GROUNDWATER MONITORING OF SHALLOW WELL NETWORKS - SOUTH BRUCE CHEMISTRY DATA ANNUAL REPORT 2022

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KGS Group

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Groundwater Monitoring of Shallow Well Network – South Bruce Chemistry Data Annual Report 2022

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STATEMENT OF LIMITATIONS AND CONDITIONS

Limitations

This report has been prepared for Nuclear Waste Management Organization (NWMO) in accordance with the agreement between KGS Group and NWMO (the "Agreement"). This report represents KGS Group's professional judgment and exercising due care consistent with the preparation of similar reports. The information and recommendations in this report are subject to the constraints and limitations in the Agreement and the qualifications in this report. This report must be read as a whole, and sections or parts should not be read out of context.

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1.0 INTRODUCTION

1.1 Overview

The Groundwater Monitoring of Shallow Well Network project is part of the Phase 2 Geoscientific Preliminary Field Investigations of the NWMO's Adaptive Phased Management (APM) Site Selection Phase. As part of the Phase 2 Preliminary Field Investigations, NWMO has established a shallow groundwater monitoring network at the two potential candidate sites in Canada. The sites are located in the Wabigoon Lake Ojibway Nation (WLON)-Ignace Area in Northwestern Ontario and Saugeen Ojibway Nation (SON)-South Bruce area in Southern Ontario. The objective of this project is to retrieve, on a quarterly basis, measurements of groundwater pressures and temperatures that are collected on installed dataloggers, and to collect groundwater samples for chemical analyses. The collection of this information is necessary to evaluate shallow groundwater system behavior and characteristics.

A separate test plan was prepared for each of the two locations so that details specific to each site can be properly captured and planned for. The field work for each Site started in the beginning of the third quarter (Q3) of year 2022, i.e., in the month of July, followed by another field event in September 2022. The final field work event for the year 2022 was conducted in its fourth quarter (Q4), in the month of December.

Each groundwater monitoring and sampling program involved the collection of groundwater pressure measurements and baseline groundwater samples from a selection of the 26 permanently installed monitoring well intervals for each of the 2022 field sampling events. The groundwater pressure and temperature measurements were recorded with 26 suspended, non-vented Solinst Levelogger pressure transducers (7 overburden wells and 19 bedrock wells) taking measurements at 6-hour intervals. The quarterly groundwater testing included the analysis of parameters including dissolved metals, routine parameters (such as Br, F, Cl, SiO_2, electrical conductivity, alkalinity etc.), nutrients, iodide, stable isotopes of oxygen and hydrogen ($\delta^{18}O$ and $\delta^{2}H$). Other specialized radioactive isotopes and dissolved ruthenium were sampled and analyzed only once in 2022.

This annual report presents the work completed and the data findings/analysis for the groundwater chemistry data and results collected in 2022 from the shallow well network in the South Bruce area.

Scope of Work

The overall objective of the groundwater monitoring and sampling program is to collect groundwater pressure measurements and baseline groundwater samples from each of the 26 permanently installed monitoring well intervals over two (2) years, starting in July 2022 until July 2024. This annual report focuses on the findings and analysis for the groundwater chemistry data collected in the year 2022, which includes three field events occurring in the months of July, September, and December. A separate report will present the groundwater pressure results for 2022. Specifically, this report addresses:

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1) This data report presents results of the field and laboratory measurements and groundwater physicochemical characteristics. The laboratory results of the groundwater samples collected in 2022 were assessed and analysed to characterize groundwater chemistry at the South Bruce Site. A total of 64 groundwater samples were collected in 2022 and analyzed for dissolved metals, routine parameters (such as Br, F, Cl, SiO_2, electrical conductivity, alkalinity etc.), nutrients, iodide, stable isotopes of oxygen and hydrogen ($\delta^{18}O$ and $\delta^{2}H$), dissolved ruthenium, gross alpha, gross beta, Strontium 87/86 ratio ($^{87}Sr/^{86}Sr$), Carbon-13 ($\delta^{13}C$ DIC), Chlorine-37 ($\delta^{37}Cl$) and Carbon-14 (^{14}C) and Tritium (^{3}H).
2) The characterization of groundwater was done based on the chemical composition of major ions. The software tool AquaChem by Waterloo Hydrogeologic was used to visualize and assess the water chemistry. The groundwater laboratory results were plotted on the Durov and Stiff diagrams to visualize physicochemical characteristics of groundwater and analyze trends. In addition to concentration of major ions in water, a discussion of trends of concentrations and ratios of stable and radio isotopes was completed.

2.0 PROJECT LOCATION

2.1 Land Acknowledgment

It is important to acknowledge that this project was completed on the traditional territory of the Anishinaabe people of the Saugeen Treaty 45 ½, 1836. KGS Group and its subcontractors are grateful for being given the opportunity to complete work within the area and are thankful for the generations of people who have taken care of the land for thousands of years.

2.2 Study Area

The South Bruce site is located approximately 7 km north-west of the Town of Teeswater in southwestern Ontario (Figure 1). This area is in the Western St. Lawrence Lowland that comprises of a gently undulating land surface and occupies much of southwestern Ontario. The area is covered with a surficial layer of glacial sediments. The land surface ranges from a maximum of 249 meters above sea level (masl) in the southeast corner of the Municipality of South Bruce to a minimum of 176 masl along the shore of Lake Huron in the Township of Huron-Kinloss (Gierszewski & Parmenter, 2022). The regional topography shows a general slope down towards Lake Huron from southeast to northwest. The municipality of South Bruce and the surrounding areas are landscaped predominantly with an agricultural land use with terrestrial features such as valley lands, along with watercourses and wetlands. The Teeswater River is the predominant drainage feature in the area that flows from east to west in the Municipality of South Bruce, and bends to flow in the north direction to eventually discharge into the Saugeen River at Paisley (NWMO, 2022).

Within the South Bruce site, a total of seven (7) shallow groundwater monitoring well groups were drilled and installed in 2021/2022. The seven (7) groups consist of MW01, MW02, MW03, MW04, MW05, MW06, and MW07. Monitoring well group MW06 contains a separate redrilled well which is designated MW09 and should be considered as part of the MW06 group. MW09 was drilled as a replacement for a compromised interval in MW06, located approximately 50m away. It was constructed in late December 2022 and was therefore not included in the 2022 field events. MW08 was a potential monitoring well group that did not proceed with drilling and testing, and therefore will not be further discussed. Six (6) of the monitoring well groups (MW02 through MW07) consist of a standalone overburden monitoring well and three nested bedrock monitoring wells installed in a single borehole at various depth intervals. One site (MW01) consists of a single overburden monitoring well and a single six-inch open bedrock well.

Each monitoring well was instrumented with a non-vented, Solinst Levelogger pressure transducer to measure and record groundwater pressures and temperatures, and Waterra tubing installed with foot valves. A single barologger is installed at site SB_MW01 to measure and record barometric pressures for compensation of the non-vented pressure transducers. In total, the eight sites subject to this project include (Figure 1):

- SB_MW01
- SB_MW02
- SB_MW03
- SB_MW04
- SB_MW05
- SB_MW06 (includes MW09)
- SB_MW07

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FIGURE 1: SITE LOCATION

2.3 Climate

The study area is subject to a humid continental climate of the warm summer subtype (Dfb under the Köppen climate classification defined by Kottek et al., (2006)). The closest weather station that exhibits the 1981-2010 Climate Normal Data is located in Hanover, ON, and is located approximately 14 kms Northeast of the South Bruce Site (Environment and Climate Change Canada, 2017). The monthly average temperature varies from -6.8 ^{0}C in January to 19.6 ^{0}C in July as per the 1981 – 2010 Canadian Climate Normal. The area receives an average annual rainfall precipitation of 819.7 mm and 271.3 mm of snowfall precipitation, with a total annual precipitation of 1087.1 mm. The wettest months are July and September (Environment and Climate Change Canada, 2017). The daily temperature and precipitation data for the year 2022 was available from the Mount Forest (AUT) weather station that is located at about 31 kms Southeast of the South Bruce Site and is presented below on Figure 2:

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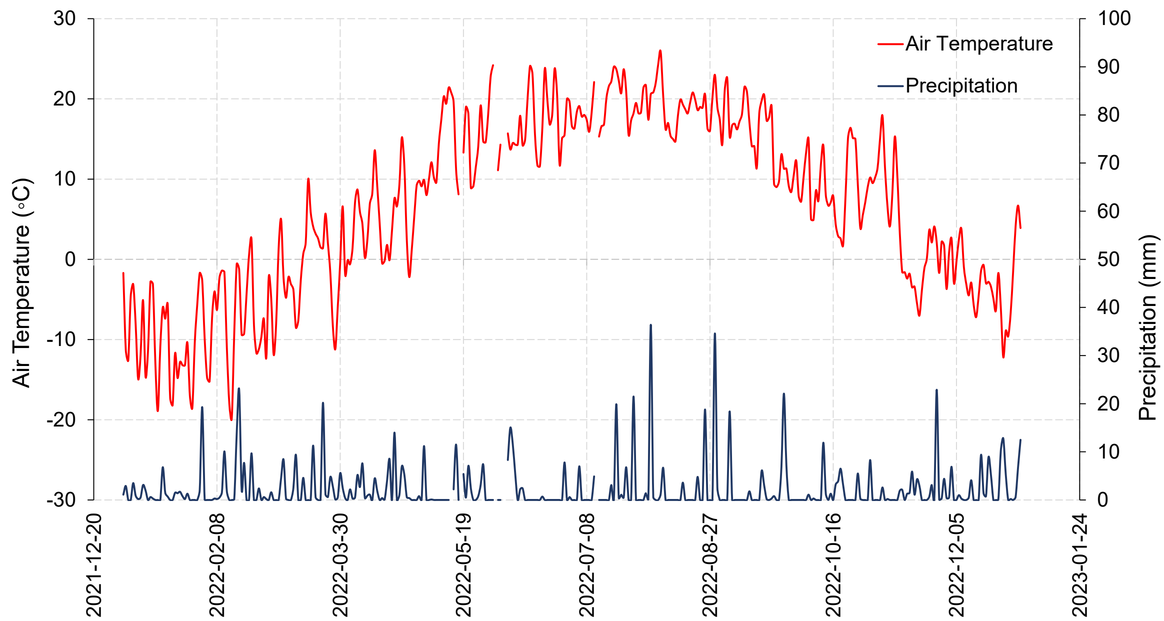
FIGURE 2: SITE CLIMATE



2.4 Geology and Hydrogeology

The South Bruce Site is located on the eastern portion of the Michigan Basin that consists of laterally extensive sedimentary rock formations deposited during the Cambrian (540 to 485 million years ago), Ordovician (485 to 443 million years ago), Silurian (443 to 416 million years ago) and Devonian (360 - 419 million years ago) periods. As the name suggests, the Michigan Basin is centered in the State of Michigan, U.S.A., and extends across southern Ontario. At the South Bruce Site sedimentary strata thicknesses decrease, being located toward the margins of the basin, with the underlying Precambrian (older than 540 million years) basement granitic rock below. The bedrock as a whole is overlain with Quaternary sediments that are comprised of sand, clays, and more recent soil deposits(NWMO, 2022).

Shallow sedimentary bedrock aquifers in the region are formed within the fractured bedrock zones which occur within the upper few metres, to over 100 m of the uppermost sedimentary bedrock formations (Devonian and Silurian). Transmissive zones for groundwater flow are formed by the network of vertical to subvertical joints, horizontal bedding plane partings, and paleokarst features that exist regionally within the upper sedimentary bedrock strata. Thus, groundwater quantity and quality within the shallow bedrock aquifers varies across the region based on the different chemical and physical characteristics of the individual bedrock formations, and subregional to regional groundwater flow paths.

The shallow bedrock is the most important source of drinking water in the area and is the primary source for municipal well water supplies. Seven (7) overburden and nineteen (19) bedrock wells were drilled and installed at the South Bruce Site in 2021, with the addition of a replacement well MW09_BR-B installed in December 2022. The borehole logs (Geofirma Engineering, 2023) indicate that the overburden wells are installed within sand, gravel, till and clay overburden deposits, whereas the bedrock wells are installed within the Devonian Lucas (dolostone), Amherstburg (limestone) and Bois Blanc (limestone) sedimentary bedrock formations.

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3.0 METHODOLOGY

3.1 Overview

Monitoring and sampling activities were scheduled to be completed by KGS Group on a quarterly basis. Each quarterly event consisted of measuring static water levels, checking and downloading all 27 pressure transducers (26 Solinst Leveloggers (water level and temperature) and 1 Solinst Barologger (barometric pressure)), followed by purging select intervals, measuring water chemistry parameters and collecting groundwater samples and submitting them for laboratory analysis. A detailed Test Plan for the South Bruce site was prepared in advance of the first field event. The Test Plan outlines all the equipment, methodologies, criteria, and steps needed to achieve the desired outcomes of the project within the confines of the approved scope of work.

Wells to be sampled were pre-determined together with the NWMO project team in advance of the event. For each quarterly event, technical work followed the same general procedures as outline below, but were not limited to:

- Pre-mobilization equipment and material checks.
- Mobilization of all personnel.
- Manually measured the depth to water level before removing and downloading all 27 Leveloggers, verified that they were in good working condition, field verified the data, and saved data following the DMP (data management plan) requirements on the field laptop (See Section 3.3).
- Purged selected monitoring wells using the installed Waterra tubing and an electric Hydrolift pump until purging criteria were met, collected and contained all purge water and disposed of purge water at a licensed wastewater treatment facility.
- Measured and recorded water chemistry and physical parameters while purging (See Section 3.4).
- Collected one groundwater sample for the quarterly sample analysis package from each purged well once the purge criteria was met (See Section 3.4 and 3.5).
- Collected three additional QA/QC samples (field duplicate, field blank, and trip blank), where applicable, as part of the 10% QA/QC requirements (See Section 3.5).
- Submitted samples for analysis to approved laboratories.
- Stored, processed, and prepared transducer and analytical data for analysis and submission to NWMO.
- Prepared separate pressure data and chemistry data quarterly reports.

The steps outlined above are detailed further as pre-mobilization and mobilization activities, fluid pressure and temperature monitoring, purging and field parameters, groundwater sampling, data assessment and reporting activities.

3.2 Health, Safety and Environment Activities

As per the Health, Safety and Environment Management Plan (HSEP) developed for the project, the KGS Group project team held a pre-job meeting via MS Teams to review the HSEP and the Test Plan to ensure all team members understood their roles and the expectations given the planned scope of work.

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While the field team was working on site, the Field Lead/Supervisor held daily tailgate meetings with the field crew at the beginning of their workday to review the planned work activities, the related health, safety and environmental issues related to the planned work and specific hazards associated with each task and mitigation and control measures related to the hazards. All Job Safety Analysis (JSA) forms were updated as needed and signed off by the field team. Completed JSAs have been provided with the data package. An example of some of the specific hazards identified during the field event included:

- Heavy lifting.
- Generator and Hydrolift Pump use including fuel handling and storage.
- Water containment.
- Slips, trips, and falls.
- Hand Tool Safety.
- Use/handling of cleaning detergents, sample preservatives.
- Highway driving.
- Tire punctures from driving on gravel roads, narrow forest road access, and farm field access, etc.
- Wildlife crossings/encounters.
- Travel to and from the work site including safely and respectfully navigating around horse and buggies on roadways and safely approaching blind hills on the road.
- All-Terrain Vehicle Use (where required).
- Handling of preservatives when collecting samples.
- Weather (e.g., heavy rain, thunderstorms, lightning protocols).

No health and safety or environmental incidents occurred during any of the field events in 2022. The field lead conducted a daily environmental inspection at each of the sites using a prescribed checklist. The completed checklist was included in the data package.

3.3 Fluid Pressure and Temperature Monitoring

Fluid pressure and temperature monitoring was also completed during each monitoring event in 2022. The annual pressure data for 2022 is addressed in a separate report.

3.4 Groundwater Sampling

The collection of groundwater samples comprises a significant portion of the scope of work of this project. The methodology for conducting the field work is described in the following sections.

3.4.1 SAMPLE LOCATION SELECTION

Monitoring well sample location selection was made in collaboration between the KGS Group project team and the NWMO project team several weeks prior to mobilizing to the field for each quarterly event. The rationale for selecting the monitoring wells to be sampled was documented on *DQCF01-Sample Location Rationale*, which provides the criteria and rationale for the sample location selection process. Completed DQCF01s were included with the data deliverable package for each quarterly event.

Well selection was done collaboratively and applying selection criteria such as: (i) time of year, (ii) even sample distribution over time, (iii) site access conditions.

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3.4.2 GROUNDWATER FIELD CHEMISTRY EQUIPMENT CALIBRATION AND DECONTAMINATION

As per the South Bruce Test Plan, KGS Group field staff did a field verification of each piece of equipment at the beginning of each day. If the instrument was not within manufacturer tolerance ranges when reading the calibration standards, then the instrument was re-calibrated in the field using valid National Institute of Standards and Technology (NIST) certified calibration standards and following the manufacturer's instructions. All field verifications and calibrations were recorded on *DQCF03-Equipment Calibration Log*. Completed DQCF03s have been provided with each of the quarterly data deliverables packages.

Certificates of calibration for each instrument used to measure a groundwater parameter in the field and Certificate of Analysis for all calibration standards have also been provided with each data deliverable package.

Decontamination and cleaning of each piece of equipment used to measure groundwater parameters was completed before purging was started as per the test plan. The decontamination process was recorded on *DQCF04-Equipment Decontamination Log* every time an interval was purged/pumped. Completed DQCF04s have been provided with each quarterly data deliverable package.

3.4.3 MONITORING WELL PURGING CRITERIA

The defined criteria agreed to by NWMO for when a groundwater sample can be collected is described in the South Bruce Test Plan, which describes how purging activities would be completed and the criteria that should be used to determine when a groundwater sample can be collected. The criteria used for determining when a sample could be collected must be one of two possible scenarios:

I. **Stabilization of Field Parameters:** Three consecutive readings that do not deviate more than the defined ranges as shown on Table 1 below for all field parameters (e.g., pH, electrical conductivity, temperature, total dissolved solids, turbidity, oxygen reduction potential, fluorescein, dissolved oxygen, density).
II. **Three well volumes purged:** Calculated total volume of water in each monitoring interval is purged three times before scenario I is observed.

The groundwater chemistry stabilization criteria (Scenario I) are given on Table 1 below and are also provided on *DQCF05-Field Parameter Data Sheet* provided with each quarterly data deliverable package.

TABLE 1: FIELD PARAMETER STABILIZATION TARGETS

Field Parameters	Measurement Instrument	Units	Stabilization targets
Fluoresceine Dye	Pyxis Handheld Fluorometer, SP-380	ppb	<1 ppb Change
Hydraulic Density	Polycarbonate Buoyant Hydraulic Densometer	g/cm^3	N/A
Total Dissolved Solids (TDS)	Hanna DiST1 Total Dissolved Solids Meter	mg/L	± 10% Change
Turbidity	Hach 2100Q	NTU	± 10% or ± 5 NTU, if initial NTU measurement is >50 NTU

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Field Parameters	Measurement Instrument	Units	Stabilization targets
Dissolved Oxygen (DO)	YSI Pro Series Water Chemistry Kit	mg/L	± 10% Change
Electrical Conductivity (EC)		mS/cm	± 10% Change
Temperature		Degrees Celsius	± 0.5 ºC Change
pH		pH unit	± 0.1 standard pH units Change
Oxidation-Reduction Potential (ORP)		mV	± 10% Change

3.4.4 PURGING METHODOLOGY

The South Bruce Test Plan describes how purging of the monitoring well intervals at the South Bruce site was completed using the dedicated Waterra tubing installed in each nested well standpipe interval. Purging was completed by attaching the previously installed Waterra ball-valve and tubing to a Waterra Hydrolift II mechanical pump, powered by a small portable generator. The Hydrolift pump was set so that a steady flow rate was achieved so that water quality parameter measurements could be taken to track stabilization progress in each well to ensure a representative groundwater sample could be collected. The flow rates ranged between 1.6 and 6.0 L/min. All purge water was diverted into pails and pumped using a battery powered Whaler pump or poured manually into a 1000 L tote contained in the KGS vehicle. The tote of purge water was disposed of at one of two licenced facilities that were approved for use by NWMO, either the Teeswater Municipal Water Treatment Plant or the Teeswater Concrete Waste Water Treatment Lagoon.

3.4.5 GROUNDWATER PARAMETER MONITORING

As per the South Bruce Test Plan, a flow-thru cell was used with the field verified YSI Pro multi-probe testing unit that allowed the measurement of water quality parameters every 5 minutes. Water quality parameters that were not measured using the YSI Pro multi-probe unit were measured with field verified/calibrated instruments from water collected from the discharge tubing of the flow-thru cell in a clean/decontaminated plastic cup or instrument-specific sample containers. Field measurements were recorded directly onto DQCF05. All completed DQCF05s and excel files were included with the quarterly data deliverable packages and reported on in the Quarterly Chemistry Data Reports.

3.4.6 QA/QC OF FIELD DATA

KGS Group completed the QA/QC of the field data that was captured on Data Quality Confirmation Forms used to capture transducer data at the time of downloading (DQCF02-*Transducer Download*), equipment calibration log (DQCF03), verify decontamination of field equipment (DQCF04), collect groundwater chemistry field measurements (DQCF05) and sample collection logs (DQCF06-*Sample Collection Log*).

This was completed as part of preparation for each of the quarterly data delivery packages. Each DQCF was reviewed by a senior reviewer for formatting, consistency of information being recorded, errors in the values

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and identification of values that were outside of the expected ranges. Where an error was found that error was highlighted, and a note was made of the correction. When a reading or value was outside of the expected range, that value was highlighted either by bolding or the cell was coloured on the DQCF.

After the review was completed, the DQCF was signed off on by both the person who prepared the DQCF and the person who verified it.

3.5 Groundwater Analysis

During the field program, KGS Group field staff presented the field parameter measurements recorded on DQCF05 to the KGS Group technical lead for verification that the purge criteria had been met and documented correctly before each sample was collected. Then groundwater sampling was completed by KGS Group field staff as described in Section 3.5.1 in the South Bruce Test Plan.

The specifics and details for sample collection for all the field events are included on DQCF06 provided with the quarterly data deliverable packages.

