Appendix C – Water Quality and Quantity Screening Methods

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C.1 WATER QUANTITY SCREENING METRICS

Based on key drivers of the program and community concerns, it was determined that water quantity should be assessed against a variety of metrics that would inform on effects to aquatic ecosystems, consumptive use, and access/navigability. As described in Section 2.6.2 of the main body, several regional initiatives were consulted, and 25 indicators were identified as appropriate screening metrics. These metrics are summarized in Table C1.

Table C1:Surface Water Quantity Screening Metrics

Indicator	Unit	Description	SOE application	Source and References
Summary Conditions – Flows				
Annual and monthly average daily streamflow	m^3/s and mm/yr	This metric represents the daily total volumetric velocity of water in a river averaged over an annual or monthly period. It helps to understand the availability of aquatic habitat and is indicative of water availability for consumption. Annual averages are broad indicators which lack the nuance of seasonality of streamflow but can be utilized in conjunction with seasonal information and ice cover to better understand the system.	Descriptive metrics will be generated for each monitoring location.	Richter et al., 1996, Monk et al., 2012, Peters et al., 2014
Annual and monthly maximum daily streamflow	m^3/s	This metric represents the daily maximum volumetric velocity of water in a river averaged over an annual or monthly period. This helps to understand impacts to aquatic habitat as high flows influence suitability. High flows also influence erosion and sediment loading and this metric can help understand these behaviours in a river. This metric can also be indicative of flood risk. Annual averages are broad indicators which lack the nuance of seasonality of streamflow but can be utilized in conjunction with seasonal information and ice cover to better understand the system. Monthly averages provide detailed characteristics.		Richter et al., 1996, Monk et al., 2012, Peters et al., 2014
Annual minimum and monthly daily streamflow	m^3/s	Parallel to the annual maximum daily streamflow, this metric represents the daily minimum volumetric velocity of water in a river averaged over an annual or monthly period. This helps to understand stress associated with a lack of water and can also help to understand the potential for low oxygen conditions. Annual averages are broad indicators which lack the nuance of seasonality of streamflow but can be utilized in conjunction with seasonal information and ice cover to better understand the system. Monthly averages provide detailed characteristics.		Richter et al., 1996, Monk et al., 2012, Peters et al., 2014

Indicator	Unit	Description	SOE application	Source and References
Annual and seasonal 7 day low flow	m^3/s	This metric describes the average lowest flow in a river experienced over 7 consecutive days in a year or season. This metric is also indicative of stress associated with a lack of water and can also help to understand the potential for low oxygen conditions. These are also broad indicators though they help to better understand more persistent low flow conditions as compared to daily streamflow. Annual values still lack the nuance of seasonality of streamflow but can be utilized in conjunction with seasonal information and ice cover to better understand the system. Seasonal values provide better consideration for seasonal variability.		Buttle et al., 2012
Richards – Baker Flashiness Index		This metric represents the 'flashiness' or the frequency and speed of short-term changes in streamflow for a river. As rapid changes in streamflow can be detrimental to aquatic life this metric helps to understand impacts to ecosystems. This value is an important characteristic of stream's hydrologic regime but is a function of a time series sample and results are sensitive to temporal frequency of the data. Note that the methods incorporate missing data.		Baker et al., 2004
Summary Conditions - Flow timing				
Annual peak flow date	Date	This metric indicates the date of the when peak flow is observed in a river, either for an entire year, a season, or for each month. It is indicative of seasonality of streamflow and provides context for streamflow magnitude statistics. To demonstrate seasonality, it should be used in conjunction with ice cover data to place into context of ice conditions. However, away from the spring freshet, high standard deviations may result in limited application of monthly results.	Descriptive metrics will be generated for each monitoring location.	Richter et al., 1996, Monk et al., 2012, Peters et al., 2014
Annual low flow date	Date	This metric indicates the date of the when the lowest flow is observed in a river, either for an entire year, a season, or for each month. It is indicative of seasonality of streamflow and provides context for streamflow magnitude statistics. To demonstrate seasonality, it should be used in conjunction with ice cover data to place into context of ice conditions. However, high standard deviations may result in limited application of monthly results.		Peters et al., 2012,Buttle et al., 2012
Number of zero flow days per calendar year	Days	This metric represents the average number of days where there is no flow in a river. It is indicative of how common an extreme loss of water availability may be and can help to understand habitat loss. This metric must be analyzed in the context of stream order to provide fulsome context.		Peters et al., 2012,Buttle et al., 2012

Indicator	Unit	Description	SOE application	Source and References
Duration > Q90	Days	Represents the number of days in a year where streamflow is greater than the 90th percentile of annual streamflow. This metric is indicative of stress on aquatic ecosystems and water management systems. This value can be particularly informative in conjunction with the low flow duration indicator below.		Burn & Whitfield, 2016
Duration < Q10	Days	Represents the number of days in a year where streamflow is less than 10th percentile of annual streamflow. This metric is indicative of stress on aquatic ecosystems and water management systems. This value can be particularly informative in conjunction with the high flow duration indicator above.		Peters et al., 2012,Buttle et al., 2012
Annual frequency of high flow pulse (7Q90)		This metric describes the frequency that flow greater than the 90th percentile of streamflow is observed for a consecutive 7-day period. It is indicative of occurrence of high flow events, which provides information on flood risk, erosion, sediment loads.		Richter et al., 1996, Monk et al., 2012, Peters et al., 2014
Annual frequency of low flow pulse (7Q10)		This metric describes the frequency that flow less than the 10th percentile of streamflow is observed for a consecutive 7-day period. It is indicative of low flow events and metric is indicative of stress on aquatic ecosystems and water management systems.		Richter et al., 1996, Monk et al., 2012, Peters et al., 2014
Freeze up and break up date	Date	Indicates the date by which the river typically freezes and thaws. These value help to understand the seasonality of streamflow. However, these values may be difficult to obtain.		De Rham et al., 2020
Ice covered period / Open water period	Days	Metric summarizes the duration that the river is under ice. The duration of this period influences aquatic systems through its impact on photosynthetic production. It also has an influence on stream temperature and water availability.		De Rham et al., 2020
Hydrological Change				
Extreme Low Flow (ELF)	m^3/s	This metric represents a flow value below which a river's flow would be considered to be extremely low. It is estimated as the lowest annual 7-day average minimum flow for the full dataset at each station.	Descriptive metrics will be generated for each monitoring location.	Richter et al. 1996, 1997, 1998; Edwards et al., 2019; USGS, 1960
Bankfull	m^3/s	This metric is used to represent the flow at which a river would be full to the banks. For the SOE it is estimated based on recurrence intervals with a recurrence interval of 1.5 years (2 out of 3 years).		
Mean Annual Flood (MAF)	m^3/s	This metric is used to represent the flow rate at which a small and common flood would occur. For the SOE it is estimated based on recurrence intervals with a recurrence interval of 2.33 years (3 out of 7 years).		
Navigation Indices and Thresholds				

Indicator	Unit	Description	SOE application	Source and References
Aboriginal baseflow (ABF)	1600 m^3/s	This metric applies specifically to the Athabasca River and adjacent streams where ACFN members practice their Treaty and Indigenous rights. The value represents a level at which ACFN members are able to fully access their territories. As this is a fixed value, it may require updating as the streambed evolves.	To be applied specifically at Athabasca River Below Fort McMurray (07DA001) hydrometric station.	As long as the River Flows (Candler et al., 2010)
Aboriginal extreme flow (AXF)	400 m^3/s and 482 m^3/s	This metric applies specifically to the Athabasca River and adjacent streams where ACFN members practice their Treaty and Indigenous rights. The value indicates a navigational depth of 1.2 m required for a fully loaded boat with an outboard motor and represents a level below which there may be widespread and significant disruption to ACFN territorial access. As this is a fixed value, it may require updating as the streambed evolves. In particular, it was recently reported that the AXF should be 482 m^3/s, which is reported on in the SOE report along with 400 m^3/s.		As long as the River Flows (Candler et al., 2010) Carver and Maclean (2022)
Aboriginal navigation index (ANI)		This metric applies specifically to the Athabasca River. It is represented as a percentage change in streamflow from pre-withdrawal conditions. This metric is intended to express the quality of the navigability of the Lower Athabasca River. This metric does not consider seasonal changes in streamflow and their cumulative influence on navigability.	To be applied specifically at Athabasca River Below Fort McMurray (07DA001) hydrometric station.	LAR (Peters et al., 2023)

C.2 WATER QUALITY SCREENING GUIDELINES

As described in Section 2.5.2, parameters for which guidelines exist will be compared against all available screening guidelines identified in the SOE. Water quality targets were compiled from four frameworks within the OSR. Risk-based guidelines were compiled from 5 jurisdictions addressing human and ecological health. A brief description of each of the source screening values applied in the SOE report is included in Table C2 below.

Table C2: Water quality screening value source documentation

Type	Source	Description	SOE Name	Application within the SOE
Historical Dataset-Derived Triggers	**Muskeg River interim management framework for water quantity and quality: summary report** (AEP, 2008)	The Muskeg River interim framework includes Water Quality Targets (mean and peak) which were defined based on an increase in concentration of more than 20% compared to historical water quality within the Muskeg River watershed. The intent of these targets was to act as "anti-degradation" limits where an exceedance could trigger further investigation. The Muskeg River framework also includes Water Quality Limits (mean and peak) which are risk-based criteria derived from historical (pre-2008) Alberta and Canada water quality guidelines. The most current versions of these guideline documents are included in the guideline sections below. There are MR-WQTs for a total of 51 parameters.	**MR-WQT**	MR – WQT to be applied as values at the Muskeg River Monitoring location at the WSC gauge (MUR_9).
	Lower Athabasca River (LAR) Surface Water Quality Framework (GoA, 2012)	Water quality triggers (mean and peak) are based on the arithmetic mean and 95th percentiles of historical data collected at the Old Fort monitoring station prior to 2009. The intent of these triggers is to provide an early indication as to whether water quality may be changing, or not, away from existing water quality in the Lower Athabasca River at Old Fort. The LAR also includes water quality limits but these are based on EPA, CCME, Health Canada, and US EPA guidelines which are included in the guideline sections below. There are LAR-WQTs for a total of 61 parameters.	**LAR-WQT**	LAR-WQT to be applied as screening values specifically at the Old Fort monitoring station (ATR_27).
	Upper Athabasca River (UAR) Surface Water Quality Framework (GoA, 2022)	Similar to the LAR WQTs, the UAR has water quality triggers (mean and peak (95th percentile)) developed based on historical water quality data collected at the Athabasca River at Town of Athabasca LTRN station (AB07BE0010). The intent of these triggers is to provide an early indication as to whether water quality may be changing, or not, away from existing water quality in the Athabasca River at Town of Athabasca LTRN station. This helps to determine if further assessment or actions are needed. The UAR also includes water quality limits but these are based on Alberta Surface Waters (Alberta Environment and Parks, 2018) guidelines which are included in the guideline sections below. There are UAR-WQTs for a total of 36 primary parameters.	**UAR-WQT**	UAR-WQT to be applied as screening value specifically at the Athabasca River at Town of Athabasca LTRN station monitoring station (SOE site ATR_1).

Type	Source		Description	SOE Name	Application within the SOE
	The Alberta-Northwest Territories Bilateral Water Management Agreement (Mackenzie River Basin Bilateral Water Management Agreement) (GoA & GoNWT, 2015)		The Alberta-NWT Transboundary Water Quality Agreement outlines triggers which are intended to be early warnings of change in the Slave (SR-WQT) and Hay Rivers (HR-WQT). This includes two trigger points based on the 50th percentile and 90th percentile of historical dataset for each of the rivers. When exceedances occur above these values at a frequency that is higher than would be statistically expected it may trigger additional investigation or management actions. The agreement includes triggers that may be seasonal (spring/summer/fall winter), open water/under ice, or annual. Only annual guidelines have been included in this reporting. There are Alberta-NWT WQTs for a total of 32 parameters with annual triggers.	**SR-WQT**	SR-WQT (annual only) to be applied as screening values at the Slave River Monitoring location at Fitzgerald (SLR_3) (Hay River out of scope).
Risk-Based Guidelines Human Health	**Drinking Water**	**Health Canada - Canadian Drinking Water Quality Guidelines – Chemical and Physical Parameters only** (Health Canada, 2024)	The Canadian Drinking Water Guidelines include Maximum Acceptable Concentrations (MAC), aesthetics objectives (AO), and operational guidance (OG). MAC are risk-based guidelines protective of human health from exposure to contaminants via consumption of drinking water. These guidelines are intended to be protective against both cancer and non-cancer health effects. AO are aesthetic considerations such as taste and odour which could influence the perceived palatability of water. OG are values which consider substances which could impact drinking water treatment processes. Guidelines were established based on published scientific research and comprehensive review of the health effects associated with contaminant exposure. The guidelines also underwent internal and external peer review and public consultation before approval. A limitation of the guidelines is that they were only developed for contaminants that have been identified frequently or could be expected to be found in drinking water supplies in Canada and as such may not include all parameters. There are guidelines for over 90 parameters.	**HC-DW (MAC and OA)**	Each of the available guidelines are applied as screening values for all sampling locations within the SOE dataset. While these guidelines are presented in the context of treated drinking water, they are risk-based and as such will be used within the SOE in the context of raw water consumption in the absence of guidelines for raw water consumption, though it is acknowledged that they were not developed for this purpose. Each of the three guideline sources are included to provide multiple points of comparison, as each of the guidelines were derived using slightly different methodologies. Different jurisdictions may also use different exposure scenarios (i.e. different values to estimate the amount of water
		US EPA – Drinking Water Regulations (US EPA, 2021)	The regulation relates specifically to drinking water and includes two guideline types. Maximum Contaminant Levels (MCLs) are enforceable limits in the US and are intended to provide public health protection from cancer, organ damage or disorders of the circulatory, nervous or reproductive systems considering chronic exposure. The Regulations also include Maximum Contaminant Level Goal (MCLGs) which are water quality targets and	**USEPA – DW (MCLs and MCLGs)**	

Type	Source		Description	SOE Name	Application within the SOE
			represent a concentration at which no known or anticipated adverse health effects would occur. Guidelines are developed for substances that may have adverse health effects, are likely to be in public water systems, and where a regulation could provide an opportunity for health risk reductions. There are guidelines for over 90 parameters.		an adult would drink in a day) which can also result in differences between guidelines.
		WHO guidelines for Drinking Water Quality (WHO, 2022)	The world health organization (WHO) sets drinking water quality guidelines which are intended to provide protection to human health and assist in establishing national or regional drinking-water policies. The guidelines are risk-based but also include aesthetics considering life-long consumption of water. There are guidelines for over 90 parameters	**WHO-DW**	
	Drinking Water and Consumption of Aquatic Organisms	**US EPA – Human Health Water Quality Criteria– Drinking Water and Organisms** (US EPA, 2015, 2023)	The US EPA Human health water quality criteria apply to ambient water quality and are risk-based guidelines intended to be protective of human health. The criteria represent thresholds concentrations in water below which a chemical is unlikely to cause adverse effects to human health from two scenarios. The first scenario considers if both aquatic organisms harvested from the waterbody and the water itself are consumed while the second considers only the risk from the consumption of aquatic organisms. Note that the criteria for the consumption of organisms do not consider direct measurements of tissue concentrations. The criteria are derived using accepted methodologies considering the most current exposure rates, toxicity, bioconcentration, and bioaccumulation factors. There are currently water quality criteria for over 110 parameters, the criteria were first developed in 2000 with the criteria for 158 parameters updated in 2002 and a further 94 updated in 2015.	**USEPA-SWQ-DW+Org**	Guidelines are applied as screening values for all sampling locations within the SOE dataset.
	Aesthetics and Recreation	**Environmental Quality Guidelines for Alberta Surface Waters – Recreation and Aesthetics** (GoA, 2018)	The Recreation and Aesthetics Environmental Quality Guidelines for Alberta Surface Waters include thresholds for biological and physical parameters as well as qualitative observations which have the potential to either present a health risk to recreation users or could influence the perceived suitability of a water body for recreational use. The values presented in the Alberta framework are sourced from Health Canada 2012 and US EPA 2012. There are a total of 16 parameters for which there are guidelines.	**EPA-SWQ-RA**	Applied as screening values for all sampling locations within the SOE dataset. Each of the guidelines are included in the SOE analyses to provide fulsome coverage of aesthetic criteria for comparison and also consider differences between jurisdictions.

Type	Source		Description	SOE Name	Application within the SOE
		Guidelines for Canadian Recreational Water Quality: Physical, Aesthetic and Chemical Characteristics (Health Canada, 2022)	The Canadian guidelines for recreation water quality provide qualitative recommendations to assess the quality of recreational surface water. There are no chemical guidelines listed. The are a total of eight (8) parameters for which there are guidelines.	**HC-SWQ-RA**	
		US EPA – Water Quality Guidelines – Organoleptic Effects (US EPA, 1986,2023b)	The US EPA Water quality criteria includes organoleptic criteria which consider sensory effects such as taste and smell to which humans could have an adverse reaction (ie., not wanting to consume the water). There are criteria for 27 parameters including both chemical and physical.	**USEPA-SWQ-RA**	
Risk-Based Guidelines Ecological Health	**Freshwater Aquatic Life**	**Environmental Quality Guidelines for Alberta Surface Waters – Protection of Aquatic Life** (GoA, 2018)	The Alberta surface water quality guidelines include guidelines protective of freshwater aquatic life considering both acute (short-term) and chronic (long-term) exposure scenarios. The guidelines presented in the Alberta framework are adopted from other jurisdictions available at the time of publication, with CCME Canadian Water Quality guidelines for the Protection of Aquatic Life as the primary source. However, the guidelines for select parameters are also adopted from BC Environmental Protection and Sustainability, Ontario Ministry of Environment and Climate Change, Quebec Ministry of Environment, the Fight Against Climate Change, Wildlife and Parks, and the US EPA. The guidelines developed by these jurisdictions and presented within the Alberta framework are risk-based guidelines intended to be protective of aquatic species via direct exposure. Further details on CCME and US EPA guidelines are provided in the sections below. There are EPA-PAL guidelines for 167 parameters.	**EPA-SWQ-PAL**	Applied as screening values for all sampling locations within the SOE dataset. It is noted that the EPA-PAL screening values will be largely consistent with their source guidelines though some variation may exist where these have been updated. However, given that the OSR is within Alberta these screening values are included independently for easy comparison to current provincial guidelines.
		CCME - Canadian Water Quality Guidelines	The Canadian Water Quality Guidelines protective of aquatic Life are a series of risk-based guidelines protective of aquatic species via direct exposure considering both acute and chronic exposure. The guidelines are developed to be protective of the most sensitive species at the most sensitive life stage.	**CCME-SWQ-PAL**	

Type	Source		Description	SOE Name	Application within the SOE
		for the Protection of Aquatic Life (publication dates are specific to parameters) (CCME, 2024)	While the protocols for the development of these guidelines may vary between parameters, the methodologies follow accepted effects evaluation techniques and are generally accepted across Canada. These guidelines do not directly assess trophic risk as CCME-CWQGs tissue residue guidelines exist to evaluate risk to wildlife consuming aquatic prey. There are approximately 120 parameters with CCME-PAL guidelines supported by fact sheets with varying dates of publication.		
		ECCC - Federal Environmental Quality Guidelines (ECCC, 2024)	The Federal Environmental Quality Guidelines are risk-based guidelines protective of ecological health and based on toxicological effects. These thresholds are intended to be protective of aquatic life via direct exposure to water as well as protective of bioaccumulation up the food chain where animals may consume the exposed aquatic life (ie birds or mammals consuming fish, invertebrates etc.). Where there is a significant amount of toxicity information available for the substance, thresholds are calculated using statistical approaches. Where an insufficient number of data are available, thresholds are calculated using critical toxicity factors plus additional safety factors to account for uncertainty. FEQGs can be used in complement to CCME guidelines as these are developed to support federal environmental quality monitoring and other risk management initiatives where CCME guidelines do not yet exist and are not anticipated to be used in the near future. There are FEQGs available for 33 parameters.	**ECCC-SWQ-FEQG**	
		US EPA – Water quality Guidelines – Aquatic Life Criteria (Stephen et al., 2010; US EPA, 2023a)	The US EPA aquatic life criteria are intended to be protective of both aquatic plants and animals and represent concentrations below which adverse effects are not expected considering acute and chronic exposure. These guidelines were derived using methodologies established in 1985 which consider toxicity to plants and animals as well as the potential for bioaccumulation. There are guidelines for 33 parameters.	**USEPA-SWQ-PAL**	
	Agricultural Water Use	**Environmental Quality Guidelines for Alberta Surface**	Includes both irrigation water and livestock watering guidelines. The Alberta guidelines are either adopted from the CCME Canadian Water Quality guidelines for the Protection of Agricultural Water available at the time of publication or derived using the methodologies presented in the CCME with modified	**EPA-SWQ-Ag**	Applied as screening values for all sampling locations within the SOE dataset. It is noted that the EPA-Ag screening values will be

Type	Source		Description	SOE Name	Application within the SOE
		Waters – Agricultural Uses (GoA, 2018)	irrigation rates. These CCME guidelines are further described below. There are approximately 74 parameters.		largely consistent with their source guidelines though some variation may exist where these have been updated. However, given that the OSR is within Alberta these screening values are included independently for easy comparison to current provincial guidelines.
		CCME - Canadian Water Quality Guidelines for the Protection of Agricultural Water Uses (CCME, 2024)	Includes both irrigation water and livestock watering risk-based guidelines. The irrigation guidelines are intended to be protective of the most sensitive crop plants at the most sensitive life stage. The livestock watering guidelines are intended to be protective of the livestock consuming water. While the protocols for the development of these guidelines may vary between parameters, the methodologies follow accepted effects evaluation techniques and are generally accepted across Canada. There are approximately 65 parameters with CCME-Ag guidelines supported by fact sheets with varying dates of publication.	**CCME-SWQ-Ag**	
	Terrestrial Wildlife	**US Department of Energy Toxicological Benchmarks for Wildlife** (Sample et al., 1996)	The US Department of Energy (USDOE) developed risk-based guidelines for the protection of mammalian and avian wildlife via the consumption of water and aquatic prey (piscivore benchmarks). These include no observable adverse effects levels (NOAELs) which represent the concentration of a chemical in surface water which is not anticipated to result in any adverse effects to wildlife and lowest observable adverse effects levels (LOAELs) which represent the concentrations above which adverse effects are likely to become evident. These guidelines consider a number of wildlife species and list NOAELs and LOAELs for select species. There are guidelines for a total of 50 parameters.	**USDOE-SWQ-WL**	For the purpose of the SOE, the lowest LOAEL and NOAEL piscivore values for each parameter were adopted as screening values.
Risk-Based Guidelines Indigenous Use	**Lower Athabasca Surface Water and Sediment Quality Criteria for Protection of Indigenous Use** (Olsgard et al., 2023)		As part of the OSM project B-CM-11-2021, surface water and sediment quality criteria were developed on behalf of three Indigenous communities Athabasca Chipewyan First Nation (ACFN), Fort McKay First Nation (FMFN) and Mikisew Cree First Nation (MCFN) to address gaps in existing guidelines considering indigenous use of aquatic resources. The methodology was intended to consider risk to humans, freshwater aquatic life, and terrestrial wildlife. The guidelines utilized a jurisdictional approach considering several of the guideline sources listed above. Surface water and aquatic organism consumption guidelines were also derived using the USEPA-SWQ-DW+Org methodologies but with	**ICBM-SWQ-IU**	Applied as screening values for all sampling locations within the SOE dataset.

