

Report

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Hydrochemical monitoring of near surface groundwater, surface waters and precipitation

Results from the sampling period January – December 2019

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Summary

This report presents the hydrochemical monitoring of near surface groundwater, surface waters and precipitation in Forsmark during the sampling period January to December 2019.

Near surface groundwater was sampled and analysed four times during this period. The samples were collected from shallow soil monitoring wells.

The streams and one of the sea sampling locations (Biotestsjön) were sampled at eleven occasions (once per month, except for July). At these occasions measurements were also conducted at Norra bassängen (PFM000097). The remaining lakes and the sea sampling location PFM000062 were sampled at four occasions (once per season) during the reported time period. The sea sampling locations PFM007910, PFM007911, PFM007912, PFM000083, PFM000084 and PFM007783 were sampled at six occasions (April, May, June, August, September and October). Site PFM007783 was also sampled in January.

The precipitation sampling locations PFM002564 (during winter) and PFM008126 (rest of 2019) were sampled weekly and analysed as collective monthly samples in a total of ten collective samples.

The results from the near surface groundwater and surface water monitoring include field measurements of redox potential (ORP), pH, dissolved oxygen, electrical conductivity and water temperature, as well as chemical analyses of major constituents, nutrient salts, trace metals and isotopes. For surface waters, the field measurements also include depth and turbidity. Precipitation results include field measurements of pH, electrical conductivity and water temperature, as well as chemical analyses of major constituents, nutrient salts, trace metals and isotopes.

Generally, the new data confirm the knowledge and conclusions from the earlier investigation periods. Surface waters in the lakes and streams in the Forsmark area are well buffered with high alkalinity, high pH and high calcium concentrations. The proportions of the major ions in the sampled freshwaters and the shallow sea bay were similar to previous years, showing no major changes. Also, the concentrations of total nitrogen and total phosphorus were similar to previous years. In previous years, occasions of slightly elevated concentration of Na^+ and Cl^- have indicated salt water inflow into Bolundsfjärden. No elevated concentrations of these ions were measured in 2019. Previous data also indicates periodic tritium contamination from the adjacent nuclear power plant in water samples from near the cooling water outlet. In 2019, elevated tritium concentration was measured in March.

Sammanfattning

Rapporten dokumenterar den hydrokemiska övervakningen av ytnära grundvatten, ytvatten och nederbörd i Forsmarksområdet under provtagningsperioden januari till december 2019.

Provtagning och analyser av ytnära grundvatten utfördes vid fyra tillfällen under 2019. Vid dessa tillfällen provtogs vatten från sju jordborrhål.

Ytvatten provtogs en gång per månad (utom i juli) i fyra bäckar och i utloppet av Biotestsjön samt fyra gånger per år (en gång per årstid) i sjöar och havspunkten PFM000062. Vid dessa tillfällen gjordes även sondmätningar i Norra bassängen. De återstående sjöarna och havspunkten PFM000062 provtogs vid fyra tillfällen, en gång per årstid under året. Havspunkterna PFM000083, PFM000084 och PFM007783, PFM007910, PFM007911, PFM007912 provtogs vid sex tillfällen (april, maj, juni, augusti, september och oktober). Havspunkten PFM007783 provtogs även i januari.

Nederbörd provtogs veckovis vid provtagningspunkt PFM002564 för uppsamling av nederbörd under vintern och provtagningspunkt PFM008126 för resten av året, och analyserades månadsvis som samlingsprov motsvarande en månads nederbörd. Totalt analyserades tio samlingsprov.

De erhållna resultaten från ytnära grundvatten och ytvatten omfattar fältmätningar av ORP (redoxpotential), pH, löst syre, elektrisk konduktivitet och vattentemperatur samt kemiska analyser av huvudkomponenter, närsalter, kolföreningar, spårelement och isotoper. För ytvatten mäts även djup och turbiditet. De erhållna resultaten från nederbördprovtagning omfattar fältmätningar av pH, elektrisk konduktivitet och vattentemperatur samt kemiska analyser av huvudkomponenter, närsalter, spårelement och isotoper.

Årets data bekräftar generellt slutsatser från tidigare undersökningsperioder. Ytvattnet i sjöar och bäckar i Forsmarksområdet är väl buffrade med hög alkalinitet, högt pH och höga kalciumkoncentrationer. Koncentrationen av de vanligaste jonerna i de provtagna sötvattnen och havet liknade föregående år. Något förhöjda koncentrationer av natrium- och kloridjoner har tidigare år indikerat saltvattensinflöde i Bolundsfjärden. Förhöjda koncentrationer av dessa joner uppmättes inte år 2019. Förhöjda halter av tritium uppmättes i provet nära kylvattenutsläppet från kärnkraftverket (Biotestsjön) vid provtagningen i mars.

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1 Introduction

The site investigations in Forsmark were finished in June 2007 (SKB 2001, 2005) and a less intensive phase commenced when a prolonged monitoring programme was established (SKB 2007). This document reports the performance and results for hydrochemical monitoring of near surface groundwater, surface waters and precipitation during the period January to December 2019. The monitoring has been ongoing, in one form or another, since 2001 and is today governed by the monitoring programme (SKB 2007).



Figure 1-1. Sampling at groundwater pipe SFM0001 in January 2019.

The sampling objects for near surface groundwater in soil include shallow monitoring wells. The different sampling objects are presented in Table 2-1 and a map showing their location is presented in Figure 2-1. The surface water sampling sites include lakes, streams and the sea in the Forsmark area. The sampling locations are presented in Figure 2-1 and Table 3-1. The precipitation sampling site include two locations, Figure 4-1 shows the locations of precipitation samples in Forsmark study area during winter and summer 2019.

The monitoring activities include sampling and chemical analyses as well as field measurements. The controlling documents for the activities are listed in Table 1-1. The activity plans and method descriptions are SKB:s internal controlling documents. Original data from the reported activities are stored in the primary database Sicada. Data are traceable in Sicada by the activity plan numbers (AP SFK-19-002 and AP SFK-19-003). Only data in the database are accepted for further interpretation and modelling. The results presented in this report are regarded as copies of the original data. Data in the database may be revised, if needed. However, such revision of the database will not necessarily result in a revision of this report.

Table 1-1. Controlling documents for performance of the activity.

Activity plans	Number	Version
Hydrokemisk övervakning av ytvatten, ytnära grundvatten och gölar 2019.	AP SFK-19-002	1.0
Hydrokemisk övervakning av nederbörd 2019.	AP SFK-19-003	1.0
Method descriptions	Number	Version
Metodbeskrivning för ytvattenprovtagningar vid platsundersökningar.	SKB MB 900.004	2.0
Metodbeskrivning för provtagning och analys av nederbörd.	SKB MD 423.003	3.0
Provtagning och Provhantering.	SKB MD 452.001	11.0

2 Near surface groundwater

2.1 Objectives and scope

An extensive, two-year-long sampling campaign designed to characterise near surface groundwater in different types of environments within the candidate area (SKB 2001) was followed by a reduced monitoring programme in July 2005 (SKB 2005). The site investigation of the candidate area was concluded in June 2007, but the monitoring programme (SKB 2007) will continue until the construction of the repository for spent nuclear fuel starts and during the construction and operation phase. This in order to monitor the water composition and obtain long time-series of data, first to create a baseline describing the natural variations and second to follow changes caused by the construction and operation of the repository.

During the reported period, January–December 2019, the sampling locations (stand pipes) within the monitoring programme were sampled at four occasions, in January, April, August and October. The sampling was conducted from shallow soil monitoring wells. The different sampling objects are presented in Table 2-1 and a map showing their location is presented in Figure 2-1.

The activity includes water sampling for chemical analysis as well as direct measurements in the field of parameters such as ORP (redox potential), pH, dissolved oxygen, electrical conductivity (EC) and water temperature. The analytical protocol includes major constituents, nutrient salts, silica, carbon species as well as isotopes and trace metals, see Tables 2-2 and 2-3.

2.2 Sampling objects

The monitoring programme for near surface groundwater includes stand pipes. The wells/pipes are of the following types:

1. Single stand pipes made of HDPE (High Density Polyethylene) located close to drill sites.
2. Double and single stand pipes made of HDPE. Double pipes mean that one of the pipes is equipped with a permanently installed sensor for logging the groundwater pressure and the other pipe is intended for hydrochemical sampling.

For both pipe types the positions of the filter/screen part correspond to the upper and lower section limits (Secup and Seclow) in the Sicada database. The section limits refer to the top of the stand pipe (Top Of Casing/TOC).

The sampled monitoring wells and their stand pipe types are listed in Table 2-1. The locations of the different sampling objects are displayed in Figure 2-1.

Table 2-1. List of sampling objects within the monitoring programme of near surface waters in Forsmark 2019.

Idcode	Comments on sampled object	Pipe type
SFM0001	Stand pipe connected to drill site	Plastic
SFM0002	Double-pipe for chemistry	Plastic
SFM0011	Double-pipe for chemistry	Plastic
SFM0032	Double-pipe for chemistry	Plastic
SFM0037	Double-pipe for chemistry	Plastic
SFM0049	Double-pipe for chemistry	Plastic
SFM0057	Double-pipe for chemistry	Plastic

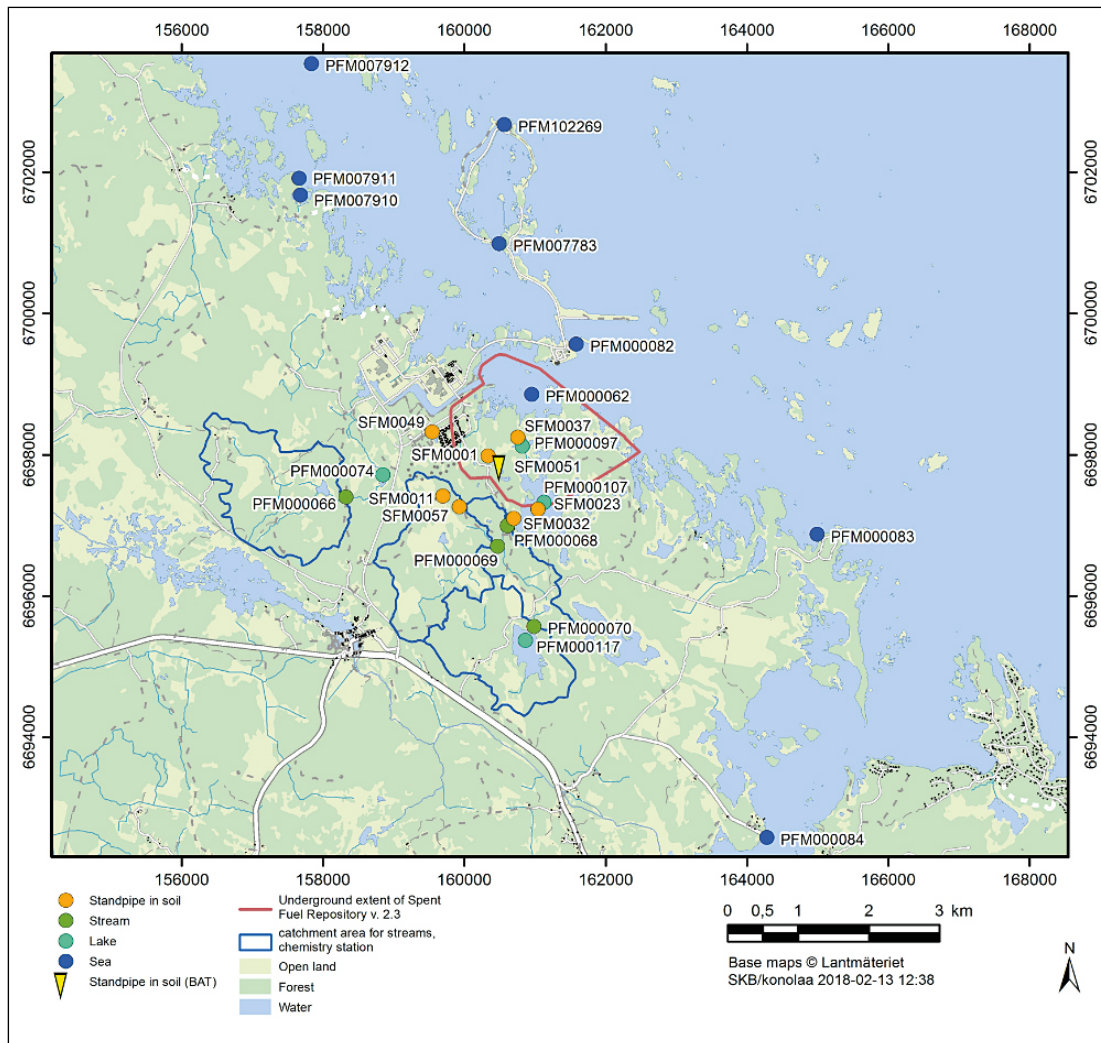


Figure 2-1. Sampling locations within the monitoring programme for surface and near surface waters in Forsmark during 2019, PFM005864 is not included in this figure but is situated in lake Bruksdammen. One location (PFM000082) constitutes an alternative for a regular sampling position (see Table 3-1).

2.3 Equipment

2.3.1 Sampling equipment

Groundwater samples from the shallow monitoring stand pipes in soil were collected using pump setups, each one consisting of a submersible electrical pump (12 V, Awimex) connected to a 5–10 m long polyamide-tube (Tecalan) of 8 mm diameter. Manually operated electrical regulators were used to adjust the water flow to a maximum of 0.5 litre/minute. Disposable filters (0.45 µm, Ø = 22 mm) were used for filtration of some sample portions. The filters were fitted to 60 ml syringes.

2.3.2 Multi-parameter sondes

Field measurements were conducted with a multi-parameter sonde, InSitu Troll9500. A hand-held PC/terminal is connected to the sonde through a cable for logging and initial field control of data.

The measured parameters in near surface groundwater included pH, water temperature, oxygen, ORP (redox potential) as well as electrical conductivity. Measurements were conducted in a flow-through cell, Figure 2-2.

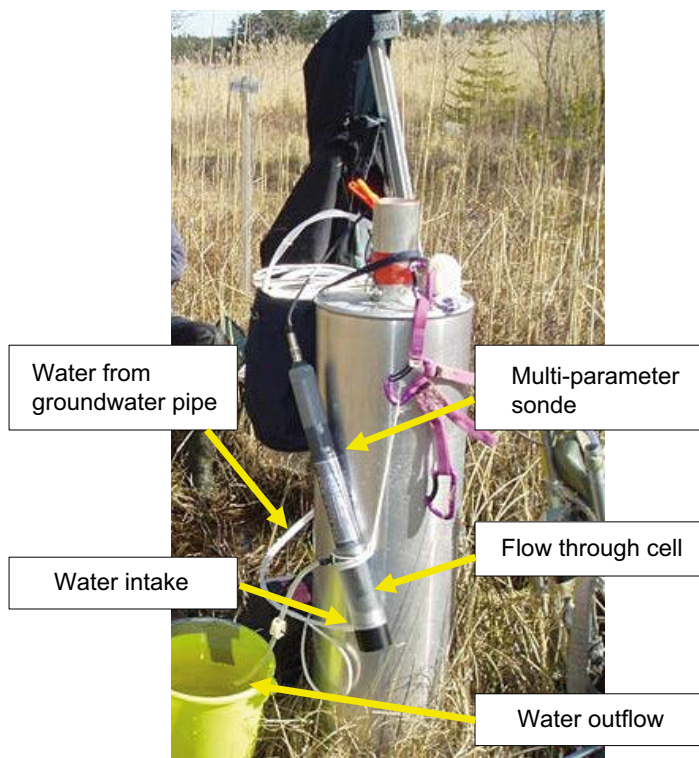


Figure 2-2. The multi-parameter sonde setup.

2.4 Performance

2.4.1 Sampling programme

Sampling schedule

The sampling schedule for the sampling programme is given in Table 2-2. Bottles were filled and the analyses performed according to the SKB chemical class III and additions d, e as summarised in Table 2-3.

Presampling preparations

Prior to the sampling campaigns, sample bottles were labelled and packed in insulated boxes/bags. Acid additions were made in advance to bottles intended for trace metal and iron analyses as well as acidified archive samples. Bottles with nitric acid added were put in a separate plastic bag and kept outside the box away from the other sample bottles in order to avoid contamination. The pump setups were washed and rinsed with deionised water before use and all parts of equipment were kept well protected in plastic bags or in tight containers. Calibration of the sonde was performed according to the measurement system description (the operator's manual).

Table 2-2. Sampling schedule January–December 2019.

Year	Month	Week	Sampling objects	Sampling and analysis class
2019	January	3	Shallow monitoring wells	SKB class III, d, e
2019	April	17	Shallow monitoring wells	SKB class III, d, e
2019	August	33	Shallow monitoring wells	SKB class III, d, e
2019	October	42	Shallow monitoring wells	SKB class III, d, e

Sampling and measurements

The groundwater sampling procedure described below was generally applied in the groundwater pipes and wells. First, the groundwater level in the pipe was established by sounding and the water volume of the pipe was calculated. The pump with its connected tube was lowered carefully in order to prevent dirt from entering the pipe. The water inlet of the submersible pump was lowered to the filter/screen section of the pipe or just above. Pumping was then performed at a maximum flow rate of 0.5 litre per minute. The pumped water was disposed of at least 10 m away from the sampling object where it filtrated back into the ground. The pumping phases were as follows:

- *Exchange of water volume in pipe and tubes:* The water volume was exchanged three to five times (depending on the exchange/recovery time) prior to the actual sampling.
- *Field measurement:* A flow-through cell was connected to the pump setup and measurements were performed with the multi parameter sonde. The results were recorded when the electrodes and sensors in the flow-through cell showed stable values (minimum 10 minutes). A judgement of the plausibility of the values was made in the field and accepted values were noted in the field protocol and logged on the hand-held PC/terminal.
- *Sampling:* All sample bottles, except the ones with added acid, were rinsed three times with sample water before they were filled. Disposable filters were used for filtration of water portions for major components, trace metals, Fe, nutrients and DOC/DIC. Each filter was rinsed with sample water (approximately 20 mL) before the sample portion/filtrate was collected. Bottles containing acid were the last ones to be filled in order to prevent acid contamination in the other sample portions. Disposable plastic gloves were used during the sampling. The samples were transported back from the field in insulated boxes/bags.

Table 2-3. Sample portions and preparation procedures for class III d, e.

Components	Preparation
Br, I	-
Deuterium ² H, ¹⁸ O	-
Anions (Br, SO ₄ , Cl, F), Alkalinity, pH, Electric conductivity	-
Tritium, ³ H	-
Tot-N, Tot-P	-
TOC	-
Archive samples	-
Ammonia, NOx, Silicate, Phosphate	Filtering with syringe/0.4 µm filter
DOC, DIC	Filtering with syringe/0.4 µm filter
Major constituents; cations ^{1a} and S, Si. Environmental metals ^{1b} , trace metals ^{1c}	Acid addition (1 mL conc. HNO ₃) Filtering with syringe/0.4 µm filter
Archive samples	Acid addition (1 mL conc. HNO ₃) Filtering with syringe/0.4 µm filter
Fe(II)/Fetot	Acid addition (2.5 mL conc. HCl) Filtering with syringe/0.4 µm filter
HS*	0.5 ml ZnAc + 0.5 ml NaOH and mix

1a. Na, K, Ca, Mg, Si, Fe, Mn, Li, Sr.

1b. Ag, Al, As, B, Ba, Cd, Cr, Cu, Co, Hg, Nb, Ni, Mo, Pb, Pd, Se, Sn, V, Zn.

1c. U, Rb, Sb, Zr, Cs and Nd.

2.4.2 Sample handling and analyses

Table 2-4 lists the collected samples during the reported period. Measurements/analyses of pH_(lab), electrical conductivity_(lab) and alkalinity as well as spectrophotometric analyses of total iron and ferrous iron (Fe+II) were conducted immediately at the site laboratory. An overview of sample treatments and analytical routines for major constituents, minor anions, trace metals and isotopes are given in Appendix 1. The routines are applicable independent of sampling method or type of sampling object.

Table 2-4. List of collected samples in soil wells during the period January to December 2019 (X = collected sample).

Idcode	Week/ Year				Sum (X)
	3/19	17/19	33/19	42/19	
SFM 0001	X	X	X	X	4
SFM 0002	X	X	X	X	4
SFM 0011	X	X	X	X	4
SFM 0032	X	X	X	X	4
SFM 0037	X	X	X	X	4
SFM 0049	X	X	X	X	4
SFM 0057	X	X	X	X	4
Sum (X)	7	7	7	7	28

2.4.3 Nonconformities

The sampling of near surface groundwater in 2019 was performed with only minor comments. During the sampling in October (week 42) sonde measurement could not be conducted in three of the pipes (SFM0032, SFM0049 och SFM0057) due to sonde terminal malfunction.

2.5 Results

2.5.1 Field measurements

The pH, electrical conductivity, dissolved oxygen, oxygen saturation, water temperature and redox potential (ORP) results from the field measurements are presented in Appendix 2.

pH-measurement

Field measurements of pH are plotted against the corresponding laboratory values in Figure 2-3. The data show good agreement between field and laboratory measurements although some deviation is expected due to different water temperatures and the time delay between field and laboratory measurements.

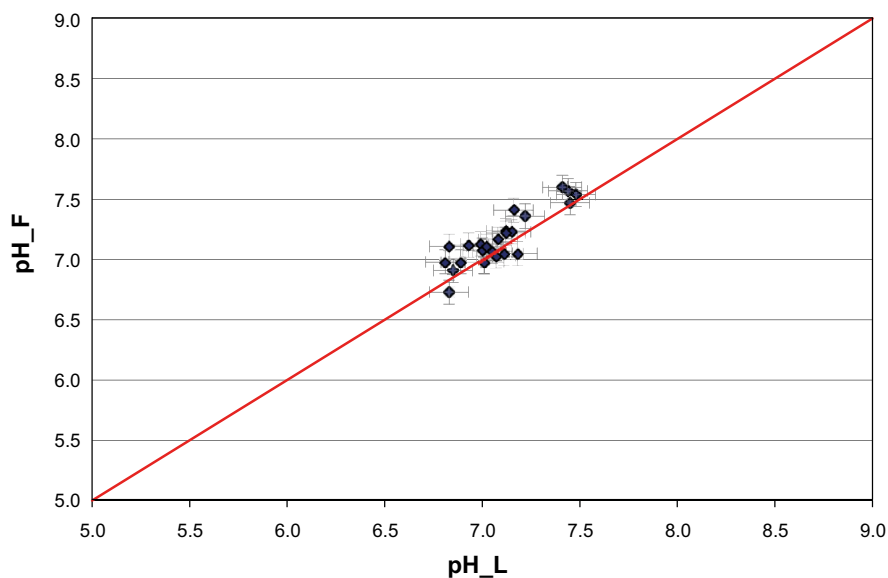


Figure 2-3. Field-pH (pH_F) values versus laboratory-pH (pH_L) values. Field-pH and laboratory-pH values are measured at prevailing water temperature and at 25 °C respectively. The measurement uncertainty (Appendix 1) is shown as error bars.

Electrical conductivity

Electrical conductivity values from the field are plotted versus corresponding laboratory values in Figure 2-4. The values generally show good agreement between field and laboratory measurements.

Dissolved oxygen

The field measurements of dissolved oxygen were checked in April 2005 by comparison to results from laboratory analyses (Nilsson and Borgiel 2005). This control showed that, generally, the field measurement values were somewhat higher, especially at oxygen concentrations below 4 mg/L. Field measurements of dissolved oxygen are presented in Appendix 2.

ORP-measurements and redox conditions

ORP-measurements (Oxidation Reduction Potential) have been conducted using the multipurpose measurement sonde. The recorded ORP-values should be used with great caution and merely considered as an indication of the redox conditions in the waters. Measured ORP-values are presented in Appendix 2.

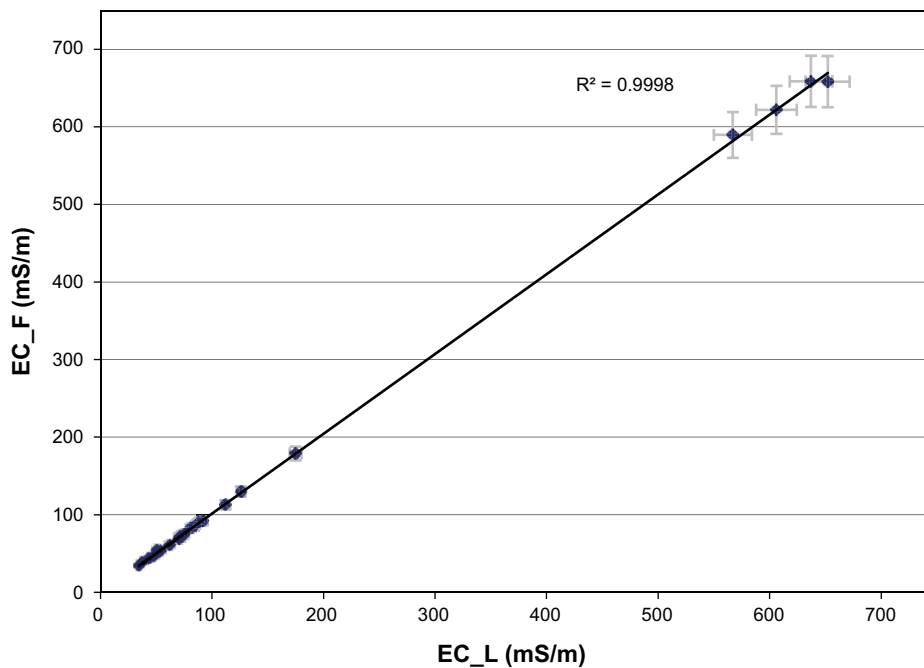


Figure 2-4. Electrical conductivity (25 °C). Field measurements (*EC_F*) versus laboratory values (*EC_L*). The measurement uncertainty (Appendix 1) is shown as error bars.

2.5.2 Water analyses

Basic components

The basic water analyses include the major constituents Na, K, Ca, Mg, Sr, S, SO_4^{2-} , Cl^- , Si and HCO_3^- as well as the minor constituents Fe, Li, Mn, Br, F and I. Furthermore, batch measurements of pH and electrical conductivity are included. The basic water analysis data are compiled in Appendix 2. The charge balance error provides an indication of the quality and uncertainty of the analyses of major constituents and the charge balance error was calculated for all samples according to the formula below.

$$\text{rel.error}(\%) = 100 \times \frac{\sum \text{cation}(\text{equivalents}) - \sum \text{anions}(\text{equivalents})}{\sum \text{cation}(\text{equivalents}) + \sum \text{anion}(\text{equivalents})}$$

Relative errors within 5 % are considered acceptable. All samples collected in 2019 showed acceptable errors (less than/within $\pm 5\%$) except three samples (SFM0001, SFM0032 and SFM0037) that were all collected the same date 2019-08-31.

Differences in flow rate may result in different water characteristics in the duplicate samples which may result in a large charge balance error. Duplicate analyses by a second laboratory or another method are conducted regularly for some of the analysed constituents as a further check of the reliability of the analyses.

Surface water supplements

Shallow groundwater analysis includes the surface water supplements/options $\text{NH}_4\text{-N}$, $\text{NO}_2\text{-N}$, $\text{NO}_3\text{-N} + \text{NO}_2\text{-N}$, $\text{NO}_3\text{-N}$, tot-N, tot-P, $\text{PO}_4\text{-P}$, $\text{SiO}_2\text{-Si}$, TOC, DOC and DIC. The analytical data are compiled in Appendix 2.

The concentrations of the different nitrogen, phosphorous and carbon compounds may show seasonal variation depending on decomposition processes and varying redox conditions also in shallow groundwater, however, this variation is more pronounced in surface waters. The graphs in Figure 2-6 show the variations of total nitrogen, ammonium and phosphate in the sampled groundwater from the soil-pipes included in the long-term monitoring programme. The results from 2019 show concentrations within reasonable variations (compared to previous measurements) for each sampling location. Of the newer pipes (SFM0002, SFM0011 and SFM0057), SFM0011 stands out with overall higher ammonium concentrations.



Figure 2-5. Winter sampling of near surface groundwater at the sampling well SFM0002.

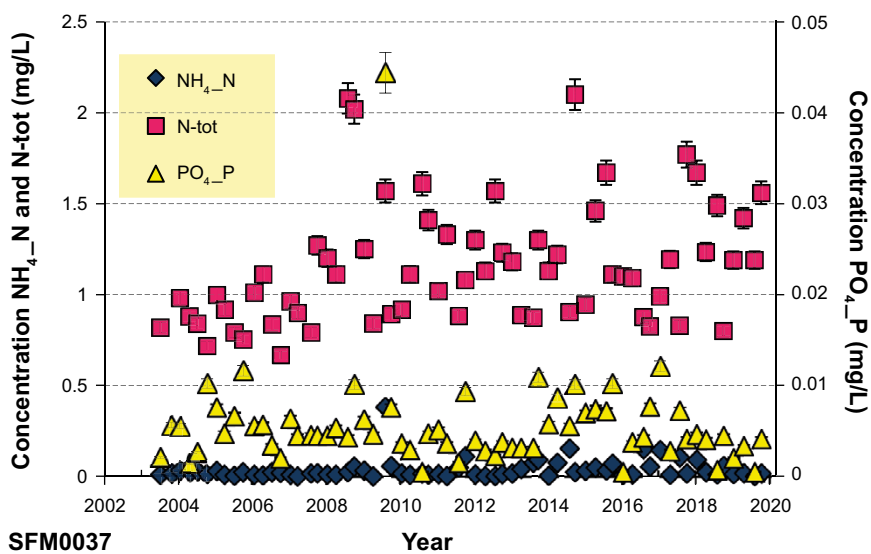
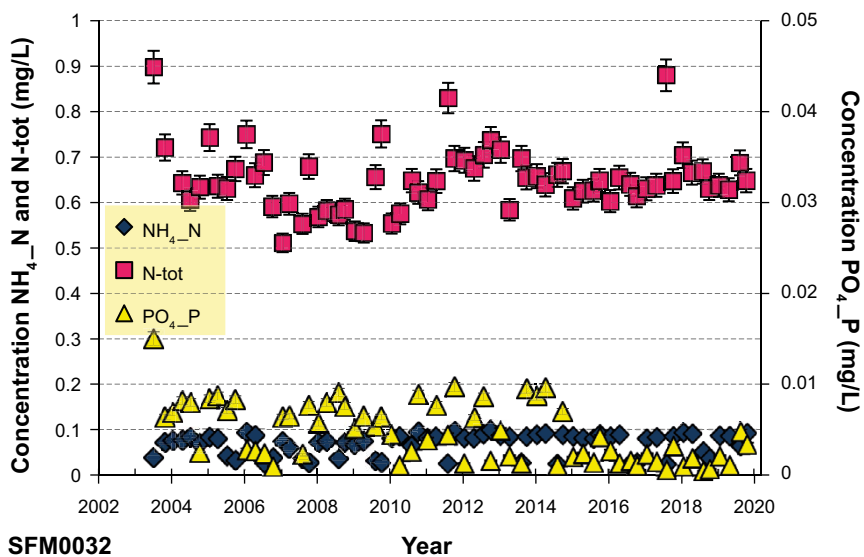
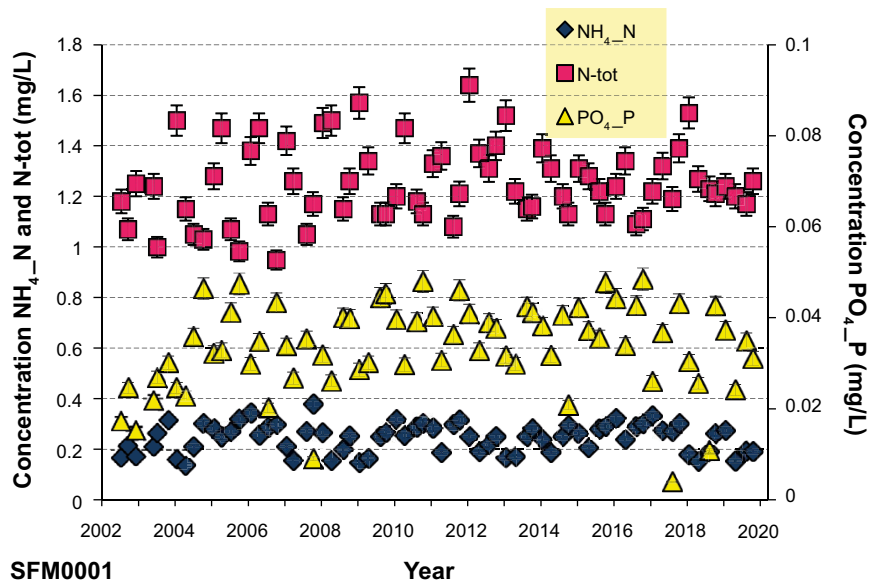


Figure 2-6. Ammonium, total nitrogen and phosphate concentrations plotted versus sampling date for the sampling wells SFM0001, SFM0032 and SFM0037.

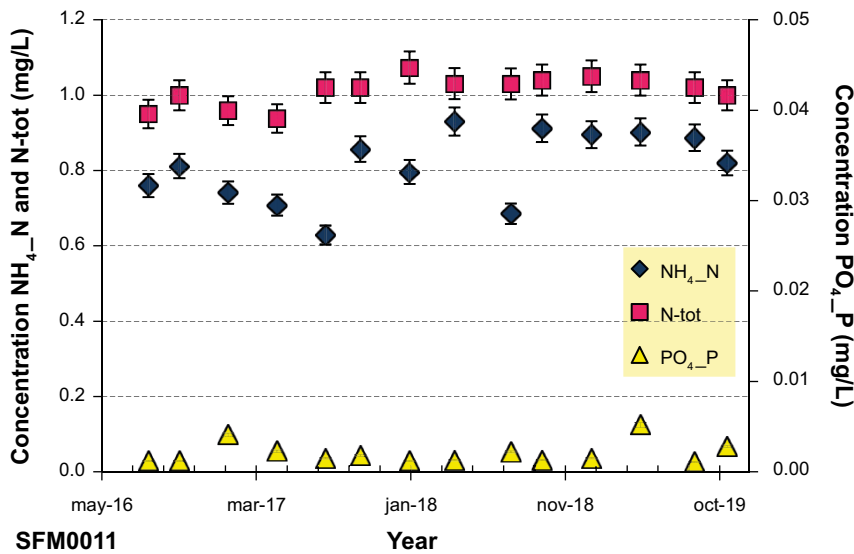
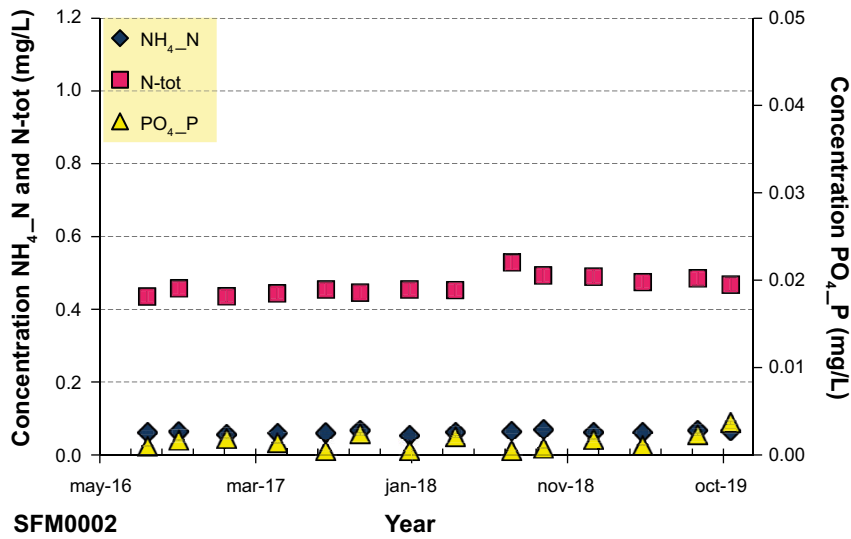
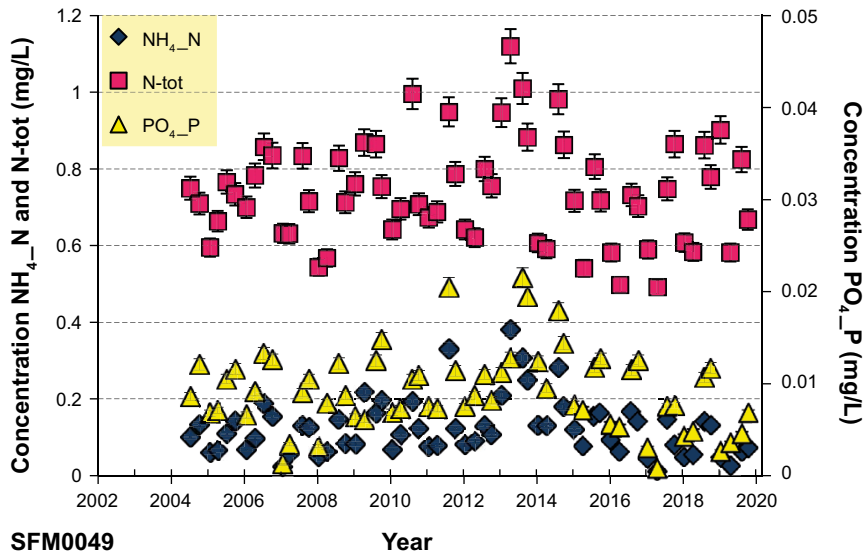
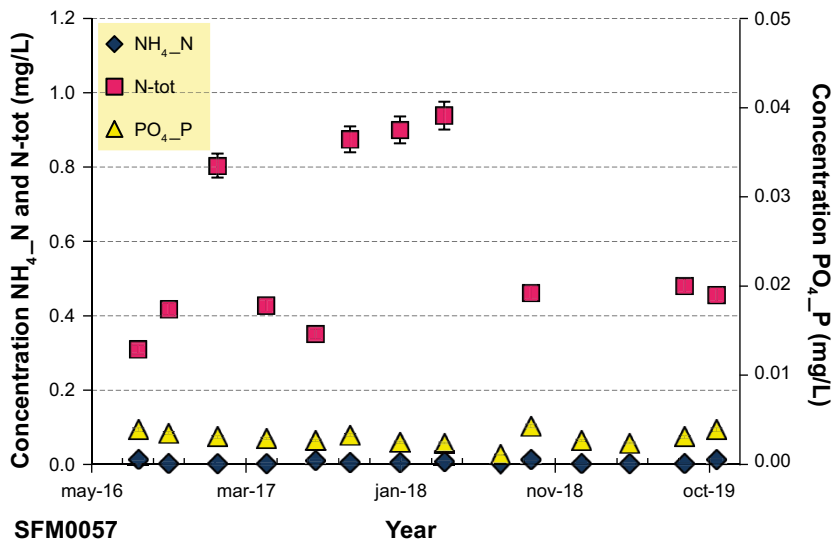


Figure 2-6 continued. Ammonium, total nitrogen and phosphate concentrations plotted versus sampling date for the sampling wells SFM0049, SFM0002 and SFM0011.



SFM0057
Year
Figure 2-6 continued. Ammonium, total nitrogen and phosphate concentrations plotted versus sampling date for the sampling well SFM0057.

Trace metals

The analyses of trace and rare earth elements include Ag, Al, As, B, Cd, Cr, Cu, Co, Hg, Nb, Ni, Pb, Pd, Se, Sn, V, Zn, U, Sb, Rb, Zr, Mo, Cs, Ba and Nd. The trace element data are compiled in Appendix 2.

These elements are generally present at low concentrations in the groundwater and the risk for contamination is high. Especially data on common metals such as Al, Cr, Cu, Co, Ni and Zn must be used with caution.

Isotopes

Isotope determinations including the stable isotopes δD , and $\delta^{18}O$ as well as the radioactive isotope 3H (TU) are compiled in Appendix 2.

2.6 Summary and discussion

The characters of the near surface groundwater in the monitoring programme generally remain unchanged. The chemical investigation routines for near surface groundwater are well established after several years of field work, reporting and data administration and this year of the long-term monitoring programme has passed without any major nonconformities or surprises.

3 Surface waters

3.1 Objectives and scope

Sampling and analyses of surface waters in the Forsmark area began in 2002 during the site investigation phase. After the site investigations, the surface water monitoring programme continued and focused on sampling locations in the prioritised north–western part of the Forsmark candidate area (SKB 2007). The monitoring programme was reviewed and modified in 2010. The modifications of the programme have resulted in reduced sampling frequency in the lakes and sea and fewer isotope determinations but also extended sampling in the streams adding environmental metals to the analytical programme at every sampling occasion.

The main objectives are to obtain long time-series of data to create a base-line, describing the natural variations. This in order to allow identification of eventual perturbation effects from SKB activities during the future construction and operation of the repository for nuclear waste.

The programme includes sampling of water for chemical analysis as well as direct field measurements of physical and chemical parameters such as ORP (Oxidation Reduction Potential), pH, dissolved oxygen, EC, measurement depth, turbidity and water temperature.

Analyses of major constituents, surface water supplements (nutrient salts etc) and trace elements were conducted frequently (once a month, except July) while extended analyses, including also isotopes were performed once per season, i.e. in January, April, August and October.

3.2 Sampling locations and sampling schedule

The monitoring programme included four lakes, eight shallow sea bay location and four streams. The extent of the sampling varied at different occasions. The streams and one of the sea sampling locations (Biotestsjön) were sampled at eleven occasions (once per month, except for July). At these occasions measurements were also conducted at Norra bassängen (PFM000097). The remaining lakes and the sea sampling location PFM000062 were sampled at four occasions (once per season) during the reported time period. The sea sampling locations PFM007910, PFM007911, PFM007912, PFM000083, PFM000084 and PFM007783 were sampled at six occasions (April, May, June, August, September and October). The sea sampling location PFM007783 was also sampled in January 2019.

The sampling locations are presented in Figure 2-1 and listed in Table 3-1. The sampling schedule for 2019 is given in Table 3-2.



Figure 3-1. Field sampling at PFM007910 in June 2019.

Table 3-1. Sampling locations (Id-code, coordinates, name and comments).

Sampling locations	Coordinates (RT90 RHB70)	Name	Comments
Lakes			
PFM000074	16 29 854, 66 99 393	Labboträsket	
PFM000097	16 31 814, 66 99 868	Norra bassängen	Only field measurements
PFM000107	16 32 065, 66 99 031	Bolundsfjärden	
PFM000117	16 31 946, 66 97 118	Eckarfjärden	
PFM005864	16 29 442, 66 97 160	Bruksdammen	
Shallow sea bays and sea location			
PFM000062	16 31 921, 67 00 605	SV Forslingens grund	
PFM102269	16 31 405, 67 04 412	Cooling water outlet, Lake Biotestsjön	Check of tritium contamination. Normal sampling starting in August 2016
PFM000083	16 36 023, 66 98 757	Kallrigafjärden	Included from August 2016. First sampled in October 2016
PFM000084	16 35 455, 66 94 442	Olandsån	Included from August 2016. First sampled in October 2016
PFM007783	16 31 390, 67 02 724	Uppströms böjen, Lake Biotestsjön	Included from August 2016. First sampled in August 2016
PFM007910	16 28 552, 67 03 318	Skaten-Rängsenområdet	
PFM007911	16 28 527, 67 03 554	Skaten-Rängsenområdet	
PFM007912	16 28 649, 67 05 182	Skaten-Rängsenområdet	
Streams			
PFM000066	16 29 343, 66 99 064	Öster Gunnarsboträsket	
PFM000068	16 31 641, 66 98 735	Kungsträsket	
PFM000069	16 31 510, 66 98 440	Bolundsskogen	
PFM000070	16 32 061, 66 97 319	Norr Eckarfjärden	

Table 3-2. Surface water sampling schedule from January to December 2019.

