0.60	0.40	<6.0	1.1	3	6	-	-	-	-
Silicon	µg/L	-	-	-	-	3,725	3,608	3,815	4,015	2,700	4,080	476	0	6	-	-	-	-
Silver	µg/L	-	-	-	0.5 - 15 ^(b)	<0.01	-	0.010	0.010	<0.01	<0.1	-	5	6	-	-	-	-
Strontium	µg/L	-	-	-	-	77	84	81	117	69	129	22	0	6	-	-	-	-
Sulphur	µg/L	-	-	-	-	6,650	6,667	7,200	8,500	4,700	8,900	1,424	0	6	-	-	-	-
Tellurium	µg/L	-	-	-	-	<0.1	-	<0.1	<1.0	<0.05	<1.0	-	6	6	-	-	-	-
Thallium	µg/L	-	-	-	3.0	<0.01	-	0.010	0.010	<0.01	<0.1	-	5	6	-	-	-	-
Thorium	µg/L	-	-	-	-	0.22	-	<0.4	<4.0	<0.05	<4.0	-	4	6	-	-	-	-
Tin	µg/L	-	-	-	-	<0.1	-	0.70	0.70	<0.1	<1.0	-	5	6	-	-	-	-
Titanium	µg/L	-	-	-	1,000	4.0	5.7	<10	15	2.0	15	4.7	2	6	-	-	-	-
Uranium	µg/L	-	-	-	3,000	0.099	0.44	<0.4	<4.0	0.070	<4.0	0.77	3	6	-	-	-	-
Vanadium	µg/L	-	-	-	-	1.3	1.1	1.4	1.7	0.70	1.7	0.47	1	6	-	-	-	-
Zinc	µg/L	-	-	-	75 - 2400 ^(b)	4.7	4.4	5.6	5.7	2.4	<10	1.2	1	6	-	-	-	-
Zirconium	µg/L	-	-	-	-	1.4	1.5	1.9	2.6	<1.0	2.8	0.82	1	6	-	-	-	-
Volatile Organics																		
Benzene	µg/L	370 ^(h)	-	-	4,000	<0.5	-	<0.5	<0.5	<0.5	<0.5	-	6	6	-	-	-	-
Ethylbenzene	µg/L	90 ^(h)	-	-	2,000	<0.5	-	<0.5	<0.5	<0.5	<0.5	-	6	6	-	-	-	-
Toluene	µg/L	2 ^(h)	-	-	390	<0.5	-	<0.5	<0.5	<0.5	<0.5	-	6	6	-	-	-	-
Xylenes	µg/L	-	30	-	-	<0.5	-	<0.5	<0.5	<0.5	<0.5	-	6	6	-	-	-	-
Styrene	µg/L	72 ^(h)	-	-	720	<0.5	-	<0.5	<0.5	<0.5	<0.5	-	6	6	-	-	-	-
Volatile Hydrocarbons	µg/L	-	-	-	15,000	<50	-	<50	<50	<50	<50	-	6	6	-	-	-	-
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	1,500	<50	-	<50	<50	<50	<50	-	6	6	-	-	-	-
Methyl tert-Butyl Ether	µg/L	10000 ^(h)	-	-	-	<0.5	-	<0.5	<0.5	<0.5	<0.5	-	6	6	-	-	-	-

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		Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)		2015 - 2017												
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline			
															Chronic	BC MOE mean	BC MOE max	>YuKon CSR
Radionuclides																		
Actinium-228	Bq/l	-	-	-	-	<0.7	-	<0.9	2.0	<0.6	2.0	-	4	5	-	-	-	-
Bismuth-212	Bq/l	-	-	-	-	<2.0	-	<2.0	3.0	<1.0	3.0	-	4	5	-	-	-	-
Bismuth-214	Bq/l	-	-	-	-	1.0	0.70	1.0	1.1	<0.4	1.1	0.46	2	5	-	-	-	-
Lead-210	Bq/l	-	-	-	-	<3.0	-	<3.0	<4.0	<2.0	<4.0	-	5	5	-	-	-	-
Lead-211	Bq/l	-	-	-	-	<4.0	-	<5.0	<5.0	<1.0	<5.0	-	5	5	-	-	-	-
Lead-212	Bq/l	-	-	-	-	0.90	0.81	1.2	1.4	<0.3	1.4	0.53	1	5	-	-	-	-
Lead-214	Bq/l	-	-	-	-	<0.5	0.74	1.0	1.7	<0.3	1.9	0.73	2	5	-	-	-	-
Potassium-40	Bq/l	-	-	-	-	<4.0	-	9.0	9.8	<4.0	10	-	3	5	-	-	-	-
Radium-223	Bq/l	-	-	-	-	<0.8	-	<0.8	<0.9	<0.6	<0.9	-	5	5	-	-	-	-
Radium-226	Bq/l	-	-	-	-	<4.0	-	<5.0	<5.0	<3.0	<5.0	-	5	5	-	-	-	-
Radon-219	Bq/l	-	-	-	-	<1.0	-	<1.0	<1.0	<0.9	<1.0	-	5	5	-	-	-	-
Thallium-208	Bq/l	-	-	-	-	0.40	0.34	0.40	0.48	0.20	0.50	0.13	0	5	-	-	-	-
Thorium-227	Bq/l	-	-	-	-	<1.0	-	<1.0	<1.0	<0.6	<1.0	-	5	5	-	-	-	-
Thorium-230	Bq/l	-	-	-	-	<20	-	<20	<30	<9.0	<30	-	5	5	-	-	-	-
Thorium-234	Bq/l	-	-	-	-	<3.0	-	<4.0	6.0	<2.0	6.0	-	4	5	-	-	-	-
Uranium-235	Bq/l	-	-	-	-	<0.8	-	<1.0	<1.0	<0.8	<1.0	-	5	5	-	-	-	-

- a) Guideline is a minimum value, unless the background concentration or value is lower.
- b) Guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (41 to 120 mg/L). The guideline is calculated based on the individual hardness value for each sample.
- c) The ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (9.7129 mg-N/L) is based on the combination of field pH (7.0) and water temperature (7.6°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.
- d) Guideline is pH dependent. The guideline range shown is based on the pH range observed in the dataset (6.8 to 7.0). The guideline is calculated based on the individual pH for each sample.
- e) Guideline is pH dependent: 5 µg/L at pH < 6.5 and 100 µg/L at pH ≥ 6.5.
- f) guideline is chloride dependent. The guideline range shown is based on the chloride concentration range observed in the dataset (0.20 to 0.38 mg/L). The guideline is calculated based on the individual chloride concentration in each sample.
- h) CCME guideline is an interim guideline
- (Acute) = concentration is higher than the acute aquatic life CCME guideline.
- (Chronic) = concentration is higher than the chronic aquatic life CCME guideline or outside the recommended pH, DO or total alkalinity range.
- (BC MOE mean) = concentration is higher than the 30-day mean BC MOE guideline or outside the recommended pH, DO or total alkalinity range.
- (BC MOE max) = concentration is higher than the maximum BC MOE guideline or outside the recommended pH, DO or total alkalinity range.
- (YK) = concentration is higher than the General Numerical Water Standards of the Yukon Contaminated Sites Regulation

Bolded concentrations are higher than water quality guidelines.

Bolded total alkalinity values indicate moderate to high level of acid sensitivity.

Water quality data and guidelines shown in this table were rounded to reflect laboratory or field instrument precision *after* comparisons to guidelines. Therefore, values slightly above guidelines may be displayed as being equal to the guidelines and identified as exceedances. Concentrations equal to the guideline values were not identified as exceedances.

In cases where 50% or more of data were <DL, no mean or standard deviation was calculated.

< = less than; - = no guideline or no data; µS/cm = microSiemens per centimetre; °C = degree celsius; mV = milli-volts; µg/L = micrograms per litre; mg/L = milligrams per litre; mg-N/L = milligrams nitrogen per litre; mg-P/L = milligrams phosphorus per litre; Bq/L = becquerel per litre; CaCO₃ = calcium carbonate.

Source: CCME (Canadian Council of Ministers of the Environment). 1999, with updates to 2017. Canadian Environmental Quality Guidelines. Winnipeg, MB, Canada.