QA/QC blanks were prepared as described in the South Bruce Test Plan by ALS Laboratories LTD. All samples (including QA/QC samples) were analyzed for the Quarterly and Annual analytical packages as detailed on Table 2 below.

TABLE 2: SUMMARY OF LABORATORY PARAMETERS

Analysis Group	Parameters	Analysis Frequency
Dissolved Metals	Aluminum (Al), Antinomy (Sb), Arsenic (As), Barium (Ba), Beryllium (Be), Bismuth (Bi), Boron (B), Cadmium (Cd), Calcium (Ca), Cesium (Cs), Chromium (Cr), Cobalt (Co), Copper (Cu), Iron (Fe), Lead (Pb), Lithium (Li), Magnesium (Mg), Manganese (Mn), Molybdenum (Mo), Nickel (Ni), Phosphorous (P), Potassium (K), Rubidium (Rb), Ruthenium (Ru), Selenium (Se), Silicon (Si), Silver (Ag), Sodium (Na), Strontium (Sr), Sulfur (S), Tellurium (Te), Thallium (Tl), Thorium (Th), Tin (Sn), Titanium (Ti), Tungsten (W), Uranium (U), Vanadium (V), Zinc (Zn), Zirconium (Zr)	Quarterly
Routine and Nutrients	Conductivity, pH, Alkalinity (Total, as CaCO3), Ammonia (Total, as N), Bicarbonate (HCO3), Bromide (Br), Carbonate (CO3), Chloride (Cl), Fluoride (F), Hydroxide (OH), Nitrate and Nitrite as N, Nitrate (as N), Nitrite (as N), Orthophosphate-Dissolved (as P), Phosphorus (P)-Total, Phosphorus (P)-Total Reactive, Silica (SiO2)-Reactive, Sulfate (SO4), Total Kjeldahl Nitrogen, Total Nitrogen	Quarterly
Dissolved Inorganic Carbon	Dissolved Inorganic Carbon (DIC)	Quarterly
Iodide	Iodide	Quarterly
$\delta^{18}O$, $\delta^{2}H$	Oxygen-18 ($\delta^{18}O$), Deuterium ($\delta^{2}H$)	Quarterly
Ruthenium – dissolved	Ruthenium – dissolved	Annually

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Analysis Group	Parameters	Analysis Frequency
$^{87}Sr/^{86}Sr$, $\delta^{13}C$ DIC, $\delta^{37}Cl$	Strontium 87/86 ratio ($^{87}Sr/^{86}Sr$), Carbon-13 ($\delta^{13}C$ DIC), Chlorine-37 ($\delta^{37}Cl$)	Annually
Gross Alpha/ Beta	Gross Alpha/ Beta	Annually
^{14}C and ^{3}H	Carbon-14 (^{14}C) and Tritium (^{3}H)	Annually

For all quarterly events, all the collected samples were submitted to ALS Laboratories located in Mississauga, Ontario by KGS Group.

All Certificates of Analysis (COA) (in both PDF and excel file formats), Sample Reception Confirmation (SRC) forms, Chain of Custody (CoC) forms, and electronic data deliverable (EDD) files have been provided with the data deliverable packages from each quarterly event.

3.5.1 QA/QC OF LABORATORY RESULTS

KGS Group completed a verification of the laboratory reports and data sets. Each set of reports and data have been identified and detailed on *DQCF07-Laboratory Data Quality Confirmation* forms and recorded per ALS work order #. These have been provided with each quarterly data deliverable package. The verification of the laboratory reports and data sets included the following checklist items:

- All results and data were received from the laboratory.
- All submitted samples requiring analysis were tested.
- Laboratory QA/QC procedures are outlined in the report.
- Laboratory results are in the proper format/unit.
- Laboratory results are in expected/reasonable ranges.
- Laboratory detection limits are correct.
- Chain-of-Custody contains the required information (dates, signatures, etc.).
- Hold time issues are identified.
- Additional notes (such as any other pertinent observations made by the reviewer of the lab reports).

Details regarding the results of the Quality Assurance/Quality Control checks and verifications done for the 2022 analytical data are described below.

Results and Data Received from the Laboratory

There were several issues with samples that had missing analysis due to error by the laboratory in 2022. The first occurred in the Q3 (July) 2022 period, where samples submitted for Sr-87, C-13 and Cl-37 were not analyzed by the contracted laboratory responsible for the analysis. By the time that this issue was identified, the laboratory indicated that there was not enough sample remaining to complete the analysis. Additional samples were collected between Q4-2022 and Q1-2023 and analyzed to cover the missing analysis.

The second issue occurred in the Q3 (September) 2022 period, where some samples were not analyzed for total reactive phosphorus, iodide, or reactive silica. This was addressed within the framework of the project non-conformance procedures. This affected 8 iodide samples, all 30 of the total reactive phosphorus analysis, and 22 reactive silica analysis. Additional samples were collected between Q4-2022 and Q1-2023 and analyzed to cover the missing analysis.

Laboratory Results are Reported in the Proper Format/Unit

The 2022 annual isotopes were analyzed and reported in units and detection limits that did not meet the NWMO project objectives. The two isotopes that did not meet these objectives were 14C-DIC, which was to be analyzed by Accelerator Mass Spectrometry (AMS) and Tritium (3H), which was to be reported in Tritium Units (TU) with a minimum detection limit of 0.8 TU. These specifications were added to the project laboratory analysis in late 2022, and will be reflected in the 2023 annual report.

Hold Time Exceedances

Table 3 below summarizes the total number of samples and which parameters exceeded the laboratory recommended hold times for each of the quarterly sample events. Important to note that the hold time for pH is 15 minutes and was exceeded for all samples submitted to the lab, this is an unavoidable exceedance, but is mitigated by collecting field measurements with a calibrated pH meter during purging. The field measured pH results are provided on Table 6.

Possible reasons for a sample to exceed a hold time can be due to travel time to deliver the samples from the site to the lab, time of travel of a sample between laboratories for specific analysis (i.e. nitrate (as N), nitrite (as N), Total alkalinity (as $CaCO_3$) or some other issue at the lab, which is detailed on each of the quarterly DQCF07 and on Table 3.

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TABLE 3: 2022 SAMPLE HOLD TIME EXCEEEDANCES

Analysis Group	Recommended Hold Times	Hold Time Exceedances		
		Q3-July	Q3-September	Q4
Dissolved Metals	180 days	None	None	None
Routine and Nutrients	Br, F, Cl, SiO_2, EC – 28 days ALK – 14 days ortho-PO_4^{3-} , NO_2^-, NO_3^- – 3 days All other nutrients – 28 days	11 samples for total reactive phosphorus. (1)	1 sample for nitrate, and nitrite (as N) and total alkalinity, this was a trip blank that had an error for the date on the COC.	22 samples for nitrate and nitrite (as N)-Samples received less than 24 hours prior to expiry.
Dissolved Inorganic Carbon	14 days	None	None	None
Iodide	28 days	None	None	None
$\delta^{18}O$, $\delta^{2}H$	Unlimited if no headspace and chilled	None	None	None
Ruthenium – dissolved	180 days	None	None	None
$^{87}Sr/^{86}Sr$, $\delta^{13}C$ DIC, $\delta^{37}Cl$	Unlimited if no headspace and chilled	None	None	None
Gross Alpha/ Beta	Unlimited	None	None	None
^{14}C and ^{3}H	Unlimited	None	None	None

Note: (1) Freezing of the reactive phosphorus samples by the laboratory was done in accordance with ISO-5667-3 (2012) and does not affect the validity of the analysis.

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3.5.2 ASSESSMENT OF LABORATORY RESULTS

Assessment of the laboratory data for this 2022 annual report by KGS Group was principally done by preparation of two distinct geochemistry plots, Durov and Stiff Diagrams. These plots were generated using AquaChem 11.0.

AquaChem 11.0 is a commercially available software developed by Waterloo Hydrogeologic. The version 11.0 and build 19.22.0516.1 of AquaChem was used to generate the Durov and Stiff Diagrams for the 2022 shallow groundwater quality data for each quarterly sampling event. The Durov and Stiff plots were used for making interpretations of the groundwater types and trend analysis.

Data Processing: KGS Group received the laboratory data from ALS Laboratories LTD as an Electronic Data Deliverable file format (.EDD) which was imported into an environmental database management system called ESdat. The file generated by the lab reporting system consists of three files (a header file in a .xml format, a sample file in a .csv format, and a chemistry file in a .csv format) compressed in a zip folder. Within ESdat, the chemistry data was then arranged to be exported into the excel based acQuire import templates and as the primary data input into AquaChem to generate the geochemical plots.

Important to note, the bicarbonate alkalinity is an important parameter in the process of understanding the water type of an aquifer. Bicarbonate is one of the major ions required for generating Durov and Stiff plots for a particular water sample. For the Q3-July and Q3-September quarterly analytical data from the laboratory, the alkalinity of water samples was reported as a total of their calcium carbonate concentrations (total, as $CaCO_3$) and not as alkalinity species of bicarbonate, carbonate and hydroxide. To generate the geochemical plots and not exclude the Q3-July and September data, KGS Group calculated the bicarbonate concentrations assuming that total alkalinity is reflecting bicarbonate alkalinity which is a reasonable assumption considering pH range of our samples between 7.5 and 8.43. Bicarbonate concentrations were calculated using the expression (Trick et al., 2008):

Alkalinity (as HCO3) mg/L = 1.22*Alkalinity (as $CaCO_3$) mg/L

Durov Plots: Multiple water types can be compared using a Durov plot. AquaChem 11.0 calculates the milliequivalents per litre (meq/L) of each cation and anion from the laboratory water quality data. The total cations and the total anions are expected to balance each other, however, there were inequalities in the sum totals of cations and anions as measured by the laboratory within the accepted margin of error of +/= 10% difference for majority of the samples. A total of five samples of the fifty-five total samples analyzed by the lab had charge balance error greater than +/- 10%

On the Durvov plots, the cations and anions are plotted on adjacent ternary plots. The intersection of the data is shown on a central rectangular plot. Side plots show the actual pH and conductivity values for each point. Durov plots can be used to differentiate between different water types, which plot in different sections of the graph. Similar water types tend to cluster within the same region of the central rectangular plot. The plot can also be used to infer the origin of the water or mixing processes between water types. Durov plots can also be used to plot changes in water quality data with time, which could be applied at this site in the future. Specific Durov Plots grouped by quarter (Figures 3, 4 and 5) and grouped by water type (Figures 6, 7 and 8) are provided below. All other Durov plots are provided in Appendix A for each set of wells (sites SB_MW01 to SB_MW07, Figures 11 to 17), then by depth interval (i.e., A, B, C and Overburden, Figures 18 to 21) and a compiled plot showing all intervals from all sites on Figure 22.

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Stiff Diagrams: Individual water types can be compared using Stiff diagrams that display the relative concentrations of major ions expressed in milliequivalents per litre (meq/L). The lengths of the polygon sides illustrate the major ion concentrations, and plots of different shapes indicate different "fingerprints" of water qualities. Waters of similar type have a similar plot shape and would be generally expected to originate from the same source. Water can be named using the major cations and anions found on a percentage basis in the laboratory water analysis, see Table 7.

Stiff diagrams for all samples collected in 2022 are provided in Appendix B.

4.0 RESULTS

4.1 Sample Selection

4.1.1 SAMPLE LOCATION SELECTION

As indicated previously, the team selected monitoring wells at SB_MW07 and SB_MW06 to be sampled in the Q3-July event, whereas all monitoring well groups (twenty-six monitoring well intervals total) were sampled in the Q3-September event and, similarly, all monitoring well groups except SB_MW03 and SB_MW06 (eighteen monitoring well intervals total) were sampled during the Q4-December field event. Table 4 below shows which samples were collected during each quarterly event.

TABLE 4: 2022 LOCATIONS SAMPLED

Field Event	Q3 July 2022	Q3 September 2022	Q4 December 2022
Dates of Event	July 26 to 28, 2022	September 12 to 19, 2022	December 13 to 17, 2022
Well Nest Group Sampled	SB_MW06 and SB_MW07	SB_MW01, SB_MW02, SB_MW03, SB_MW04, SB_MW05, SB_MW06 and SB_MW07	SB_MW01, SB_MW02, SB_MW03, SB_MW04, SB_MW05 and SB_MW07
Well Nest Group Not Sampled	SB_MW01, SB_MW02, SB_MW03, SB_MW04, SB_MW05	None	SB_MW06
Total Samples Collected	8 groundwater samples + 3 QA/QC samples	26 groundwater samples + 5 QA/QC samples	18 groundwater samples + 4 QA/QC samples

Each well group comprised of three nested bedrock stand pipes (e.g. SB_MW03_BR-A, SB_MW03_BR-B, SB_MW03_BR-C), where (A - deep, B –intermediate, and C – shallowest within the nest) and one overburden standpipe for each (e.g. SB_MW03_OB-INT), except for the well group SB_MW01 which comprises of only a single nested bedrock stand pipe (SB_MW01_BR-A) and one overburden stand pipe (SB_MW01_OB-INT). Purging of the eight monitoring well intervals during the Q3-July field event, twenty-six monitoring well intervals during the Q3-September field event, and eighteen monitoring well intervals during the Q4-December field event were completed as per the Test Plan.

4.2 Purging and Field Chemistry

The sections below present the results and a discussion of the purging and field chemistry results from 20222 field events.

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4.2.1 FIELD PURGING RESULTS

4.2.1.1 Purge Volumes

A summary of purge volumes corresponding to each quarterly event is shown on Table 5 below, these measurements are also included on DQCF05 provided with the data deliverable package of each quarterly event.

TABLE 5: 2022 PURGING RESULTS SUMMARY

Monitoring Well ID	Purging Results			Field Event
	Total Purge Volume (L)	Purge Method	Purge Criteria Achieved (I or II)	
SB_MW06_BR-A	260	Waterra Pump	II-three well volumes purged	Q3-July
SB_MW06_BR-B	215	Waterra Pump	II-three well volumes purged	
SB_MW06_BR-C	121	Waterra Pump	II-three well volumes purged	
SB_MW06_OB-INT	18	Waterra Pump	II-three well volumes purged	
SB_MW07_BR-A	288	Waterra Pump	II-three well volumes purged	
SB_MW07_BR-B	206	Waterra Pump	II-three well volumes purged	
SB_MW07_BR-C	100	Waterra Pump	II-three well volumes purged	
SB_MW07_OB-INT	16	Waterra Pump	II-three well volumes purged	
SB_MW01_BR_A	1850	Submersible pump	II-three well volumes purged	Q3-September
SB_MW01_OB-INT	12	Waterra Pump	II-three well volumes purged	
SB_MW02_BR-A	267	Waterra Pump	II-three well volumes purged	
SB_MW02_BR-B	217	Waterra Pump	II-three well volumes purged	
SB_MW02_BR-C	54	Waterra Pump	II-three well volumes purged	
SB_MW02_OB-INT	32	Waterra Pump	II-three well volumes purged	
SB_MW03_BR-A	201	Waterra Pump	II-three well volumes purged	
SB_MW03_BR-B	134	Waterra Pump	II-three well volumes purged	
SB_MW03_BR-C	60	Waterra Pump	II-three well volumes purged	
SB_MW03_OB-INT	58	Waterra Pump	II-three well volumes purged	
SB_MW04_BR-A	274	Waterra Pump	II-three well volumes purged	
SB_MW04_BR-B	146	Waterra Pump	II-three well volumes purged	
SB_MW04_BR-C	96	Waterra Pump	II-three well volumes purged	
SB_MW04_OB-INT	23	Waterra Pump	II-three well volumes purged	
SB_MW05_BR-A	262	Waterra Pump	II-three well volumes purged	
SB_MW05_BR-B	170	Waterra Pump	II-three well volumes purged	
SB_MW05_BR-C	90	Waterra Pump	II-three well volumes purged	
SB_MW05_OB-INT	11	Waterra Pump	II-well went dry before purging three well volumes	
SB_MW06_BR-A	264	Waterra Pump	II-three well volumes purged	
SB_MW06_BR-B	25	Waterra Pump	II-pumping was suspended due to sediments in Waterra before	

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Monitoring Well ID	Purging Results			Field Event
	Total Purge Volume (L)	Purge Method	Purge Criteria Achieved (I or II)	
			three well volumes were purged	
SB_MW06_BR-C	120	Waterra Pump	II-three well volumes purged	
SB_MW06_OB-INT	16	Waterra Pump	II-three well volumes purged	
SB_MW07_BR-A	287	Waterra Pump	II-three well volumes purged	
SB_MW07_BR-B	220	Waterra Pump	II-three well volumes purged	
SB_MW07_BR-C	102	Waterra Pump	II-three well volumes purged	
SB_MW07_OB-INT	15	Waterra Pump	II-three well volumes purged	
SB_MW01_BR_A	1839	Submersible pump	II-three well volumes purged	Q4-December
SB_MW01_OB-INT	15	Waterra Pump	II-three well volumes purged	
SB_MW02_BR-A	264	Waterra Pump	II-three well volumes purged	
SB_MW02_BR_R-B	221	Waterra Pump	II-three well volumes purged	
SB_MW02_BR-C	48	Waterra Pump	II-three well volumes purged	
SB_MW02_OB-INT	32	Waterra Pump	II-three well volumes purged	
SB_MW04_BR-A	270	Waterra Pump	II-three well volumes purged	
SB_MW04_BR-B	165	Waterra Pump	II-three well volumes purged	
SB_MW04_BR-C	90	Waterra Pump	II-three well volumes purged	
SB_MW04_OB-INT	23	Waterra Pump	II-three well volumes purged	
SB_MW05_BR-A	254	Waterra Pump	II-three well volumes purged	
SB_MW05_BR-B	165	Waterra Pump	II-three well volumes purged	
SB_MW05_BR-C	91	Waterra Pump	II-three well volumes purged	
SB_MW05_OB-INT	10	Waterra Pump	II-well went dry before purging three well volumes	
SB_MW07_BR-A	288	Waterra Pump	II-three well volumes purged	
SB_MW07_BR-B	208	Waterra Pump	II-three well volumes purged	
SB_MW07_BR-C	102	Waterra Pump	II-three well volumes purged	
SB_MW07_OB-INT	16	Waterra Pump	II-three well volumes purged	

4.2.2 FIELD CHEMISTRY RESULTS

KGS Group has reviewed the field chemistry results from all the field events of 2022 which includes a discussion of the results in the sections below.

The results of the field chemistry monitoring results are presented on Table 6 below. These field measurements were recorded during the purging of each of the well intervals in preparation for collecting a representative groundwater sample for laboratory analysis and are discussed in the section below.

4.2.2.1 Field Parameters Data Discussion

The groundwater temperature values during the field work ranged between 7.7 and 15.1 °C. The values of pH in groundwater of the area of study vary from 7.51 to 8.43, revealing the circumneutral to slightly alkaline nature of the groundwater.

The values of field EC in samples varied between 287 and 1526 µS/cm at field groundwater temperatures, whereas the field TDS values ranged between 200 mg/L and 830 mg/L. To understand the accuracy of field EC and field TDS measurements, the field EC values were compared against the EC values reported by the laboratory, whereas the field TDS measurements were compared with the calculated TDS values using the expression:

$TDS = k.EC_{field}$

Where, TDS is represented in mg/L, "k" is a unitless conversion factor, and EC is represented in µS/cm (Rusydi, 2018). The value of "k" is derived from the literature to be in the range 0.55 – 0.75 (Hem & Survey, 1985). During the Q3-September and the Q4-December field events, it was noted that the field TDS values appeared to be lower than expected (as noted by KGS Group on the acQuire Importers SB_IMP-29_SH included with the Q3-September and Q4-December Chemistry Data Deliverables) and was most likely due to the High Range TDS meter that was used during those two events, which has a lower accuracy when measuring concentrations that are in the lower range of the instrument i.e., <999 mg/L, as seen in the groundwater at the South Bruce site. For future field events, a TDS meter that has a higher accuracy will be used.

There were instances where dissolved oxygen (DO) and turbidity of the samples were higher than expected or remained elevated after purging three well volumes. Elevated DO and turbidity readings in field samples that are noted in Table 6 below, correspond primarily with overburden wells (OB-INT). The likely reason for this is that the well was not fully developed after installation. The other reason that several field measurements of DO were flagged on Table 6 below for samples collected during the Q4 event, was related to using the incorrect units on the DO measuring equipment due to human error. Several readings were recorded in % oxygen instead of mg/L. This was flagged during the QA of the daily DQCFs and corrected. On Table 6 below, KGS Group converted the % dissolved oxygen values using this equation:

DO (mg/L) = DO% * Oxygen Solubility Value (considers temperature and salinity), YSI (2019)

Also, during the Q3-September field event, KGS Group identified a collapse of the well casing in SB_MW06_BR-B while the well was being purged. The collapsed well casing was identified because the field team observed a large amount of sand coming out of the well during purging and when they stopped purging to clean out the Watterra foot valve which was blocked by sand, they measured the depth to bottom of the well and confirmed that there was a blockage. The damaged well casing most likely was present when the Q3-July samples were collected and any previous samples collected should be treated with caution as the results may not be representative. Replacement well SB_MW09_BR-B was installed for this bedrock interval in December 2022 by the NWMO but was not sampled in 2022.

TABLE 6: FIELD CHEMISTRY PARAMETER SUMMARY

Monitoring Interval	Sample Event	Field DO (Multimeter) [mg/L]	Field EC [mS/cm]	Field ORP [mV]	Field Turbidity (NTU)	Field Fluorescein [ppb]	Field pH	Field TDS [mg/L]	Field Temp [°C]	Field Density (g/cm3)	Comments
SB_MW01_OB-INT	Q3-September	**10.03**	**0.792**	36.7	**177.3**	3.9	7.55	273	**14.1**	0.998	Field DO, turbidity and temperature values were higher than expected
	Q4-December	**3.15**	0.499	86.9	**218**	0	7.53	280	**11.4**	1	Field DO, turbidity and temperature values were higher than expected
SB_MW01_BR-A	Q3-September	0.81	0.488	-134.7	1.39	0	7.5	243	10.1	0.998	-
	Q4-December	0.56	0.382	-241.5	**91.1**	0	8.16	200	9.5	1.002	Field turbidity was higher than expected
SB_MW02_OB-INT	Q3-September	**5.47**	0.613	85.8	**1582**	1.4	7.52	310	10.4	0.998	Field DO and turbidity were higher than expected
	Q4-December	**2.2***	0.598	72.5	**>999**	4.9	7.43	340	8	0.999	DO of 19.66 was measured and recorded in % oxygen not mg/L. Showing calculated DO in mg/L. turbidity continued to be elevated
SB_MW02_BR-A	Q3-September	0.81	0.818	-60.1	1.56	0	7.04	418	9	0.996	-
	Q4-December	**4.7***	0.788	-65.4	**138**	0.1	7.26	430	8.8	0.998	DO of 41.15 was measured and recorded in % oxygen not mg/L. Showing calculated DO in mg/L. DO is elevated, turbidity was also elevated compared to previous results.
SB_MW02_BR_R-B	Q3-September	0.82	0.474	-20.9	2.04	3.7	7.13	243	8.9	0.996	-
	Q4-December	**3.5***	0.472	-76.2	4.95	0.7	7.31	270	7.7	0.999	DO of 29.87 was measured and recorded in % oxygen not mg/L. Showing calculated DO in mg/L. DO is elevated.
SB_MW02_BR-C	Q3-September	0.85	0.498	-117.3	**281.22**	0.3	7.38	256	9.2	0.996	Field turbidity was higher than expected.