Year	Month	Week	Programme type*	Sampling comment
2019	January	3	E	All sampling points, except PFM007910, 7911, 7912, 0083 and 0084
2019	February	7	M	Streams, PFM000097 and Lake Biotestsjön
2019	March	12	M	Streams, PFM000097 and Lake Biotestsjön
2019	April	17	E	All sampling points
2019	May	21	M	Streams, Lake Biotestsjön, PFM000097, PFM007910, 7911, 7912, 0083, 0084 and 7783
2019	June	25	M	Streams, Lake Biotestsjön, PFM000097, PFM007910, 7911, 7912, 0083, 0084 and 7783
2019	August	33	E	All sampling points
2019	September	36	M	Streams, Lake Biotestsjön, PFM000097, PFM007910, 7911, 7912, 0083, 0084 and 7783
2019	October	42	E	All sampling points
2019	November	46	M	Streams, PFM000097 and Lake Biotestsjön
2019	December	50	M	Streams, PFM000097 and Lake Biotestsjön

* M = main programme (SKB class 3 including surface water supplements), E = extended programme (SKB class 5 including surface water supplements).



Figure 3-2. Field sampling at PFM000070 in June 2019.

3.3 Equipment

3.3.1 Sampling equipment

Water samples were collected using a pump setup consisting of an electrical peristaltic pump system, Solinst, model 410, connected to 4–8 m long Teflon-tubes (FEP 140) of 5 mm inner diameter. The sampling equipment is presented in Figure 3-3.

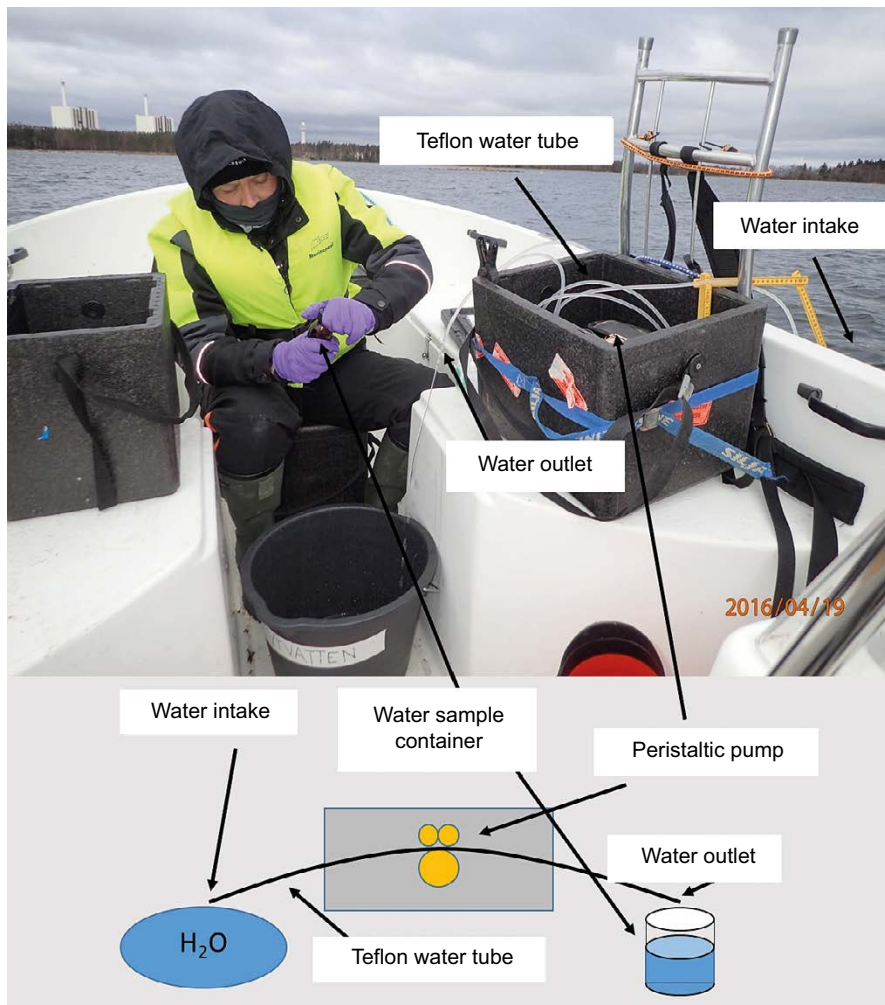


Figure 3-3. Winter sampling of surface water using the peristaltic pump system (PPS). A schematic presentation of the PPS is shown below the photo. Photo from the sampling at PFM000062.

3.3.2 Multi-parameter sondes

Field measurements were conducted with a multi-parameter sonde, InSitu AquaTroll600 or YSI (YSI Pro DSS). The parameters measured in field are summarised in Table 3-3. A hand-held PC/terminal is connected to the sonde through a cable for logging and initial field control of data.

Table 3-3. Parameters measured by the sonde AquaTroll or YSI Pro DSS.

Parameter
Date/time
Temperature (°C)
pH
Dissolved oxygen (mg/L, %)
ORP (Redox potential, mV)
Electrical conductivity (mS/cm)
Depth (m)
Turbidity (NTU)

3.3.3 General field equipment

- Ruttner samplers were used as back up if the portable pump system should fail.
- The exact locations of the sampling location positions were determined using a GPS.
- Water depth in the lakes and sea was measured using an echo sounder (Plastimo, Echotest, LCD digital sounder) with an accuracy of ± 0.05 m.
- Water transparency was estimated using a Secchi disc and an aqua scope.
- Disposable filters (0.4 μm , $\varnothing = 22$ mm) were used together with 60 mL syringes to filter specific sample portions of the sampled water in the field.
- Stopwatch, a water-filled plastic bottle (50 mL) and measuring-tape were used for flow/runoff estimates in stream waters.

3.4 Performance

3.4.1 Pre-sampling preparations

Prior to sampling, the sample bottles were labelled and packed in insulated boxes/bags. Acid additions were made in advance to bottles intended for iron and trace metal analyses as well as acidified archive samples. The bottles with added acid were placed in separate plastic bags outside the box/bag to avoid contamination. The peristaltic pump system, including the Teflon tubes, was washed using acid (0.5 M HCl) and rinsed with deionised water before use. The equipment was kept well protected in plastic bags or in tight containers. Calibration of the sonde was performed according to the measurement system description (the operator's manual for AquaTroll or YSI Pro DSS).

3.4.2 Water sampling

Water samples were collected using the peristaltic pump system. Lake and sea water samples were collected close to the surface at 0.5 m depth. When the lake and sea sampling locations were covered with ice, water was also collected from approximately 0.5 m above the lake or sea bottom, in order to sample water both above and below the stratification. Stream water samples were collected at approximately 0.1 m depth. The peristaltic pump and sample bottles were rinsed with water from the sampling locations prior to collecting samples, except for bottles with acid additions. The disposable filters were rinsed with sample water before filtering and sampling commenced. The field crew wore rubber gloves to avoid contamination and great care was taken not to contaminate bottles or equipment. Bottles and samples with added acid were handled and stored separately to avoid contaminating other sample portions.

Each sample consists of several sample portions labelled with the same sample number. The preparation of the sample portions in the field differs depending on their use. Details on collected sample portions, components to be analysed and sample preparations are summarised in Table 3-4.

Table 3-4. Sample components and preparation of samples. Sampling according to the main programme 11 times a year in streams and four times in lakes and in the sea. Blue lines indicate added analyses within the extended programme collected in each sample point four times a year.

Analyses	Comments	Preparation in field
pH, EC, Alkalinity, colour determination		
Cl ⁻ , SO ₄ ²⁻ , Br ⁻ , F ⁻		
Br ⁻		
Major cations ^{1a} , SO ₄ , S, Si, Environmental metals ^{1b}	Acid washed	Filtering with syringe/0.4 µm filter
PON, POP, POC, Chlorophyll a, c and pheophytin	Filtrated in laboratory	
Tot-N, tot-P		
DIC, DOC		Filtering with syringe/0.4 µm filter
TOC		
Nutrients: NH ₄ , NO ₂ , NO ₃ , PO ₄		Filtering with syringe/0.4 µm filter
Archives	Acid washed	Filtering with syringe/0.4 µm filter
Archives		
Suspended matter		
Iodine	The same bottle as for Br ⁻ above	
Trace metals ^{1c}	Acid washed, the same bottle as for major cations above	
Deuterium, ¹⁸ O		
Tritium, ³ H		

1a. Na, K, Ca, Mg, Si, Fe, Mn, Li, Sr.

1b. Ag, Al, As, B, Ba, Cd, Cr, Cu, Co, Hg, Nb, Ni, Mo, Pb, Pd, Se, Sn, V, Zn.

1c. Sc, Rb, Y, Zr, I, Sb, Cs, La, Hf, Tl, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, U, Th.



Figure 3-4. Field sampling at PFM000107 in January 2019.

3.4.3 Field measurements

The multi-parameter sonde was used for measurements of pH, water temperature, ORP, turbidity, electrical conductivity and dissolved oxygen. Light penetration was measured at lake and sea sampling locations with a Secchi disc according to the Swedish standard BIN SR 111. Photo documentation of stream waters was performed to facilitate evaluation of the investigation data. Photos were taken at each stream water sampling location. At the lakes and sea sampling location field measurements were taken in a depth profile, with measurements logged at every metre from the surface to the bottom, see Table 3-5.

Table 3-5. Logging depths at sampling locations in lakes and sea locations.

Sampling locations	Name	Logging depth (m)												
		0.2	0.5	1	1.5	2	2.5	3	4	4.5	5	6	7	8
Lakes														
PFM000074	Labboträsket		X											
PFM000097	Norra bassängen		X											
PFM000107	Bolundsfjärden		X	X										
PFM000117	Eckarfjärden		X	X	X									
PFM005864	Bruksdammen	X	X											
Shallow sea bays and sea locations														
PFM000062	SV Forslingens grund		X	X		X		X						
PFM007910	Skaten-Rångsenområdet		X	X	X	X								
PFM007911	Skaten-Rångsenområdet		X	X		X		X	X	X	X	X	X	X
PFM007912	Skaten-Rångsenområdet							X	X	X	X	X	X	X
PFM102269	Cooling water outlet, Lake Biotestsjön		X											
PFM000083	Kallrigafjärden		X											
PFM000084	Olandsån		X											
PFM007783	Uppströms böjen, Lake Biotestsjön		X											

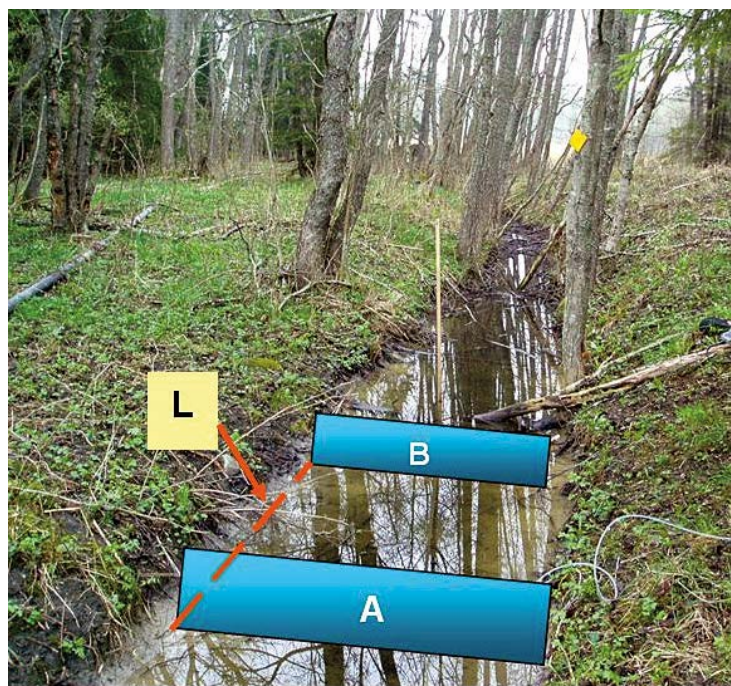


Figure 3-5. Schematic presentation for estimating water runoff in natural stream waters (see text for explanation).

A simple “floating bottle” method (Johansson 2005) was used to measure water flow/runoff in the streams as a complement to the regular method using discharge weirs and gauges. The cross-section mean area of the stream was estimated, forming a rectangle, see Figure 3-5. The time for the bottle (close to neutral in weight in water) to float the distance (L) from point A to B was measured with a stopwatch. This procedure was repeated three times in each stream. The average water velocity (m/s) multiplied with the average area (m²) resulted in a rough water runoff estimate (m³/s).

3.4.4 Sample treatment and chemical analyses

An overview of sample treatment and analytical methods is given in Appendix 1. The routines are applicable independently of sampling method or type of sampling object.

3.4.5 Data handling/post processing

A field protocol established during sampling/measuring contains metadata (idcode, date, time, sample no, field crew etc), a few measured data and weather observations as well as other comments on field conditions that may influence the analytical results. The field protocols supply the basic information for creating activities and activity comments in the Sicada database and also information that describes the sampling conditions for further storage in database tables. Furthermore, eventual deviations from the sampling programme or from the normal routines are also documented in special reports/comment files. The comment files are stored in the Sicada file archive (Table 3-6).

Field measurement data

The logged data from field measurements are exported digitally from the hand-held PC to the specified Sicada data table. The original data file, as well as photographs and comments on sampling and measurements, are stored in the Sicada file archive (Table 3-6).

Table 3-6. File types stored in the Sicada file archive.

Type of file	Example of file name	No per sampling session
Data file	Vatten_v42_19_data.xls	1
Comments	Noterat V42-19.doc	1
Photography	PFM66.jpg	1 or 4*

* Only one photo is taken if snow or ice cover.



Figure 3-6. Sampling at site PFM000069 in September 2019.

Other relevant information and data

Information about weather conditions and related parameters describing the sampling conditions are compiled in a separate table in Sicada called “Weather_data” which contains the following columns below. These data are not presented in this report but are good information when evaluating data together with information from measurements of other activities within the monitoring programme.

Air temperature	Wind velocity	Runoff/Water flow
Cloudiness	Wind direction	Water depth
Precipitation	Light penetration (lakes and sea)	Snow/ice depth

3.4.6 Nonconformities

Some nonconformities have been reported during this sampling period, January–December 2019. The flow measurements in the streams were not always performed due to e.g. ice, dry conditions or too much water vegetation. Collected samples and some comments on sampling and measurements are compiled in Tables 3-7 and 3-8.

During January 2019 there were problems with the sondes, both ordinary and backup Troll sondes. Instead a replacement sonde (AquaTroll 600) was used during the sampling in January. However, the turbidity on this sonde was also unreliable and this problem could not be solved by calibrating. A new sonde (Ysi ProDSS) was used during the rest of 2019.

Table 3-7. Collected samples and conducted measurements.

	Year	19	19	19	19	19	19	19	19	19	19	19	Sum
	Week	3	7	12	17	21	25	33	36	42	46	50	
Sea	Name												
PFM000062	SV-Forslingen	X			X			X		X			4
PFM102269	Utlopp Biotesten	X	X	X	X	X	X	X	X	X	X	X	11
PFM000083	Kallrigafjärden				X	X	X	X	X	X			6
PFM000084	Olandsån				X	X	X	X	X	X			6
PFM007783	Böjen Biotestsjön	X			X	X	X	X	X	X			7
PFM007910	Skaten-Rångsenomr.				X	X	X	X	X	X			6
PFM007911	Skaten-Rångsenomr.				X	X	X	X	X	X			6
PFM007912	Skaten-Rångsenomr.				X	X	X	X	X	X			6
Stream													
PFM000066	Ö-Gunnarsbo	X	X	X	X	X	X	X	X	X	X	X	11
PFM000068	Kungsträsket	X	X	X	X	X	X	X	X	X	X	X	11
PFM000069	Bolundsskogen	X	X	X	X	X	X	X	X	X	X	X	11
PFM000070	N-Eckarfjärden	X	X	X	X	X	X	X	G	X	X	X	10
Lakes													
PFM000074	Labboträsket	X			X			X		X			4
PFM000097	N. bassängen	B	B	B	B	B	B	B	B	B	B	B	
PFM00107	Bolundsfjärden	XX			X			X		X			5
PFM00117	Eckarfjärden	XX			X			X		X			5
	Sum water samples	12	5	5	15	11	11	15	10	15	5	5	109

X: Sample and field measurements taken.

B: No sample, only field measurements with sonde.

G: Dry conditions, no measurements or samples.

Table 3-8. Some comments on measurements/water sampling.

	Year	19	19	19	19	19	19	19	19	19	19	
	Week	3	7	12	17	21	25	33	36	42	46	50
Stream												
PFM000066	Ö-Gunnarsbo	C	C									
PFM000068	Kungsträsket	C	C	D			F	F	F	B		
PFM000069	Bolundsskogen	C	C									
PFM000070	N-Eckarfjärden	C	C			F	F	B	F	B		
Lakes												
PFM00107	Bolundsfjärden	A										
PFM00117	Eckarfjärden	A										

Explanations to codes/abbreviations:

A: Two samples collected. Surface and bottom water sampled separately due to winter stagnation in lake.

B: Too much water vegetation, no measurement.

D: Too much ice, no measurement.

F: Flow rate too low, no flow measurement.

3.5 Results

3.5.1 General

The surface water investigation period from January to December 2019 includes 109 water samples and 240 field loggings of measurements from the regular sampling locations in streams, lakes and sea. Furthermore, the accompanying field documentation is quite extensive. The data are compiled in the attached Appendices and stored in the Sicada database where they are traceable by the activity plan number (AP SFK-19-002).

Fresh waters in the Forsmark area are well buffered with high alkalinity, high pH and high calcium concentrations. In addition, waters affected or recently affected by brackish sea water still show high sodium chloride concentrations. The relationship between the position of the coastline and the salinity of the water samples collected at the sampling locations in the area has been demonstrated in Nilsson et al. (2003). Furthermore, a detailed evaluation of surface water data from March 2002 to March 2004 was presented in Sonesten (2005). A summary of the results from the surface water monitoring during 2005 to 2009 is available in Nilsson et al. (2010).

The results presented and compiled in this section are restricted to field work performed between January and December 2019.

3.5.2 Water analyses

Major components

The basic water analyses include the major constituents Na, K, Ca, Mg, HCO₃⁻, Sr, SO₄²⁻, SO₄-S, Cl, Si as well as the minor constituents Fe, Li, Mn, Br, F⁻, and I. Furthermore, batch measurements of pH and EC are included. The basic water analysis data are compiled together with field measurements of pH and water temperature in Appendix 3.

The charge balance errors, see Section 2.5.2 for calculation formula, give an indication of the quality and uncertainty of the analyses of major constituents. All of the samples collected in 2019 were within the acceptable error for surface water ($\pm 10\%$).

Surface water supplements

The surface water supplements include NH₄-N, NO₂-N, NO₃-N+NO₂-N, NO₃-N, tot-N, tot-P, PO₄-P, POP, PON, SiO₂-Si, POC, TOC, DOC and DIC. The analytical data are compiled in Appendix 3.

Isotopes

The isotope data including the stable isotopes δD , $\delta^{18}O$, as well as the radioactive isotope tritium (3H) are compiled in Appendix 3.

Tritium

It is suspected that the adjacent nuclear power plant may have increased the natural content of tritium and ^{14}C isotopes (Nilsson and Borgiel 2005). Very high tritium concentrations, above 100 TU, have previously been recorded in samples from the cooling water outlet PFM102269 in July 2005, January and May 2008, October 2010 and April 2011 (Qvarfordt et al. 2012). Slightly elevated values have also been noted in 2006, 2007, 2009, 2011, 2013, 2015, 2016, 2017 and 2018. In 2019, elevated tritium concentration was measured in March, Figure 3-7. Tritium content in the water from near the cooling water outlet (PFM102269) ranged from 5.20 to 59.40 TU compared to the other sampling points, ranging from 4.30 to 11.10 TU.

Trace metals

The analyses of trace and rare earth elements include Ag, Al, As, B, Ba, Cd, Cr, Cu, Co, Hg, Nb, Ni, Mo, Pb, Pd, Se, Sn, V, Zn, U, Th, Sc, Rb, Y, Zr, Sb, Cs, La, Hf, Tl, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu. The trace element data are compiled in Appendix 3.

These elements are generally present at low concentrations in the water and the risk for contamination is high.

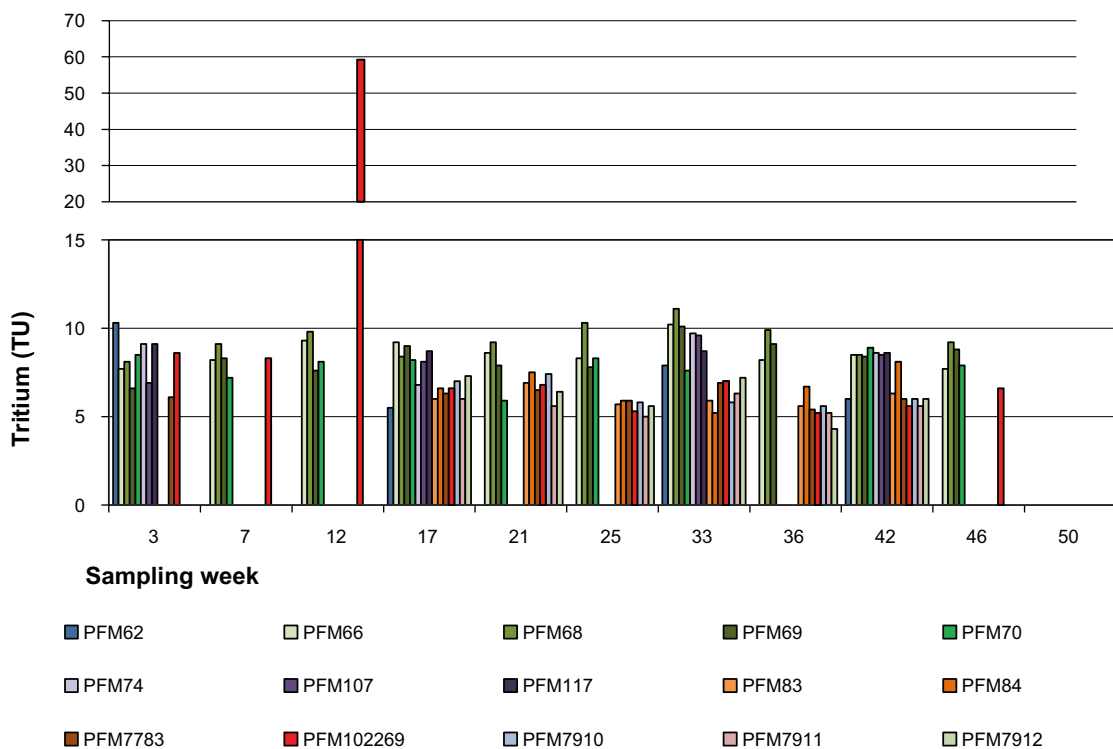


Figure 3-7. Tritium concentration in surface water sampled during 2019. The red bar represents the sampling location near the cooling water outlet, PFM102269. Note the broken y-axis.

3.5.3 Field measurements

The field measurement data including redox potential, pH, dissolved oxygen, electrical conductivity, turbidity and water temperature. This dataset is compiled in Appendix 3. The water flow rate estimations by the float method (Johansson 2005) are of low accuracy compared to measurements using discharge weirs and gauges. They were performed in order to allow comparison between early data obtained when there was no other available method and new data from installed measurement stations.

3.5.4 Water composition

The major cations in freshwater and sea water are generally calcium, magnesium, sodium and potassium. Sulphate and chloride are the major anions in sea water and in freshwater also bicarbonate gives a large contribution. The relative proportions between these major constituents differ between sea water and freshwater and also between different freshwater bodies, Figures 3-8 and 3-9. The sampling locations PFM007910, 7911, 7912, 0083, 0084 and 7783 are not presented in these figures. These are sea locations and they are similar to the sea location PFM000062.

Comparisons of the mean concentrations of these ions at the different sampling locations during the years 2008 to 2019 generally show some variation, Figure 3-10 and 3-11. Large variation in these major constituents is seen in Lake Bolundsfjärden, PFM000107, especially for the ions Na^+ and Cl^- . Lake Bolundsfjärden is characterised by irregular inflow of saltwater, which explains the larger variations in these two ions. The concentrations of ions Na^+ and Cl^- were comparatively high in 2008 indicating a recent influx of saltwater. Also, in 2012, 2015–2017 the concentrations were higher indicating saltwater inflow.

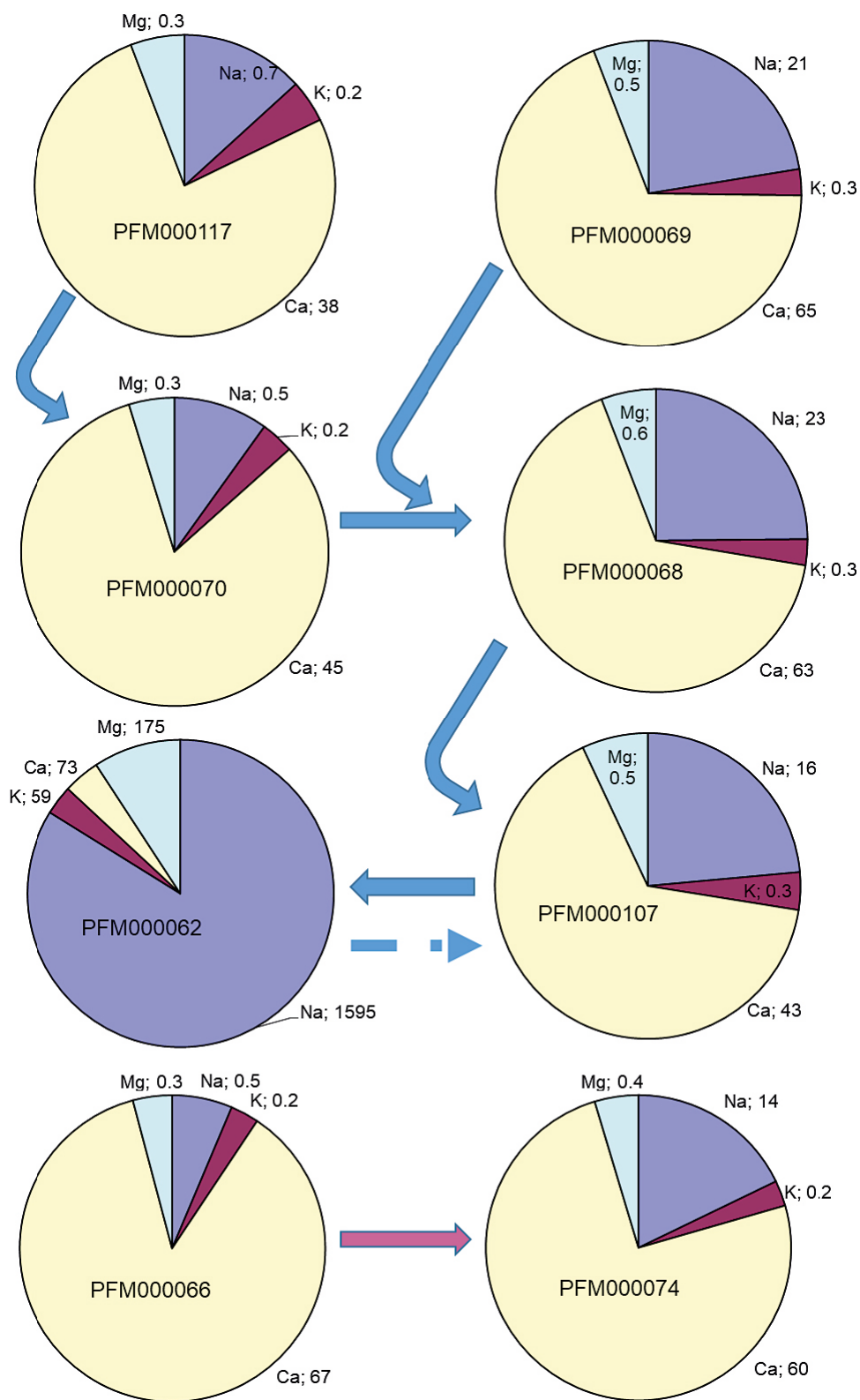


Figure 3-8. Relative proportions of the cations Na^+ , K^+ , Ca^{2+} , Mg^{2+} based on average values during the sampling period 2019. The average values (mg/L) are displayed behind each cation in the diagrams. The arrows show the path of the surface water between the lakes and streams. Occasional inflow of sea water into Lake Bolundsfjärden (PFM 000107) is indicated by a dashed arrow. The Lake Labboträsket (PFM000074) and the stream PFM000066 belong to a different catchment area.

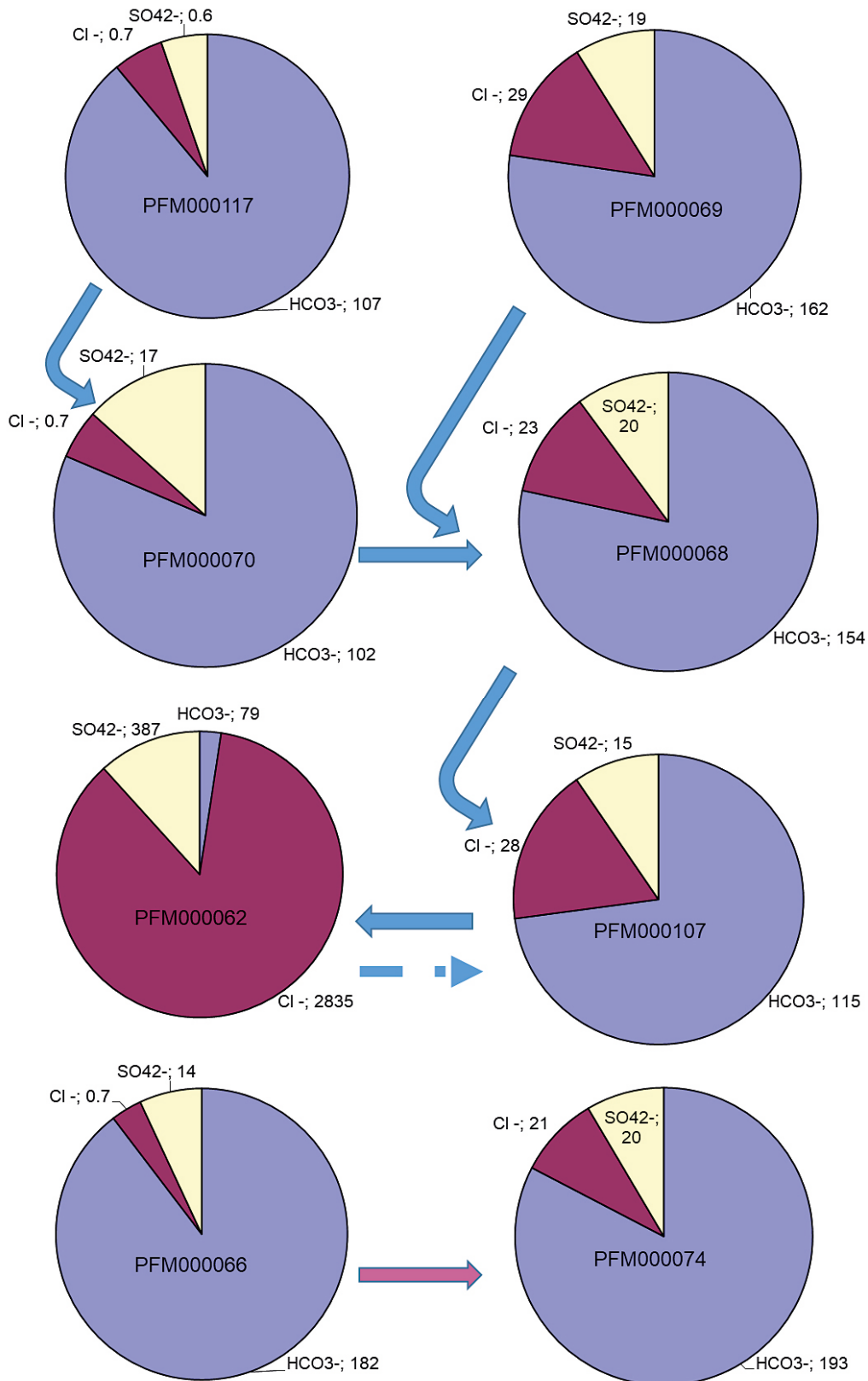


Figure 3-9. Relative proportions of the anions Cl^- , HCO_3^- and SO_4^{2-} based on the average values (given in the diagrams in mg/L) during the sampling period 2019. The arrows show the path of the surface water between the lakes and streams. Occasional inflow of sea water into Lake Bolundsfjärden (PFM 000107) is indicated by a dotted arrow. The Lake Labboträsket (PFM000074) and the stream PFM000066 belong to a different catchment area.

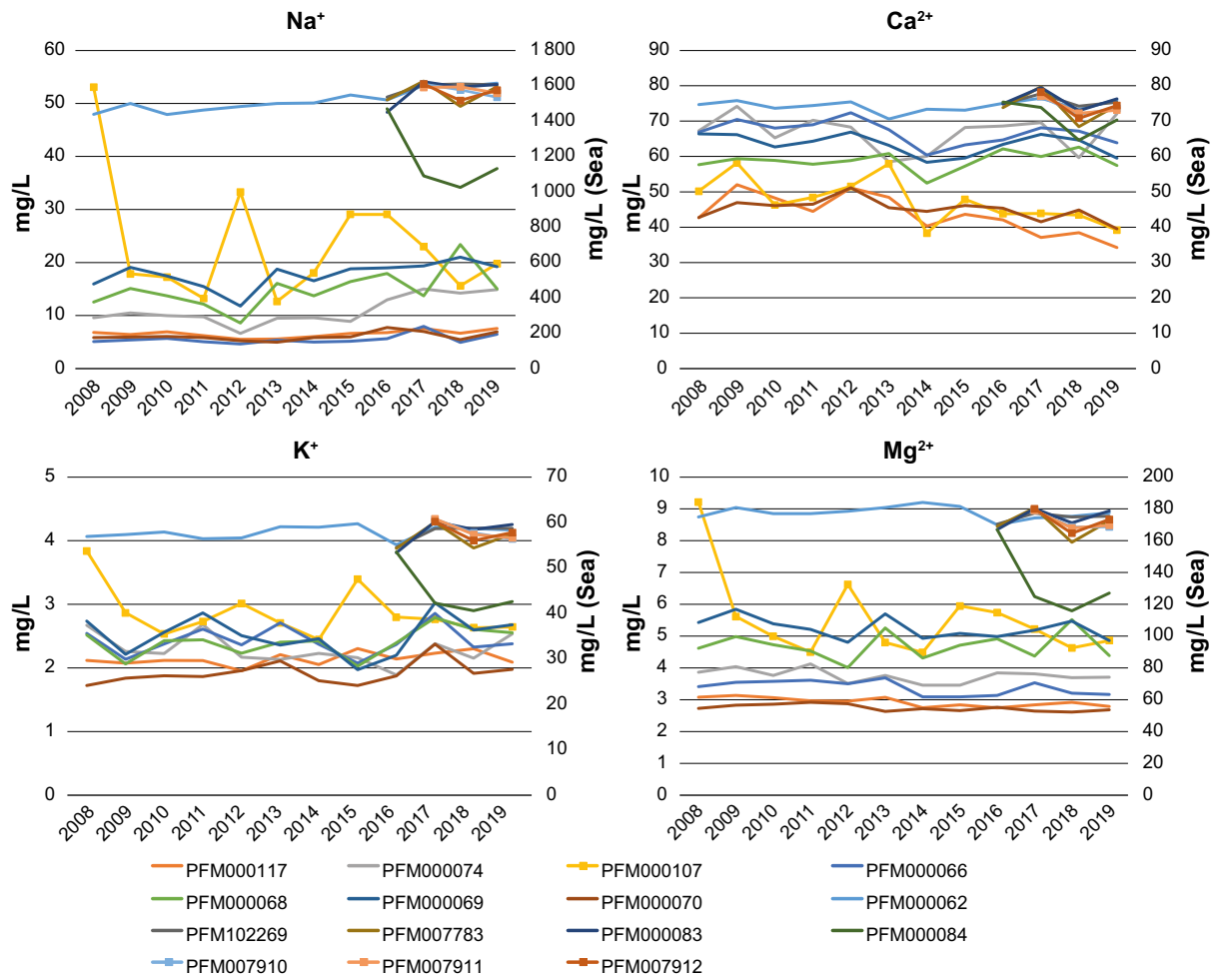


Figure 3-10. Mean concentrations of the cations Na^+ , K^+ , Ca^{2+} , Mg^{2+} during the years 2008 to 2019 at the sampling locations in the three lakes (PFM000074, PFM000107 and PFM000117), the four streams (PFM000066, PFM000068, PFM000069 and PFM000070) and the sea (PFM000062, PFM102269, PFM007783, PFM000083, PFM000084, PFM007910, PFM007911 and PFM007912). Note that the four sea locations PFM102269, PFM007783, PFM000083 and PFM000084 only have data from 2016 to 2019 and the three locations PFM007910, PFM007911 and PFM007912 only have data from 2017 and 2019.

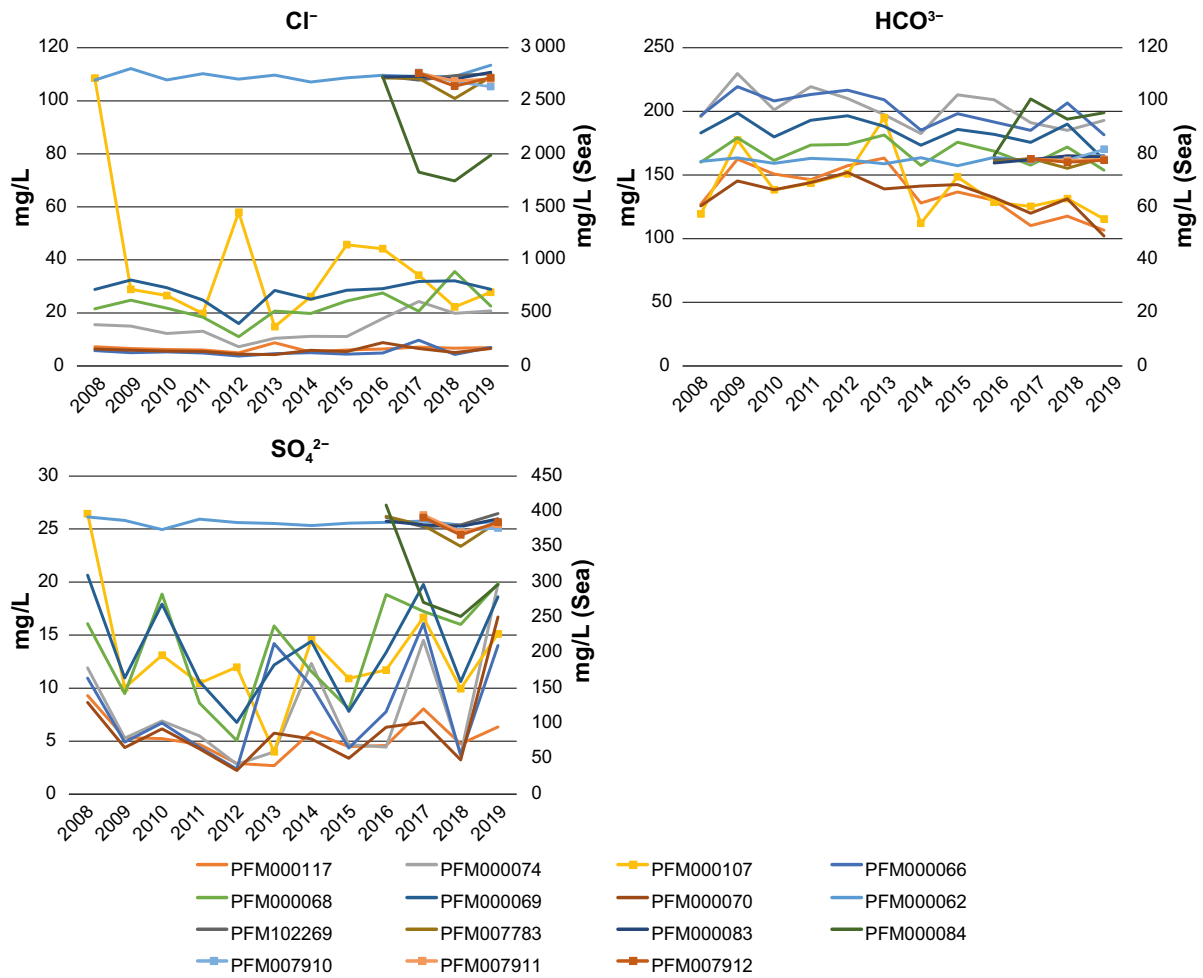


Figure 3-11. Mean concentrations of the anions Cl^- , HCO_3^- and SO_4^{2-} during the years 2008 to 2019 at the sampling locations in the three lakes (PFM000074, PFM000107 and PFM000117), the four streams (PFM000066, PFM000068, PFM000069 and PFM000070) and the sea (PFM000062, PFM102269, PFM007783, PFM000083, PFM000084, PFM007910, PFM007911 and PFM007912). Note that the four sea locations PFM102269, PFM007783, PFM000083 and PFM000084 only have data from 2016 to 2019 and the three locations PFM007910, PFM007911 and PFM007912 only have data from 2017 and 2019.



Figure 3-12. Water sampling at site PFM000068 in May 2019.

3.5.5 The NP-ratio in the surface water

The nutrients, nitrogen and phosphorus, are often the limiting factors for the primary production. Primary producers, such as plants and phytoplankton, use nitrogen and phosphorus in a ratio of about 16 mol nitrogen to 1 mol phosphorus, also known as the Redfield ratio, or 7:1 in terms of mass. A ratio deviating from 16 (or 7) indicates that the primary production is limited by either nitrogen or phosphorus. When nitrogen is present in excess the ratio will be higher than 16, indicating that lack of phosphorus is limiting the growth. Whereas lower ratios indicate nitrogen limitations, which may favour growth of blue green algae able to use nitrogen from the air. In fresh water, phosphorus is usually the limiting nutrient whereas in the oceans it is usually nitrogen.