Source: BC MOE Guidelines (British Columbia Ministry of Environment Guidelines). 2017. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture.

Source: Yukon Contaminated Sites Regulation, 2012.

APPENDIX C
Table C-3: Groundwater Quality Summary for Dalglish Creek, 2016 - 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				YuKon CSR	Summary												
		Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	2016 - 2017														
					Median		Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline				
															Chronic	BC MOE mean	BC MOE max	>Yukon CSR	
Field Measured																			
pH	-	6.5 - 9.0	-	-	-	7.1	7.0	7.3	7.4	6.3 ^(Chronic)	7.4	0.42	0	5	20	-	-	-	
Specific conductivity	µS/cm	-	-	-	-	499	563	752	844	329	867	237	0	5	-	-	-	-	
Temperature	°C	-	-	-	-	5.1	6.6	8.6	9.6	4.6	9.9	2.4	0	5	-	-	-	-	
Dissolved oxygen	mg/L	5.5 - 9.5	-	-	-	2.5 ^(Chronic)	2.3 ^(Chronic)	3.1 ^(Chronicx)	3.2 ^(Chronic)	0.31 ^(Chronic)	3.3 ^(Chronic)	1.2	0	5	100	-	-	-	
Redox potential	mV	-	-	-	-	-54	-44	-54	29	-84	49	54	0	5	-	-	-	-	
Total dissolved solids	mg/L	-	-	-	-	227	227	233	238	214	239	18	0	2	-	-	-	-	
Conventional Parameters																			
pH	-	6.5 - 9.0	-	-	-	7.5	7.3	7.7	7.8	6.4 ^(Chronic)	7.8	0.58	0	5	20			-	
Specific conductivity	µS/cm	-	-	-	-	488	514	566	788	320	843	209	0	5	-	-	-	-	
Hardness, as CaCO ₃	mg/L	-	-	-	-	234	198	242	248	110	250	77	0	3	-	-	-	-	
Total alkalinity, as CaCO ₃	mg/L	-	20 ^(a)	-	-	72	95	99	197	32	222	75	0	5	-	-	-	-	
Alkalinity, Phenolphthalein as CaCO ₃	mg/L	-	-	-	-	<5.0	-	<5.0	<5.0	<5.0	<5.0	-	5	5	-	-	-	-	
Total dissolved solids	mg/L	-	-	-	-	408	471	529	626	356	650	157	0	3	-	-	-	-	
Total suspended solids	mg/L	-	-	-	-	40	71	90	190	2.0	215	88	0	5	-	-	-	-	
Total organic carbon	mg/L	-	-	-	-	17	18	17	27	11	29	6.7	0	5	-	-	-	-	
Dissolved organic carbon	mg/L	-	-	-	-	15	15	18	18	9	18	3.5	0	5	-	-	-	-	
Total inorganic carbon	mg/L	-	-	-	-	24	24	27	45	8.5	49	15.6	0	5	-	-	-	-	
Dissolved inorganic carbon	mg/L	-	-	-	-	23	23	25	43	8.2	47	14.8	0	5	-	-	-	-	
Major Ions																			
Bicarbonate, as CaCO ₃	mg/L	-	-	-	-	87	116	120	241	39	271	92	0	5	-	-	-	-	
Bromide	mg/L	-	-	-	-	<0.02	-	<0.02	<0.2	<0.02	<0.2	-	5	5	-	-	-	-	
Calcium	mg/L	-	-	-	-	68	73	74	135	31	150	47	0	5	-	-	-	-	
Carbonate, as CaCO ₃	mg/L	-	-	-	-	<6.0	3.0	<6.0	<6.0	<6.0	<6.0	0	5	5	-	-	-	-	
Chloride	mg/L	120	-	-	-	<0.05	-	0.20	0.20	<0.05	<0.5	-	4	5	-	-	-	-	
Hydroxide, as CaCO ₃	mg/L	-	-	-	-	<5.0	-	<5.0	<5.0	<5.0	<5.0	-	5	5	-	-	-	-	
Magnesium	mg/L	-	-	-	-	15	15	16	22	9.1	23	5.6	0	5	-	-	-	-	
Potassium	mg/L	-	-	-	-	1.6	1.6	1.9	2.3	0.90	2.4	0.61	0	5	-	-	-	-	
Sodium	mg/L	-	-	-	-	18	21	23	32	15	34	7.7	0	5	-	-	-	-	
Sulphate	mg/L	-	309 - 429 ^(b, c)	-	1,000	144	173	209	253	123	264	62	0	5	-	-	-	-	
Nutrients																			
Nitrate	mg-N/L	2.9	-	-	400	<0.01	-	<0.01	<0.1	<0.01	<0.1	-	5	5	-	-	-	-	
Nitrite	mg-N/L	0.060	-	-	0.2 ^(g)	<0.01	-	<0.01	<0.1 ^(DL>Chronic)	<0.01	<0.1 ^(DL>Chronic)	-	5	5	-	-	-	-	
Total ammonia	mg-N/L	5.2 - 43 ^(d)	-	-	11.3 - 18.4 ^(e)	0.22	0.25	0.31	0.43	0.090	0.46	0.16	0	4	-	-	-	-	
Total nitrogen	mg-N/L	-	-	-	-	0.69	0.93	1.3	1.5	0.56	1.5	0.44	0	5	-	-	-	-	
Phosphorus (as phosphate)	mg-P/L	-	-	-	-	0.049	0.19	0.20	0.55	0.016	0.64	0.30	0	4	-	-	-	-	
Total Metals																			
Aluminum	µg/L	5.0 - 100 ^(e, f)	-	-	-	215 ^(Chronic)	1,939 ^(Chronic)	2,670 ^(Chronic)	5,902 ^(Chronic)	44	6,710 ^(Chronic)	2,890	0	5	60	-	-	-	
Antimony	µg/L	-	9.0	-	200	0.22	0.34	0.51	0.76	0.080	0.82	0.32	0	5	-	-	-	-	
Arsenic	µg/L	5.0	-	-	50	2.5	6.8 ^(Chronic)	8.7 ^(Chronic)	17 ^(Chronic)	1.6	20 ^(Chronic)	7.7	0	5	40	-	-	-	
Barium	µg/L	-	1,000	-	10,000	110	181	242	415	46	458	174	0	5	-	-	-	-	
Beryllium	µg/L	-	0.13	-	53	<0.05	-	0.35 ^(BC MOE Mean)	0.74 ^(BC MOE Mean)	<0.05	0.84 ^(BC MOE Mean)	-	3	5	-	40	-	-	
Bismuth	µg/L	-	-	-	-	<0.1	-	<0.1	0.20	<0.1	0.20	-	4	5	-	-	-	-	
Boron	µg/L	1,500	-	-	-	32	48	60	91	25	99	32	0	5	-	-	-	-	
Cadmium	µg/L	0.17 - 0.34 ^(b)	-	-	0.3 - 0.6 ^(b)	0.12	0.60 ^(Chronic, YK)	1.0 ^(Chronic, YK)	1.7 ^(Chronic, YK)	<0.01	1.8 ^(Chronic, YK)	0.80	1	5	40	-	-	40	
Calcium	µg/L					74,700	76,000	77,100	135,420	34,200	150,000	45,415	0	5	-	-	-	-	
Chromium	µg/L	1.0	-	-	10	0.99	13 ^(Chronic, YK)	22 ^(Chronic, YK)	36 ^(Chronic, YK)	<0.05	39 ^(Chronic, YK)	18	1	5	40	-	-	40	
Cobalt	µg/L	-	4.0	110	9.0	8.0 ^(BC MOE Mean)	6.4 ^(BC MOE Mean)	8.9 ^(BC MOE Mean)	10 ^(BC MOE Mean, YK)	1.0	11 ^(BC, YK)	4.1	0	5	-	60	-	20	
Copper	µg/L	2.6 - 4.0 ^(b)	-	-	20 - 90 ^(b)	0.80	14 ^(Chronic)	14 ^(Chronic)	45 ^(Chronic, YK)	0.30	53 ^(Chronic, YK)	23	0	5	40	-	-	-	
Iron	µg/L	300	-	-	-	6,400 ^(Chronic)	15,076 ^(Chronic)	26,200 ^(Chronic)	33,400 ^(Chronic)	1,610 ^(Chronic)	35,200 ^(Chronic)	14,733	0	5	100	-	-	-	
Lead	µg/L	3.6 - 7.0 ^(b)	-	-	60 - 110 ^(b)	0.22	3.5	4.6	11 ^(Chronic)	0.053	13 ^(Chronic)	5.5	0	5	20	-	-	-	
Lithium	µg/L	-	-	-	-	8.5	11	14	18	6.0	19	5.4	0	5	-	-	-	-	
Magnesium	µg/L					16,400	15,570	17,400	22,680	9,750	24,000	5,847	0	5	-	-	-	-	
Manganese	µg/L	-	1,089 - 1,705 ^(b)	1,752 - 3,295 ^(b)	-	1,020	1,585	1,730 ^(BC MOE Mean)	3,386 ^(BC MOE Mean)	572	3,800 ^(BC MOE Mean, BC MOE Max)	1,312	0	5	-	40	20	-	
Mercury	µg/L	0.026	-	-	1.0	<0.01	-	0.02	0.044 ^(Chronic)	<0.01	0.050 ^(Chronic)	-	3	5	20	-	-	-	
Molybdenum	µg/L	73	-	-	10,000	1.6	2.1	2.4	3.8	0.88	4.2	1.3	0	5	-	-	-	-	
Nickel	µg/L	103 - 150 ^(b)	-	-	650 - 1500 ^(b)	28	28	40	49	8.2	52	18	0	5	-	-	-	-	
Potassium	µg/L					1,700	2,060	2,600	3,640	1,000	3,900	1,210	0	5	-	-	-	-	