Monitoring Interval	Sample Event	Field DO (Multimeter) [mg/L]	Field EC [mS/cm]	Field ORP [mV]	Field Turbidity (NTU)	Field Fluorescein [ppb]	Field pH	Field TDS [mg/L]	Field Temp [°C]	Field Density (g/cm3)	Comments
	Q4-December	**4.8***	0.589	-97.2	**>999**	0.2	7.38	330	8.9	0.996	DO of 41.71 was measured and recorded in % oxygen not mg/L. Showing calculated DO in mg/L.DO is elevated. Turbidity was outside maximum range of field equipment.
SB_MW03_OB-INT	Q3-September	**5.31**	0.464	-17.1	**155.22**	5.6	7.48	236	10.2	0.998	Field turbidity was higher than expected.
SB_MW03_BR-A	Q3-September	0.91	0.456	-78.3	**80.77**	0	7.38	234	10.2	0.998	Field turbidity was higher than expected.
SB_MW03_BR-B	Q3-September	0.83	0.463	-81.5	16.74	1.5	7.36	236	9.5	0.998	Field turbidity was higher than expected.
SB_MW03_BR-C	Q3-September	0.87	0.463	-77.8	**77.15**	3.5	7.36	238	9.4	0.998	Field turbidity was higher than expected.
SB_MW04_OB-INT	Q3-September	**10.03**	**0.287**	108	**179**	0	7.74	287	**11.1**	0.998	Field turbidity was higher than expected.
	Q4-December	2.45	0.597	207.7	**>999**	0	7.4	330	8.7	1.001	Field turbidity was higher than expected.
SB_MW04_BR-A	Q3-September	0.85	1.133	187.2	35.25	0	7.15	569	8.4	0.998	-
	Q4-December	0.71	1.12	-7.1	19.5	0	7.27	620	8.4	1.001	-
SB_MW04_BR-B	Q3-September	0.85	1.073	15.4	9.28	0	7.16	535	8.5	0.998	-
	Q4-December	0.56	1.06	11.7	1.87	0	7.22	580	8.4	1	-
SB_MW04_BR-C	Q3-September	0.86	1.014	-32.1	13.08	0	7.37	513	8.5	0.998	-

Monitoring Interval	Sample Event	Field DO (Multimeter) [mg/L]	Field EC [mS/cm]	Field ORP [mV]	Field Turbidity (NTU)	Field Fluorescein [ppb]	Field pH	Field TDS [mg/L]	Field Temp [°C]	Field Density (g/cm3)	Comments
	Q4-December	0.41	1.02	-16.4	**134**	0	7.36	560	8.4	1.001	Field turbidity was higher than expected.
SB_MW05_OB-INT	Q3-September	**5.17**	0.78	163.1	**3976**	**14.8**	7.46	398	**12.6**	1.002	-
	Q4-December	**1.7***	0.749	55.1	**>999**	**10.1**	7.45	410	9.7	1.001	DO of 15.15 was measured and recorded in % oxygen not mg/L. Showing calculated DO in mg/L. Turbidity, fluorescein continued to be elevated compared to previous readings.
SB_MW05_BR-A	Q3-September	0.87	1.526	-50.4	45.5	0	7.4	760	9	0.998	-
	Q4-December	0.49	1.52	-90.5	0.91	15	7.4	830	8.8	1.001	-
SB_MW05_BR-B	Q3-September	0.84	0.951	-68.7	58.01	0	7.44	477	9	0.998	-
	Q4-December	0.64	0.94	-88.5	**106**	**12.8**	7.47	520	8.9	1.001	Field turbidity and fluorescein were higher than expected.
SB_MW05_BR-C	Q3-September	0.84	1.004	-105.8	55.39	2.4	7.48	499	9	0.998	-
	Q4-December	0.67	0.94	-135	32	5.4	7.57	520	9.1	1.002	-
SB_MW06_OB-INT	Q3-July	**2.26**	**0.55**	109.9	**64.7**	**13.5**	8.02	260	**15.1**	0.994	-
	Q3-September	5.36	0.545	81.4	**177.93**	11	7.38	274	10.3	0.998	Field turbidity higher than expected.
SB_MW06_BR-A	Q3-July	0.75	0.47	-99.6	**-1.2**	3.6	7.58	333	8.3	0.995	-

Monitoring Interval	Sample Event	Field DO (Multimeter) [mg/L]	Field EC [mS/cm]	Field ORP [mV]	Field Turbidity (NTU)	Field Fluorescein [ppb]	Field pH	Field TDS [mg/L]	Field Temp [°C]	Field Density (g/cm3)	Comments
	Q3-September	0.84	0.736	-49.6	3.2	0.1	7.09	380	9.2	0.998	-
SB_MW06_BR-B	Q3-July	**0.74**	**0.56**	**-15.2**	**>999**	**17.3**	**7.76**	**397**	**8.4**	**1**	Well replaced in Q4-2022 with SB_MW09_BR-B due to well casing collapse and data may not be representative
SB_MW06_BR-C	Q3-July	0.74	0.337	-118.8	**100.4**	0.996	7.67	260	8.4	0.995	Field turbidity higher than expected.
	Q3-September	0.86	0.53	-73.1	15.96	6	7.21	272	8	0.998	-
SB_MW07_OB-INT	Q3-July	**10.04**	**0.888**	180	**115**	3.8	7.97	333	**15.1**	0.995	-
	Q3-September	**9.97**	0.788	166.7	**813**	0	7.46	401	**14.5**	0.998	-
	Q4-December	**2.0***	0.59	26.6	**945**	0	7.6	390	**10.9**	1.002	DO of 18.18 was measured and recorded in % oxygen not mg/L. Showing calculated DO in mg/L. Also, turbidity and temperature readings continued to be elevated.
SB_MW07_BR-A	Q3-July	**1.95**	0.406	216.4	31.4	0.998	7.25	278	9.2	0.995	-
	Q3-September	**2.01**	0.577	196.7	**213.5**	0	7.03	297	9.2	0.996	-
	Q4-December	0.77	0.564	6.7	**940**	0	7.29	310	8.8	1.001	-
SB_MW07_BR-B	Q3-July	0.72	0.426	-6.7	15.42	2.4	7.63	295	9	0.995	-
	Q3-September	0.81	0.599	-19.8	6.22	0	7.1	310	9.2	0.996	-

Monitoring Interval	Sample Event	Field DO (Multimeter) [mg/L]	Field EC [mS/cm]	Field ORP [mV]	Field Turbidity (NTU)	Field Fluorescein [ppb]	Field pH	Field TDS [mg/L]	Field Temp [°C]	Field Density (g/cm3)	Comments
	Q4-December	0.65	0.593	-53.9	3.45	0	7.46	330	8.8	1.001	-
SB_MW07_BR-C	Q3-July	0.73	0.33	16.3	24.68	2.2	7.61	229	9	0.995	-
	Q3-September	0.85	0.462	-32.7	14.3	0	6.95	236	9.3	0.994	-
	Q4-December	0.98	0.43	-76.6	44.5	0	7.51	250	8.8	1	-

Notes: **Bolded** values indicate a reading/measurement is flagged as not representative or erroneous and should be treated with caution, see comments.

*% Dissolved oxygen converted to mg/L using DO (mg/L) = %DO * Value from oxygen solubility table @ temperature for a specific salinity, YSI (2019)

4.3 Groundwater Sampling Results

The 2022 Q3-July event comprised of collection of eight groundwater samples, one field duplicate, one trip blank, and one field blank, for a total of eleven samples. The 2022 Q3-September event comprised of collection of twenty-six groundwater samples, three field duplicates, one trip blank and one field blank samples, for a total of thirty-one samples. The 2022 Q3-December event comprised of collection of nineteen groundwater samples, one field duplicate, one trip blank, and one field blank sample for a total of twenty-two samples. All samples were submitted for analysis at ALS Laboratories LTD. All sample IDs were provided by the NWMO Geoscientific Data Management (GDMS) Administrator prior to mobilizing to the field. Table 4 provides a summary of the total number of samples collected each quarterly sample event and the location of the samples.

KGS Group has compiled and assessed all the 2022 Laboratory Chemistry data and discussed in the sections below.

4.3.1 LABORATORY RESULTS

KGS Group has reviewed the laboratory results from all the field events of 2022 and included an assessment of the hydrogeochemical characteristics of groundwater at the South Bruce Site.

4.3.1.1 Concentrations of Major Ions

There are many natural factors that can affect the groundwater quality of an area. The primary factors include the chemical composition and the source of recharge water, the lithological and hydrological properties of the water-bearing geological unit and the groundwater residence time in a geological unit.

Major ions, both positively (cations) and negatively (anions) charged, are the most abundant dissolved constituents in the groundwater, and are found at equal concentrations for electroneutrality. The most abundant cations present in water are calcium (Ca), magnesium (Mg), sodium (Na), and potassium (K). The most abundant anions are bicarbonate (HCO_3), chloride (Cl), and sulfate (SO_4). Durov plots were prepared for all samples based on the concentration of these ions and are provided in Appendix A. Durov plots were also prepared for each quarterly sample event seen on Figures 3 to 5 below. The concentration of major ions listed above are also shown for reference on all stiff diagrams presented in Appendix B.

The groundwater water type is based on the dominant dissolved cation and anion, expressed in milliequivalents per liter (meq/L). The dominant dissolved ion must be greater than 50% of the total. For example, the sodium-bicarbonate (Na-HCO_3) type water contains greater than 50% of total cation milliequivalents as sodium and more than 50% of total anion milliequivalents in water as bicarbonate. If no cation or anion is dominant, the water is classified as mixed, and the two most common anions (or anions in decreasing order of their composition) are used to describe the water type.

The results of groundwater sampling for the South Bruce Site in 2022 indicate the following ranges of constituents: 1.41–130 mg/L for Na, 37.9–170 mg/L for Ca, 14.5–63 mg/L for Mg, 0.488–3.2 mg/L for K, 0.63–168 mg/L for Cl, 2.81–441 mg/L for SO_4, and 244–688 mg/L for HCO_3. The water type of each sample is provided below grouped by water type and then sample location and excludes the trip blank, field blank and field duplicate samples:

TABLE 7: WATER TYPES AT THE SOUTH BRUCE SITE

Sample ID	Sample Event	Sample Date (dd-mm-yyyy)	Water Type
SB_MW07_OB_INT_GW0003	Q4-Dec	16-12-2022	Ca-HCO_3
SB_MW01_BR_GW0001	Q4-Dec	09-12-2022	Ca-Mg- HCO_3
SB_MW01_OB-INT_GW0001	Q4-Dec	09-12-2022	Ca-Mg- HCO_3
SB_MW01_OB-INT_GW0002	Q4-Dec	14-12-2022	Ca-Mg- HCO_3
SB_MW02_BR_R-B_GW0001	Q3-Sept	16-09-2022	Ca-Mg- HCO_3
SB_MW02_BR-R-B_GW0002	Q4-Dec	13-12-2022	Ca-Mg- HCO_3
SB_MW02_BR-C_GW0001	Q3-Sept	16-09-2022	Ca-Mg- HCO_3
SB_MW02_OB-INT_GW0001	Q3-Sept	16-09-2022	Ca-Mg- HCO_3
SB_MW02_OB-INT_GW0002	Q4-Dec	13-12-2022	Ca-Mg- HCO_3
SB_MW03_BR-A_GW0001	Q3-Sept	15-09-2022	Ca-Mg- HCO_3
SB_MW03_BR-B_GW0001	Q3-Sept	15-09-2022	Ca-Mg- HCO_3
SB_MW03_BR-C_GW0001	Q3-Sept	15-09-2022	Ca-Mg- HCO_3
SB_MW03_OB-INT_GW0001	Q3-Sept	15-09-2022	Ca-Mg- HCO_3
SB_MW04_OB-INT_GW0001	Q3-Sept	13-09-2022	Ca-Mg- HCO_3
SB_MW04_OB-INT_GW0002	Q4-Dec	14-12-2022	Ca-Mg- HCO_3
SB_MW05_OB-INT_GW0002	Q4-Dec	16-12-2022	Ca-Mg- HCO_3
SB_MW06_BR_C_GW0001	Q3-July	27-07-2022	Ca-Mg- HCO_3
SB_MW06_BR-C_GW0003	Q3-Sept	14-09-2022	Ca-Mg- HCO_3
SB_MW06_OB-INT_GW0001	Q3-July	27-07-2022	Ca-Mg- HCO_3
SB_MW06_OB-INT_GW0002	Q3-Sept	14-09-2022	Ca-Mg- HCO_3
SB_MW07_BR_A_GW0001	Q3-July	26-07-2022	Ca-Mg- HCO_3
SB_MW07_BR-A_GW0003	Q3-Sept	17-09-2022	Ca-Mg- HCO_3
SB_MW07_BR-A_GW0004	Q4-Dec	16-12-2022	Ca-Mg- HCO_3
SB_MW07_BR_B_GW0001	Q3-July	26-07-2022	Ca-Mg- HCO_3
SB_MW07_BR-B_GW0002	Q3-Sept	17-09-2022	Ca-Mg- HCO_3
SB_MW07_BR-B_GW0004	Q4-Dec	16-12-2022	Ca-Mg- HCO_3
SB_MW07_BR_C_GW0001	Q3-July	26-07-2022	Ca-Mg- HCO_3

Sample ID	Sample Event	Sample Date (dd-mm-yyyy)	Water Type
SB_MW07_BR-C_GW0002	Q3-Sept	18-09-2022	Ca-Mg- HCO_3
SB_MW07_BR-C_GW0003	Q4-Dec	16-12-2022	Ca-Mg- HCO_3
SB_MW07_OB-INT_GW0002	Q3-Sept	17-09-2022	Ca-Mg- HCO_3
SB_MW02_BR-A_GW0002	Q4-Dec	13-12-2022	Ca-Mg- HCO_3- SO_4
SB_MW06_BR_A_GW0001	Q3-July	27-07-2022	Ca-Mg- HCO_3-Cl
SB_MW06_BR_C_GW0002	Q3-July	27-07-2022	Ca-Mg- HCO_3-Cl
SB_MW06_BR-A_GW0003	Q3-Sept	14-09-2022	Ca-Mg- HCO_3-Cl
SB_MW06_BR-A_GW0004	Q3-Sept	14-09-2022	Ca-Mg- HCO_3-Cl
SB_MW02_BR-A_GW0001	Q3-Sept	16-09-2022	Ca-Mg- SO_4- HCO_3
SB_MW04_BR-A_GW0001	Q3-Sept	13-09-2022	Ca-Mg- SO_4- HCO_3
SB_MW04_BR-A_GW0002	Q4-Dec	14-12-2022	Ca-Mg- SO_4- HCO_3
SB_MW04_BR-B_GW0001	Q3-Sept	13-09-2022	Ca-Mg- SO_4- HCO_3
SB_MW04_BR-B_GW0002	Q3-Sept	13-09-2022	Ca-Mg- SO_4- HCO_3
SB_MW04_BR-B_GW0003	Q4-Dec	14-12-2022	Ca-Mg- SO_4- HCO_3
SB_MW04_BR-C_GW0001	Q3-Sept	13-09-2022	Ca-Mg- SO_4- HCO_3
SB_MW04_BR-C_GW0002	Q4-Dec	14-12-2022	Ca-Mg- SO_4- HCO_3
SB_MW05_OB-INT_GW0001	Q3-Sept	14-09-2022	Ca-Mg-Na- HCO_3
SB_MW07_OB-INT_GW0001	Q3-July	28-07-2022	Ca-Mg-Na- HCO_3-Cl
SB_MW05_BR-C_GW0002	Q4-Dec	15-12-2022	Ca-Mg-Na- HCO_3- SO_4-Cl
SB_MW05_BR-B_GW0001	Q3-Sept	13-09-2022	Ca-Na-Mg- HCO_3- SO_4-Cl
SB_MW05_BR-C_GW0001	Q3-Sept	13-09-2022	Ca-Na-Mg- HCO_3- SO_4-Cl
SB_MW06_BR_B_GW0001	Q3-July	27-07-2022	Ca-Na-Mg- HCO_3-Cl
SB_MW05_BR-B_GW0002	Q4-Dec	15-12-2022	Ca-Na-Mg- HCO_3- SO_4-Cl
SB_MW05_BR-A_GW0001	Q3-Sept	13-09-2022	Ca-Na-Mg- SO_4-Cl- HCO_3
SB_MW05_BR-A_GW0002	Q4-Dec	15-12-2022	Ca-Na-Mg- SO_4-Cl- HCO_3
SB_MW01_BR_GW0003	Q4-Dec	16-12-2022	Mg-Ca- HCO_3
SB_MW02_BR-C_GW0002	Q4-Dec	13-12-2022	Na-Ca- HCO_3

The predominant groundwater type of the overburden and upper bedrock horizons at the South Bruce Site is **Ca-Mg-HCO_3** which was the characteristic water type at sites SB_MW01, SB_MW02, SB_MW03, SB_MW06 and SB_MW07. The samples with this water type are primarily from the overburden (OB), upper bedrock (intervals C and B). The upper bedrock were typically Lucas Formation (dolostone) and Amherstburg Formation (limestone). The results are plotted on a Durov plot shown in Figure 6.

The second most observed water type is **Ca-Mg- SO_4- HCO_3** due to sulphate (SO_4) ions being more prevalent than bicarbonate ions. This water type was observed in samples collected from the bedrock intervals at SB_MW04. The results are plotted together on a Durov plot seen in Figure 7.

All other water types were present where higher concentrations of sodium, chloride and sulphate were found in varying proportions are plotted together in the Figure 8 Durov plot. Higher percentages of chloride were detected in the sample SB_MW06_BR-A_GW0001, whereas higher percentages of sodium and chloride were found in the samples SB_MW06_BR-B_GW0001, SB_MW05_BR-C_GW0001 and SB_MW07_OB-INT_GW0001. Higher percentages of sulphate (SO_4) and chloride (Cl) were also found in samples collected during the September 2022 event: SB_MW05_BR-B_GW0001, SB_MW05_BR-B_GW0001, and SB_MW05_BR-C_GW0001.

Similarly, the following samples were found to have higher percentages of sulphate (SO_4) and chloride (Cl), collected during the December 2022 event: SB_MW05_BR-B_GW0002 and SB_MW05_BR-C_GW0002.

The Durov plots were used to characterize the samples collected from the South Bruce Site according to the sample events (Figures 3, 4 and 5) and then by their water types (Figures 6, 7 and 8). All other Durov plots are included in Appendix A (Figures 11 to 22).