Figure 3-13 shows the relationship between nitrogen and phosphorus in the surface water of the investigated streams, lakes and coastal bays in the Forsmark area. The lakes and streams are phosphorus limited with high concentrations of nitrogen. Excluded in Figure 3-13 (to make the figure easier to understand) is the January concentrations at site PFM000074 (N_{tot}: 8 050, P_{tot}: 16.4) and PFM000070 (N_{tot}: 2 890, P_{tot}: 32.8).

The coastal locations in the Baltic Sea, PFM000062, PFM000083, PFM000084, PFM007783, PFM007910, PFM007911 and PFM007912 are also phosphorus limited although the ratio is much lower. Excluded in Figure 3-13 (to make the figure easier to understand) is the August concentrations at site PFM000084 (N_{tot}: 649, P_{tot}: 71.1).

Comparisons of the mean concentrations of total nitrogen and total phosphorus during the years 2008 to 2019 generally show little variation between years, Figure 3-14. The largest variation is seen for phosphorus in Lake Eckarfjärden, PFM000117, but there is no increasing or decreasing trend over the years. In January 2019, a high concentration (8.05 mg/l) of total nitrogen was measured at PFM000074, which influences the mean concentration presented in Figure 3-14. During the rest of 2019, the concentrations were similar to previous years.

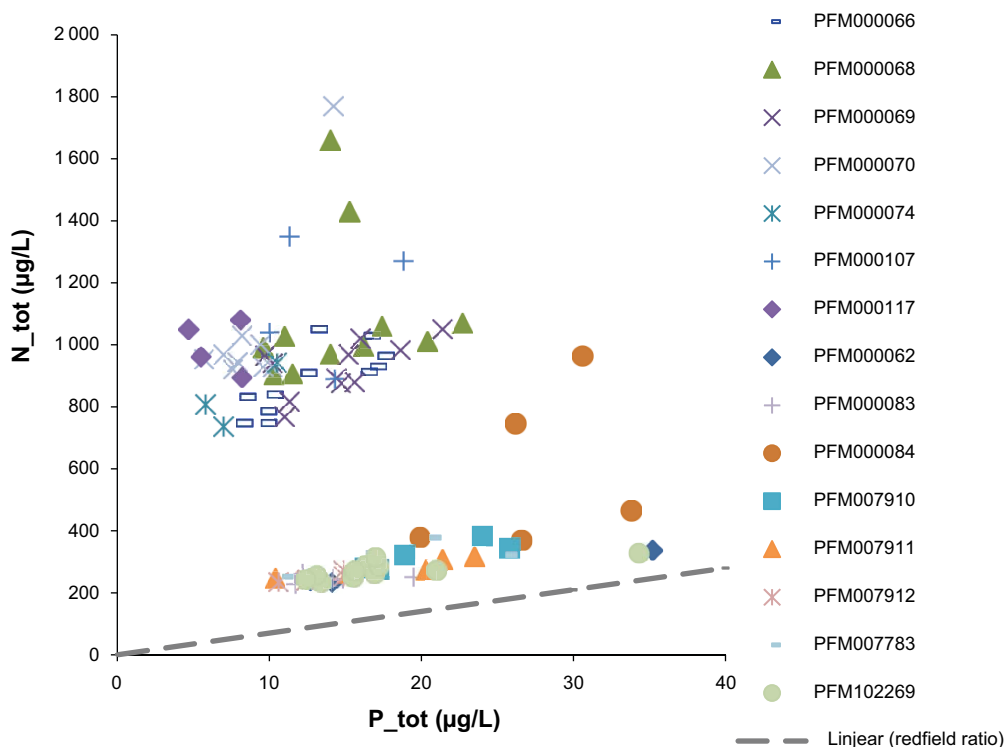


Figure 3-13. The relationship between nitrogen and phosphorus in the surface water of the investigated streams, lakes and coastal locations in the Forsmark area during 2019. The Redfield ratio (7:1) is indicated. Values above and below the line indicate phosphorus limitation and nitrogen limitation, respectively.

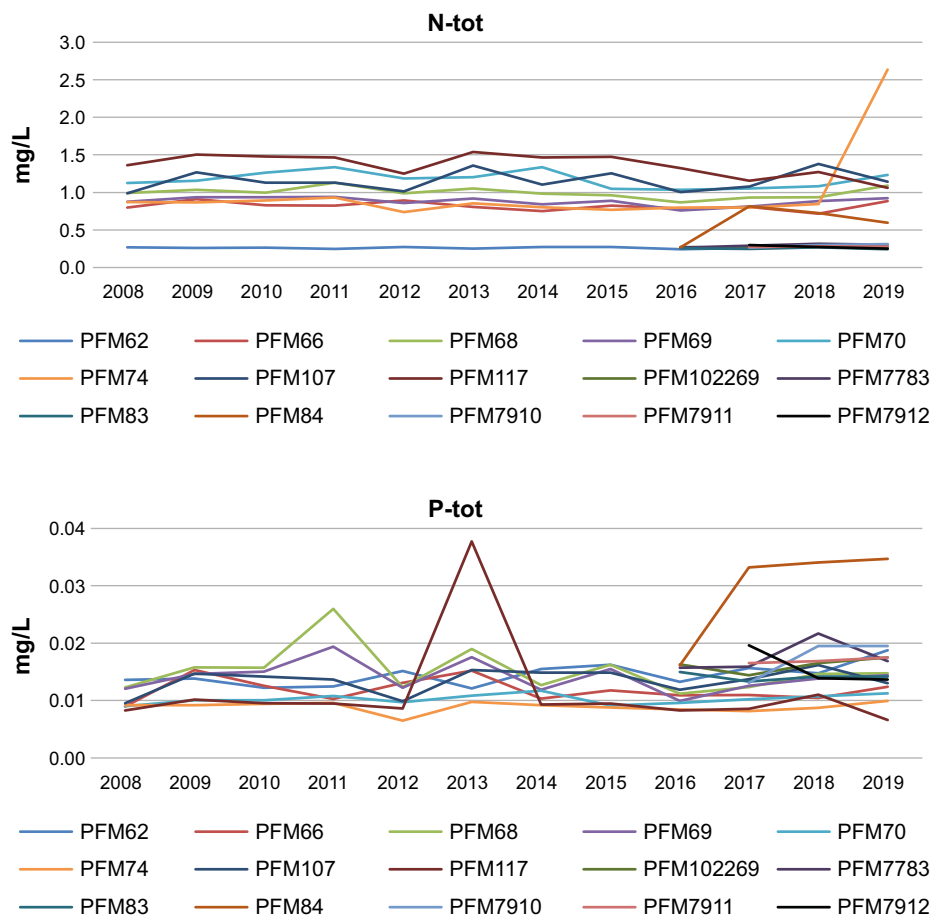


Figure 3-14. Mean concentrations of total nitrogen (N-tot) and total phosphorus (P-tot) during the years 2008 to 2019 at the sampling locations in the four streams (PFM000066, PFM000068, PFM000069 and PFM000070), three lakes (PFM000074, PFM000107 and PFM000117) and the sea (PFM000062, PFM102269, PFM007783, PFM000083, PFM000084, PFM007910, PFM007911 and PFM007912). Note that the four sea locations PFM102269, PFM007783, PFM000083 and PFM000084 only have data from 2016 to 2019 and the three locations PFM007910, PFM007911 and PFM007912 only have data from 2017 to 2019.

3.6 Summary and discussion

The chemical investigation routines for surface waters are well established and this period of the long-term surface water monitoring programme has passed without any major nonconformities or surprises.

The main experiences and conclusions from surface water sampling and analyses during the sampling period January to December 2019 are summarised below:

- Previous data indicates periodic tritium contamination from the adjacent nuclear power plant in water samples from near the cooling water outlet. In 2019, elevated tritium concentration was measured in March.
- The proportions of the major ions in the sampled freshwaters and the shallow sea bay were similar to previous years. In 2015, 2016 and 2017 the concentration of Na^+ and Cl^- in Lake Bolundsfjärden, PFM000107, were higher compared to 2013 and 2014, indicating saltwater inflows. In 2019 the proportion of these ions were lower, suggesting that no saltwater inflow happened in Lake Bolundsfjärden in 2019.
- The concentrations of total nitrogen and total phosphorus in the sampled freshwaters and shallow sea locations were similar to previous years. However, a remarkably high nitrogen concentration was measured in Labboträsket (PFM000074) in January 2019.

4 Precipitation

4.1 Objective and scope

Information on the chemical composition of precipitation and its variation in Forsmark is useful in the following context:

- to improve the understanding of groundwater formation and other hydrogeological conditions at the site,
- to provide complete information for constructing a facility that is maximum customized to the bedrock properties,
- to further develop the safety assessments and to control of the environmental impact.

Precipitation sampling started at the end of 2002 within the hydrochemical monitoring program and continued until June 2008 when a decision was made to interrupt this activity in Forsmark. After the site selection, the sampling was resumed for about two years, 2010–2012, with emphasis on the collection of trace metals that had not previously been included in a hydrochemical monitoring program 2002–2008. After some years a need to resume precipitation sampling was identified and a new monitoring program started September 2016. Performance of this activity is controlled by an internal document, AP SFK-19-003, which describes a plan for sampling and analyses of precipitation January to December 2019. Since the precipitation samples of January were analysed as collective samples collected from the end of November 2018 to start of February 2019, to include January 2019 sampling of December 2018 is included in the results of precipitation sampling in this report as well. Performance of the activity of 2018 is controlled by the internal document AP SFK-17-003.

Figure 4-1 shows the location of precipitation samplers in Forsmark study area during 2019. The first location, PFM002564, was used for sampling during the first winter months of 2019 (and December 2018) and is situated southeast from the three nuclear power plants in Forsmark. In April 2019, a new sampling location (PFM008126) was chosen to be situated in SKB territory, slightly northwest from the old sampling location. Precipitation samples were collected for the rest of the year 2019 starting in May at the new location.

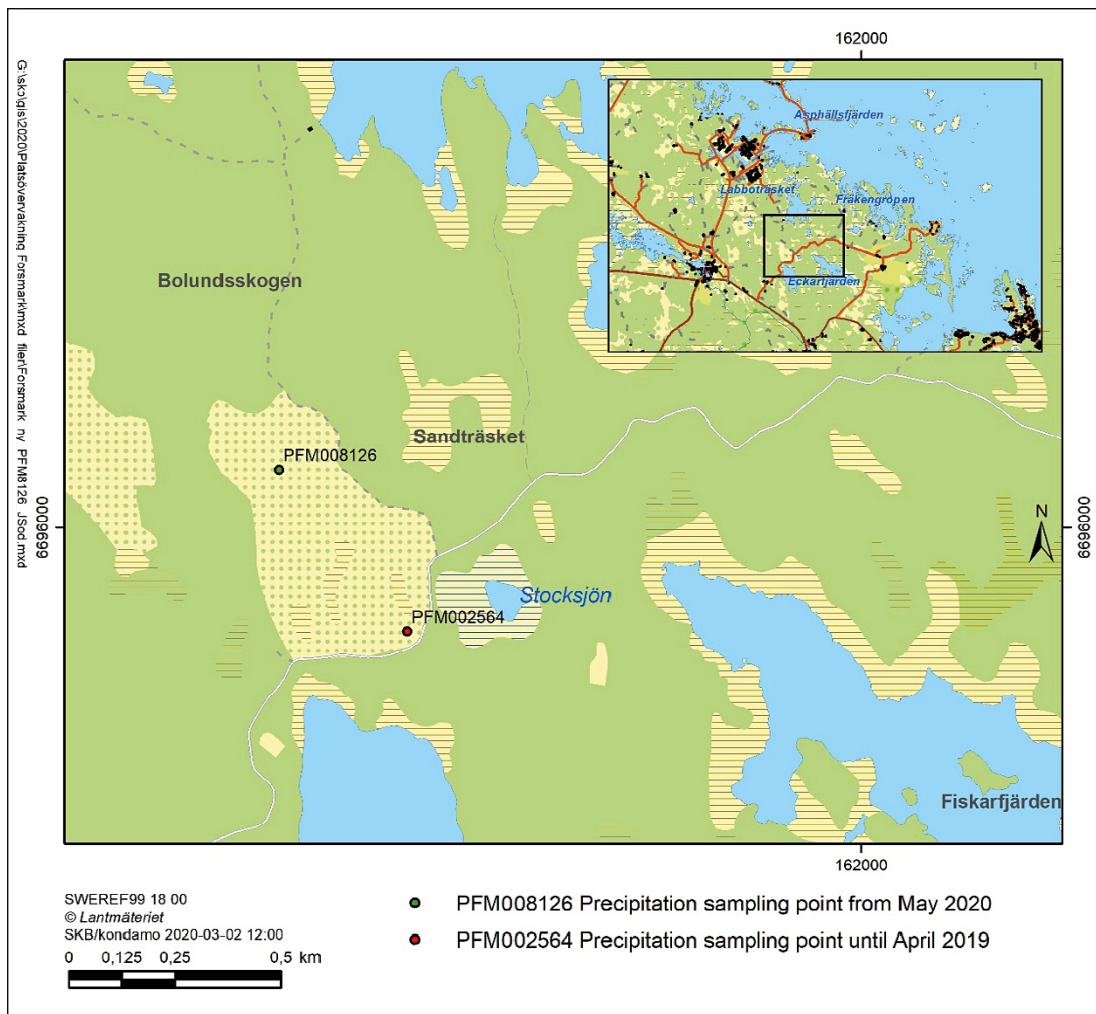


Figure 4-1. Location of the samplers for precipitation, PFM002564 and PFM008126 within the Forsmark investigation area.

4.2 Equipment

The equipment for precipitation consists of separate polyethylene containers that were placed on mounting stands that were ca 1.5 m high. There were two types of polyethylene containers, a summer type for collecting rain, and a winter type for collecting snow, see Figure 4-2 and Figure 4-3. The summer container was funnel-shaped and was fitted with a sieve to prevent contamination of samples with debris and insects. In the winter type container, the polyethylene container was jar-shaped. The collectors were designed and developed by NILU, Norway, and were ISO-certified.



Figure 4-2. Precipitation samplers: two summer setups (to the left) and two winter setups (to the right) at location PFM002564.



Figure 4-3. Precipitation sampler setup of six funnel-shaped polyethylene containers (summer type) at new location PFM008126.

4.3 Performance

4.3.1 Sampling

Sampling of precipitation within the Forsmark area was carried out according to activity plan AP SFK-19-003 following the method described in SKB MD 423.003.

Sampling procedure and sampling treatment are shown in Figure 4-4. The polyethylene samplers were emptied once a week, regardless of whether or amount of rainfall. Water/snow were collected from several (maximum 6) samplers to achieve the volume of water required for the chemical analyses.

Weekly collected samples, after the volume has been determined, were transferred into customised plastic containers and were stored in a refrigerator. After a month, weekly samples were combined into a one (month) sample and distributed into smaller bottles for sample dispatch. That generates twelve analysed samples per year.

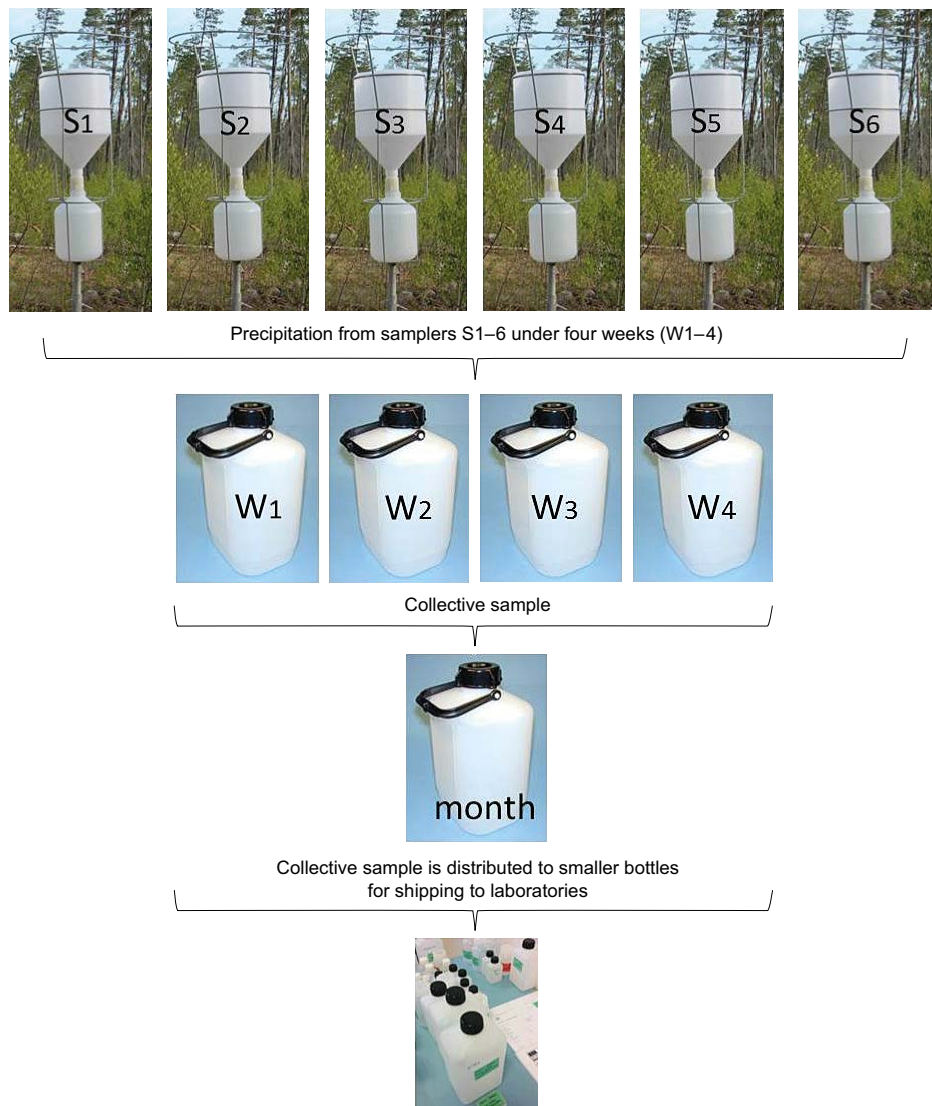


Figure 4-4. Schematic outline of sample handling procedure.

4.3.2 Chemical analyses

Field measurements, see Table 4-1, were performed mostly at the sampling site when rain was sampled. Snow was collected and after melting in the laboratory, pH and conductivity were measured.

Sample of precipitation collected under one month were analysed for chemical analyses, see Table 4-1. Due to low concentrations of elements in precipitates, selection of chemical components that were included in analyses deviate from SKB's chemical classes. For a small amount of rainfall during a month, the analyses were performed in descending order: $\delta^2\text{H}$, $\delta^{18}\text{O}$, pH, EC, anions, cations, $\delta^3\text{H}$ and archival samples. Chemical analyses were performed, in the first place, by accredited chemical laboratories at Äspö or in Forsmark, and in another case – in external laboratories.

Table 4-1. Chemical analyses performed for precipitation samples.

Component	Sample bottles volume (mL)	Sample preparation	Laboratory/Field
pH, electric conductivity (EC), temperature	-	-	Field measurements
pH, electric conductivity (EC), Alkalinity (HCO_3^-)	100	-	Forsmark chemical laboratory
Bromide (Br^-)	50	-	External laboratory
Na, K, Ca, Mg, Si, Fe, Mn, Li, Sr and trace elements*	125	Filtered through 0.4 μm , and acidified with 1 % HNO_3 .	External laboratory
Cl^- , Br^- , SO_4^{2-} , F^-	250	-	Äspö chemical laboratory
$\delta^3\text{H}$	500	Sub-sampler is fully filled, avoiding air bubbles	External laboratory
$\delta^2\text{H}$, $\delta^{18}\text{O}$	100	Sub-sampler is fully filled, avoiding air bubbles	External/Äspö chemical laboratory

* Trace element includes: Ag, Al, As, B, Ba, Cd, Cr, Cu, Co, Hg, Nb, Ni, Mo, Pb, Pd, Se, Sn, V, Zn.

The handling of hydrochemical data follow the same routine for quality control and data management independently of sampling method or type of sampling object.

4.4 Results

The field measurements that were performed on weekly collected samples are compiled in Appendix 4, Table 4-1.

The chemical analyses that were performed for a collective sample are compiled in Appendix 4, Table 4-2. Concentrations of elements are, as expected, very low and often are below/close to reporting limits. This largely impact the charge balance. Therefore, it often exceeds designated accepted limits for surface waters, $\pm 10\%$, or is unable to calculate. Reported results of aluminium and zinc do however show some values of higher concentrations, likely due to contamination. The risk of contamination is high for these common metals due to low natural concentrations and frequent use in different equipment.

The isotope analyses that were performed for a collective sample are compiled in Appendix 4, Table 4-2b. Stable isotopes of water well corresponds to the Global Meteoric Water Line (Craig 1961) and are not biased by evaporation during summer time, see Figure 4-5. Tritium content, the indicator of an activity of nuclear power plant, is between 5.4 and 12.3 TU, Figure 4-6. This corresponds to the same levels observed under monitoring program 2002–2008.

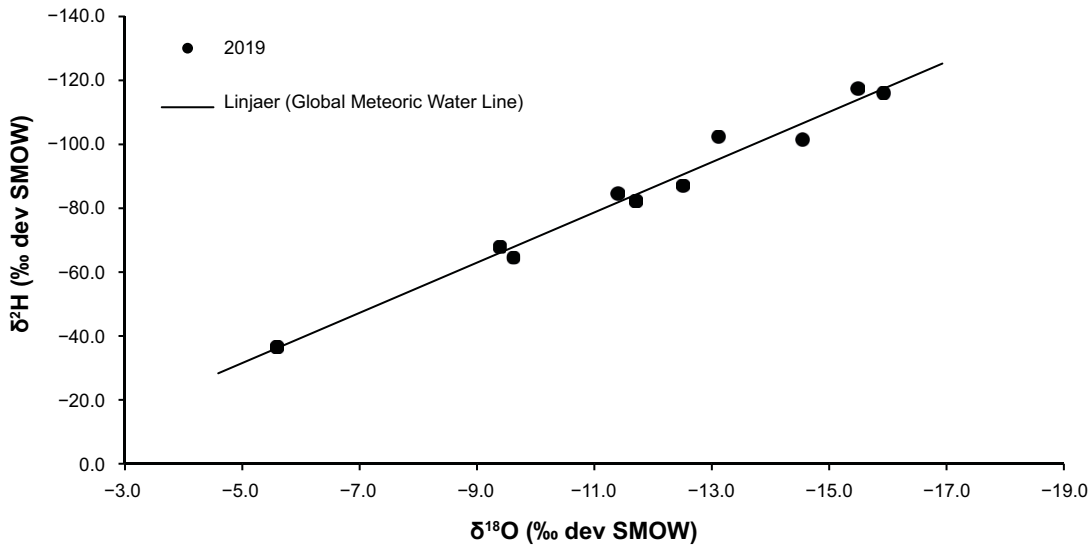


Figure 4-5. $\delta^{18}\text{O}$ plotted versus $\delta^2\text{H}$ and compared with the Global Meteoric Water Line (Craig 1961).

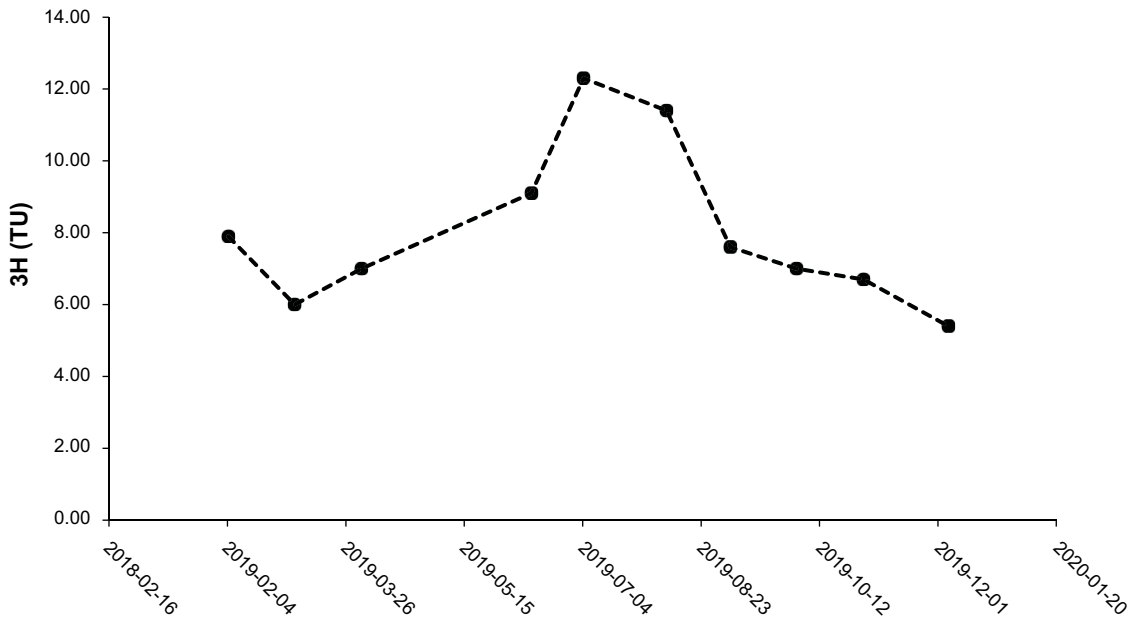


Figure 4-6. Tritium contents in precipitation collected at the Forsmark site.

4.5 Summary

The precipitation results that were collected in 2019, starting in November 2018, do not show significant deviation from previously reported results obtained under monitoring program 2002–2008. Most trace metals results were reported below the reporting limit. Where results showed above reporting limit, risk of contamination is to be considered.

References

SKB's (Svensk Kärnbränslehantering AB) publications can be found at www.skb.com/publications. SKBdoc documents will be submitted upon request to document@skb.se.

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Sampling and analytical methods

Table A1-1. Methods, reporting limits and measurement uncertainties.

Component	Method ¹	Reporting limits (RL), detection limits (DL) or range ²	Unit	Measurement uncertainty ³
pH	Potentiometric	3–10	pH unit	± 0.1
EC	Electrical Conductivity meas.	2–150 150–10 000	mS/m	5 % 3 %
HCO ₃	Alkalinity titration	2	mg/L	4 %
Cl ⁻	Mohr-titration	≥ 70	mg/L	5 %
Cl ⁻	IC	0.5–70	mg/L	8 %
SO ₄	IC	0.5	mg/L	12 %
Br ⁻	IC	DL 0.2, RL 0.5	mg/L	15 %
Br	ICP SFMS	0.001, 0.004, 0.010 ⁴	mg/L	25 % ⁵
F ⁻	IC	DL 0.2, RL 0.5	mg/L	13 %
F ⁻	Potentiometric	DL 0.1, RL 0.2	mg/L	12 %
I ⁻	ICP SFMS	0.001, 0.004, 0.010 ⁴	mg/L	25 % ⁵
Na	ICP AES	0.1	mg/L	13 %
K	ICP AES	0.4	mg/L	12 %
Ca	ICP AES	0.1	mg/L	12 %
Mg	ICP AES	0.09	mg/L	12 %
S(tot)	ICP AES	0.16	mg/L	12 %
Si(tot)	ICP AES	0.03	mg/L	14 %
Sr	ICP AES	0.002	mg/L	12 %
Li	ICP AES	0.004	mg/L	12.2 %
Fe	ICP AES	0.02	mg/L	13.3 % ⁶
Fe	ICP SFMS	0.0004, 0.002, 0.004 ⁴	mg/L	20 % ⁶
Mn	ICP AES	0.003	mg/L	12.1 % ⁵
Mn	ICP SFMS	0.00003, 0.00004, 0.0001 ⁴	mg/L	53 % ⁶
Fe(II), Fe(tot)	Spectrophotometry	DL 0.006, RL 0.02	mg/L	0.005 (0.02–0.05 mg/L) 9 % (0.05–1 mg/L) 7 % (1–3 mg/L)
HS ⁻	Spectrophotometry, SKB	SKB DL 0.006, RL 0.02	mg/L	25 %
HS ⁻	Spectrophotometry, external laboratory	0.01	mg/L	0.02 (0.01–0.2 mg/L) 12 % (> 0.2 mg/L)
NO ₂ as N	Spectrophotometry	0.1	µg/L	2 %
NO ₃ as N	Spectrophotometry	0.2	µg/L	5 %
NO ₂ +NO ₃ as N	Spectrophotometry	0.2	µg/L	0.2 (0.2–20 µg/L) 2 % (> 20 µg/L)
NH ₄ as N	Spectrophotometry, SKB	11	µg/L	30 % (11–20 µg/L) 25 % (20–50 µg/L) 12 % (50–1 200 µg/L)
NH ₄ as N	Spectrophotometry external laboratory	0.8	µg/L	0.8 (0.8–20 µg/L) 5 % (> 20 µg/L)
PO ₄ as P	Spectrophotometry	0.7	µg/L	0.7 (0.7–20 µg/L) 3 % (> 20 µg/L)

Component	Method ¹	Reporting limits (RL), detection limits (DL) or range ²	Unit	Measurement uncertainty ³
SiO ₄	Spectrophotometry	1	µg/L	2.5 % (> 100 µg/L)
O ₂	Iodometric titration	0.2–20	mg/L	5 %
Chlorophyll a, c pheopigment ⁷	Spectrophotometry	0.5	µg/L	5 %
PON ⁷	Leco	0.5	µg/L	5 %
POP ⁷	500 °C + persulphate	0.1	µg/L	5 %
POC ⁷	Leco	1	µg/L	4 %
Tot-N ⁷	SFA	10	µg/L	4 %
Tot-P ⁷	SFA	0.5	µg/L	6 %
Al	ICP SFMS	0.2, 0.3, 0.7 ⁴	µg/L	17.6 % ⁶
Zn	ICP SFMS	0.2, 0.8, 2 ⁴	µg/L	15.5, 17.7, 25.5 % ⁶
Ba, Cr, Mo	ICP SFMS	0.01, 0.04, 0.1 ⁴	µg/L	Ba 15 % ⁴ , Cr 22 % ⁵ , Mo 39 % ⁶
Pb	ICP SFMS	0.01, 0.1, 0.3 ⁴	µg/L	15 % ⁶
Cd	ICP SFMS	0.002, 0.02, 0.5 ⁴	µg/L	15.5 % ⁶
Hg	ICP AFS	0.002	µg/L	10.7 % ⁶
Co	ICP SFMS	0.005, 0.02, 0.05 ⁴	µg/L	25.9 % ⁶
V	ICP SFMS	0.005, 0.03, 0.05 ⁴	µg/L	18.1 % ⁶
Cu	ICP SFMS	0.1, 0.2, 0.5 ⁴	µg/L	14.4 % ⁶
Ni	ICP SFMS	0.05, 0.2, 0.5 ⁴	µg/L	15.8 % ⁶
P	ICP SFMS	1, 5, 40 ⁴	µg/L	16.3 % ⁶
As	ICP SFMS	0.01 (520 mS/m)	µg/L	59.2 % ⁶
La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu	ICP SFMS	0.005, 0.02, 0.05 ⁴	µg/L	20 %, 20 %, 25 % ⁶
Sc, In, Th	ICP SFMS	0.05, 0.2, 0.5 ⁴	µg/L	25 % ⁶
Rb, Zr, Sb, Cs	ICP SFMS	0.025, 0.1, 0.25 ⁴	µg/L	15 %, 20 %, 20 % ⁵ 25 % ⁶
Tl	ICP SFMS	0.025, 0.1, 0.25 ⁴	µg/L	14.3 % ^{5 and 6}
Y, Hf	ICP SFMS	0.005, 0.02, 0.05 ⁴	µg/L	15 %, 20 %, 20 % ⁵ 25 % ⁶
U	ICP SFMS	0.001, 0.005, 0.01 ⁴	µg/L	13.5 %, 14.3 %, 15.9 % ⁵ 19.1 %, 17.9 %, 20.9 % ⁶
DOC	UV oxidation, IR Carbon analysator	0.5	mg/L	8 %
TOC	UV oxidation, IR Carbon analysator	0.5	mg/L	10 %
δ ² H	MS	2	‰ SMOW ⁸	0.9 (one standard deviation)
δ ¹⁸ O	MS	0.1	‰ SMOW ⁸	0.1 (one standard dev.)
³ H	LSC	0.8	TU ⁹	0.8
δ ³⁷ Cl	A (MS)	0.2	‰ SMOC ¹⁰	0.2 ¹⁷
δ ¹³ C	A (MS)	-	‰ PDB ¹¹	0.3 ¹⁷
¹⁴ C pmc	A (MS)	-	PMC ¹²	0.4 ¹⁷
δ ³⁴ S	MS	0.2	‰ CDT ¹³	0.4 (one standard dev.)

Component	Method ¹	Reporting limits (RL), detection limits (DL) or range ²	Unit	Measurement uncertainty ³
⁸⁷ Sr/ ⁸⁶ Sr	TIMS	-	No unit (ratio) ¹⁴	0.00002
¹⁰ B/ ¹¹ B	ICP SFMS	-	No unit (ratio) ¹⁴	-
²³⁴ U, ²³⁵ U, ²³⁸ U, ²³² Th, ³⁰ Th	Alfa spectr.	0.0001	Bq/L ¹⁵	≤ 5 % (Counting statistics uncertainty)
²²² Rn, ²²⁶ Ra	LSS	0.015	Bq/L	≤ 5 % (Count. stat. uncert.)

- Many elements may be determined by more than one ICP technique depending on concentration range. The most relevant technique and measurement uncertainty for the concentrations normally encountered in groundwater are presented. In cases where two techniques were frequently used, both are displayed.
- Reporting limits (RL), generally 10 × standard deviation, if nothing else is stated. Measured values below RL or DL are stored as negative values in SICADA (i.e. -RL value and -DL value).
- Measurement uncertainty reported by the laboratory, generally as ± percent of measured value in question at 95 % confidence interval.
- Reporting limits at electrical cond. 520 mS/m, 1 440 mS/m and 3810 mS/m respectively.
- Measurement uncertainty at concentrations 100 × RL.
- Measurement uncertainty at concentrations 10 × RL.
- Determined only in surface waters. PON, POP and POC refers to Particulate Organic Nitrogen, Phosphorous and Carbon, respectively.
- Per mille deviation¹⁶ from SMOW (Standard Mean Oceanic Water).
- TU = Tritium Units, where one TU corresponds to a tritium/hydrogen ratio of 10⁻¹⁸ (1 Bq/L Tritium = 8.45 TU).
- Per mille deviation¹⁶ from SMOC (Standard Mean Oceanic Chloride).
- Per mille deviation¹⁶ from PDB (the standard PeeDee Belemnite).
- The following relation is valid between pmC (percent modern carbon) and Carbon-14 age:

$$\text{pmC} = 100 \times e^{((1950-y-1.031)/8274)}$$
where y = the year of the C-14 measurement and t = C-14 age.
- Per mille deviation¹⁶ from CDT (the standard Canyon Diablo Troilite).
- Isotope ratio without unit.
- The following expressions are applicable to convert activity to concentration, for uranium-238 and thorium-232:
1 ppm U = 12.4 Bq/kg²³⁸U, 1 ppm Th = 3.93 Bq/kg²³²Th.
- Isotopes are often reported as per mill deviation from a standard. The deviation is calculated as:

$$\delta y = 1000 \times (K_{\text{sample}} - K_{\text{standard}}) / K_{\text{standard}}$$
where K = the isotope ratio and y = ²H, ¹⁸O, ³⁷Cl, ¹³C or ³⁴S etc.
- SKB estimation from duplicate analyses by the contracted laboratory.

Near surface groundwater, compilation of hydrochemical data from water analysis

Table A2-1. Field measurements.

Idcode	Measuring date (yyyy-mm-dd)	Sample no	Water temp, (°C)	pH	EC (mS/m)	O ₂ dissolved (mg/L)	Oxygen (%)	ORP (mV)
SFM0001	2019-01-16	62859	5.95	7.24	178.9	-0.04	-0.3	-389
SFM0001	2019-04-23	65782	6.43	7.36	86.4	0.14	1.2	-430
SFM0001	2019-08-13	69023	9.04	7.41	129.8	-0.11	-0.9	-440
SFM0001	2019-10-17	71196	8.83	7.23	112.9	-0.16	-1.4	-390
SFM0002	2019-01-16	62860	7.68	7.07	72.1	0.04	0.3	-350
SFM0002	2019-04-24	65783	7.14	6.98	69.8	-0.11	-0.9	-410
SFM0002	2019-08-12	69024	9.56	7.13	68.9	-0.10	-0.8	-390
SFM0002	2019-10-16	71197	9.29	7.03	71.7	-0.17	-1.5	-360
SFM0011	2019-01-17	62861	5.62	7.57	658.7	-0.03	-0.2	-404
SFM0011	2019-04-25	65784	7.57	7.47	658.2	-0.14	-1.2	-450
SFM0011	2019-08-12	69025	10.38	7.60	622.0	-0.15	-1.4	-430
SFM0011	2019-10-16	71198	8.61	7.54	589.6	-0.09	-0.8	-370
SFM0032	2019-01-14	62862	5.05	6.98	91.9	0.00	0.0	-325
SFM0032	2019-04-24	65785	6.38	7.05	82.9	-0.12	-1.0	-460
SFM0032	2019-08-13	69026	12.06	7.17	90.5	-0.14	-1.3	-430
SFM0037	2019-01-15	62863	3.22	6.98	75.2	0.06	0.5	-307
SFM0037	2019-04-25	65786	7.03	7.22	61.0	0.99	8.1	-250
SFM0037	2019-08-13	69027	13.02	6.98	54.9	0.08	0.7	-240
SFM0037	2019-10-17	71200	8.69	7.12	53.9	0.28	2.4	-210
SFM0049	2019-01-15	62864	4.90	7.11	47.2	0.73	5.7	-234
SFM0049	2019-04-23	65787	5.17	6.73	35.0	-0.10	-0.8	-370
SFM0049	2019-08-13	69028	14.34	6.91	39.3	-0.14	-1.4	-430
SFM0057	2019-01-17	62865	5.58	7.08	51.0	0.05	0.4	-250
SFM0057	2019-04-24	65788	6.25	7.05	44.4	-0.11	-0.9	-370
SFM0057	2019-08-12	69029	11.03	7.11	50.6	0.74	6.7	-190

Table A2-2a. Major components.

Idcode	Secup (m)	Seclow (m)	Date (yyyy-mm-dd)	Sample no	RCB (%)	Na (mg/l)	K (mg/l)	Ca (mg/l)	Mg (mg/l)	Alk (mg/l)	Cl (mg/l)	SO ₄ (mg/l)	SO ₄ -S (mg/l)	Br ⁻ (mg/l)
SFM0001	3.95	4.95	2019-01-16	62859	2.08	236	18	104	37	514	240	138	49	1
SFM0001	3.95	4.95	2019-04-23	65782	3.62	96	11	69	19	316	81	57	22	0
SFM0001	3.95	4.95	2019-08-13	69023	7.96	161	14	83	25	413	154	91	33	1
SFM0001	3.95	4.95	2019-10-17	71196	0.73	130	13	79	22	403	121	76	26	1
SFM0002	4.21	5.21	2019-01-16	62860	2.11	17	4	124	9	357	50	12	4	0
SFM0002	4.21	5.21	2019-04-24	65783	1.94	16	4	122	9	352	47	11	4	1
SFM0002	4.21	5.21	2019-08-12	69024	2.6	16	4	124	9	353	50	12	4	0
SFM0002	4.21	5.21	2019-10-16	71197	2.01	16	5	122	9	349	52	12	4	1
SFM0011	3.50	4.50	2019-01-17	62861	-0.43	1100	27	161	72	326	1840	279	92	8
SFM0011	3.50	4.50	2019-04-25	65784	-0.76	1100	26	165	73	320	1870	235	90	8
SFM0011	3.50	4.50	2019-08-12	69025	3.74	1080	27	155	73	331	1770	242	89	7
SFM0011	3.50	4.50	2019-10-16	71198	-0.07	1030	24	131	62	339	1650	232	79	7
SFM0032	3.00	4.00	2019-01-14	62862	4.3	47	7	146	12	361	74	71	26	0
SFM0032	3.00	4.00	2019-04-24	65785	1.82	34	6	127	10	351	59	50	18	0
SFM0032	3.00	4.00	2019-08-13	69026	8.85	47	7	134	12	377	78	47	17	0
SFM0032	3.00	4.00	2019-10-15	71199	1.52	35	7	132	11	379	61	48	17	0
SFM0037	2.00	3.00	2019-01-15	62863	3.13	30	7	123	14	259	24	136	53	0
SFM0037	2.00	3.00	2019-04-25	65786	3.05	18	5	105	10	315	15	43	16	0
SFM0037	2.00	3.00	2019-08-13	69027	8.45	16	2	88	8	208	9	82	30	0
SFM0037	2.00	3.00	2019-10-17	71200	3.14	16	4	92	9	275	10	41	15	0
SFM0049	4.00	5.00	2019-01-15	62864	3.29	24	3	71	5	139	34	62	25	0
SFM0049	4.00	5.00	2019-04-23	65787	3.18	17	4	51	4	156	22	12	5	0
SFM0049	4.00	5.00	2019-08-13	69028	3.94	19	3	59	5	195	24	2	1	0
SFM0049	4.00	5.00	2019-10-15	71201	3.79	19	3	59	5	194	25	3	1	0
SFM0057	3.55	4.55	2019-01-17	62865	3.57	6	3	99	5	289	9	15	5	0
SFM0057	3.55	4.55	2019-04-24	65788	3.56	5	2	89	4	265	4	9	3	0
SFM0057	3.55	4.55	2019-08-12	69029	2.28	6	3	104	5	327	4	8	3	0
SFM0057	3.55	4.55	2019-10-15	71202	0.6	7	3	118	6	382	7	9	3	0

Table A2-2a. Continued.