Type	Source	Description	SOE Name	Application within the SOE
		modified water and organism consumption rates based on surveys completed within the three communities. The lowest of the jurisdictional and derived guidelines were then selected as the surface water quality guidelines for protection of Indigenous surface water. Though the cultural and spiritual value of water was acknowledged, other metrics apart from guidelines are likely required to address these components. There are guidelines for a total of 320 parameters.		

C.3 WATER QUALITY SCREENING VALUES

Screening values from the guidelines are presented in Table C3 below. Parameter naming conventions were standardized across guideline sources and the SOE dataset parameter list to generate a single unique parameter name. As necessary, the naming convention for select parameters was also updated to reflect significant differences between analytical methodologies (i.e., 'chlorine' results from ICP-MS versus guidelines for 'chlorine' based on free chlorine). Where US EPA guidelines were available for two carcinogenicity risk level ($1x10^{-6}$ and $1x10^{-5}$), the guidelines reflective of a $1x10^{-5}$ risk level was selected for consistency with Alberta guidance (Alberta Health, 2019). A CCME-SWQ-PAL chronic value for dissolved oxygen was selected based on the most sensitive receptor (early life stages of cold-water biota) (CCME, 1999). USEPA-DW-MCLGs that had values of 0 were removed from the guideline list as they represent goals associated with drinking water purification and are not realistic for the purpose of the report herein. Guideline units were standardized across guideline types to reflect the lowest unit used.

Table C3: Water quality screening values. 'Variable' indicates that the guideline is parameter-dependent and calculated for each sample based on other characteristics of the sample, 'Narrative' indicates that the guideline is non-numeric and qualitative.

Guideline	Parameter	Type	Value	Units
ICBM-SWQ-IU	1,1,1-Trichloroethane	Direct	200	µg/l
	1,1,2,2-Tetrachloroethane	Direct	2	µg/l
	1,1,2-Trichloroethane	Direct	3	µg/l
	1,1-Dichloroethylene	Direct	7	µg/l
	1,2,3-Trichlorobenzene	Direct	8	µg/l
	1,2,4-Trichlorobenzene	Direct	0.071	µg/l
	1,2-Dibromo-3-Chloropropane	Direct	0.2	µg/l
	1,2-Dibromoethane	Direct	0.4	µg/l
	1,2-Dichlorobenzene	Direct	0.7	µg/l
	1,2-Dichloroethane	Direct	5	µg/l
	1,2-Dichloropropane	Direct	5	µg/l
	1,2-Diphenylhydrazine	Direct	0.3	µg/l
	1,3-Dichlorobenzene	Direct	7	µg/l
	1,4-Dichlorobenzene	Direct	5	µg/l
	1,4-Dioxane	Direct	50	µg/l
	2,3,4,6-Tetrachlorophenol	Direct	1	µg/l
	2,4,5-Trichlorophenol	Direct	1	µg/l
	2,4,6-Trichlorophenol	Direct	2	µg/l
	2,4-D (Dichlorophenoxyacetic Acid)	Direct	4	µg/l
	2,4-DB (2,4-Dichlorophenoxy)Butanoic Acid)	Direct	25	µg/l
	2,4-Dichlorophenol	Direct	0.3	µg/l
	2,4-Dimethylphenol	Direct	100	µg/l
	2,4-Dinitrotoluene	Direct	0.49	µg/l
	2,6-Dichlorophenol	Direct	0.0002	mg/l
	2-Chloronaphthalene	Direct	800	µg/l
	2-Chlorophenol	Direct	100	ng/l
	4-Chlorophenol	Direct	0.1	µg/l
	Acenaphthene	Direct	4790	ng/l
	Acridine	Direct	4400	ng/l

	Acrolein	Direct	2.87	µg/l
	Acrylonitrile	Direct	0.53	µg/l
	Alachlor	Direct	2	µg/l
	Aldicarb	Direct	1	µg/l
	Aldrin	Direct	7.7E-06	µg/l
	Alkalinity Total CaCO3	Direct	20	mg/l
	Alpha-Endosulfan	Direct	0.056	µg/l
	Aluminum Dissolved	Direct	50	µg/l
	Aluminum Total	Direct	18	µg/l
	Ammonia Total	Direct	0.67	mg/l
	Ammonia Un-Ionized (Calcd.)	Direct	0.016	mg/l
	Anthracene	Direct	12	ng/l
	Antimony Total	Direct	4.59	µg/l
	Arsenic Dissolved	Direct	150	µg/l
	Arsenic Total	Direct	0.03	µg/l
	Atrazine	Direct	1.8	µg/l
	Azinphos Methyl (Guthion)	Direct	10	ng/l
	Barium Total	Direct	1000	µg/l
	Benzene	Direct	2.11	µg/l
	Benzidine	Direct	0.001	µg/l
	Benzo(A)Anthracene	Direct	1	ng/l
	Benzo(A)Pyrene	Direct	0.1	ng/l
	Benzo(B)Fluoranthene	Direct	1	ng/l
	Benzo(K)Fluoranthene	Direct	10	ng/l
	Beta-Endosulfan	Direct	0.056	µg/l
	Beryllium Total	Direct	3.27	µg/l
	Bis(2-Chloroethyl) Ether	Direct	0.25	µg/l
	Bis(2-Ethylhexyl) Phthalate	Direct	0.21	µg/l
	Bisphenol A	Direct	3.5	µg/l
	Boron Total	Direct	1333.33	µg/l
	Bromacil	Direct	5	µg/l
	Bromodichloromethane	Direct	6.33	µg/l
	Bromoform	Direct	7	µg/l
	Bromoxynil	Direct	5	µg/l
	Butylbenzyl Phthalate	Direct	0.06	µg/l
	Cadmium Dissolved	Direct	0.824	µg/l
	Cadmium Total	Direct	0.002	µg/l
	Calcium Dissolved	Direct	1000	mg/l
	Captan	Direct	1.3	µg/l
	Carbamazepine	Direct	10	µg/l
	Carbaryl	Direct	0.2	µg/l

	Carbofuran	Direct	1.8	µg/l
	Carbon Tetrachloride	Direct	1.9	µg/l
	Chlorate	Direct	0.7	mg/l
	Chloride Dissolved	Direct	120	mg/l
	Chlorobenzene	Direct	1.3	µg/l
	Chloroform	Direct	1.8	µg/l
	DDT And Metabolites	Direct	0.000004	µg/l
	Fenoprop(Silvex)(2,4,5-Tp)	Direct	20.55	µg/l
	Chlorothalonil	Direct	0.18	µg/l
	Chlorpyrifos-Ethyl (Dursban)	Direct	0.002	µg/l
	Chromium Total	Direct	50	µg/l
	Chrysene	Direct	70	ng/l
	Cobalt Total	Direct	1.1	µg/l
	Copper Dissolved	Direct	0.53	µg/l
	Copper Total	Direct	2.76	µg/l
	Cyanazine	Direct	0.6	µg/l
	Cyanide Total	Direct	3620	mg/l
	Deltamethrin	Direct	0.0004	µg/l
	Demeton	Direct	0.1	µg/l
	Diazinon	Direct	0.17	µg/l
	Dibenzo(A,H) Anthracene	Direct	0.1	ng/l
	Dibromochloromethane	Direct	5.21	µg/l
	Dicamba (Banvel)	Direct	10	µg/l
	Dichlorobromomethane	Direct	9.5	µg/l
	Dichloromethane	Direct	5	µg/l
	Dichlorprop(2,4-DP)	Direct	100	µg/l
	Diclofop-Methyl (Hoegrass)	Direct	6.1	µg/l
	Dieldrin	Direct	0.00001	µg/l
	Diethyl Phthalate	Direct	35.61	µg/l
	Dimethoate (Cygon)	Direct	3	µg/l
	Dimethyl Phthalate	Direct	102.91	µg/l
	Di-N-Butyl Phthalate	Direct	0.15	µg/l
	Dinitrophenols	Direct	10	µg/l
	Dinoseb	Direct	0.05	µg/l
	Diuron	Direct	150	µg/l
	Endrin	Direct	0.001	µg/l
	Ethanol	Direct	123377	µg/l
	Fluoranthene	Direct	40	ng/l
	Fluorene	Direct	3000	ng/l
	Fluoride Dissolved	Direct	0.12	mg/l
	Formaldehyde Total	Direct	73910	µg/l

	Gamma-Benzenehexachloride (Lindane) (Gamma-BHC)	Direct	0.01	µg/l
	Glyphosate (Roundup)	Direct	280	µg/l
	Heptachlor	Direct	0.00004	µg/l
	Heptachlor Epoxide	Direct	0.0001	µg/l
	Hexachlorobenzene	Direct	0.0001	µg/l
	Hexachlorobutadiene	Direct	0.001	µg/l
	Hexachlorocyclopentadiene	Direct	0.4	µg/l
	Hexachloroethane	Direct	0.02	µg/l
	Hydrogen Sulphide	Direct	0.002	mg/l
	Imidacloprid	Direct	0.23	µg/l
	Indeno (1,2,3-C,D)Pyrene	Direct	1	ng/l
	Iron Dissolved	Direct	300	µg/l
	Iron Total	Direct	300	µg/l
	Isophorone	Direct	268.41	µg/l
	Lead Dissolved	Direct	3.07	µg/l
	Lead Total	Direct	4.01	µg/l
	Linuron	Direct	7	µg/l
	Malathion	Direct	0.1	µg/l
	Manganese Total	Direct	50	µg/l
	MCPA	Direct	2.6	µg/l
	MCPP (Mecoprop)	Direct	10	µg/l
	Mercury Dissolved	Direct	770	ng/l
	Mercury Total	Direct	1.6	ng/l
	Methoxychlor (P,P'-Methoxychlor)	Direct	0.001	µg/l
	Methyl Mercury Dissolved	Direct	4	ng/l
	Metolachlor	Direct	7.8	µg/l
	Metribuzin	Direct	1	µg/l
	Mirex	Direct	0.001	µg/l
	Molybdenum Total	Direct	33.33	µg/l
	MTBE (Methyl Tertiary Butyl Ether)	Direct	10	µg/l
	Naphthalene	Direct	1000	ng/l
	Nickel Dissolved	Direct	60.68	µg/l
	Nickel Total	Direct	7.35	µg/l
	Nitrate and Nitrite as Nitrogen	Direct	100	mg/l
	Nitrate as Nitrogen	Direct	3	mg/l
	Nitrilotriacetic Acid - Nta	Direct	0.2	mg/l
	Nitrite as Nitrogen	Direct	0.06	mg/l
	Nitrobenzene	Direct	9.72	µg/l
	N-Nitroso-Di-N-Propylamine	Direct	0.05	µg/l
	N-Nitrosodiphenylamine	Direct	33	µg/l
	Nonylphenol	Direct	6.6	µg/l

	P,P'-DDD (TDP)	Direct	0.00018	µg/l
	P,P'-DDE	Direct	0.001	µg/l
	Parathion	Direct	0.013	µg/l
	Pentachlorobenzene	Direct	0.01	µg/l
	Pentachlorophenol	Direct	0.1	µg/l
	Perfluorooctanesulfonate (PFOS)	Direct	600	ng/l
	Permethrin	Direct	0.004	µg/l
	pH (Field)	Direct	7,9	pH units
	Phenanthrene	Direct	400	ng/l
	Phenol	Direct	2	µg/l
	Phorate (Thimet)	Direct	2	µg/l
	Picloram (Tordon)	Direct	29	µg/l
	Pyrene	Direct	25	ng/l
	Quinoline	Direct	3.4	µg/l
	Selenium Total	Direct	0.24	µg/l
	Silver Total	Direct	0.25	µg/l
	Simazine	Direct	2	µg/l
	Strontium Total	Direct	4000	µg/l
	Styrene	Direct	20	µg/l
	Sulphate Dissolved	Direct	250	mg/l
	Terbufos	Direct	1	µg/l
	Tetrachloroethylene	Direct	4.48	µg/l
	Thallium Total	Direct	0.02	µg/l
	Toluene	Direct	0.5	µg/l
	Total Dissolved Solids (Calcd.)	Direct	3000	mg/l
	Triallate (Avadex BW)	Direct	0.24	µg/l
	Trichloroethylene	Direct	1.38	µg/l
	Triclosan	Direct	0.47	µg/l
	Trifluralin (Treflan)	Direct	0.2	µg/l
	Trihalomethanes	Direct	80	µg/l
	Uranium Total	Direct	15	µg/l
	Vanadium Total	Direct	100	µg/l
	Vinyl Chloride	Direct	0.18	µg/l
	Xylene	Direct	28	µg/l
	Xylenes (O,M,P)	Direct	10	mg/l
	Zinc Dissolved	Direct	31.35	µg/l
	Zinc Total	Direct	12.72	µg/l
ICBM-SWQ-IU(DW+O-Derived)	Acenaphthene	Direct	4790	ng/l
	Acrolein	Direct	2.87	µg/l
	Acrylonitrile	Direct	0.53	µg/l
	Alpha-Endosulfan	Direct	1.82	µg/l

	Ammonia Total	Direct	0.67	mg/l
	Antimony Total	Direct	4.59	µg/l
	Arsenic Total	Direct	0.03	µg/l
	Beta-Endosulfan	Direct	2.87	µg/l
	Benzene	Direct	2.11	µg/l
	Benzidine	Direct	0.001	µg/l
	Benzo(A)Anthracene	Direct	1	ng/l
	Benzo(A)Pyrene	Direct	0.1	ng/l
	Benzo(B)Fluoranthene	Direct	1	ng/l
	Benzo(K)Fluoranthene	Direct	10	ng/l
	Beryllium Total	Direct	3.27	µg/l
	Bis(2-Chloroethyl) Ether	Direct	0.25	µg/l
	Bis(2-Ethylhexyl) Phthalate	Direct	0.21	µg/l
	Boron Total	Direct	1333.33	µg/l
	Bromodichloromethane	Direct	6.33	µg/l
	Butylbenzyl Phthalate	Direct	0.06	µg/l
	Cadmium Total	Direct	0.002	µg/l
	Carbon Tetrachloride	Direct	1.9	µg/l
	Fenoprop(Silvex)(2,4,5-Tp)	Direct	20.55	µg/l
	Chrysene	Direct	70	ng/l
	Cyanide Total	Direct	3620	mg/l
	Dibenzo(A,H) Anthracene	Direct	0.1	ng/l
	Dibromochloromethane	Direct	5.21	µg/l
	Diethyl Phthalate	Direct	35.61	µg/l
	Dimethyl Phthalate	Direct	102.91	µg/l
	Heptachlor	Direct	0.00004	µg/l
	Heptachlor Epoxide	Direct	0.0001	µg/l
	Hexachlorobenzene	Direct	0.0001	µg/l
	Hexachlorobutadiene	Direct	0.001	µg/l
	Hexachlorocyclopentadiene	Direct	0.4	µg/l
	Hexachloroethane	Direct	0.02	µg/l
	Indeno (1,2,3-C,D)Pyrene	Direct	1	ng/l
	Isophorone	Direct	268.41	µg/l
	Methoxychlor (P,P'-Methoxychlor)	Direct	0.001	µg/l
	Molybdenum Total	Direct	33.33	µg/l
	Nickel Total	Direct	7.35	µg/l
	Nitrobenzene	Direct	9.72	µg/l
	Pentachlorobenzene	Direct	0.01	µg/l
	Pentachlorophenol	Direct	0.1	µg/l
	Strontium Total	Direct	4000	µg/l
	Tetrachloroethylene	Direct	4.48	µg/l

	Thallium Total	Direct	0.02	µg/l
	Trichloroethylene	Direct	1.38	µg/l
	Vinyl Chloride	Direct	0.18	µg/l
	Zinc Dissolved	Direct	31.35	µg/l
EPA-SWQ-AG-IRRIGATION	Aldicarb	Direct	73	µg/l
	Aluminum Total	Direct	5000	µg/l
	Arsenic Total	Direct	160	µg/l
	Atrazine	Direct	10	µg/l
	Beryllium Total	Direct	100	µg/l
	Boron Total	Direct	500	µg/l
	Bromacil	Direct	0.2	µg/l
	Bromoxynil	Direct	0.44	µg/l
	Cadmium Total	Direct	8.2	µg/l
	Chloride Dissolved	Direct	100	mg/l
	Chlorothalonil	Direct	9.3	µg/l
	Cobalt Total	Direct	50	µg/l
	Copper Total	Direct	200	µg/l
	Cyanazine	Direct	0.5	µg/l
	Dicamba (Banvel)	Direct	0.008	µg/l
	Diclofop-Methyl (Hoegrass)	Direct	0.24	µg/l
	Dinoseb	Direct	21	µg/l
	Escherichia Coli	Direct	100	No/100 ml
	Fluoride Dissolved	Direct	1	mg/l
	Iron Total	Direct	5000	µg/l
	Lead Total	Direct	200	µg/l
	Linuron	Direct	0.11	µg/l
	Lithium Total	Direct	2500	µg/l
	Manganese Total	Direct	200	µg/l
	MCPA	Direct	0.04	µg/l
	Metolachlor	Direct	28	µg/l
	Metribuzin	Direct	0.5	µg/l
	Molybdenum Total	Direct	10	µg/l
	Nickel Total	Direct	200	µg/l
	Selenium Total	Direct	20	µg/l
	Simazine	Direct	0.5	µg/l
	Sodium Adsorption Ratio (Calcd.)	Direct	5	rel units
	Total Dissolved Solids (Calcd.)	Direct	500	mg/l
	Uranium Total	Direct	10	µg/l
	Vanadium Total	Direct	100	µg/l
	Zinc Total	Direct	1000	µg/l
EPA-SWQ-LIVESTOCK	1,2-Dichloroethane	Direct	5	µg/l

	Aldicarb	Direct	11	µg/l
	Aluminum Total	Direct	5000	µg/l
	Arsenic Total	Direct	25	µg/l
	Atrazine	Direct	5	µg/l
	Beryllium Total	Direct	100	µg/l
	Boron Total	Direct	5000	µg/l
	Bromacil	Direct	1100	µg/l
	Bromodichloromethane	Direct	100	µg/l
	Bromoxynil	Direct	11	µg/l
	Cadmium Total	Direct	80	µg/l
	Calcium Dissolved	Direct	1000	mg/l
	Captan	Direct	13	µg/l
	Carbaryl	Direct	1100	µg/l
	Carbofuran	Direct	45	µg/l
	Carbon Tetrachloride	Direct	5	µg/l
	Chloroform	Direct	100	µg/l
	Chlorothalonil	Direct	170	µg/l
	Chlorpyrifos-Ethyl (Dursban)	Direct	24	µg/l
	Cobalt Total	Direct	1000	µg/l
	Copper Total	Direct	500	µg/l
	Cyanazine	Direct	10	µg/l
	Deltamethrin	Direct	2.5	µg/l
	Dibromochloromethane	Direct	100	µg/l
	Dicamba (Banvel)	Direct	122	µg/l
	Dichlorobromomethane	Direct	100	µg/l
	Dichloromethane	Direct	50	µg/l
	Diclofop-Methyl (Hoegrass)	Direct	9	µg/l
	Dimethoate (Cygon)	Direct	3	µg/l
	Dinoseb	Direct	150	µg/l
	Fluoride Dissolved	Direct	1	mg/l
	Glyphosate (Roundup)	Direct	280	µg/l
	Hexachlorobenzene	Direct	0.52	µg/l
	Lead Total	Direct	100	µg/l
	MCPA	Direct	25	µg/l
	Mercury Total	Direct	3000	ng/l
	Metolachlor	Direct	50	µg/l
	Metribuzin	Direct	80	µg/l
	Molybdenum Total	Direct	500	µg/l
	Nickel Total	Direct	1000	µg/l
	Nitrate and Nitrite as Nitrogen	Direct	100	mg/l
	Nitrite as Nitrogen	Direct	10	mg/l