APPENDIX C
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Parameter	Unit	Guidelines for the Protection of Aquatic Life			YuKon CSR	Summary												
		Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)		2016 - 2017												
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline			
															Chronic	BC MOE mean	BC MOE max	>Yukon CSR
Selenium	µg/L	1.0	-	-	10	0.40	3.1 ^(Chronic)	3.8 ^(Chronic)	9.3 ^(Chronic)	0.30	11 ^(Chronic, YK)	4.5	0	5	40	-	-	20
Silicon	µg/L	-	-	-	-	3,400	5,274	6,410	10,882	1,950	12,000	4,129	0	5	-	-	-	-
Silver	µg/L	0.25	-	-	0.5 - 15 ^(b)	0.012	0.30 ^(Chronic)	0.50 ^(Chronic)	0.88 ^(Chronic, YK)	<0.01	0.97 ^(Chronic, YK)	0.43	1	5	40	-	-	-
Sodium	µg/L					19,700	21,120	21,700	30,420	14,000	32,600	7,022	0	5	-	-	-	-
Strontium	µg/L	-	-	-	-	149	219	268	219	68	280	90	0	5	-	-	-	-
Sulphur	µg/L	-	-	-	-	55,800	59,680	70,100	88,420	38,700	93,000	22,530	0	5	-	-	-	-
Tellurium	µg/L	-	-	-	-	<0.05	-	<0.05	<0.05	<0.05	<0.05	-	5	5	-	-	-	-
Thallium	µg/L	0.80	-	-	3.0	<0.01	-	0.13	0.26	<0.01	0.29	-	3	5	-	-	-	-
Thorium	µg/L	-	-	-	-	0.24	1.2	1.7	3.1	0.17	3.5	1.5	0	5	-	-	-	-
Tin	µg/L	-	-	-	-	<0.1	-	0.20	0.44	<0.1	0.50	-	3	5	-	-	-	-
Titanium	µg/L	-	-	-	1,000	15	14	18	23	6.0	24	7.4	0	5	-	-	-	-
Uranium	µg/L	15	-	-	3,000	1.4	1.5	2.0	3.4	0.12	3.8	1.5	0	5	-	-	-	-
Vanadium	µg/L	-	-	-	-	2.4	21	32	60	0.67	66	29	0	5	-	-	-	-
Zinc	µg/L	30	-	-	75 - 1650 ^(b)	9.0	85 ^(Chronic, YK)	134 ^(Chronic, YK)	247 ^(Chronic, YK)	2.0	275 ^(Chronic, YK)	120	0	5	40	-	-	-
Zirconium	µg/L	-	-	-	-	0.60	2.1	4.4	4.6	0.50	4.6	2.2	0	5	-	-	-	-
Dissolved Metals																		
Aluminum	µg/L	-	36 - 50 ^(e)	69 - 100 ^(e)	-	8.0	15	16	32	7.0	36	12	0	5	-	-	-	-
Antimony	µg/L	-	-	-	200	0.22	0.25	0.23	0.53	0.091	0.60	0.21	1	5	-	-	-	-
Arsenic	µg/L	-	-	-	50	1.7	1.7	2.0	2.4	0.90	2.5	0.62	0	5	-	-	-	-
Barium	µg/L	-	-	-	10,000	66	70	78	97	46	101	21	0	5	-	-	-	-
Beryllium	µg/L	-	-	-	53	<0.05	-	<0.05	<0.5	<0.04	<0.5	-	5	5	-	-	-	-
Bismuth	µg/L	-	-	-	-	<1.0	-	<1.0	<1.0	<0.1	<1.0	-	5	5	-	-	-	-
Boron	µg/L	-	-	-	-	40	83	51	225	28	268	104	0	5	-	-	-	-
Cadmium	µg/L	-	0.23 - 0.42 ^(b)	0.65 - 1.5 ^(b)	0.3 - 0.6 ^(b)	0.070	0.088	0.13	0.16	0.012	0.17	0.062	0	5	-	-	-	-
Chromium	µg/L	-	-	-	10	<0.4	-	<0.4	<0.5	0.066	<0.5	-	3	5	-	-	-	-
Cobalt	µg/L	-	-	-	9.0	4.1	4.0	6.7	7.2	0.94	7.4	3.0	0	5	-	-	-	-
Copper	µg/L	-	-	-	50 - 90 ^(b)	0.70	1.0	1.3	1.3	0.40	<5.0	0.91	2	5	-	-	-	-
Iron	µg/L	-	-	350	-	3,890 ^(BC MOE Max)	3,799 ^(BC MOE Max)	5,490 ^(BC MOE Max)	6,938 ^(BC MOE Max)	87	7,300 ^(BC MOE Max)	2,800	0	5	-	-	80	-
Lead	µg/L	-	-	-	60 - 110 ^(b)	<0.1	-	<0.1	<0.1	<0.01	<0.1	-	4	5	-	-	-	-
Lithium	µg/L	-	-	-	-	8.0	8.0	8.5	11	5.3	11	2.1	0	5	-	-	-	-
Manganese	µg/L	-	-	-	-	1,070	1,650	2,100	3,324	613	3,630	1,245	0	5	-	-	-	-
Mercury	µg/L	-	-	-	1.0	<0.01	-	<0.01	<0.01	<0.01	<0.01	-	5	5	-	-	-	-
Molybdenum	µg/L	-	-	-	10,000	1.4	1.4	1.5	1.8	0.86	1.9	0.40	0	5	-	-	-	-
Nickel	µg/L	-	-	-	650 - 1500 ^(b)	16	17	24	26	8.0	26	8.6	0	5	-	-	-	-
Selenium	µg/L	-	-	-	10	<0.6	-	<0.6	<2.0	0.30	<2.0	-	3	5	-	-	-	-
Silicon	µg/L	-	-	-	-	2,530	2,480	2,920	3,144	1,760	3,200	607	0	5	-	-	-	-
Silver	µg/L	-	-	-	0.5 - 15 ^(b)	<0.01	-	<0.01	<0.1	<0.01	<0.1	-	5	5	-	-	-	-
Strontium	µg/L	-	-	-	-	132	137	135	232	80	256	71	0	5	-	-	-	-
Sulphur	µg/L	-	-	-	-	49,100	58,420	73,900	90,780	37,000	95,000	25,387	0	5	-	-	-	-
Tellurium	µg/L	-	-	-	-	<0.1	-	<0.1	<0.5	<0.05	<0.5	-	5	5	-	-	-	-
Thallium	µg/L	-	-	-	3.0	0.020	0.038	0.030	0.11	<0.01	0.13	0.053	2	5	-	-	-	-
Thorium	µg/L	-	-	-	-	<0.4	-	<0.4	<0.5	<0.05	<0.5	-	4	5	-	-	-	-
Tin	µg/L	-	-	-	-	<0.1	-	<0.1	<1.0	<0.1	<1.0	-	5	5	-	-	-	-
Titanium	µg/L	-	-	-	1,000	<10	5.8	<10	11	4.0	11	2.9	2	5	-	-	-	-
Uranium	µg/L	-	-	-	3,000	0.70	0.90	1.4	1.8	0.24	1.9	0.73	0	5	-	-	-	-
Vanadium	µg/L	-	-	-	-	1.1	1.1	1.2	1.8	0.40	2.0	0.63	0	5	-	-	-	-
Zinc	µg/L	-	-	-	900 - 1650 ^(b)	<5.0	5.7	7.3	11	2.4	12	4.1	1	5	-	-	-	-
Zirconium	µg/L	-	-	-	-	0.50	0.54	0.80	0.80	0.40	<1.0	0.15	1	5	-	-	-	-
Volatile Organics																		
Benzene	µg/L	370 ^(h)	-	-	4,000	<0.5	-	<0.5	<0.5	<0.5	<0.5	-	5	5	-	-	-	-
Ethylbenzene	µg/L	90 ^(h)	-	-	2,000	<0.5	-	<0.5	<0.5	<0.5	<0.5	-	5	5	-	-	-	-
Toluene	µg/L	2 ^(h)	-	-	390	<0.5	-	<0.5	<0.5	<0.5	<0.5	-	5	5	-	-	-	-
Xylenes	µg/L	-	-	-	-	<0.5	-	<0.5	<0.5	<0.5	<0.5	-	5	5	-	-	-	-
Styrene	µg/L	72 ^(h)	-	-	720	<0.5	-	<0.5	<0.5	<0.5	<0.5	-	5	5	-	-	-	-
Volatile Hydrocarbons	µg/L	-	-	-	15,000	<50	-	<50	<50	<50	<50	-	5	5	-	-	-	-
Volatile Petroleum Hydrocarbons	µg/L	-	-	-	1,500	<50	-	<50	<50	<50	<50	-	5	5	-	-	-	-
Methyl tert-Butyl Ether	µg/L	10000 ^(h)	-	-	-	<0.5	-	<0.5	<0.5	<0.5	<0.5	-	5	5	-	-	-	-