Idcode	Secup (m)	Seclow (m)	Date (yyyy-mm-dd)	Sample no	RCB (%)	F ⁻ (mg/l)	Si (mg/l)	Fe (mg/l)	Fe-tot (mg/l)	Fe ²⁺ (mg/l)	Mn (mg/l)	Li (mg/l)	Sr (mg/l)	pH (pH unit)	EC (lab) (mS/m)	Sulphide (mg/l)	I ⁻ (mg/l)
SFM0001	3.95	4.95	2019-01-16	62859	2.08	1	8	3	3	3	0	0	0	7	175	0	0
SFM0001	3.95	4.95	2019-04-23	65782	3.62	1	6	2	2	2	0	0	0	7	85	0	0
SFM0001	3.95	4.95	2019-08-13	69023	7.96	1	7	2	2	2	0	13	0	7	126	0	9
SFM0001	3.95	4.95	2019-10-17	71196	0.73	1	8	2	2	2	0	0	0	7	112	0	0
SFM0002	4.21	5.21	2019-01-16	62860	2.11	0	6	3	3	3	0	0	0	7	73	0	0
SFM0002	4.21	5.21	2019-04-24	65783	1.94	0	6	3	1	1	0	0	0	7	70	0	0
SFM0002	4.21	5.21	2019-08-12	69024	2.6	1	6	3	3	3	0	< 4	0	7	70	0	8
SFM0002	4.21	5.21	2019-10-16	71197	2.01	1	6	3	3	3	0	0	0	7	71	0	0
SFM0011	3.50	4.50	2019-01-17	62861	-0.43	1	7	1	1	1	0	0	1	7	637	< 0.019	0
SFM0011	3.50	4.50	2019-04-25	65784	-0.76	1	6	0	1	1	0	0	1	7	652	< 0.019	0
SFM0011	3.50	4.50	2019-08-12	69025	3.74	1	7	1	1	1	0	30	1	7	606	0	20
SFM0011	3.50	4.50	2019-10-16	71198	-0.07	1	7	1	1	1	0	0	1	7	567	< 0.019	0
SFM0032	3.00	4.00	2019-01-14	62862	4.3	1	7	2	2	2	0	0	0	7	92	< 0.019	0
SFM0032	3.00	4.00	2019-04-24	65785	1.82	1	6	2	3	3	0	0	0	7	81	< 0.019	0
SFM0032	3.00	4.00	2019-08-13	69026	8.85	1	8	3	3	2	0	9	0	7	88	0	9
SFM0032	3.00	4.00	2019-10-15	71199	1.52	1	7	3	3	3	0	0	0	7	84	0	0
SFM0037	2.00	3.00	2019-01-15	62863	3.13	1	6	0	0	0	0	0	0	7	75	0	< 0.001
SFM0037	2.00	3.00	2019-04-25	65786	3.05	0	7	1	1	1	0	0	0	7	62	0	0
SFM0037	2.00	3.00	2019-08-13	69027	8.45	1	6	0	0	0	0	6	0	7	51	0	3
SFM0037	2.00	3.00	2019-10-17	71200	3.14	1	6	1	1	1	0	0	0	7	54	0	0
SFM0049	4.00	5.00	2019-01-15	62864	3.29	0	5	0	0	0	0	0	0	7	48	0	< 0.001
SFM0049	4.00	5.00	2019-04-23	65787	3.18	0	5	0	0	0	0	0	0	7	35	0	0
SFM0049	4.00	5.00	2019-08-13	69028	3.94	0	5	1	1	1	0	< 4	0	7	38	0	8
SFM0049	4.00	5.00	2019-10-15	71201	3.79	0	6	1	1	1	0	0	0	7	39	0	0
SFM0057	3.55	4.55	2019-01-17	62865	3.57	0	4	0	0	0	0	0	0	7	51	< 0.019	0
SFM0057	3.55	4.55	2019-04-24	65788	3.56	1	4	0	0	0	0	0	0	7	44	< 0.019	0
SFM0057	3.55	4.55	2019-08-12	69029	2.28	0	5	0	0	0	0	< 4	0	7	51	< 0.019	4
SFM0057	3.55	4.55	2019-10-15	71202	0.6	0	5	0	0	0	0	0	0	7	60	< 0.019	0

Table A2-2b. Biochemical components.

Idcode	Secup (m)	Seclow (m)	Date (yyyy-mm-dd)	Sample no	NH ₄ -N (mg/L)	NO ₂ -N (mg/L)	NO ₃ -N+NO ₂ -N (mg/L)	NO ₃ -N (mg/L)	N-tot (mg/L)	P-tot (mg/L)	PO ₄ -P (mg/L)	PO ₄ -P hlysis (mg/L)	SiO ₂ -Si (mg/L)	TOC (mg/L)	DOC (mg/L)	DIC (mg/L)
SFM0001	3.95	4.95	2019-01-16	62859	0.2740	0.0005	0.0008	0.0003	1.2400	0.0433	0.0373	0.0438	8.20	33	33	98
SFM0001	3.95	4.95	2019-04-23	65782	0.1530	0.0004	0.0008	0.0003	1.2000	0.0315	0.0241	0.0276	6.35	38	38	63
SFM0001	3.95	4.95	2019-08-13	69023	0.1920	0.0005	0.0010	0.0004	1.1700	0.0400	0.0349	0.0363	7.28	35	35	73
SFM0001	3.95	4.95	2019-10-17	71196	0.1910	0.0004	0.0005	< 0.0003	1.2600	0.0398	0.0311	0.0349	7.69	38	38	77
SFM0002	4.21	5.21	2019-01-16	62860	0.0622	0.0008	0.0029	0.0021	0.4900	0.0083	0.0018	0.0061	5.93	18	17	64
SFM0002	4.21	5.21	2019-04-24	65783	0.0625	< 0.0002	0.0005	0.0005	0.4750	0.0092	0.0011	0.0089	5.65	18	18	54
SFM0002	4.21	5.21	2019-08-12	69024	0.0667	0.0003	0.0004	< 0.0003	0.4850	0.0107	0.0023	0.0094	5.84	18	19	59
SFM0002	4.21	5.21	2019-10-16	71197	0.0672	< 0.0002	0.0005	0.0004	0.4680	0.0099	0.0037	0.0095	5.98	17	17	59
SFM0011	3.50	4.50	2019-01-17	62861	0.8950	0.0002	0.0047	0.0045	1.0500	0.0210	0.0015	0.0125	6.74	6	6	46
SFM0011	3.50	4.50	2019-04-25	65784	0.9020	0.0011	0.0019	0.0008	1.0400	0.0128	0.0052	0.0123	6.41	6	6	47
SFM0011	3.50	4.50	2019-08-12	69025	0.8870	0.0003	0.0005	< 0.0003	1.0200	0.0335	0.0011	0.0125	6.65	6	6	54
SFM0011	3.50	4.50	2019-10-16	71198	0.8200	0.0004	0.0024	0.0020	1.0000	0.0191	0.0028	0.0149	6.56	7	7	43
SFM0032	3	4	2019-01-14	62862	0.0870	0.0004	0.0012	0.0008	0.6380	0.0091	0.0021	0.0066	6.70	19	19	68
SFM0032	3	4	2019-04-24	65785	0.0858	< 0.0002	0.0006	0.0006	0.6280	0.0101	0.0011	0.0092	6.21	20	20	64
SFM0032	3	4	2019-08-13	69026	0.0646	0.0003	0.0007	0.0004	0.6870	0.0127	0.0048	0.0099	7.49	21	22	55
SFM0032	3	4	2019-10-15	71199	0.0923	0.0003	< 0.0003	< 0.0003	0.6480	0.0126	0.0034	0.0108	7.32	20	20	65
SFM0037	2	3	2019-01-15	62863	0.0152	0.0017	0.0178	0.0160	1.1900	0.0281	0.0020	0.0015	5.41	34	35	55
SFM0037	2	3	2019-04-25	65786	0.0194	0.0004	0.0014	0.0010	1.4200	0.0339	0.0033	0.0045	6.67	40	40	62
SFM0037	2	3	2019-08-13	69027	0.0028	0.0006	< 0.0003	< 0.0003	1.1900	0.0275	0.0005	0.0008	5.76	37	35	39
SFM0037	2	3	2019-10-17	71200	0.0162	0.0015	0.0121	0.0106	1.5600	0.0393	0.0041	0.0045	6.18	49	45	59
SFM0049	4	5	2019-01-15	62864	0.0498	0.0014	0.1220	0.1210	0.9020	0.0112	0.0027	0.0030	5.21	25	25	27
SFM0049	4	5	2019-04-23	65787	0.0279	0.0002	0.0062	0.0060	0.5820	0.0089	0.0036	0.0040	5.07	19	19	31
SFM0049	4	5	2019-08-13	69028	0.0645	0.0003	0.0006	< 0.0003	0.8250	0.0123	0.0046	0.0050	4.54	26	26	38
SFM0049	4	5	2019-10-15	71201	0.0744	0.0002	< 0.0003	< 0.0003	0.6680	0.0107	0.0068	0.0071	5.61	22	22	35
SFM0057	3.55	4.55	2019-01-17	62865	0.0031	0.0108	1.3900	1.3800	1.8900	0.0070	0.0027	0.0037	4.40	16	17	51
SFM0057	3.55	4.55	2019-04-24	65788	0.0014	0.1310	1.2400	1.1100	1.6600	0.0062	0.0024	0.0026	3.94	14	14	45
SFM0057	3.55	4.55	2019-08-12	69029	0.0032	0.0004	0.0056	0.0052	0.4810	0.0090	0.0031	0.0029	4.65	14	14	48
SFM0057	3.55	4.55	2019-10-15	71202	0.0127	< 0.0002	< 0.0003	< 0.0003	0.4560	0.0076	0.0039	0.0036	5.09	14	14	62

Table A2-2c. Isotopes.

Idcode	Secup (m)	Seclow (m)	Date (yyyy-mm-dd)	Sample no	$\delta^2\text{H}$ (‰ SMOW)	^3H (TU)	$\delta^{18}\text{O}$ (‰ SMOW)
SFM0001	3.95	4.95	2019-01-16	62859	-78.3	8	-10.93
SFM0001	3.95	4.95	2019-04-23	65782	-87.6	7	-12.18
SFM0001	3.95	4.95	2019-08-13	69023	-84	5	-11.67
SFM0001	3.95	4.95	2019-10-17	71196	-81.2	8	-11.19
SFM0002	4.21	5.21	2019-01-16	62860	-83.1	6	-11.71
SFM0002	4.21	5.21	2019-04-24	65783	-84.8	7	-11.91
SFM0002	4.21	5.21	2019-08-12	69024	-86.0	6	-12.12
SFM0002	4.21	5.21	2019-10-16	71197	-85.7	7	-12.04
SFM0011	3.50	4.50	2019-01-17	62861	-70.7	1	-9.60
SFM0011	3.50	4.50	2019-04-25	65784	-70.4	2	-9.48
SFM0011	3.50	4.50	2019-08-12	69025	-71.6	1	-9.76
SFM0011	3.50	4.50	2019-10-16	71198	-71.1	1	-9.62
SFM0032	3	4	2019-01-14	62862	-81.2	7	-11.13
SFM0032	3	4	2019-04-24	65785	-84	6	-11.75
SFM0032	3	4	2019-08-13	69026	-81.4	7	-11.42
SFM0032	3	4	2019-10-15	71199	-80.4	7	-11.19
SFM0037	2	3	2019-01-15	62863	-78.6	8	-10.84
SFM0037	2	3	2019-04-25	65786	-84.9	9	-11.71
SFM0037	2	3	2019-08-13	69027	-66.8	9	-9.42
SFM0037	2	3	2019-10-17	71200	-71.8	11	-10.17
SFM0049	4	5	2019-01-15	62864	-70.8	7	-8.83
SFM0049	4	5	2019-04-23	65787	-79.8	9	-10.70
SFM0049	4	5	2019-08-13	69028	-65.6	8	-8.64
SFM0049	4	5	2019-10-15	71201	-67.3	10	-8.98
SFM0057	3.55	4.55	2019-01-17	62865	-75.6	8	-10.62
SFM0057	3.55	4.55	2019-04-24	65788	-99.1	8	-13.60
SFM0057	3.55	4.55	2019-08-12	69029	-78.6	9	-10.96
SFM0057	3.55	4.55	2019-10-15	71202	-78.2	9	-10.82

Table A2-2d. Trace elements I.

Idcode	Secup (m)	Seclow (m)	Date (yyyy/mm/dd)	Sample no	Ag (µg/L)	Al (µg/L)	As (µg/L)	B (µg/L)	Ba (µg/L)	Cd (µg/L)	Cr (µg/L)	Cu (µg/L)	Co (µg/L)	Hg (µg/L)
SFM0001	3.95	4.95	2019-01-16	62859	-	32.5	-	-	55.8	< 0.002	0.381	0.292	0.135	< 0.002
SFM0001	3.95	4.95	2019-04-23	65782	-	42.5	-	-	22.5	0.00228	0.374	2.13	0.0912	< 0.002
SFM0001	3.95	4.95	2019-08-13	69023	-	32.7	-	-	35.3	0.00207	0.363	0.248	0.104	< 0.002
SFM0001	3.95	4.95	2019-10-17	71196	< 0.05	47.3	3.29	181	34.2	0.00368	0.456	-	0.117	< 0.002
SFM0002	4.21	5.21	2019-01-16	62860	-	25.1	-	-	103	< 0.002	0.332	0.203	0.0613	< 0.002
SFM0002	4.21	5.21	2019-04-24	65783	-	19.8	-	-	96.7	0.00281	0.244	0.385	0.0356	< 0.002
SFM0002	4.21	5.21	2019-08-12	69024	-	23	-	-	93.1	< 0.002	0.39	0.148	0.0572	< 0.002
SFM0002	4.21	5.21	2019-10-16	71197	< 0.05	25.1	0.496	21	99.7	< 0.002	0.374	-	0.0786	< 0.002
SFM0011	3.50	4.50	2019-01-17	62861	-	1.55	-	-	54.3	0.00701	0.0364	< 0.1	0.119	< 0.002
SFM0011	3.50	4.50	2019-04-25	65784	-	5.85	-	-	51	0.00651	0.0179	0.0939	0.0836	< 0.002
SFM0011	3.50	4.50	2019-08-12	69025	-	1.33	-	-	51.7	< 0.02	0.0718	< 0.2	0.103	< 0.002
SFM0011	3.50	4.50	2019-10-16	71198	< 0.05	1.18	3.44	439	45.6	0.00669	0.0342	-	0.0817	< 0.002
SFM0032	3	4	2019-01-14	62862	-	11.8	-	-	81.2	0.00293	0.193	0.258	0.122	< 0.002
SFM0032	3	4	2019-04-24	65785	-	11.3	-	-	63.9	< 0.002	0.152	0.626	0.0721	< 0.002
SFM0032	3	4	2019-08-13	69026	-	16.1	-	-	70.1	< 0.002	0.246	0.116	0.0818	< 0.002
SFM0032	3	4	2019-10-15	71199	< 0.05	16.1	1.6	44.7	68.7	0.00308	0.236	-	0.082	< 0.002
SFM0037	2	3	2019-01-15	62863	-	29	-	-	71.1	0.0354	0.302	3.08	0.315	< 0.002
SFM0037	2	3	2019-04-25	65786	-	29.3	-	-	58.7	0.0482	0.284	1.09	0.189	0.00297
SFM0037	2	3	2019-08-13	69027	-	59.2	-	-	51.9	0.0389	0.503	3.4	0.527	< 0.002
SFM0037	2	3	2019-10-17	71200	< 0.05	55.9	1.01	47.1	46.1	0.00947	0.354	-	0.248	0.00324
SFM0049	4	5	2019-01-15	62864	-	28.8	-	-	42.3	0.0429	0.179	2.73	0.487	< 0.002
SFM0049	4	5	2019-04-23	65787	-	29.3	-	-	28.4	0.0119	0.0998	1.57	0.11	< 0.002
SFM0049	4	5	2019-08-13	69028	-	43.9	-	-	25.5	< 0.002	0.261	0.26	0.193	< 0.002
SFM0049	4	5	2019-10-15	71201	< 0.05	26	0.794	< 10	23.2	< 0.002	0.182	-	0.108	< 0.002
SFM0057	3.55	4.55	2019-01-17	62865	-	54.9	-	-	47.5	0.0169	0.282	6.88	0.192	0.0035
SFM0057	3.55	4.55	2019-04-24	65788	-	51.7	-	-	36.5	0.0111	0.183	6	0.118	0.00539
SFM0057	3.55	4.55	2019-08-12	69029	-	31.5	-	-	48.5	0.0166	0.238	8.01	0.174	0.00261
SFM0057	3.55	4.55	2019-10-15	71202	< 0.05	46.4	0.624	12.2	55.4	0.0237	0.27	-	0.207	0.00296

Table A2-2d. Continued.

Idcode	Secup (m)	Seclow (m)	Date (yyyy/mm/dd)	Sample no	Nb (µg/L)	Ni (µg/L)	Mo (µg/L)	Pb (µg/L)	Pd (µg/L)	Se (µg/L)	Sn (µg/L)	V (µg/L)	Zn (µg/L)
SFM0001	3.95	4.95	2019-01-16	62859	-	0.657	1.11	0.0836	-	< 0.5	-	2.53	0.417
SFM0001	3.95	4.95	2019-04-23	65782	-	0.847	2.27	0.209	-	< 0.5	-	1.82	0.234
SFM0001	3.95	4.95	2019-08-13	69023	0.193	0.599	1.72	0.0852	-	< 0.5	-	2.78	0.764
SFM0001	3.95	4.95	2019-10-17	71196	0.209	1.15	-	-	0.0221	< 0.5	< 0.05	3.22	-
SFM0002	4.21	5.21	2019-01-16	62860	-	0.49	1.23	0.0319	-	< 0.5	-	2.91	1.25
SFM0002	4.21	5.21	2019-04-24	65783	-	0.166	0.962	0.0202	-	< 0.5	-	1.89	0.421
SFM0002	4.21	5.21	2019-08-12	69024	0.307	0.449	1.09	0.0344	-	< 0.5	-	2.98	0.741
SFM0002	4.21	5.21	2019-10-16	71197	0.269	0.358	-	-	0.0215	< 0.5	< 0.05	3.02	-
SFM0011	3.50	4.50	2019-01-17	62861	-	0.254	7.53	0.027	-	3.44	-	0.444	0.554
SFM0011	3.50	4.50	2019-04-25	65784	-	0.0832	6.66	< 0.02	-	6.15	-	0.0864	0.432
SFM0011	3.50	4.50	2019-08-12	69025	0.0141	0.363	9.49	< 0.1	-	< 3	-	0.422	< 0.8
SFM0011	3.50	4.50	2019-10-16	71198	0.02	0.235	-	-	0.00208	< 0.5	< 0.05	0.438	-
SFM0032	3	4	2019-01-14	62862	-	0.844	2.44	0.314	-	< 0.5	-	1.66	0.879
SFM0032	3	4	2019-04-24	65785	-	0.543	1.78	0.098	-	< 0.5	-	1.2	0.283
SFM0032	3	4	2019-08-13	69026	0.117	0.523	2.02	0.0642	-	< 0.5	-	2.17	0.389
SFM0032	3	4	2019-10-15	71199	0.0902	0.531	-	-	0.0146	< 0.5	< 0.05	1.81	-
SFM0037	2	3	2019-01-15	62863	-	1.81	2.18	0.422	-	< 0.5	-	1.42	6.76
SFM0037	2	3	2019-04-25	65786	-	1.76	1.29	0.53	-	< 0.5	-	1.62	1.19
SFM0037	2	3	2019-08-13	69027	0.0848	2.51	3.19	1.42	-	< 0.5	-	3.22	4.66
SFM0037	2	3	2019-10-17	71200	0.095	1.93	-	-	0.0096	< 0.5	< 0.05	1.82	-
SFM0049	4	5	2019-01-15	62864	-	0.763	0.492	1.51	-	< 0.5	-	0.836	1.8
SFM0049	4	5	2019-04-23	65787	-	0.354	0.191	0.602	-	< 0.5	-	0.433	0.762
SFM0049	4	5	2019-08-13	69028	0.0839	0.476	0.153	0.35	-	< 0.5	-	1.44	1.08
SFM0049	4	5	2019-10-15	71201	0.0558	0.269	-	-	0.0029	< 0.5	< 0.05	0.846	-
SFM0057	3.55	4.55	2019-01-17	62865	-	0.745	0.493	0.0899	-	< 0.5	-	0.603	0.435
SFM0057	3.55	4.55	2019-04-24	65788	-	0.666	0.635	0.0739	-	< 0.5	-	0.338	< 0.2
SFM0057	3.55	4.55	2019-08-12	69029	0.0379	1.01	0.732	0.0823	-	< 0.5	-	0.728	0.512
SFM0057	3.55	4.55	2019-10-15	71202	0.0426	0.962	-	-	0.00489	< 0.5	< 0.05	0.689	-

Table A2-2e. Trace elements II.

Idcode	Secup (m)	Seclow (m)	Date (yyyy/mm/dd)	Sample no	U (µg/L)	Rb (µg/L)	Zr (µg/L)	Sb (µg/L)	Cs (µg/L)	Nd (µg/L)
SFM0001	3.95	4.95	2019-01-16	62859	4.3	-	-	-	-	-
SFM0001	3.95	4.95	2019-04-23	65782	7.7	-	-	-	-	-
SFM0001	3.95	4.95	2019-08-13	69023	8.1	-	-	-	-	-
SFM0001	3.95	4.95	2019-10-17	71196	7.7	3.05	9.37	0.0818	< 0.03	3.130
SFM0002	4.21	5.21	2019-01-16	62860	2.9	-	-	-	-	-
SFM0002	4.21	5.21	2019-04-24	65783	2.6	-	-	-	-	-
SFM0002	4.21	5.21	2019-08-12	69024	2.9	-	-	-	-	-
SFM0002	4.21	5.21	2019-10-16	71197	3.0	1.86	9.24	0.0394	< 0.03	0.951
SFM0011	3.50	4.50	2019-01-17	62861	8.5	-	-	-	-	-
SFM0011	3.50	4.50	2019-04-25	65784	8.0	-	-	-	-	-
SFM0011	3.50	4.50	2019-08-12	69025	10.7	-	-	-	-	-
SFM0011	3.50	4.50	2019-10-16	71198	8.6	5.74	0.72	0.3170	0.0746	0.196
SFM0032	3.00	4.00	2019-01-14	62862	9.8	-	-	-	-	-
SFM0032	3.00	4.00	2019-04-24	65785	7.5	-	-	-	-	-
SFM0032	3.00	4.00	2019-08-13	69026	6.9	-	-	-	-	-
SFM0032	3.00	4.00	2019-10-15	71199	7.8	2.39	4.79	0.0406	< 0.03	0.814
SFM0037	2.00	3.00	2019-01-15	62863	20.4	-	-	-	-	-
SFM0037	2.00	3.00	2019-04-25	65786	32.2	-	-	-	-	-
SFM0037	2.00	3.00	2019-08-13	69027	8.4	-	-	-	-	-
SFM0037	2.00	3.00	2019-10-17	71200	11.6	4.26	3.34	0.1620	< 0.03	2.790
SFM0049	4.00	5.00	2019-01-15	62864	0.6	-	-	-	-	-
SFM0049	4.00	5.00	2019-04-23	65787	0.4	-	-	-	-	-
SFM0049	4.00	5.00	2019-08-13	69028	0.4	-	-	-	-	-
SFM0049	4.00	5.00	2019-10-15	71201	0.3	3.77	0.38	0.0391	< 0.03	0.982
SFM0057	3.55	4.55	2019-01-17	62865	5.7	-	-	-	-	-
SFM0057	3.55	4.55	2019-04-24	65788	7.5	-	-	-	-	-
SFM0057	3.55	4.55	2019-08-12	69029	7.6	-	-	-	-	-
SFM0057	3.55	4.55	2019-10-15	71202	7.6	2.88	1.62	0.1400	< 0.03	1.440

Appendix 3

Surface waters, compilation of hydrochemical data from water analysis

Table A3-1. Field measurements.

Idcode	Measuring date (yyyy-mm-dd)	Depth (m)	Water depth (m)	Sno	Temp. (°C)	pH	EC (mS/m)	Salinity (per mill)	Turb (NTU)	O ₂ diss. (mg/l)	O ₂ sat. (%)	ORP (mV)
PFM000062	2019-01-15	0.50	4.20	62753.00	1.50	7.81	971.90			12.62	95.30	191.70
PFM000062	2019-01-15	1.00	4.20		1.60	7.82	972.60			12.52	95.00	175.50
PFM000062	2019-01-15	2.00	4.20		1.70	7.84	971.70			12.49	94.80	167.10
PFM000062	2019-01-15	3.00	4.20		1.70	7.84	971.10			12.47	94.70	170.50
PFM000062	2019-04-24	0.50	3.70	65818.00	3.30	8.07	903.20		0.60	14.00	108.50	170.90
PFM000062	2019-04-24	1.00	3.70		3.30	8.08	903.40		0.56	14.03	108.60	168.40
PFM000062	2019-04-24	2.00	3.70		3.30	8.08	903.40		0.54	14.04	108.70	167.00
PFM000062	2019-04-24	3.00	3.70		3.40	8.10	903.20		0.86	14.02	108.80	194.40
PFM000062	2019-08-13	0.50	3.90	69130.00	15.80	8.06	879.80		0.35	8.76	91.10	104.70
PFM000062	2019-08-13	1.00	3.90		15.80	8.04	879.80		0.42	8.75	91.00	106.10
PFM000062	2019-08-13	2.00	3.90		15.80	8.03	879.80		0.37	8.75	91.00	107.10
PFM000062	2019-08-13	3.00	3.90		15.80	8.03	879.90		0.34	8.75	91.00	108.10
PFM000062	2019-10-15	0.50	4.10	71234.00	9.10	8.06	909.50	5.10	0.01	10.71	96.00	108.40
PFM000062	2019-10-15	1.00	4.10		9.10	8.06	908.70	5.09	0.02	10.71	96.00	109.60
PFM000062	2019-10-15	2.00	4.10		9.10	8.04	908.60	5.09	-0.01	10.70	96.00	111.70
PFM000062	2019-10-15	3.00	4.10		9.10	8.03	908.60	5.09	0.07	10.68	95.70	113.00
PFM000066	2019-01-16	0.10	0.26	62761.00	-0.10	7.01	44.50			2.05	14.30	154.40
PFM000066	2019-02-11	0.10	0.22	63866.00	0.00	7.07	35.30		2.85	4.95	33.80	145.80
PFM000066	2019-03-18	0.10	0.57	64673.00	0.40	7.40	29.30	0.14	0.40	5.45	37.70	1412.10
PFM000066	2019-04-23	0.10	0.38	65826.00	12.10	7.27	31.70		0.20	6.52	60.70	144.00
PFM000066	2019-05-20	0.10	0.32	66804.00	13.10	7.59	33.30	0.16	0.61	6.84	65.20	132.00
PFM000066	2019-06-17	0.10	0.41	68097.00	17.30	7.15	29.50	0.14	0.43	4.34	45.20	151.80
PFM000066	2019-08-12	0.10	0.21	69088.00	16.60	7.17	28.40		0.33	3.95	40.60	99.50
PFM000066	2019-09-01	0.10	0.30	70050.00	18.80	7.81	34.40	0.16	0.10	4.51	48.50	106.20
PFM000066	2019-10-14	0.10	0.35	71275.00	7.40	7.08	31.90	0.15	0.11	7.68	64.00	151.40
PFM000066	2019-11-11	0.10	0.49	72837.00	1.60	7.57	33.60	0.16	0.05	8.69	62.30	139.80
PFM000066	2019-12-09	0.10	0.58	74049.00	1.70	6.85	31.50	0.15	-0.23	6.03	43.30	163.10
PFM000068	2019-01-14	0.10	0.58	62762.00	0.50	6.61	49.70			3.32	23.90	243.90
PFM000068	2019-02-11	0.10	0.54	63867.00	0.00	7.16	21.90		37.56	4.72	32.30	70.00
PFM000068	2019-03-18	0.10	0.75	64674.00	0.40	7.04	29.90	0.14	0.56	6.83	47.20	158.00
PFM000068	2019-04-23	0.10	0.63	65827.00	8.90	6.96	32.10		0.45	6.38	55.10	140.60
PFM000068	2019-05-20	0.10	0.62	66805.00	10.80	7.55	38.30	0.18	0.67	6.43	58.10	98.20
PFM000068	2019-06-17	0.10	0.70	68098.00	15.40	6.80	32.40	0.16	0.41	5.06	50.70	167.40
PFM000068	2019-08-12	0.10	0.58	69111.00	14.70	6.70	35.90		0.68	5.49	54.20	140.00
PFM000068	2019-09-01	0.10	0.57	70051.00	16.60	7.84	40.10	0.19	0.49	5.95	61.20	118.20
PFM000068	2019-10-14	0.10	0.60	71276.00	7.10	6.26	31.70	0.15	0.48	7.49	61.90	177.20
PFM000068	2019-11-11	0.10	0.60	72838.00	2.30	7.13	29.20	0.14	0.38	8.50	62.00	103.90
PFM000068	2019-12-09	0.10	0.80	74050.00	1.30	7.17	28.30	0.13	-0.05	7.57	53.70	127.50
PFM000069	2019-01-14	0.10	0.15	62763.00	-0.10	6.60	56.10			0.61	4.20	229.00
PFM000069	2019-02-11	0.10	0.23	63868.00	0.00	6.77	51.80		0.70	1.42	9.70	144.50
PFM000069	2019-03-18	0.10	0.47	64675.00	0.20	7.01	39.20	0.19	0.50	2.82	19.50	93.80
PFM000069	2019-04-23	0.10	0.29	65828.00	9.10	7.09	36.70		0.17	5.41	47.00	144.60
PFM000069	2019-05-20	0.10	0.17	66806.00	10.50	7.37	41.60	0.20	0.43	5.45	48.90	102.90
PFM000069	2019-06-17	0.10	0.22	68099.00	15.20	6.93	36.00	0.17	0.22	4.12	41.10	131.90
PFM000069	2019-08-12	0.10	0.12	69112.00	14.70	7.15	37.00		0.35	5.84	57.60	179.60
PFM000069	2019-09-01	0.10	0.13	70052.00	16.10	7.75	40.10	0.19	0.31	5.82	59.20	98.70
PFM000069	2019-10-14	0.10	0.12	71277.00	7.30	6.54	37.50	0.18	0.67	7.00	58.10	185.90
PFM000069	2019-11-11	0.10	0.41	72839.00	2.60	7.13	38.80	0.18	0.10	5.81	42.70	109.50

Table A3-1. Continued.

Idcode	Measuring date (yyyy-mm-dd)	Depth (m)	Water depth (m)	Sno	Temp. (°C)	pH	EC (mS/m)	Salinity (per mill)	Turb (NTU)	O₂ diss. (mg/l)	O₂ sat. (%)	ORP (mV)
PFM000069	2019-12-09	0.10	0.48	74051.00	2.00	7.16	36.90	0.18	-0.18	4.82	34.90	196.50
PFM000070	2019-01-15	0.10	0.14	62764.00	0.10	6.43	35.10			1.17	8.20	176.50
PFM000070	2019-02-11	0.10	0.25	63869.00	0.00	7.02	23.00		63.91	5.91	40.40	177.50
PFM000070	2019-03-18	0.10	0.36	64676.00	1.70	7.20	20.40	0.10	0.22	8.09	58.00	102.40
PFM000070	2019-04-23	0.10	0.27	65829.00	13.80	7.39	24.40		0.67	8.04	77.70	142.90
PFM000070	2019-05-20	0.10	0.18	66807.00	14.20	7.47	23.30	0.11	1.76	6.79	66.20	100.30
PFM000070	2019-06-18	0.10	0.22	68100.00	17.50	7.47	20.90	0.10	-0.05	4.37	45.70	98.50
PFM000070	2019-08-12	0.10	0.11	69113.00	16.30	7.03	21.80		-0.13	4.77	48.60	108.90
PFM000070	2019-09-01	0.10	0.08									
PFM000070	2019-10-14	0.10	0.24	71278.00	8.20	7.37	16.10	0.08	-0.17	9.53	80.90	139.80
PFM000070	2019-11-11	0.10	0.34	72840.00	1.40	7.86	19.80	0.09	0.12	13.00	92.70	149.30
PFM000070	2019-12-09	0.10	0.38	74052.00	0.90	7.49	19.80	0.09	-0.36	11.81	82.80	196.80
PFM000074	2019-01-16	0.50	1.05	62766.00	2.40	6.94	69.90			0.01	0.10	-224.60
PFM000074	2019-04-23	0.50	1.28	65830.00	12.80	7.33	36.60		0.16	8.85	83.60	64.60
PFM000074	2019-08-12	0.50	0.90	69170.00	16.70	7.22	36.30		0.63	3.07	31.60	118.50
PFM000074	2019-10-16	0.50	1.10	71453.00	6.60	8.10	38.40	0.18	-0.28	4.42	36.10	99.60
PFM000083	2019-04-24	0.50		65819.00	3.50	8.25	908.90		0.66	14.30	111.40	202.30
PFM000083	2019-05-19	0.50		66797.00	10.70	8.27	858.90	4.80	0.51	11.91	110.50	184.40
PFM000083	2019-06-17	0.50		68090.00	13.20	7.96	861.70	4.83	0.33	10.71	105.10	170.70
PFM000083	2019-08-13	0.50		69131.00	15.80	8.23	885.60		0.15	9.87	102.50	116.10
PFM000083	2019-09-02	0.50		70074.00	12.10	7.79	921.40	5.19	0.31	8.77	84.20	120.30
PFM000083	2019-10-15	0.50		71235.00	9.20	7.96	904.20	5.07	0.02	10.88	97.80	126.40
PFM000084	2019-04-24	0.50		65820.00	11.50	8.33	439.70		6.16	12.93	120.40	210.00
PFM000084	2019-05-19	0.50		66798.00	15.00	8.32	441.30	2.37	3.66	10.73	107.90	213.40
PFM000084	2019-06-17	0.50		68091.00	15.80	8.02	736.50	4.08	3.21	10.43	107.80	169.60
PFM000084	2019-08-13	0.50		69132.00	17.00	8.19	765.20		3.61	9.31	98.70	130.80
PFM000084	2019-09-02	0.50		70075.00	13.20	7.81	847.60	4.74	1.60	8.28	81.40	100.70
PFM000084	2019-10-15	0.50		71236.00	7.80	7.94	682.40	3.74	1.40	10.91	93.80	128.60
PFM000097	2019-01-15	0.50	0.75		2.60	7.18	534.30			0.00	0.00	-307.10
PFM000097	2019-02-12	0.50	0.95		0.10	6.97	438.60			0.58	4.00	-214.00
PFM000097	2019-03-19	0.50	0.82		2.90	7.23	48.70	0.23	0.25	5.41	40.20	111.70
PFM000097	2019-04-26	0.50	0.95		13.70	8.25	32.10		0.60	10.69	103.10	154.90
PFM000097	2019-05-21	0.50	0.85		18.20	8.45	32.70	0.16	0.70	10.91	115.90	164.30
PFM000097	2019-06-18	0.50	0.92		21.10	8.52	29.80	0.14	0.75	10.09	113.50	177.30
PFM000097	2019-08-15	0.50	0.97		16.70	8.36	27.30		0.45	10.83	111.40	123.60
PFM000097	2019-09-01	0.50	0.98		18.70	8.17	25.40	0.12	0.74	9.25	99.10	105.30
PFM000097	2019-10-15	0.50	1.00		6.70	8.73	24.80	0.12	-0.14	12.17	99.50	107.90
PFM000097	2019-11-12	0.50	1.12		1.80	8.41	27.60	0.13	-0.13	12.87	92.70	116.60
PFM000097	2019-12-10	0.50	1.00		2.10	7.30	32.70	0.16	0.34	4.45	32.30	72.30
PFM000107	2019-01-14	0.50	2.00	62767.00	2.10	7.42	39.00			9.60	72.10	234.40
PFM000107	2019-01-14	1.00	2.00	63166.00	3.60	7.10	41.50			4.00	31.30	228.40
PFM000107	2019-04-23	0.50	2.10	65831.00	13.70	8.40	28.80		0.50	11.90	114.80	134.60
PFM000107	2019-04-23	1.00	2.10		13.70	8.40	28.80		0.47	11.94	115.10	129.90
PFM000107	2019-08-12	0.50	1.90	69171.00	19.70	9.16	23.40		0.85	10.78	118.00	100.20
PFM000107	2019-08-12	1.00	1.90		19.70	9.23	23.40		0.85	10.74	117.60	53.30
PFM000107	2019-10-15	0.50	1.90	71454.00	7.20	8.74	24.70	0.12	-0.16	12.55	104.00	102.60
PFM000107	2019-10-15	1.00	1.90		7.20	8.68	24.70	0.12	-0.14	12.53	103.80	104.80
PFM000117	2019-01-15	0.50	2.10	62768.00	2.10	8.32	22.20			12.71	94.20	122.70
PFM000117	2019-01-15	1.00	2.10		4.00	7.73	27.40			5.51	43.00	126.20
PFM000117	2019-01-15	1.50	2.10	63167.00	4.40	7.67	27.80			4.59	36.20	123.70
PFM000117	2019-04-24	0.50	2.20	65832.00	13.60	8.62	23.90		0.31	12.82	123.40	194.30
PFM000117	2019-04-24	1.00	2.20		13.60	8.61	23.90		0.33	12.87	123.80	193.10
PFM000117	2019-04-24	1.50	2.20		13.60	8.60	23.90		0.32	12.87	123.80	191.90
PFM000117	2019-08-12	0.50	2.20	69172.00	19.90	8.93	16.20		0.41	10.56	116.00	111.40

Table A3-1. Continued.

Idcode	Measuring date (yyyy-mm-dd)	Depth (m)	Water depth (m)	Sno	Temp. (°C)	pH	EC (mS/m)	Salinity (per mill)	Turb (NTU)	O ₂ diss. (mg/l)	O ₂ sat. (%)	ORP (mV)
PFM000117	2019-08-12	1.00	2.20		19.80	8.97	16.20		0.39	10.61	116.30	111.90
PFM000117	2019-08-12	1.50	2.20		19.60	9.00	16.20		0.54	10.81	118.10	112.20
PFM000117	2019-10-14	0.50	2.30	71455.00	7.80	8.07	16.70	0.08	-0.24	12.95	108.80	161.70
PFM000117	2019-10-14	1.00	2.30		7.80	8.15	16.70	0.08	-0.22	12.97	109.00	161.80
PFM000117	2019-10-14	1.50	2.30		7.80	8.22	16.70	0.08	-0.24	12.98	109.10	161.70
PFM005864	2019-04-25	0.50		65937.00	12.40	7.44	16.10		1.00	9.67	90.60	129.00
PFM005864	2019-05-20	0.50		66781.00	16.20	7.87	15.80	0.07	0.95	8.17	83.10	148.80
PFM005864	2019-06-18	0.20		68343.00	20.00	7.87	16.10	0.08	0.25	7.97	87.60	143.60
PFM005864	2019-08-13	0.20		69195.00	20.00	8.25	16.70		1.07	6.88	75.80	120.20
PFM005864	2019-09-01	0.50		70110.00	19.80	8.32	16.10	0.08	0.63	6.62	72.50	133.80
PFM005864	2019-10-15	0.50		72187.00	7.20	8.84	15.90	0.08	0.10	9.57	79.30	111.40
PFM007783	2019-01-15	0.50		62756.00	0.00	7.92	982.50			13.56	98.50	189.90
PFM007783	2019-04-24	0.50		65821.00	10.70	8.29	843.60		0.49	12.03	111.60	205.50
PFM007783	2019-05-20	0.50		66799.00	12.70	8.28	856.00	4.79	1.52	11.20	108.70	118.30
PFM007783	2019-06-18	0.50		68092.00	17.10	8.35	847.80	4.74	0.26	9.04	96.50	112.80
PFM007783	2019-08-12	0.50		69133.00	19.40	8.60	852.50		0.99	9.98	111.60	109.50
PFM007783	2019-09-01	0.50		70076.00	20.50	8.49	888.50	4.98	0.35	10.37	118.60	120.40
PFM007783	2019-10-14	0.50		71237.00	8.40	7.58	904.20	5.06	-0.21	11.79	103.70	178.20
PFM007910	2019-04-24	0.50	1.80	65823.00	7.80	8.35	846.70		0.52	13.56	117.60	143.20
PFM007910	2019-04-24	1.00	1.80		7.50	8.38	852.20		0.61	13.76	118.30	143.80
PFM007910	2019-04-24	1.50	1.80		7.30	8.41	854.20		1.20	13.97	119.70	144.10
PFM007910	2019-05-19	0.50	1.90	66801.00	14.00	8.25	840.00	4.70	0.59	10.94	109.40	152.00
PFM007910	2019-05-19	1.00	1.90		13.70	8.27	846.40	4.74	0.51	11.04	109.70	152.00
PFM007910	2019-05-19	1.50	1.90		13.50	8.29	849.40	4.76	0.96	11.20	110.70	152.10
PFM007910	2019-06-17	0.50	1.80	68094.00	16.20	8.21	818.60	4.57	0.29	11.53	120.60	148.10
PFM007910	2019-06-17	1.00	1.80		15.50	8.25	834.80	4.67	0.29	11.78	121.50	150.60
PFM007910	2019-06-17	1.50	1.80		14.30	8.27	851.80	4.77	0.32	11.87	119.30	150.00
PFM007910	2019-08-13	0.50	1.90	69135.00	17.90	7.99	805.60		0.51	7.85	85.10	122.30
PFM007910	2019-08-13	1.00	1.90		18.00	7.96	821.60		2.81	7.85	85.30	122.20
PFM007910	2019-08-13	1.50	1.90		17.80	7.95	863.50		2.36	7.95	86.10	116.00
PFM007910	2019-09-02	0.50	2.10	70078.00	15.80	7.88	891.00	5.01	0.15	8.35	86.80	114.30
PFM007910	2019-09-02	1.00	2.10		15.80	7.86	890.80	5.00	0.15	8.22	85.40	114.60
PFM007910	2019-09-02	1.50	2.10		15.50	7.80	904.20	5.09	0.28	7.95	82.20	75.60
PFM007910	2019-10-15	0.50	2.10	71239.00	7.70	7.87	893.20	4.99	-0.12	10.95	94.90	121.30
PFM007910	2019-10-15	1.00	2.10		7.90	7.88	898.40	5.02	-0.06	10.81	94.00	121.50
PFM007910	2019-10-15	1.50	2.10		7.80	7.89	900.50	5.03	0.08	10.85	94.20	108.30
PFM007910	2019-10-15	2.00	2.10		7.90	7.90	899.90	5.03	0.04	10.93	95.00	108.60
PFM007911	2019-04-24	0.50	5.10	65824.00	7.40	8.32	856.00		0.91	13.44	115.30	200.30
PFM007911	2019-04-24	1.00	5.10		7.50	8.32	855.30		0.66	13.43	115.40	198.90
PFM007911	2019-04-24	2.00	5.10		7.30	8.32	855.40		0.56	13.48	115.50	198.10
PFM007911	2019-04-24	3.00	5.10		7.20	8.33	855.80		0.66	13.52	115.60	197.70
PFM007911	2019-04-24	4.00	5.10		7.20	8.33	855.70		0.52	13.51	115.40	196.90
PFM007911	2019-04-24	4.50	5.10		7.10	8.34	857.50		0.62	13.52	115.20	132.10
PFM007911	2019-05-19	0.50	5.00	66802.00	13.50	8.27	848.00	4.75	0.50	11.01	108.80	157.40
PFM007911	2019-05-19	1.00	5.00		13.50	8.28	848.00	4.75	0.49	11.01	108.90	156.70
PFM007911	2019-05-19	2.00	5.00		13.50	8.28	848.60	4.75	0.46	11.01	108.70	156.60
PFM007911	2019-05-19	3.00	5.00		11.80	8.27	854.10	4.78	0.54	11.27	107.30	157.40
PFM007911	2019-05-19	4.00	5.00		10.70	8.15	851.90	4.76	1.67	10.92	101.30	159.60
PFM007911	2019-05-19	4.50	5.00		10.40	8.11	853.90	4.77	1.26	10.95	100.90	160.20
PFM007911	2019-06-17	0.50	5.00	68095.00	14.90	8.08	850.30	4.76	0.40	10.80	110.00	168.80
PFM007911	2019-06-17	1.00	5.00		14.80	8.10	850.40	4.76	0.34	10.83	110.20	169.80
PFM007911	2019-06-17	2.00	5.00		14.60	8.11	850.90	4.76	0.42	10.90	110.40	170.60
PFM007911	2019-06-17	3.00	5.00		13.00	8.07	854.20	4.78	0.50	10.76	105.40	173.00
PFM007911	2019-06-17	4.00	5.00		12.80	8.00	854.70	4.79	0.68	10.65	103.60	175.10

Table A3-1. Continued.