	Phenol	Direct	2	µg/l
	Picloram (Tordon)	Direct	190	µg/l
	Selenium Total	Direct	50	µg/l
	Simazine	Direct	10	µg/l
	Sulphate Dissolved	Direct	1000	mg/l
	Toluene	Direct	24	µg/l
	Total Dissolved Solids (Calcd.)	Direct	3000	mg/l
	Triallate (Avadex BW)	Direct	230	µg/l
	Trichloroethylene	Direct	50	µg/l
	Trifluralin (Treflan)	Direct	45	µg/l
	Uranium Total	Direct	200	µg/l
	Vanadium Total	Direct	100	µg/l
	Zinc Total	Direct	50000	µg/l
EPA-SWQ-PAL-CHRONIC	1,2,3-Trichlorobenzene	Direct	8	µg/l
	1,2,4-Trichlorobenzene	Direct	24	µg/l
	1,2-Dichlorobenzene	Direct	0.7	µg/l
	1,2-Dichloroethane	Direct	100	µg/l
	1,3-Dichlorobenzene	Direct	150	µg/l
	1,4-Dichlorobenzene	Direct	26	µg/l
	2,3,4,6-Tetrachlorophenol	Direct	1	µg/l
	2,3,6-Trichlorophenol	Direct	18	µg/l
	2,4,6-Trichlorophenol	Direct	18	µg/l
	2,4-D (Dichlorophenoxyacetic Acid)	Direct	4	µg/l
	2,4-DB (2,4-Dichlorophenoxy)Butanoic Acid)	Direct	25	µg/l
	2,4-Dichlorophenol	Direct	0.2	µg/l
	2-Chlorophenol	Direct	7000	ng/l
	4-Chlorophenol	Direct	7	µg/l
	Acenaphthene	Direct	5800	ng/l
	Acridine	Direct	4400	ng/l
	Acrolein	Direct	3	µg/l
	Aldicarb	Direct	1	µg/l
	Aldrin	Direct	0.004	µg/l
	Alkalinity Total CaCO3	Direct	20	mg/l
	Ammonia Un-Ionized (Calcd.)	Direct	0.016	mg/l
	Anthracene	Direct	12	ng/l
	Arsenic Total	Direct	5	µg/l
	Atrazine	Direct	1.8	µg/l
	Azinphos Methyl (Guthion)	Direct	10	ng/l
	Benzene	Direct	40	µg/l
	Benzo(A)Anthracene	Direct	18	ng/l
	Benzo(A)Pyrene	Direct	15	ng/l

	Boron Total	Direct	1500	µg/l
	Bromacil	Direct	5	µg/l
	Bromoxynil	Direct	5	µg/l
	Captan	Direct	1.3	µg/l
	Carbamazepine	Direct	10	µg/l
	Carbaryl	Direct	0.2	µg/l
	Carbofuran	Direct	1.8	µg/l
	Carbon Tetrachloride	Direct	13.3	µg/l
	Chloride Dissolved	Direct	120	mg/l
	Chlorobenzene	Direct	1.3	µg/l
	Chloroform	Direct	1.8	µg/l
	Chlorothalonil	Direct	0.18	µg/l
	Chlorpyrifos-Ethyl (Dursban)	Direct	0.002	µg/l
	Copper Total	Direct	7	µg/l
	Cyanazine	Direct	2	µg/l
	Cyanide Total	Direct	5.2	mg/l
	DDT And Metabolites	Direct	0.001	µg/l
	Deltamethrin	Direct	0.0004	µg/l
	Demeton	Direct	0.1	µg/l
	Diazinon	Direct	0.17	µg/l
	Dicamba (Banvel)	Direct	10	µg/l
	Dichloromethane	Direct	98.1	µg/l
	Diclofop-Methyl (Hoegrass)	Direct	6.1	µg/l
	Dieldrin	Direct	0.004	µg/l
	Diethyl Phthalate	Direct	16	µg/l
	Dimethoate (Cygon)	Direct	6.2	µg/l
	Di-N-Butyl Phthalate	Direct	19	µg/l
	Dinoseb	Direct	0.05	µg/l
	Endrin	Direct	0.0023	µg/l
	Fluoranthene	Direct	40	ng/l
	Fluorene	Direct	3000	ng/l
	Glyphosate (Roundup)	Direct	800	µg/l
	Heptachlor Epoxide	Direct	0.01	µg/l
	Hexachlorobutadiene	Direct	1.3	µg/l
	Imidacloprid	Direct	0.23	µg/l
	Iron Dissolved	Direct	300	µg/l
	Linuron	Direct	7	µg/l
	Malathion	Direct	0.1	µg/l
	MCPA	Direct	2.6	µg/l
	MCPP (Mecoprop)	Direct	13	µg/l
	Mercury Total	Direct	5	ng/l

	Methoxychlor (P,P'-Methoxychlor)	Direct	0.03	µg/l
	Metolachlor	Direct	7.8	µg/l
	Metribuzin	Direct	1	µg/l
	Mirex	Direct	0.001	µg/l
	Molybdenum Total	Direct	73	µg/l
	MTBE (Methyl Tertiary Butyl Ether)	Direct	10000	µg/l
	Naphthalene	Direct	1000	ng/l
	Nitrate as Nitrogen	Direct	3	mg/l
	Oxygen Dissolved	Multilevel	Multilevel	mg/L
	Parathion	Direct	0.013	µg/l
	Pentachlorobenzene	Direct	6	µg/l
	Pentachlorophenol	Direct	0.5	µg/l
	Permethrin	Direct	0.004	µg/l
	pH (Field)	Direct	6.5, 9	pH units
	Phenanthrene	Direct	400	ng/l
	Phenol	Direct	4	µg/l
	Picloram (Tordon)	Direct	29	µg/l
	Pyrene	Direct	25	ng/l
	Quinoline	Direct	3.4	µg/l
	Selenium Total	Direct	2	µg/l
	Silver Total	Direct	0.25	µg/l
	Simazine	Direct	10	µg/l
	Styrene	Direct	72	µg/l
	Tetrachloroethylene	Direct	110	µg/l
	Thallium Total	Direct	0.8	µg/l
	Toluene	Direct	0.5	µg/l
	Triallate (Avadex BW)	Direct	0.24	µg/l
	Trichloroethylene	Direct	21	µg/l
	Trifluralin (Treflan)	Direct	0.2	µg/l
	Uranium Total	Direct	15	µg/l
	Xylene	Direct	30	µg/l
	Zinc Total	Direct	30	µg/l
EPA-SWQ-PAL-ACUTE	2,4-DB (2,4-Dichlorophenoxy)Butanoic Acid)	Direct	560	µg/l
	Acrolein	Direct	3	µg/l
	Boron Total	Direct	29000	µg/l
	Carbaryl	Direct	3.3	µg/l
	Chloride Dissolved	Direct	640	mg/l
	Chlorpyrifos-Ethyl (Dursban)	Direct	0.02	µg/l
	Cyanide Total	Direct	22	mg/l
	Diazinon	Direct	0.17	µg/l
	F1 Hydrocarbons (C6-C10)	Direct	150	µg/l

	F2 Hydrocarbons (C10-C16)	Direct	110	µg/l
	Glyphosate (Roundup)	Direct	27000	µg/l
	MCPP (Mecoprop)	Direct	10000	µg/l
	Mercury Total	Direct	13	ng/l
	Nitrate as Nitrogen	Direct	124	mg/l
	Oxygen Dissolved	Direct	5	mg/L
	Parathion	Direct	0.065	µg/l
	Uranium Total	Direct	33	µg/l
EPA-SWQ-RA	Escherichia Coli	Direct	100	No/100 ml
	pH (Field)	Direct	5.0,9.0	pH units
	Turbidity (Field)	Direct	50	NTU
CCME-SWQ-AG-IRRIGATION	Aldicarb	Direct	54.9	µg/l
	Aluminum Total	Direct	5000	µg/l
	Arsenic Total	Direct	100	µg/l
	Atrazine	Direct	10	µg/l
	Beryllium Total	Direct	100	µg/l
	Boron Total	Direct	500	µg/l
	Bromacil	Direct	0.2	µg/l
	Bromoxynil	Direct	0.33	µg/l
	Cadmium Total	Direct	5.1	µg/l
	Chloride Dissolved	Direct	100	mg/l
	Chlorothalonil	Direct	5.8	µg/l
	Cobalt Total	Direct	50	µg/l
	Copper Total	Direct	200	µg/l
	Cyanazine	Direct	0.5	µg/l
	Dicamba (Banvel)	Direct	0.006	µg/l
	Diclofop-Methyl (Hoegrass)	Direct	0.18	µg/l
	Dinoseb	Direct	16	µg/l
	Fluoride Dissolved	Direct	1	mg/l
	Iron Dissolved	Direct	5000	µg/l
	Lead Total	Direct	200	µg/l
	Linuron	Direct	0.071	µg/l
	Lithium Total	Direct	2500	µg/l
	Manganese Total	Direct	200	µg/l
	MCPA	Direct	0.025	µg/l
	Metolachlor	Direct	28	µg/l
	Metribuzin	Direct	0.5	µg/l
	Nickel Total	Direct	200	µg/l
	Selenium Total	Direct	20	µg/l
	Simazine	Direct	0.5	µg/l
	Total Dissolved Solids (Calcd.)	Direct	500	mg/l

	Uranium Total	Direct	10	µg/l
	Vanadium Total	Direct	100	µg/l
	Zinc Total	Direct	1000	µg/l
CCME-SWQ-AG-LIVESTOCK	1,2-Dichloroethane	Direct	5	µg/l
	Aldicarb	Direct	11	µg/l
	Aluminum Total	Direct	5000	µg/l
	Arsenic Total	Direct	25	µg/l
	Atrazine	Direct	5	µg/l
	Beryllium Total	Direct	100	µg/l
	Boron Total	Direct	5000	µg/l
	Bromacil	Direct	1100	µg/l
	Bromoxynil	Direct	11	µg/l
	Cadmium Total	Direct	80	µg/l
	Calcium Dissolved	Direct	1000	mg/l
	Carbaryl	Direct	1100	µg/l
	Carbofuran	Direct	45	µg/l
	Chlorothalonil	Direct	170	µg/l
	Chlorpyrifos-Ethyl (Dursban)	Direct	24	µg/l
	Cobalt Total	Direct	1000	µg/l
	Copper Total	Direct	500	µg/l
	Cyanazine	Direct	10	µg/l
	Deltamethrin	Direct	2.5	µg/l
	Dibromochloromethane	Direct	100	µg/l
	Dicamba (Banvel)	Direct	122	µg/l
	Dichlorobromomethane	Direct	100	µg/l
	Dichloromethane	Direct	50	µg/l
	Diclofop-Methyl (Hoegrass)	Direct	9	µg/l
	Dimethoate (Cygon)	Direct	3	µg/l
	Dinoseb	Direct	150	µg/l
	Endrin	Direct	0.2	µg/l
	Fluoride Dissolved	Direct	1	mg/l
	Glyphosate (Roundup)	Direct	280	µg/l
	Heptachlor	Direct	3	µg/l
	Hexachlorobenzene	Direct	0.52	µg/l
	Lead Total	Direct	100	µg/l
	MCPA	Direct	25	µg/l
	Mercury Total	Direct	3000	ng/l
	Metolachlor	Direct	50	µg/l
	Metribuzin	Direct	80	µg/l
	Molybdenum Total	Direct	500	µg/l
	Nickel Total	Direct	1000	µg/l

	Nitrate and Nitrite as Nitrogen	Direct	100	mg/l
	Nitrite as Nitrogen	Direct	10	mg/l
	Phenol	Direct	2	µg/l
	Picloram (Tordon)	Direct	190	µg/l
	Selenium Total	Direct	50	µg/l
	Simazine	Direct	10	µg/l
	Sulphate Dissolved	Direct	1000	mg/l
	Toluene	Direct	24	µg/l
	Total Dissolved Solids (Calcd.)	Direct	3000	mg/l
	Triallate (Avadex BW)	Direct	230	µg/l
	Trichloroethylene	Direct	50	µg/l
	Trifluralin (Treflan)	Direct	45	µg/l
	Uranium Total	Direct	200	µg/l
	Vanadium Total	Direct	100	µg/l
	Zinc Total	Direct	50000	µg/l
CCME-SWQ-PAL-ACUTE	Boron Total	Direct	29000	µg/l
	Carbaryl	Direct	3.3	µg/l
	Chloride Dissolved	Direct	640	mg/l
	Chlorpyrifos-Ethyl (Dursban)	Direct	0.02	µg/l
	Glyphosate (Roundup)	Direct	27000	µg/l
	Nitrate as Nitrogen	Direct	550	mg/l
	Uranium Total	Direct	33	µg/l
CCME-SWQ-PAL-CHRONIC	1,1,2,2-Tetrachloroethane	Direct	110	µg/l
	1,1,2-Trichloroethane	Direct	21	µg/l
	1,2,3-Trichlorobenzene	Direct	8	µg/l
	1,2,4-Trichlorobenzene	Direct	24	µg/l
	1,2-Dichlorobenzene	Direct	0.7	µg/l
	1,2-Dichloroethane	Direct	100	µg/l
	1,3-Dichlorobenzene	Direct	150	µg/l
	1,4-Dichlorobenzene	Direct	26	µg/l
	2,4-D (Dichlorophenoxyacetic Acid)	Direct	4	µg/l
	Acenaphthene	Direct	5800	ng/l
	Acridine	Direct	4400	ng/l
	Aldicarb	Direct	1	µg/l
	Aldrin	Direct	0.004	µg/l
	Ammonia Un-Ionized (Calcd.)	Direct	0.019	mg/l
	Anthracene	Direct	12	ng/l
	Arsenic Total	Direct	5	µg/l
	Atrazine	Direct	1.8	µg/l
	Benzene	Direct	370	µg/l
	Benzo(A)Anthracene	Direct	18	ng/l

	Benzo(A)Pyrene	Direct	15	ng/l
	Boron Total	Direct	1500	µg/l
	Bromacil	Direct	5	µg/l
	Bromoxynil	Direct	5	µg/l
	Carbamazepine	Direct	10	µg/l
	Carbaryl	Direct	0.2	µg/l
	Carbofuran	Direct	1.8	µg/l
	Chlorate	Direct	0.0005	mg/l
	Chloride Dissolved	Direct	120	mg/l
	Chlorothalonil	Direct	0.18	µg/l
	Chlorpyrifos-Ethyl (Dursban)	Direct	0.002	µg/l
	Cyanazine	Direct	2	µg/l
	Cyanide Total	Direct	0.005	mg/l
	Deltamethrin	Direct	0.0004	µg/l
	Dicamba (Banvel)	Direct	10	µg/l
	Dichloromethane	Direct	98.1	µg/l
	Diclofop-Methyl (Hoegrass)	Direct	6.1	µg/l
	Dieldrin	Direct	0.004	µg/l
	Dimethoate (Cygon)	Direct	6.2	µg/l
	Di-N-Butyl Phthalate	Direct	19	µg/l
	Dinoseb	Direct	0.05	µg/l
	Endrin	Direct	0.0023	µg/l
	Fluoranthene	Direct	40	ng/l
	Fluorene	Direct	3000	ng/l
	Fluoride Dissolved	Direct	0.12	mg/l
	Glyphosate (Roundup)	Direct	800	µg/l
	Heptachlor	Direct	0.01	µg/l
	Hexachlorobutadiene	Direct	1.3	µg/l
	Imidacloprid	Direct	0.23	µg/l
	Iron Dissolved	Direct	300	µg/l
	Linuron	Direct	7	µg/l
	MCPA	Direct	2.6	µg/l
	Mercury Total	Direct	26	ng/l
	Methyl Mercury Dissolved	Direct	4	ng/l
	Metolachlor	Direct	7.8	µg/l
	Metribuzin	Direct	1	µg/l
	Molybdenum Total	Direct	73	µg/l
	MTBE (Methyl Tertiary Butyl Ether)	Direct	10000	µg/l
	Naphthalene	Direct	1100	ng/l
	Nitrate as Nitrogen	Direct	13	mg/l
	Nitrite as Nitrogen	Direct	0.06	mg/l

	Oxygen Dissolved	Direct	9.5	mg/L
	Pentachlorobenzene	Direct	6	µg/l
	Pentachlorophenol	Direct	0.5	µg/l
	Permethrin	Direct	0.004	µg/l
	pH (Field)	Direct	6.5, 9.0	pH units
	Phenanthrene	Direct	400	ng/l
	Phenol	Direct	4	µg/l
	Picloram (Tordon)	Direct	29	µg/l
	Pyrene	Direct	25	ng/l
	Quinoline	Direct	3.4	µg/l
	Selenium Total	Direct	1	µg/l
	Silver Total	Direct	0.25	µg/l
	Simazine	Direct	10	µg/l
	Styrene	Direct	72	µg/l
	Thallium Total	Direct	0.8	µg/l
	Toluene	Direct	2	µg/l
	Triallate (Avadex BW)	Direct	0.24	µg/l
	Trifluralin (Treflan)	Direct	0.2	µg/l
	Uranium Total	Direct	15	µg/l
ECCC-SWQ-FEQG	Benzene	Direct	590	µg/l
	Bisphenol A	Direct	3.5	µg/l
	Perfluorooctanesulfonate (PFOS)	Direct	6800	ng/l
	Quinoline	Direct	150	µg/l
	Strontium Total	Direct	2500	µg/l
	Toluene	Direct	30	µg/l
	Triclosan	Direct	0.47	µg/l
	Vanadium Total	Direct	120	µg/l
	Xylene	Direct	70	µg/l
ECCC-SWQ-FEQG-Acute	Benzene	Direct	6000	µg/l
	Toluene	Direct	3000	µg/l
	Xylene	Direct	1000	µg/l
HC-DW-MAC	1,1-Dichloroethylene	Direct	14	µg/l
	1,2-Dichloroethane	Direct	5	µg/l
	1,4-Dichlorobenzene	Direct	5	µg/l
	1,4-Dioxane	Direct	50	µg/l
	2,4,6-Trichlorophenol	Direct	5	µg/l
	2,4-D (Dichlorophenoxyacetic Acid)	Direct	100	µg/l
	Aluminum Total	Direct	2900	µg/l
	Antimony Total	Direct	6	µg/l
	Arsenic Total	Direct	10	µg/l
	Atrazine	Direct	0.005	µg/l

	Barium Total	Direct	2000	µg/l
	Benzene	Direct	5	µg/l
	Benzo(A)Pyrene	Direct	40	ng/l
	Boron Total	Direct	5000	µg/l
	Bromoxynil	Direct	30	µg/l
	Cadmium Total	Direct	7	µg/l
	Carbon Tetrachloride	Direct	2	µg/l
	Chlorate	Direct	1	mg/l
	Chlorpyrifos-Ethyl (Dursban)	Direct	90	µg/l
	Chromium Total	Direct	50	µg/l
	Copper Total	Direct	2000	µg/l
	Cyanide Total	Direct	0.2	mg/l
	Dicamba (Banvel)	Direct	110	µg/l
	Dichloromethane	Direct	50	µg/l
	Dimethoate (Cygon)	Direct	20	µg/l
	Fluoride Dissolved	Direct	1.5	mg/l
	Glyphosate (Roundup)	Direct	280	µg/l
	Lead Total	Direct	5	µg/l
	Malathion	Direct	290	µg/l
	Manganese Total	Direct	120	µg/l
	Mercury Total	Direct	1000	ng/l
	Metribuzin	Direct	80	µg/l
	Nitrate as Nitrogen	Direct	10	mg/l
	Nitrilotriacetic Acid - Nta	Direct	0.4	mg/l
	Nitrite as Nitrogen	Direct	1	mg/l
	Pentachlorophenol	Direct	60	µg/l
	Perfluorooctanesulfonate (PFOS)	Direct	600	ng/l
	Selenium Total	Direct	50	µg/l
	Strontium Total	Direct	7000	µg/l
	Tetrachloroethylene	Direct	10	µg/l
	Toluene	Direct	60	µg/l
	Trichloroethylene	Direct	5	µg/l
	Trihalomethanes	Direct	100	µg/l
	Uranium Total	Direct	20	µg/l
	Vinyl Chloride	Direct	2	µg/l
	Xylenes (O,M,P)	Direct	0.09	mg/l
HC-DW-AO	Chloride Dissolved	Direct	250	mg/l
	Copper Total	Direct	1000	µg/l
	Iron Total	Direct	300	µg/l
	Manganese Total	Direct	20	µg/l
	MTBE (Methyl Tertiary Butyl Ether)	Direct	15	µg/l