FIGURE 3: DUROV PLOT FOR Q3-JULY SAMPLES

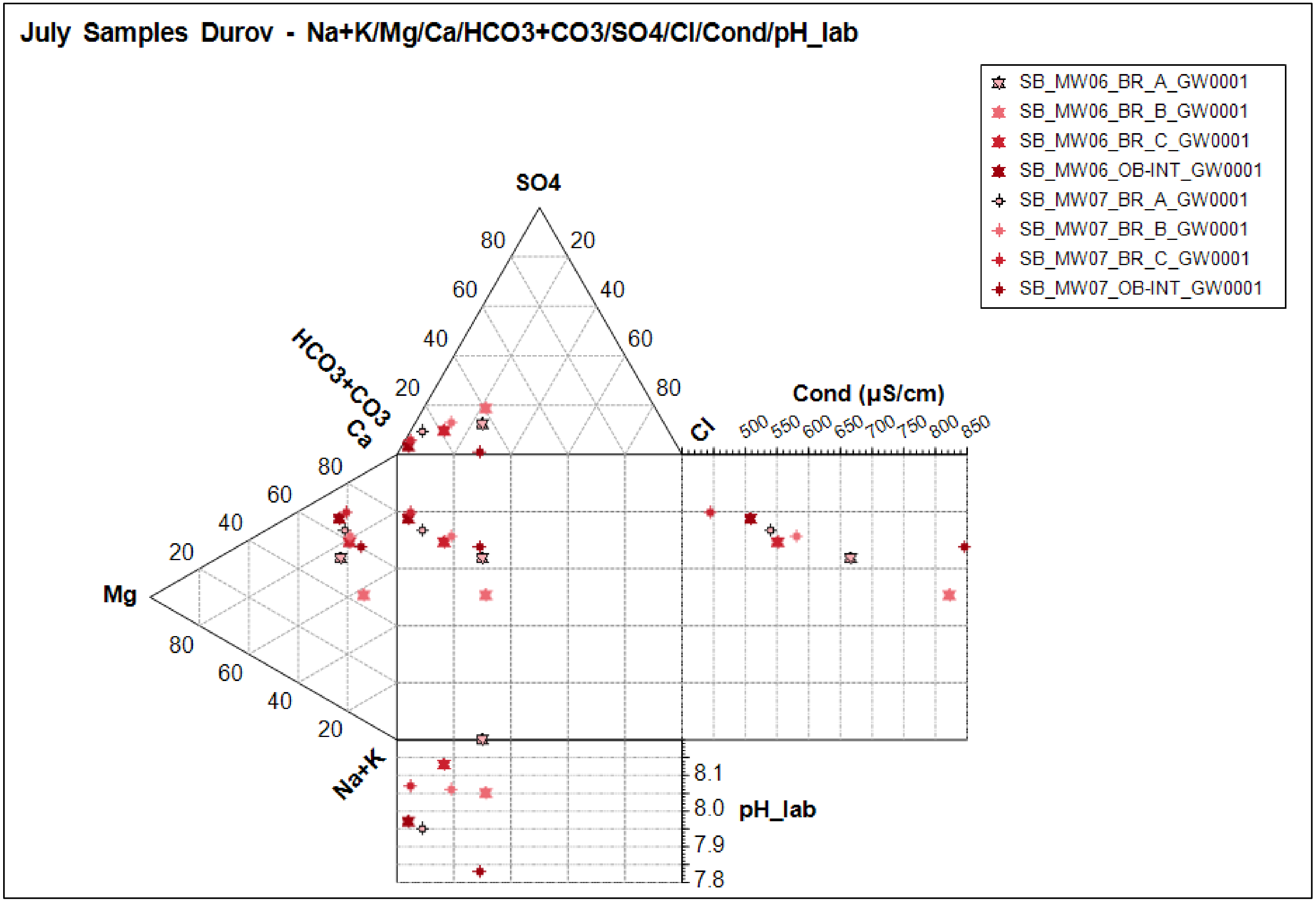


FIGURE 4: DUROV PLOT FOR Q3-SEPTEMBER SAMPLES

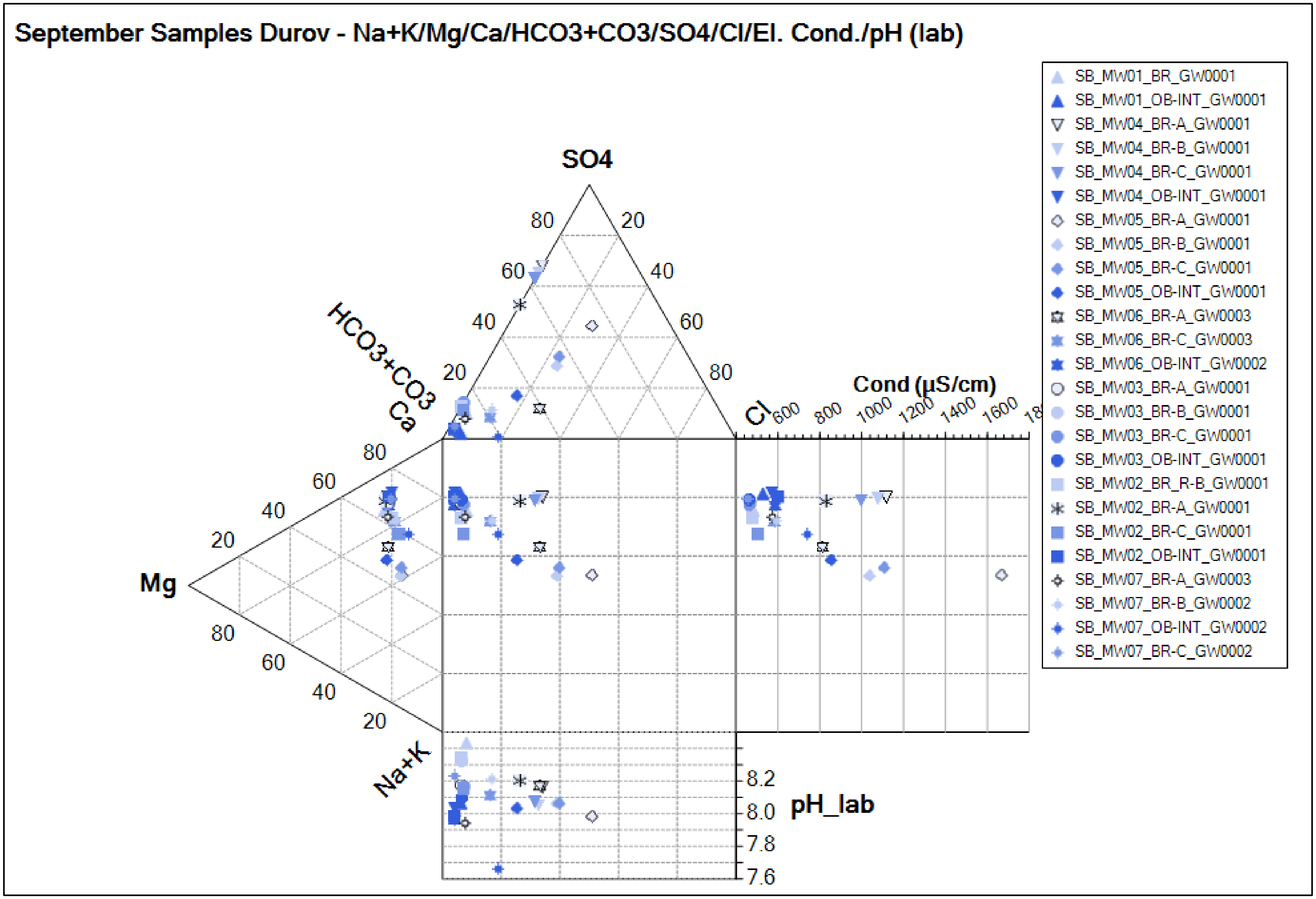


FIGURE 5: DUROV PLOT FOR Q4 SAMPLES

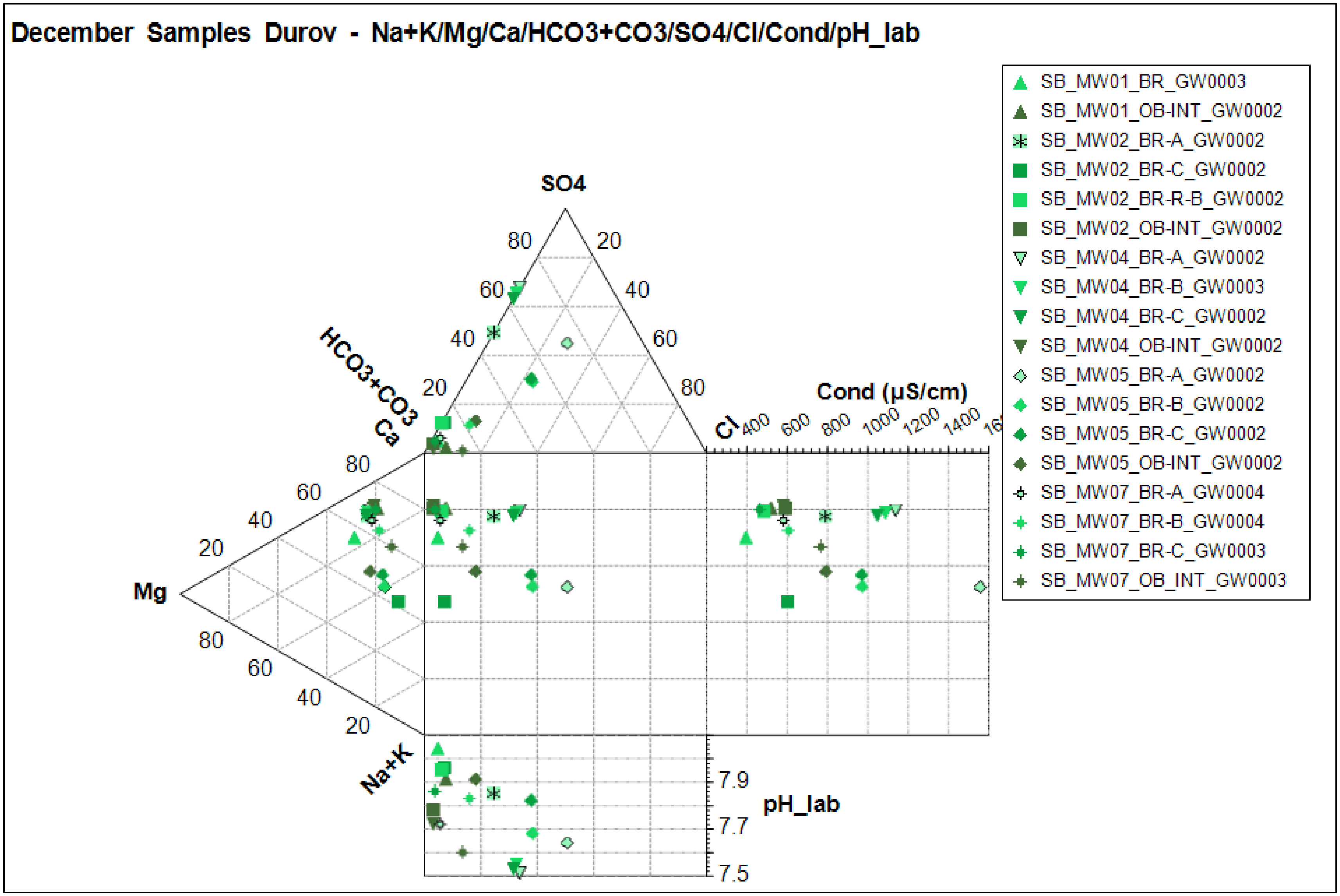


FIGURE 6: DUROV PLOT OF $Ca-Mg-HCO_3$ WATER TYPE

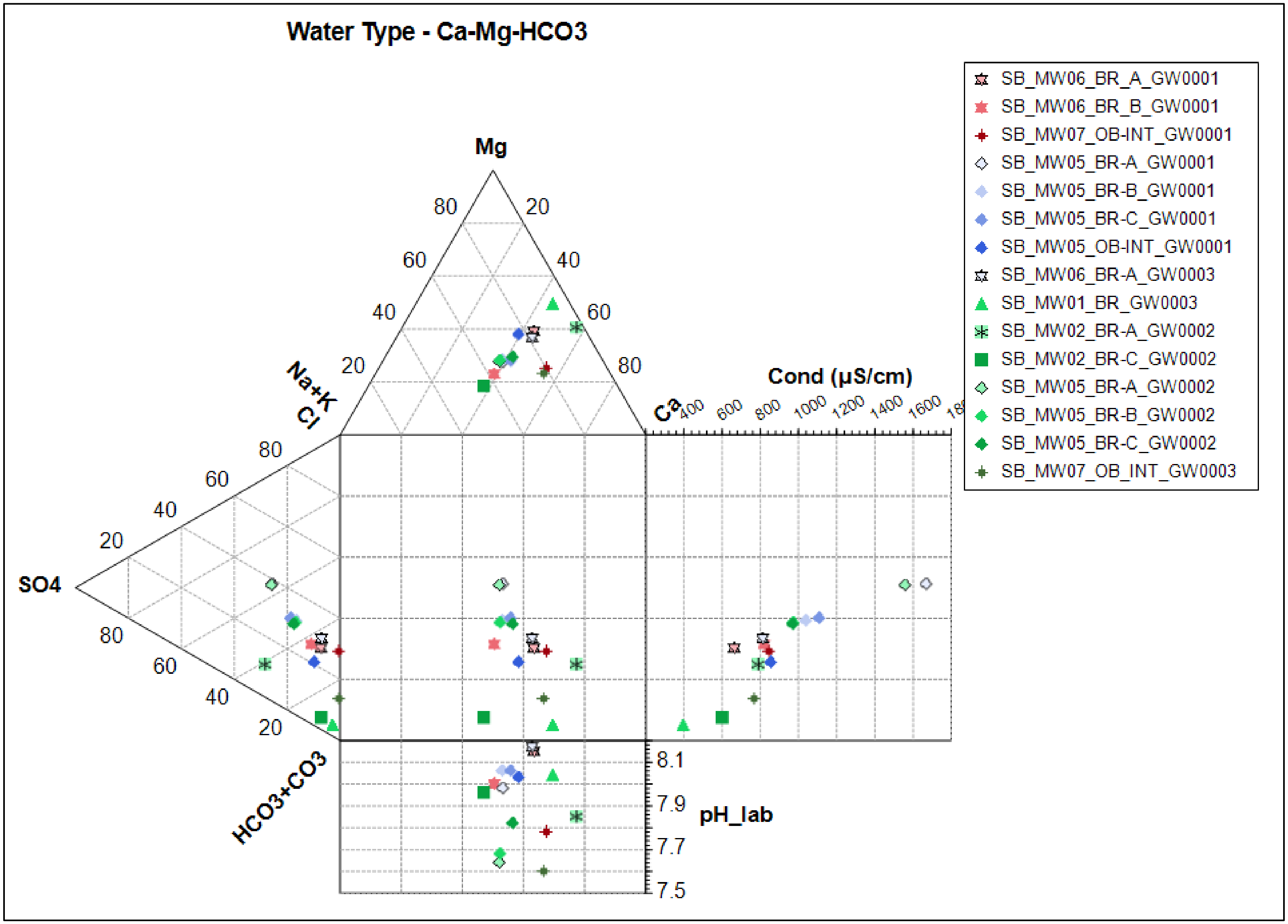


FIGURE 7: DUROV PLOT OF Ca-Mg-SO_4-HCO_3 WATER TYPE

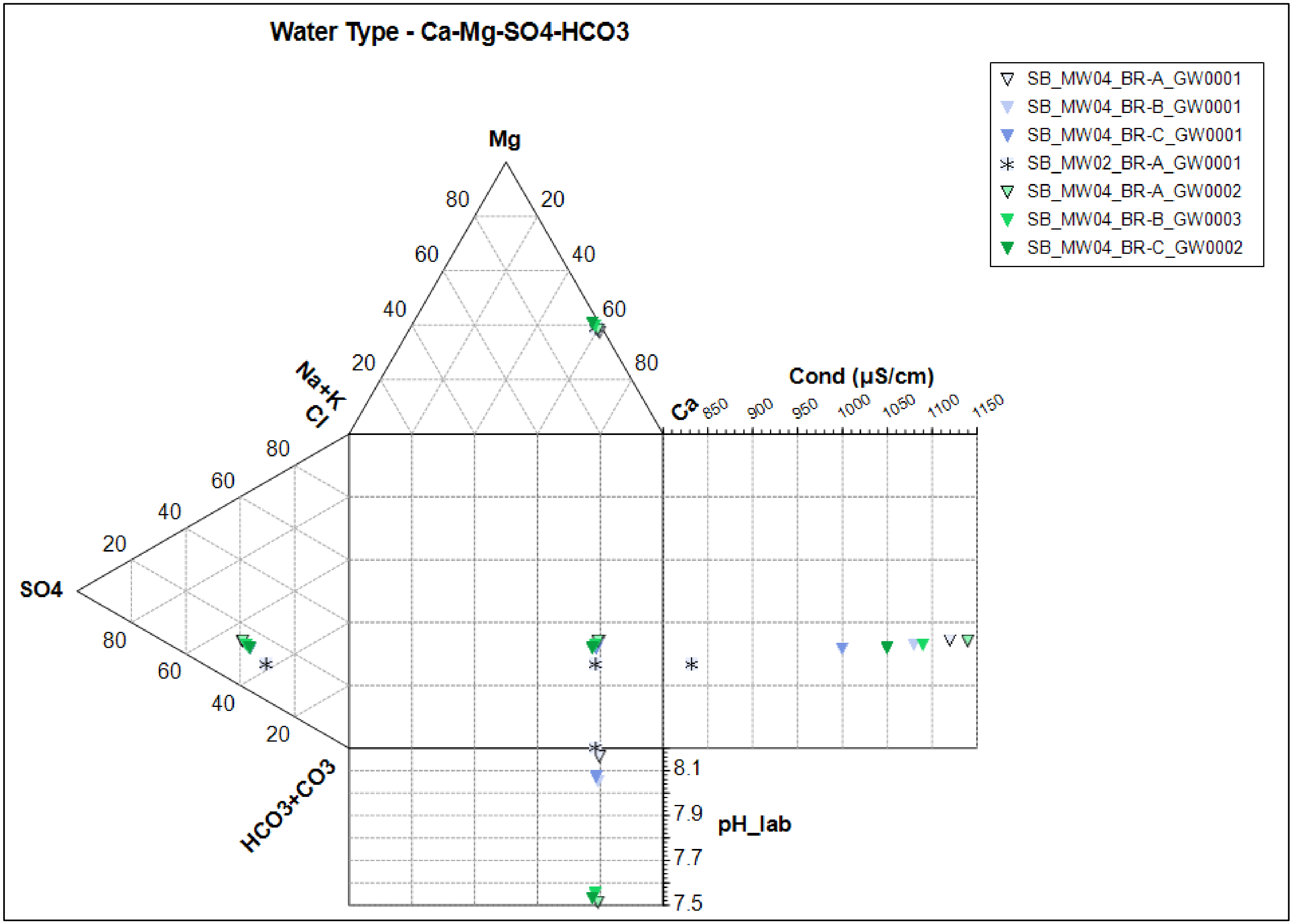
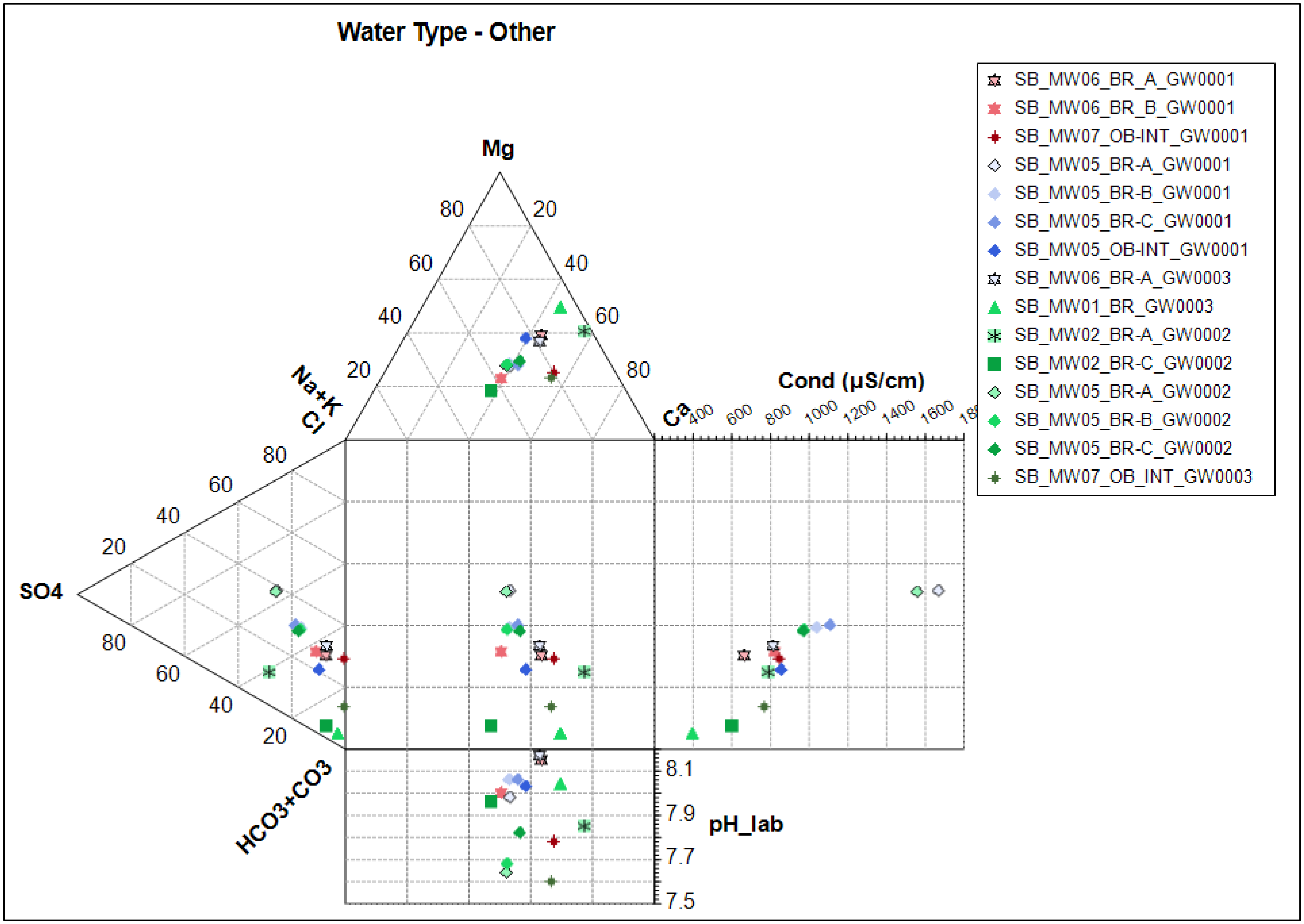


FIGURE 8: DUROV PLOT OF ALL OTHER WATER TYPES



Additional Durov plots were prepared for each well site SB_MW01, SB_MW02, SB_MW03, SB_MW04, SB_MW05, SB_MW06 and SB_MW07 on Figures 11 through 17, respectively in Appendix A. Data was then grouped by monitoring interval type (i.e., overburden or bedrock) on Figures 18 through 21, respectively in Appendix A. Finally, all data was grouped and plotted together on Figure 22 of Appendix A. Each sample has a unique symbol, allowing comparisons over time as well as location.

The specific well site plots can be used to look for any variations in groundwater quality with depth at a single location and for changes over time. The monitoring interval plots can be used to look at variations with a single depth interval over the project area. The composite plot (Appendix A-Figure 22) can be used to summarize the characteristics of the site as a whole.

It is important to note that the first spring sampling event did not occur until May 2023, which is not included in this 2022 report. Seasonal changes for the spring melt will be assessed in the 2023 annual report.

The major ion concentrations of individual water samples collected from the South Bruce Site in 2022 were also compared using Stiff diagrams that displayed the relative concentrations of major ions expressed in milliequivalents per liter (meq). Stiff diagrams for the South Bruce Site are included in Appendix B of this report. The plots are organized by well and then by monitoring interval from overburden to bedrock intervals C, B and A in order of depth. Each diagram can be “read” by reading down the page and noting the differences in the plots. A uniform scale was used for all plots for comparison.

Calcium-magnesium-bicarbonate ions are derived from dissolution of the underlying dolostone and limestone rocks and overburden. Natural sources for higher proportions of chloride, sodium, and sulphate likely represent dissolution of minor minerals within the same rock formations such as gypsum (calcium, sulphate) and halite (albeit at depth).

Parameters of Interest

KGS Group also observed high concentrations of nitrate (as NO_3) in groundwater for the samples listed on Table 8 below.