Table C-3: Groundwater Quality Summary for Dalglish Creek, 2016 - 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life			YuKon CSR	Summary												
		Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)		2016 - 2017												
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline			
															Chronic	BC MOE mean	BC MOE max	>Yukon CSR
Radionuclides																		
Actinium-228	Bq/l	-	-	-	-	<0.75	-	0.90	0.90	<0.6	0.90	-	3	4	-	-	-	-
Bismuth-212	Bq/l	-	-	-	-	<1.5	-	2.0	2.0	<1.0	2.0	-	3	4	-	-	-	-
Bismuth-214	Bq/l	-	-	-	-	<0.4	-	<0.4	<0.4	<0.4	<0.4	-	4	4	-	-	-	-
Lead-210	Bq/l	-	-	-	-	<3.0	-	<3.0	<3.0	<2.0	<3.0	-	4	4	-	-	-	-
Lead-211	Bq/l	-	-	-	-	<3.0	-	<4.0	<4.0	<3.0	<4.0	-	4	4	-	-	-	-
Lead-212	Bq/l	-	-	-	-	0.30	-	0.33	0.39	<0.3	0.40	-	2	4	-	-	-	-
Lead-214	Bq/l	-	-	-	-	<0.4	-	0.60	0.60	<0.3	0.60	-	3	4	-	-	-	-
Potassium-40	Bq/l	-	-	-	-	<4.0	-	6.0	6.0	<3.0	6.0	-	3	4	-	-	-	-
Radium-223	Bq/l	-	-	-	-	<0.8	-	<0.9	<0.9	<0.5	<0.9	-	4	4	-	-	-	-
Radium-226	Bq/l	-	-	-	-	<3.0	-	<4.0	<4.0	<3.0	<4.0	-	4	4	-	-	-	-
Radon-219	Bq/l	-	-	-	-	<0.7	-	<0.9	<0.9	<0.5	<0.9	-	4	4	-	-	-	-
Thallium-208	Bq/l	-	-	-	-	0.25	0.23	0.30	0.30	<0.2	0.30	0.096	1	4	-	-	-	-
Thorium-227	Bq/l	-	-	-	-	<0.65	-	<0.7	<0.7	<0.5	<0.7	-	4	4	-	-	-	-
Thorium-230	Bq/l	-	-	-	-	<10	-	<20	<20	<10	<20	-	4	4	-	-	-	-
Thorium-234	Bq/l	-	-	-	-	<2.5	-	<3.0	<3.0	<2.0	<3.0	-	4	4	-	-	-	-
Uranium-235	Bq/l	-	-	-	-	<0.8	-	<0.9	<0.9	<0.6	<0.9	-	4	4	-	-	-	-

- a) Guideline is a minimum value, unless the background concentration or value is lower.
- b) Guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (110 to 250 mg/L). The guideline is calculated based on the individual hardness value for each sample.
- c) For some samples, water hardness was greater than 250 mg/L. At this hardness, no BC MOE water quality guideline has been established for sulphate; however, the observed data were screened against the guideline for very hard water (i.e., 429 mg/L) for comparative purposes.
- d) The ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (5.2042 mg-N/L) is based on the combination of field pH (7.4) and water temperature (5.1°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.
- e) Guideline is pH dependent. The guideline range shown is based on the pH range observed in the dataset (6.3 to 7.4). The guideline is calculated based on the individual pH for each sample.
- f) Guideline is pH dependent: 5 µg/L at pH < 6.5 and 100 µg/L at pH ≥ 6.5.
- g) = guideline is chloride dependent. The guideline range shown is based on the chloride concentration range observed in the dataset (0.20 to 0.25 mg/L). The guideline is calculated based on the individual chloride concentration in each sample.
- h) CCME guideline is an interim guideline.
- (Chronic) = concentration is higher than the chronic aquatic life CCME guideline or outside the recommended pH, DO or total alkalinity range.
- (BC MOE mean) = concentration is higher than the 30-day mean BC MOE guideline or outside the recommended pH, DO or total alkalinity range.
- (BC MOE max) = concentration is higher than the maximum BC MOE guideline or outside the recommended pH, DO or total alkalinity range.
- (>Yukon CSR) = concentration is higher than the General Numerical Water Standards of the Yukon Contaminated Sites Regulation

Bolded concentrations are higher than water quality guidelines.

Water quality data and guidelines shown in this table were rounded to reflect laboratory or field instrument precision*after* comparisons to guidelines. Therefore, values slightly above guidelines may be displayed as being equal to the guidelines and identified as exceedances. Concentrations equal to the guideline values were not identified as exceedances.

In cases where 50% or more of data were <DL, no mean or standard deviation was calculated.

< = less than; - = no guideline or no data; µS/cm = microSiemens per centimetre; °C = degree celsius; mV = milli-volts; µg/L = micrograms per litre; mg/L = milligrams per litre; mg-N/L = milligrams nitrogen per litre; mg-P/L = milligrams phosphorus per litre; Bq/L = becquerel per litre; CaCQ= calcium carbonate.

Source: CCME (Canadian Council of Ministers of the Environment). 1999, with updates to 2017. Canadian Environmental Quality Guidelines. Winnipeg, MB, Canada.

Source: BC MOE Guidelines (British Columbia Ministry of Environment Guidelines). 2017. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture.

Source: Yukon Contaminated Sites Regulation. 2012.