	Pentachlorophenol	Direct	30	µg/l
	Sodium Dissolved/Filtered	Direct	200000	µg/l
	Sulphate Dissolved	Direct	500	mg/l
	Total Dissolved Solids (Calcd.)	Direct	500	mg/l
	Xylenes (O,M,P)	Direct	0.02	mg/l
	Zinc Total	Direct	5000	µg/l
HC-SWQ-RA	pH (Field)	Direct	5,11	pH units
	Turbidity (Field)	Direct	50	NTU
USEPA-DW-MCLG	1,1,1-Trichloroethane	Direct	200	µg/l
	1,1,2-Trichloroethane	Direct	3	µg/l
	1,1-Dichloroethylene	Direct	7	µg/l
	1,2,4-Trichlorobenzene	Direct	70	µg/l
	1,2-Dichlorobenzene	Direct	600	µg/l
	1,4-Dichlorobenzene	Direct	75	µg/l
	2,4-D (Dichlorophenoxyacetic Acid)	Direct	70	µg/l
	Antimony Total	Direct	6	µg/l
	Atrazine	Direct	3	µg/l
	Barium Total	Direct	2000	µg/l
	Beryllium Total	Direct	4	µg/l
	Cadmium Total	Direct	5	µg/l
	Carbofuran	Direct	40	µg/l
	Chlorate	Direct	41	mg/l
	Chlorobenzene	Direct	100	µg/l
	Endrin	Direct	2	µg/l
	Fenoprop(Silvex)(2,4,5-Tp)	Direct	50	µg/l
	Chromium Total	Direct	100	µg/l
	Copper Total	Direct	1300	µg/l
	Cyanide Total	Direct	0.2	mg/l
	Dinoseb	Direct	7	µg/l
	Fluoride Dissolved	Direct	4	mg/l
	Gamma-Benzenehexachloride (Lindane) (Gamma-BHC)	Direct	0.2	µg/l
	Glyphosate (Roundup)	Direct	700	µg/l
	Hexachlorocyclopentadiene	Direct	50	µg/l
	Mercury Total	Direct	2000	ng/l
	Methoxychlor (P,P'-Methoxychlor)	Direct	40	µg/l
	Nitrate as Nitrogen	Direct	10	mg/l
	Nitrite as Nitrogen	Direct	1	mg/l
	Pentachlorophenol	Direct	1	µg/l
	Picloram (Tordon)	Direct	500	µg/l
	Perfluorooctanoic Acid (PFOA)	Direct	0	µg/l
	Selenium Total	Direct	50	µg/l

	Simazine	Direct	4	µg/l
	Styrene	Direct	100	µg/l
	Thallium Total	Direct	0.5	µg/l
	Toluene	Direct	1000	µg/l
	Uranium Total	Direct	30	µg/l
	Xylenes (O,M,P)	Direct	10	mg/l
USEPA-DW-MCL	1,1,1-Trichloroethane	Direct	200	µg/l
	1,1,2-Trichloroethane	Direct	5	µg/l
	1,1-Dichloroethylene	Direct	7	µg/l
	1,2,4-Trichlorobenzene	Direct	70	µg/l
	1,2-Dibromo-3-Chloropropane	Direct	0.2	µg/l
	1,2-Dichlorobenzene	Direct	600	µg/l
	1,2-Dichloroethane	Direct	5	µg/l
	1,2-Dichloropropane	Direct	5	µg/l
	1,4-Dichlorobenzene	Direct	75	µg/l
	2,4-D (Dichlorophenoxyacetic Acid)	Direct	70	µg/l
	Alachlor	Direct	2	µg/l
	Antimony Total	Direct	6	µg/l
	Arsenic Total	Direct	10	µg/l
	Atrazine	Direct	3	µg/l
	Barium Total	Direct	2000	µg/l
	Benzene	Direct	5	µg/l
	Benzo(A)Pyrene	Direct	200	ng/l
	Beryllium Total	Direct	4	µg/l
	Cadmium Total	Direct	5	µg/l
	Carbofuran	Direct	40	µg/l
	Carbon Tetrachloride	Direct	5	µg/l
	Chlorate	Direct	4.01	mg/l
	Chlorobenzene	Direct	100	µg/l
	Endrin	Direct	2	µg/l
	Fenoprop(Silvex)(2,4,5-Tp)	Direct	50	µg/l
	Chromium Total	Direct	100	µg/l
	Copper Total	Direct	1300	µg/l
	Cyanide Total	Direct	0.2	mg/l
	Dichloromethane	Direct	5	µg/l
	Dinoseb	Direct	7	µg/l
	Fluoride Dissolved	Direct	4	mg/l
	Gamma-Benzenehexachloride (Lindane) (Gamma-BHC)	Direct	0.2	µg/l
	Glyphosate (Roundup)	Direct	700	µg/l
	Heptachlor	Direct	0.4	µg/l
	Heptachlor Epoxide	Direct	0.2	µg/l

	Hexachlorobenzene	Direct	1	µg/l
	Hexachlorocyclopentadiene	Direct	50	µg/l
	Lead Total	Direct	15	µg/l
	Mercury Total	Direct	2000	ng/l
	Methoxychlor (P,P'-Methoxychlor)	Direct	40	µg/l
	Nitrate as Nitrogen	Direct	10	mg/l
	Nitrite as Nitrogen	Direct	1	mg/l
	Pentachlorophenol	Direct	1	µg/l
	Perfluorooctanesulfonate (PFOS)	Direct	0.04	ng/l
	Perfluorooctanoic Acid (PFOA)	Direct	0.04	µg/l
	Picloram (Tordon)	Direct	500	µg/l
	Selenium Total	Direct	50	µg/l
	Simazine	Direct	4	µg/l
	Styrene	Direct	100	µg/l
	Tetrachloroethylene	Direct	5	µg/l
	Thallium Total	Direct	2	µg/l
	Toluene	Direct	1000	µg/l
	Trichloroethylene	Direct	5	µg/l
	Trihalomethanes	Direct	80	µg/l
	Uranium Total	Direct	30	µg/l
	Vinyl Chloride	Direct	2	µg/l
	Xylenes (O,M,P)	Direct	10	mg/l
USEPA-SWQ-RA	2,3,4,6-Tetrachlorophenol	Direct	1	µg/l
	2,4,5-Trichlorophenol	Direct	1	µg/l
	2,4,6-Trichlorophenol	Direct	2	µg/l
	2,4-Dichlorophenol	Direct	0.3	µg/l
	2,4-Dimethylphenol	Direct	400	µg/l
	2,6-Dichlorophenol	Direct	0.0002	mg/l
	2-Chlorophenol	Direct	100	ng/l
	4-Chlorophenol	Direct	0.1	µg/l
	Acenaphthene	Direct	20000	ng/l
	Copper Total	Direct	1000	µg/l
	Hexachlorocyclopentadiene	Direct	1	µg/l
	Iron Total	Direct	300	µg/l
	Nitrobenzene	Direct	30	µg/l
	Pentachlorophenol	Direct	30	µg/l
	Phenol	Direct	300	µg/l
	Zinc Total	Direct	5000	µg/l
USEPA-SWQ-DW+O	1,1,1-Trichloroethane	Direct	10000	µg/l
	1,1,2,2-Tetrachloroethane	Direct	2	µg/l
	1,1,2-Trichloroethane	Direct	5.5	µg/l

1,1-Dichloroethylene	Direct	300	µg/l
1,2,4-Trichlorobenzene	Direct	0.071	µg/l
1,2-Dichlorobenzene	Direct	1000	µg/l
1,2-Dichloroethane	Direct	99	µg/l
1,2-Dichloropropane	Direct	9	µg/l
1,2-Diphenylhydrazine	Direct	0.3	µg/l
1,3-Dichlorobenzene	Direct	7	µg/l
1,4-Dichlorobenzene	Direct	300	µg/l
2,4,5-Trichlorophenol	Direct	300	µg/l
2,4,6-Trichlorophenol	Direct	15	µg/l
2,4-D (Dichlorophenoxyacetic Acid)	Direct	1300	µg/l
2,4-Dichlorophenol	Direct	10	µg/l
2,4-Dimethylphenol	Direct	100	µg/l
2,4-Dinitrotoluene	Direct	0.49	µg/l
2-Chloronaphthalene	Direct	800	µg/l
2-Chlorophenol	Direct	30000	ng/l
Acenaphthene	Direct	70000	ng/l
Acrolein	Direct	3	µg/l
Acrylonitrile	Direct	0.61	µg/l
Aldrin	Direct	7.7E-06	µg/l
Alpha-Endosulfan	Direct	20	µg/l
Anthracene	Direct	300000	ng/l
Antimony Total	Direct	5.6	µg/l
Arsenic Total	Direct	0.18	µg/l
Barium Total	Direct	1000	µg/l
Benzene	Direct	5.8	µg/l
Benzidine	Direct	0.0014	µg/l
Benzo(A)Anthracene	Direct	12	ng/l
Benzo(A)Pyrene	Direct	1.2	ng/l
Benzo(B)Fluoranthene	Direct	12	ng/l
Benzo(K)Fluoranthene	Direct	120	ng/l
Beta-Endosulfan	Direct	20	µg/l
Bis(2-Chloroethyl) Ether	Direct	0.3	µg/l
Bis(2-Ethylhexyl) Phthalate	Direct	3.2	µg/l
Bromoform	Direct	70	µg/l
Butylbenzyl Phthalate	Direct	1	µg/l
Carbon Tetrachloride	Direct	4	µg/l
Chlorobenzene	Direct	100	µg/l
Chloroform	Direct	60	µg/l
Fenoprop(Silvex)(2,4,5-Tp)	Direct	100	µg/l
Chrysene	Direct	1200	ng/l

	Copper Total	Direct	1300	µg/l
	Cyanide Total	Direct	0.004	mg/l
	DDT And Metabolites	Direct	0.0003	µg/l
	Dibenzo(A,H) Anthracene	Direct	1.2	ng/l
	Dichlorobromomethane	Direct	9.5	µg/l
	Dieldrin	Direct	0.000012	µg/l
	Diethyl Phthalate	Direct	600	µg/l
	Dimethyl Phthalate	Direct	2000	µg/l
	Di-N-Butyl Phthalate	Direct	20	µg/l
	Dinitrophenols	Direct	10	µg/l
	Endrin	Direct	0.03	µg/l
	Fluoranthene	Direct	20000	ng/l
	Fluorene	Direct	50000	ng/l
	Gamma-Benzenehexachloride (Lindane) (Gamma-BHC)	Direct	4.2	µg/l
	Heptachlor	Direct	0.000059	µg/l
	Heptachlor Epoxide	Direct	0.00032	µg/l
	Hexachlorobenzene	Direct	0.00079	µg/l
	Hexachlorobutadiene	Direct	0.1	µg/l
	Hexachlorocyclopentadiene	Direct	4	µg/l
	Hexachloroethane	Direct	1	µg/l
	Indeno (1,2,3-C,D)Pyrene	Direct	12	ng/l
	Isophorone	Direct	340	µg/l
	Manganese Total	Direct	50	µg/l
	Methoxychlor (P,P'-Methoxychlor)	Direct	0.02	µg/l
	Nickel Total	Direct	610	µg/l
	Nitrate as Nitrogen	Direct	10	mg/l
	Nitrobenzene	Direct	10	µg/l
	N-Nitroso-Di-N-Propylamine	Direct	0.05	µg/l
	N-Nitrosodiphenylamine	Direct	33	µg/l
	P,P'-DDD (TDP)	Direct	0.0012	µg/l
	P,P'-DDE	Direct	0.00018	µg/l
	Pentachlorobenzene	Direct	0.1	µg/l
	Pentachlorophenol	Direct	0.3	µg/l
	pH (Field)	Direct	5,9	pH units
	Phenol	Direct	4000	µg/l
	Pyrene	Direct	20000	ng/l
	Selenium Total	Direct	170	µg/l
	Tetrachloroethylene	Direct	100	µg/l
	Thallium Total	Direct	0.24	µg/l
	Toluene	Direct	57	µg/l
	Total Dissolved Solids (Calcd.)	Direct	250	mg/l

	Trichloroethylene	Direct	6	µg/l
	Vinyl Chloride	Direct	0.22	µg/l
	Zinc Total	Direct	7400	µg/l
USEPA-SWQ-O	1,1,1-Trichloroethane	Direct	200000	µg/l
	1,1,2,2-Tetrachloroethane	Direct	30	µg/l
	1,1,2-Trichloroethane	Direct	89	µg/l
	1,1-Dichloroethylene	Direct	20000	µg/l
	1,2,4-Trichlorobenzene	Direct	0.76	µg/l
	1,2-Dichlorobenzene	Direct	3000	µg/l
	1,2-Dichloroethane	Direct	6500	µg/l
	1,2-Dichloropropane	Direct	310	µg/l
	1,2-Diphenylhydrazine	Direct	2	µg/l
	1,3-Dichlorobenzene	Direct	10	µg/l
	1,4-Dichlorobenzene	Direct	900	µg/l
	2,4,5-Trichlorophenol	Direct	600	µg/l
	2,4,6-Trichlorophenol	Direct	28	µg/l
	2,4-D (Dichlorophenoxyacetic Acid)	Direct	12000	µg/l
	2,4-Dichlorophenol	Direct	60	µg/l
	2,4-Dimethylphenol	Direct	3000	µg/l
	2,4-Dinitrotoluene	Direct	17	µg/l
	2-Chloronaphthalene	Direct	1000	µg/l
	2-Chlorophenol	Direct	800000	ng/l
	Acenaphthene	Direct	90000	ng/l
	Acrolein	Direct	400	µg/l
	Acrylonitrile	Direct	70	µg/l
	Aldrin	Direct	7.7E-06	µg/l
	Alpha-Endosulfan	Direct	30	µg/l
	Anthracene	Direct	400000	ng/l
	Antimony Total	Direct	640	µg/l
	Arsenic Total	Direct	1.4	µg/l
	Benzene	Direct	160	µg/l
	Benzidine	Direct	0.11	µg/l
	Benzo(A)Anthracene	Direct	13	ng/l
	Benzo(A)Pyrene	Direct	1.3	ng/l
	Benzo(B)Fluoranthene	Direct	13	ng/l
	Benzo(K)Fluoranthene	Direct	130	ng/l
	Beta-Endosulfan	Direct	40	µg/l
	Bis(2-Chloroethyl) Ether	Direct	22	µg/l
	Bis(2-Ethylhexyl) Phthalate	Direct	3.7	µg/l
	Bromoform	Direct	1200	µg/l
	Butylbenzyl Phthalate	Direct	1	µg/l

	Carbon Tetrachloride	Direct	50	µg/l
	Chlorobenzene	Direct	800	µg/l
	Chloroform	Direct	2000	µg/l
	Fenoprop(Silvex)(2,4,5-Tp)	Direct	400	µg/l
	Chrysene	Direct	1300	ng/l
	Cyanide Total	Direct	0.4	mg/l
	DDT And Metabolites	Direct	0.0003	µg/l
	Dibenzo(A,H) Anthracene	Direct	1.3	ng/l
	Dichlorobromomethane	Direct	270	µg/l
	Dieldrin	Direct	0.000012	µg/l
	Diethyl Phthalate	Direct	600	µg/l
	Dimethyl Phthalate	Direct	2000	µg/l
	Di-N-Butyl Phthalate	Direct	30	µg/l
	Dinitrophenols	Direct	1000	µg/l
	Endrin	Direct	0.03	µg/l
	Fluoranthene	Direct	20000	ng/l
	Fluorene	Direct	70000	ng/l
	Gamma-Benzenehexachloride (Lindane) (Gamma-BHC)	Direct	4.4	µg/l
	Heptachlor	Direct	0.000059	µg/l
	Heptachlor Epoxide	Direct	0.00032	µg/l
	Hexachlorobenzene	Direct	0.00079	µg/l
	Hexachlorobutadiene	Direct	0.1	µg/l
	Hexachlorocyclopentadiene	Direct	4	µg/l
	Hexachloroethane	Direct	1	µg/l
	Indeno (1,2,3-C,D)Pyrene	Direct	13	ng/l
	Isophorone	Direct	18000	µg/l
	Manganese Total	Direct	100	µg/l
	Methoxychlor (P,P'-Methoxychlor)	Direct	0.02	µg/l
	Nickel Total	Direct	4600	µg/l
	Nitrobenzene	Direct	600	µg/l
	N-Nitroso-Di-N-Propylamine	Direct	5.1	µg/l
	N-Nitrosodiphenylamine	Direct	60	µg/l
	P,P'-DDD (TDP)	Direct	0.0012	µg/l
	P,P'-DDE	Direct	0.00018	µg/l
	Pentachlorobenzene	Direct	0.1	µg/l
	Pentachlorophenol	Direct	0.4	µg/l
	Phenol	Direct	300000	µg/l
	Pyrene	Direct	30000	ng/l
	Selenium Total	Direct	4200	µg/l
	Tetrachloroethylene	Direct	290	µg/l
	Thallium Total	Direct	0.47	µg/l

	Toluene	Direct	520	µg/l
	Trichloroethylene	Direct	70	µg/l
	Vinyl Chloride	Direct	16	µg/l
	Zinc Total	Direct	26000	µg/l
USEPA-SWQ-PAL-ACUTE	Acrolein	Direct	3	µg/l
	Aldrin	Direct	3	µg/l
	Alpha-Endosulfan	Direct	0.22	µg/l
	Arsenic Total	Direct	340	µg/l
	Beta-Endosulfan	Direct	0.22	µg/l
	Carbaryl	Direct	2.1	µg/l
	Chloride Dissolved	Direct	860	mg/l
	Chlorpyrifos-Ethyl (Dursban)	Direct	0.083	µg/l
	Cyanide Total	Direct	0.022	mg/l
	DDT And Metabolites	Direct	1.1	µg/l
	Dieldrin	Direct	0.24	µg/l
	Diazinon	Direct	0.17	µg/l
	Endrin	Direct	0.086	µg/l
	Gamma-Benzenehexachloride (Lindane) (Gamma-BHC)	Direct	0.95	µg/l
	Heptachlor	Direct	0.52	µg/l
	Heptachlor Epoxide	Direct	0.52	µg/l
	Mercury Dissolved	Direct	1400	ng/l
	Nonylphenol	Direct	28	µg/l
	Oxygen Dissolved	Direct	6.5	mg/L
	Parathion	Direct	0.065	µg/l
	Perfluorooctanesulfonate (PFOS)	Direct	3000000	ng/l
	Perfluorooctanoic Acid (PFOA)	Direct	49000	µg/l
USEPA-SWQ-PAL-CHRONIC	Acrolein	Direct	3	µg/l
	Alpha-Endosulfan	Direct	0.056	µg/l
	Alkalinity Total CaCO3	Direct	20	mg/l
	Arsenic Total	Direct	150	µg/l
	Azinphos Methyl (Guthion)	Direct	10	ng/l
	Beta-Endosulfan	Direct	0.056	µg/l
	Carbaryl	Direct	2.1	µg/l
	Chloride Dissolved	Direct	230	mg/l
	Chlorpyrifos-Ethyl (Dursban)	Direct	0.041	µg/l
	Cyanide Total	Direct	0.0052	mg/l
	DDT And Metabolites	Direct	0.001	µg/l
	Demeton	Direct	0.1	µg/l
	Diazinon	Direct	0.17	µg/l
	Dieldrin	Direct	0.056	µg/l
	Endrin	Direct	0.036	µg/l

	Heptachlor	Direct	0.0038	µg/l
	Heptachlor Epoxide	Direct	0.0038	µg/l
	Hydrogen Sulphide	Direct	0.002	mg/l
	Iron Dissolved	Direct	1000	µg/l
	Malathion	Direct	0.1	µg/l
	Mercury Dissolved	Direct	770	ng/l
	Methoxychlor (P,P'-Methoxychlor)	Direct	0.03	µg/l
	Mirex	Direct	0.001	µg/l
	Nonylphenol	Direct	6.6	µg/l
	Oxygen Dissolved	Direct	4	mg/L
	Parathion	Direct	0.013	µg/l
	Perfluorooctanesulfonate (PFOS)	Direct	8400	ng/l
	Perfluorooctanoic Acid (PFOA)	Direct	94	µg/l
	pH (Field)	Direct	6.5,9	pH units
	Selenium Total	Direct	1.5	µg/l
USDOE-SWQ-WL-NOAEL	1,1,1-Trichloroethane	Direct	49419	µg/l
	1,1-Dichloroethylene	Direct	929	µg/l
	1,2-Dichloroethane	Direct	4284	µg/l
	1,4-Dioxane	Direct	2010	µg/l
	Aldrin	Direct	0.001	µg/l
	Aluminum Total	Direct	18	µg/l
	Antimony Total	Direct	161	µg/l
	Arsenic Total	Direct	16	µg/l
	Benzene	Direct	2293	µg/l
	Benzo(A)Pyrene	Direct	6.722	ng/l
	Beryllium Total	Direct	136	µg/l
	Bis(2-Ethylhexyl) Phthalate	Direct	0.000759	µg/l
	Cadmium Total	Direct	0.2307	µg/l
	Carbon Tetrachloride	Direct	913	µg/l
	Chloroform	Direct	3439	µg/l
	Copper Dissolved	Direct	213	µg/l
	Cresols, Total	Direct	58.07	mg/l
	Cyanide Total	Direct	369.092	mg/l
	DDT And Metabolites	Direct	4.14E-06	µg/l
	Dieldrin	Direct	0.00136	µg/l
	Diethyl Phthalate	Direct	210561	µg/l
	Di-N-Butyl Phthalate	Direct	0.15	µg/l
	Endrin	Direct	0.00131	µg/l
	Ethanol	Direct	123377	µg/l
	Formaldehyde Total	Direct	73910	µg/l
	Gamma-Benzenehexachloride (Lindane) (Gamma-BHC)	Direct	9	µg/l