TABLE 8: ELEVATED NITRATE CONCENTRATIONS

Sample ID	Quarter Sample Collected	Nitrate (as NO3) mg/L
SB_MW07_BR_A_GW0001	Q3-July	5.49
SB_MW07_OB-INT_GW0001	Q3-July	2.42
SB_MW06_OB-INT_GW0001	Q3-July	9.78
SB_MW01_OB-INT_GW0001	Q3-September	57.14
SB_MW04_OB-INT_GW0001	Q3-September	20.51
SB_MW06_OB-INT_GW0002	Q3-September	11.51
SB_MW02_OB-INT_GW0001	Q3-September	36.69
SB_MW07_BR-A_GW0003	Q4	5.79
SB_MW01_OB-INT_GW0002	Q4	39.60

Sample ID	Quarter Sample Collected	Nitrate (as NO3) mg/L
SB_MW02_BR-C_GW0002	Q4	7.53
SB_MW02_OB-INT_GW0002	Q4	24.89
SB_MW04_OB-INT_GW0002	Q4	22.41
SB_MW07_BR-A_GW0004	Q4	6.11

Generally, elevated concentrations of nitrate are associated with groundwater in the overburden and upper bedrock. Elevated nitrate concentrations were also found in the upper bedrock on two dates at MW02 (MW02_BR-C_GW0001 and MW02_BR-C_GW0002).

Elevated nitrate concentrations were also found in the deep bedrock at MW-07(SB_MW07_BR-A_GW0001, SB_MW07_BR-A_GW0003, SB_, and SB_MW07_BR-A_GW0004).

Concentration trends of major ions with respect to depth intervals and time

Chloride: In general, chloride concentrations in the monitoring wells SB_MW01, SB_MW02, SB_MW03 and SB_MW04 for all depth intervals, were below 10 mg/L, and no trend changes with depth were noted for these wells. Other wells showed variations in concentration with depth. At monitoring well SB_MW05, chloride concentration increased between the overburden interval and bedrock interval A. For the monitoring well location SB_MW06, an increasing trend in chloride concentration was observed from the overburden interval to bedrock interval B; however, bedrock well interval A had lower concentrations of chloride. In contrast, the highest concentration of chloride was observed in the overburden interval at the SB_MW07, whereas lower concentrations were observed at the deeper depths within the bedrock aquifer. The concentrations of chloride remained consistent for observations across all the field events of 2022.

Sodium: Like chloride concentrations, sodium concentrations were in general higher in monitoring wells SB_MW05, SB_MW06, and SB_MW07 for all intervals. In monitoring well SB_MW05, chloride concentrations increased between the overburden interval and bedrock interval A. Like the trend observed for chloride, the monitoring well location SB_MW06 showed an increasing trend in sodium concentrations from the overburden interval to bedrock interval B, whereas, the bedrock interval A had lower concentrations of sodium. In contrast, the highest concentration of sodium was observed in the overburden interval at the monitoring well SB_MW07, whereas lower concentrations were observed at the deeper intervals within the bedrock aquifer. The concentrations of sodium also remained consistent for observations across all the field events of 2022.

Sulphate: Sulphate concentrations increased from the overburden interval to the deepest bedrock interval (A) at monitoring well locations SB_MW02, SB_MW04, and SB_MW05. Like the trend observed for chloride and sulphate, the monitoring well location SB_MW06 showed increasing sulphate concentrations from the overburden interval to the bedrock interval B, whereas, the bedrock interval A had lower concentrations of sulphate. In general, sulphate concentrations were higher in the bedrock intervals (at levels of few hundred milligrams) in contrast to the overburden interval (less than 100 mg/L). The concentrations of sulphate remained consistent for observations across all the field events of 2022.

Calcium and Magnesium: No specific trends of concentrations were observed for calcium and magnesium concentrations at the South Bruce Site. The calcium and magnesium concentrations are typical for the limestone bedrock formation. The concentrations of both calcium and magnesium remained consistent for observations across all the field events of 2022.

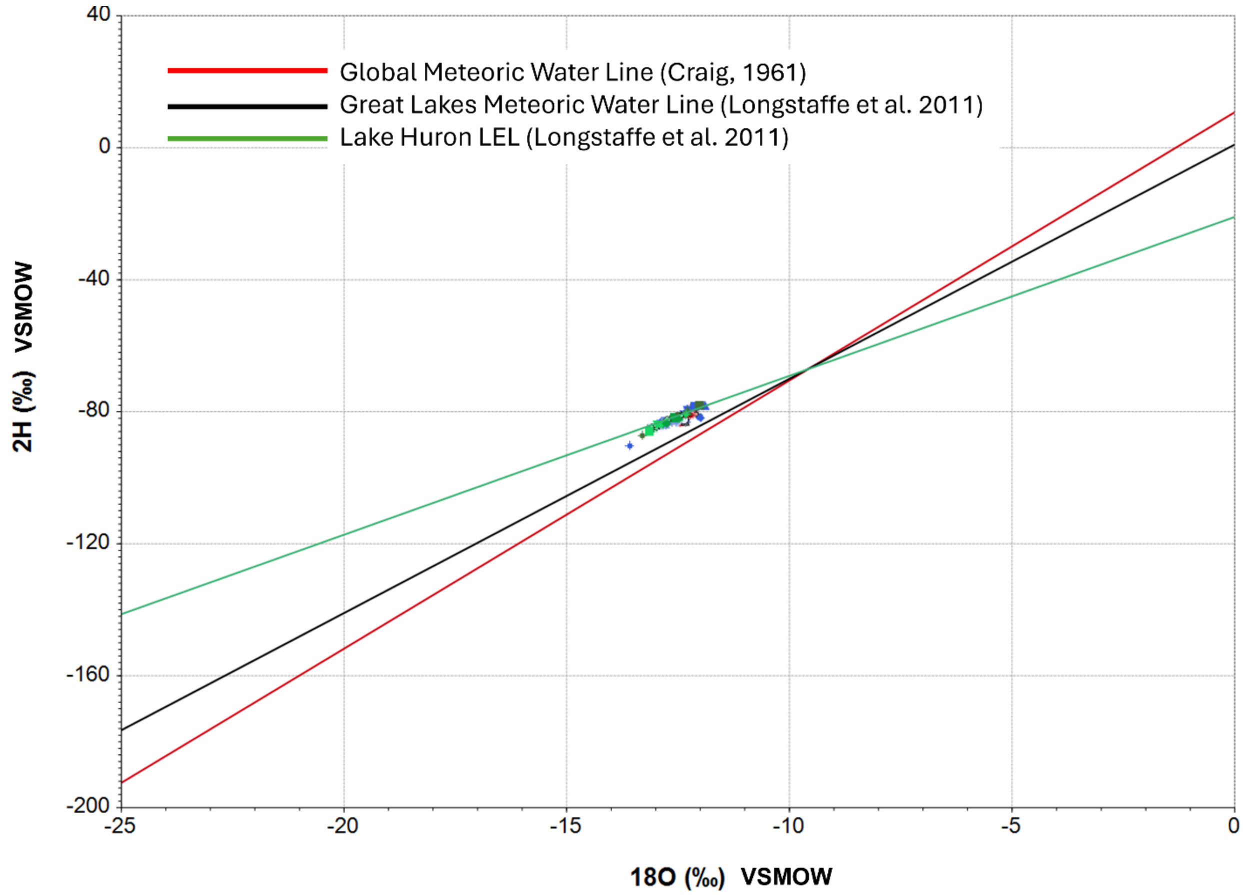
Quarterly Isotope Analysis

Oxygen-18 ($\delta^{18}O$) and Deuterium ($\delta^{2}D$)

Isotope parameters Oxygen-18 ($\delta^{18}O$) and Deuterium ($\delta^{2}D$), O-18 and H2 isotopes in water serve as valuable indicators in hydrology. The ratio of O-18 to O-16 can provide insights into temperature variations during water formation, while H2 isotopes can indicate the water source and its geographical origin. Analyzing these isotopes aids in understanding hydrological cycles, climate patterns, and tracing water movement in ecosystems and aquifers. O-18 and H2 samples were collected during quarterly sample events from all the wells, for a total of 57 samples collected, not including any QA/QC samples (i.e. duplicates or blanks).

The 2022 data is presented on Figure 9 relative to the Great Lakes Meteoric Water Line (GLMWL) ($\delta^{2}H=7.1*\delta^{18}O+1.0$; (Longstaffe et al., 2011)), the Global Meteoric Water Line (GMWL, $\delta^{2}H=8.13*\delta^{18}O+10.8$; (Craig, 1961)) and the Lake Huron Local Evaporation Line ($\delta^{2}H=4.8*\delta^{18}O - 20.9$) ; Longstaffe et al., 2011), for comparison purposes. The GLMWL is a local meteoric water line, comprised of samples taken on a more frequent basis specifically in the region of the Great Lakes, and is helpful for interpreting local water movements, water sources, and evaporative/precipitation processes these waters have undergone, over and above the coarser resolution the GMWL provides. Moreover, the Lake Huron LEL is helpful to understand more specifically the evaporation processes that have occurred in the various water sources being analysed isotopically, and local to the region of Lake Huron, where the South Bruce project site is located. This LEL is a regression line through isotopic compositions of evaporating surface waters, specific to the region of Lake Huron.

FIGURE 9: SHALLOW GROUNDWATER δ^2H VS $\delta^{18}O$



The 18O and 2H groundwater isotope data collected at the South Bruce project site reflects local meteoric precipitation source (Figure 9). Portions of the data cluster slightly below the Lake Huron LEL, and plot more closely to (but above) the GLMWL, however the interpretation remains that the 18O and 2H groundwater signature, when analysed in this manner, reflects normal meteoric precipitation of the region.

Annual Isotope Analysis

A summary of the 2022 annual isotope analytical results is provided on Table 9 below. Environmental isotope analysis was planned to be completed once in 2022 at two preselected sites, those being nested wells at SB_MW06 and SB_MW07. This information would be used for baselining the shallow groundwater geochemistry. However, there are a few points to highlight regarding the completeness of the 2022 dataset and changes that were made late in 2022 that would only be reflected in the second year of environmental isotope sampling, planned for Q2-2023.

Incomplete Data

The original plan was to analyze groundwater samples for the entire suite of environmental isotopes shown on Table 2 once per year. However, due to a laboratory non-conformance, the laboratory responsible to perform the analysis did not perform the analysis on the samples before they were disposed of. Therefore, to fulfill the annual isotope analysis package, carbon-13 of DIC and Chlorine-37 and the strontium 87Sr/87Sr ratio were completed in Q4 because these parameters were not analysed with the original samples submitted during Q3(July).

TABLE 9: ANNUALLY COLLECTED ISOTOPE RESULTS

Sample ID	Quarter Sample Collected	Gross Alpha (Bq/L)	Gross Beta (Bq/L)	Tritium (^3H) Bq/L	Carbon-13 of DIC (d13C-DIC) per mil VPDB	Carbon-14 of DIC (^{14}C-DIC) Bq/L	Chlorine-37 (d37Cl) per mil SMOC	Strontium Isotope Ratio ($^{87}Sr/^{86}Sr$)
SB_MW06_BR-A_GW0001	Q3-July	0.061	<0.061	<14	-	<7.0	-	-
SB_MW06_BR-B_GW0001	Q3-July	0.94	0.61	<14	-	<6.8	-	-
SB_MW06_BR-C_GW0001	Q3-July	0.37	0.14	<14	-	<7.0	-	-
SB_MW06_OB-INT_GW0001	Q3-July	<0.88	1.1 (1)	<14	-	<6.7	-	-
SB_MW07_BR-A_GW0001	Q3-July	0.34	<0.10	<14	-	<6.9	-	-
SB_MW07_BR-A_GW0004	Q4	-	-	-	-11.35	-	0.33	0.708153
SB_MW07_BR-B_GW0001	Q3-July	0.78	0.28	<14	-	<6.8	-	-
SB_MW07_BR-B_GW0004	Q4	-	-	-	-12.18	-	0.37	0.708222
SB_MW07_BR-C_GW0001	Q3-July	0.83	0.39	<14	-	<6.8	-	-
SB_MW07_BR-C_GW0003	Q4	-	-	-	-12.07	-	0.47	0.707933
SB_MW07_OB-INT_GW0001	Q3-July	0.43	<0.41	<14	-	<6.7	-	-
SB_MW07_OB-INT_GW0003	Q4	-	-	-	-13.99	-	0.37	0.708939

Note: (1) Detection limit was raised due to high TDS

During 2022, a change was also made to better define the isotope analyses for tritium and carbon-13/carbon-14 of DIC, to ensure analyses were completed using the required specific testing methodology, detection limits, and units. These changes will be reflected in the 2023 sample event for the annual isotope analysis.

Gross Alpha/Beta

Radionuclides are found in the environment as naturally occurring elements and as products or by-products of nuclear technologies. Gross alpha and gross beta determination is an initial screening for the presence of radioactivity, and the procedures used to analyze the samples are not the same procedures used to determine the identity of the contributing radionuclides. To help with a relative comparison of the presence of radionuclides in groundwater at the study site, it is important to know that the recommended screening values for gross alpha and gross beta activity have been set at 0.5 Bq/L and 1 Bq/L, respectively by Health Canada Canadian Drinking Water Quality Guidelines (HC-CDWQG). Using the HC-CDWQG, there were several samples with gross alpha activity that is greater than the screening level of 0.5 Bq/L, measured in samples SB_MW06_BR-B_GW0001, SB_MW06_OB-INT_GW0001, SB_MW07_BR-B_GW0001 and SB_MW07_BR-C_GW0001 of 0.94 Bq/L, <0.88 Bq/L, 0.78 Bq/L and 0.83 Bq/L, respectively. One sample, SB_MW06_OB-INT_GW0001 had gross beta activity measurement of 1.1 Bq/L, which is slightly above the HC-CDWQG recommended screening level of 1.0 Bq/L. It is important to note that sample SB_MW06_OB-INT_GW0001 had the minimum detection limit raised by the laboratory due to sample matrix (e.g., high TDS), which was above the recommended HC-CDWQG, for both the gross alpha and gross beta measurements. This could be a source of error in the results and may not be representative of the naturally occurring radionuclides.

Tritium (^{3}H) and Carbon-14 (^{14}C)

Tritium and Carbon-14 are naturally occurring radionuclides at very low levels and contribute to natural radioactivity exposure to Canadians. However, these radionuclides have been introduced in greater concentrations into the global environment via the use and expansion of nuclear technologies over the past 60 years, and in particular due to nuclear weapon testing prior to 1963. Therefore, tritium as an example, is an important parameter to measure and baseline, because its presence and concentration provides insight to the relative “age” or atmospheric interconnection/origin of a groundwater sample, depending on its origin and exposure within the hydrological system prior to, or during activities that occurred globally related to the nuclear industry.

Again, Health Canada has a recommended Maximum Allowable Concentration (MAC) in water for Tritium of 7000 Bq/L. All of the samples submitted for analysis had reported concentrations of <14 Bq/L, far below the HC-CDWQG MAC. The detection limit for 2023 tritium analysis will be significantly lower so that a more detailed assessment can be made.

For comparison purposes, Health Canada has a recommended screening level concentration for Carbon-14 in water of 200 Bq/L. For purpose of baseline data collection, the concentrations of ^{14}C in groundwater sampled at the study site were all below the minimum detection limit, which varied from <6.7 to <7.0.

The detection limits used for the 2022 analysis of tritium and carbon-14 did not meet NWMO’s data objectives and has been corrected for the 2023 analysis, as described in Section 3.5.1. This change for 2023 data collection will allow for a more detailed analysis and interpretation of these analytical results, as they become available and are analysed within the 2023 dataset.

Chlorine Isotope (δ^{37}Cl)

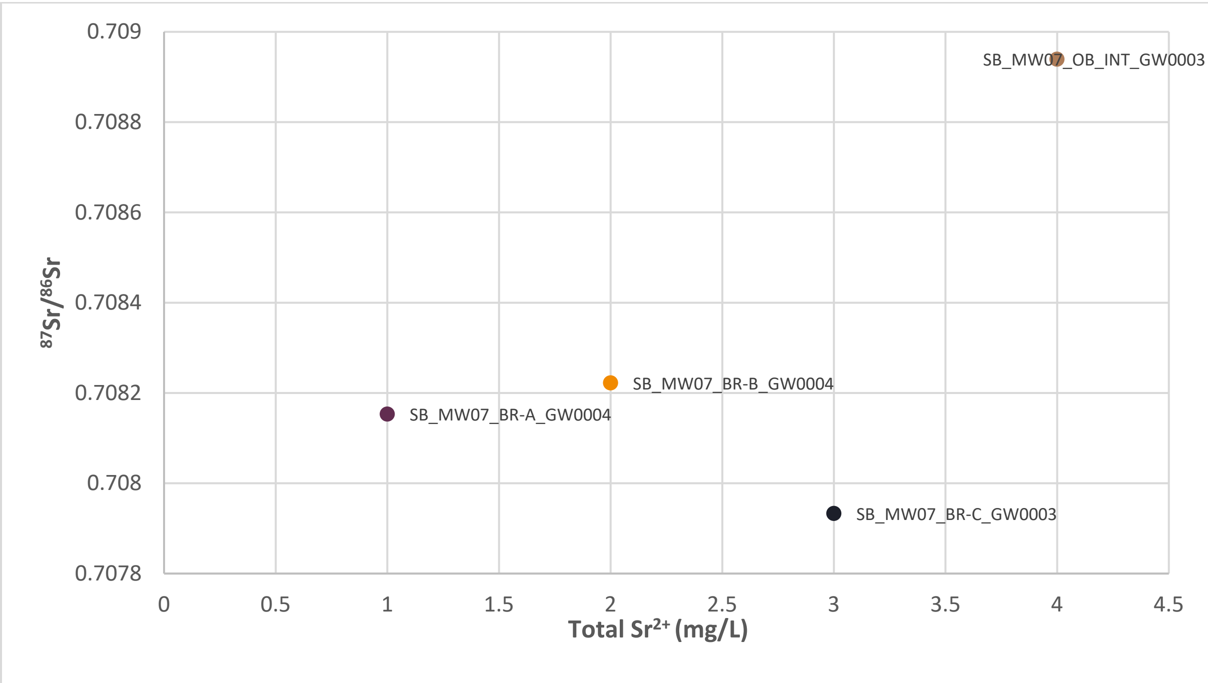
The stable isotope of Chlorine (Cl) has been used to estimate the origin of salts and fluids which help in characterization of groundwater. The δ^{37}Cl results ranged from a low of 0.33‰ in SB_MW07_BR-A_GW0004 monitoring the limestone bedrock of the Amherstburg Formation, to a high of 0.47‰ in the SB_MW07_BR-C_GW0003 monitoring the carbonate limestone Lucas Formation.

Strontium Isotope Ratio ^{87}Sr/^{86}Sr

The ^{87}Sr/^{86}Sr ratio reflects the source of Sr in the rock and water. The present ^{87}Sr/^{86}Sr ratio in seawater is a relatively constant value of 0.709 (Qing et al. 1998). The Upper Devonian (Lucas and Amherstburg Formations) strontium isotope curve varies according to Qing et al. 1998, between 0.7077 and 0.7087.

Four samples have an overall variation in ^{87}Sr/^{86}Sr with a low of 0.707933 in the Lucas Formation bedrock well SB_MW07_BR-C and a high of 0.708939 in the overburden well SB_MW07-INT. Notably, the strontium isotope ratio differs by very little <0.00006 in the groundwater of the deeper Amherstburg Formation. These Strontium isotope ratios are within the typical range for groundwater from the Lucas and Amherstburg formations.

FIGURE 10: STRONTIUM ISOTOPIC RATIOS VS. TOTAL SR^{2+} CONCENTRATIONS



5.0 SUMMARY

The NWMO Groundwater Monitoring of Shallow Well Network study objective at the South Bruce site was to measure groundwater pressures and temperatures on a quarterly basis, from the installed dataloggers, and to collect groundwater samples for their chemical analyses. This information is collected to allow NWMO to evaluate the shallow groundwater system behavior and geochemical characteristics.

The field work for the South Bruce Site started in 2022 at the beginning of the third quarter (Q3-July), followed by field events in Q3-September and Q4-December 2022. Each groundwater monitoring and sampling event in 2022 involved the collection of groundwater pressure measurements and baseline groundwater samples from a selection of the 26 permanently installed shallow groundwater monitoring wells. The quarterly groundwater quality testing included the analysis of parameters including dissolved metals, routine parameters (such as Br, F, Cl, SiO_2, electrical conductivity, alkalinity etc.) nutrients, iodide, stable isotopes of oxygen and hydrogen ($\delta^{18}O$ and $\delta^{2}H$). An annual sample from two shallow groundwater monitoring well sites was collected and analyzed for dissolved ruthenium and other specialized radioactive isotopes such as oxygen-18, deuterium, tritium, carbon-14, chlorine-37 and strontium ratio Sr^{87}/Sr^{86}.

The predominant groundwater type at the South Bruce Site is calcium-magnesium-bicarbonate (Ca-Mg-HCO_3) however, elevated concentrations of chloride and sulphate ions were also detected in several samples analysed in 2022. The samples characterized by Ca-Mg-HCO_3 water type were from all depth intervals at the Site including the overburden (OB), Lucas Formation (dolostone) – (Interval C), Amherstburg Formation (limestone) – (Interval B), and Bois Blanc (limestone) Formation – (Interval A). The second most observed water type is Ca-Mg- SO4- HCO3 due to sulphate (SO4) ions being more prevalent than bicarbonate ions. This water type was observed in samples collected from the bedrock intervals at SB_MW04. No consistent trends of concentration changes with time were observed for major ions in samples collected at the South Bruce Site. Generally increasing concentrations of major ions were seen with increasing depth at two locations: monitoring well location SB_MW05, where chloride and sodium concentrations increased from the overburden interval to the deepest bedrock interval A; and monitoring well location SB_MW06 where chloride, sodium and sulphate increased from the overburden interval to bedrock interval B (however, the deepest bedrock interval A had lower concentrations of these ions). In contrast, decreasing chloride and sodium concentrations were seen at monitoring well location SB_MW07 where the highest concentrations of chloride and sodium were observed in the overburden interval, whereas lower concentrations were observed at the deeper bedrock intervals (i.e. A and B). The concentrations of all major ions remained consistent for observations across all the field events of 2022.

Elevated nitrate concentrations were found in most of the overburden groundwater wells and in one upper bedrock interval (MW02) and may be due to the agricultural activities in the area surrounding the South Bruce site and region in general. Nitrate concentrations were also detected at depth in the bedrock at MW07.