Idcode	Measuring date (yyyy-mm-dd)	Depth (m)	Water depth (m)	Sno	Temp. (°C)	pH	EC (mS/m)	Salinity (per mill)	Turb (NTU)	O ₂ diss. (mg/l)	O ₂ sat. (%)	ORP (mV)
PFM007911	2019-06-17	4.50	5.00		12.80	7.98	854.40	4.78	0.56	10.66	103.70	84.50
PFM007911	2019-08-13	0.50	5.60	69136.00	17.70	8.14	855.10		0.53	8.83	95.40	121.10
PFM007911	2019-08-13	1.00	5.60		17.80	8.13	855.40		0.53	8.83	95.50	121.80
PFM007911	2019-08-13	2.00	5.60		17.70	8.13	854.70		0.53	8.80	95.10	122.40
PFM007911	2019-08-13	3.00	5.60		17.60	8.11	856.40		0.47	8.44	91.00	123.30
PFM007911	2019-08-13	4.00	5.60		17.30	8.07	866.00		0.42	8.04	86.20	124.90
PFM007911	2019-08-13	5.00	5.60		17.20	8.02	866.60		0.50	7.96	85.10	122.30
PFM007911	2019-09-02	0.50	5.80	70079.00	16.20	7.96	900.70	5.06	0.43	8.85	92.70	116.30
PFM007911	2019-09-02	1.00	5.80		16.10	7.95	901.50	5.07	0.42	8.82	92.30	117.70
PFM007911	2019-09-02	2.00	5.80		15.10	7.94	908.80	5.11	0.20	8.52	87.30	119.20
PFM007911	2019-09-02	3.00	5.80		14.60	7.92	910.20	5.12	0.25	8.64	87.70	119.90
PFM007911	2019-09-02	4.00	5.80		14.10	7.89	915.00	5.15	0.21	8.21	82.40	121.50
PFM007911	2019-09-02	5.00	5.80		13.80	7.83	915.70	5.15	0.89	7.56	75.40	118.30
PFM007911	2019-10-15	0.50	5.60	71240.00	7.80	7.92	906.90	5.07	-0.02	11.15	96.80	133.00
PFM007911	2019-10-15	1.00	5.60		7.80	7.94	906.80	5.07	0.01	11.13	96.70	133.20
PFM007911	2019-10-15	2.00	5.60		7.80	7.95	906.90	5.07	-0.02	11.11	96.50	134.20
PFM007911	2019-10-15	3.00	5.60		7.80	7.96	906.80	5.07	-0.09	11.11	96.50	135.50
PFM007911	2019-10-15	4.00	5.60		7.80	7.96	906.70	5.07	-0.04	11.10	96.30	136.00
PFM007911	2019-10-15	5.00	5.60		7.80	7.97	906.90	5.07	0.01	11.08	96.20	136.60
PFM007912	2019-04-24	0.50	8.60	65825.00	7.40	8.37	862.00		0.52	13.36	114.80	208.10
PFM007912	2019-04-24	1.00	8.60		7.50	8.37	861.70		0.51	13.39	115.20	205.60
PFM007912	2019-04-24	2.00	8.60		7.40	8.37	862.10		0.54	13.42	115.10	204.30
PFM007912	2019-04-24	3.00	8.60		7.30	8.37	862.10		0.54	13.44	115.10	201.80
PFM007912	2019-04-24	4.00	8.60		7.20	8.36	861.90		0.51	13.43	114.80	200.90
PFM007912	2019-04-24	5.00	8.60		7.10	8.35	861.70		0.49	13.43	114.50	200.10
PFM007912	2019-04-24	6.00	8.60		7.10	8.35	865.50		0.54	13.49	115.10	196.70
PFM007912	2019-04-24	7.00	8.60		6.70	8.32	872.60		0.55	13.56	114.40	194.80
PFM007912	2019-04-24	8.00	8.60		6.50	8.28	876.00		0.75	13.51	113.40	194.30
PFM007912	2019-05-19	0.50	9.50	66803.00	12.90	8.26	849.90	4.76	0.38	11.04	107.80	182.00
PFM007912	2019-05-19	1.00	9.50		12.90	8.26	850.00	4.76	0.34	11.07	107.90	180.90
PFM007912	2019-05-19	2.00	9.50		12.40	8.28	851.70	4.77	0.30	11.21	108.20	180.40
PFM007912	2019-05-19	3.00	9.50		12.00	8.28	852.70	4.77	0.35	11.27	107.90	180.20
PFM007912	2019-05-19	4.00	9.50		10.60	8.29	857.10	4.79	0.47	11.58	107.40	180.40
PFM007912	2019-05-19	5.00	9.50		9.80	8.26	858.10	4.79	0.54	11.66	106.00	181.00
PFM007912	2019-05-19	6.00	9.50		9.20	8.18	857.70	4.79	0.67	11.34	101.70	182.30
PFM007912	2019-05-19	7.00	9.50		9.00	8.13	858.40	4.79	0.65	11.19	99.80	182.90
PFM007912	2019-05-19	8.00	9.50		8.80	8.04	859.60	4.80	1.02	10.49	93.10	184.50
PFM007912	2019-06-17	0.50	8.10	68096.00	15.40	8.16	850.60	4.76	0.20	10.84	111.70	143.10
PFM007912	2019-06-17	1.00	8.10		15.40	8.16	850.60	4.76	0.19	10.85	111.70	145.60
PFM007912	2019-06-17	2.00	8.10		15.30	8.16	850.50	4.76	0.22	10.86	111.70	149.60
PFM007912	2019-06-17	3.00	8.10		15.30	8.17	850.50	4.76	0.18	10.86	111.50	152.10
PFM007912	2019-06-17	4.00	8.10		14.90	8.16	850.40	4.76	0.19	10.86	110.70	154.80
PFM007912	2019-06-17	5.00	8.10		13.90	8.13	851.60	4.77	0.19	10.94	109.00	157.30
PFM007912	2019-06-17	6.00	8.10		12.20	8.06	851.40	4.76	0.29	10.71	102.90	160.40
PFM007912	2019-06-17	7.00	8.10		11.80	7.97	852.50	4.77	0.26	10.60	100.90	163.80
PFM007912	2019-06-17	8.00	8.10		11.30	7.80	859.00	4.81	4.44	9.64	90.70	169.30
PFM007912	2019-08-13	0.50	8.60	69137.00	17.70	8.32	863.60		0.38	8.98	97.00	104.10
PFM007912	2019-08-13	1.00	8.60		17.70	8.28	863.70		0.51	8.98	97.00	106.40
PFM007912	2019-08-13	2.00	8.60		17.70	8.25	863.80		0.54	8.97	96.80	108.20
PFM007912	2019-08-13	3.00	8.60		17.70	8.24	863.80		0.63	8.96	96.70	109.00
PFM007912	2019-08-13	4.00	8.60		17.70	8.23	863.70		0.50	8.94	96.60	110.20
PFM007912	2019-08-13	5.00	8.60		17.60	8.22	864.60		0.38	8.88	95.70	111.40
PFM007912	2019-08-13	6.00	8.60		17.50	8.20	865.50		0.39	8.78	94.40	113.00
PFM007912	2019-08-13	7.00	8.60		17.00	8.16	869.90		0.36	8.57	91.40	114.90
PFM007912	2019-08-13	8.00	8.60		17.00	8.14	870.00		2.18	8.52	90.70	115.40

Table A3-1. Continued.

Idcode	Measuring date (yyyy-mm-dd)	Depth (m)	Water depth (m)	Sno	Temp. (°C)	pH	EC (mS/m)	Salinity (per mill)	Turb (NTU)	O ₂ diss. (mg/l)	O ₂ sat. (%)	ORP (mV)
PFM007912	2019-09-02	0.50	9.00	70080.00	16.00	8.33	901.70	5.07	0.15	9.24	96.60	99.50
PFM007912	2019-09-02	1.00	9.00		16.00	8.24	901.60	5.07	0.20	9.24	96.50	102.40
PFM007912	2019-09-02	2.00	9.00		16.00	8.20	901.70	5.07	0.19	9.23	96.40	104.40
PFM007912	2019-09-02	3.00	9.00		16.00	8.16	901.70	5.07	0.20	9.22	96.20	106.50
PFM007912	2019-09-02	4.00	9.00		15.90	8.12	902.40	5.07	0.15	9.20	96.00	109.50
PFM007912	2019-09-02	5.00	9.00		14.70	8.10	911.70	5.13	0.19	9.11	92.60	111.80
PFM007912	2019-09-02	6.00	9.00		13.50	8.05	920.10	5.18	0.21	8.90	88.20	114.80
PFM007912	2019-09-02	7.00	9.00		13.20	8.01	922.00	5.19	0.35	8.74	86.10	116.90
PFM007912	2019-09-02	8.00	9.00		13.00	7.97	923.90	5.20	0.50	8.69	85.20	118.10
PFM007912	2019-10-15	0.50	8.50	71241.00	7.90	7.90	899.20	5.03	-0.02	11.27	98.00	133.30
PFM007912	2019-10-15	1.00	8.50		7.90	7.92	899.20	5.03	0.04	11.26	97.90	133.50
PFM007912	2019-10-15	2.00	8.50		7.90	7.93	899.10	5.03	0.00	11.25	97.80	133.80
PFM007912	2019-10-15	3.00	8.50		7.90	7.94	899.30	5.03	0.02	11.24	97.80	134.40
PFM007912	2019-10-15	4.00	8.50		7.90	7.94	899.50	5.03	0.06	11.23	97.60	134.80
PFM007912	2019-10-15	5.00	8.50		7.90	7.95	899.80	5.03	-0.02	11.21	97.50	135.10
PFM007912	2019-10-15	6.00	8.50		7.80	7.95	900.40	5.03	0.08	11.19	97.30	135.50
PFM007912	2019-10-15	7.00	8.50		7.80	7.95	901.00	5.04	-0.02	11.13	96.70	136.00
PFM007912	2019-10-15	8.00	8.50		7.80	7.95	901.20	5.04	0.00	11.09	96.30	136.30
PFM102269	2019-01-15	0.50		62757.00	11.20	7.73	965.10			12.56	121.20	183.10
PFM102269	2019-02-11	0.50		63870.00	11.60	7.73	912.40		1.28	13.09	124.40	83.60
PFM102269	2019-03-18	0.50		64677.00	11.70	8.08	872.60	4.89	5.02	14.09	134.00	146.40
PFM102269	2019-04-24	0.50		65822.00	14.30	8.09	882.30		1.82	13.62	137.10	198.80
PFM102269	2019-05-20	0.50		66800.00	22.00	8.13	861.70	4.81	1.52	11.06	129.90	142.20
PFM102269	2019-06-17	0.50		68093.00	23.90	8.02	864.50	4.82	0.55	10.33	126.00	198.70
PFM102269	2019-08-12	0.50		69134.00	27.70	8.03	877.20		0.50	8.32	108.70	133.70
PFM102269	2019-09-01	0.50		70077.00	25.50	7.96	919.00	5.14	0.44	8.96	112.60	138.50
PFM102269	2019-10-15	0.50		71238.00	17.10	7.82	896.30	5.04	-0.02	9.98	106.80	131.60
PFM102269	2019-11-11	0.50		72860.00	16.50	7.63	843.70	4.72	0.71	11.95	126.00	167.50
PFM102269	2019-12-10	0.50		74053.00	13.90	6.44	851.50	4.77	1.28	11.96	119.20	219.90

Sno = Corresponding water sample no.

Table A3-2. Water flow measurements.

Idcode	Date	Simple flow rate (m³/s)	Code/Comment
PFM000066	2019-01-16 10:00	-	C
PFM000066	2019-02-11 13:10	-	C
PFM000066	2019-03-18 12:20	0.1260	L
PFM000066	2019-04-23 14:50	0.3800	L
PFM000066	2019-05-20 10:50	0.0430	L
PFM000066	2019-06-17 12:10	0.0710	L
PFM000066	2019-08-12 11:05	0.0890	L
PFM000066	2019-09-01 15:10	0.0430	L
PFM000066	2019-10-14 13:50	0.0270	L
PFM000066	2019-11-11 12:50	0.1180	L
PFM000066	2019-12-09 14:20	0.1500	L
PFM000068	2019-01-14 14:00	-	C
PFM000068	2019-02-11 10:20	-	C
PFM000068	2019-03-18 09:50	-	D
PFM000068	2019-04-23 10:50	0.2530	L
PFM000068	2019-05-20 09:00	0.1050	L
PFM000068	2019-06-17 10:50	-	F
PFM000068	2019-08-12 08:20	-	F
PFM000068	2019-09-01 14:20	-	F
PFM000068	2019-10-14 11:00	-	B
PFM000068	2019-11-11 10:05	0.0880	L
PFM000068	2019-12-09 17:30	0.4500	L
PFM000069	2019-01-14 16:50	-	C
PFM000069	2019-02-11 11:10	-	C
PFM000069	2019-03-18 13:40	0.1490	L
PFM000069	2019-04-23 12:50	0.0540	L
PFM000069	2019-05-20 09:25	0.0280	L
PFM000069	2019-06-17 11:20	0.0560	L
PFM000069	2019-08-12 09:20	0.0230	L
PFM000069	2019-09-01 13:20	0.0160	L
PFM000069	2019-10-14 11:30	0.0210	L
PFM000069	2019-11-11 10:30	0.0900	L
PFM000069	2019-12-09 16:50	0.1640	L
PFM000070	2019-01-15 11:50	-	C
PFM000070	2019-02-11 14:50	-	C
PFM000070	2019-03-18 14:30	0.1350	L
PFM000070	2019-04-23 13:50	0.0600	L
PFM000070	2019-05-20 09:55	-	F
PFM000070	2019-06-18 08:50	-	F
PFM000070	2019-08-12 10:15	-	B
PFM000070	2019-09-01 13:50	-	F
PFM000070	2019-10-14 14:40	-	B
PFM000070	2019-11-11 13:30	0.1500	L
PFM000070	2019-12-09 16:00	0.1930	L

Code	Code description
B	Too much water vegetation, no measurement.
C	Water completely frozen, no measurement.
D	Too much ice, no measurement.
F	Flow rate too low, no measurement.
L	Flow rate value available.

Table A3-3a. Major components.

Idcode	Sample no	Sampling date (yyyy-mm-dd)	Depth (m)	RCB (%)	Na (mg/l)	K (mg/l)	Ca (mg/l)	Mg (mg/l)	alk (mg/l)	Cl (mg/l)	SO ₄ (mg/l)	SO _{4_s} (mg/l)	Br ⁻ (mg/l)	F ⁻ (mg/l)	Si (mg/l)	Fe (mg/l)	Mn (mg/l)
PFM000062	62753	2019-01-15	0.50	-1.64	1600	57.6	75.8	174	81.1	2910	405	138	9.77	0.4	0.935	0.00214	0.0013
PFM000062	65818	2019-04-24	0.50	0.68	1610	58	75.9	176	79	2780	365	139	15.3	0.23	0.385	0.00415	0.00164
PFM000062	69130	2019-08-13	0.50	0.15	1600	58.1	75.4	179	77.2	2780	386	152	9.9	0.42	0.675	0.00934	0.00251
PFM000062	71234	2019-10-15	0.50	0.48	1650	59.8	76.9	181	80.4	2870	390	140	10.7	0.45	0.64	0.00259	0.00134
PFM000066	62761	2019-01-16	0.10	2.12	7.65	3.09	79.8	4.01	205	7.4	42	15.2	0.0256	0.21	6.57	0.0504	0.00604
PFM000066	63866	2019-02-11	0.10	2.21	6.21	2.23	66.3	3.35	175	6.5	32	10.9	0.0709	0.24	5.24	0.115	0.0661
PFM000066	64673	2019-03-18	0.10	5.83	5.35	2.27	58.3	2.79	145	5.7	22	8.25	0.0352	< 0.2	4.79	0.0466	0.0167
PFM000066	65826	2019-04-23	0.10	2.84	5.09	2.17	61.1	2.75	175	5.3	13.6	5.14	0.0452	0.34	4.29	0.0467	0.00355
PFM000066	66804	2019-05-20	0.10	5.25	5.94	2.27	66.4	3.07	190	3.8	5.6	4.08	0.062	0.39	3.7	0.12	0.0437
PFM000066	68097	2019-06-17	0.10	4.23	5.32	1.89	57.9	2.62	170	4.2	7.5	3	0.0545	0.36	3.88	0.0946	0.0124
PFM000066	69088	2019-08-12	0.10	7.49	5.02	1.75	60.1	2.78	166	4.5	5.1	2.31	0.0576	0.25	4.31	0.142	0.0134
PFM000066	70050	2019-09-01	0.10	2.86	5.48	1.91	66.9	2.94	207	5	3.4	1.7	0.0677	0.26	5.25	0.167	0.0206
PFM000066	71275	2019-10-14	0.10	2.33	5.17	2.95	60.6	2.94	189	5.7	5.2	2.16	0.0728	0.22	5.15	0.185	0.0206
PFM000066	72837	2019-11-11	0.10	3.36	15.4	3.13	63.2	4.53	182	24	14	5.2	0.115	0.28	5.65	0.159	0.00899
PFM000066	74049	2019-12-09	0.10	2.64	4.52	2.5	61.7	3.04	193	4.5	3.9	1.66	0.0427	0.22	5.57	0.0845	0.00544
PFM000068	62762	2019-01-14	0.10	3.24	22.8	3.57	72.3	6.31	152	37	59	21.4	0.116	0.27	6.69	0.159	0.0401
PFM000068	63867	2019-02-11	0.10	2.92	18.4	3.04	65.5	5.51	145	31	49	17.2	0.213	0.28	5.68	0.223	0.0398
PFM000068	64674	2019-03-18	0.10	6.19	10.7	2.3	50.4	3.52	117	15.6	24	9.17	0.0638	0.22	4.7	0.162	0.018
PFM000068	65827	2019-04-23	0.10	3.42	12	2.26	51.9	3.68	143	17.1	17.5	6.36	0.0727	0.38	4.21	0.138	0.00487
PFM000068	66805	2019-05-20	0.10	4.09	17.9	2.66	60.3	4.72	168	27	15.4	6.03	0.156	0.38	4.96	0.288	0.0521
PFM000068	68098	2019-06-17	0.10	5.4	14.5	2.23	52.9	3.86	146	20	11.8	4.75	0.124	0.36	4.16	0.289	0.0188
PFM000068	69111	2019-08-12	0.10	5.13	18.4	2.57	54.7	4.65	152	28	11.6	4.7	0.156	0.31	4.95	0.467	0.0341
PFM000068	70051	2019-09-01	0.10	3.27	22.3	1.4	58.2	5.13	175	34	7.9	3.42	0.154	0.34	5.73	0.396	0.0247
PFM000068	71276	2019-10-14	0.10	5.08	14.7	2.66	50.1	4.15	142	22	9.4	3.93	0.12	0.26	4.81	0.238	0.024
PFM000068	72838	2019-11-11	0.10	2.6	5.13	3.17	66.1	3.19	207	5.7	4	1.69	0.0564	0.21	5.75	0.0761	0.00494
PFM000068	74050	2019-12-09	0.10	4.73	8.69	2.23	49.8	3.52	145	10.9	8.8	3.56	0.0728	0.27	4.31	0.191	0.00821
PFM000069	62763	2019-01-14	0.10	4.5	25.5	3.74	64.6	5.87	167	41	25	9.37	0.124	0.25	7.39	0.149	0.0938
PFM000069	63868	2019-02-11	0.10	2.24	26.5	3.59	73.1	6.31	179	46	42	14.9	0.32	0.26	7.68	0.282	0.0799
PFM000069	64675	2019-03-18	0.10	4.39	15.7	2.81	63.1	4.5	148	26	32	11.9	0.0896	0.26	5.64	0.229	0.0346
PFM000069	65828	2019-04-23	0.10	2.57	15.8	2.34	56.2	4.25	152	25	22	7.85	0.0816	0.37	5.12	0.0879	0.00209
PFM000069	66806	2019-05-20	0.10	10.29	22.6	2.9	65.3	5.41	174	20	18.6	6.98	0.189	0.39	6.13	0.17	0.0205
PFM000069	68099	2019-06-17	0.10	3.9	17.6	2.42	55.7	4.28	157	27	12.5	4.92	0.133	0.39	4.71	0.165	0.0157
PFM000069	69112	2019-08-12	0.10	3.88	21.1	2.69	53.2	4.87	154	33	10	4.3	0.157	0.31	4.81	0.225	0.0128
PFM000069	70052	2019-09-01	0.10	3.34	23	1.26	57.4	5.17	172	35	8.2	3.51	0.164	0.34	5.61	0.17	0.00794
PFM000069	71277	2019-10-14	0.10	4.18	21.5	2.56	54.5	5.01	155	34	11.1	4.6	0.166	0.28	5.94	0.163	0.0191
PFM000069	72839	2019-11-11	0.10	4.51	10.2	2.5	48.5	3.55	138	15	10.1	3.93	0.083	0.24	4.17	0.19	0.00908
PFM000069	74051	2019-12-09	0.10	3.23	12.1	2.65	63.2	4.27	186	16.2	13.3	5.15	0.0848	0.31	5.69	0.198	0.00956

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Table A3-3a. Continued.

Idcode	Sample no	Sampling date (yyyy-mm-dd)	Depth (m)	RCB (%)	Na (mg/l)	K (mg/l)	Ca (mg/l)	Mg (mg/l)	alk (mg/l)	Cl (mg/l)	SO ₄ (mg/l)	SO _{4_s} (mg/l)	Br ⁻ (mg/l)	F ⁻ (mg/l)	Si (mg/l)	Fe (mg/l)	Mn (mg/l)
PFM000070	62764	2019-01-15	0.10	5.86	9.84	2.15	64.7	3.92	87.2	9.9	81	30.2	0.0231	< 0.2	4.17	0.135	0.178
PFM000070	63869	2019-02-11	0.10	3.14	6.3	2.72	37.7	2.63	101	6.7	19.6	7.18	0.0928	< 0.2	3.47	0.0689	0.0161
PFM000070	64676	2019-03-18	0.10	7.65	5.12	1.61	38.2	2.29	86.6	5.4	19.8	7.24	0.0296	< 0.2	3.47	0.0601	0.00538
PFM000070	65829	2019-04-23	0.10	3.49	6.64	1.91	42.5	2.57	126	6.5	9.3	3.53	0.0367	0.41	1.97	0.0257	0.007
PFM000070	66807	2019-05-20	0.10	8.32	7.36	1.99	43	2.78	120	4.9	8.1	3.17	0.0546	0.44	1.07	0.0692	0.0794
PFM000070	68100	2019-06-18	0.10	5.91	7.24	1.58	35.7	2.54	104	6.2	7.4	2.92	0.0561	0.45	0.818	0.0616	0.0355
PFM000070	69113	2019-08-12	0.10	5.79	7.11	1.68	37.8	2.67	114	7.3	3.6	1.68	0.0576	0.23	2.7	0.137	0.0565
PFM000070	71278	2019-10-14	0.10	5.14	6.73	2.35	24.4	2.3	74.8	6.8	6.7	2.56	0.0489	0.2	0.776	0.0207	0.00772
PFM000070	72840	2019-11-11	0.10	5.64	6.97	1.92	34.1	2.59	102	6.5	6.4	2.55	0.0468	0.21	1.2	0.0329	0.00238
PFM000070	74052	2019-12-09	0.10	7.5	5.89	1.86	37.1	2.53	105	5.7	5.2	2.25	0.0386	0.22	2.11	0.0627	0.00636
PFM000074	62766	2019-01-16	0.50	8.63	27.7	3.47	94.1	5.31	192	37	57	19.6	0.0678	< 0.2	6.49	0.202	0.285
PFM000074	65830	2019-04-23	0.50	2.82	11.6	2.35	62.9	3.12	177	17.3	14	5.32	0.0667	0.42	4.18	0.0327	0.00898
PFM000074	69170	2019-08-12	0.50	4.17	9.58	1.8	65.6	3.16	195	12.1	4.4	2.05	0.0777	0.25	4.72	0.124	0.0602
PFM000074	71453	2019-10-16	0.50	1.03	10.7	2.52	65.8	3.25	208	16.5	3.9	1.8	0.09	0.23	5.9	0.0912	0.0181
PFM000083	65819	2019-04-24	0.50	-0.06	1580	58.2	76	176	79.4	2780	366	140	11.5	0.26	0.358	0.00411	0.00123
PFM000083	66797	2019-05-19	0.50	1.71	1570	58.9	74.3	174	77.3	2660	384	135	12.5	< 0.2	0.301	0.00447	0.00296
PFM000083	68090	2019-06-17	0.50	2.01	1630	59.5	77.4	173	76.5	2720	388	142	10	0.24	0.493	0.00761	0.00593
PFM000083	69131	2019-08-13	0.50	1.38	1600	61	76.3	187	77.4	2750	387	143	10.1	0.41	0.596	0.00376	0.00315
PFM000083	70074	2019-09-02	0.50	-0.18	1610	60	76.1	182	81.1	2850	411	141	11	0.35	0.907	0.0036	0.00738
PFM000083	71235	2019-10-15	0.50	0.85	1660	59.7	77.7	180	80.9	2860	400	140	10.3	0.44	0.659	0.00285	0.00147
PFM000084	65820	2019-04-24	0.50	-0.54	707	27.9	65.8	82.7	103	1260	214	75.3	6.03	0.29	1.77	0.218	0.0617
PFM000084	66798	2019-05-19	0.50	-0.45	595	24.4	62.2	70.8	110	1060	169	63.9	4.9	0.3	0.664	0.0679	0.0855
PFM000084	68091	2019-06-17	0.50	-1.52	1260	46.3	70.1	134	86	2280	323	110	8.2	0.3	0.632	0.0342	0.0298
PFM000084	69132	2019-08-13	0.50	0.93	1360	52.9	72.5	161	85.6	2360	354	126	8.55	0.38	0.572	0.0119	0.00857
PFM000084	70075	2019-09-02	0.50	3.61	1620	58.4	75.8	177	87.6	2620	374	137	9.5	0.33	1.01	0.00844	0.0122
PFM000084	71236	2019-10-15	0.50	-2.94	1250	45.6	75.8	137	101	2350	344	109	9.64	0.43	1.25	0.0231	0.0104
PFM000107	62767	2019-01-14	0.50	3.7	25.5	3.6	47.1	6.05	152	34	11.9	4.7	0.137	0.32	0.422	0.0253	0.00594
PFM000107	63166	2019-01-14	1.00	3.8	24.2	3.25	51.6	5.87	155	34	15.3	5.96	0.119	0.3	1.53	0.0509	0.0185
PFM000107	65831	2019-04-23	0.50	2.43	12.9	2.23	43.3	3.7	118	19.1	21	7.1	< 0.2	0.42	1.42	0.0521	0.00385
PFM000107	69171	2019-08-12	0.50	5.08	18.1	1.99	25.8	4.41	69.3	26	15.3	5.81	0.131	0.29	0.673	0.0211	0.00109
PFM000107	71454	2019-10-15	0.50	4.01	18.2	2.15	28.1	4.28	82.9	26	12.1	4.72	0.129	0.26	0.12	0.0186	0.000638
PFM000117	62768	2019-01-15	0.50	5.79	8.1	2.43	33	2.89	106	6.9	3.5	1.67	< 0.02	0.23	2.87	0.00381	0.00154
PFM000117	63167	2019-01-15	1.50	3.08	8.37	2.53	45.9	3.19	150	7.7	4.3	1.85	0.0222	0.25	3.52	0.0165	0.00669
PFM000117	65832	2019-04-24	0.50	3.57	6.63	1.92	42	2.58	125	6.4	9.3	3.56	0.0887	0.22	1.84	0.0164	0.00394
PFM000117	69172	2019-08-12	0.50	6.97	7.36	1.8	24.8	2.7	73.2	6.6	7.8	3.06	0.0484	0.21	0.825	0.00392	0.000638
PFM000117	71455	2019-10-14	0.50	5.32	7.3	1.77	25.6	2.58	79	6.9	6.8	2.65	0.0523	0.21	0.621	0.0039	0.000711
PFM005864	65937	2019-04-25	0.50	6.52	4.92	1.04	28	1.54	68.5	5.9	11.1	4.17	< 0.2	< 0.2	2.29	0.161	0.0126
PFM005864	66781	2019-05-20	0.50	9.91	5.12	1.18	29.1	1.68	67.6	5.7	9.8	3.9	< 0.2	< 0.2	1.29	0.151	0.0331

Table A3-3a. Continued.

Idcode	Sample no	Sampling date (yyyy-mm-dd)	Depth (m)	RCB (%)	Na (mg/l)	K (mg/l)	Ca (mg/l)	Mg (mg/l)	alk (mg/l)	Cl (mg/l)	SO ₄ (mg/l)	SO _{4_s} (mg/l)	Br ⁻ (mg/l)	F ⁻ (mg/l)	Si (mg/l)	Fe (mg/l)	Mn (mg/l)
PFM005864	68343	2019-06-18	0.20	7.68	4.98	1.03	28.3	1.59	71.4	5.4	8.8	3.36	0.0427	< 0.2	0.833	0.174	0.0349
PFM005864	69195	2019-08-13	0.20	-6.69	4.88	0.735	29.5	1.69	77.3	5.4	6.8	2.59	42.2	< 0.2	0.94	0.209	0.0498
PFM005864	70110	2019-09-01	0.50	5.65	4.81	0.78	27.7	1.65	75	5.6	6.8	2.8	< 0.2	< 0.2	1.03	0.125	0.033
PFM005864	72187	2019-10-15	0.50	6.39	5.22	1	27.6	1.7	75.7	5.6	6.3	2.55	0.0472	< 0.2	1.53	0.0935	0.0153
PFM007783	62756	2019-01-15	0.50	1.26	1700	59.8	79.5	181	83	2890	405	144	9.83	0.39	0.999	< 0.002	0.0011
PFM007783	65821	2019-04-24	0.50	1.29	1530	54.5	72.9	164	79.3	2600	368	130	13.3	< 0.2	< 0.2	0.00715	0.00139
PFM007783	66799	2019-05-20	0.50	1.02	1540	58.2	73.4	171	77.9	2650	377	133	12.1	0.21	0.184	0.0109	0.00379
PFM007783	68092	2019-06-18	0.50	1.36	1580	56.9	73.5	164	76.9	2670	378	133	9.86	0.3	0.17	0.0158	0.00513
PFM007783	69133	2019-08-12	0.50	0.97	1560	55.9	72.5	172	75.3	2660	377	144	9.67	0.4	0.202	0.0143	0.0023
PFM007783	70076	2019-09-01	0.50	0.92	1600	57.6	72.8	174	77.5	2750	388	135	10.2	0.35	0.471	0.00963	0.00226
PFM007783	71237	2019-10-14	0.50	0.61	1650	59.8	76.9	181	79.8	2860	403	141	10.5	0.45	0.38	0.00544	0.00222
PFM007910	65823	2019-04-24	0.50	0.95	1550	54.8	72.9	165	79.2	2650	373	132	10.7	0.26	0.168	0.00481	0.000687
PFM007910	66801	2019-05-19	0.50	0.12	1440	55.1	70.5	162	84	2530	367	125	12.1	0.41	0.226	0.00996	0.00383
PFM007910	68094	2019-06-17	0.50	1.31	1520	54.8	72.9	157	78.9	2570	379	128	9.7	0.37	0.537	0.0165	0.00386
PFM007910	69135	2019-08-13	0.50	2.3	1480	56.8	74.5	174	83.5	2490	350	134	9	0.41	1.02	0.028	0.0061
PFM007910	70078	2019-09-02	0.50	0.78	1580	57.5	74.8	175	84.4	2730	392	135	11	0.36	0.94	0.0213	0.0049
PFM007910	71239	2019-10-15	0.50	0.63	1640	59.2	76.2	179	80.3	2840	399	139	10.4	0.43	0.663	0.00603	0.00232
PFM007911	65824	2019-04-24	0.50	-0.96	1480	53.5	71.2	162	78	2650	375	129	12.3	0.24	0.164	0.00486	0.000744
PFM007911	66802	2019-05-19	0.50	-0.03	1480	56.1	71.6	166	77.8	2610	360	129	11.7	0.35	0.209	0.00989	0.00375
PFM007911	68095	2019-06-17	0.50	0.55	1560	55.8	72	160	76.1	2680	383	130	11.4	0.46	0.398	0.0132	0.00386
PFM007911	69136	2019-08-13	0.50	1.47	1570	56.3	73.3	173	76.5	2660	376	139	9.57	0.25	0.685	0.00802	0.000672
PFM007911	70079	2019-09-02	0.50	0.72	1620	58.4	73.7	177	79.4	2800	399	136	11.1	0.34	0.757	0.00472	0.0019
PFM007911	71240	2019-10-15	0.50	0.63	1640	59.5	76.8	180	79.8	2840	399	141	10.3	0.43	0.674	0.00376	0.00157
PFM007912	65825	2019-04-24	0.50	1.87	1600	57.7	76.2	175	77.7	2690	377	139	13.2	0.31	0.266	0.00497	0.00081
PFM007912	66803	2019-05-19	0.50	1.34	1540	57.9	73.5	171	77.4	2630	383	133	12.4	0.49	0.204	0.00501	0.00165
PFM007912	68096	2019-06-17	0.50	0.7	1550	56.5	72.8	163	75.9	2660	379	133	10.5	0.37	0.337	0.00775	0.00219
PFM007912	69137	2019-08-13	0.50	1.13	1580	56.7	73.5	175	75.9	2700	373	140	9.75	0.38	0.554	0.00282	0.000383
PFM007912	70080	2019-09-02	0.50	-0.86	1550	58.6	74.3	177	79.3	2790	399	137	12	0.35	0.727	0.00252	0.000422
PFM007912	71241	2019-10-15	0.50	0.41	1630	59.4	76.2	179	79.2	2840	399	139	10.4	0.44	0.67	0.00233	0.00134
PFM102269	62757	2019-01-15	0.50	-0.5	1640	58.2	75.9	176	81.5	2900	461	140	9.99	0.42	0.904	0.00415	0.00171
PFM102269	63870	2019-02-11	0.50	0.72	1670	61.8	76.3	183	82.2	2880	429	144	14.1	0.42	0.909	0.00378	0.00265
PFM102269	64677	2019-03-18	0.50	1.24	1610	58.4	76.6	169	80.4	2730	378	138	10.2	0.36	0.579	0.0037	0.00223
PFM102269	65822	2019-04-24	0.50	1.73	1610	57.6	74.9	174	79.3	2710	391	138	13	0.25	0.341	0.00409	0.00228
PFM102269	66800	2019-05-20	0.50	0.14	1510	58.2	73.3	172	77.4	2660	378	133	12.4	< 0.2	0.299	0.00912	0.00501
PFM102269	68093	2019-06-17	0.50	0.85	1580	58.1	75	168	76.3	2710	387	136	9.7	0.22	0.455	0.00655	0.00498
PFM102269	69134	2019-08-12	0.50	0.9	1580	56.9	74.5	176	76.2	2710	384	144	9.82	0.37	0.698	0.00396	0.00535
PFM102269	70077	2019-09-01	0.50	1.01	1650	59.5	75.2	180	80.5	2830	403	140	10.9	0.35	0.816	0.00271	0.0052
PFM102269	71238	2019-10-15	0.50	1.01	1650	59.4	76.7	179	80.2	2830	400	140	10.2	0.44	0.694	0.00278	0.000926
PFM102269	72860	2019-11-11	0.50	0.08	1520	55.6	72	167	76.1	2670	372	129	10.2	0.34	0.828	0.00721	0.00155
PFM102269	74053	2019-12-10	0.50	3.48	1650	62	78.7	185	79.1	2690	382	144	9.51	0.42	1.07	0.00816	0.00192

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Table A3-3a. Continued.

Idcode	Sample no	Sampling date (yyyy-mm-dd)	Depth (m)	RCB (%)	Li (mg/l)	Sr (mg/l)	I ⁻ (mg/l)	pH_L* (pH unit)	pH_F**	Temp_F (°C)	EC_L (mS/m)	EC_F (mS/m)
PFM000062	62753	2019-01-15	0.50	-1.64	0.028	1.23	0.00354	7.73	7.81	1.50	925	971.9
PFM000062	65818	2019-04-24	0.50	0.68	0.0236	1.23	0.0103	7.91	8.07	3.30	869	903.2
PFM000062	69130	2019-08-13	0.50	0.15	0.0269	1.23	0.0126	7.79	8.06	15.80	857	879.8
PFM000062	71234	2019-10-15	0.50	0.48	0.0289	1.26	0.0129	7.8	8.06	9.10	891	909.5
PFM000066	62761	2019-01-16	0.10	2.12	0.0031	0.0952	< 0.001	6.95	7.01	-0.10	43	44.5
PFM000066	63866	2019-02-11	0.10	2.21	0.00228	0.08	0.0053	6.94	7.07	0.00	36	35.3
PFM000066	64673	2019-03-18	0.10	5.83	0.00137	0.0645	0.00417	7.12	7.40	0.40	30	29.3
PFM000066	65826	2019-04-23	0.10	2.84	0.00148	0.0695	0.00607	7.29	7.27	12.10	32	31.7
PFM000066	66804	2019-05-20	0.10	5.25	0.00161	0.0788	0.0139	7.55	7.59	13.10	34	33.3
PFM000066	68097	2019-06-17	0.10	4.23	0.004	0.0701	0.00815	7.46	7.15	17.30	30	29.5
PFM000066	69088	2019-08-12	0.10	7.49	< 0.004	0.0736	0.00933	7.27	7.17	16.60	29	28.4
PFM000066	70050	2019-09-01	0.10	2.86	0.00185	0.0838	0.0142	7.48	7.81	18.80	35	34.4
PFM000066	71275	2019-10-14	0.10	2.33	0.004	0.0748	0.0094	7.33	7.08	7.40	32	31.9
PFM000066	72837	2019-11-11	0.10	3.36	0.004	0.101	0.00847	7.14	7.57	1.60	40	33.6
PFM000066	74049	2019-12-09	0.10	2.64	0.00141	0.0724	0.00764	7.2	6.85	1.70	32	31.5
PFM000068	62762	2019-01-14	0.10	3.24	0.00421	0.14	< 0.001	6.85	6.61	0.50	50	49.7
PFM000068	63867	2019-02-11	0.10	2.92	0.00316	0.123	0.00869	6.85	7.16	0.00	44	21.9
PFM000068	64674	2019-03-18	0.10	6.19	0.00173	0.0749	0.00528	6.97	7.04	0.40	31	29.9
PFM000068	65827	2019-04-23	0.10	3.42	0.00184	0.0824	0.00433	7.12	6.96	8.90	33	32.1
PFM000068	66805	2019-05-20	0.10	4.09	0.00235	0.105	0.0175	7.32	7.55	10.80	39	38.3
PFM000068	68098	2019-06-17	0.10	5.4	0.004	0.0913	0.00909	7.24	6.80	15.40	33	32.4
PFM000068	69111	2019-08-12	0.10	5.13	< 0.004	0.107	0.00967	7.14	6.70	14.70	37	35.9
PFM000068	70051	2019-09-01	0.10	3.27	0.00286	0.114	0.00872	7.39	7.84	16.60	40	40.1
PFM000068	71276	2019-10-14	0.10	5.08	0.004	0.0916	0.00584	7.27	6.26	7.10	32	31.7
PFM000068	72838	2019-11-11	0.10	2.6	0.00172	0.0783	0.00837	7.11	7.13	2.30	35	29.2
PFM000068	74050	2019-12-09	0.10	4.73	0.00165	0.0752	0.00814	7.21	7.17	1.30	29	28.3
PFM000069	62763	2019-01-14	0.10	4.5	0.00291	0.115	0.0011	6.79	6.60	-0.10	47	56.1
PFM000069	63868	2019-02-11	0.10	2.24	0.00304	0.128	0.0159	6.75	6.77	0.00	52	51.8
PFM000069	64675	2019-03-18	0.10	4.39	0.00212	0.0953	0.00561	6.94	7.01	0.20	40	39.2
PFM000069	65828	2019-04-23	0.10	2.57	0.00176	0.0906	0.00495	7.01	7.09	9.10	38	36.7
PFM000069	66806	2019-05-20	0.10	10.29	0.00232	0.115	0.0164	7.26	7.37	10.50	43	41.6
PFM000069	68099	2019-06-17	0.10	3.9	0.004	0.0961	0.00846	7.18	6.93	15.20	37	36.0
PFM000069	69112	2019-08-12	0.10	3.88	< 0.004	0.102	0.00863	7.26	7.15	14.70	38	37.0
PFM000069	70052	2019-09-01	0.10	3.34	0.00269	0.112	0.00788	7.29	7.75	16.10	41	40.1
PFM000069	71277	2019-10-14	0.10	4.18	0.004	0.103	0.00672	7.24	6.54	7.30	38	37.5
PFM000069	72839	2019-11-11	0.10	4.51	0.004	0.0774	0.00803	7.2	7.13	2.60	29	38.8
PFM000069	74051	2019-12-09	0.10	3.23	0.00188	0.0945	0.00851	7.17	7.16	2.00	37	36.9
PFM000070	62764	2019-01-15	0.10	5.86	0.00286	0.078	< 0.001	6.47	6.43	0.10	37	35.1

Table A3-3a. Continued.