	Heptachlor	Direct	0.00108	µg/l
	Lead Total	Direct	168	µg/l
	Methoxychlor (P,P'-Methoxychlor)	Direct	1	µg/l
	Methyl Ethyl Ketone	Direct	4308293	µg/l
	Nickel Total	Direct	1438	µg/l
	Pentachlorophenol	Direct	0.275	µg/l
	Selenium Total	Direct	0.236	µg/l
	Tetrachloroethylene	Direct	48	µg/l
	Thallium Total	Direct	1	µg/l
	Toluene	Direct	764	µg/l
	Trichloroethylene	Direct	22	µg/l
	Vinyl Chloride	Direct	78	µg/l
	Xylene	Direct	28	µg/l
	Zinc Total	Direct	30	µg/l
USDOE-SWQ-WL-LOAEL	1,2-Dichloroethane	Direct	34400	µg/l
	1,4-Dioxane	Direct	460	µg/l
	Aldrin	Direct	457	µg/l
	Aluminum Total	Direct	4776	µg/l
	Antimony Total	Direct	309	µg/l
	Arsenic Total	Direct	312	µg/l
	Benzene	Direct	65200	µg/l
	Benzo(A)Pyrene	Direct	2470000	ng/l
	Cadmium Total	Direct	4412	µg/l
	Chloroform	Direct	19000	µg/l
	Copper Dissolved	Direct	9200	µg/l
	Di-N-Butyl Phthalate	Direct	1100	µg/l
	Dieldrin	Direct	91	µg/l
	Endrin	Direct	100	µg/l
	Ethanol	Direct	146000	µg/l
	Gamma-Benzenehexachloride (Lindane) (Gamma-BHC)	Direct	20000	µg/l
	Heptachlor	Direct	595	µg/l
	Methoxychlor (P,P'-Methoxychlor)	Direct	3700	µg/l
	Methyl Ethyl Ketone	Direct	2091000	µg/l
	Nickel Total	Direct	107000	µg/l
	Pentachlorophenol	Direct	1098	µg/l
	Selenium Total	Direct	151	µg/l
	Tetrachloroethylene	Direct	1730	µg/l
	Thallium Total	Direct	34	µg/l
	Toluene	Direct	64300	µg/l
	Trichloroethylene	Direct	1732	µg/l
	Vinyl Chloride	Direct	777	µg/l

	Xylene	Direct	643	µg/l
	Zinc Total	Direct	131000	µg/l
WHO-DW	1,2-Dibromo-3-Chloropropane	Direct	1	µg/l
	1,2-Dibromoethane	Direct	0.4	µg/l
	1,2-Dichlorobenzene	Direct	1000	µg/l
	1,2-Dichloroethane	Direct	50	µg/l
	1,2-Dichloropropane	Direct	40	µg/l
	1,4-Dichlorobenzene	Direct	300	µg/l
	1,4-Dioxane	Direct	50	µg/l
	2,4,5-Trichlorophenol	Direct	9	µg/l
	2,4,6-Trichlorophenol	Direct	200	µg/l
	2,4-D (Dichlorophenoxyacetic Acid)	Direct	30	µg/l
	2,4-DB (2,4-Dichlorophenoxy)Butanoic Acid)	Direct	90	µg/l
	Alachlor	Direct	20	µg/l
	Aldicarb	Direct	10	µg/l
	Antimony Total	Direct	20	µg/l
	Arsenic Total	Direct	10	µg/l
	Barium Total	Direct	1300	µg/l
	Benzene	Direct	10	µg/l
	Benzo(A)Pyrene	Direct	700	ng/l
	Boron Total	Direct	2400	µg/l
	Bromodichloromethane	Direct	60	µg/l
	Bromoform	Direct	100	µg/l
	Cadmium Total	Direct	3	µg/l
	Carbofuran	Direct	7	µg/l
	Carbon Tetrachloride	Direct	4	µg/l
	Chlorate	Direct	0.7	mg/l
	Chloroform	Direct	300	µg/l
	Chlorpyrifos-Ethyl (Dursban)	Direct	30	µg/l
	Chromium Total	Direct	50	µg/l
	Copper Total	Direct	2000	µg/l
	Cyanazine	Direct	0.6	µg/l
	DDT And Metabolites	Direct	1	µg/l
	Dibromochloromethane	Direct	100	µg/l
	Dichloromethane	Direct	20	µg/l
	Dichlorprop(2,4-DP)	Direct	100	µg/l
	Dimethoate (Cygon)	Direct	6	µg/l
	Endrin	Direct	0.6	µg/l
	Fluoride Dissolved	Direct	1.5	mg/l
	Gamma-Benzenehexachloride (Lindane) (Gamma-BHC)	Direct	2	µg/l
	Hexachlorobutadiene	Direct	0.6	µg/l

	Lead Total	Direct	10	µg/l
	MCPP (Mecoprop)	Direct	10	µg/l
	Mercury Total	Direct	6000	ng/l
	Methoxychlor (P,P'-Methoxychlor)	Direct	20	µg/l
	Metolachlor	Direct	10	µg/l
	Nickel Total	Direct	70	µg/l
	Nitrate as Nitrogen	Direct	50	mg/l
	Nitrilotriacetic Acid - Nta	Direct	0.2	mg/l
	Nitrite as Nitrogen	Direct	3	mg/l
	Pentachlorophenol	Direct	9	µg/l
	Selenium Total	Direct	40	µg/l
	Simazine	Direct	2	µg/l
	Styrene	Direct	20	µg/l
	Toluene	Direct	700	µg/l
	Trichloroethene	Direct	8	µg/l
	Trifluralin (Treflan)	Direct	20	µg/l
	Uranium Total	Direct	30	µg/l
	Vinyl Chloride	Direct	0.3	µg/l
	Xylene	Direct	500	µg/l

C.4 WATER QUALITY PARAMETERS

Data was compiled from all sources listed in Section 2.5.1 and Appendix B and naming conventions for parameters were standardized to develop a consistent SOE naming convention. Table C4 lists all the chemical and physical parameters included in the dataset along with the number of times that parameters were reported in the dataset. All parameters for which one or more guidelines exist were carrier forward for further analysis (Appendix E).

Table C4 SOE Parameters

Parameter	Samples	Guideline
1,1,1,2-Tetrachloroethane	140	
1,1,1-Trichloroethane	161	Yes
1,1,2,2-Tetrachloroethane	161	Yes
1,1,2-Trichloroethane	161	Yes
1,1-Dichloroethane	161	
1,1-Dichloroethylene	161	Yes
1,1-Dichloropropylene	132	
1,2,3,4-Tetrahydronaphthalene	1471	
1,2,3-Trichlorobenzene	143	Yes
1,2,3-Trichloropropane	134	
1,2,4,5-Tetrabromobenzene	29	
1,2,4-Trichlorobenzene	304	Yes
1,2,4-Trimethylbenzene	141	
1,2,6-Trimethylphenanthrene	5032	

Parameter	Samples	Guideline
1,2-Dibromo-3-Chloropropane	132	Yes
1,2-Dibromoethane	143	Yes
1,2-Dichlorobenzene	161	Yes
1,2-Dichloroethane	161	Yes
1,2-Dichloropropane	161	Yes
1,2-Dimethylnaphthalene	5022	
1,2-Diphenylhydrazine	168	Yes
1,3 Dibromobenzene	2	
1,3,5-Tribromobenzene	2	
1,3,5-Trichlorobenzene	9	
1,3,5-Trimethylbenzene	141	
1,3-Dichlorobenzene	161	Yes
1,3-Dichloropropane	132	
1,4,6,7-Tetramethylnaphthalene	5022	
1,4-Dichloro-2-Butene-Trans	2	
1,4-Dichlorobenzene	161	Yes
1,4-Dioxane	2	Yes
1,7-Dimethylfluorene	5032	
1,7-Dimethylphenanthrene	5032	
1,8-Dimethylphenanthrene	5032	
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonate	261	
12,14-Dichlorodehydroabietic Acid	108	
12-Chlorodehydroabietic Acid	108	
14-Chlorodehydroabietic Acid	108	
1-Methylchrysene	5033	
1-Methylnaphthalene	6534	
1-Methylphenanthrene	5032	
2,2-Dichloropropane	132	
2,3,4,6-Tetrachlorophenol	194	Yes
2,3,4-Trichlorophenol	6	
2,3,5,6-Tetrachlorophenol	6	
2,3,5-Trichlorophenol	6	
2,3,5-Trimethylnaphthalene	5022	
2,3,6-Trichlorobenzoic Acid	7	
2,3,6-Trichlorophenol	30	Yes
2,3,6-Trimethylnaphthalene	5022	
2,3-Methyldibenzothiophene	5032	
2,4,5-T (2,4,5-Trichlorophenoxyacetic Acid)	121	
2,4,5-Trichlorophenol	78	Yes
2,4,6-Trichlorophenol	231	Yes

Parameter	Samples	Guideline
2,4-D (Dichlorophenoxyacetic Acid)	796	Yes
2,4-DB (2,4-Dichlorophenoxy)Butanoic Acid)	795	Yes
2,4-Dichlorophenol	779	Yes
2,4-Dimethyldibenzothiophene	5032	
2,4-Dimethylphenol	174	Yes
2,4-Dinitrotoluene	168	Yes
2,6-Dibromophenol	69	
2,6-Dichlorophenol	15	Yes
2,6-Dimethylnaphthalene	5022	
2,6-Dimethylphenanthrene	5032	
2,6-Dinitrotoluene	168	
2-Chloroethylvinylether (2-Chloroethoxyethylene)	149	
2-Chloro-Hydroxytoluene	4	
2-Chloronaphthalene	1639	Yes
2-Chlorophenol	179	Yes
2-Chlorotoluene	132	
2-Hexanone	2	
2-Methylanthracene	5032	
2-Methylfluorene	5032	
2-Methylnaphthalene	6536	
2-Methylphenanthrene	5032	
2-Nitrophenol	174	
3- And 4-Chlorophenol	6	
3,4,5-Trichlorocatecol	131	
3,4,5-Trichloroguaiacol	123	
3,4,5-Trichloroveratrol	113	
3,4,6-Trichlorocatechol	122	
3,4,6-Trichloroguaiacol	121	
3,4-Dichlorocatechol	122	
3,5-Dichlorocatechol	121	
3,6-Dimethylphenanthrene	5032	
3:3 Perfluorohexanoic Acid	255	
3-Methylcholanthrene	273	
3-Methylfluoranthene	76	
3-Methylfluoranthene/Benzo(A)Fluorene	4977	
3-Methylphenanthrene	5032	
4,5,6-Trichloroguaiacol	123	
4,5,6-Trichlorosyringol	122	
4,5-Dichlorocatechol	122	
4,5-Dichloroguaiacol	123	

Parameter	Samples	Guideline
4,5-Dichloroveratrole	122	
4,6-Dichloroguaiacol	123	
4,6-Dimethyldibenzothiophene	2769	
4,6-Dinitro-O-Cresol	6	
4,8-Dioxa-3H-Perfluorononanoate (Adona)	2	
4:2 Fluorotelomersulfonate	261	
4-Bromophenyl Phenyl Ether	168	
4-Chloro-2-Methylphenol	557	
4-Chloro-3-Methylphenol	170	
4-Chlorocatechol	118	
4-Chloroguaiacol	123	
4-Chlorophenol	123	Yes
4-Chlorophenyl Phenyl Ether	168	
4-Chlorotoluene	132	
4-Dioxa-3H-Perfluorononanoate	259	
4-Nitrophenol	174	
5,6-Methylchrysene	5033	
5,9-Dimethylchrysene	5033	
5:3 Perfluorooctanoic Acid	255	
6:2 Fluorotelomersulfonate	261	
7,10-Dimethylbenzo(A)Pyrene	988	
7,12-Dimethylbenz(A)Anthracene	268	
7:3 Perfluorodecanoic Acid	255	
7-Methylbenzo(A)Pyrene	6021	
8:2 Fluorotelomersulfonate	261	
9,10-Dichlorostearic Acid	101	
9,4-Methylphenanthrene	5032	
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonate	261	
9-Ethylfluorene	1162	
9-Methylfluorene	1162	
Abietic Acid	108	
Acenaphthene	8605	Yes
Acenaphthylene	8605	Yes
Acetaminophen	3	
Acetone	2	
Acetylsalicylic Acid	3	
Acridine	1250	Yes
Acrolein	2	Yes
Acrylonitrile	2	Yes
Alachlor	17	Yes

Parameter	Samples	Guideline
Aldicarb	518	Yes
Aldicarb Sulfone	156	
Aldicarb Sulfoxide	156	
Aldrin	663	Yes
Alkalinity Phenolphthalein Caco3	9083	
Alkalinity Total CaCO3	14177	Yes
Alpha-Benzenehexachloride(BHC)	819	
Alpha-Chlordane	142	
Alpha-Endosulfan	818	Yes
Aluminum Dissolved	13543	Yes
Aluminum Total	14542	Yes
Aminocarb	175	
Aminomethyl Phosphonic Acid	6	
Aminopyralid	446	
Ammonia As Nitrogen	25	
Ammonia Dissolved	7586	
Ammonia Total	7666	Yes
Ammonia Un-Ionized (Calcd.)	3464	Yes
Amoxicillin	3	
Anions Total	4220	
Anthracene	8636	Yes
Antimony Dissolved	13157	Yes
Antimony Total	13480	Yes
Arachidic Acid	101	
Aroclor	28	
Aroclor 1242	16	
Aroclor 1248	11	
Aroclor 1254	27	
Aroclor 1260	27	
Arsenic Dissolved	13967	Yes
Arsenic Total	13822	Yes
Aspon	19	
Atrazine	699	Yes
Atrazine De-Ethylated	156	
Azinphos Methyl (Guthion)	756	Yes
Azoxystrobin	156	
B(A)P Total Potency Equivalent	9	
Barium Dissolved	13243	Yes
Barium Total	14295	Yes
Benomyl	156	

Parameter	Samples	Guideline
Bentazon	502	
Benzene	6116	Yes
Benzidine	168	Yes
Benzo(A)Anthracene	8664	Yes
Benzo(A)Pyrene	8679	Yes
Benzo(B)Fluoranthene	6929	Yes
Benzo(B,J)Fluoranthene	9	
Benzo(B,J,K)Fluoranthene	383	Yes
Benzo(C)Phenanthrene	277	
Benzo(E)Pyrene	6978	
Benzo(G,H,I)Perylene	8602	Yes
Benzo(J,K)Fluoranthene	5034	Yes
Benzo(K)Fluoranthene	2271	Yes
Benzoylecgonine	3	
Beryllium Dissolved	13322	Yes
Beryllium Total	13963	Yes
Beta-Benzenehexachloride	20	
Beta-Endosulfan	142	Yes
Beta-Hch	18	
Bezafibrate	3	
Bicarbonate (Calcd.)	13528	
Biphenyl	7056	
Bis(2-Chloroethoxy) Methane	168	
Bis(2-Chloroethyl) Ether	168	Yes
Bis(2-Chloroisopropyl) Ether	168	
Bis(2-Ethylhexyl) Phthalate	166	Yes
Bismuth Dissolved	13086	Yes
Bismuth Total	13396	Yes
Bisphenol A	4	Yes
Boron Dissolved	13810	Yes
Boron Total	13549	Yes
Bromacil	695	Yes
Bromine Dissolved	259	
Bromine Total	259	
Bromobenzene	132	
Bromochloromethane	1	
Bromodichloromethane	3	Yes
Bromoform	161	Yes
Bromomethane	161	
Bromoxynil	676	Yes

Parameter	Samples	Guideline
BTEX Total	2	
BTEX+Styrene Total	2	
Butylbenzyl Phthalate	168	Yes
C1-Benzo(A)Anthracene/Chrysene	6529	
C1-Benzofluoranthene/Benzopyrene	5551	
C1-Benzopyrene	162	
C1-Benzopyrenes/Perylenes	1	
C1-Biphenyls	1	
C1-Chrysene	2509	
C1-Dibenzothiophene	7825	
C1-Fluoranthene/Pyrene	7825	
C1-Fluorene	7763	
C1-Methyldibenzothiophene (3Pks)	235	
C1-Methylfluoranthene (2Pks)	235	
C1-Methylfluorene	235	
C1-Naphthalene	7106	
C1-Phenanthrene	2217	
C1-Phenanthrene/Anthracene	5840	
C2-1,6-Dimethylnaphthalene (5Pks)	235	
C2-1,9-Dimethylfluorene	1162	
C2-3-Ethylfluoranthene	1223	
C2-Benz(A)Anthracene/Chrysene	5497	
C2-Benzofluoranthenes/Benzopyrene	5551	
C2-Benzopyrene	162	
C2-Benzopyrenes/Perylenes	1	
C2-Biphenyls	1	
C2-Chrysene	2509	
C2-Dibenzothiophene	7607	
C2-Dimethyldibenzothiophene	453	
C2-Fluoranthene/Pyrene	6837	
C2-Fluorene	6836	
C2-Naphthalene	6914	
C2-Phenanthrene	1571	
C2-Phenanthrene/Anthracene	6489	
C3-2,4,7-Trimethyldibenzothiophene	1162	
C3-2-Isopropylnaphthalene	1162	
C3-4-Propyldibenzothiophene	1162	
C3-Benzo(A)Anthracene/Chrysene	5034	
C3-Benzopyrenes/Perylenes	1	
C3-Chrysene	2509	

Parameter	Samples	Guideline
C3-Dibenzothiophene	6837	
C3-Fluoranthene/Pyrene	6651	
C3-Fluorene	7824	
C3-Naphthalene	6827	
C3-N-Propylfluorene	235	
C3-Phenanthrene	1571	
C3-Phenanthrene/Anthracene	6489	
C3-Trimethylnaphthalene	1162	
C4 Benz(A)Anthracene/Chrysene	5034	
C4-Benzopyrenes/Perylenes	1	
C4-Chrysene	2509	
C4-Dibenzothiophene	6650	
C4-Fluoranthene/Pyrene	6133	
C4-Fluorene	2509	
C4-Naphthalene	9383	
C4-Phenanthrene/Anthracene	6489	
C4-Tetramethylnaphthalene	235	
C5-Benz(A)Anthracenes/Chrysenes	1	
C5-Benzopyrenes/Perylenes	1	
C5-Fluoranthenes/Pyrenes	1	
C5-Naphthalenes	1	
C5-Phenanthrene/Anthracene	1	
Cadmium Dissolved	13238	Yes
Cadmium Total	14335	Yes
Caffeine	3	
Calcium Dissolved	18288	Yes
Calcium Total	9913	
Captan	21	Yes
Carbamate (Eptc)	128	
Carbamazepine	3	Yes
Carbaryl	156	Yes
Carbathiin (Carboxin)	676	
Carbazole	162	
Carbofuran	156	Yes
Carbon Dissolved Inorganic	1876	
Carbon Dissolved Organic	14455	Yes
Carbon Particulate Organic	4749	
Carbon Particulate Total	1164	
Carbon Tetrachloride	161	Yes
Carbon Total	22	

Parameter	Samples	Guideline
Carbon Total Inorganic	61	
Carbon Total Organic	8051	
Carbon Total Organic (Calcd.)	4071	
Carbon-13 In DIC	348	
Carbonaceous Oxygen Demand Bod10	7	
Carbonate (Calcd.)	12627	
Carbonate (As CaCO3)	18	
Carbonate Dissolved	458	
Carbophenothion	19	
Cations Total	4229	
Cerium Dissolved	5307	
Cerium Total	5356	
Cesium Dissolved	5235	
Cesium Total	5394	
Chemical Oxygen Demand	16	Yes
Chloramphenicol	3	
Chlorate	108	Yes
Chloride Dissolved	14227	Yes
Chlorine Dissolved	6473	
Chlorine Total	6733	
Chlorobenzene	161	Yes
Chloroethane	161	
Chloroform	161	Yes
Chloromethane	57	
Chlorophyll A	2980	Yes
Chlorophyll A Epilithon	15	
Chlorothalonil	502	Yes
Chlorpyrifos-Ethyl (Dursban)	695	Yes
Chlorthal-Dimethyl (Dacthal)	19	
Chromium (III)	7	
Chromium Dissolved	13335	Yes
Chromium (VI)	482	
Chromium Total	14199	Yes
Chrysene	8670	Yes
Ciprofloxacin	3	
Cis-1,2-Dichloroethene	143	
Cis-1,3-Dichloropropene	161	
Cis-1,4-Dichloro-2-Butene	2	
Cis-Nonachlor	18	
Clindamycin	3	