Generally, oxygen-18 ($\delta^{18}O$) and deuterium ($\delta^{2}D$) isotope analyses indicated that the shallow groundwater is largely recharged from modern regional winter precipitation that is isotopically heavier relative to the GLMWL, versus precipitation originating more directly from the Great Lakes.

Other isotopes measured during 2022 including gross alpha, gross beta, tritium (^{3}H), carbon-14 (^{14}C), chlorine-37 $\delta^{37}Cl$, and strontium isotope ratio $^{87}Sr/^{86}Sr$, which were all within the expected values for groundwaters of the shallow bedrock aquifer.

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APPENDIX A

Durov Plots

DUROV PLOTS - 2022

Red symbols are for samples taken in July 2022

Overburden Interval C Interval B Interval A

Blue symbols are for samples taken in September 2022

Overburden Interval C Interval B Interval A

Green symbols are for samples taken in December 2022

Overburden Interval C Interval B Interval A

FIGURE 11: MW01 DUROV (ALL FIELD EVENTS)

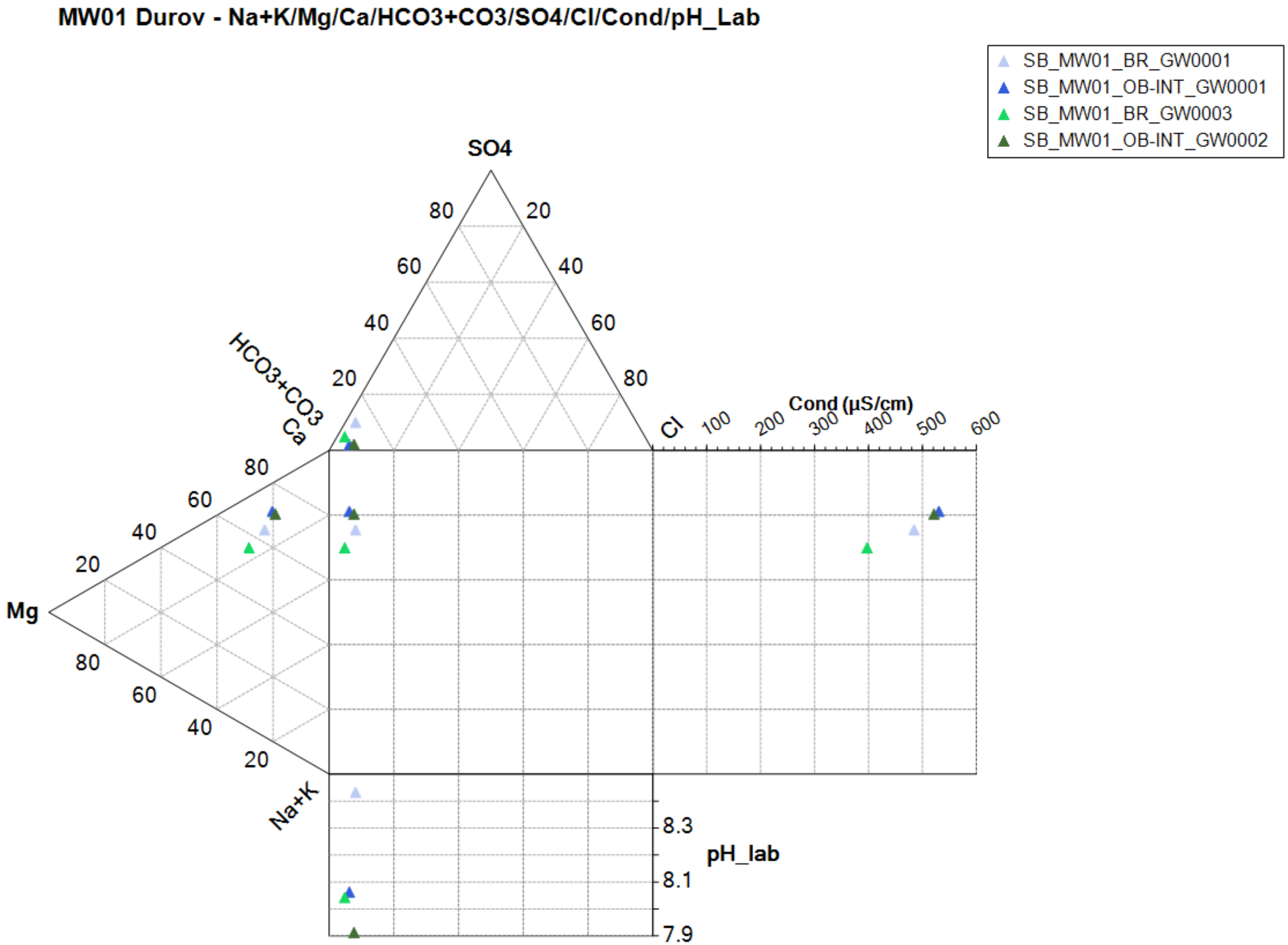


FIGURE 12: MW02 DUROV (ALL FIELD EVENTS)

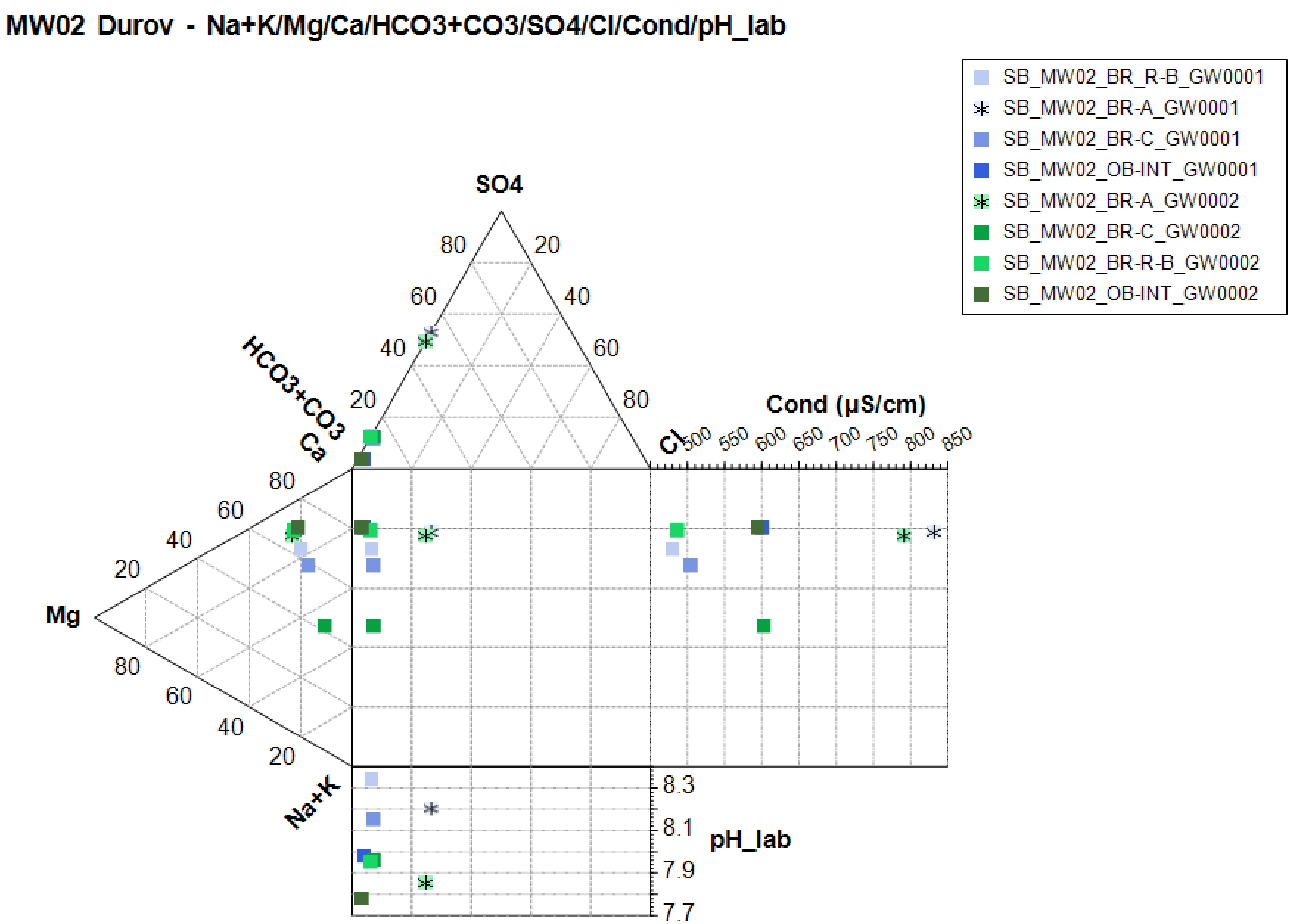


FIGURE 13: MW03 DUROV (ALL FIELD EVENTS)

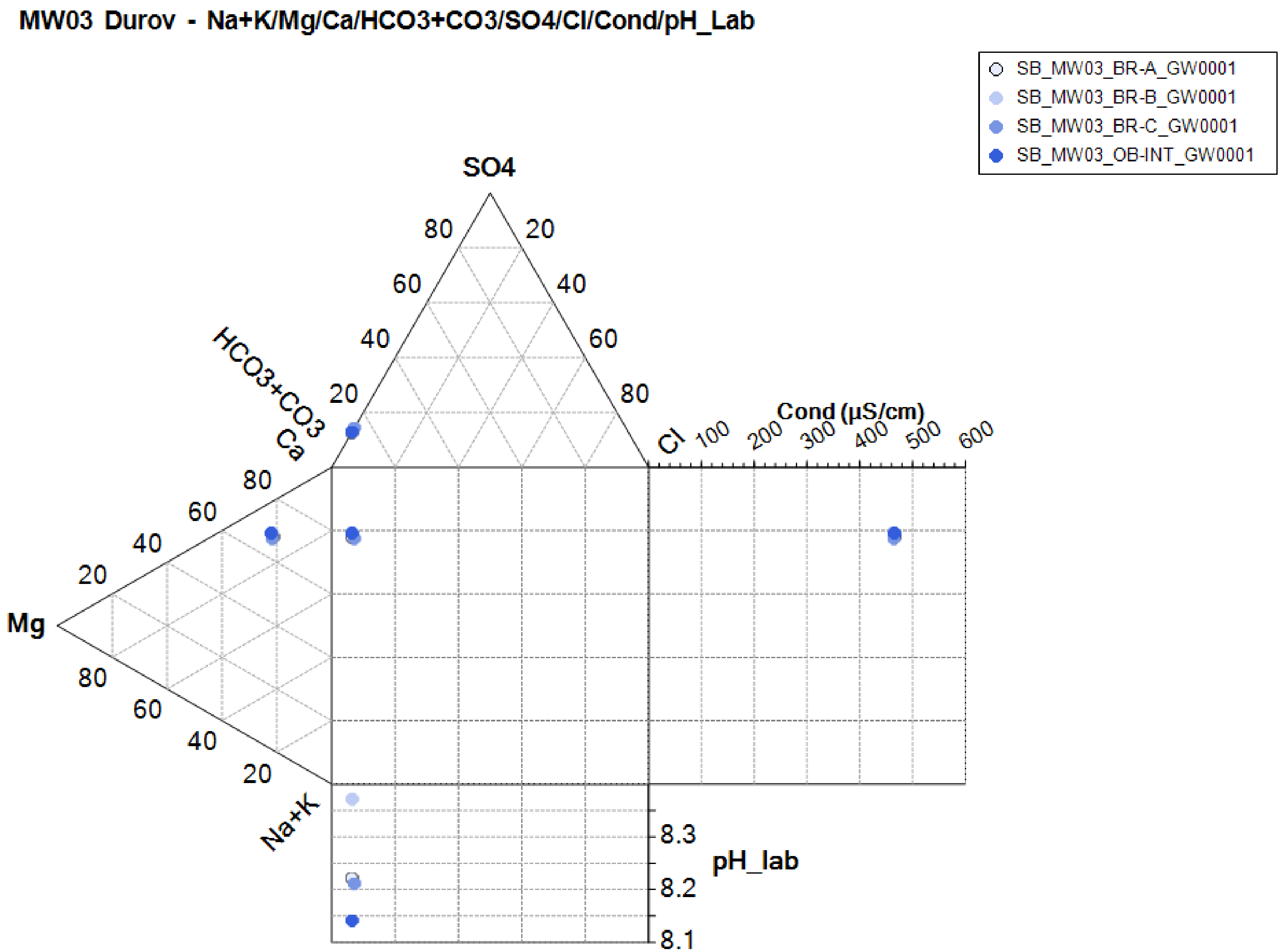


FIGURE 14: MW04 DUROV (ALL FIELD EVENTS)

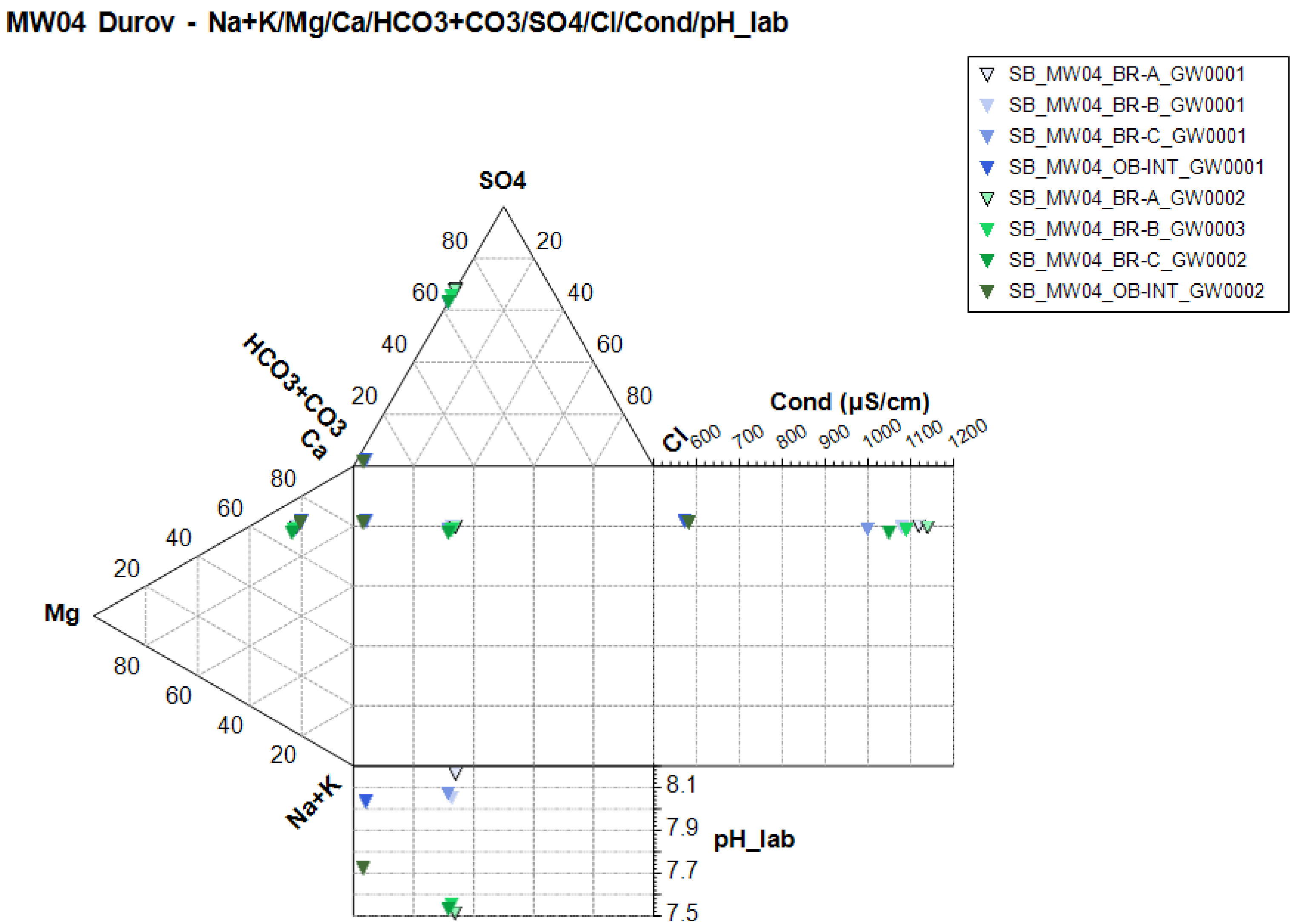
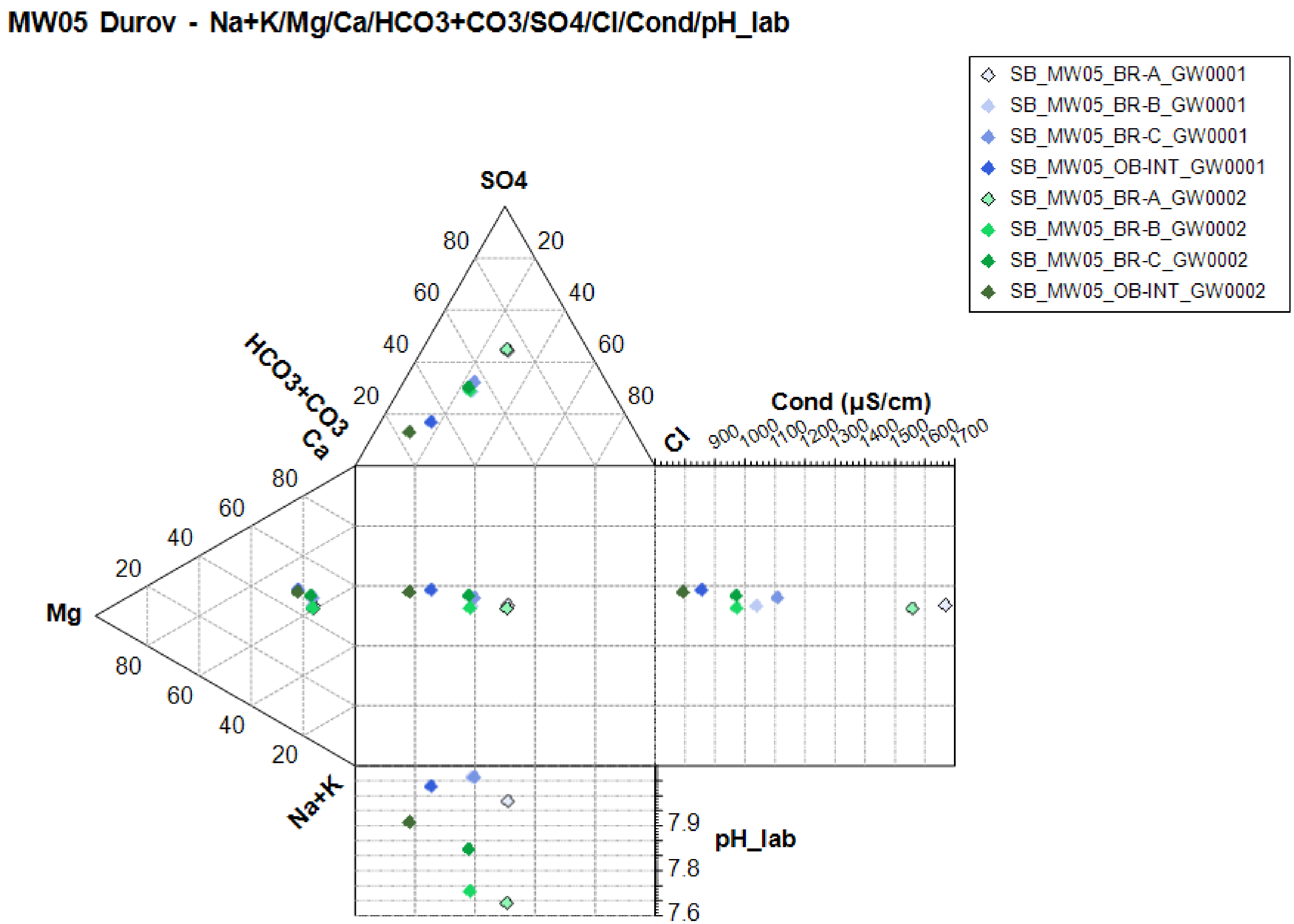


FIGURE 15: MW05 DUROV (ALL FIELD EVENTS)