Idcode	Sample no	Sampling date (yyyy-mm-dd)	Depth (m)	RCB (%)	Li (mg/l)	Sr (mg/l)	I ⁻ (mg/l)	pH_L* (pH unit)	pH_F**	Temp_F (°C)	EC_L (mS/m)	EC_F (mS/m)
PFM000070	63869	2019-02-11	0.10	3.14	0.00137	0.0477	0.00705	7.08	7.02	0.00	24	23.0
PFM000070	64676	2019-03-18	0.10	7.65	0.000928	0.0468	0.00516	7.13	7.20	1.70	22	20.4
PFM000070	65829	2019-04-23	0.10	3.49	0.00109	0.0542	0.00737	7.46	7.39	13.80	25	24.4
PFM000070	66807	2019-05-20	0.10	8.32	0.00115	0.0579	0.015	7.36	7.47	14.20	24	23.3
PFM000070	68100	2019-06-18	0.10	5.91	0.004	0.0518	0.00925	7.27	7.47	17.50	21	20.9
PFM000070	69113	2019-08-12	0.10	5.79	0.004	0.0533	0.0104	7.13	7.03	16.30	22	21.8
PFM000070	71278	2019-10-14	0.10	5.14	0.004	0.041	0.00792	7.33	7.37	8.20	16.7	16.1
PFM000070	72840	2019-11-11	0.10	5.64	0.004	0.0505	0.00882	7.49	7.86	1.40	19.9	19.8
PFM000070	74052	2019-12-09	0.10	7.5	0.00104	0.0515	0.0083	7.52	7.49	0.90	20.44	19.8
PFM000074	62766	2019-01-16	0.50	8.63	0.00276	0.119	< 0.001	6.73	6.94	2.40	61	69.9
PFM000074	65830	2019-04-23	0.50	2.82	0.0016	0.0781	0.00669	7.49	7.33	12.80	36	36.6
PFM000074	69170	2019-08-12	0.50	4.17	< 0.004	0.0852	0.0116	7.19	7.22	16.70	36	36.3
PFM000074	71453	2019-10-16	0.50	1.03	0.004	0.0855	0.0118	7.27	8.10	6.60	38	38.4
PFM000083	65819	2019-04-24	0.50	-0.06	0.0233	1.24	0.00856	7.93	8.25	3.50	881	908.9
PFM000083	66797	2019-05-19	0.50	1.71	0.0301	1.23	0.0253	8.03	8.27	10.70	839	858.9
PFM000083	68090	2019-06-17	0.50	2.01	0.0268	1.22	0.0117	7.92	7.96	13.20	856	861.7
PFM000083	69131	2019-08-13	0.50	1.38	0.0278	1.21	0.0117	8.07	8.23	15.80	868	885.6
PFM000083	70074	2019-09-02	0.50	-0.18	0.0294	1.26	0.0125	7.63	7.79	12.10	911	921.4
PFM000083	71235	2019-10-15	0.50	0.85	0.028	1.25	0.0118	7.88	7.96	9.20	896	904.2
PFM000084	65820	2019-04-24	0.50	-0.54	0.0148	0.616	0.0133	8.01	8.33	11.50	438	439.7
PFM000084	66798	2019-05-19	0.50	-0.45	0.0137	0.54	0.0211	8.05	8.32	15.00	376	441.3
PFM000084	68091	2019-06-17	0.50	-1.52	0.0217	0.962	0.0126	8.14	8.02	15.80	748	736.5
PFM000084	69132	2019-08-13	0.50	0.93	0.025	1.06	0.013	8.05	8.19	17.00	762	765.2
PFM000084	70075	2019-09-02	0.50	3.61	0.0276	1.23	0.0108	7.65	7.81	13.20	852	847.6
PFM000084	71236	2019-10-15	0.50	-2.94	0.0222	0.975	0.0121	7.82	7.94	7.80	753	682.4
PFM000107	62767	2019-01-14	0.50	3.7	0.00337	0.104	0.00371	7.47	7.42	2.10	39	39.0
PFM000107	63166	2019-01-14	1.00	3.8	0.00321	0.105	< 0.001	7.28	7.10	3.60	40	41.5
PFM000107	65831	2019-04-23	0.50	2.43	0.00177	0.0716	0.00615	8.27	8.40	13.70	29	28.8
PFM000107	69171	2019-08-12	0.50	5.08	< 0.004	0.0732	0.00809	9.26	9.16	19.70	24	23.4
PFM000107	71454	2019-10-15	0.50	4.01	0.004	0.0732	0.00673	8.29	8.74	7.20	25	24.7
PFM000117	62768	2019-01-15	0.50	5.79	0.00136	0.0551	< 0.001	7.96	8.32	2.10	29	22.2
PFM000117	63167	2019-01-15	1.50	3.08	0.00148	0.0648	< 0.001	7.5	7.67	4.40	28	27.8
PFM000117	65832	2019-04-24	0.50	3.57	0.000951	0.0531	0.0094	8.35	8.62	13.60	24	23.9
PFM000117	69172	2019-08-12	0.50	6.97	< 0.004	0.0486	0.00852	9.08	8.93	19.90	16.4	16.2
PFM000117	71455	2019-10-14	0.50	5.32	0.004	0.0481	0.0089	8.49	8.07	7.80	17.1	16.7
PFM005864	65937	2019-04-25	0.50	6.52	0.00076	0.0372	0.00534	7.39	7.44	12.40	16.8	16.1
PFM005864	66781	2019-05-20	0.50	9.91	0.000725	0.0405	0.0111	7.5	7.87	16.20	17	15.8
PFM005864	68343	2019-06-18	0.20	7.68	0.000871	0.0393	0.00542	7.55	7.87	20.00	16.6	16.1
PFM005864	69195	2019-08-13	0.20	-6.69	< 0.004	0.0419	0.00694	7.51	8.25	20.00	16.6	16.7
PFM005864	70110	2019-09-01	0.50	5.65	0.000861	0.0404	0.00641	7.3	8.32	19.80	16.4	16.1

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Table A3-3a. Continued.

Idcode	Sample no	Sampling date (yyyy-mm-dd)	Depth (m)	RCB (%)	Li (mg/l)	Sr (mg/l)	I ⁻ (mg/l)	pH_L* (pH unit)	pH_F**	Temp_F (°C)	EC_L (mS/m)	EC_F (mS/m)
PFM005864	72187	2019-10-15	0.50	6.39	0.004	0.0402	0.00708	7.27	8.84	7.20	16.4	15.9
PFM007783	62756	2019-01-15	0.50	1.26	0.0307	1.28	0.00286	7.71	7.92	0.00	922	982.5
PFM007783	65821	2019-04-24	0.50	1.29	0.022	1.16	0.0102	8.01	8.29	10.70	823	843.6
PFM007783	66799	2019-05-20	0.50	1.02	0.028	1.22	0.0235	8.06	8.28	12.70	832	856.0
PFM007783	68092	2019-06-18	0.50	1.36	0.0241	1.17	0.0114	8.19	8.35	17.10	842	847.8
PFM007783	69133	2019-08-12	0.50	0.97	0.0258	1.18	0.012	8.48	8.60	19.40	839	852.5
PFM007783	70076	2019-09-01	0.50	0.92	0.0284	1.21	0.0148	8.47	8.49	20.50	879	888.5
PFM007783	71237	2019-10-14	0.50	0.61	0.028	1.25	0.0118	8.01	7.58	8.40	890	904.2
PFM007910	65823	2019-04-24	0.50	0.95	0.025	1.17	0.00895	8.08	8.35	7.80	834	846.7
PFM007910	66801	2019-05-19	0.50	0.12	0.0261	1.16	0.0241	7.93	8.25	14.00	812	840.0
PFM007910	68094	2019-06-17	0.50	1.31	0.0238	1.12	0.013	8.06	8.21	16.20	817	818.6
PFM007910	69135	2019-08-13	0.50	2.3	0.0264	1.13	0.0122	7.79	7.99	17.90	792	805.6
PFM007910	70078	2019-09-02	0.50	0.78	0.0278	1.21	0.0194	7.78	7.88	15.80	872	891.0
PFM007910	71239	2019-10-15	0.50	0.63	0.028	1.24	0.0107	7.82	7.87	7.70	890	893.2
PFM007911	65824	2019-04-24	0.50	-0.96	0.0229	1.14	0.0106	8.06	8.32	7.40	832	856.0
PFM007911	66802	2019-05-19	0.50	-0.03	0.0273	1.18	0.0217	7.99	8.27	13.50	847	848.0
PFM007911	68095	2019-06-17	0.50	0.55	0.0243	1.14	0.0144	8.02	8.08	14.90	841	850.3
PFM007911	69136	2019-08-13	0.50	1.47	0.0245	1.19	0.0126	7.91	8.14	17.70	845	855.1
PFM007911	70079	2019-09-02	0.50	0.72	0.0285	1.22	0.0174	7.84	7.96	16.20	893	900.7
PFM007911	71240	2019-10-15	0.50	0.63	0.0276	1.25	0.0114	7.84	7.92	7.80	898	906.9
PFM007912	65825	2019-04-24	0.50	1.87	0.025	1.23	0.0103	8.06	8.37	7.40	842	862.0
PFM007912	66803	2019-05-19	0.50	1.34	0.0278	1.22	0.0263	7.99	8.26	12.90	838	849.9
PFM007912	68096	2019-06-17	0.50	0.7	0.0246	1.16	0.0115	8.09	8.16	15.40	840	850.6
PFM007912	69137	2019-08-13	0.50	1.13	0.0267	1.2	0.0121	8	8.32	17.70	852	863.6
PFM007912	70080	2019-09-02	0.50	-0.86	0.0271	1.22	0.0145	7.9	8.33	16.00	892	901.7
PFM007912	71241	2019-10-15	0.50	0.41	0.0275	1.24	0.0116	7.85	7.90	7.90	893	899.2
PFM102269	62757	2019-01-15	0.50	-0.5	0.0262	1.24	0.00273	7.72	7.73	11.20	925	965.1
PFM102269	63870	2019-02-11	0.50	0.72	0.0286	1.24	0.0152	7.71	7.73	11.60	915	912.4
PFM102269	64677	2019-03-18	0.50	1.24	0.0303	1.21	0.0117	7.9	8.08	11.70	877	872.6
PFM102269	65822	2019-04-24	0.50	1.73	0.0242	1.22	0.0118	7.9	8.09	14.30	861	882.3
PFM102269	66800	2019-05-20	0.50	0.14	0.0285	1.22	0.0224	7.96	8.13	22.00	841	861.7
PFM102269	68093	2019-06-17	0.50	0.85	0.0276	1.19	0.0119	7.92	8.02	23.90	852	864.5
PFM102269	69134	2019-08-12	0.50	0.9	0.0253	1.21	0.0127	7.97	8.03	27.70	858	877.2
PFM102269	70077	2019-09-01	0.50	1.01	0.0304	1.24	0.0182	7.82	7.96	25.50	904	919.0
PFM102269	71238	2019-10-15	0.50	1.01	0.028	1.24	0.0118	7.82	7.82	17.10	882	896.3
PFM102269	72860	2019-11-11	0.50	0.08	0.0276	1.17	0.0144	7.62	7.63	16.50	826	843.7
PFM102269	74053	2019-12-10	0.50	3.48	0.0292	1.3	0.0141	7.66	6.44	13.90	834	851.5

* L stands for Laboratory measurement.

** F stands for Field measurement.

Table A3-3b. Biochemical components.

Idcode	Sample no	Sampling date (yyyy-mm-dd)	NH ₄ _N (mg/L)	NO ₂ _N (mg/L)	NO ₃ _N+NO ₂ _N (mg/L)	NO ₃ _N (mg/L)	N TOT (mg/L)	P TOT (mg/L)	PO ₄ _P (mg/L)	POP (mg/L)	PON (mg/L)	SiO ₂ _Si (mg/L)
PFM000062	62753	2019-01-15	0.0035	0.0013	0.0484	0.0471	0.338	0.035	0.013	0.015	0.048	0.920
PFM000062	65818	2019-04-24	0.0014	0.0003	0.0005	< 0.0003	0.233	0.014	0.001	0.007	0.026	0.425
PFM000062	69130	2019-08-13	< 0.0005	< 0.0002	< 0.0003	< 0.0003	0.255	0.013	< 0.0005	0.007	0.047	0.647
PFM000062	71234	2019-10-15	0.0025	0.0003	0.0010	0.0007	0.239	0.013	0.002	0.006	0.034	0.661
PFM000066	62761	2019-01-16	0.0082	0.0006	0.0909	0.0903	0.840	0.010	0.001	0.003	0.019	6.770
PFM000066	63866	2019-02-11	0.0481	0.0020	0.2370	0.2350	1.030	0.016	0.003	0.010	0.062	5.410
PFM000066	64673	2019-03-18	0.0050	0.0006	0.0173	0.0168	0.748	0.010	0.001	0.003	0.019	4.730
PFM000066	65826	2019-04-23	0.0057	0.0003	0.0017	0.0014	0.785	0.010	< 0.0005	0.003	0.012	4.420
PFM000066	66804	2019-05-20	0.0163	0.0006	0.0031	0.0024	0.913	0.016	0.002	0.007	0.048	3.690
PFM000066	68097	2019-06-17	0.0080	0.0003	0.0011	0.0008	0.930	0.017	0.002	0.008	0.031	4.000
PFM000066	69088	2019-08-12	0.0065	0.0004	0.0015	0.0011	0.965	0.017	0.002	0.007	0.046	4.110
PFM000066	70050	2019-09-01	0.0089	0.0007	0.0036	0.0029	1.050	0.013	0.001	0.005	0.018	5.420
PFM000066	71275	2019-10-14	0.0168	0.0008	0.0192	0.0184	0.910	0.012	0.002	0.006	0.031	5.220
PFM000066	72837	2019-11-11	0.0067	0.0005	0.0064	0.0060	0.832	0.008	0.001	0.003	0.006	5.400
PFM000066	74049	2019-12-09	0.0044	0.0003	0.0039	0.0035	0.748	0.008	0.001	0.002	0.009	5.510
PFM000068	62762	2019-01-14	0.0140	0.0034	0.5270	0.5240	1.660	0.014	< 0.0005	0.005	0.028	6.760
PFM000068	63867	2019-02-11	0.0321	0.0043	0.4730	0.4680	1.430	0.015	0.002	0.006	0.034	5.850
PFM000068	64674	2019-03-18	0.0064	0.0007	0.0545	0.0537	0.903	0.010	< 0.0005	0.004	0.020	4.630
PFM000068	65827	2019-04-23	0.0142	0.0005	0.0029	0.0025	0.906	0.012	0.001	0.004	0.027	4.370
PFM000068	66805	2019-05-20	0.0216	0.0006	0.0052	0.0046	0.995	0.016	0.002	0.006	0.051	4.990
PFM000068	68098	2019-06-17	0.0120	0.0004	0.0061	0.0057	1.060	0.017	0.002	0.008	0.079	4.280
PFM000068	69111	2019-08-12	0.0324	0.0013	0.0103	0.0091	1.070	0.023	0.006	0.008	0.055	4.960
PFM000068	70051	2019-09-01	0.0312	0.0010	0.0082	0.0072	1.010	0.020	0.007	0.008	0.032	5.870
PFM000068	71276	2019-10-14	0.0124	0.0006	0.0174	0.0167	0.970	0.014	0.002	0.005	0.043	4.750
PFM000068	72838	2019-11-11	0.0048	0.0007	0.0319	0.0312	1.027	0.011	< 0.0005	0.002	0.017	4.130
PFM000068	74050	2019-12-09	0.0073	0.0006	0.0196	0.0190	0.991	0.010	0.001	0.003	0.009	4.280
PFM000069	62763	2019-01-14	0.0053	0.0069	0.0773	0.0703	1.020	0.016	< 0.0005	0.006	0.042	7.410
PFM000069	63868	2019-02-11	0.0063	0.0021	0.0776	0.0755	1.050	0.021	0.002	0.010	0.057	7.880
PFM000069	64675	2019-03-18	0.0048	0.0008	0.0291	0.0283	0.816	0.011	< 0.0005	0.005	0.023	5.600
PFM000069	65828	2019-04-23	0.0082	< 0.0002	0.0015	0.0014	0.768	0.011	0.001	0.004	0.095	5.320
PFM000069	66806	2019-05-20	0.0101	0.0010	0.0010	< 0.0003	0.892	0.014	0.002	0.004	0.037	5.890
PFM000069	68099	2019-06-17	0.0065	0.0002	0.0049	0.0047	0.879	0.016	0.002	0.003	0.017	4.820
PFM000069	69112	2019-08-12	0.0146	0.0006	0.0030	0.0024	0.984	0.019	0.005	0.008	0.039	4.860
PFM000069	70052	2019-09-01	0.0173	0.0004	0.0024	0.0019	0.969	0.015	0.004	0.003	0.023	5.780
PFM000069	71277	2019-10-14	0.0118	0.0005	0.0106	0.0101	0.876	0.015	0.002	0.006	0.042	5.800
PFM000069	72839	2019-11-11	0.0030	0.0009	0.0113	0.0104	0.941	0.010	0.001	0.003	-	5.030
PFM000069	74051	2019-12-09	0.0045	0.0005	0.0158	0.0153	0.965	0.010	0.001	0.003	0.006	5.660
PFM000070	62764	2019-01-15	0.1480	0.0358	0.9030	0.8670	2.890	0.033	0.001	0.011	0.115	4.000

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Table A3-3b. Continued.

Idcode	Sample no	Sampling date (yyyy-mm-dd)	NH ₄ _N (mg/L)	NO ₂ _N (mg/L)	NO ₃ _N+NO ₂ _N (mg/L)	NO ₃ _N (mg/L)	N TOT (mg/L)	P TOT (mg/L)	PO ₄ _P (mg/L)	POP (mg/L)	PON (mg/L)	SiO ₂ _Si (mg/L)
PFM000070	63869	2019-02-11	0.0786	0.0093	0.9970	0.9880	1.770	0.014	0.003	0.008	0.048	3.120
PFM000070	64676	2019-03-18	0.0469	0.0011	0.0525	0.0514	1.030	0.008	< 0.0005	0.003	0.020	3.540
PFM000070	65829	2019-04-23	0.0159	0.0007	0.0064	0.0057	0.929	0.010	0.001	0.004	0.022	2.060
PFM000070	66807	2019-05-20	0.0118	0.0007	0.0058	0.0051	0.927	0.010	0.001	0.005	0.039	1.040
PFM000070	68100	2019-06-18	0.0092	0.0002	0.0016	0.0014	1.000	0.009	0.001	0.003	0.045	0.850
PFM000070	69113	2019-08-12	0.0224	0.0006	0.0032	0.0026	0.944	0.008	0.001	0.003	0.025	2.730
PFM000070	71278	2019-10-14	0.0080	0.0003	0.0131	0.0128	0.921	0.008	0.001	0.006	0.051	0.807
PFM000070	72840	2019-11-11	0.0210	0.0005	0.0086	0.0081	0.953	0.006	0.001	0.003	0.041	1.050
PFM000070	74052	2019-12-09	0.0471	0.0011	0.0179	0.0168	0.969	0.007	0.001	0.003	0.025	2.030
PFM000074	62766	2019-01-16	0.0410	0.0962	6.6000	6.5100	8.050	0.016	< 0.0005	0.008	0.055	6.740
PFM000074	65830	2019-04-23	0.0072	< 0.0002	0.0005	< 0.0003	0.736	0.007	< 0.0005	0.003	0.082	4.340
PFM000074	69170	2019-08-12	0.0107	< 0.0002	0.0004	< 0.0003	0.942	0.011	0.001	0.004	0.021	4.730
PFM000074	71453	2019-10-16	0.0110	0.0003	0.0081	0.0078	0.809	0.006	< 0.0005	0.003	0.015	5.940
PFM000083	65819	2019-04-24	0.0018	0.0004	0.0016	0.0012	0.251	0.020	0.002	0.014	0.070	0.432
PFM000083	66797	2019-05-19	-	-	-	-	0.228	0.012		0.004	0.034	-
PFM000083	68090	2019-06-17	0.0011	0.0003	0.0005	< 0.0003	0.247	0.014	0.002	0.008	0.046	0.471
PFM000083	69131	2019-08-13	< 0.0005	0.0003	0.0006	0.0003	0.263	0.012	< 0.0005	0.006	0.032	0.553
PFM000083	70074	2019-09-02	0.0009	0.0013	0.0014	< 0.0003	0.245	0.015	0.003	0.007	0.049	0.948
PFM000083	71235	2019-10-15	0.0011	0.0002	0.0011	0.0008	0.240	0.013	0.002	0.006	0.034	0.667
PFM000084	65820	2019-04-24	0.0102	0.0038	0.2900	0.2860	0.964	0.031	0.003	0.015	0.113	1.550
PFM000084	66798	2019-05-19	0.0063	0.0025	0.0401	0.0376	0.746	0.026	0.002	0.007	0.080	0.697
PFM000084	68091	2019-06-17	0.0022	0.0009	0.0012	0.0003	0.465	0.034	0.004	0.013	0.077	0.584
PFM000084	69132	2019-08-13	0.0012	< 0.0002	< 0.0003	< 0.0003	0.649	0.071	0.004	0.015	0.080	0.548
PFM000084	70075	2019-09-02	0.0015	0.0014	0.0020	0.0007	0.370	0.027	0.004	0.014	0.088	1.060
PFM000084	71236	2019-10-15	0.0042	0.0008	0.0346	0.0338	0.379	0.020	0.002	0.013	0.076	0.907
PFM000107	62767	2019-01-14	0.0415	0.0006	0.0202	0.0195	1.350	0.011	0.001	0.005	0.083	0.430
PFM000107	63166	2019-01-14	0.0431	0.0004	0.0137	0.0134	1.160	0.011	< 0.0005	0.001	0.044	1.560
PFM000107	65831	2019-04-23	0.0065	0.0003	0.0005	< 0.0003	0.890	0.014	0.001	0.008	0.133	1.490
PFM000107	69171	2019-08-12	0.0038	< 0.0002	0.0005	0.0004	1.270	0.019	0.001	0.015	0.204	0.688
PFM000107	71454	2019-10-15	0.0094	< 0.0002	0.0015	0.0014	1.040	0.010	0.002	0.004	0.040	0.129
PFM000117	62768	2019-01-15	0.0548	0.0011	0.0570	0.0559	1.050	0.005	< 0.0005	0.002	0.037	2.930
PFM000117	63167	2019-01-15	0.2800	0.0004	0.0219	0.0215	1.330	0.007	< 0.0005	0.003	0.031	3.650
PFM000117	65832	2019-04-24	0.0044	< 0.0002	0.0008	0.0007	0.895	0.008	< 0.0005	0.004	0.040	1.930
PFM000117	69172	2019-08-12	0.0030	< 0.0002	0.0006	0.0006	1.080	0.008	0.001	0.003	0.076	0.848
PFM000117	71455	2019-10-14	0.0071	< 0.0002	0.0018	0.0017	0.961	0.006	0.001	0.003	0.046	0.634
PFM005864	65937	2019-04-25	0.0045	0.0013	0.0738	0.0725	0.916	0.015	< 0.0005	0.007	0.058	2.410
PFM005864	66781	2019-05-20	0.0043	0.0008	0.0008	< 0.0003	0.887	0.015	0.001	0.007	0.068	1.270
PFM005864	68343	2019-06-18	0.0097	0.0007	0.0064	0.0056	0.874	0.012	0.001	0.005	0.051	0.870
PFM005864	69195	2019-08-13	0.0067	0.0004	0.0017	0.0013	0.850	0.012	< 0.0005	0.006	0.054	0.974

Table A3-3b. Continued.

Idcode	Sample no	Sampling date (yyyy-mm-dd)	NH ₄ _N (mg/L)	NO ₂ _N (mg/L)	NO ₃ _N+NO ₂ _N (mg/L)	NO ₃ _N (mg/L)	N TOT (mg/L)	P TOT (mg/L)	PO ₄ _P (mg/L)	POP (mg/L)	PON (mg/L)	SiO ₂ _Si (mg/L)
PFM005864	70110	2019-09-01	0.0028	< 0.0002	0.0004	< 0.0003	0.838	0.014	0.001	0.008	0.094	1.090
PFM005864	72187	2019-10-15	0.0326	0.0007	0.0164	0.0157	0.829	0.013	0.001	0.006	0.050	1.560
PFM007783	62756	2019-01-15	0.0031	0.0007	0.0538	0.0531	0.286	0.016	0.007	0.007	0.033	0.930
PFM007783	65821	2019-04-24	0.0046	0.0008	0.0066	0.0058	0.267	0.013	0.002	0.005	0.032	0.151
PFM007783	66799	2019-05-20	0.0032	0.0003	0.0058	0.0055	0.322	0.026	0.003	0.016	0.103	0.183
PFM007783	68092	2019-06-18	0.0020	0.0004	0.0008	0.0004	0.293	0.017	0.002	0.008	0.063	0.166
PFM007783	69133	2019-08-12	< 0.0005	< 0.0002	0.0011	0.0012	0.378	0.021	< 0.0005	0.008	0.061	0.232
PFM007783	70076	2019-09-01	0.0008	0.0002	0.0003	< 0.0003	0.328	0.016	< 0.0005	0.011	0.077	0.510
PFM007783	71237	2019-10-14	0.0043	0.0002	0.0044	0.0042	0.252	0.011	0.001	0.005	0.034	0.396
PFM007910	65823	2019-04-24	0.0018	< 0.0002	0.0006	0.0005	0.276	0.017	0.001	0.008	0.069	0.262
PFM007910	66801	2019-05-19	0.0013	0.0002	0.0008	0.0005	0.280	0.016	0.001	0.010	0.067	0.220
PFM007910	68094	2019-06-17	0.0023	0.0004	0.0005	< 0.0003	0.344	0.026	0.003	0.009	0.074	0.554
PFM007910	69135	2019-08-13	0.0012	< 0.0002	< 0.0003	< 0.0003	0.383	0.024	0.005	0.012	0.078	1.020
PFM007910	70078	2019-09-02	0.0013	0.0003	0.0003	< 0.0003	0.322	0.019	0.002	0.012	0.089	0.933
PFM007910	71239	2019-10-15	0.0011	< 0.0002	0.0004	< 0.0003	0.270	0.015	0.001	0.008	0.057	0.669
PFM007911	65824	2019-04-24	0.0015	< 0.0002	0.0006	0.0006	0.247	0.010	< 0.0005	0.006	0.034	0.239
PFM007911	66802	2019-05-19	0.0012	0.0002	0.0004	< 0.0003	0.264	0.015	0.001	0.009	0.052	0.204
PFM007911	68095	2019-06-17	0.0014	< 0.0002	0.0005	0.0004	0.275	0.020	0.003	0.012	0.073	0.394
PFM007911	69136	2019-08-13	< 0.0005	< 0.0002	< 0.0003	< 0.0003	0.307	0.021	0.003	0.013	0.061	0.663
PFM007911	70079	2019-09-02	0.0013	0.0002	< 0.0003	< 0.0003	0.316	0.024	0.001	0.013	0.088	0.801
PFM007911	71240	2019-10-15	0.0011	0.0003	0.0006	0.0004	0.264	0.014	0.001	0.008	0.047	0.671
PFM007912	65825	2019-04-24	0.0016	< 0.0002	0.0004	0.0004	0.235	0.011	< 0.0005	0.006	0.025	0.248
PFM007912	66803	2019-05-19	0.0012	0.0002	0.0004	< 0.0003	0.244	0.013	0.001	0.007	0.027	0.210
PFM007912	68096	2019-06-17	0.0014	< 0.0002	< 0.0003	< 0.0003	0.253	0.015	0.001	0.008	0.029	0.309
PFM007912	69137	2019-08-13	< 0.0005	< 0.0002	< 0.0003	< 0.0003	0.283	0.017	< 0.0005	-	0.066	0.539
PFM007912	70080	2019-09-02	0.0009	< 0.0002	< 0.0003	< 0.0003	0.273	0.015	< 0.0005	0.006	0.064	0.746
PFM007912	71241	2019-10-15	0.0009	< 0.0002	0.0004	< 0.0003	0.240	0.012	0.001	0.007	0.040	0.695
PFM102269	62757	2019-01-15	0.0049	0.0013	0.0494	0.0481	0.328	0.034	0.013	0.009	0.055	0.940
PFM102269	63870	2019-02-11	0.0049	0.0019	0.0633	0.0613	0.273	0.021	0.014	0.004	0.014	0.930
PFM102269	64677	2019-03-18	0.0034	0.0007	0.0189	0.0182	0.288	0.016	0.002	0.012	0.058	0.587
PFM102269	65822	2019-04-24	0.0019	0.0003	0.0012	0.0009	0.233	0.013	0.002	0.005	0.029	0.394
PFM102269	66800	2019-05-20	0.0065	0.0002	0.0024	0.0021	0.262	0.017	0.003	0.005	0.026	0.297
PFM102269	68093	2019-06-17	0.0011	0.0003	< 0.0003	< 0.0003	0.250	0.016	0.002	0.005	0.039	0.433
PFM102269	69134	2019-08-12	< 0.0005	< 0.0002	< 0.0003	< 0.0003	0.285	0.017	< 0.0005	0.008	0.061	0.686
PFM102269	70077	2019-09-01	0.0007	< 0.0002	0.0005	0.0003	0.257	0.013	< 0.0005	0.004	0.025	0.871
PFM102269	71238	2019-10-15	0.0093	0.0009	0.0195	0.0185	0.243	0.012	0.006	0.002	0.014	0.685
PFM102269	72860	2019-11-11	0.0116	0.0016	0.0213	0.0197	0.271	0.016	0.004	0.005	0.016	0.547
PFM102269	74053	2019-12-10	0.0103	0.0026	0.0672	0.0646	0.313	0.017	0.009	0.004	0.020	0.944

Table A3-3b. Continued.

Idcode	Sample no	Sampling date (yyyy-mm-dd)	Chl. A (ug/L)	Chl. C (ug/L)	Pheop. (ug/L)	POC (mg/L)	TOC (mg/L)	DOC (mg/L)	DIC (mg/L)	Abs. coeff. (1/m)	Susp. mtrl. (mg/L)
PFM000062	62753	2019-01-15	3.7	0.7	2.1	0.414	4.5	4.0	14.7	0.27	12.0
PFM000062	65818	2019-04-24	2.1	0.7	< 0.2	0.276	4.3	4.1	14.1	0.60	1.3
PFM000062	69130	2019-08-13	1.4	0.2	0.3	0.296	4.4	4.1	14.5	0.58	1.3
PFM000062	71234	2019-10-15	2.9	0.4	0.6	0.283	4.3	3.9	14.7	0.30	1.0
PFM000066	62761	2019-01-16	0.3	< 0.2	0.2	0.160	21.0	20.0	40.1	2.27	0.5
PFM000066	63866	2019-02-11	0.3	< 0.2	0.3	0.505	17.5	17.7	35.6	2.08	0.6
PFM000066	64673	2019-03-18	-	-	-	0.192	21.0	22.0	31.7	2.70	0.3
PFM000066	65826	2019-04-23	-	-	-	0.127	21.0	21.0	28.1	3.04	0.7
PFM000066	66804	2019-05-20	-	-	-	0.400	24.0	23.0	34.4	3.54	1.4
PFM000066	68097	2019-06-17	-	-	-	0.206	24.0	23.0	27.2	3.80	1.4
PFM000066	69088	2019-08-12	-	-	-	0.333	26.0	26.0	25.8	4.16	2.1
PFM000066	70050	2019-09-01	-	-	-	0.148	27.0	26.0	35.5	4.50	1.1
PFM000066	71275	2019-10-14	-	-	-	0.273	24.0	24.0	27.2	3.98	1.3
PFM000066	72837	2019-11-11	-	-	-	0.074	28.0	27.0	40.2	4.36	0.5
PFM000066	74049	2019-12-09	-	-	-	0.102	21.0	21.0	37.0	3.32	0.5
PFM000068	62762	2019-01-14	< 0.2	< 0.2	< 0.2	0.219	31.0	30.0	31.4	3.46	0.2
PFM000068	63867	2019-02-11	< 0.2	< 0.2	< 0.2	0.268	26.0	26.0	29.5	3.60	0.3
PFM000068	64674	2019-03-18	-	-	-	0.221	27.0	28.0	24.6	3.80	0.5
PFM000068	65827	2019-04-23	-	-	-	0.224	25.0	25.0	24.4	3.86	0.6
PFM000068	66805	2019-05-20	-	-	-	0.464	26.0	25.0	32.3	4.62	1.2
PFM000068	68098	2019-06-17	-	-	-	0.686	27.0	28.0	24.5	5.28	1.2
PFM000068	69111	2019-08-12	-	-	-	0.479	28.0	29.0	21.6	5.86	1.1
PFM000068	70051	2019-09-01	-	-	-	0.309	26.0	25.0	31.6	5.02	1.1
PFM000068	71276	2019-10-14	-	-	-	0.522	25.0	26.0	25.2	4.42	1.1
PFM000068	72838	2019-11-11	-	-	-	0.191	23.0	23.0	26.9	3.40	1.1
PFM000068	74050	2019-12-09	-	-	-	0.088	28.0	30.0	27.5	5.08	1.1
PFM000069	62763	2019-01-14	0.3	< 0.2	0.4	0.370	25.0	24.0	37.0	3.19	0.4
PFM000069	63868	2019-02-11	< 0.2	< 0.2	< 0.2	0.343	25.0	25.0	37.4	3.60	0.1
PFM000069	64675	2019-03-18	-	-	-	0.236	25.0	25.0	32.7	3.50	0.2
PFM000069	65828	2019-04-23	-	-	-	0.502	23.0	23.0	29.1	3.48	0.5
PFM000069	66806	2019-05-20	-	-	-	0.337	23.0	24.0	34.5	4.14	1.1
PFM000069	68099	2019-06-17	-	-	-	0.118	24.0	24.0	25.8	4.18	1.6
PFM000069	69112	2019-08-12	-	-	-	0.413	26.0	25.0	25.1	5.38	1.1
PFM000069	70052	2019-09-01	-	-	-	0.192	26.0	25.0	32.9	4.54	1.1
PFM000069	71277	2019-10-14	-	-	-	0.487	23.0	22.0	25.2	4.14	1.9
PFM000069	72839	2019-11-11	-	-	-		28.0	29.0	36.2	4.82	1.3
PFM000069	74051	2019-12-09	-	-	-	0.070	28.0	28.0	35.2	5.02	0.7
PFM000070	62764	2019-01-15	0.3	< 0.2	< 0.2	1.240	30.0	30.0	20.9	3.22	6.8
PFM000070	63869	2019-02-11	0.2	< 0.2	0.2	0.402	20.0	20.0	20.8	1.84	0.1

Table A3-3b. Continued.

Idcode	Sample no	Sampling date (yyyy-mm-dd)	Chl. A (ug/L)	Chl. C (ug/L)	Pheop. (ug/L)	POC (mg/L)	TOC (mg/L)	DOC (mg/L)	DIC (mg/L)	Abs. coeff. (1/m)	Susp. mtrl. (mg/L)
PFM000070	64676	2019-03-18	-	-	-	0.216	31.0	31.0	17.9	3.84	0.3
PFM000070	65829	2019-04-23	-	-	-	0.218	23.0	23.0	20.5	2.16	0.5
PFM000070	66807	2019-05-20	-	-	-	0.356	22.0	22.0	22.9	2.26	0.4
PFM000070	68100	2019-06-18	-	-	-	0.472	11.4	11.4	18.3	2.24	0.6
PFM000070	69113	2019-08-12	-	-	-	0.241	25.0	24.0	18.5	3.16	0.2
PFM000070	71278	2019-10-14	-	-	-	0.588	21.0	20.0	13.1	1.26	0.5
PFM000070	72840	2019-11-11	-	-	-	0.439	23.0	22.0	18.6	1.56	0.5
PFM000070	74052	2019-12-09	-	-	-	0.267	24.0	24.0	19.3	2.98	0.4
PFM000074	62766	2019-01-16	-	-	-	0.408	26.0	27.0	38.5	3.31	0.5
PFM000074	65830	2019-04-23	0.4	< 0.2	< 0.2	0.448	20.0	20.0	27.8	2.84	0.3
PFM000074	69170	2019-08-12	0.3	< 0.2	0.2	0.189	24.0	25.0	28.8	4.30	0.3
PFM000074	71453	2019-10-16	0.5	< 0.2	< 0.2	0.139	22.0	22.0	31.8	3.04	0.7
PFM000083	65819	2019-04-24	2.7	0.8	0.2	0.684	4.6	4.2	11.1	0.56	4.1
PFM000083	66797	2019-05-19	1.8	0.3	0.4	0.230	4.9	4.6	14.4	0.58	0.5
PFM000083	68090	2019-06-17	2.3	0.5	0.6	0.367	4.5	4.6	13.1	0.62	1.2
PFM000083	69131	2019-08-13	2.7	0.5	0.8	0.023	4.3	4.3	14.4	0.54	1.2
PFM000083	70074	2019-09-02	2.7	0.5	0.7	0.314	4.0	3.8	15.5	0.18	1.3
PFM000083	71235	2019-10-15	3.7	0.7	1.0	0.266	4.2	3.9	15.0	0.28	1.0
PFM000084	65820	2019-04-24	6.0	1.0	2.3	1.490	12.5	12.1	17.3	3.50	7.5
PFM000084	66798	2019-05-19	5.5	1.1	1.6	0.505	14.3	14.7	19.7	3.38	4.1
PFM000084	68091	2019-06-17	3.3	0.5	3.6	0.490	8.4	8.0	14.3	2.06	6.4
PFM000084	69132	2019-08-13	5.5	1.0	2.3	0.578	7.4	6.9	14.1	1.66	7.6
PFM000084	70075	2019-09-02	6.2	1.2	4.8	0.578	5.8	5.5	17.0	0.48	2.9
PFM000084	71236	2019-10-15	5.1	0.8	1.8	0.496	6.7	5.0	18.3	0.68	1.7
PFM000107	62767	2019-01-14	6.0	1.9	2.5	0.668	26.0	25.0	24.7	0.79	0.8
PFM000107	63166	2019-01-14	3.4	1.1	0.6	0.393	24.0	24.0	26.4	1.02	0.6
PFM000107	65831	2019-04-23	2.9	0.8	1.1	1.460	22.0	22.0	19.0	2.76	0.4
PFM000107	69171	2019-08-12	2.3	0.3	< 0.2	1.650	24.0	26.0	9.5	2.22	3.5
PFM000107	71454	2019-10-15	1.1	0.2	0.3	0.388	22.0	21.0	12.6	1.06	0.4
PFM000117	62768	2019-01-15	1.4	0.3	0.3	0.423	22.0	21.0	17.2	0.69	0.2
PFM000117	63167	2019-01-15	0.4	< 0.2	< 0.2	0.413	26.0	24.0	23.8	0.85	0.3
PFM000117	65832	2019-04-24	2.6	0.5	0.3	0.406	23.0	22.0	18.3	2.06	0.6
PFM000117	69172	2019-08-12	3.0	0.4	0.8	0.749	24.0	25.0	10.3	1.74	1.7
PFM000117	71455	2019-10-14	-	-	-	0.520	22.0	23.0	11.2	0.80	0.7
PFM005864	65937	2019-04-25	4.7	0.6	4.6	0.432	23.0	23.0	12.0	4.78	
PFM005864	66781	2019-05-20	4.2	0.7	1.0	0.585	24.0	24.0	13.3	4.64	1.7
PFM005864	68343	2019-06-18	3.0	0.4	0.7	0.374	24.0	23.0	12.2	4.06	0.9
PFM005864	69195	2019-08-13	4.6	0.7	2.4	0.410	23.0	22.0		3.70	0.8
PFM005864	70110	2019-09-01	3.3	0.4	1.4	0.637	22.0	22.0	13.5	2.70	1.5

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Table A3-3b. Continued.

Idcode	Sample no	Sampling date (yyyy-mm-dd)	Chl. A (ug/L)	Chl. C (ug/L)	Pheop. (ug/L)	POC (mg/L)	TOC (mg/L)	DOC (mg/L)	DIC (mg/L)	Abs. coeff. (1/m)	Susp. mtrl. (mg/L)
PFM005864	72187	2019-10-15	3.7	0.6	1.0	0.352	17.1	18.6	12.9	2.46	1.8
PFM007783	62756	2019-01-15	3.6	0.9	0.7	0.327	4.0	4.1	15.0	0.25	2.2
PFM007783	65821	2019-04-24	1.2	0.3	< 0.2	0.211	5.2	5.0	13.0	0.68	1.3
PFM007783	66799	2019-05-20	1.9	0.3	0.5	0.598	5.5	5.0	14.6	0.84	2.0
PFM007783	68092	2019-06-18	3.0	0.5	3.3	0.424	5.1	4.7	11.8	0.80	1.1
PFM007783	69133	2019-08-12	2.3	0.3	0.2	0.387	5.4	5.1	13.5	0.88	2.6
PFM007783	70076	2019-09-01	2.0	0.3	2.8	0.330	4.7	4.4	13.9	0.26	1.7
PFM007783	71237	2019-10-14	2.1	0.5	0.5	0.243	4.3	4.3	14.3	0.26	0.5
PFM007910	65823	2019-04-24	2.1	0.4	0.2	0.217	5.1	4.8	14.1	0.68	1.0
PFM007910	66801	2019-05-19	5.3	0.9	0.6	0.394	5.4	5.4	15.0	1.06	1.0
PFM007910	68094	2019-06-17	3.5	0.8	1.4	0.527	6.0	5.7	13.3	1.10	1.3
PFM007910	69135	2019-08-13	3.4	0.5	1.7	0.577	6.9	6.9	15.9	1.52	1.3
PFM007910	70078	2019-09-02	3.3	0.6	1.0	0.492	5.2	4.8	16.1	0.42	1.0
PFM007910	71239	2019-10-15	3.5	0.8	1.0	0.441	4.3	4.3	15.1	0.34	0.7
PFM007911	65824	2019-04-24	1.3	0.4	1.5	0.355	4.8	4.7	13.6	0.66	1.0
PFM007911	66802	2019-05-19	2.4	0.4	< 0.2	0.350	5.5	4.8	14.5	0.72	0.9
PFM007911	68095	2019-06-17	3.6	0.7	2.4	0.502	5.0	4.8	11.9	0.94	0.9
PFM007911	69136	2019-08-13	3.9	0.6	1.5	0.443	5.0	5.5	14.4	1.04	1.6
PFM007911	70079	2019-09-02	3.5	0.5	0.9	0.481	4.4	4.3	14.9	0.22	1.2
PFM007911	71240	2019-10-15	3.7	0.8	1.2	0.323	4.2	4.1	14.1	0.30	0.9
PFM007912	65825	2019-04-24	1.4	0.3	0.7	0.267	4.9	4.8	13.9	0.70	0.9
PFM007912	66803	2019-05-19	1.7	0.4	0.3	0.199	4.7	4.6	14.4	0.66	0.6
PFM007912	68096	2019-06-17	2.2	0.5	0.9	0.243	4.6	4.7	11.4	0.74	1.0
PFM007912	69137	2019-08-13	4.6	0.7	1.0	0.452	4.9	4.4	14.1	0.82	1.4
PFM007912	70080	2019-09-02	4.4	0.6	2.3	0.396	4.3	4.1	14.7	0.20	1.0
PFM007912	71241	2019-10-15	2.7	0.5	1.3	0.296	4.0	3.8	14.0	0.30	1.1
PFM102269	62757	2019-01-15	3.4	0.8	1.8	0.558	4.1	4.0	14.7	0.27	11.0
PFM102269	63870	2019-02-11	1.3	0.3	1.6	0.147	4.1	4.0	15.5	0.30	1.3
PFM102269	64677	2019-03-18	9.4	2.3	1.7	0.413	4.8	4.4	15.4	0.38	2.9
PFM102269	65822	2019-04-24	2.0	0.6	0.4	0.240	4.3	4.3	14.2	0.56	1.2
PFM102269	66800	2019-05-20	2.5	0.5	< 0.2	0.194	5.2	4.9	14.5	0.80	3.5
PFM102269	68093	2019-06-17	1.1	0.2	0.9	0.285	4.4	4.3	12.7	0.56	2.8
PFM102269	69134	2019-08-12	1.1	< 0.2	0.2	0.387	4.7	4.3	14.7	0.56	1.5
PFM102269	70077	2019-09-01	1.4	0.2	0.5	0.175	4.1	4.0	15.0	0.22	0.9
PFM102269	71238	2019-10-15	1.4	0.2	0.9	0.113	3.9	4.5	15.2	0.28	0.7
PFM102269	72860	2019-11-11	1.7	0.4	0.9	0.175	4.4	4.4	13.8	0.36	1.8
PFM102269	74053	2019-12-10	1.2	< 0.2	0.9	0.191	4.3	4.7	15.3	0.40	2.3

Table A3-3c. Isotopes.