Parameter	Samples	Guideline
Clodinafop Acid Metabolite	500	
Clodinafop-Propargyl	500	
Clofibric Acid	3	
Clopyralid (Lontrel)	676	
Clothianidin	156	
Cobalt Dissolved	13211	Yes
Cobalt Total	14336	Yes
Codeine	2	
Coliforms Fecal	2988	
Coliforms Total	841	
Colour Apparent	4885	
Colour True	8926	Yes
Copper Dissolved	13238	Yes
Copper Total	14607	Yes
Cotinine	3	
Cresols, Total	10	Yes
Crufomate	19	
Cyanazine	695	Yes
Cyanide	231	
Cyanide Total	1358	Yes
DDT And Metabolites	284	Yes
Def	19	
Delta-Bhc	2	
Deltamethrin	156	Yes
Demeton	19	Yes
Desethyl Atrazine	471	
Desisopropyl Atrazine	627	
Diallate	19	
Diazinon	752	Yes
Dibenzo(A,H) Anthracene	8680	Yes
Dibenzo(A,H)Pyrene	268	
Dibenzo(A,I)Pyrene	445	
Dibenzo(A,L)Pyrene	91	
Dibenzothiophene	6258	
Dibromochloromethane	161	Yes
Dibromomethane	140	
Dicamba (Banvel)	705	Yes
Dichlorobromomethane	158	Yes
Dichlorodifluoromethane	14	
Dichloromethane	155	Yes

Parameter	Samples	Guideline
Dichlorprop(2,4-DP)	795	Yes
Dichlorvos	19	
Diclofenac	3	
Diclofop-Methyl (Hoegrass)	699	Yes
Dicofol	2	
Dieldrin	682	Yes
Diethyl Phthalate	168	Yes
Difenoconazole	156	
Dimethoate (Cygon)	645	Yes
Dimethyl Biphenyl	5541	
Dimethyl Phthalate	690	Yes
Di-N-Butyl Phthalate	168	Yes
Dinitramine	19	
Dinitrophenols	342	Yes
Di-N-Octyl Phthalate	169	
Dinoseb	19	Yes
Discharge Daily Mean	452	
Discharge Instantaneous	10	
Discharge Monthly Mean	355	
Disulfoton (Di-Syston)	756	
Diuron	676	Yes
Dysprosium Dissolved	259	
Dysprosium Total	259	
Endosulfan Sulphate	2	
Endrin	140	Yes
Enrofloxacin	3	
Enterococci	36	
Erbium Dissolved	259	
Erbium Total	259	
Erythromycin	3	
Escherichia Coli	2264	Yes
Ethalfluralin (Edge)	676	
Ethanol	2	Yes
Ethion	756	
Ethodrophos	19	
Ethofumesate	502	
Ethyl Methacrylate	2	
Ethylbenzene	6116	
Europium Dissolved	645	
Europium Total	646	

Parameter	Samples	Guideline
F1 Hydrocarbons (C6-C10)	3627	Yes
F1 Hydrocarbons (C6-C10)- BTEX	1869	
F2 Hydrocarbons (C10-C16)	5862	Yes
F3 Hydrocarbons (C16-C34)	5862	
F4 Hydrocarbons (C34-C50)	5617	
Fecal Streptococci	448	
Fenchlorphos (Ronnel)	80	
Fenitrothion	19	
Fenoprofen	3	
Fenoprop(Silvex)(2,4,5-Tp)	60	Yes
Fenoxaprop-P-Ethyl	471	
Fenoxaprop-P-Methyl	156	
Fensulfothion	19	
Fenthion	19	
Fluazifop	502	
Fluoranthene	8679	Yes
Fluorene	8677	Yes
Fluoride Dissolved	8248	Yes
Fluoride Total	108	
Fluoxetine	3	
Fluroxypyr	502	
Fonofos	19	
Formaldehyde Total	2	Yes
Free Co2 (Calcd.)	4325	
Gadolinium Dissolved	645	
Gadolinium Total	646	
Gallium Dissolved	5450	
Gallium Total	5491	
Gamma-Benzenehexachloride (Lindane) (Gamma-BHC)	819	Yes
Gamma-Chlordane	142	
Gemfibrozil	3	
Germanium Dissolved	4172	
Germanium Total	4177	
Glufosinate	6	
Glyphosate (Roundup)	6	Yes
Gold Dissolved	259	
Gold Total	259	
Hafnium Dissolved	386	
Hafnium Total	387	
Hardness Non-Carbonated (Calcd.)	4351	

Parameter	Samples	Guideline
Hardness Total Caco3	13953	Yes
Heptachlor	140	Yes
Heptachlor Epoxide	140	Yes
Heptadecanoic Acid	74	
Hexachlorobenzene	310	Yes
Hexachlorobutadiene	314	Yes
Hexachlorocyclopentadiene	168	Yes
Hexachloroethane	168	Yes
Hexaconazole	502	
Hexane Extractable Material	25	
Holmium Dissolved	645	
Holmium Total	646	
Hydrocarbons Extractable (C11 To C30)	2	
Hydrocarbons Extractable (C8 And Up)	2	
Hydrocarbons Extractable (TEH), C10-C50	2	
Hydrocarbons Extractable (TEH), C16-C50	2	
Hydrocarbons Volatile Scan (C3 To C9)	2	
Hydrocarbons, Total Extractable	18	
Hydrocarbons, Total Purgeable	2	
Hydrogen Sulphide	640	Yes
Hydroxide (Calcd.)	11815	
Hydroxide Alk (As Caco3)	18	
Ibuprofen	3	
Imazamethabenz-Methyl	642	
Imazamox	608	
Imazethapyr	625	
Imidacloprid	156	Yes
Indene	470	
Indeno (1,2,3-C,D)Pyrene	8680	Yes
Indeno(1,2,3-CD)Fluoranthene	1137	
Indium Dissolved	4174	
Indium Total	4177	
Indomethacin	3	
Iodomethane	2	
Ionic Balance	2196	
Ionic Balance Difference (Calcd.)	4683	
Iprodione	502	
Iridium Dissolved	386	
Iridium Total	387	
Iron Dissolved	20004	Yes

Parameter	Samples	Guideline
Iron Total	15578	Yes
Isophorone	168	Yes
Isopimaric Acid	108	
Isopropylbenzene	132	
Ketoprofen	3	
Lambda-Cyhalothrin	156	
Lanthanum Dissolved	5450	
Lanthanum Total	5490	
Lead Dissolved	13252	Yes
Lead Total	14575	Yes
Levopimaric Acid	108	
Lincomycin	3	
Linoleic Acid	101	
Linolenic Acid	101	
Linuron	502	Yes
Lithium Dissolved	13211	Yes
Lithium Total	13775	Yes
Lutetium Dissolved	386	
Lutetium Total	390	
M- + P-Xylene	6091	
M And P-Cresol	6	
Magnesium Dissolved	13546	Yes
Magnesium Total	3175	
Malathion	756	Yes
Manganese Dissolved	19995	Yes
Manganese Total	14507	Yes
MCPA	797	Yes
MCPB	683	
MCPP (Mecoprop)	676	Yes
Meclofenamic Acid	3	
Mercury Dissolved	5464	Yes
Mercury Total	11373	Yes
Metalaxyl-M	502	
Metconazole	156	
Methamphetamine	3	
Methomyl	498	
Methoxychlor (P,P'-Methoxychlor)	816	Yes
Methyl Acenaphthene	5543	
Methyl Biphenyl	5541	
Methyl Ethyl Ketone	2	Yes

Parameter	Samples	Guideline
Methyl Isobutyl Ketone	2	
Methyl Mercury Dissolved	3973	Yes
Methyl Mercury Total	6542	
Methyl Methacrylate	9	
Methyl Triclosan	3	
Metolachlor	502	Yes
Metribuzin	521	Yes
Mevinphos	19	
Mirex	142	Yes
Molybdenum Dissolved	13227	Yes
Molybdenum Total	14052	Yes
Monuron	156	
MTBE (Methyl Tertiary Butyl Ether)	104	Yes
Myristic Acid	103	
N,N-Diethyl-M-Toluamide (Deet)	3	
Naphthalene	8802	Yes
Naphthenic Acid C10H16O2 (Z =-4; Dbe =3)	732	
Naphthenic Acid C10H18O2 (Z = -2; Dbe=2)	732	
Naphthenic Acid C10H20O2 (Z = 0; Dbe=1)	732	
Naphthenic Acid C11H14O2 (Z =-8; Dbe =5)	732	
Naphthenic Acid C11H16O2 (Z=-6, Dbe =4)	732	
Naphthenic Acid C11H18O2 (Z =-4; Dbe =3)	732	
Naphthenic Acid C11H20O2 (Z = -2; Dbe=2)	732	
Naphthenic Acid C11H22O2 (Z = 0; Dbe=1)	732	
Naphthenic Acid C12H16O2 (Z = -8; Dbe=5)	732	
Naphthenic Acid C12H18O2 (Z = -6; Dbe = 4)	732	
Naphthenic Acid C12H20O2 (Z = -4; Dbe = 3)	732	
Naphthenic Acid C12H22O2 (Z = -2; Dbe = 2)	732	
Naphthenic Acid C12H24O2 (Z = 0; Dbe = 1)	732	
Naphthenic Acid C13H16O2 (Z = -10; Dbe=6)	732	
Naphthenic Acid C13H18O2 (Z = -8; Dbe=5)	732	
Naphthenic Acid C13H20O2 (Z = -6; Dbe = 4)	732	
Naphthenic Acid C13H22O2 (Z = -4; Dbe = 3)	732	
Naphthenic Acid C13H24O2 (Z = -2; Dbe = 2)	732	
Naphthenic Acid C13H26O2 (Z = 0; Dbe = 1)	732	
Naphthenic Acid C14H16O2 (Z = -12; Dbe=7)	732	
Naphthenic Acid C14H18O2 (Z = -10; Dbe=6)	732	
Naphthenic Acid C14H20O2 (Z = -8; Dbe = 5)	732	
Naphthenic Acid C14H22O2 (Z = -6; Dbe = 4)	732	
Naphthenic Acid C14H24O2 (Z = -4; Dbe = 3)	732	

Parameter	Samples	Guideline
Naphthenic Acid C14H26O2 (Z = -2; Dbe = 2)	732	
Naphthenic Acid C14H28O2 (Z = 0; Dbe = 1)	732	
Naphthenic Acid C15H14O2 (Z = -16; Dbe=9)	732	
Naphthenic Acid C15H16O2 (Z = -14; Dbe=8)	732	
Naphthenic Acid C15H18O2 (Z = -12; Dbe = 7)	732	
Naphthenic Acid C15H20O2 (Z = -10; Dbe = 6)	732	
Naphthenic Acid C15H22O2 (Z = -8; Dbe = 5)	732	
Naphthenic Acid C15H24O2 (Z = -6; Dbe = 4)	732	
Naphthenic Acid C15H26O2 (Z = -4; Dbe = 3)	732	
Naphthenic Acid C15H28O2 (Z = -2; Dbe = 2)	732	
Naphthenic Acid C15H30O2 (Z = 0; Dbe = 1)	732	
Naphthenic Acid C16H14O2 (Z = -18; Dbe=10)	732	
Naphthenic Acid C16H16O2 (Z = -16; Dbe=9)	732	
Naphthenic Acid C16H18O2 (Z = -14; Dbe=8)	732	
Naphthenic Acid C16H20O2 (Z = -12; Dbe = 7)	732	
Naphthenic Acid C16H22O2 (Z = -10; Dbe = 6)	732	
Naphthenic Acid C16H24O2 (Z = -8; Dbe = 5)	732	
Naphthenic Acid C16H26O2 (Z = -6; Dbe = 4)	732	
Naphthenic Acid C16H28O2 (Z = -4; Dbe = 3)	732	
Naphthenic Acid C16H30O2 (Z = -2; Dbe = 2)	732	
Naphthenic Acid C16H32O2 (Z = 0; Dbe = 1)	732	
Naphthenic Acid C17H18O2 (Z = -16; Dbe=9)	732	
Naphthenic Acid C17H20O2 (Z = -14; Dbe=8)	732	
Naphthenic Acid C17H22O2 (Z = -12; Dbe = 7)	732	
Naphthenic Acid C17H24O2 (Z = -10; Dbe = 6)	732	
Naphthenic Acid C17H26O2 (Z = -8; Dbe = 5)	732	
Naphthenic Acid C17H28O2 (Z = -6; Dbe = 4)	732	
Naphthenic Acid C17H30O2 (Z = -4; Dbe = 3)	732	
Naphthenic Acid C17H32O2 (Z = -2; Dbe = 2)	732	
Naphthenic Acid C17H34O2 (Z = 0; Dbe = 1)	732	
Naphthenic Acid C18H20O2 (Z = -16; Dbe=9)	732	
Naphthenic Acid C18H22O2 (Z = -14; Dbe=8)	732	
Naphthenic Acid C18H24O2 (Z = -12; Dbe = 7)	732	
Naphthenic Acid C18H26O2 (Z = -10; Dbe = 6)	732	
Naphthenic Acid C18H28O2 (Z = -8; Dbe = 5)	732	
Naphthenic Acid C18H30O2 (Z = -6; Dbe = 4)	732	
Naphthenic Acid C18H32O2 (Z = -4; Dbe = 3)	732	
Naphthenic Acid C18H34O2 (Z = -2; Dbe = 2)	732	
Naphthenic Acid C18H36O2 (Z = 0; Dbe = 1)	732	
Naphthenic Acid C19H20O2 (Z = -18; Dbe=10)	732	

Parameter	Samples	Guideline
Naphthenic Acid C19H22O2 (Z = -16; Dbe=9)	732	
Naphthenic Acid C19H24O2 (Z = -14; Dbe=8)	732	
Naphthenic Acid C19H26O2 (Z = -12; Dbe = 7)	732	
Naphthenic Acid C19H28O2 (Z = -10; Dbe = 6)	732	
Naphthenic Acid C19H30O2 (Z = -8; Dbe = 5)	732	
Naphthenic Acid C19H32O2 (Z = -6; Dbe = 4)	732	
Naphthenic Acid C19H34O2 (Z = -4; Dbe = 3)	732	
Naphthenic Acid C19H36O2 (Z = -2; Dbe = 2)	732	
Naphthenic Acid C19H38O2 (Z = 0; Dbe = 1)	732	
Naphthenic Acid C20H22O2 (Z = -18; Dbe=10)	732	
Naphthenic Acid C20H24O2 (Z = -16; Dbe=9)	732	
Naphthenic Acid C20H26O2 (Z = -14; Dbe=8)	732	
Naphthenic Acid C20H28O2 (Z = -12; Dbe = 7)	732	
Naphthenic Acid C20H30O2 (Z = -10; Dbe = 6)	732	
Naphthenic Acid C20H32O2 (Z = -8; Dbe = 5)	732	
Naphthenic Acid C20H34O2 (Z = -6; Dbe = 4)	732	
Naphthenic Acid C20H36O2 (Z = -4; Dbe = 3)	732	
Naphthenic Acid C20H38O2 (Z = -2; Dbe = 2)	732	
Naphthenic Acid C20H40O2 (Z = 0; Dbe=1)	732	
Naphthenic Acid C21H24O2 (Z = -18; Dbe=10)	732	
Naphthenic Acid C21H26O2 (Z = -16; Dbe=9)	732	
Naphthenic Acid C21H28O2 (Z = -14; Dbe=8)	732	
Naphthenic Acid C21H30O2 (Z = -12; Dbe = 7)	732	
Naphthenic Acid C21H32O2 (Z = -10; Dbe = 6)	732	
Naphthenic Acid C21H34O2 (Z = -8; Dbe = 5)	732	
Naphthenic Acid C21H36O2 (Z = -6; Dbe = 4)	732	
Naphthenic Acid C21H38O2 (Z = -4; Dbe = 3)	732	
Naphthenic Acid C21H40O2 (Z = -2; Dbe = 2)	732	
Naphthenic Acid C21H42O2 (Z = 0; Dbe=1)	732	
Naphthenic Acid C22H32O2 (Z = -12; Dbe=7)	732	
Naphthenic Acid C22H34O2 (Z = -10; Dbe=6)	732	
Naphthenic Acid C22H36O2 (Z = -8; Dbe=5)	732	
Naphthenic Acid C22H38O2 (Z = -6; Dbe=4)	732	
Naphthenic Acid C22H40O2 (Z = -4; Dbe=3)	732	
Naphthenic Acid C22H42O2 (Z = -2; Dbe=2)	732	
Naphthenic Acid C22H44O2 (Z = 0; Dbe=1)	732	
Naphthenic Acid C23H32O2 (Z = -14; Dbe=8)	732	
Naphthenic Acid C23H34O2 (Z = -12; Dbe=7)	732	
Naphthenic Acid C23H36O2 (Z = -10; Dbe=6)	732	
Naphthenic Acid C23H38O2 (Z = -8; Dbe=5)	732	

Parameter	Samples	Guideline
Naphthenic Acid C23H40O2 (Z = -6; Dbe=4)	732	
Naphthenic Acid C23H42O2 (Z = -4; Dbe=3)	732	
Naphthenic Acid C23H44O2 (Z = -2; Dbe=2)	732	
Naphthenic Acid C23H46O2 (Z = 0; Dbe=1)	732	
Naphthenic Acid C24H36O2 (Z = -12; Dbe=7)	732	
Naphthenic Acid C24H38O2 (Z = -10; Dbe=6)	732	
Naphthenic Acid C24H40O2 (Z = -8; Dbe=5)	732	
Naphthenic Acid C24H42O2 (Z = -6; Dbe=4)	732	
Naphthenic Acid C24H44O2 (Z = -4; Dbe=3)	732	
Naphthenic Acid C24H46O2 (Z = -2; Dbe=2)	732	
Naphthenic Acid C24H48O2 (Z = 0; Dbe=1)	732	
Naphthenic Acid C25H38O2 (Z = -12; Dbe=7)	732	
Naphthenic Acid C25H40O2 (Z = -10; Dbe=6)	732	
Naphthenic Acid C25H42O2 (Z = -8; Dbe=5)	732	
Naphthenic Acid C25H44O2 (Z = -6; Dbe=4)	732	
Naphthenic Acid C25H46O2 (Z = -4; Dbe=3)	732	
Naphthenic Acid C25H48O2 (Z = -2; Dbe=2)	732	
Naphthenic Acid C25H50O2 (Z = 0; Dbe=1)	732	
Naphthenic Acid C5H10O2 (Z = 0; Dbe=1)	732	
Naphthenic Acid C6H12O2 (Z = 0; Dbe=1)	732	
Naphthenic Acid C7H12O2 (Z = -2; Dbe=2)	732	
Naphthenic Acid C7H14O2 (Z = 0; Dbe=1)	732	
Naphthenic Acid C8H14O2 (Z = -2; Dbe=2)	732	
Naphthenic Acid C8H16O2 (Z = 0; Dbe=1)	732	
Naphthenic Acid C9H14O2 (Z = -4; Dbe=3)	732	
Naphthenic Acid C9H16O2 (Z = -2; Dbe=2)	732	
Naphthenic Acid C9H18O2 (Z = 0; Dbe=1)	732	
Naphthenic Acids	2267	
Napropamide	518	
Naproxen	3	
N-Butylbenzene	132	
Neoabietic Acid	108	
Neodymium Dissolved	645	
Neodymium Total	646	
N-Ethyl Perfluorooctane Sulfonamide	255	
N-Ethyl Perfluorooctane Sulfonamidoacetic Acid	261	
N-Ethyl Perfluorooctane Sulfonamidoethanol	255	
Nickel Dissolved	13240	Yes
Nickel Total	14434	Yes
Niobium Dissolved	5321	

Parameter	Samples	Guideline
Niobium Total	5362	
Nitrate and Nitrite as Nitrogen	14178	Yes
Nitrate as Nitrogen	8240	Yes
Nitrilotriacetic Acid - Nta	2	Yes
Nitrite as Nitrogen	8732	Yes
Nitrobenzene	168	Yes
Nitrogen Dissolved	4542	
Nitrogen Dissolved Kjeldahl (Dkn)	5431	
Nitrogen Particulate	4849	
Nitrogen Total	4869	Yes
Nitrogen Total (Calcd.)	5989	
Nitrogen Total Kjeldahl	9511	Yes
N-Methyl Perfluorooctane Sulfonamidoacetic Acid	2	
N-Methylperfluorooctanesulfonamide	255	
N-Methylperfluorooctanesulfonamidoacetic Acid	259	
N-Methylperfluorooctanesulfonamidoethanol	255	
N-Nitroso-Di-N-Propylamine	168	Yes
N-Nitrosodiphenylamine	168	Yes
Nonylphenol	4	Yes
Nonylphenol Tetraethoxylate	4	
Nonylphenol-Diethoxylate	4	
Nonylphenol-Monoethoxylate	4	
Nonylphenol-Triethoxylate	4	
Norfloxacin	3	
Norfluoxetine	3	
N-Propylbenzene	132	
O,P'-DDD	37	
O,P'-DDE	37	
O-Cresol	6	
Ofloxacin	3	
OH-Carbofuran	156	
Oil And Grease	127	Yes
Oilsands Acid Extractable Organics	276	
Oleic Acid	101	
O-Methyl Podocarpic Acid	74	
Orthophosphate Dissolved	4198	
Oxolinic Acid	3	
Oxycarboxin	518	
Oxychlordane	18	
Oxygen Biochemical Demand	2234	Yes