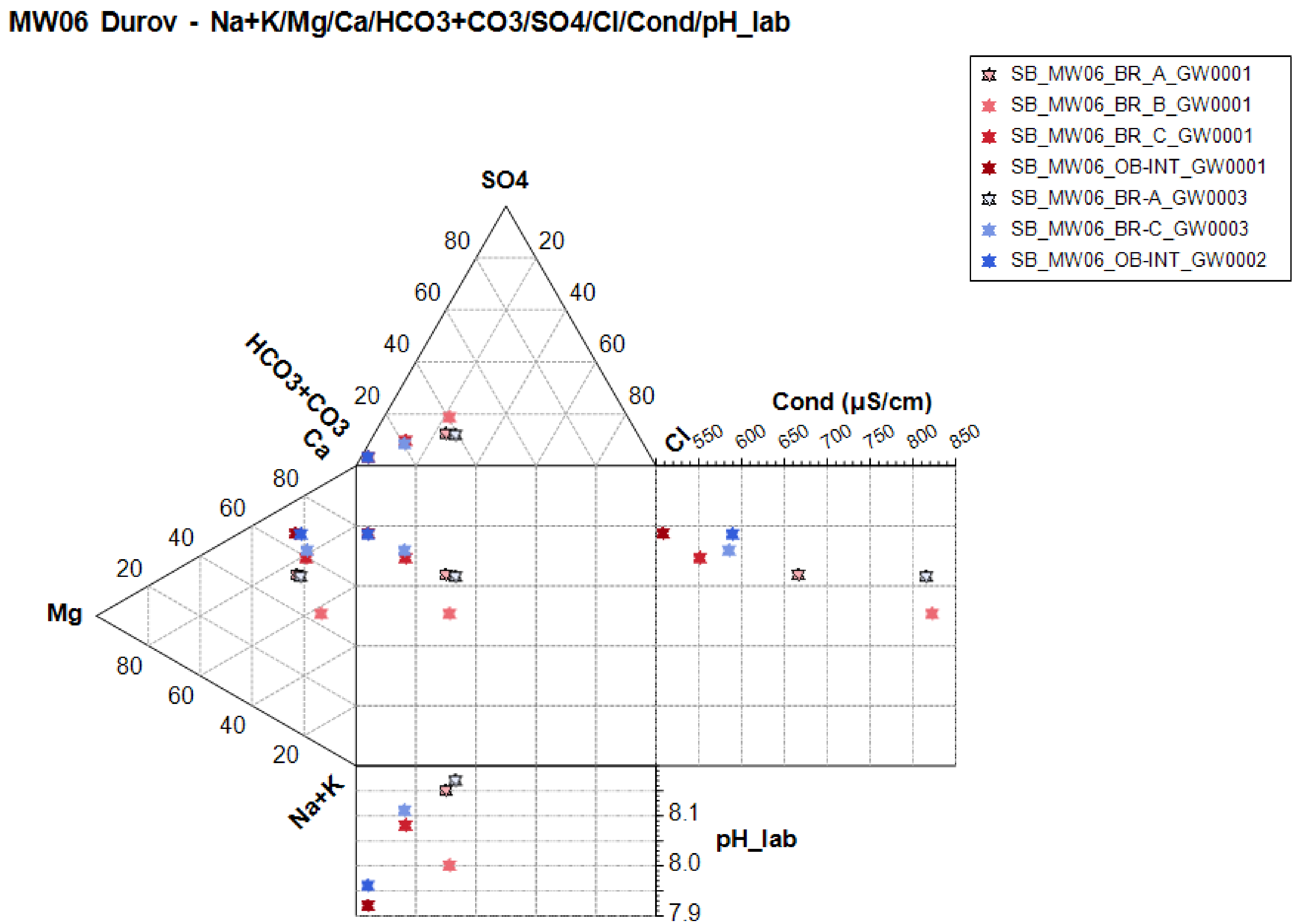

MW06 Durov - Na+K/Mg/Ca/HCO3+CO3/SO4/Cl/Cond/pH_lab
SB_MW06_BR_A_GW0001
SB_MW06_BR_B_GW0001
SB_MW06_BR_C_GW0001
SB_MW06_OB-INT_GW0001
SB_MW06_BR-A_GW0003
SB_MW06_BR-C_GW0003
SB_MW06_OB-INT_GW0002
SO4
HCO3+CO3
Ca
Mg
Na+K
Cl
Cond (µS/cm)
550 600 650 700 750 800 850
pH_lab
8.1
8.0
7.9
20 40 60 80

FIGURE 17: MW07 DUROV (ALL FIELD EVENTS)

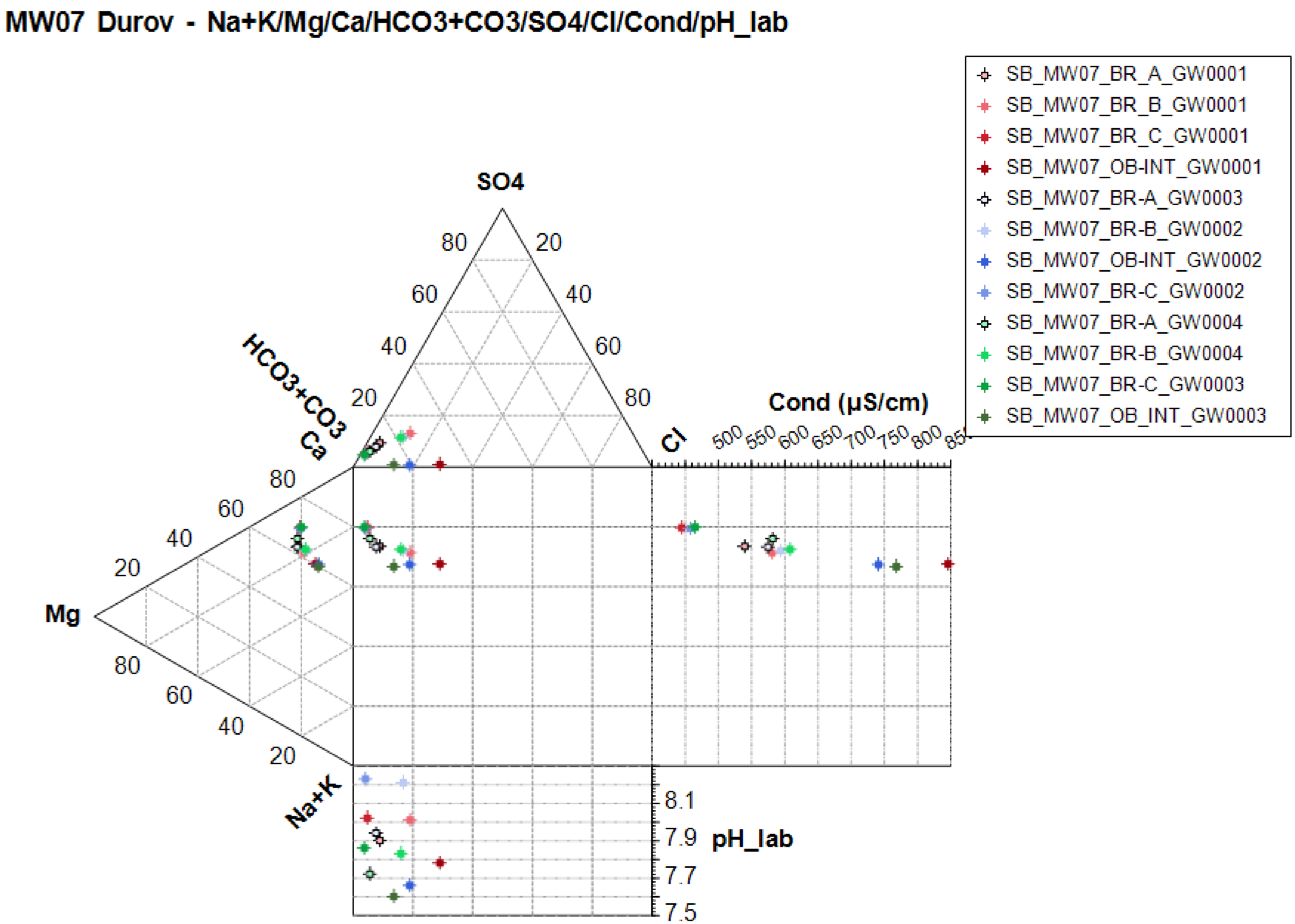


FIGURE 18: OVERBURDEN WELLS DUROV (ALL FIELD EVENTS)

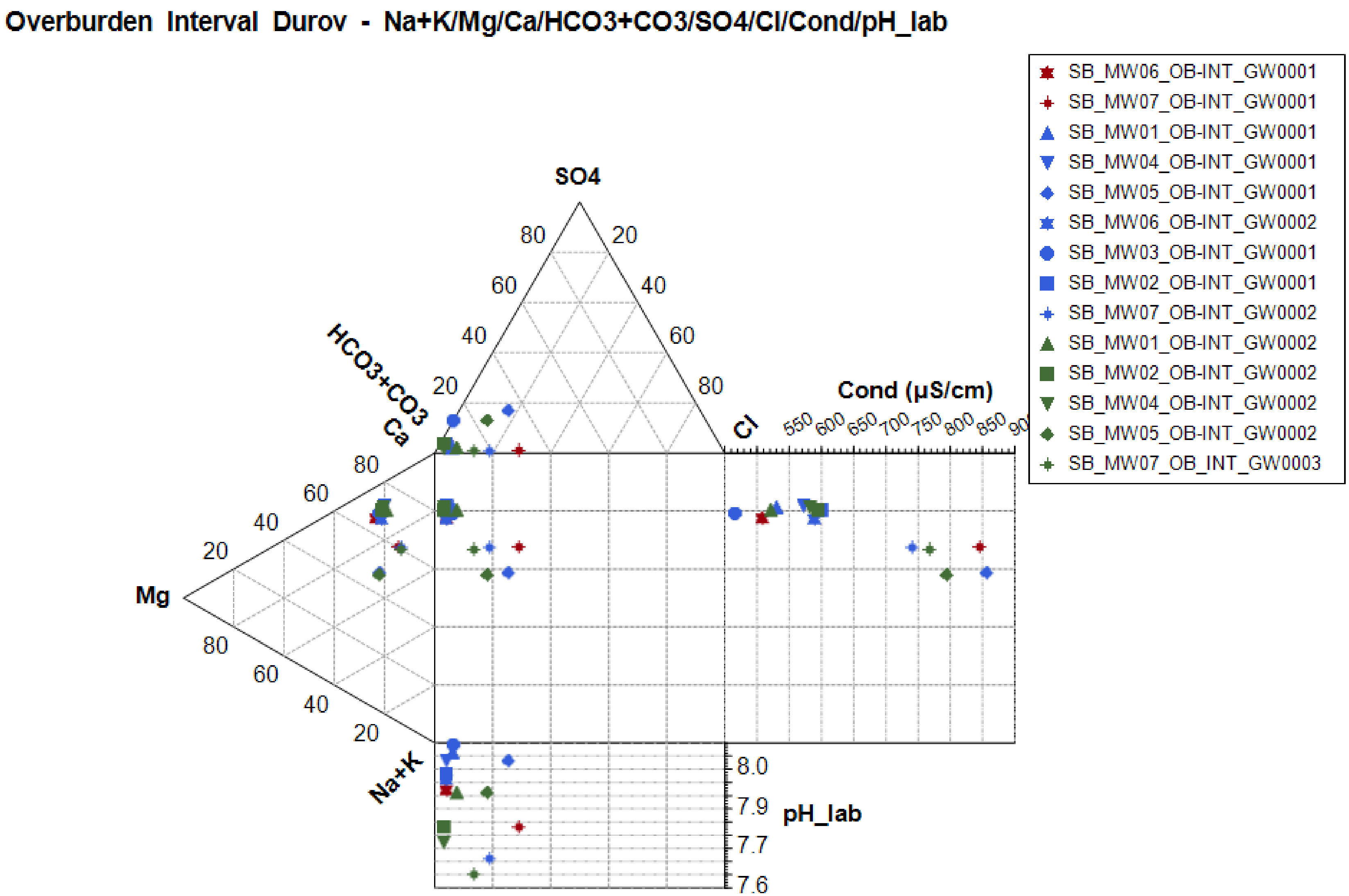
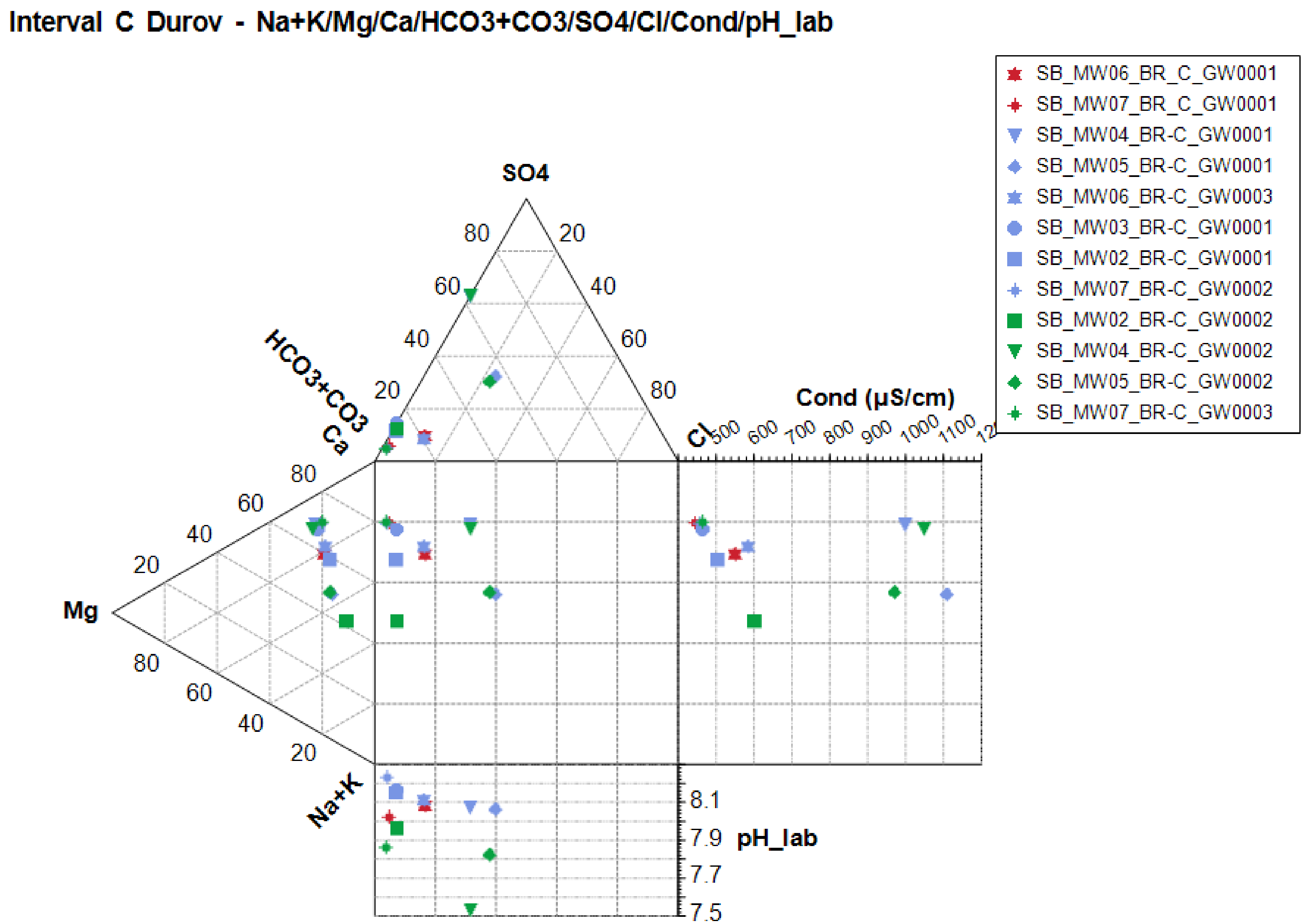


FIGURE 19: C-INTERVAL WELLS DUROV (ALL FIELD EVENTS)



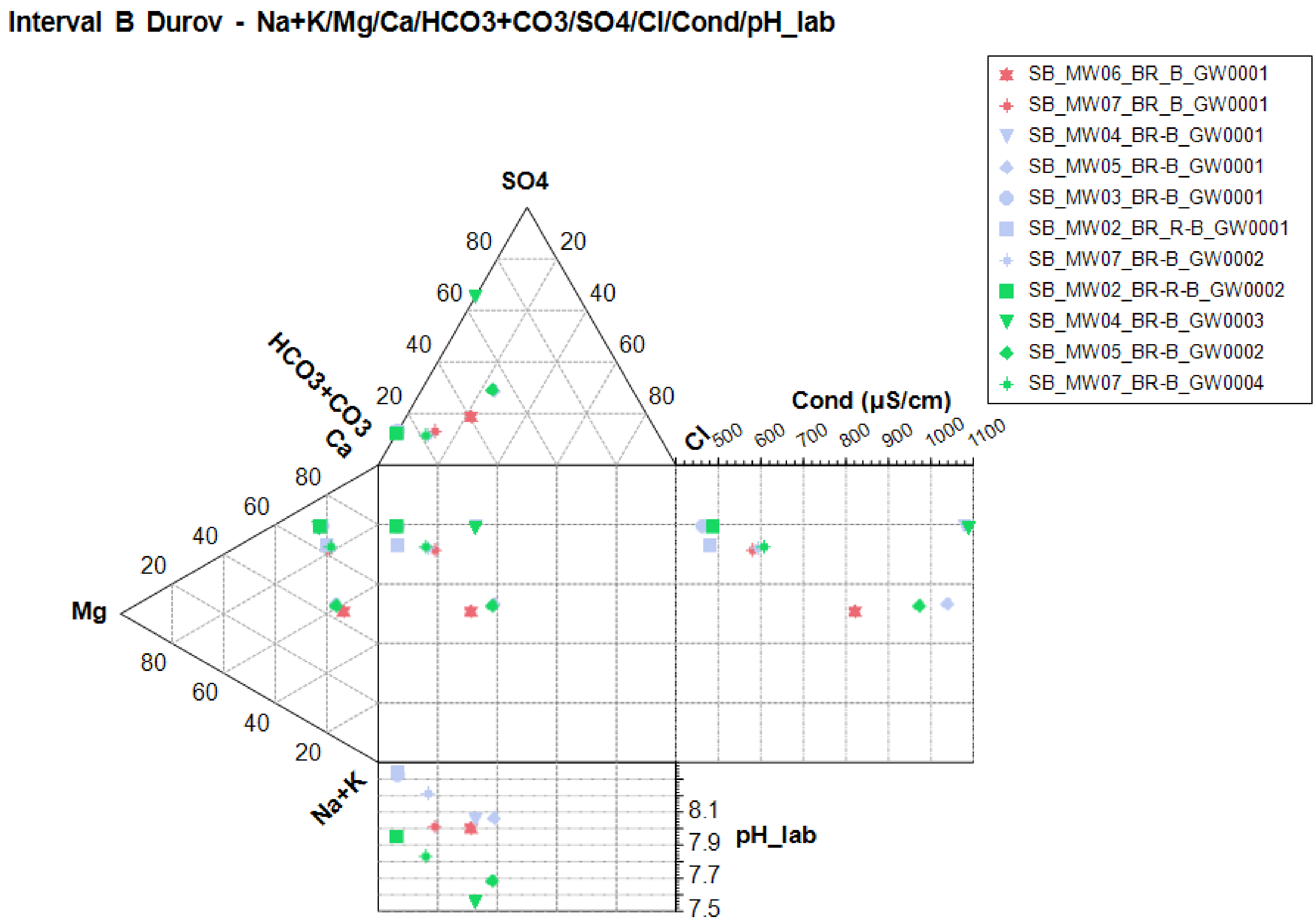

Interval B Durov - Na+K/Mg/Ca/HCO3+CO3/SO4/Cl/Cond/pH_lab
SB_MW06_BR_B_GW0001
SB_MW07_BR_B_GW0001
SB_MW04_BR-B_GW0001
SB_MW05_BR-B_GW0001
SB_MW03_BR-B_GW0001
SB_MW02_BR_R-B_GW0001
SB_MW07_BR-B_GW0002
SB_MW02_BR-R-B_GW0002
SB_MW04_BR-B_GW0003
SB_MW05_BR-B_GW0002
SB_MW07_BR-B_GW0004
SO4
HCO3+CO3
Ca
Mg
Na+K
Cl
Cond (µS/cm)
pH_lab
20
40
60
80
500
600
700
800
900
1000
1100
8.1
7.9
7.7
7.5

FIGURE 21: A-INTERVAL WELLS DUROV (ALL FIELD EVENTS)

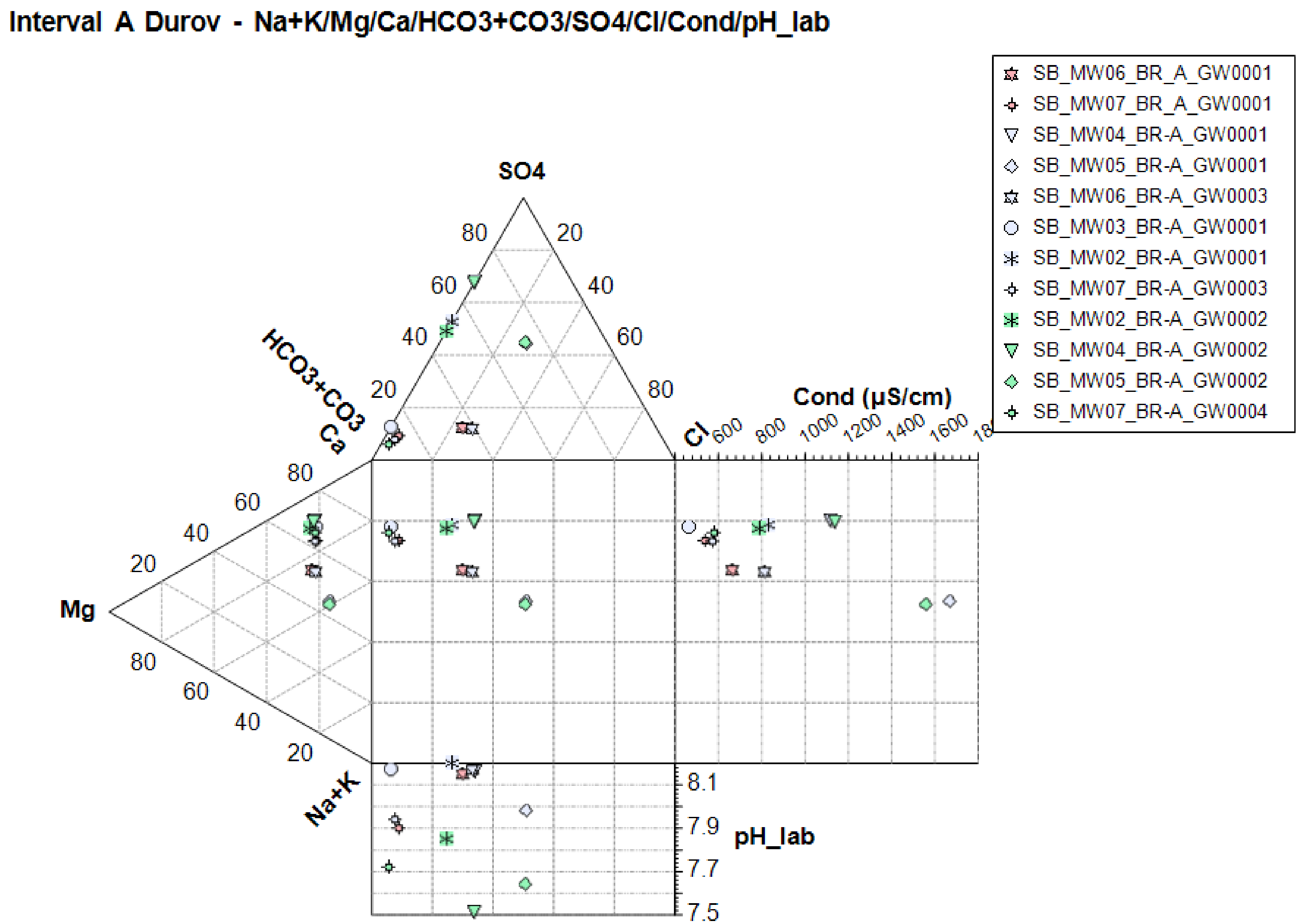
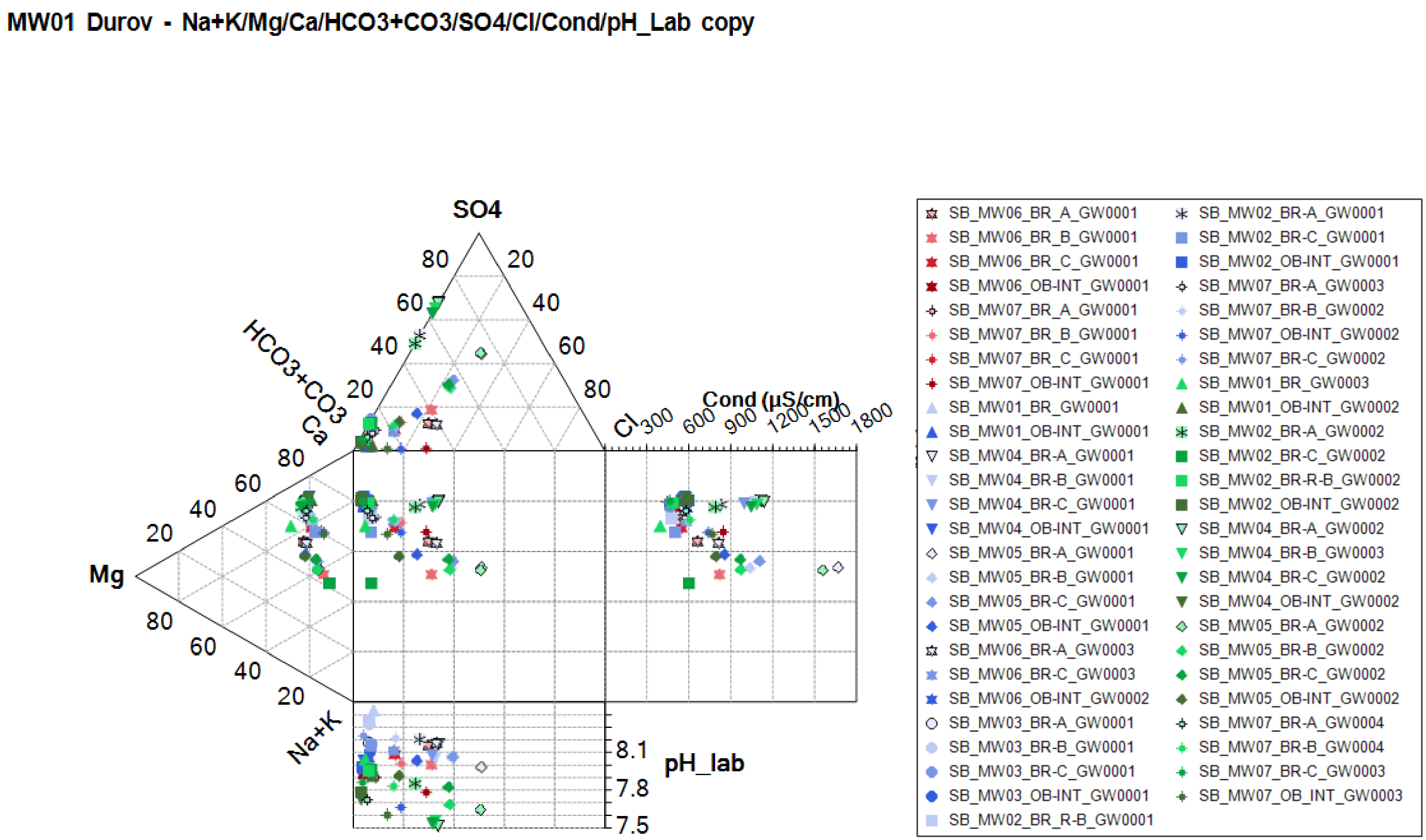