APPENDIX C
Table C-4: Groundwater Quality Summary for YOWN-1401, 2015 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Yukon CSR	Summary											
		2015 - 2017																
		Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)	Median		Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline			
															Chronic	BC MOE mean	BC MOE max	>Yukon CSR
Field Measured																		
pH	-	6.5 - 9.0	-	-	-	8.2	8.1	8.6	8.9	6.9	9.0	0.86	0	4	-	-	-	-
Specific conductivity	µS/cm	-	-	-	-	9,335	9,546	9,645	10,258	9,102	10,411	589	0	4	-	-	-	-
Temperature	°C	-	-	-	-	1.2	1.5	2.3	3.1	-0.1	3.3	1.7	0	3	-	-	-	-
Dissolved oxygen	mg/L	5.5 - 9.5	-	-	-	3.2 ^(Chronic)	3.3 ^(Chronic)	4.0 ^(Chronic)	4.7 ^(Chronic)	2.0 ^(Chronic)	4.9 ^(Chronic)	1.3	0	4	100	100	100	-
Redox potential	mV	-	-	-	-	-223	-179	-176	-66	-231	-38	94	0	4	-	-	-	-
Conventional Parameters																		
pH	-	6.5 - 9.0	-	-	-	8.0	7.9	8.1	8.8	7.3	9.0	0.68	0	5	-	-	-	-
Specific conductivity	µS/cm	-	-	-	-	9,540	9,768	10,200	11,168	8,720	11,410	1,080	0	5	-	-	-	-
Hardness, as CaCO ₃	mg/L	-	-	-	-	1,270	1,868	2,320	3,400	1,000	3,670	1,138	0	5	-	-	-	-
Total alkalinity, as CaCO ₃	mg/L	-	20 ^(a)	-	-	971	999	1,140	1,276	742	1,310	230	0	5	-	-	-	-
Total dissolved solids	mg/L	-	-	-	-	7,600	8,984	9,640	12,328	7,280	13,000	2,444	0	5	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	103	113	170	181	18	184	67	0	5	-	-	-	-
Total organic carbon	mg/L	-	-	-	-	3.5	3.7	3.8	4.4	3.2	4.5	0.58	0	4	-	-	-	-
Dissolved organic carbon	mg/L	-	-	-	-	3.5	3.6	3.8	4.7	2.6	4.9	0.88	0	5	-	-	-	-
Alkalinity, Phenolphthalein as CaCO ₃	mg/L	-	-	-	-	<5.0	35	134	134	<5.0	134	66	3	4	-	-	-	-
Total inorganic carbon	mg/L	-	-	-	-	220	217	237	259	161	265	43	0	4	-	-	-	-
Dissolved inorganic carbon	mg/L	-	-	-	-	174	157	195	198	82	199	54	0	4	-	-	-	-
Major Ions																		
Bicarbonate, as CaCO ₃	mg/L	-	-	-	-	1,180	1,153	1,390	1,558	577	1,600	389	0	5	-	-	-	-
Bromide	mg/L	-	-	-	-	<2.0	0.53	<2.0	<2.0	<0.02	<2.0	0.55	4	4	-	-	-	-
Calcium	mg/L	-	-	-	-	83	117	216	235	22	240	104	0	5	-	-	-	-
Carbonate, as CaCO ₃	mg/L	-	-	-	-	<6.0	35	<6.0	161	<6.0	161	71	4	5	-	-	-	-
Chloride	mg/L	120	-	-	-	1.9	1.6	<5.0	<5.0	<0.05	<5.0	1.0	3	5	-	-	-	-
Hydroxide, as CaCO ₃	mg/L	-	-	-	-	<5.0	2.5	<5.0	<5.0	<5.0	<5.0	0	5	5	-	-	-	-
Magnesium	mg/L	-	-	-	-	259	383	433	683	230	746	219	0	5	-	-	-	-
Potassium	mg/L	-	-	-	-	9.2	9.8	10	12	8.6	13	1.6	0	5	-	-	-	-
Sodium	mg/L	-	-	-	-	2,300	2,310	2,490	2,498	2,110	2,500	183	0	5	-	-	-	-
Sulphate	mg/L	-	429 ^(b, c)	-	1,000	4,620 ^(BC MOE Mean, YK)	5,504 ^(BC MOE Mean, YK)	5,860 ^(BC MOE Mean, YK)	7,564 ^(BC MOE Mean, YK)	4,450 ^(BC MOE Mean, YK)	7,990 ^(BC MOE Mean, YK)	1,501	0	5	-	100	-	100
Nutrients																		
Nitrate	mg-N/L	2.9	-	-	400	<0.1	0.23	<1.0	<1.0	<0.01	<1.0	0.25	4	5	-	-	-	-
Nitrite	mg-N/L	0.060	-	-	0.2 ^(g)	<0.01	-	<1.0 ^(DL>Chronic)	<1.0 ^(DL>Chronic)	<0.01	<1.0 ^(DL>Chronic)	-	5	5	-	-	-	-
Total ammonia + ammonium	mg-N/L	-	-	-	-	4.3	4.3	4.4	4.5	4.1	4.6	0.30	0	2	-	-	-	-
Total ammonia	mg-N/L	1.5 - 17 ^(d)	-	-	,31 - 18.4 ⁽ⁱ⁾	4.5	3.2	4.7	5.8	0.11	6.1	2.7	0	5	-	-	-	-
Total nitrogen	mg-N/L	-	-	-	-	5.0	5.3	5.5	5.9	4.8	6.0	0.66	0	3	-	-	-	-
Phosphorus (as phosphate)	mg-P/L	-	-	-	-	0.0080	0.0080	0.010	0.012	0.0040	0.012	0.0057	0	2	-	-	-	-
Phosphate	mg/L	-	-	-	-	0.030	0.030	0.036	0.040	0.019	0.041	0.016	0	2	-	-	-	-