Parameter	Samples	Guideline
Oxygen Biochemical Demand Bod5	3	
Oxygen Biochemical Demand Bod10	3	
Oxygen Biochemical Demand Bod14	14	
Oxygen Biochemical Demand Bod30	1	
Oxygen Consumed	33	
Oxygen Dissolved % Saturation	4855	
Oxygen Dissolved	12262	Yes
Oxygen Dissolved (Winkler)	1483	
Oxygen Total Cod	760	
Oxygen-18 In Sulphate	134	
Oxygen-18 In Water	4019	
O-Xylene	6144	
P,P'-DDD (TDP)	140	Yes
P,P'-DDE	142	Yes
Palladium Dissolved	2850	
Palladium Total	2854	
Palmitic Acid	103	
Palustric Acid	108	
Para-Oxon	19	
Parathion	582	Yes
Parathion Methyl	80	
Pentachloroanisole	18	
Pentachlorobenzene	28	Yes
Pentachlorophenol	229	Yes
Pentoxifylline	3	
Perfluoro(2-Ethoxyethane)Sulfonic Acid	255	
Perfluoro-1-Heptansulfonate	4	
Perfluoro-2-Propoxypropanoate (HFPO-DA)	261	
Perfluoro-3,6-Dioxaheptanoate	255	
Perfluoro-3-Methoxypropanoate	255	
Perfluoro-4-Methoxybutanoate	255	
Perfluorobutane Sulfonic Acid (PFBS)	261	
Perfluorobutanoate	259	
Perfluorodecane Sulfonic Acid (PFDS)	263	
Perfluorodecanoate	255	
Perfluorododecanesulfonate	255	
Perfluorododecanoate	259	
Perfluoroheptane Sulfonate (PFHPS)	257	
Perfluoroheptanoate	263	
Perfluorohexane Sulfonic Acid (PFHXS)	261	

Parameter	Samples	Guideline
Perfluorohexanoate	259	
Perfluoro-N-Butanoic Acid (PFBA)	2	
Perfluoro-N-Decanoic Acid (PFDA)	2	
Perfluoro-N-Dodecanoic Acid (PFDOA)	2	
Perfluoro-N-Heptanoic Acid (PFHPA)	2	
Perfluoro-N-Hexanoic Acid (PFHXA)	2	
Perfluoro-N-Nonanoic Acid (PFNA)	2	
Perfluorononanesulfonate (PFNS)	520	
Perfluoro-N-Pentanoic Acid (PFPEA)	2	
Perfluoro-N-Tetradecanoic Acid (PFTEDA)	2	
Perfluoro-N-Tridecanoic Acid (PFTRDA)	2	
Perfluorooctanesulfonamide (PFOSA)	261	
Perfluoropentane Sulfonic Acid (PFPES)	261	
Perfluoropentanoate	259	
Perfluorotetradecanoate	257	
Perfluorotridecanoate	257	
Perfluoroundecanoate (PFUNA)	261	
Permethrin	156	Yes
Perthane	19	
Perylene	6322	
Perfluorooctanoic Acid (PFOA)	261	Yes
Perfluorooctanesulfonate (PFOS)	261	Yes
Ph	34	
pH (Field)	11426	Yes
pH (Lab)	14101	
Phenanthrene	8679	Yes
Phenol	1986	Yes
Phenolic Material	1302	
Phenols Total	156	
Phorate (Thimet)	756	Yes
Phosphate Dissolved Ortho	1445	
Phosphate Total Inorganic	8	
Phosphorus Dissolved	14507	Yes
Phosphorus Particulate (Calcd.)	5393	
Phosphorus Soluble Reactive	45	
Phosphorus Total	14803	Yes
Picloram (Tordon)	734	Yes
Picoxystrobin	156	
Pimaric Acid	103	
Pine-O Disinfectant	4	

Parameter	Samples	Guideline
Pipemidic Acid	3	
P-Isopropyltoluene	132	
Platinum Dissolved	5322	
Platinum Total	5104	
Potassium Dissolved	14776	Yes
Potassium Total	2073	
Praseodymium Dissolved	645	
Praseodymium Total	646	
Prometryn	19	
Propachlor	19	
Propanil	19	
Propazine	19	
Propiconazole	502	
Prothioconazole	156	
Pyraclostrobin	156	
Pyrene	8679	Yes
Pyridaben	627	
Quinclorac	627	
Quinoline	9	Yes
Quizalofop	502	
Reactive Silica	1282	
Redox Potential	5467	
Residue Filterable	3379	
Residue Nonfilterable	18250	
Residue Total	121	
Residue Volatile Filterable	13	
Retene	7692	
Rhenium Dissolved	1396	
Rhenium Total	1396	
Rubidium Dissolved	5468	
Rubidium Total	5523	
Ruthenium Disolved	386	
Ruthenium Total	387	
Salicylic Acid	3	
Salinity	942	
Samarium Dissolved	645	
Samarium Total	646	
Sample Temperature At Laboratory	418	
Sandaracopimaric Acid	108	
Saturation Index (Calcd.)	3666	

Parameter	Samples	Guideline
Scandium Dissolved	4162	
Scandium Total	4165	
Sec-Butylbenzene	132	
Selenium Dissolved	13944	Yes
Selenium Total	13799	Yes
Sigma-Benzenehexachloride	19	
Silica	4336	
Silica Dissolved	1	
Silica Reactive	1585	
Silica Reactive Filtered	64	
Silicon Dissolved	98	
Silicon Total	2778	
Silver Dissolved	13178	Yes
Silver Total	13831	Yes
Simazine	577	Yes
Sodium Adsorption Ratio (Calcd.)	5525	Yes
Sodium Dissolved/Filtered	14790	Yes
Sodium Percentage (Calcd.)	4396	
Sodium Total	2084	
Specific Conductance	1069	
Specific Conductance (Field)	10630	Yes
Specific Conductance (Lab)	13980	Yes
Stability Index (Calcd.)	3670	
Std. Plate Count 20Deg.C Bact. Dens.	48	
Std. Plate Count 35Deg.C Bact. Dens.	23	
Stearic Acid	101	
Strontium Dissolved	13223	Yes
Strontium Total	13714	Yes
Styrene	1145	Yes
Sulfamethazine	2	
Sulfamethoxazole	2	
Sulphate Dissolved	14205	Yes
Sulphide	2422	
Sulphide Dissolved	1225	
Sulphur Dissolved	1311	
Sulphur In Sulphate	134	
Sulphur Total	1304	
Sum Of Anions	636	
Sum Of Cations	636	
Tannin And Lignin Lig. Sulph.	193	

Parameter	Samples	Guideline
Tantalum Dissolved	259	
Tantalum Total	259	
Tebuconazole	156	
Tellurium Dissolved	4174	
Tellurium Total	4178	
Temperature Water	1	
Temperature Water (Field)	7082	Yes
Temperature Water (Lab)	518	
Tentatively Identified Compound(S) Pest Scan	1	
Terbacil	19	
Terbium Dissolved	645	
Terbium Total	646	
Terbufos	676	Yes
Tert-Butylbenzene	132	
Tetrachlorocatecol	122	
Tetrachloroethylene	161	Yes
Tetrachloroguaiacol	124	
Tetrachloroveratrol	122	
Tetrachlorvinphos	19	
Thallium Dissolved	13159	Yes
Thallium Total	13476	Yes
Thiamethoxam	495	
Thorium Dissolved	7877	Yes
Thorium Total	8139	Yes
Tin Dissolved	13027	
Tin Total	13338	
Titanium Dissolved	12039	Yes
Titanium Total	12330	Yes
Tolfenamic Acid	3	
Toluene	6109	Yes
Total Dissolved Solids (Calcd.)	17732	Yes
Total Petroleum Hydrocarbons (TPH)	422	
Trans-1,2-Dichloroethene	167	
Trans-1,3-Dichloropropene	157	
Trans-Nonachlor	20	
Triallate (Avadex BW)	699	Yes
Trichloroethene	2	Yes
Trichloroethylene	149	Yes
Trichlorofluoromethane	161	
Trichloromethoxybenzene (2,4,6-Trichloroanisole)	9	

Parameter	Samples	Guideline
Triclocarban (3,4,4-Trichlorocarbanilide)	3	
Triclopyr	558	
Triclosan	3	Yes
Trifloxystrobin	156	
Trifluralin (Treflan)	699	Yes
Trihalomethanes	64	Yes
Trimethoprim	3	
Triticonazole	156	
Tungsten Dissolved	5321	
Tungsten Total	5362	
Turbidity	806	
Turbidity (Field)	9022	Yes
Turbidity (Lab)	12298	
Turbidity (Visual) At Site	1888	
Uranium Dissolved	13157	Yes
Uranium Total	13527	Yes
Vanadium Dissolved	13238	Yes
Vanadium Total	14429	Yes
Vinclozolin	518	
Vinyl Chloride	161	Yes
Xylene	1046	Yes
Xylenes (O,M,P)	19	Yes
Ytterbium Dissolved	645	
Ytterbium Total	646	
Yttrium Dissolved	5321	
Yttrium Total	5362	
Zinc Dissolved	13257	Yes
Zinc Total	14569	Yes
Zirconium Dissolved	4244	
Zirconium Total	4245	
TOTAL	964	243

C.5 TEMPORAL CHANGE ASSESSMENT METHODS

C.5.1 Water Quality

C.5.1.1 Data Preparation

All parameters with a minimum of 10 years of data were initially considered for an assessment of trends (changepoints and trend tests). For locations with multiple samples taken on panel sites, the main thalweg sampling location and/or on separate instances, the fifth panel (5/10), as noted in appendix Table B3 were incorporated into the analysis.

For ECCC metal analysis, there are different approaches used for dissolved and total metals that are often conducted at the same or at different water quality sampling locations. As these methods use different digestions and can have different results on the same samples, they were separated and run as distinct metal suites in the trend assessment analysis where there was sufficient data to permit the assessment. In particular, the modified EPA 200.8 ICP-MS approach referred to as ‘Metals 45’ was initiated specifically for the Integrated Monitoring Plan for the Oil Sands in the late 2011 and run as its own metals’ suite in the trend assessment by appending 45 to the parameter names.

To be consistent with reporting in the Lower Athabasca Surface Water Quality Framework annual condition reports, data from the ATR_29 (Athabasca River – Devils Elbow site) was used as a surrogate for winter sampling at the ATR_27 (Athabasca River – Old Fort) when samples were not collected at Old Fort. This allows more comparability with reporting in the region.

Similarly to the guideline screening assessment, data prior to November 1, 2023, was used in the temporal change assessment. Sites with samples not obtained in 2022 or thereafter did not meet the criteria for inclusion as these locations do not have continuous recent sampling. Next, sites with less than 10 years of sampling history were removed from the dataset and an assessment of missing years was conducted. An assessment of missing data focused on ensuring that there were at least one sample per season (Winter, Spring/Summer and fall) with no more than 30% of the time-window missing. A minimum requirement for inclusion in the trend assessment analyses below was that every parameter required at least 10 data points in a given season at a particular station.

Three heat maps are presented below to illustrate the approach to identifying sites with appropriate data series for trend assessments. The first is all of the data for all of the sites is presented in a heatmap based on unique sample number counts for the SOE sites in a given year. Second, there is a heatmap for sites counting unique sample numbers in each month. Third there is a heatmap after the gap and missing data assessment, which includes the data that will be used in the trend assessment.

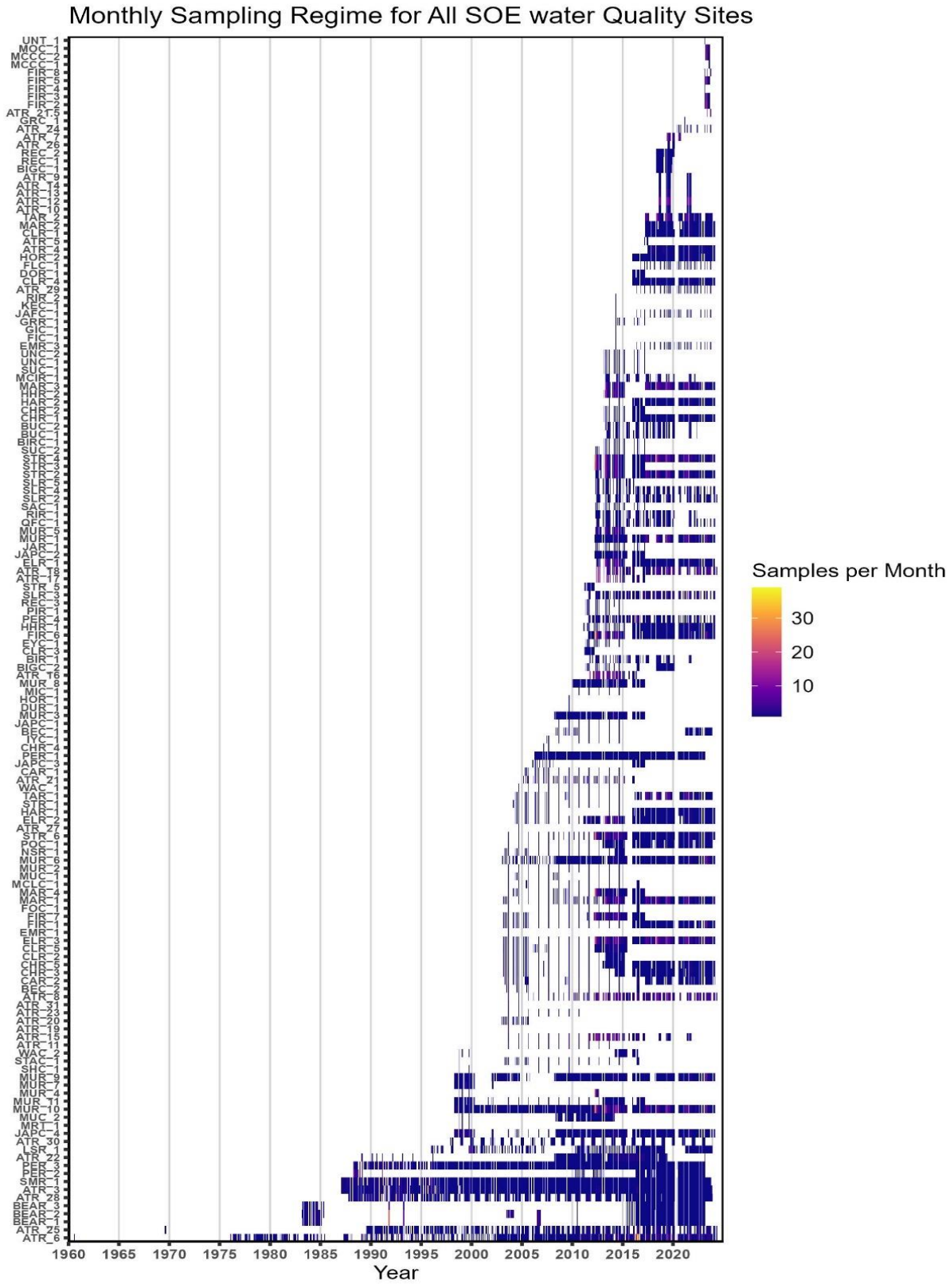

Figure C1: A heatmap of the unique monthly sample numbers for all of the SOE sites.

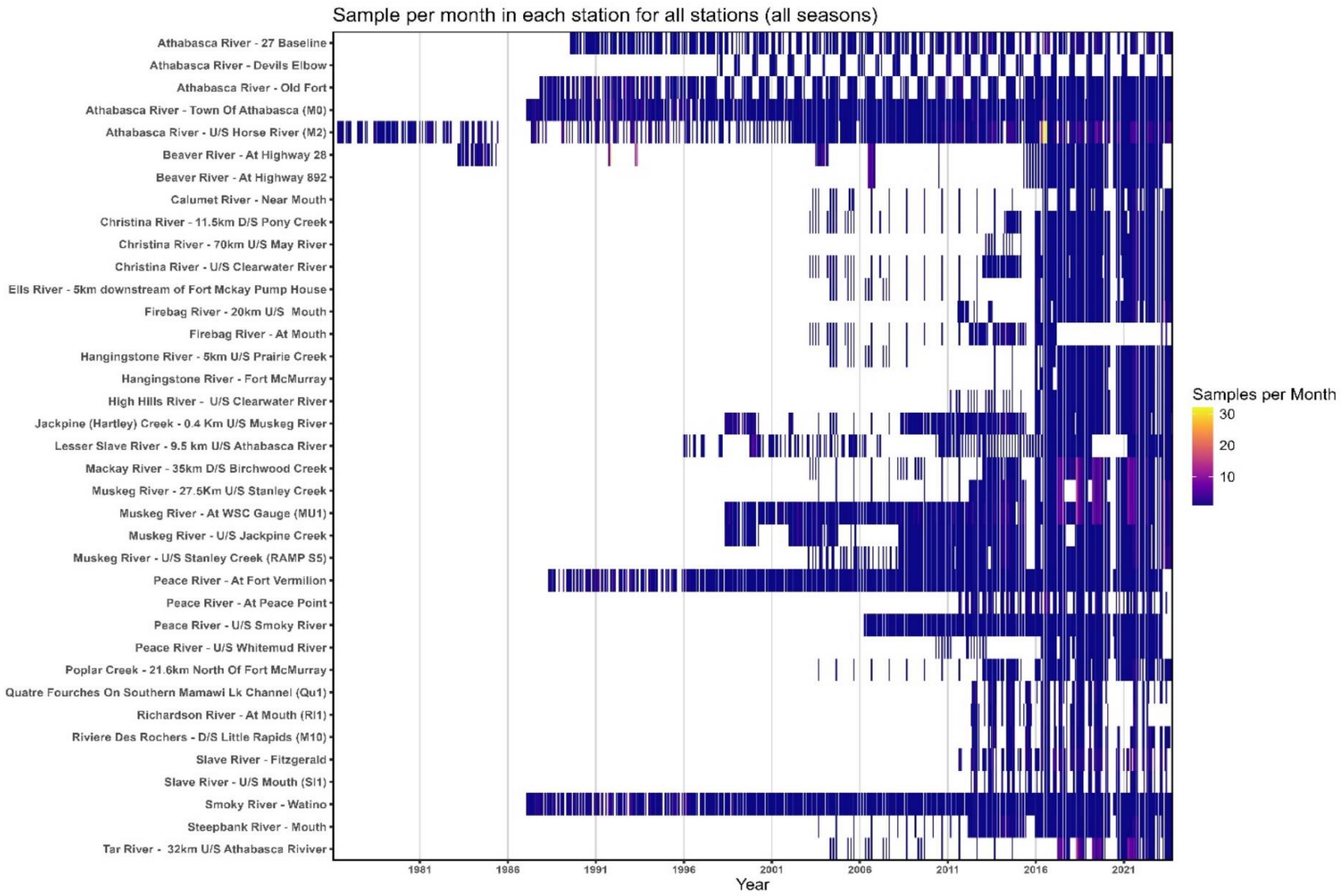

Figure C2: A heatmap of the unique monthly sample numbers for all of the SOE water quality sites after selecting sites with at least 10 years of data

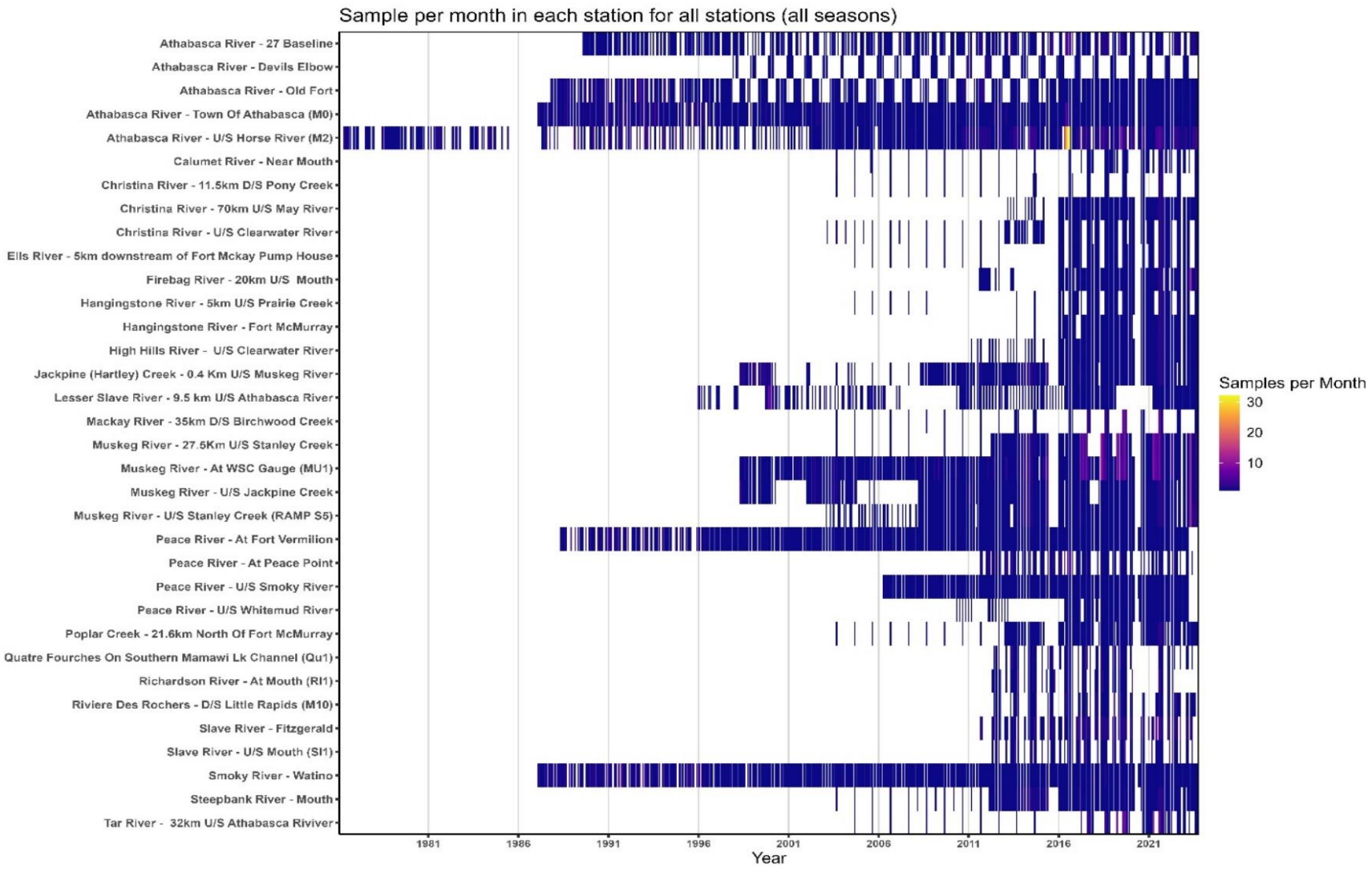

Figure C3: A heatmap of the unique monthly sample numbers for all of the SOE sites after selecting sites with at least 10 years of data after addressing gaps in the data.