Idcode	Sample no	Sampling date (yyyy-mm-dd)	$\delta^2\text{H}$ (‰ SMOW)	^3H (TU)	$\delta^{18}\text{O}$ (‰ SMOW)
PFM000062	62753	2019-01-15	-59.9	10.3	-7.90
PFM000062	65818	2019-04-24	-59.2	5.5	-7.77
PFM000062	69130	2019-08-13	-61.7	7.9	-8.07
PFM000062	71234	2019-10-15	-59.6	6.0	-7.82
PFM000066	62761	2019-01-16	-82.8	7.7	-11.43
PFM000066	63866	2019-02-11	-81.8	8.2	-11.37
PFM000066	64673	2019-03-18	-90.2	9.3	-12.53
PFM000066	65826	2019-04-23	-81.7	9.2	-11.10
PFM000066	66804	2019-05-20	-80.1	8.6	-10.67
PFM000066	68097	2019-06-17	-68.9	8.3	-9.37
PFM000066	69088	2019-08-12	-66.1	10.2	-8.87
PFM000066	70050	2019-09-01	-66.8	8.2	-9.15
PFM000066	71275	2019-10-14	-70.2	8.5	-9.74
PFM000066	72837	2019-11-11	-77.1	7.7	-10.72
PFM000066	74049	2019-12-09	-82.6	8.6	-11.76
PFM000068	62762	2019-01-14	-76.6	8.1	-10.41
PFM000068	63867	2019-02-11	-84.6	9.1	-11.76
PFM000068	64674	2019-03-18	-89.0	9.8	-12.16
PFM000068	65827	2019-04-23	-77.6	8.4	-10.23
PFM000068	66805	2019-05-20	-78.3	9.2	-10.33
PFM000068	68098	2019-06-17	-66.0	10.3	-8.73
PFM000068	69111	2019-08-12	-68.0	11.1	-9.12
PFM000068	70051	2019-09-01	-66.9	9.9	-8.93
PFM000068	71276	2019-10-14	-65.4	8.5	-8.65
PFM000068	72838	2019-11-11	-72.2	9.2	-9.68
PFM000068	74050	2019-12-09	-79.1	8.0	-10.76
PFM000069	62763	2019-01-14	-74.5	6.6	-9.98
PFM000069	63868	2019-02-11	-83.3	8.3	-11.46
PFM000069	64675	2019-03-18	-90.0	7.6	-12.43
PFM000069	65828	2019-04-23	-85.2	9.0	-11.71
PFM000069	66806	2019-05-20	-82.2	7.9	-11.11
PFM000069	68099	2019-06-17	-71.5	7.8	-9.57
PFM000069	69112	2019-08-12	-70.3	10.1	-9.69
PFM000069	70052	2019-09-01	-67.8	9.1	-9.09
PFM000069	71277	2019-10-14	-70.3	8.4	-9.47
PFM000069	72839	2019-11-11	-76.6	8.8	-10.70
PFM000069	74051	2019-12-09	-82.2	8.5	-11.70
PFM000070	62764	2019-01-15	-71.9	8.5	-9.50
PFM000070	63869	2019-02-11	-83.3	7.2	-10.59
PFM000070	64676	2019-03-18	-85.6	8.1	-11.59
PFM000070	65829	2019-04-23	-66.8	8.2	-8.13
PFM000070	66807	2019-05-20	-65.5	5.9	-7.70
PFM000070	68100	2019-06-18	-58.0	8.3	-6.56
PFM000070	69113	2019-08-12	-57.3	7.6	-6.60
PFM000070	71278	2019-10-14	-54.7	8.9	-5.88
PFM000070	72840	2019-11-11	-58.4	7.9	-6.45
PFM000070	74052	2019-12-09	-70.0	7.6	-9.00
PFM000074	62766	2019-01-16	-81.6	9.1	-11.25
PFM000074	65830	2019-04-23	-82.4	6.8	-11.21
PFM000074	69170	2019-08-12	-67.1	9.7	-9.02
PFM000074	71453	2019-10-16	-70.1	8.6	-9.67
PFM000083	65819	2019-04-24	-61.4	6.0	-8.33
PFM000083	66797	2019-05-19	-61.1	6.9	-7.84
PFM000083	68090	2019-06-17	-61.5	5.7	-8.12
PFM000083	69131	2019-08-13	-61.3	5.9	-8.17
PFM000083	70074	2019-09-02	-59.1	5.6	-8.02
PFM000083	71235	2019-10-15	-59.5	6.3	-7.89
PFM000084	65820	2019-04-24	-72.0	6.6	-9.78

Table A3-3c. Continued.

Idcode	Sample no	Sampling date (yyyy-mm-dd)	δ²H (‰ SMOW)	δ³H (TU)	δ¹⁸O (‰ SMOW)
PFM000084	66798	2019-05-19	-70.3	7.5	-9.28
PFM000084	68091	2019-06-17	-61.6	5.9	-8.14
PFM000084	69132	2019-08-13	-61.4	5.2	-8.01
PFM000084	70075	2019-09-02	-59.4	6.7	-8.04
PFM000084	71236	2019-10-15	-61.5	8.1	-8.15
PFM000107	62767	2019-01-14	-48.8	6.9	-5.27
PFM000107	63166	2019-01-14	-52.8	9.1	-6.03
PFM000107	65831	2019-04-23	-74.0	8.1	-9.59
PFM000107	69171	2019-08-12	-51.4	9.6	-5.15
PFM000107	71454	2019-10-15	-51.6	8.5	-5.62
PFM000117	62768	2019-01-15	-55.6	9.1	-5.96
PFM000117	63167	2019-01-15	-52.0	8.3	-5.25
PFM000117	65832	2019-04-24	-66.9	8.7	-8.13
PFM000117	69172	2019-08-12	-52.9	8.7	-5.35
PFM000117	71455	2019-10-14	-50.6	8.6	-5.10
PFM005864	65937	2019-04-25	-78.9	9.8	-10.47
PFM005864	66781	2019-05-20	-75.3	7.0	-9.71
PFM005864	68343	2019-06-18	-67.0	7.9	-8.36
PFM005864	69195	2019-08-13	-63.1	9.8	-7.21
PFM005864	70110	2019-09-01	-60.9	7.5	-7.19
PFM005864	72187	2019-10-15	-59.3	7.9	-6.90
PFM007783	62756	2019-01-15	-60.5	6.1	-7.99
PFM007783	65821	2019-04-24	-62.0	6.3	-8.43
PFM007783	66799	2019-05-20	-62.5	6.5	-8.11
PFM007783	68092	2019-06-18	-60.4	5.9	-7.94
PFM007783	69133	2019-08-12	-60.1	6.9	-7.87
PFM007783	70076	2019-09-01	-58.6	5.4	-7.91
PFM007783	71237	2019-10-14	-59.6	6.0	-7.86
PFM007910	65823	2019-04-24	-60.5	7.0	-7.98
PFM007910	66801	2019-05-19	-61.1	7.4	-7.94
PFM007910	68094	2019-06-17	-61.1	5.8	-8.08
PFM007910	69135	2019-08-13	-61.5	5.8	-8.18
PFM007910	70078	2019-09-02	-59.7	5.6	-7.81
PFM007910	71239	2019-10-15	-60.1	6.0	-7.88
PFM007911	65824	2019-04-24	-61.1	6.0	-8.08
PFM007911	66802	2019-05-19	-61.2	5.6	-8.02
PFM007911	68095	2019-06-17	-61.1	5.0	-8.09
PFM007911	69136	2019-08-13	-60.6	6.3	-7.95
PFM007911	70079	2019-09-02	-59.9	5.2	-7.79
PFM007911	71240	2019-10-15	-59.6	5.6	-7.88
PFM007912	65825	2019-04-24	-61.8	7.3	-8.19
PFM007912	66803	2019-05-19	-61.1	6.4	-7.91
PFM007912	68096	2019-06-17	-60.9	5.6	-8.09
PFM007912	69137	2019-08-13	-60.3	7.2	-7.94
PFM007912	70080	2019-09-02	-59.5	4.3	-7.80
PFM007912	71241	2019-10-15	-59.8	6.0	-8.05
PFM102269	62757	2019-01-15	-60.5	8.6	-7.91
PFM102269	63870	2019-02-11	-62.1	8.3	-8.18
PFM102269	64677	2019-03-18	-62.0	59.4	-8.12
PFM102269	65822	2019-04-24	-59.8	6.6	-7.86
PFM102269	66800	2019-05-20	-61.8	6.8	-7.98
PFM102269	68093	2019-06-17	-61.0	5.3	-8.09
PFM102269	69134	2019-08-12	-60.9	7.0	-8.05
PFM102269	70077	2019-09-01	-58.4	5.2	-7.91
PFM102269	71238	2019-10-15	-60.2	5.6	-7.91
PFM102269	72860	2019-11-11	-61.1	6.6	-8.22
PFM102269	74053	2019-12-10	-62.2	5.7	-8.20

Table A3-3d. Trace elements I.

	Idcode	Sample no	Sampling date (yyyy-mm-dd)	Ag (ug/L)	Al (ug/L)	As (ug/L)	B (ug/L)	Ba (ug/L)	Cd (ug/L)	Cr (ug/L)	Cu (ug/L)	Co (ug/L)	Hg (ug/L)
SKB P-20-30	PFM000062	62753	2019-01-15	-	2.05	-	-	15.6	< 0.02	0.2650	2.490	0.0213	< 0.002
	PFM000062	65818	2019-04-24	-	13.40	-	-	13.8	0.0287	0.0755	0.559	< 0.02	< 0.002
	PFM000062	69130	2019-08-13	-	1.78	0.938	638.0	16.9	< 0.02	0.1100	0.827	< 0.02	< 0.002
	PFM000062	71234	2019-10-15	< 0.3	0.59	1.160	659.0	16.1	< 0.02	0.0650	-	< 0.02	< 0.002
	PFM000066	62761	2019-01-16	-	9.52	-	-	30.3	0.0042	0.1390	2.190	0.0665	< 0.002
	PFM000066	63866	2019-02-11	-	8.13	-	-	27.0	0.0073	0.1560	1.530	0.2660	< 0.002
	PFM000066	64673	2019-03-18	-	16.50	-	-	17.9	< 0.002	0.1860	1.490	0.0708	< 0.002
	PFM000066	65826	2019-04-23	-	7.93	-	-	21.7	0.0031	0.1200	1.070	0.0370	< 0.002
	PFM000066	66804	2019-05-20	-	6.34	0.434	13.3	26.4	0.0029	0.1510	0.785	0.1030	< 0.002
	PFM000066	68097	2019-06-17	-	9.53	0.510	14.6	23.8	0.0051	0.1980	1.780	0.0860	0.00276
	PFM000066	69088	2019-08-12	-	6.91	0.897	17.1	25.3	0.0026	0.1620	0.712	0.0787	< 0.002
	PFM000066	70050	2019-09-01	< 0.05	6.91	0.561	15.9	29.5	0.0040	0.1780	0.276	0.0851	< 0.002
	PFM000066	71275	2019-10-14	< 0.05	7.60	0.455	13.7	23.8	0.0022	0.1400	-	0.0836	< 0.002
	PFM000066	72837	2019-11-11	< 0.05	23.20	0.471	16.3	24.1	0.0080	0.1860	-	0.0811	0.00219
	PFM000066	74049	2019-12-09	< 0.05	24.80	0.392	< 10	22.4	0.0029	0.2550	-	0.0704	0.00220
	PFM000068	62762	2019-01-14	-	29.20	-	-	31.9	0.0101	0.2420	2.300	0.1220	0.00266
	PFM000068	63867	2019-02-11	-	34.10	-	-	28.1	0.0084	0.2350	2.650	0.1380	0.00338
	PFM000068	64674	2019-03-18	-	40.20	-	-	17.1	0.0069	0.2240	1.660	0.0767	0.00322
	PFM000068	65827	2019-04-23	-	18.00	-	-	19.0	0.0073	0.1630	1.140	0.0438	0.00302
	PFM000068	66805	2019-05-20	-	18.10	0.486	21.7	26.2	0.0038	0.1770	0.688	0.1680	0.00334
	PFM000068	68098	2019-06-17	-	25.70	0.524	25.8	22.8	0.0087	0.2180	1.020	0.1290	0.00314
	PFM000068	69111	2019-08-12	-	22.60	0.512	35.0	25.5	0.0052	0.2370	0.719	0.1450	< 0.002
	PFM000068	70051	2019-09-01	< 0.05	20.10	0.471	35.8	27.3	0.0033	0.2060	0.399	0.1120	< 0.002
	PFM000068	71276	2019-10-14	< 0.05	17.90	0.527	24.6	19.1	0.0039	0.1780	-	0.0989	< 0.002
	PFM000068	72838	2019-11-11	< 0.05	17.00	0.462	< 10	21.8	0.0077	0.2050	-	0.0689	< 0.002
	PFM000068	74050	2019-12-09	< 0.05	60.60	0.460	12.3	18.5	0.0072	0.3060	-	0.0953	0.00438
	PFM000069	62763	2019-01-14	-	11.40	-	-	28.1	0.0038	0.1280	0.900	0.1040	0.00252
	PFM000069	63868	2019-02-11	-	10.90	-	-	27.6	0.0077	0.1640	1.040	0.1270	0.00311
	PFM000069	64675	2019-03-18	-	17.00	-	-	25.0	0.0043	0.1770	1.470	0.0973	0.00269
	PFM000069	65828	2019-04-23	-	13.00	-	-	21.5	0.0037	0.1540	1.380	0.0432	< 0.002
	PFM000069	66806	2019-05-20	-	15.50	0.390	24.1	28.6	< 0.002	0.0942	0.524	0.0822	0.00248
	PFM000069	68099	2019-06-17	-	16.50	0.420	26.8	24.0	0.0035	0.1120	0.721	0.0865	0.00243
	PFM000069	69112	2019-08-12	-	18.60	0.497	38.4	24.2	0.0023	0.1640	0.516	0.0787	< 0.002
PFM000069	70052	2019-09-01	< 0.05	17.80	0.358	37.6	26.6	0.0023	0.1700	0.278	0.0655	< 0.002	
PFM000069	71277	2019-10-14	< 0.05	16.30	0.287	30.5	22.3	0.0028	0.1640	-	0.0588	< 0.002	
PFM000069	72839	2019-11-11	< 0.05	59.90	0.567	13.8	18.3	0.0110	0.2910	-	0.0949	0.00407	
PFM000069	74051	2019-12-09	< 0.05	41.70	0.456	13.0	25.3	0.0042	0.2750	-	0.0697	0.00346	
PFM000070	62764	2019-01-15	-	21.40	-	-	27.7	0.0103	0.1780	1.260	0.1400	< 0.002	
PFM000070	63869	2019-02-11	-	7.22	-	-	13.8	< 0.02	0.1170	0.459	0.0599	< 0.002	

Table A3-3d. Continued.

Idcode	Sample no	Sampling date (yyyy-mm-dd)	Ag (ug/L)	Al (ug/L)	As (ug/L)	B (ug/L)	Ba (ug/L)	Cd (ug/L)	Cr (ug/L)	Cu (ug/L)	Co (ug/L)	Hg (ug/L)
PFM000070	64676	2019-03-18	-	51.90	-	-	11.9	0.0082	0.2340	1.650	0.0454	0.00321
PFM000070	65829	2019-04-23	-	6.24	-	-	13.3	0.0042	0.1000	1.010	0.0348	< 0.002
PFM000070	66807	2019-05-20	-	5.52	0.349	12.8	15.5	< 0.002	0.1140	0.580	0.0849	< 0.002
PFM000070	68100	2019-06-18	-	5.84	0.310	11.8	13.9	0.0033	0.0860	0.294	0.0784	< 0.002
PFM000070	69113	2019-08-12	-	7.71	0.299	15.6	17.2	< 0.002	0.0705	0.240	0.0912	< 0.002
PFM000070	71278	2019-10-14	< 0.05	3.69	0.204	< 10	8.3	0.0024	0.1120	-	0.0452	< 0.002
PFM000070	72840	2019-11-11	< 0.05	9.84	0.346	< 10	9.8	0.0047	0.1180	-	0.0395	< 0.002
PFM000070	74052	2019-12-09	< 0.05	25.10	0.360	< 10	11.8	0.0038	0.1850	-	0.0423	< 0.002
PFM000074	62766	2019-01-16	-	7.16	-	-	42.9	< 0.002	0.1430	1.380	0.1600	< 0.002
PFM000074	65830	2019-04-23	-	7.18	-	-	26.3	0.0021	0.1030	1.440	0.0363	< 0.002
PFM000074	69170	2019-08-12	-	11.00	0.515	22.2	28.8	< 0.002	0.1230	0.372	0.0729	< 0.002
PFM000074	71453	2019-10-16	< 0.05	6.98	0.397	13.0	25.8	< 0.002	0.1450	-	0.0497	< 0.002
PFM000083	65819	2019-04-24	-	5.17	-	-	13.5	< 0.02	0.0990	0.590	0.0211	< 0.002
PFM000083	66797	2019-05-19	-	1.22	0.637	650.0	16.5	< 0.02	0.1270	0.885	< 0.02	< 0.002
PFM000083	68090	2019-06-17	-	0.90	0.956	633.0	17.7	< 0.02	0.1130	0.902	< 0.02	< 0.002
PFM000083	69131	2019-08-13	-	1.43	1.130	638.0	16.7	0.0128	0.1070	0.567	0.0154	< 0.002
PFM000083	70074	2019-09-02	< 0.3	0.95	0.712	651.0	17.3	0.0240	0.0852	0.531	0.0398	< 0.002
PFM000083	71235	2019-10-15	< 0.3	1.00	< 0.5	650.0	16.4	< 0.02	0.1240	-	< 0.02	< 0.002
PFM000084	65820	2019-04-24	-	80.60	-	-	18.2	0.0229	0.1130	1.550	0.2890	< 0.002
PFM000084	66798	2019-05-19	-	24.00	0.673	264.0	18.8	0.0071	0.1850	1.700	0.4080	< 0.002
PFM000084	68091	2019-06-17	-	4.84	0.507	495.0	17.0	< 0.02	0.1040	0.824	0.1100	< 0.002
PFM000084	69132	2019-08-13	-	3.38	1.010	552.0	18.0	0.0061	0.0742	0.688	0.0795	< 0.002
PFM000084	70075	2019-09-02	< 0.3	2.02	0.865	638.0	18.4	< 0.02	0.0858	0.798	0.0539	< 0.002
PFM000084	71236	2019-10-15	< 0.3	11.90	0.682	499.0	18.6	< 0.02	0.1030	-	0.0868	< 0.002
PFM000107	62767	2019-01-14	-	3.11	-	-	21.7	< 0.002	0.1080	0.445	0.0596	< 0.002
PFM000107	63166	2019-01-14	-	5.55	-	-	21.9	< 0.002	0.1110	0.433	0.0679	< 0.002
PFM000107	65831	2019-04-23	-	6.82	-	-	14.4	0.0023	0.1250	0.825	0.0440	0.00298
PFM000107	69171	2019-08-12	-	17.20	0.554	27.2	12.5	< 0.002	0.0523	0.558	0.0738	< 0.002
PFM000107	71454	2019-10-15	< 0.05	6.40	0.356	25.5	12.4	< 0.002	0.0938	-	0.0521	< 0.002
PFM000117	62768	2019-01-15	-	2.86	-	-	10.8	0.0062	0.0741	0.544	0.0509	< 0.002
PFM000117	63167	2019-01-15	-	2.94	-	-	15.2	< 0.002	0.0900	0.397	0.0545	< 0.002
PFM000117	65832	2019-04-24	-	6.44	-	-	11.5	< 0.002	0.1040	0.761	0.0428	0.00262
PFM000117	69172	2019-08-12	-	15.20	0.494	10.5	6.9	0.0026	0.0827	0.706	0.0497	< 0.002
PFM000117	71455	2019-10-14	< 0.05	8.02	0.298	< 10	7.6	< 0.002	0.0733	-	0.0463	< 0.002
PFM005864	65937	2019-04-25	-	32.20	0.372	-	10.6	< 0.002	0.1820	1.240	0.0257	< 0.002
PFM005864	66781	2019-05-20	-	24.80	0.474	< 10	10.5	< 0.002	0.2050	1.320	0.0362	< 0.002
PFM005864	68343	2019-06-18	-	14.60	0.498	< 10	13.3	< 0.002	0.1820	1.050	0.0450	< 0.002
PFM005864	69195	2019-08-13	-	7.49	0.578	< 10	13.9	< 0.002	0.1190	0.552	0.0286	< 0.002
PFM005864	70110	2019-09-01	< 0.05	8.29	0.460	< 10	13.8	< 0.002	0.1120	0.498	0.0305	< 0.002

Table A3-3d. Continued.

Idcode	Sample no	Sampling date (yyyy-mm-dd)	Ag (ug/L)	Al (ug/L)	As (ug/L)	B (ug/L)	Ba (ug/L)	Cd (ug/L)	Cr (ug/L)	Cu (ug/L)	Co (ug/L)	Hg (ug/L)	
SKB P-20-30	PFM005864	72187	2019-10-15	< 0.05	8.25	0.394	< 10	12.0	< 0.002	0.1310	-	0.0396	< 0.002
	PFM007783	62756	2019-01-15	-	1.23	-	-	16.4	< 0.02	0.0657	0.817	0.0280	< 0.002
	PFM007783	65821	2019-04-24	-	4.34	-	-	13.3	0.0254	0.0955	0.816	< 0.02	< 0.002
	PFM007783	66799	2019-05-20	-	1.83	0.645	638.0	16.3	< 0.02	0.1030	0.874	0.0247	< 0.002
	PFM007783	68092	2019-06-18	-	1.56	0.734	609.0	15.6	< 0.02	0.0516	0.615	0.0225	< 0.002
	PFM007783	69133	2019-08-12	-	2.58	1.230	617.0	17.9	< 0.02	0.0849	0.452	0.0263	< 0.002
	PFM007783	70076	2019-09-01	< 0.3	1.61	0.795	626.0	18.4	< 0.02	0.0730	0.932	0.0289	< 0.002
	PFM007783	71237	2019-10-14	< 0.3	0.75	1.090	656.0	15.8	< 0.02	< 0.04	-	0.0222	< 0.002
	PFM007910	65823	2019-04-24	-	3.77	-	-	13.9	< 0.02	0.0799	0.447	< 0.02	< 0.002
	PFM007910	66801	2019-05-19	-	2.11	0.804	605.0	17.0	< 0.02	0.1690	0.918	< 0.02	< 0.002
	PFM007910	68094	2019-06-17	-	3.47	0.360	590.0	16.0	< 0.02	0.1970	0.898	0.0287	< 0.002
	PFM007910	69135	2019-08-13	-	3.41	1.100	596.0	17.3	0.0077	0.0804	0.680	0.0278	< 0.002
	PFM007910	70078	2019-09-02	< 0.3	1.33	0.918	630.0	18.8	< 0.02	0.0867	0.951	0.0285	< 0.002
	PFM007910	71239	2019-10-15	< 0.3	0.93	0.881	644.0	16.6	< 0.02	0.0774	-	0.0295	< 0.002
	PFM007911	65824	2019-04-24	-	6.10	-	-	13.8	< 0.02	0.0880	0.533	< 0.02	< 0.002
	PFM007911	66802	2019-05-19	-	1.84	0.905	617.0	16.0	< 0.02	0.1990	0.988	0.0293	< 0.002
	PFM007911	68095	2019-06-17	-	2.32	0.785	590.0	16.1	< 0.02	0.1130	0.901	0.0410	< 0.002
	PFM007911	69136	2019-08-13	-	2.10	0.787	620.0	16.4	< 0.02	0.1040	0.677	< 0.02	< 0.002
	PFM007911	70079	2019-09-02	< 0.3	1.20	0.943	644.0	18.2	< 0.02	0.0802	0.665	< 0.02	< 0.002
	PFM007911	71240	2019-10-15	< 0.3	0.84	0.783	643.0	15.7	< 0.02	0.0495	-	< 0.02	< 0.002
	PFM007912	65825	2019-04-24	-	2.63	-	-	13.0	0.0312	< 0.04	0.621	< 0.02	< 0.002
	PFM007912	66803	2019-05-19	-	1.40	0.801	641.0	16.5	< 0.02	0.0514	0.951	0.0227	< 0.002
	PFM007912	68096	2019-06-17	-	1.19	0.850	603.0	16.2	< 0.02	0.1060	0.607	< 0.02	< 0.002
	PFM007912	69137	2019-08-13	-	0.91	1.030	630.0	16.5	< 0.02	0.0554	0.426	< 0.02	< 0.002
	PFM007912	70080	2019-09-02	< 0.3	1.13	1.200	635.0	17.4	< 0.02	0.0526	0.635	0.0279	< 0.002
	PFM007912	71241	2019-10-15	< 0.3	0.98	0.834	644.0	16.1	< 0.02	< 0.04	-	< 0.02	< 0.002
	PFM102269	62757	2019-01-15	-	0.83	-	-	15.3	< 0.02	0.1540	2.120	0.0309	< 0.002
	PFM102269	63870	2019-02-11	-	1.40	-	-	18.0	0.0250	0.0654	0.734	0.0220	< 0.002
	PFM102269	64677	2019-03-18	-	4.86	-	-	15.7	< 0.02	0.1960	0.552	0.0292	< 0.002
	PFM102269	65822	2019-04-24	-	4.28	-	-	13.6	0.0287	< 0.04	0.451	< 0.02	< 0.002
	PFM102269	66800	2019-05-20	-	1.99	0.664	641.0	15.7	< 0.02	0.1630	0.810	0.0257	< 0.002
	PFM102269	68093	2019-06-17	-	1.14	0.529	619.0	16.3	< 0.02	0.1180	0.796	< 0.02	< 0.002
	PFM102269	69134	2019-08-12	-	1.77	1.150	628.0	16.4	< 0.02	0.0855	0.555	0.0223	< 0.002
PFM102269	70077	2019-09-01	< 0.3	1.34	0.824	642.0	19.1	< 0.02	0.0507	0.664	0.0270	< 0.002	
PFM102269	71238	2019-10-15	< 0.3	1.31	< 0.5	647.0	15.8	< 0.02	< 0.04	-	0.0325	< 0.002	
PFM102269	72860	2019-11-11	< 0.3	2.51	1.100	601.0	15.6	< 0.02	0.1640	-	0.0242	< 0.002	
PFM102269	74053	2019-12-10	< 0.3	6.03	0.923	677.0	16.5	< 0.02	0.0947	-	0.0346	< 0.002	

Table A3-3d. Continued.

Idcode	Sample no	Sampling date (yyyy-mm-dd)	Nb (ug/L)	Ni (ug/L)	Mo (ug/L)	Pb (ug/L)	Pd (ug/L)	Se (ug/L)	Sn (ug/L)	V (ug/L)	Zn (ug/L)
PFM000062	62753	2019-01-15	-	1.360	1.460	< 0.1	-	< 3	-	0.2700	1.190
PFM000062	65818	2019-04-24	-	0.709	1.190	< 0.1	-	< 3	-	0.1000	< 0.8
PFM000062	69130	2019-08-13	0.00572	0.646	1.370	< 0.1	-	< 3	-	0.2680	< 0.8
PFM000062	71234	2019-10-15	0.00618	0.825	-	-	< 0.005	< 3	< 0.3	0.2660	-
PFM000066	62761	2019-01-16	-	0.787	0.924	0.0355	-	< 0.5	-	0.4370	4.880
PFM000066	63866	2019-02-11	-	0.613	1.080	0.0438	-	< 0.5	-	0.2060	2.330
PFM000066	64673	2019-03-18	-	0.626	0.441	0.0355	-	< 0.5	-	0.1840	1.510
PFM000066	65826	2019-04-23	-	0.561	0.653	0.0152	-	< 0.5	-	0.1480	0.890
PFM000066	66804	2019-05-20	A	0.574	0.598	0.0535	A	< 0.5	-	0.3350	1.040
PFM000066	68097	2019-06-17	0.01100	0.689	0.836	0.0558	-	< 0.5	-	0.3170	0.847
PFM000066	69088	2019-08-12	0.01030	0.652	0.586	0.0224	-	< 0.5	-	0.2090	1.350
PFM000066	70050	2019-09-01	0.01480	0.602	0.386	0.0401	0.00246	< 0.5	0.195	0.2930	0.681
PFM000066	71275	2019-10-14	0.01510	0.661	-	-	< 0.001	< 0.5	< 0.05	0.3410	-
PFM000066	72837	2019-11-11	0.02120	0.753	-	-	0.00372	< 0.5	< 0.05	0.3640	-
PFM000066	74049	2019-12-09	0.01620	0.884	-	-	0.00173	< 0.5	< 0.05	0.2760	-
PFM000068	62762	2019-01-14	-	1.040	1.150	0.0570	-	< 0.5	-	0.4590	3.290
PFM000068	63867	2019-02-11	-	0.977	0.916	0.0680	-	< 0.5	-	0.3040	2.450
PFM000068	64674	2019-03-18	-	0.914	0.604	0.0638	-	< 0.5	-	0.2160	1.620
PFM000068	65827	2019-04-23	-	0.706	1.060	0.0498	-	< 0.5	-	0.2270	1.940
PFM000068	66805	2019-05-20	A	0.836	0.562	0.1290	A	< 0.5	-	0.3870	1.750
PFM000068	68098	2019-06-17	0.01780	1.210	0.785	0.0772	-	< 0.5	-	0.3670	1.400
PFM000068	69111	2019-08-12	0.02050	0.952	0.435	0.0684	-	< 0.5	-	0.4230	1.460
PFM000068	70051	2019-09-01	0.01420	0.727	0.174	0.0770	0.00296	< 0.5	1.4	0.3530	1.820
PFM000068	71276	2019-10-14	0.01490	0.829	-	-	0.00109	< 0.5	< 0.05	0.3040	-
PFM000068	72838	2019-11-11	0.01740	0.749	-	-	0.00327	< 0.5	< 0.05	0.2710	-
PFM000068	74050	2019-12-09	0.02950	0.831	-	-	0.00220	< 0.5	< 0.05	0.4250	-
PFM000069	62763	2019-01-14	-	0.544	0.537	0.0618	-	< 0.5	-	0.1670	2.680
PFM000069	63868	2019-02-11	-	0.668	0.695	0.0747	-	< 0.5	-	0.1680	1.510
PFM000069	64675	2019-03-18	-	0.740	0.807	0.0661	-	< 0.5	-	0.1740	2.200
PFM000069	65828	2019-04-23	-	0.551	1.470	0.0271	-	< 0.5	-	0.1800	0.816
PFM000069	66806	2019-05-20	A	0.682	0.483	0.0613	A	< 0.5	-	0.2820	1.050
PFM000069	68099	2019-06-17	0.01390	0.868	0.737	0.0692	-	< 0.5	-	0.2690	0.893
PFM000069	69112	2019-08-12	0.01480	0.584	0.328	0.0630	-	< 0.5	-	0.3510	1.540
PFM000069	70052	2019-09-01	0.01340	0.487	0.152	0.0524	0.00140	< 0.5	0.684	0.2640	0.716
PFM000069	71277	2019-10-14	0.01270	0.670	-	-	< 0.001	< 0.5	< 0.05	0.3120	-
PFM000069	72839	2019-11-11	0.03090	0.853	-	-	0.00474	< 0.5	< 0.05	0.3420	-
PFM000069	74051	2019-12-09	0.02810	1.150	-	-	0.00268	< 0.5	< 0.05	0.3280	-
PFM000070	62764	2019-01-15	-	0.534	0.288	0.0639	-	< 0.5	-	0.3970	13.400

Table A3-3d. Continued.

Idcode	Sample no	Sampling date (yyyy-mm-dd)	Nb (ug/L)	Ni (ug/L)	Mo (ug/L)	Pb (ug/L)	Pd (ug/L)	Se (ug/L)	Sn (ug/L)	V (ug/L)	Zn (ug/L)	
	PFM000070	63869	2019-02-11	-	0.272	0.272	< 0.1	-	< 3	-	0.1720	3.850
	PFM000070	64676	2019-03-18	-	0.487	0.444	0.0538	-	< 0.5	-	0.2890	1.730
	PFM000070	65829	2019-04-23	-	0.210	0.394	0.0205	-	< 0.5	-	0.1890	0.625
	PFM000070	66807	2019-05-20	A	0.281	0.304	0.0520	A	< 0.5	-	0.3160	1.030
	PFM000070	68100	2019-06-18	0.00534	0.320	0.306	0.0525		< 0.5	-	0.2480	0.853
	PFM000070	69113	2019-08-12	0.00532	0.229	0.084	0.0480		< 0.5	-	0.2400	0.913
	PFM000070	71278	2019-10-14	0.00299	0.245	-	-	< 0.001	< 0.5	< 0.05	0.2420	-
	PFM000070	72840	2019-11-11	0.00750	0.329	-	-	0.00167	< 0.5	< 0.05	0.2610	-
	PFM000070	74052	2019-12-09	0.01430	0.406	-	-	0.00116	< 0.5	< 0.05	0.3120	-
	PFM000074	62766	2019-01-16	-	0.457	0.446	0.0389	-	< 0.5	-	0.1690	1.770
	PFM000074	65830	2019-04-23	-	0.587	0.683	0.0138	-	< 0.5	-	0.1560	0.707
	PFM000074	69170	2019-08-12	0.01090	0.501	0.412	0.0531	-	< 0.5	-	0.2610	0.713
	PFM000074	71453	2019-10-16	0.00897	0.487	-	-	< 0.001	< 0.5	< 0.05	0.2860	-
	PFM000083	65819	2019-04-24	-	0.581	1.260	< 0.1	-	-	-	0.0986	< 0.8
	PFM000083	66797	2019-05-19	A	1.010	1.420	< 0.1	A	< 3	-	0.2290	1.870
	PFM000083	68090	2019-06-17	< 0.005	0.936	1.650	0.1310	-	< 3	-	0.2020	1.510
	PFM000083	69131	2019-08-13	0.00416	0.813	1.400	0.0205	-	< 0.5	-	0.2500	0.427
	PFM000083	70074	2019-09-02	0.00759	0.742	1.420	< 0.1	< 0.005	< 3	< 0.3	0.2710	< 0.8
	PFM000083	71235	2019-10-15	0.00774	1.110	-	-	< 0.005	< 3	< 0.3	0.2510	-
	PFM000084	65820	2019-04-24	-	2.280	1.120	0.0629		2.43	-	0.2570	1.450
	PFM000084	66798	2019-05-19	A	2.380	1.110	0.1280	A	< 0.5	-	0.3930	1.640
	PFM000084	68091	2019-06-17	0.01760	1.210	1.360	< 0.1	-	< 3	-	0.2380	0.987
	PFM000084	69132	2019-08-13	0.00503	0.982	1.370	0.0358	-	< 0.5	-	0.3170	0.717
	PFM000084	70075	2019-09-02	0.00808	0.772	1.450	< 0.1	0.01030	< 3	< 0.3	0.2820	1.210
	PFM000084	71236	2019-10-15	0.00857	1.750	-	-	< 0.005	< 3	< 0.3	0.2780	-
	PFM000107	62767	2019-01-14	-	0.279	0.816	0.0415	-	< 0.5	-	0.2120	1.030
	PFM000107	63166	2019-01-14	-	0.240	0.705	0.0368	-	< 0.5	-	0.2360	0.958
	PFM000107	65831	2019-04-23	-	0.289	0.691	0.0537	-	< 0.5	-	0.2170	0.228
	PFM000107	69171	2019-08-12	0.00547	0.280	0.691	0.0727		< 0.5		0.4770	0.489
	PFM000107	71454	2019-10-15	0.00370	0.379	-	-	< 0.001	< 0.5	< 0.05	0.2530	
	PFM000117	62768	2019-01-15	-	0.187	0.330	0.1310	-	< 0.5	-	0.4290	2.890
	PFM000117	63167	2019-01-15	-	0.138	0.317	0.0233	-	< 0.5	-	0.3430	0.421
	PFM000117	65832	2019-04-24	-	0.229	0.319	0.0243	-	< 0.5	-	0.1980	< 0.2
	PFM000117	69172	2019-08-12	0.00383	0.228	0.341	0.0257		< 0.5		0.4570	0.460
	PFM000117	71455	2019-10-14	0.00284	0.213	-	-	< 0.001	< 0.5	< 0.05	0.3540	
	PFM005864	65937	2019-04-25	-	0.418	0.357	0.0450	-	-	-	0.2180	0.743
	PFM005864	66781	2019-05-20	0.01180	0.543	0.415	0.0511	-	< 0.5	-	0.3430	1.200
	PFM005864	68343	2019-06-18	0.00762	0.458	0.666	0.0783	-	< 0.5	-	0.3200	0.897
	PFM005864	69195	2019-08-13	0.00486	0.400	0.297	0.0629	-	< 0.5	-	0.2770	0.774

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Table A3-3d. Continued.

Idcode	Sample no	Sampling date (yyyy-mm-dd)	Nb (ug/L)	Ni (ug/L)	Mo (ug/L)	Pb (ug/L)	Pd (ug/L)	Se (ug/L)	Sn (ug/L)	V (ug/L)	Zn (ug/L)
PFM005864	70110	2019-09-01	0.00430	0.249	0.281	0.0600	< 0.001	< 0.5	< 0.05	0.2830	0.682
PFM005864	72187	2019-10-15	0.00389	0.923	-	-	< 0.001	< 0.5	< 0.05	0.2540	-
PFM007783	62756	2019-01-15	-	0.705	1.540	< 0.1	-	< 3	-	0.2840	2.210
PFM007783	65821	2019-04-24	-	1.200	1.110	< 0.1	-	< 3	-	0.1110	< 0.8
PFM007783	66799	2019-05-20	A	0.803	1.390	0.1030	A	< 3	-	0.2670	1.970
PFM007783	68092	2019-06-18	0.00839	0.742	1.460	< 0.1	-	< 3	-	0.2270	1.300
PFM007783	69133	2019-08-12	0.00627	0.915	1.440	< 0.1	-	< 3	-	0.3120	< 0.8
PFM007783	70076	2019-09-01	0.00761	0.653	1.330	< 0.1	0.00972	< 3	< 0.3	0.2540	< 0.8
PFM007783	71237	2019-10-14	0.00781	0.916	-	-	< 0.005	< 3	< 0.3	0.2130	-
PFM007910	65823	2019-04-24	-	0.565	1.150	0.1010	-	< 3	-	0.0997	< 0.8
PFM007910	66801	2019-05-19	A	0.953	1.490	< 0.1	A	< 3	-	0.2620	2.290
PFM007910	68094	2019-06-17	0.00659	1.090	1.400	< 0.1	-	< 3	-	0.2740	2.280
PFM007910	69135	2019-08-13	0.00504	0.897	1.490	0.0229	-	< 0.5	-	0.3760	0.736
PFM007910	70078	2019-09-02	0.00774	0.850	1.520	< 0.1	< 0.005	< 3	< 0.3	0.1910	1.000
PFM007910	71239	2019-10-15	0.00780	0.604	-	-	< 0.005	< 3	< 0.3	0.1930	-
PFM007911	65824	2019-04-24	-	0.744	1.150	< 0.1	-	< 3	-	0.1760	< 0.8
PFM007911	66802	2019-05-19	A	1.030	1.380	< 0.1	A	< 3	-	0.2280	3.480
PFM007911	68095	2019-06-17	0.00761	1.340	1.480	0.1800	-	< 3	-	0.1710	5.130
PFM007911	69136	2019-08-13	0.00695	0.921	1.330	< 0.1	-	< 3	-	0.2780	0.883
PFM007911	70079	2019-09-02	0.01160	0.702	1.410	< 0.1	0.00682	< 3	< 0.3	0.2180	0.952
PFM007911	71240	2019-10-15	0.00690	1.040	-	-	< 0.005	< 3	< 0.3	0.1880	-
PFM007912	65825	2019-04-24	-	0.864	1.270	< 0.1	-	< 3	-	0.0847	< 0.8
PFM007912	66803	2019-05-19	A	0.985	1.480	< 0.1	A	< 3	-	0.2320	1.780
PFM007912	68096	2019-06-17	< 0.005	0.788	1.420	< 0.1	-	< 3	-	0.2530	1.140
PFM007912	69137	2019-08-13	0.00930	1.020	1.300	< 0.1	-	< 3	-	0.2440	< 0.8
PFM007912	70080	2019-09-02	0.00605	0.577	1.520	< 0.1	0.00654	< 3	< 0.3	0.2460	1.060
PFM007912	71241	2019-10-15	< 0.005	1.380	-	-	< 0.005	< 3	< 0.3	0.1790	-
PFM102269	62757	2019-01-15	-	1.190	1.410	< 0.1	-	< 3	-	0.1360	2.150
PFM102269	63870	2019-02-11	-	0.942	1.600	0.0268	-	< 0.5	-	0.1660	1.410
PFM102269	64677	2019-03-18	-	0.937	1.290	0.1300	-	< 5	-	0.1170	1.680
PFM102269	65822	2019-04-24	-	0.566	1.290	< 0.1	-	< 3	-	0.0878	< 0.8
PFM102269	66800	2019-05-20	A	0.925	1.410	< 0.1	A	< 3	-	0.2560	1.300
PFM102269	68093	2019-06-17	0.00853	0.715	1.370	< 0.1	-	< 3	-	0.2080	2.630
PFM102269	69134	2019-08-12	0.01660	0.772	1.370	< 0.1	-	< 3	-	0.2860	1.020
PFM102269	70077	2019-09-01	0.00744	0.871	1.550	< 0.1	0.00728	< 3	< 0.3	0.2760	1.210
PFM102269	71238	2019-10-15	0.00692	0.261	-	-	< 0.005	< 3	< 0.3	0.2250	-
PFM102269	72860	2019-11-11	0.00903	1.170	-	-	< 0.005	< 3	< 0.3	0.2210	-
PFM102269	74053	2019-12-10	0.00722	0.677	-	-	< 0.005	< 3	< 0.3	0.3020	-

A: Nb and Pd were not analysed due to a mistake from the responsible laboratory.