APPENDIX C
Table C-4: Groundwater Quality Summary for YOWN-1401, 2015 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life				Yukon CSR	Summary												
							2015 - 2017												
		Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)			Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline			
																Chronic	BC MOE mean	BC MOE max	>Yukon CSR
Total Metals																			
Aluminum	µg/L	100 ^(e, f)	-	-	-	51	87	<100	300 ^(Chronic)	6.0	300 ^(Chronic)	120	1	5	20	-	-	-	-
Antimony	µg/L	-	9.0	-	200	1.5	1.8	<2.0	5.0	<0.2	5.0	1.9	2	5	-	-	-	-	-
Arsenic	µg/L	5.0	-	-	50	2.3	3.1	<10 ^(DL>Chronic)	<10 ^(DL>Chronic)	1.0	<10 ^(DL>Chronic)	1.8	2	5	-	-	-	-	-
Barium	µg/L	-	1,000	-	10,000	9.0	8.4	<10	20	3.0	20	6.8	1	5	-	-	-	-	-
Beryllium	µg/L	-	0.13	-	53	<0.5 ^(DL>BC MOE Mean)	1.1 ^(BC MOE Mean)	<5.0 ^(DL>BC MOE Mean)	<5.0 ^(DL>BC MOE Mean)	<0.04	<5.0 ^(DL>BC MOE Mean)	-	5	5	-	-	-	-	-
Bismuth	µg/L	-	-	-	-	<1.0	2.3	<10	<10	<1.0	<10	-	5	5	-	-	-	-	-
Boron	µg/L	1,500	-	-	-	300	315	338	388	268	400	55	0	5	-	-	-	-	-
Cadmium	µg/L	0.37 ^(b)	-	-	0.3 - 0.6 ^(b)	<0.1	0.23	<1.0 ^(DL>Chronic, DL>YK)	<1.0 ^(DL>Chronic, DL>YK)	0.040	<1.0 ^(DL>Chronic, DL>YK)	-	4	5	-	-	-	-	-
Calcium	µg/L	-	-	-	-	89,400	121,060	219,000	240,600	17,000	246,000	105,629	0	5	-	-	-	-	-
Chromium	µg/L	1.0	-	-	10	2.3 ^(Chronic)	-	<5.0 ^(DL>Chronic)	<5.0 ^(DL>Chronic)	<0.5	<5.0 ^(DL>Chronic)	-	3	5	20	-	-	-	-
Cobalt	µg/L	-	4.0	110	9.0	2.1	2.5	2.8	5.1 ^(BC MOE Mean)	0.97	5.7 ^(BC MOE Mean)	1.9	1	5	-	20	-	-	-
Copper	µg/L	4.0 ^(b)	-	-	30 - 90 ^(b)	6.0 ^(Chronic)	-	<20 ^(DL>Chronic)	<20 ^(DL>Chronic)	3.0	<20 ^(DL>Chronic)	-	3	5	20	-	-	-	-
Iron	µg/L	300	-	-	-	45,000 ^(Chronic)	43,376 ^(Chronic)	50,900 ^(Chronic)	78,500 ^(Chronic)	4,880 ^(Chronic)	85,400 ^(Chronic)	29,444	0	5	100	-	-	-	-
Lead	µg/L	7.0 ^(b)	-	-	50 - 160 ^(b)	0.40	1.3	<1.0	5.1	0.20	5.1	2.1	1	5	-	-	-	-	-
Lithium	µg/L	-	-	-	-	150	153	161	170	130	172	16	0	5	-	-	-	-	-
Magnesium	µg/L	-	-	-	-	271,000	380,600	437,000	680,200	220,000	741,000	219,297	0	5	-	-	-	-	-
Manganese	µg/L	-	2,585 ^(b)	3,394 ^(b)	-	980	3,452 ^(BC MOE Mean, BC MOE Max)	3,595 ^(BC MOE Mean, BC MOE Max)	9,679 ^(BC MOE Mean, BC MOE Max)	650	11,200 ^(BC MOE Mean, BC MOE Max)	5,168	0	4	-	25	25	-	-
Mercury	µg/L	0.026	-	-	1.0	<0.01	-	<0.01	<0.01	<0.01	<0.01	-	4	4	-	-	-	-	-
Molybdenum	µg/L	73	-	-	10,000	5.7	5.8	6.5	6.7	4.9	6.7	0.79	0	5	-	-	-	-	-
Nickel	µg/L	150 ^(b)	-	-	50 - 1500 ^(b)	14	16	<20	40	7.0	40	14	1	5	-	-	-	-	-
Potassium	µg/L	-	-	-	-	9,600	10,000	9,900	12,060	8,800	12,600	1,515	0	5	-	-	-	-	-
Selenium	µg/L	1.0	-	-	10	4.4 ^(Chronic)	-	<20 ^(DL>Chronic, DL>YK)	<20 ^(DL>Chronic, DL>YK)	<2.0 ^(DL>Chronic)	<20 ^(DL>Chronic, DL>YK)	-	4	5	20	-	-	-	-
Silicon	µg/L	-	-	-	-	2,730	2,454	3,200	3,392	1,100	3,440	983	0	5	-	-	-	-	-
Silver	µg/L	0.25	-	-	0.5 - 15 ^(b)	0.10	0.34 ^(Chronic)	<1.0 ^(DL>Chronic, DL>YK)	1.0 ^(Chronic, YK)	0.040	1.0 ^(Chronic, YK)	0.42	2	5	20	-	-	-	20
Sodium	µg/L	-	-	-	-	2,330,000	2,362,000	2,510,000	2,574,000	2,180,000	2,590,000	183,221	0	5	-	-	-	-	-
Strontium	µg/L	-	-	-	-	220	430	759	976	39	1,030	440	0	5	-	-	-	-	-
Sulphur	µg/L	-	-	-	-	1,960,000	1,940,000	2,060,000	2,364,000	1,600,000	2,440,000	342,929	0	5	-	-	-	-	-
Tellurium	µg/L	-	-	-	-	<0.5	-	<5.0	<5.0	<0.1	<5.0	-	5	5	-	-	-	-	-
Thallium	µg/L	0.80	-	-	3.0	<0.1	-	<1.0 ^(DL>Chronic)	<1.0 ^(DL>Chronic)	<0.01	<1.0 ^(DL>Chronic)	-	5	5	-	-	-	-	-
Thorium	µg/L	-	-	-	-	1.1	-	<5.0	<5.0	<0.4	<5.0	-	3	5	-	-	-	-	-
Tin	µg/L	-	-	-	-	7.0	203	<10	1,000	0.10	1,000	446	2	5	-	-	-	-	-
Titanium	µg/L	-	-	-	1,000	8.5	7.3	9.5	11	<2.0	11	4.3	1	4	-	-	-	-	-
Uranium	µg/L	15	-	-	3,000	3.5	6.5	11	15	1.0	16 ^(Chronic)	6.6	0	5	20	-	-	-	-
Vanadium	µg/L	-	-	-	-	<0.5	-	<5.0	<5.0	0.40	<5.0	-	4	5	-	-	-	-	-
Zinc	µg/L	30	-	-	75 - 2400 ^(b)	28	100 ^(Chronic)	<50 ^(DL>Chronic)	430 ^(Chronic)	5.0	430 ^(Chronic)	185	1	5	20	-	-	-	-
Zirconium	µg/L	-	-	-	-	8.5	4.8	<10	<10	<1.0	<10	2.8	3	5	-	-	-	-	-

APPENDIX C
Table C-4: Groundwater Quality Summary for YOWN-1401, 2015 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life			Yukon CSR	Summary												
						2015 - 2017												
		Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)		Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline			
															Chronic	BC MOE mean	BC MOE max	>Yukon CSR
Dissolved Metals																		
Aluminum	µg/L	-	50 ^(e)	100 ^(e)	-	52 ^(BC MOE Mean)	-	<100 ^(DL>BC MOE Mean)	152 ^(BC MOE Mean, BC MOE Max)	<5.0	152 ^(BC MOE Mean, BC MOE Max)	-	3	5	-	40	20	-
Antimony	µg/L	-	-	-	200	<2.0	-	<2.0	<2.0	<0.2	<2.0	-	4	5	-	-	-	-
Arsenic	µg/L	-	-	-	50	3.9	-	<10	<10	<1.0	<10	-	4	5	-	-	-	-
Barium	µg/L	-	-	-	10,000	<10	-	<10	<10	3.0	<10	-	3	5	-	-	-	-
Beryllium	µg/L	-	-	-	53	<0.5	-	<5.0	<5.0	<0.04	<5.0	-	5	5	-	-	-	-
Bismuth	µg/L	-	-	-	-	<10	-	<10	<10	<1.0	<10	-	5	5	-	-	-	-
Boron	µg/L	-	-	-	-	380	371	400	480	276	500	89	0	5	-	-	-	-
Cadmium	µg/L	-	0.46 ^(b)	2.8 ^(b)	0.30	<0.1	-	<1.0 ^(DL>BC MOE Mean, DL>YK)	<1.0 ^(DL>BC MOE Mean, DL>YK)	0.040	<1.0 ^(DL>BC MOE Mean, DL>YK)	-	4	5	-	-	-	-
Chromium	µg/L	-	-	-	10	<5.0	-	<5.0	21 ^(YK)	<0.5	21 ^(YK)	-	4	5	-	-	-	20
Cobalt	µg/L	-	-	-	9.0	<2.0	-	<2.0	2.7	<0.2	2.7	-	3	5	-	-	-	-
Copper	µg/L	-	-	-	30	8.0	-	<50 ^(DL>YK)	<50 ^(DL>YK)	3.0	<50 ^(DL>YK)	-	3	5	-	-	-	-
Iron	µg/L	-	-	350	-	4,570 ^(BC MOE Max)	10,356 ^(BC MOE Max)	21,700 ^(BC MOE Max)	22,820 ^(BC MOE Max)	500 ^(BC MOE Max)	23,100 ^(BC MOE Max)	11,102	0	5	-	-	100	-
Lead	µg/L	-	-	-	50	<1.0	-	<1.0	2.7	<0.1	2.7	-	4	5	-	-	-	-
Lithium	µg/L	-	-	-	-	177	170	180	204	132	210	30	0	5	-	-	-	-
Manganese	µg/L	-	-	-	-	927	759	949	1,150	320	1,200	381	0	5	-	-	-	-
Mercury	µg/L	-	-	-	1.0	<0.01	-	<0.01	<0.01	<0.01	<0.01	-	4	4	-	-	-	-
Molybdenum	µg/L	-	-	-	10,000	5.7	6.1	7.1	7.6	4.8	7.7	1.3	0	5	-	-	-	-
Nickel	µg/L	-	-	-	250	15	-	<20	<20	7.0	<20	-	3	5	-	-	-	-
Selenium	µg/L	-	-	-	10	<6.0	-	<20 ^(DL>YK)	<20 ^(DL>YK)	<2.0	<20 ^(DL>YK)	-	4	5	-	-	-	-
Silicon	µg/L	-	-	-	-	2,400	2,240	2,930	3,050	1,390	3,080	812	0	5	-	-	-	-
Silver	µg/L	-	-	-	0.50	0.20	-	<1.0 ^(DL>YK)	<1.0 ^(DL>YK)	0.040	<1.0 ^(DL>YK)	-	3	5	-	-	-	-
Strontium	µg/L	-	-	-	-	260	419	768	927	42	967	424	0	5	-	-	-	-
Sulphur	µg/L	-	-	-	-	1,700,000	1,874,000	2,120,000	2,360,000	1,560,000	2,420,000	380,762	0	5	-	-	-	-
Tellurium	µg/L	-	-	-	-	<1.0	-	<5.0	<5.0	<0.1	<5.0	-	5	5	-	-	-	-
Thallium	µg/L	-	-	-	3.0	<0.1	-	<1.0	<1.0	<0.01	<1.0	-	5	5	-	-	-	-
Thorium	µg/L	-	-	-	-	<4.0	-	<5.0	<5.0	<0.4	<5.0	-	4	5	-	-	-	-
Tin	µg/L	-	-	-	-	<1.0	-	<10	330	<0.1	330	-	4	5	-	-	-	-
Titanium	µg/L	-	-	-	1,000	7.0	-	<10	<10	<2.0	<10	-	3	5	-	-	-	-
Uranium	µg/L	-	-	-	3,000	1.6	5.8	10	15	0.10	17	7.3	1	5	-	-	-	-
Vanadium	µg/L	-	-	-	-	2.4	-	<5.0	<5.0	<0.5	<5.0	-	4	5	-	-	-	-
Zinc	µg/L	-	-	-	75	15	-	<50	370 ^(YK)	<5.0	370 ^(YK)	-	3	5	-	-	-	20
Zirconium	µg/L	-	-	-	-	7.8	4.8	<10	<10	2.0	<10	2.1	2	5	-	-	-	-
Volatile Organics																		
Benzene	µg/L	370 ^(h)	-	-	4,000	<0.5	-	<0.5	<0.5	<0.5	<0.5	-	4	4	-	-	-	-
Ethylbenzene	µg/L	90 ^(h)	-	-	2,000	<0.5	-	<0.5	<0.5	<0.5	<0.5	-	4	4	-	-	-	-
Toluene	µg/L	2 ^(h)	-	-	390	5.5 ^(Chronic)	-	6.0 ^(Chronic)	7.3 ^(Chronic)	<0.5	7.6 ^(Chronic)	-	2	4	50	50	-	-
Xylenes	µg/L	-	30	-	-	<0.5	-	<0.5	<0.5	<0.5	<0.5	-	4	4	-	-	-	-
Styrene	µg/L	72 ^(h)	-	-	720	<0.5	-	<0.5	<0.5	<0.5	<0.5	-	4	4	-	-	-	-
Methyl tert-Butyl Ether	µg/L	-	-	-	-	<0.5	-	<0.5	<0.5	<0.5	<0.5	-	4	4	-	-	-	-
Volatile Hydrocarbons	µg/L	-	-	-	15,000	<50	-	<50	<50	<50	<50	-	4	4	-	-	-	-
Volatile Petroleum Hydrocarbons	µg/L	10000 ^(h)	-	-	1,500	<50	-	<50	<50	<50	<50	-	4	4	-	-	-	-