C.5.1.2 Changepoint Analysis

Changepoint analysis was conducted on all of the data outlined above to determine whether or not there are significant changes in the mean or variance in a parameter over time. The change point assessment was conducted with the changepoint package in the R Programming language. The changepoint function algorithms assesses the timeseries of data to identify any dates where there has been a shift in the mean or the variance in the dataset. In the SOE changepoint assessment, a binary segmentation approach was used along with a minimum segment length reflective of their being a minimum length of two years (i.e., 730 days) for any changepoint segment in the temporal datasets.

The results from the changepoint analysis are used in multiple ways. First, the mean and variance changepoints are plotted up with the data series to investigate how the impact of sampling regimes, analysis methods and shifts in detection limits of the given parameters may drive the change points detected. Second the changepoints are plotted up with kernel density plots and compared to other potential drivers of the changepoints with respect to the sampling regime to determine how artefacts of sampling may influence the changepoints detected. Owing to the various drivers of change, including the impact of the sampling regime, the main use of the changepoint analyses in the water quality trend assessment is to help determine temporal periods to be used for specific parameters in the trend analysis below along with visual assessments of the data. For the SOE report, the approach used for the changepoint analyses was a high-level, regional assessment to determine whether or not there are any major patterns across the datasets and demonstrate how multiple factors in the data (e.g. detection limit changes, method changes, etc.) may affect the surface water quality data over time. As such, seasonality and serial autocorrelation corrections were not used to pre-process the data prior to the changepoint assessment. There are pros and cons to applying these corrections, particularly when applying corrections at a regional scale for multiple water quality parameters simultaneously, which adds to the risk of overcorrection.

C.5.1.3 Trend Assessment

There were multiple steps taken prior to running the trend tests and multiple tests run on all of the data to determine if there was a statistically significant trend in the data set. One factor that can potentially influence trend tests are detection limits. The approach taken in the SOE report with respect to detection limits aims to limit the potential of having a false positive or false negative trend result owing to changes in levels of analytical detection. For example, if there is a major increase or decrease in detection limits, the shift either down or up may result in a significant trend test result. There are two main approaches to addressing these shifts in analytical detection limits. One approach is to model the data below the limits of detection and use modelled data in the trend test. The challenge with this approach is that you can still be adding bias to the data if there have been significant shifts in the detection limit. Another approach is to substitute the maximum detection limit across the entire length of record to ensure there is one consistent detection limit utilized in the analysis. The maximum detection limit substitution approach helps limit the influence of changing analytical methods on trend results though also does require some judgement as the maximum detection limit is not always clear as there may be instances where the laboratories may run a higher detection limit on one sample due to the nature of the sample. To determine the maximum detection limit, all of the detection limits were compiled and assessed for each parameter by two scientists independently with extensive experience analyzing water quality datasets. The highest main sample detection limit was determined by identifying the maximum detection limit with at least 10 samples and at least 20% of the values below detection. Additionally, all data below the highest main sample DL was substituted with the highest main sample DL. Parameters at sites with more than 50% of censored data were omitted from this analysis and trend assessment results for sites with between 25-50% censored data should be interpreted with caution.

Seasonal variations in a dataset can influence the overall trend results. Many rivers have known seasonal patterns, where there is increased flow during specific periods (e.g., the snowmelt runoff freshet following winter). While pre-whitening can address seasonality, statistical tests like the Seasonal Mann-Kendall test are specifically designed to incorporate seasonal effects. Seasonality often leads to serial autocorrelation in time series data, which is addressed in the SOE report trend assessment by using appropriate trend tests and reporting trend results for the main seasons in addition to the entire dataset.

It is important for assessing trends to address serial autocorrelation, which is also known as serial dependence. Serial autocorrelatoin refers to the relationship between a data point and its past values in a time series (e.g., data collected over time). In time series data, past values can influence current values, and as a result, serial autocorrelation or dependence can bias trend results. If we do not assess how past values influence the current ones,

it can be mistakenly concluded that a trend either exists or does not exist. This can lead to inaccurate trend tests. Additionally, many statistical tests assume that data points are independent of one another. If serial autocorrelation/dependence is present, the testing approach may need to be adjusted. Otherwise, there is a risk of incorrectly concluding that there is no trend when one exists or detecting a trend when there is not one.

Pre-whitening is a process that can be applied to time series data to reduce or eliminate the effects of serial autocorrelation. This step helps prepare the data for trend analysis or other statistical assessments by addressing these dependencies, making the data more suitable for analyses that assume independence between data points. Typically, pre-whitening is done by fitting an autoregressive model (or similar) to the data, and then using this model to remove the autocorrelation. Once the serial dependence is removed, the data is considered “whitened” or “decorrelated,” allowing for more accurate conclusions to be drawn from trend tests and other statistical analyses.

To prepare the data and identify the most appropriate trend test pathway to follow, first the Kruskal-Wallis test (kruskal.test function in the R programming language) (Kruskal & Wallis, 1952), the censored-difference test (cendiff function) and the van Belle-Hughes heterogeneity test (van Belle & Hughes, 1984) were used to determine whether or not the data had significant seasonal variation. As such, data with distinct seasonal patterns are assessed with the Seasonal Mann Kendall (SMK) whereas trend tests without seasonality are assessed with a Mann Kendall trend test. SMK trend tests assess for monotonic trends in the parameters when the temporal data is anticipated to change in the same direction (increase or decrease) for one or more different seasons. For example, water quality may be anticipated to increase during the freshet snow melt run off and decrease in the fall and is often more appropriate for water quality parameters owing to the seasonality of flow patterns that are driven by climatic factors. The approach taken was to first assess the data with the Kruskal-Wallis test for all of the data. The van Belle-Hughes heterogeneity test is built into the SMK series of tests and used as a secondary test of heterogeneity. The cendiff test is used in place of the Kruskal-Wallis test for instances where there is censored data (e.g. data below the analytical limits of detection).

Data for parameters at the sites included in the trend analyses were also tested for serial dependence with the Breusch-Godfrey test (bgtest function in R) (Breusch, 1978 ; Godfrey, 1978). The Breusch-Godfrey test assesses whether serial correlation is present in the dataset. Essentially the Breusch-Godfrey test is used to assess the data for autocorrelation because positive autocorrelation may bias the results to false positives and negative correlation may bias the result to false negatives. Accordingly, the Breusch-Godfrey test identifies time-series for parameters at a given site that are significantly correlated. Parameters that do have significant autocorrelation are pre-whitened whereby the autocorrelation signal is removed from the data prior to running the trend test. For the SOE report the Zhang method was used for pre-whitening with the zyp.trend.vector function in R.

Overall, these assessments were used to determine whether a SMK with or without continuity correction, or a Mann-Kendall (MK) test with or without pre-whitening was used for the trend analysis at each site. Where non-seasonal data was not serially dependent, trends were assessed with a MK test. For non-seasonal data that was serially dependent, the data was pre-whitened before running the MK test. Where seasonality was evident, with or without serial dependency, a SMK test was conducted with or without a continuity correction respectively.

Seasonal trend tests were conducted to investigate whether there were significant differences in the individual seasons. Where significant differences were evident, all the trend assumption and trend tests were conducted on the winter, spring/summer, and fall seasons, with monthly data used as the seasonal input in the analyses. Flow-weighted trend assessments were run for sites with a paired hydrometric station, where the parameters were weighted by flow prior to running the same series of trend analyses. Trends were assessed for both the entire record length at sites with more than 10 years of consistent data using the Seasonal Kendall permutation test on censored data to incorporate data that is below the limits of detection. The MK and SMK tests were run with the cenken and censeaken functions from the NADA package.

A significance level of 0.1 was adopted for all the trend tests. Power analyses for parameters included in the trend assessment was conducted with a 0.1 significance level and run with the pwr.r.test function in the R programming language. Parameters with significant trends with a power below 0.8 were flagged as being low power with no trend direction reported in the results. The percent change per year (% yr^{-1}) was calculated by dividing the site’s slope, as determined by the appropriate trend test, by the site’s median parameter concentration over the study period. The most appropriate trend test based on the data was reported on in the results.

C.5.1.3 Loads and Yields

Annual loads and yields were calculated at select monitoring locations where sufficient data was available. Daily total suspended sediment (TSS) and total dissolved solids (TDS) loads were estimated by the equation:

$$L = \int_0^{t_1} Q \cdot C dt$$

where Q is the measured daily streamflow (m^3/s), C is the TSS concentration (mg/L), and L is the suspended sediment load (mg) over time interval t_1. River flow is measured daily at gauge stations. Discrete water quality samples for TSS were collected by the regional surface water quality monitoring program at monthly frequency during the winter and more frequently during the open-water season.

There is a positive relationship between discharge and TSS concentrations across all stations. Using this relationship, a site-specific sediments rating curve was developed for individual water quality parameters, which defines an empirical relationship between TSS and streamflow discharge. Typically, it is a power function, where the streamflow (Q) is the independent variable and TSS (C) is the dependent variable (Phillips 1999).

$$C = aQ^b$$

Herein, a and b are the constant and exponent of the rating relationship. This relationship is applied to the daily streamflow record in order to generate a matching concentration time-series, which in turn can be combined with the streamflow time series to estimate daily suspended sediment loads at individual WQ monitoring stations. Nonlinear least square (NLS) curve fitting algorithm within the R Statistics (R Development Core Team, 2016) are used for C-Q power curve rating.

A Monte Carlo simulation approach was used to assess the overall uncertainty of daily loading estimations considering uncertainties in water chemistry analysis and error propagation through rating curve regression (Rode and Suhr 2007; Yanai et al., 2015). Uncertainties associate with field instruments, sampling locations, and sampling frequency are not incorporated in this uncertainty evaluations. The Monte Carlo approach involves performing the load estimations thousands of times, each time selecting the input variables from statistical distributions representing their uncertainty. The collective results of thousands load estimations provide a measure of the uncertainty in load calculation (Guo et al., 2002; Navratil et al., 2011). In this report, Monte Carlo simulations were performed in R (Development Core Team, 2016) by using the propagate package. 2000 replications were found to be a good compromise between the resulting stability and the computation time, and 95% confidence intervals (95CI) for daily loads were developed using the 2.5 and 97.5 percentile of Monte-Carlo simulations.

C.5.2 Water Quantity

C.5.2.1 Data Preparation

All parameters with a minimum of 10 years of flow data were initially considered for an assessment of trends (changepoints and trend tests). Data was initially filtered to select water quantity data between November 1, 1950 and October 31, 2023. The initial date of 1950 was selected as there was limited consistent regularly sampled water quantity data in the dataset prior to 1950. Five sites that ended prior to 2020 were removed from the dataset as these sites are no longer operational (05EE02, 07FD908, 07HA914, 07HC907 and 07HD001). Next, data with 2 or more missing years were identified and assessed. For the sites with instances of 20 or more years of missing data (e.g., 07CE005, 07BK001, 07DD001, 07HF001, 07DA007, 07DB003, 07DB002), data prior to the large gap were removed from the dataset. Thereafter stations were selected that had at least 10 years of consistent monitoring with no more than a 2 year data gap for the trend assessment.

The trend assessment was conducted similarly to the water quality trends outlined above with the exception that there is no censored data for the water quantity data so there were no tests included to incorporate the censored data such as the cen-diff test or the censeaken function in R that handles censored data when running the SMK tests. The remainder of the approach to running trends and changepoints is similar to the approach outlined above for water quality.

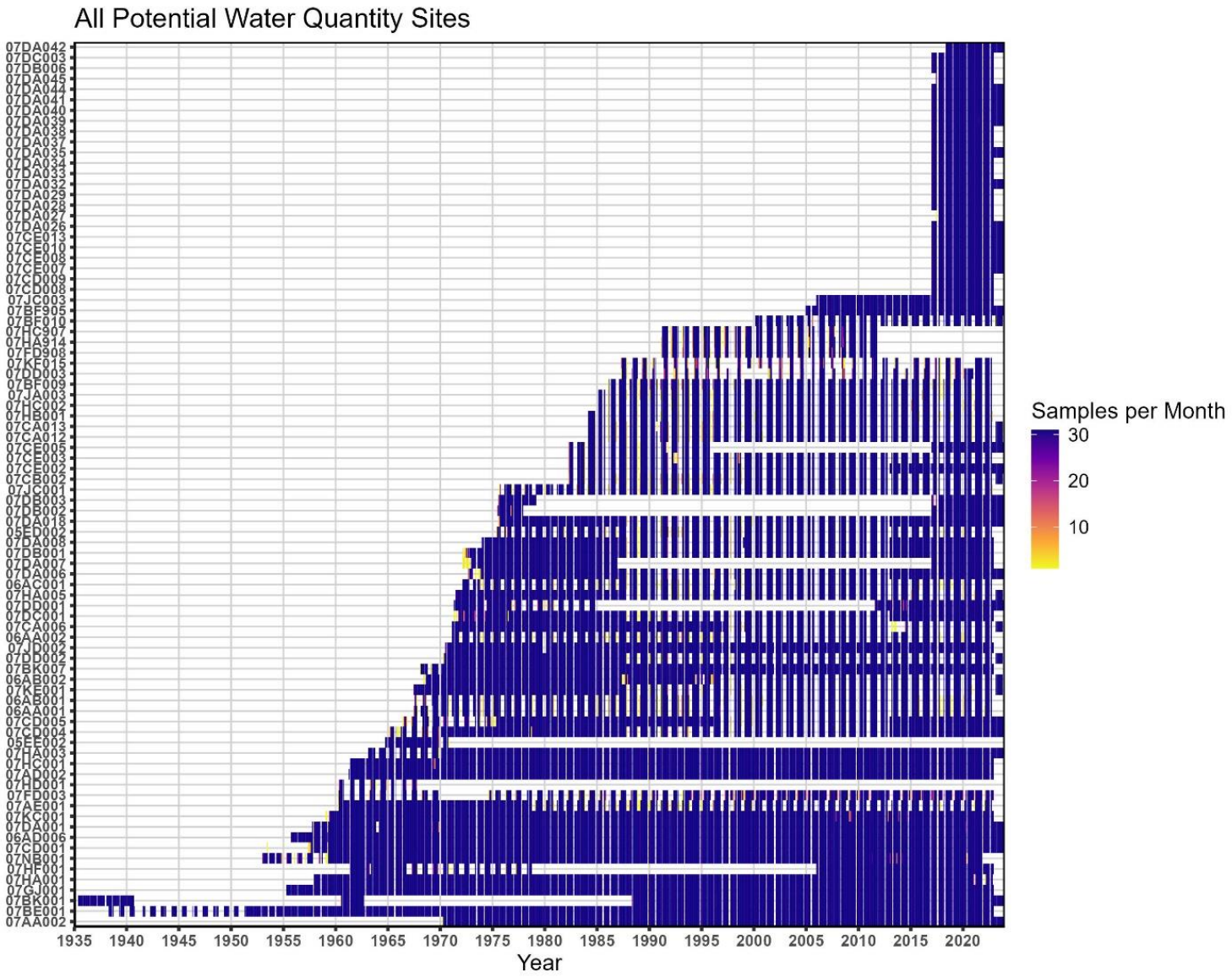

Figure C4: A heatmap of the unique monthly sample numbers for all of the SOE water quantity.

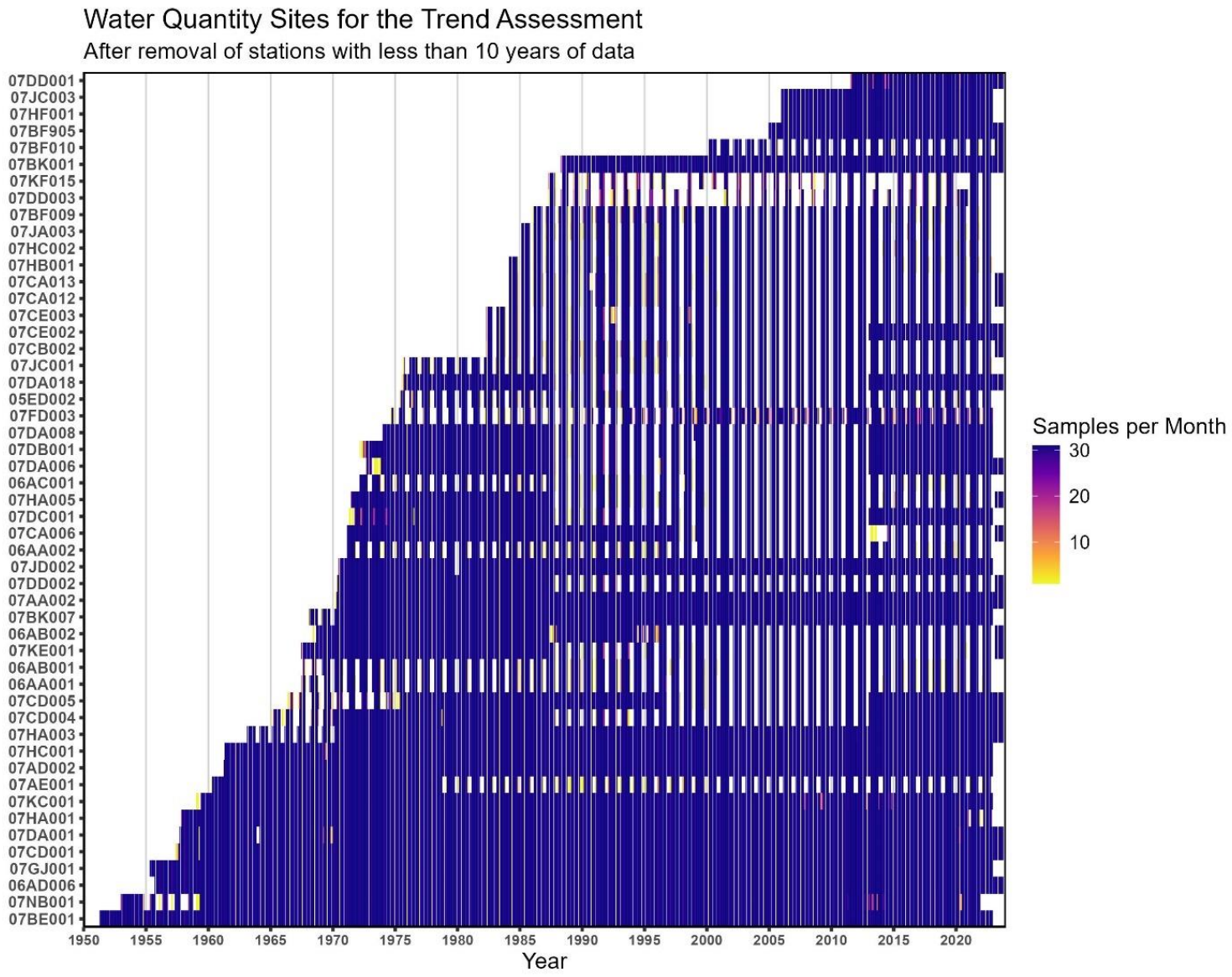

Figure C5: A heatmap of the unique monthly sample numbers for all of the SOE water quantity sites used in the trend test.

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