Table A3-3e. Trace elements II.

	Idcode	Sample no	Sampling date (yyyy-mm-dd)	U (ug/l)	Th (ug/l)	Sc (ug/l)	Rb (ug/l)	Y (ug/l)	Zr (ug/l)	Sb (ug/l)	Cs (ug/l)	La (ug/l)	Hf (ug/l)	Tl (ug/l)	Ce (ug/l)
SKB P-20-30	PFM000062	62753	2019-01-15	0.622	< 0.2	< 0.4	20.00	0.0303	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
	PFM000062	65818	2019-04-24	0.579	< 0.2	< 0.4	19.80	0.0870	< 0.1	0.101	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
	PFM000062	69130	2019-08-13	0.614	< 0.2	< 0.4	19.00	0.0238	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
	PFM000062	71234	2019-10-15	0.600	< 0.2	< 0.4	19.40	0.0180	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
	PFM000066	62761	2019-01-16	3.330	0.0252	< 0.05	3.50	0.2600	0.344	0.1130	< 0.03	0.1190	0.00797	< 0.01	0.1240
	PFM000066	63866	2019-02-11	2.390	0.0223	< 0.05	2.46	0.2190	< 10	0.0853	< 0.03	0.1020	0.02100	< 0.01	0.1420
	PFM000066	64673	2019-03-18	0.837	0.0672	< 0.05	2.14	0.2220	0.402	0.0811	< 0.03	0.0925	0.00947	< 0.01	0.0964
	PFM000066	65826	2019-04-23	1.370	0.0244	0.0882	2.58	0.1730	0.283	0.0666	< 0.03	0.0617	0.00873	< 0.01	0.0661
	PFM000066	66804	2019-05-20	1.520	< 0.02	< 0.05	2.61	0.1500	0.287	0.0570	< 0.03	0.0646	0.00729	< 0.01	0.0827
	PFM000066	68097	2019-06-17	1.230	0.0962	< 0.05	2.81	0.2240	0.351	0.0761	< 0.03	0.1080	0.00531	< 0.01	0.1030
	PFM000066	69088	2019-08-12	0.840	< 0.02	< 0.05	2.38	0.1590	0.229	0.0723	< 0.03	0.0657	0.01750	< 0.01	0.0760
	PFM000066	70050	2019-09-01	0.842	0.0239	< 0.05	3.14	0.1900	0.254	0.0674	< 0.03	0.0835	< 0.005	< 0.01	0.1060
	PFM000066	71275	2019-10-14	1.440	0.0276	< 0.05	3.58	0.2130	0.407	0.0535	< 0.03	0.1020	0.01090	< 0.01	0.1750
	PFM000066	72837	2019-11-11	7.650	0.0672	< 0.05	3.45	0.4270	0.708	0.0971	< 0.03	0.2750	0.01820	< 0.01	0.3240
	PFM000066	74049	2019-12-09	1.560	0.0636	< 0.05	2.50	0.3380	0.452	0.0824	< 0.03	0.1510	0.01460	< 0.01	0.1660
	PFM000068	62762	2019-01-14	3.450	0.0647	< 0.05	4.37	0.4350	0.547	0.1060	< 0.03	0.3630	0.01240	< 0.01	0.5000
	PFM000068	63867	2019-02-11	3.910	0.1000	0.0621	3.44	0.5570	< 10	0.1090	< 0.03	0.4760	0.02260	< 0.01	0.6880
	PFM000068	64674	2019-03-18	2.360	0.1190	< 0.05	2.34	0.4390	0.576	0.0884	< 0.03	0.3610	0.01630	< 0.01	0.4840
	PFM000068	65827	2019-04-23	3.720	0.0335	0.0696	2.72	0.2570	0.404	0.0833	< 0.03	0.1620	0.01180	< 0.01	0.2020
	PFM000068	66805	2019-05-20	3.830	0.0252	< 0.05	2.83	0.2530	0.399	0.0664	< 0.03	0.1770	0.01080	< 0.01	0.2650
	PFM000068	68098	2019-06-17	1.880	0.0985	< 0.05	3.28	0.3610	0.500	0.0835	< 0.03	0.3000	0.00672	< 0.01	0.4150
	PFM000068	69111	2019-08-12	1.710	0.0371	< 0.05	2.81	0.3250	0.403	0.0910	< 0.03	0.2520	0.02880	< 0.01	0.4140
	PFM000068	70051	2019-09-01	1.920	0.0231	< 0.05	1.76	0.2360	0.301	0.0443	< 0.03	0.1790	< 0.005	< 0.01	0.2580
	PFM000068	71276	2019-10-14	1.550	0.0397	< 0.05	2.92	0.2670	0.361	0.0578	< 0.03	0.2310	0.00966	< 0.01	0.3620
	PFM000068	72838	2019-11-11	1.710	0.0477	< 0.05	3.71	0.2440	0.434	0.0754	< 0.03	0.0967	0.01510	< 0.01	0.1200
	PFM000068	74050	2019-12-09	5.030	0.1120	< 0.05	2.39	0.6250	0.643	0.0992	< 0.03	0.4960	0.01970	< 0.01	0.6700
	PFM000069	62763	2019-01-14	2.980	0.0235	< 0.05	4.74	0.2240	0.272	0.0710	< 0.03	0.1490	0.00658	< 0.01	0.2020
	PFM000069	63868	2019-02-11	3.520	0.0350	< 0.05	4.21	0.2600	< 10	0.0819	< 0.03	0.1810	0.01280	< 0.01	0.2610
	PFM000069	64675	2019-03-18	2.940	0.0670	< 0.05	2.67	0.3130	0.520	0.0944	< 0.03	0.1740	0.01360	< 0.01	0.2150
	PFM000069	65828	2019-04-23	5.820	0.0306	0.0821	2.63	0.2500	0.432	0.0878	< 0.03	0.1320	0.01130	< 0.01	0.1410
	PFM000069	66806	2019-05-20	4.640	0.0235	< 0.05	2.88	0.2180	0.341	0.0509	< 0.03	0.1280	0.01080	< 0.01	0.1560
	PFM000069	68099	2019-06-17	2.340	0.0603	< 0.05	3.16	0.2370	0.353	0.0669	< 0.03	0.1550	< 0.005	< 0.01	0.2010
PFM000069	69112	2019-08-12	1.780	0.0231	< 0.05	2.72	0.2440	0.289	0.0487	< 0.03	0.1650	0.02720	< 0.01	0.2160	
PFM000069	70052	2019-09-01	1.910	< 0.02	< 0.05	1.60	0.2140	0.256	0.0421	< 0.03	0.1400	< 0.005	< 0.01	0.1690	
PFM000069	71277	2019-10-14	2.190	0.0271	< 0.05	2.68	0.2380	0.333	0.0475	< 0.03	0.1630	0.01060	< 0.01	0.2310	
PFM000069	72839	2019-11-11	4.140	0.1220	0.0578	2.87	0.5730	0.721	0.1110	< 0.03	0.5470	0.02090	< 0.01	0.7650	
PFM000069	74051	2019-12-09	9.150	0.1020	0.0624	2.62	0.6370	0.786	0.1090	< 0.03	0.4000	0.02380	< 0.01	0.4160	
PFM000070	62764	2019-01-15	0.409	0.0283	< 0.05	3.29	0.2370	0.260	0.2070	< 0.03	0.1630	0.00650	< 0.01	0.2540	

Table A3-3e. Continued.

Idcode	Sample no	Sampling date (yyyy-mm-dd)	U (ug/l)	Th (ug/l)	Sc (ug/l)	Rb (ug/l)	Y (ug/l)	Zr (ug/l)	Sb (ug/l)	Cs (ug/l)	La (ug/l)	Hf (ug/l)	Tl (ug/l)	Ce (ug/l)
PFM000070	63869	2019-02-11	0.466	< 0.2	< 0.4	3.95	0.0686	< 50	0.1110	< 0.1	0.0391	< 0.02	< 0.05	0.0500
PFM000070	64676	2019-03-18	1.100	0.0993	0.0695	1.97	0.4290	0.631	0.0997	< 0.03	0.2770	0.01630	< 0.01	0.3140
PFM000070	65829	2019-04-23	1.250	< 0.02	0.0663	2.48	0.1290	0.220	0.0782	< 0.03	0.0532	0.00647	< 0.01	0.0531
PFM000070	66807	2019-05-20	0.812	< 0.02	< 0.05	2.24	0.0904	0.178	0.0739	< 0.03	0.0418	< 0.005	< 0.01	0.0421
PFM000070	68100	2019-06-18	0.662	0.0320	< 0.05	2.54	0.0764	0.153	0.0899	< 0.03	0.0332	< 0.005	< 0.01	0.0347
PFM000070	69113	2019-08-12	0.303	< 0.02	< 0.05	2.30	0.0913	0.094	0.0485	< 0.03	0.0457	0.01620	< 0.01	0.0573
PFM000070	71278	2019-10-14	0.667	< 0.02	< 0.05	2.68	0.0355	0.090	0.1080	< 0.03	0.0173	< 0.005	< 0.01	0.0207
PFM000070	72840	2019-11-11	1.010	0.0264	< 0.05	2.56	0.1040	0.221	0.1050	< 0.03	0.0476	0.00578	< 0.01	0.0598
PFM000070	74052	2019-12-09	1.130	0.0660	< 0.05	2.30	0.2350	0.336	0.0953	< 0.03	0.1310	0.00931	< 0.01	0.1580
PFM000074	62766	2019-01-16	0.655	< 0.02	< 0.05	3.47	0.1550	0.227	0.0974	< 0.03	0.0545	0.00546	< 0.01	0.0767
PFM000074	65830	2019-04-23	1.690	< 0.02	0.0907	2.51	0.1690	0.271	0.0697	< 0.03	0.0615	0.00754	< 0.01	0.0563
PFM000074	69170	2019-08-12	0.521	< 0.02	< 0.05	2.27	0.2130	0.216	0.0515	< 0.03	0.0975	0.01430	< 0.01	0.1120
PFM000074	71453	2019-10-16	1.020	< 0.02	< 0.05	2.48	0.1520	0.209	0.0500	< 0.03	0.0626	0.00576	< 0.01	0.0768
PFM000083	65819	2019-04-24	0.529	< 0.2	< 0.4	20.10	0.0770	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM000083	66797	2019-05-19	0.672	< 0.2	< 0.4	17.60	0.0325	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM000083	68090	2019-06-17	0.705	< 0.2	< 0.4	20.60	0.0266	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM000083	69131	2019-08-13	0.568	< 0.02	< 0.05	17.00	0.0248	0.032	0.0734	0.0319	0.0070	0.01680	< 0.01	0.0080
PFM000083	70074	2019-09-02	0.572	< 0.2	< 0.4	20.60	0.0364	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM000083	71235	2019-10-15	0.572	< 0.2	< 0.4	19.30	0.0224	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM000084	65820	2019-04-24	2.010	0.0602	0.1060	10.60	0.4800	0.377	0.0790	< 0.03	0.3520	0.01140	< 0.01	0.4490
PFM000084	66798	2019-05-19	2.210	< 0.02	< 0.05	8.61	0.2260	0.316	0.0747	< 0.03	0.1560	0.00711	< 0.01	0.2060
PFM000084	68091	2019-06-17	1.020	< 0.2	< 0.4	17.10	0.0962	< 0.1	< 0.1	< 0.1	0.0539	< 0.02	< 0.05	0.0781
PFM000084	69132	2019-08-13	0.825	< 0.02	< 0.05	16.70	0.0552	0.058	0.0709	< 0.03	0.0246	0.01650	< 0.01	0.0345
PFM000084	70075	2019-09-02	0.639	< 0.2	< 0.4	19.90	0.0549	< 0.1	< 0.1	< 0.1	0.0213	< 0.02	< 0.05	0.0407
PFM000084	71236	2019-10-15	1.540	< 0.2	< 0.4	15.40	0.1470	0.135	< 0.1	< 0.1	0.1030	< 0.02	< 0.05	0.1230
PFM000107	62767	2019-01-14	2.990	< 0.02	< 0.05	4.00	0.0703	0.066	0.1180	< 0.03	0.0371	< 0.005	< 0.01	0.0342
PFM000107	63166	2019-01-14	2.770	< 0.02	< 0.05	3.63	0.1020	0.102	0.1010	< 0.03	0.0547	< 0.005	< 0.01	0.0671
PFM000107	65831	2019-04-23	2.090	0.0241	0.0531	2.56	0.1810	0.249	0.0719	< 0.03	0.0894	0.00807	< 0.01	0.1190
PFM000107	69171	2019-08-12	2.030	< 0.02	< 0.05	2.79	0.0377	0.097	0.0993	< 0.03	0.0213	0.01160	< 0.01	0.0300
PFM000107	71454	2019-10-15	1.530	< 0.02	< 0.05	2.69	0.0375	0.100	0.0904	< 0.03	0.0193	< 0.005	< 0.01	0.0271
PFM000117	62768	2019-01-15	1.770	< 0.02	< 0.05	3.09	0.0275	0.072	0.1200	< 0.03	0.0067	< 0.005	< 0.01	0.0068
PFM000117	63167	2019-01-15	1.760	< 0.02	< 0.05	3.28	0.0526	0.094	0.1020	< 0.03	0.0142	< 0.005	< 0.01	0.0120
PFM000117	65832	2019-04-24	1.290	< 0.02	0.0617	2.58	0.1520	0.249	0.0838	< 0.03	0.0487	0.00635	< 0.01	0.0547
PFM000117	69172	2019-08-12	1.290	< 0.02	< 0.05	2.26	0.0212	0.082	0.1060	< 0.03	< 0.005	0.00984	< 0.01	0.0062
PFM000117	71455	2019-10-14	1.090	< 0.02	< 0.05	2.34	0.0210	0.101	0.1130	< 0.03	0.0072	< 0.005	< 0.01	0.0120
PFM005864	65937	2019-04-25	-	-	-	2.19	-	0.451	0.0735	< 0.03	-	-	-	-
PFM005864	66781	2019-05-20	-	-	-	2.11	-	0.466	0.0922	0.0901	-	-	-	-
PFM005864	68343	2019-06-18	0.363	< 0.02	< 0.05	1.52	0.0699	0.094	0.0643	< 0.03	0.0376	0.00890	< 0.01	0.0421

Table A3-3e. Continued.

Idcode	Sample no	Sampling date (yyyy-mm-dd)	U (ug/l)	Th (ug/l)	Sc (ug/l)	Rb (ug/l)	Y (ug/l)	Zr (ug/l)	Sb (ug/l)	Cs (ug/l)	La (ug/l)	Hf (ug/l)	Tl (ug/l)	Ce (ug/l)
PFM005864	69195	2019-08-13	-	-	-	1.66	-	0.098	0.0631	< 0.03	-	-	-	-
PFM005864	70110	2019-09-01	-	-	-	1.95	-	0.105	0.0747	< 0.03	-	-	-	-
PFM005864	72187	2019-10-15	1.170	< 0.2	< 0.4	21.30	0.0340	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM007783	62756	2019-01-15	0.612	< 0.2	< 0.4	19.00	0.0754	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM007783	65821	2019-04-24	0.665	< 0.2	< 0.4	17.50	0.0256	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM007783	66799	2019-05-20	0.617	< 0.2	< 0.4	20.20	0.0224	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM007783	68092	2019-06-18	0.628	< 0.2	< 0.4	18.30	0.0315	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM007783	69133	2019-08-12	0.564	< 0.2	< 0.4	20.50	0.0289	< 0.1	0.1090	< 0.1	< 0.02	< 0.02	< 0.05	0.0255
PFM007783	70076	2019-09-01	0.548	< 0.2	< 0.4	18.80	0.0203	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM007783	71237	2019-10-14	0.523	< 0.2	< 0.4	19.50	0.0861	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM007910	65823	2019-04-24	0.739	< 0.2	< 0.4	17.20	0.0280	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM007910	66801	2019-05-19	0.625	< 0.2	< 0.4	19.70	0.0346	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM007910	68094	2019-06-17	0.601	< 0.02	< 0.05	18.80	0.0571	0.061	0.0715	< 0.03	0.0174	0.01430	< 0.01	0.0185
PFM007910	69135	2019-08-13	0.645	< 0.2	< 0.4	20.00	0.0349	< 0.1	< 0.1	< 0.1	0.0218	< 0.02	< 0.05	0.0434
PFM007910	70078	2019-09-02	0.573	< 0.2	< 0.4	18.90	0.0207	< 0.1	0.1020	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM007910	71239	2019-10-15	0.520	< 0.2	< 0.4	19.20	0.0796	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM007911	65824	2019-04-24	0.614	< 0.2	< 0.4	17.70	0.0260	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM007911	66802	2019-05-19	0.599	< 0.2	< 0.4	20.30	0.0265	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM007911	68095	2019-06-17	0.584	< 0.2	< 0.4	18.90	0.0270	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM007911	69136	2019-08-13	0.575	< 0.2	< 0.4	19.80	0.0314	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	0.0242
PFM007911	70079	2019-09-02	0.551	< 0.2	< 0.4	18.90	0.0238	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM007911	71240	2019-10-15	0.513	< 0.2	< 0.4	18.10	0.0722	< 0.1	0.1130	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM007912	65825	2019-04-24	0.628	< 0.2	< 0.4	18.00	0.0300	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM007912	66803	2019-05-19	0.577	< 0.2	< 0.4	20.00	0.0251	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM007912	68096	2019-06-17	0.558	< 0.2	< 0.4	18.60	0.0235	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM007912	69137	2019-08-13	0.558	< 0.2	< 0.4	19.90	0.0287	< 0.1	0.1400	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM007912	70080	2019-09-02	0.520	< 0.2	< 0.4	18.50	0.0230	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM007912	71241	2019-10-15	0.648	< 0.2	< 0.4	19.60	0.0305	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM102269	62757	2019-01-15	0.705	< 0.02	< 0.05	25.40	0.0456	< 10	0.0722	0.0366	0.0218	< 0.005	< 0.01	0.0168
PFM102269	63870	2019-02-11	0.649	< 0.2	< 0.4	17.20	0.0481	< 0.1	< 0.1	< 0.1	0.0296	< 0.02	< 0.05	0.0292
PFM102269	64677	2019-03-18	0.495	< 0.2	< 0.4	20.90	0.0769	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	0.0614
PFM102269	65822	2019-04-24	0.638	< 0.2	< 0.4	18.10	0.0282	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM102269	66800	2019-05-20	0.579	< 0.2	< 0.4	20.50	0.0269	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM102269	68093	2019-06-17	0.614	< 0.2	< 0.4	19.20	0.0321	< 0.1	< 0.1	< 0.1	0.0215	< 0.02	< 0.05	0.0319
PFM102269	69134	2019-08-12	0.586	< 0.2	< 0.4	20.20	0.0275	< 0.1	0.1100	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM102269	70077	2019-09-01	0.647	< 0.2	< 0.4	19.30	0.0226	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.02
PFM102269	71238	2019-10-15	0.658	< 0.2	< 0.4	19.50	0.0318	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	0.0281
PFM102269	72860	2019-11-11	0.720	< 0.2	< 0.4	17.30	0.0593	< 0.1	< 0.1	< 0.1	0.0278	< 0.02	< 0.05	0.0439

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Table A3-3e. Continued.

Idcode	Sample no	Sampling date (yyyy-mm-dd)	Pr (ug/l)	Nd (ug/l)	Sm (ug/l)	Eu (ug/l)	Gd (ug/l)	Tb (ug/l)	Dy (ug/l)	Ho (ug/l)	Er (ug/l)	Tm (ug/l)	Yb (ug/l)	Lu (ug/l)
PFM000062	62753	2019-01-15	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM000062	65818	2019-04-24	0.0285	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM000062	69130	2019-08-13	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.0313
PFM000062	71234	2019-10-15	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM000066	62761	2019-01-16	0.0327	0.1530	0.0336	< 0.005	0.0346	< 0.005	0.0362	0.00809	0.0253	0.00407	0.0258	< 0.005
PFM000066	63866	2019-02-11	0.0296	0.1310	0.0256	< 0.005	0.0297	< 0.005	0.0271	0.00608	0.0213	< 0.004	0.0234	< 0.005
PFM000066	64673	2019-03-18	0.0288	0.1280	0.0276	0.00527	0.0283	< 0.005	0.0312	0.00674	0.0235	< 0.004	0.0190	< 0.005
PFM000066	65826	2019-04-23	0.0194	0.0825	0.0174	0.00537	0.0212	< 0.005	0.0216	< 0.005	0.0173	< 0.004	0.0168	< 0.005
PFM000066	66804	2019-05-20	0.0191	0.0805	0.0195	< 0.005	0.0214	< 0.005	0.0200	0.00521	0.0173	< 0.004	0.0153	0.00669
PFM000066	68097	2019-06-17	0.0305	0.1450	0.0290	< 0.005	0.0304	< 0.005	0.0315	0.00753	0.0235	< 0.004	0.0207	< 0.005
PFM000066	69088	2019-08-12	0.0197	0.0872	0.0173	< 0.005	0.0182	< 0.005	0.0193	< 0.005	0.0140	< 0.004	0.0168	< 0.005
PFM000066	70050	2019-09-01	0.0251	0.1020	0.0264	< 0.005	0.0235	< 0.005	0.0252	0.00584	0.0172	< 0.004	0.0168	0.00600
PFM000066	71275	2019-10-14	0.0291	0.1300	0.0285	< 0.005	0.0272	< 0.005	0.0296	0.00653	0.0233	< 0.004	0.0225	< 0.005
PFM000066	72837	2019-11-11	0.0748	0.3130	0.0646	0.00763	0.0647	0.00957	0.0617	0.01250	0.0381	0.00580	0.0399	0.00644
PFM000066	74049	2019-12-09	0.0507	0.2160	0.0515	0.00841	0.0503	0.00888	0.0530	0.01300	0.0395	0.00548	0.0348	0.01770
PFM000068	62762	2019-01-14	0.0900	0.3730	0.0719	0.00764	0.0626	0.01040	0.0641	0.01360	0.0417	0.00604	0.0403	0.00717
PFM000068	63867	2019-02-11	0.1230	0.4950	0.0994	0.01180	0.0874	0.01330	0.0773	0.01830	0.0520	0.00758	0.0487	0.00925
PFM000068	64674	2019-03-18	0.0877	0.3610	0.0646	0.00828	0.0630	0.00973	0.0615	0.01460	0.0418	0.00652	0.0427	0.00714
PFM000068	65827	2019-04-23	0.0421	0.1690	0.0352	0.00595	0.0334	0.00529	0.0322	0.00715	0.0225	< 0.004	0.0225	< 0.005
PFM000068	66805	2019-05-20	0.0429	0.1900	0.0348	< 0.005	0.0345	0.00570	0.0343	0.00861	0.0276	< 0.004	0.0219	0.00889
PFM000068	68098	2019-06-17	0.0720	0.3040	0.0599	0.00674	0.0605	0.00874	0.0497	0.01160	0.0330	0.00548	0.0349	0.00577
PFM000068	69111	2019-08-12	0.0590	0.2750	0.0514	0.00710	0.0477	0.00743	0.0484	0.00980	0.0319	0.00445	0.0276	< 0.005
PFM000068	70051	2019-09-01	0.0422	0.1770	0.0388	0.00572	0.0359	< 0.005	0.0347	0.00738	0.0256	< 0.004	0.0240	0.00662
PFM000068	71276	2019-10-14	0.0530	0.2290	0.0474	< 0.005	0.0396	0.00648	0.0415	0.00816	0.0255	< 0.004	0.0239	< 0.005
PFM000068	72838	2019-11-11	0.0298	0.1350	0.0275	< 0.005	0.0301	< 0.005	0.0340	0.00808	0.0230	< 0.004	0.0229	< 0.005
PFM000068	74050	2019-12-09	0.1300	0.5160	0.1110	0.01460	0.0970	0.01610	0.0934	0.02130	0.0654	0.00975	0.0585	0.02610
PFM000069	62763	2019-01-14	0.0369	0.1580	0.0313	< 0.005	0.0317	< 0.005	0.0303	0.00722	0.0210	< 0.004	0.0215	< 0.005
PFM000069	63868	2019-02-11	0.0486	0.1980	0.0405	0.00612	0.0363	0.00551	0.0373	0.00898	0.0255	< 0.004	0.0270	< 0.005
PFM000069	64675	2019-03-18	0.0488	0.2010	0.0412	0.00570	0.0427	0.00714	0.0446	0.00998	0.0313	0.00460	0.0322	0.00527
PFM000069	65828	2019-04-23	0.0347	0.1520	0.0316	0.00716	0.0312	< 0.005	0.0323	0.00815	0.0223	< 0.004	0.0236	< 0.005
PFM000069	66806	2019-05-20	0.0332	0.1480	0.0291	< 0.005	0.0286	< 0.005	0.0305	0.00657	0.0221	< 0.004	0.0244	0.00960
PFM000069	68099	2019-06-17	0.0395	0.1760	0.0327	< 0.005	0.0334	< 0.005	0.0325	0.00832	0.0237	< 0.004	0.0250	< 0.005
PFM000069	69112	2019-08-12	0.0411	0.1740	0.0393	0.00605	0.0355	0.00531	0.0360	0.00735	0.0215	< 0.004	0.0232	< 0.005
PFM000069	70052	2019-09-01	0.0342	0.1510	0.0292	< 0.005	0.0292	< 0.005	0.0318	0.00660	0.0198	< 0.004	0.0218	0.01010
PFM000069	71277	2019-10-14	0.0427	0.1790	0.0383	< 0.005	0.0316	< 0.005	0.0351	0.00739	0.0231	< 0.004	0.0247	< 0.005
PFM000069	72839	2019-11-11	0.1380	0.5590	0.1090	0.01230	0.0946	0.01330	0.0886	0.01950	0.0561	0.00742	0.0567	0.00813
PFM000069	74051	2019-12-09	0.1030	0.4410	0.0970	0.01430	0.1020	0.01510	0.0923	0.02060	0.0677	0.01030	0.0652	0.02740
PFM000070	62764	2019-01-15	0.0406	0.1640	0.0316	< 0.005	0.0322	0.00507	0.0321	0.00741	0.0228	< 0.004	0.0249	< 0.005

Table A3-3e. Continued.

Idcode	Sample no	Sampling date (yyyy-mm-dd)	Pr (ug/l)	Nd (ug/l)	Sm (ug/l)	Eu (ug/l)	Gd (ug/l)	Tb (ug/l)	Dy (ug/l)	Ho (ug/l)	Er (ug/l)	Tm (ug/l)	Yb (ug/l)	Lu (ug/l)
PFM005864	70110	2019-09-01	-	0.0423	-	-	-	-	-	-	-	-	-	-
PFM005864	72187	2019-10-15	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM007783	62756	2019-01-15	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM007783	65821	2019-04-24	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM007783	66799	2019-05-20	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM007783	68092	2019-06-18	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM007783	69133	2019-08-12	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.12600
PFM007783	70076	2019-09-01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM007783	71237	2019-10-14	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM007910	65823	2019-04-24	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM007910	66801	2019-05-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM007910	68094	2019-06-17	< 0.005	0.0220	< 0.005	< 0.005	0.0063	< 0.005	< 0.005	< 0.005	< 0.005	< 0.004	0.0060	0.01070
PFM007910	69135	2019-08-13	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.14500
PFM007910	70078	2019-09-02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM007910	71239	2019-10-15	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM007911	65824	2019-04-24	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM007911	66802	2019-05-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM007911	68095	2019-06-17	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.09880
PFM007911	69136	2019-08-13	< 0.02	0.0224	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.03330
PFM007911	70079	2019-09-02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM007911	71240	2019-10-15	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM007912	65825	2019-04-24	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM007912	66803	2019-05-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM007912	68096	2019-06-17	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.05190
PFM007912	69137	2019-08-13	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM007912	70080	2019-09-02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM007912	71241	2019-10-15	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM102269	62757	2019-01-15	< 0.005	0.0226	0.0059	< 0.005	0.0062	< 0.005	< 0.005	< 0.005	< 0.005	< 0.004	< 0.005	< 0.005
PFM102269	63870	2019-02-11	< 0.02	0.0221	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM102269	64677	2019-03-18	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM102269	65822	2019-04-24	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM102269	66800	2019-05-20	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM102269	68093	2019-06-17	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	1.15000
PFM102269	69134	2019-08-12	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.03320
PFM102269	70077	2019-09-01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM102269	71238	2019-10-15	< 0.02	0.0226	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PFM102269	72860	2019-11-11	< 0.02	0.0467	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02

Precipitation, compilation of hydrochemical data from water analyses

Table A4-1. Field measurements.

Idcode	Sample no	Sampling start date (yyyy-mm-dd)	Sampling stop date (yyyy-mm-dd)	pH_F	Temp_F (°C)	EC_F (mS/m)
PFM002564	31556	2018-12-11	2018-12-11	4.28	4	1
PFM002564	31557	2019-01-17	2019-01-17	4.34	16.1	1
PFM002564	31558	2019-02-04	2019-02-04	3.94	2.5	2
PFM002564	63968	2019-02-12	2019-02-12	4.16	16.7	1.6
PFM002564	64450	2019-03-04	2019-03-04	4.29	8.6	0.7
PFM002564	64894	2019-03-18	2019-03-18	4.52	2.8	0.9
PFM002564	65307	2019-04-01	2019-04-01	3.9	6.6	1.5
PFM008126	67082	2019-05-09	2019-05-09	4.61	16.6	0.8
PFM008126	67083	2019-05-17	2019-05-17	5.38	19.8	3
PFM008126	67745	2019-05-29	2019-05-29	5.34	13.1	1.2
PFM008126	68675	2019-06-24	2019-06-24	4.61	19.3	1.1
PFM008126	68084	2019-06-12	2019-06-12	4.97	13.6	1.1
PFM008126	69278	2019-07-04	2019-07-04	4.58	16.8	1.3
PFM008126	69363	2019-07-11	2019-07-11	4.52	15.5	1
PFM008126	69628	2019-07-17	2019-07-17	4.13	18.2	1.1
PFM008126	69629	2019-07-25	2019-07-25	4.65	30.7	2
PFM008126	69630	2019-08-01	2019-08-01	4.33	21.4	2.1
PFM008126	69631	2019-08-08	2019-08-08	4.39	17.5	2.3
PFM008126	70018	2019-08-16	2019-08-16	4.33	15.9	1.9
PFM008126	70020	2019-08-22	2019-08-22	4.28	12.3	0.6
PFM008126	70227	2019-08-29	2019-08-29	4.67	18.9	0.7
PFM008126	70535	2019-09-04	2019-10-02	4.25	14.1	1.2
PFM008126	70805	2019-09-10	2019-09-10	4.2	18.9	1.4
PFM008126	71104	2019-09-19	2019-09-19	4.28	12.1	0.7
PFM008126	71407	2019-09-27	2019-09-27	4.61	14.1	0.4
PFM008126	71594	2019-10-02	2019-10-02	4.46	10.7	0.7
PFM008126	71595	2019-10-09	2019-10-09	4.61	6.5	1.4
PFM008126	72716	2019-10-28	2019-10-28	4.1	2.6	0.8
PFM008126	72717	2019-10-30	2019-10-30	5.18	4.7	1.7
PFM008126	73399	2019-11-13	2019-11-13	4.35	5.7	1.4
PFM008126	73638	2019-11-20	2019-11-20	4.12	9.1	2.5
PFM008126	73886	2019-11-29	2019-11-29	4.13	2.5	1.4
PFM008126	74044	2019-12-13	2019-12-13	4.43	6.2	0.6
PFM008126	74572	2019-12-19	2019-12-19	4.65	17.5	1.1
PFM008126	74595	2019-12-27	2019-12-27	4.03	6.4	1.9

Table A4-2a. Major components.

Idcode	Sample no	Sampling start date (yyyy-mm-dd)	Sampling stop date (yyyy-mm-dd)	Br ⁻ (mg/L)	Ca (mg/L)	Cl ⁻ (mg/L)	F ⁻ (mg/L)	Fe (mg/L)	HCO ₃ ⁻ (mg/L)	K (mg/L)	Li (mg/L)	Mg (mg/L)	Mn (mg/L)
PFM002564	31559	2018-11-29	2019-02-04	< 0.02	< 0.1	< 1	< 0.2	0.0066	< 2	< 0.4	0.0000272	< 0.09	0.00223
PFM002564	64451	2019-02-04	2019-03-04	< 0.01	0.147	0.84	< 0.2	0.00644	< 2	0.519	0.0000332	< 0.09	0.00118
PFM002564	65308	2019-03-04	2019-04-01	< 0.004	0.218	0.6	< 0.2	0.0038	< 2	< 0.4	0.0000367	< 0.09	0.00102
PFM008126	68085	2019-04-29	2019-06-12	< 0.02	0.426	0.57	< 0.2	0.00339	< 2	0.58	< 0.004	< 0.09	0.00911
PFM008126	69284	2019-06-12	2019-07-04	0.00385	0.402	0.33	< 0.2	0.0096	< 2	< 0.4	< 0.004	< 0.09	0.00525
PFM008126	69633	2019-07-04	2019-08-08	0.00433	0.179	1.4	< 0.2	0.00481	< 2	1.29	< 0.004	< 0.09	0.00312
PFM008126	70536	2019-08-08	2019-09-04	< 0.02	0.162	0.47	< 0.2	0.00529	< 2	0.427	0.0000533	< 0.09	0.00251
PFM008126	71608	2019-09-04	2019-10-02	0.00362	0.213	0.69	< 0.2	0.00461	< 2	0.452	< 0.004	< 0.09	0.00796
PFM008126	72718	2019-10-02	2019-10-30	< 0.02	0.178	0.79	< 0.2	0.00324	< 2	< 0.4	< 0.004	< 0.09	0.00792
PFM008126	74045	2019-10-30	2019-12-05	< 0.001	0.284	0.74	< 0.2	0.00646	< 2	< 0.4	0.0000745	< 0.09	0.00626

Table A4-2a. Continued.

Idcode	Sample no	Sampling start date (yyyy-mm-dd)	Sampling stop date (yyyy-mm-dd)	Na (mg/L)	P TOT (mg/L)	Si (mg/L)	SO ₄ -S (mg/L)	SO ₄ ²⁻ (mg/L)	Sr (mg/L)	I ⁻ (mg/L)	TOC (mg/L)	pH_L	EC_L (mS/m)
PFM002564	31559	2018-11-29	2019-02-04	0.325	0.00219	< 0.03	0.255	-5	0.000422			4.71	< 2
PFM002564	64451	2019-02-04	2019-03-04	0.338		< 0.03	< 0.2	0.4	0.00165	0.00161	0.9	4.85	< 2
PFM002564	65308	2019-03-04	2019-04-01	0.385	0.00693	< 0.03	< 0.2	0.43	0.00261	0.00247	1.3	4.99	< 2
PFM008126	68085	2019-04-29	2019-06-12	0.417	0.0336	< 0.03	0.365	0.91	0.002	0.00151	4.3	5.86	< 2
PFM008126	69284	2019-06-12	2019-07-04	0.164	0.00671	< 0.03	0.421	1.3	0.00247	0.00236	2.5	5.45	< 2
PFM008126	69633	2019-07-04	2019-08-08	0.315	0.0122	< 0.03	< 0.2	0.44	0.002	0.0015	2	5.38	< 2
PFM008126	70536	2019-08-08	2019-09-04	0.208	0.00717	< 0.03	0.254	0.47	0.00112	0.00183	1.8	5.62	< 2
PFM008126	71608	2019-09-04	2019-10-02	0.425		< 0.03	0.232	0.58	0.002	0.0031	2.3	5.7	< 2
PFM008126	72718	2019-10-02	2019-10-30	0.472		< 0.03	< 0.2	0.5	0.002	0.00301	1.1	5.03	< 2
PFM008126	74045	2019-10-30	2019-12-05	0.474		< 0.03	0.301	0.8	0.00184	0.0019	0.9	4.89	< 2

Table A4-2b. Isotopes.

Idcode	Sample no	Sampling start date (yyyy-mm-dd)	Sampling stop date (yyyy-mm-dd)	$\delta^2\text{H}$ (‰ SMOW)	^3H (TU)	$\delta^{18}\text{O}$ (‰ SMOW)
PFM002564	31559	2018-11-29 09:00	2019-02-04 08:15	-116.1	8	-15.93
PFM002564	64451	2019-02-04 08:15	2019-03-04 09:29	-117.4	6	-15.49
PFM002564	65308	2019-03-04 09:35	2019-04-01 12:45	-102.3	7	-13.11
PFM008126	68085	2019-04-29 12:55	2019-06-12 08:00	-84.6	9	-11.40
PFM008126	69284	2019-06-12 08:30	2019-07-04 08:50	-36.5	12	-5.59
PFM008126	69633	2019-07-04 09:00	2019-08-08 08:40	-82.2	11	-11.71
PFM008126	70536	2019-08-08 08:50	2019-09-04 08:30	-67.9	8	-9.39
PFM008126	71608	2019-09-04 08:30	2019-10-02 09:00	-64.5	7	-9.62
PFM008126	72718	2019-10-02 09:00	2019-10-30 13:40	-87	7	-12.51
PFM008126	74045	2019-10-30 13:40	2019-12-05 10:30	-101.5	5	-14.55

Table A4-2c. Trace elements I.

Idcode	Sample no	Sampling start date (yyyy-mm-dd)	Sampling stop date (yyyy-mm-dd)	Ag (ug/L)	Al (ug/L)	As (ug/L)	B (ug/L)	Ba (ug/L)	Cd (ug/L)	Cr (ug/L)	Cu (ug/L)	Co (ug/L)	Hg (ug/L)
PFM002564	64451	2019-02-04	2019-03-04		2.570	< 0.05		0.391	0.008	0.054		0.020	< 0.002
PFM002564	65308	2019-03-04	2019-04-01		1.470	0.165	< 10	0.445	0.004	0.039	0.931	0.010	< 0.002
PFM008126	68085	2019-04-29	2019-06-12	< 0.05	4.550	0.055	< 10	0.740	0.021	0.303	2.440	0.077	< 0.002
PFM008126	69284	2019-06-12	2019-07-04	0.075	5.640	0.240	< 10	1.100	0.030	0.127	1.090	0.055	< 0.002
PFM008126	69633	2019-07-04	2019-08-08	0.093	4.170	0.238	< 10	0.527	0.008	0.188	1.230	0.032	< 0.002
PFM008126	70536	2019-08-08	2019-09-04	< 0.05	2.830	0.137	< 10	0.463	0.010	0.183	1.610	0.021	< 0.002
PFM008126	71608	2019-09-04	2019-10-02	< 0.05	3.530	0.062	< 10	0.508	0.017	0.228		0.037	< 0.002
PFM008126	72718	2019-10-02	2019-10-30	< 0.05	3.750	0.239	< 10	0.615	0.018	0.084		0.011	< 0.002
PFM008126	74045	2019-10-30	2019-12-05	< 0.05	4.960	0.112	< 10	0.793	0.019	0.085		0.047	< 0.002

Table A4-2c. Continued.

Idcode	Sample no	Sampling start date (yyyy-mm-dd)	Sampling stop date (yyyy-mm-dd)	Nb (ug/L)	Ni (ug/L)	Mo (ug/L)	Pb (ug/L)	Pd (ug/L)	Se (ug/L)	Sn (ug/L)	V (ug/L)	Zn (ug/L)
PFM002564	64451	2019-02-04	2019-03-04		0.360						0.085	
PFM002564	65308	2019-03-04	2019-04-01		0.157	0.053	0.108				0.082	1.900
PFM008126	68085	2019-04-29	2019-06-12	< 0.001	1.170	0.142	0.129	< 0.001	< 0.5	< 0.05	0.231	14.800
PFM008126	69284	2019-06-12	2019-07-04	< 0.001	0.658	0.068	0.155	< 0.001	< 0.5	< 0.05	0.253	11.100
PFM008126	69633	2019-07-04	2019-08-08	< 0.001	0.985	0.061	0.093	< 0.001	< 0.5	< 0.05	0.216	10.400
PFM008126	70536	2019-08-08	2019-09-04	< 0.001	1.020	< 0.05	0.128	< 0.001	< 0.5	< 0.05	0.205	7.770
PFM008126	71608	2019-09-04	2019-10-02	< 0.001	2.400			< 0.001	< 0.5	< 0.05	0.135	
PFM008126	72718	2019-10-02	2019-10-30	< 0.001	0.574			< 0.001	< 0.5	< 0.05	0.195	
PFM008126	74045	2019-10-30	2019-12-05	0.001	0.507			< 0.001	< 0.5	< 0.05	0.251	

Table A4-2d. Trace elements II.

Idcode	Sample no	Sampling stop date (yyyy-mm-dd)	Sampling start date (yyyy-mm-dd)	U (µg/l)	Th (µg/l)	Sc (µg/l)	Rb (µg/l)	Y (µg/l)	Zr (µg/l)	Sb (µg/l)	Cs (µg/l)	La (µg/l)	Hf (µg/l)	Tl (µg/l)	Ce (µg/l)
PFM002564	64451	2019-02-04	2019-03-04												
PFM002564	65308	2019-03-04	2019-04-01												
PFM008126	68085	2019-04-29	2019-06-12	0.001	0.065	< 0.05	1.930	< 0.005	< 0.03	0.115	< 0.03	< 0.005	< 0.005	< 0.01	0.011
PFM008126	69284	2019-06-12	2019-07-04				0.371		< 0.03	0.078	< 0.03				
PFM008126	69633	2019-07-04	2019-08-08				0.249		< 0.03	0.059	< 0.03				
PFM008126	70536	2019-08-08	2019-09-04				0.166		< 0.03	0.054	< 0.03				
PFM008126	71608	2019-09-04	2019-10-02				0.305		< 0.03	0.087	< 0.03				
PFM008126	72718	2019-10-02	2019-10-30				0.184		< 0.03	0.071	< 0.03				
PFM008126	74045	2019-10-30	2019-12-05				0.243		< 0.03	0.297	< 0.03				

Table A4-2d. Continued.

Idcode	Sample no	Sampling stop date (yyyy-mm-dd)	Sampling start date (yyyy-mm-dd)	Pr (µg/l)	Nd (µg/l)	Sm (µg/l)	Eu (µg/l)	Gd (µg/l)	Tb (µg/l)	Dy (µg/l)	Ho (µg/l)	Er (µg/l)	Tm (µg/l)	Yb (µg/l)	Lu (µg/l)
PFM002564	64451	2019-02-04	2019-03-04												
PFM002564	65308	2019-03-04	2019-04-01												
PFM008126	68085	2019-04-29	2019-06-12	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.004	< 0.005	< 0.005
PFM008126	69284	2019-06-12	2019-07-04												
PFM008126	69633	2019-07-04	2019-08-08												
PFM008126	70536	2019-08-08	2019-09-04												
PFM008126	71608	2019-09-04	2019-10-02		< 0.005										
PFM008126	72718	2019-10-02	2019-10-30		< 0.005										
PFM008126	74045	2019-10-30	2019-12-05		0.005										

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