APPENDIX C
Table C-4: Groundwater Quality Summary for YOWN-1401, 2015 to 2017

Parameter	Unit	Guidelines for the Protection of Aquatic Life			Yukon CSR	Summary																
		Chronic (CCME)	30-day mean (BC MOE)	Maximum (BC MOE)		2015 - 2017																
						Median	Mean	75 th Percentile	95 th Percentile	Min	Max	Standard Deviation	nd	Count	% Above Guideline							
																			Chronic	BC MOE mean	BC MOE max	>Yukon CSR
Radionuclides																						
Actinium-228	Bq/l	-	-	-	-	<0.9	-	<1.0	<1.0	<0.8	<1.0	-	3	3	-	-	-	-				
Bismuth-212	Bq/l	-	-	-	-	<1.0	-	<2.0	<2.0	<0.9	<2.0	-	3	3	-	-	-	-				
Bismuth-214	Bq/l	-	-	-	-	<0.5	-	0.80	0.80	<0.5	0.80	-	2	3	-	-	-	-				
Lead-210	Bq/l	-	-	-	-	<3.0	-	<4.0	<4.0	<3.0	<4.0	-	3	3	-	-	-	-				
Lead-211	Bq/l	-	-	-	-	<4.0	-	<4.0	<4.0	<3.0	<4.0	-	3	3	-	-	-	-				
Lead-212	Bq/l	-	-	-	-	0.30	0.28	0.35	0.39	<0.3	0.40	0.13	1	3	-	-	-	-				
Lead-214	Bq/l	-	-	-	-	<0.5	-	<0.5	<0.5	<0.4	<0.5	-	3	3	-	-	-	-				
Potassium-40	Bq/l	-	-	-	-	<4.0	-	18	18	<4.0	18	-	2	3	-	-	-	-				
Radium-223	Bq/l	-	-	-	-	<0.8	-	<1.0	<1.0	<0.6	<1.0	-	3	3	-	-	-	-				
Radium-226	Bq/l	-	-	-	-	<4.0	-	<5.0	<5.0	0.0050	<5.0	-	2	3	-	-	-	-				
Radon-219	Bq/l	-	-	-	-	<0.7	-	<1.0	<1.0	<0.5	<1.0	-	3	3	-	-	-	-				
Thallium-208	Bq/l	-	-	-	-	0.50	0.50	0.70	0.86	<0.2	0.90	0.40	1	3	-	-	-	-				
Thorium-227	Bq/l	-	-	-	-	<0.8	-	<0.9	<0.9	<0.6	<0.9	-	3	3	-	-	-	-				
Thorium-230	Bq/l	-	-	-	-	<20	-	<30	<30	<10	<30	-	3	3	-	-	-	-				
Thorium-234	Bq/l	-	-	-	-	<3.0	-	<4.0	<4.0	<3.0	<4.0	-	3	3	-	-	-	-				
Uranium-235	Bq/l	-	-	-	-	<0.9	-	<1.0	<1.0	<0.8	<1.0	-	3	3	-	-	-	-				

- a) Guideline is a minimum value, unless the background concentration or value is lower.
- b) Guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (1,000 to 3,670 mg/L). The guideline is calculated based on the individual hardness value for each sample.
- c) For some samples, water hardness was greater than 250 mg/L. At this hardness, no BC MOE water quality guideline has been established for sulphate; however, the observed data were screened against the guideline for very hard water (i.e., 429 mg/L) for comparative purposes.
- d) The ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (1.5255 mg-N/L) is based on the combination of field pH (8.0) and water temperature (3.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.
- e) Guideline is pH dependent. The guideline range shown is based on the pH range observed in the dataset (6.9 to 9.0). The guideline is calculated based on the individual pH for each sample.
- f) Guideline is pH dependent: 5 µg/L at pH < 6.5 and 100 µg/L at pH ≥ 6.5.
- g) = guideline is chloride dependent. The guideline range shown is based on the chloride concentration range observed in the dataset (1.88 to 2.5 mg/L). The guideline is calculated based on the individual chloride concentration in each sample.
- h) CCME guideline is an interim guideline.
- (Chronic) = concentration is higher than the chronic aquatic life CCME guideline or outside the recommended pH, DO or total alkalinity range.
- (BC MOE mean) = concentration is higher than the 30-day mean BC MOE guideline or outside the recommended pH, DO or total alkalinity range.
- (BC MOE max) = concentration is higher than the maximum BC MOE guideline or outside the recommended pH, DO or total alkalinity range.
- (YK) = concentration is higher than the General Numerical Water Standards of the Yukon Contaminated Sites Regulation
- (DL>Chronic) = analytical detection limit is higher than the chronic aquatic life CCME guideline.
- (DL>BC MOE mean) = analytical detection limit is higher than the 30-day mean BC MOE guideline.
- (DL>BC MOE max) = analytical detection limit is higher than the maximum BC MOE guideline.
- (DL>Yukon CSR) = analytical detection limit is higher than General Numerical Water Standards of the Yukon Contaminated Sites Regulation.
- Bolded** concentrations are higher than water quality guidelines.

Water quality data and guidelines shown in this table were rounded to reflect laboratory or field instrument precision *after* comparisons to guidelines. Therefore, values slightly above guidelines may be displayed as being equal to the guidelines and identified as exceedances. Concentrations equal to the guideline values were not identified as exceedances.

In cases where 50% or more of data were <DL, no mean or standard deviation was calculated.

< = less than; - = no guideline or no data; µS/cm = microSiemens per centimetre; °C = degree celsius; mV = milli-volts; µg/L = micrograms per litre; mg/L = milligrams per litre; mg-N/L = milligrams nitrogen per litre; mg-P/L = milligrams phosphorus per litre; Bq/L = becquerel per litre; CaCO = calcium carbonate.

Source: CCME (Canadian Council of Ministers of the Environment). 1999, with updates to 2017. Canadian Environmental Quality Guidelines. Winnipeg, MB, Canada.

Source: BC MOE Guidelines (British Columbia Ministry of Environment Guidelines). 2017. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture.

Source: Yukon Contaminated Sites Regulation, 2012.

APPENDIX D

Sediment Quality Data

Table D-1: Sediment Quality and Guidelines Comparison for the Eagle Plains Baseline Study, 2016

Sample Location		Guidelines for the Protection of Aquatic Life		CHNC-001	CHNC-001	DALG-002	DALG-002	EAGL-T-002	EAGL-T-002	EAGL-T-003	EAGL-T-003	McPL-001	McPL-001	WHST-004	WHST-004
Sample Name				CHNC-001	CHNC-001 (2 mm)	DALG-002	DALG-002 (2 mm)	EAGL-t-002	EAGL-t-002 (2 mm)	EAGL-t-003	EAGL-t-003 (2 mm)	McPL-001	McPL-001 (2 mm)	WHST-004	WHST-004 (2 mm)
Sample Date		ISQG	PEL	20-Sep-16	20-Sep-16	20-Sep-16	20-Sep-16	20-Sep-16	20-Sep-16	20-Sep-16	20-Sep-16	20-Sep-16	20-Sep-16	20-Sep-16	20-Sep-16
Parameter	Unit														
Physical Properties															
pH	-	-	-	7.2	7.2	6.7	6.7	5.3	5.3	5.8	5.8	6.1	6.1	7.5	7.5
Moisture content	%	-	-	17.6	17.6	20	20	41.3	41.3	43.5	43.5	19.8	19.8	29.8	29.8
Nutrients															
Total Nitrogen	%	-	-	0.14	0.14	0.21	0.21	0.19	0.19	0.17	0.17	0.1	0.1	0.07	0.07
Phosphorus (as phosphate)	mg/kg	-	-	1390	974	777	747	719	649	851	545	2430	1190	990	942
Hydrocarbons															
Benzene	mg/kg	-	-	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Ethylbenzene	mg/kg	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Toluene	mg/kg	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Xylenes	mg/kg	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Methyl tert-Butyl Ether	mg/kg	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Styrene	mg/kg	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Volatile Hydrocarbons	mg/kg	-	-	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
Volatile Petroleum Hydrocarbons	mg/kg	-	-	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
Total Metals, Metalloids, and Non-Metals															
Aluminum	mg/kg	-	-	-	15200	-	8460	-	11300	-	10500	-	16500	-	11800
Antimony	mg/kg	-	-	1.4	1.8	1.2	< 1.5	0.53	< 1.5	1.3	< 1.5	2.7	2.6	0.89	< 1.5
Arsenic	mg/kg	5.9	17	28.4 ^(a, b)	11 ^(a)	22.9 ^(a, b)	12.1 ^(a)	13.7 ^(a)	6.02 ^(a)	33.9 ^(a, b)	13.8 ^(a)	49.6 ^(a, b)	13.7 ^(a)	13.4 ^(a)	8.59 ^(a)
Barium	mg/kg	-	-	386	642	197	376	332	410	404	839	451	995	312	775
Beryllium	mg/kg	-	-	2	0.873	0.53	0.551	0.5	0.528	0.7	0.551	2	0.979	0.61	0.698
Cadmium	mg/kg	0.6	3.5	0.845 ^(a)	0.8 ^(a)	0.455	0.91 ^(a)	0.498	0.4	0.318	0.89 ^(a)	1.15 ^(a)	0.81 ^(a)	0.688 ^(a)	1.1 ^(a)
Calcium	mg/kg	-	-	-	8110	-	4730	-	2190	-	2910	-	3820	-	27300
Chromium	mg/kg	37.3	90	16.6	42.2 ^(a)	15.2	31.8	16	23.9	21	29.4	17.1	43.9 ^(a)	12	31.1
Cobalt	mg/kg	-	-	20.2	15.8	10.1	9.6	9.03	8.45	8.9	8.1	27.5	19.5	9.04	13.1
Copper	mg/kg	35.7	197	26.3	31.3	22.5	25.8	17.4	16.9	29	26.1	32.7	32.8	17.1	28.1
Iron	mg/kg	-	-	-	35500	-	23200	-	17500	-	27400	-	45400	-	29500
Lead	mg/kg	35	91.3	12	12.2	10.6	13	9.13	10.4	13.3	11.2	15.7	16	6.74	9.52
Lithium	mg/kg	-	-	11.8	22.4	5.2	10.2	6.91	10.1	16.7	16.4	9.88	23.1	6.8	18.4
Magnesium	mg/kg	-	-	-	5270	-	2080	-	2320	-	2440	-	4070	-	13000
Manganese	mg/kg	-	-	1730	1250	326	209	345	296	140	131	2790	1910	762	1270
Mercury	mg/kg	0.17	0.486	0.0343	0.0579	0.0449	0.0368	0.0542	0.0383	0.0567	0.0418	0.0601	0.0539	0.0362	0.0607
Molybdenum	mg/kg	-	-	4.09	2.2	2.78	2.2	1.27	0.67	2.2	1.5	8.87	2.8	2.31	1.6
Nickel	mg/kg	-	-	52.1	46.2	49.8	48.5	18.3	18.4	35.2	37.9	71.6	46.1	30.3	42.8
Potassium	mg/kg	-	-	-	1790	-	1630	-	1400	-	1310	-	1550	-	1290
Selenium	mg/kg	-	-	2.2	1.3	5.25	3.5	0.96	0.85	2.8	1.5	2.8	1.5	1.1	1.6
Silicon	mg/kg	-	-	-	3320	-	2550	-	3640	-	2660	-	2780	-	2440
Silver	mg/kg	-	-	0.06	< 0.4	0.55	< 0.4	0.2	< 0.4	0.2	< 0.4	0.07	0.63	0.1	< 0.4
Sodium	mg/kg	-	-	-	120	-	180	-	170	-	150	-	140	-	110
Strontium	mg/kg	-	-	69.9	47.6	59	76.2	38.4	43.3	32.2	38.4	36.6	39.9	37.6	55.4
Thallium	mg/kg	-	-	0.1	< 0.5	0.2	< 0.5	0.09	< 0.5	0.2	< 0.5	0.1	< 0.5	0.09	< 0.5
Tin	mg/kg	-	-	0.32	0.68	0.45	1.3	0.38	< 0.5	0.47	< 0.5	0.28	< 0.5	0.21	0.68
Uranium	mg/kg	-	-	1.1	102	0.99	56.2	0.78	125	0.82	67.2	1.7	110	0.99	72.8
Vanadium	mg/kg	-	-	47.5	60.9	38.6	48.9	38.4	49.5	57	54.9	60.4	63.4	38.2	62.9
Zinc	mg/kg	123	315	259 ^(a)	160 ^(a)	195 ^(a)	171 ^(a)	82.3	75	202 ^(a)	144 ^(a)	355 ^(a, b)	164 ^(a)	121	150 ^(a)
Zirconium	mg/kg	-	-	-	3	-	2.8	-	2.4	-	2.7	-	3.3	-	2.9

a) Concentration is higher than the CCME ISQG sediment quality guideline.

b) Concentration is higher than the CCME PEL sediment quality guideline.

CCME = Canadian Council of Ministers of the Environment; SQG = sediment quality guideline; - = no data; mg/kg = milligram per kilogram; < = less than; ISQG = nterim sediment quality guideline; PEL = probable effects level.



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