FIGURE 22: ALL WELLS DUROV (ALL FIELD EVENTS)



APPENDIX B

Stiff Diagrams

FIGURE 23: STIFF DIAGRAMS FOR WELLS SB_MW01_OB-INT, SB_MW01_BR, AND SB_MW02_OB-INT

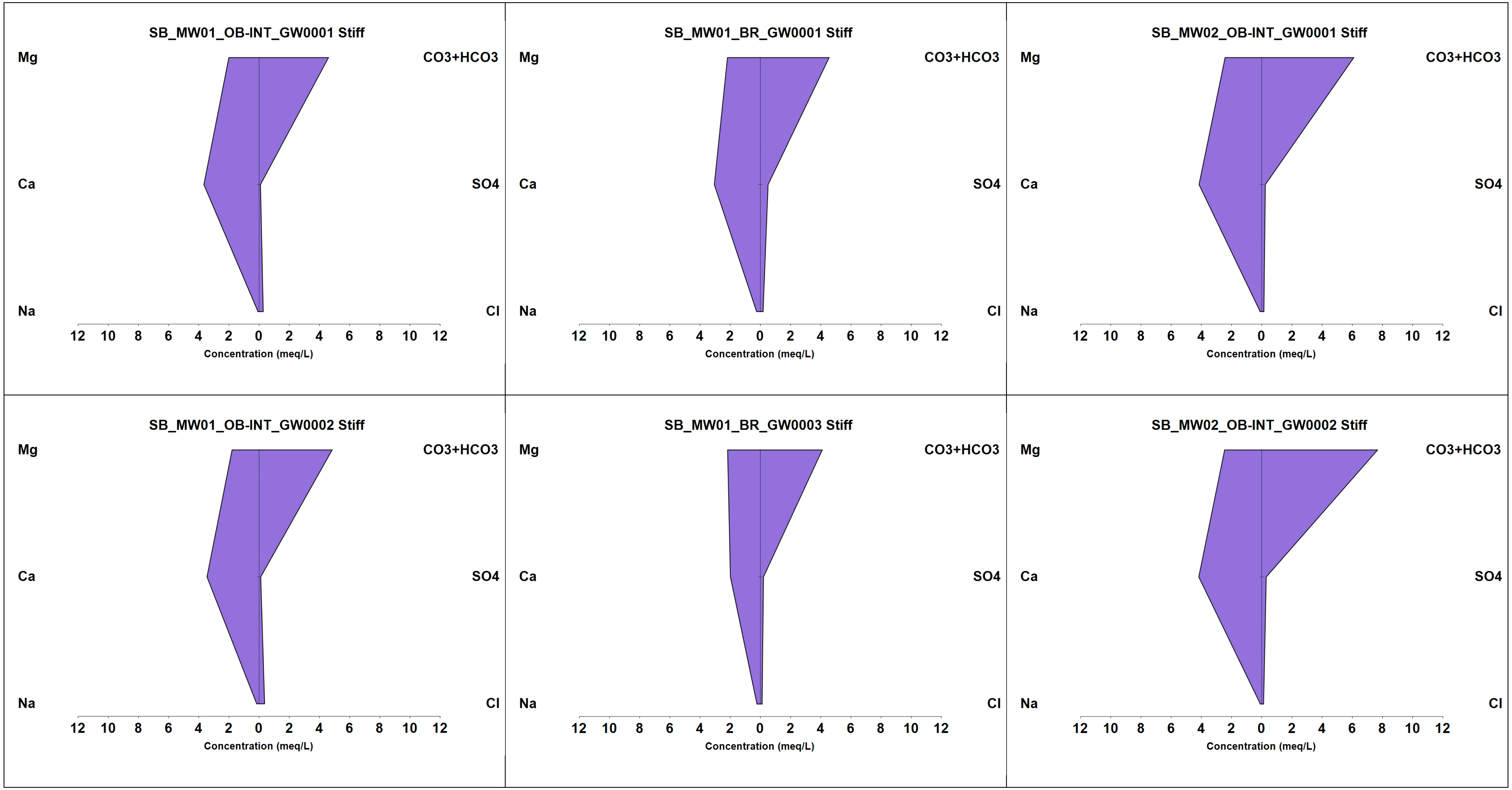


FIGURE 24: STIFF DIAGRAMS FOR WELLS SB_MW02_BR-C, SB_MW02_BR-R-B, AND SB_MW02_BR-A

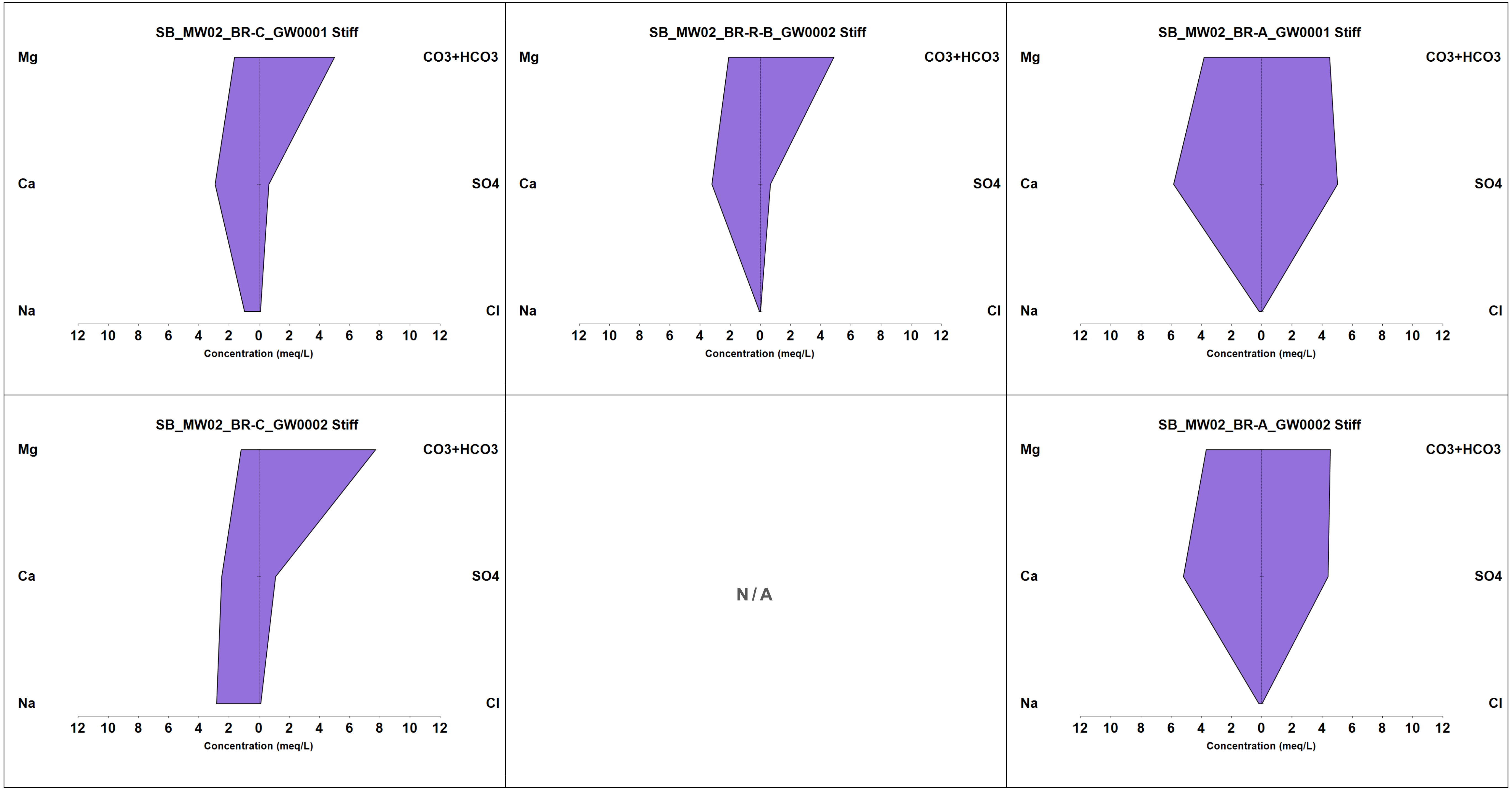
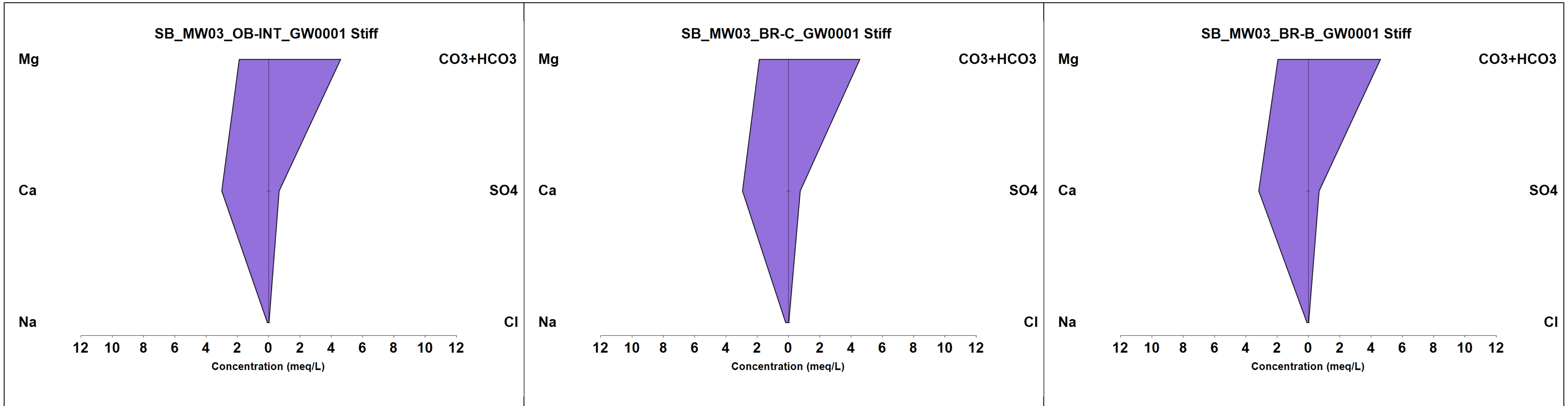


FIGURE 25: STIFF DIAGRAMS FOR WELLS SB_MW03_OB-INT, SB_MW03_BR-C, AND SB_MW03_BR-B



N/A

N/A

N/A

FIGURE 26: STIFF DIAGRAMS FOR WELLS SB_MW03_BR-A, SB_MW04_OB-INT, AND SB_MW05_BR-C

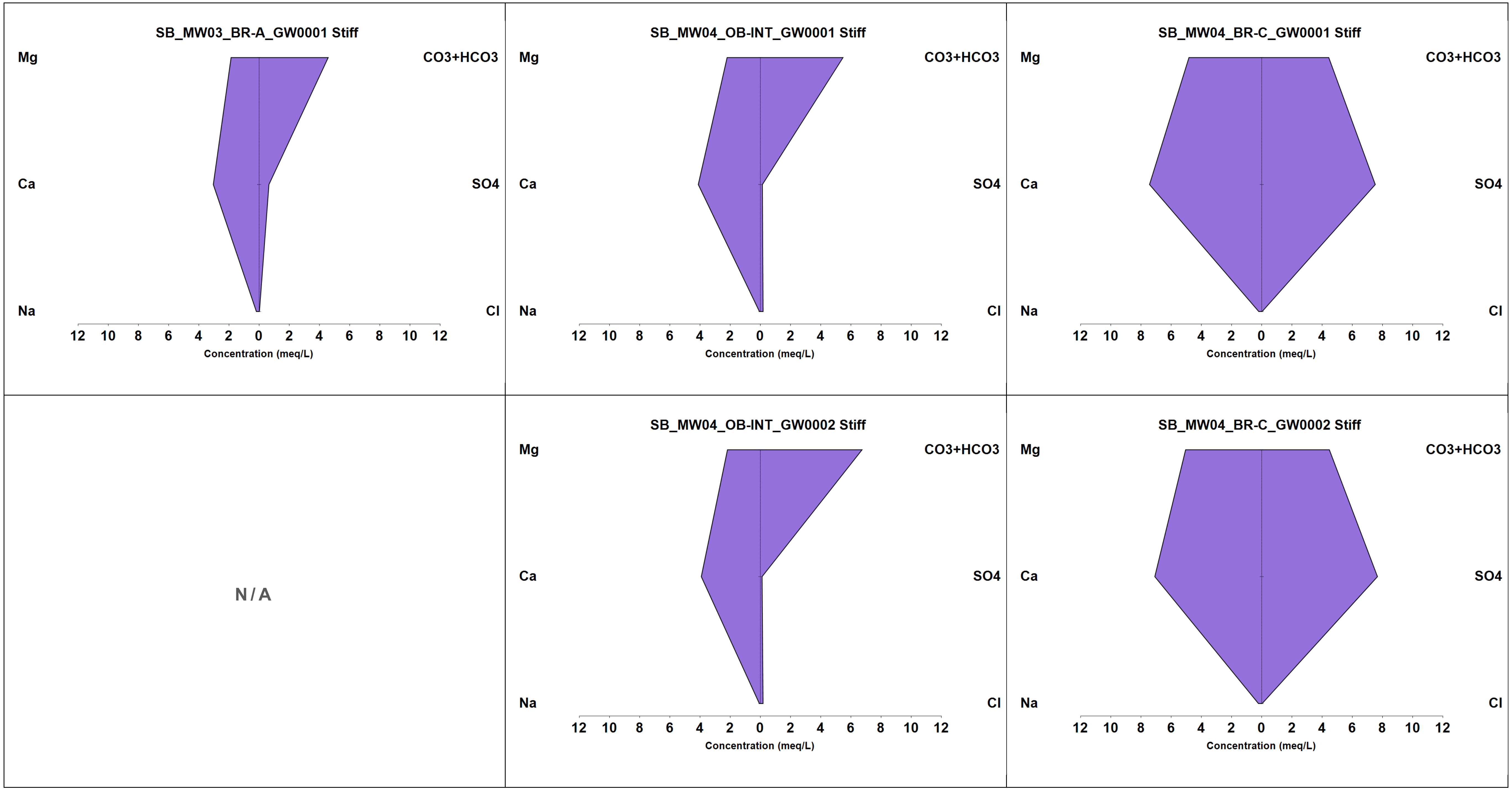


FIGURE 27: STIFF DIAGRAMS FOR WELLS SB_MW04_BR-B, SB_MW04_BR-A, AND SB_MW05_OB-INT

FIGURE 28: STIFF DIAGRAMS FOR WELLS SB_MW05_BR-C, SB_MW05_BR-B, AND SB_MW05_BR-A

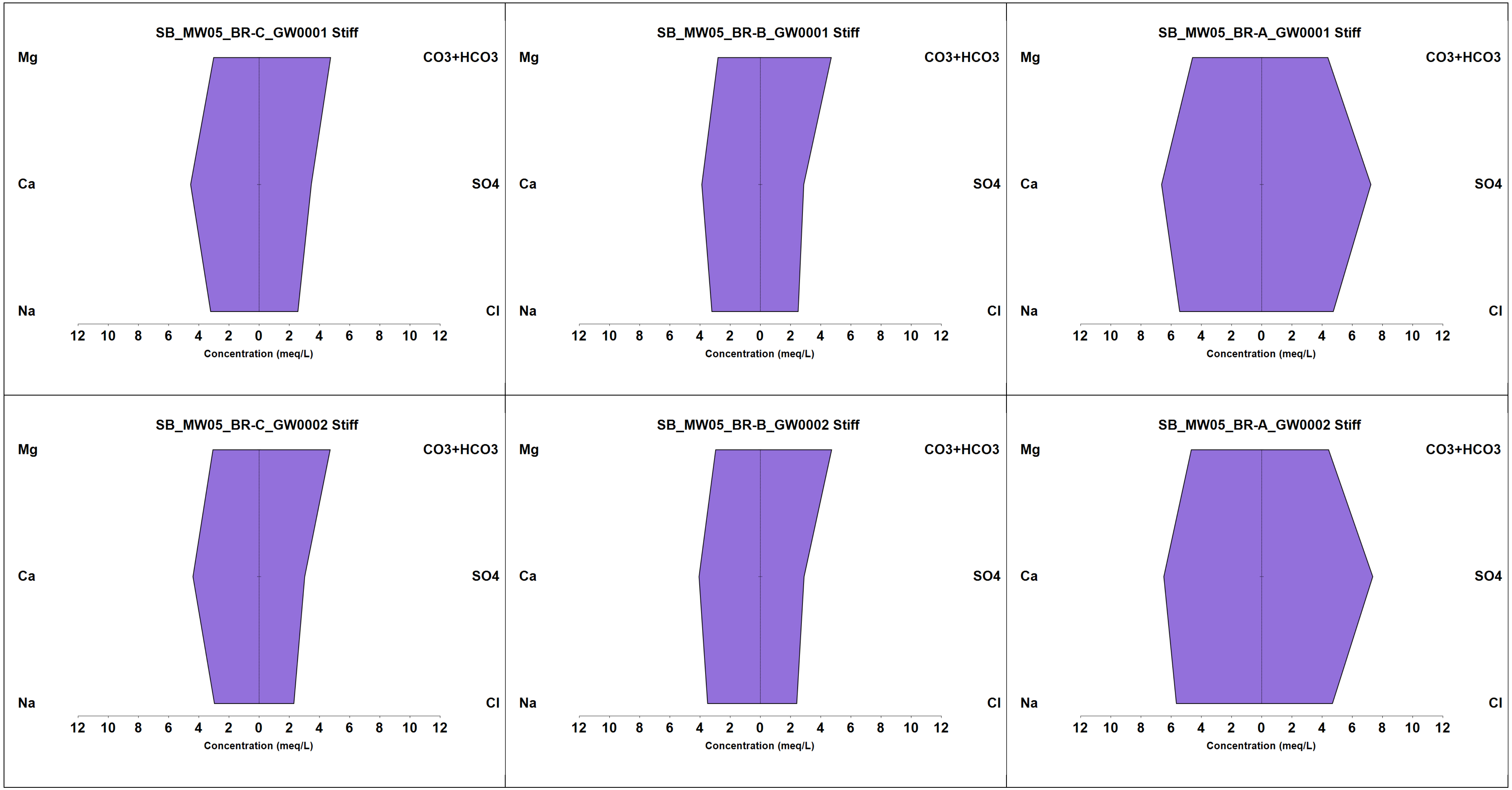


FIGURE 29: STIFF DIAGRAMS FOR WELLS SB_MW06_OB-INT, SB_MW06_BR-C, AND SB_MW06_BR-B

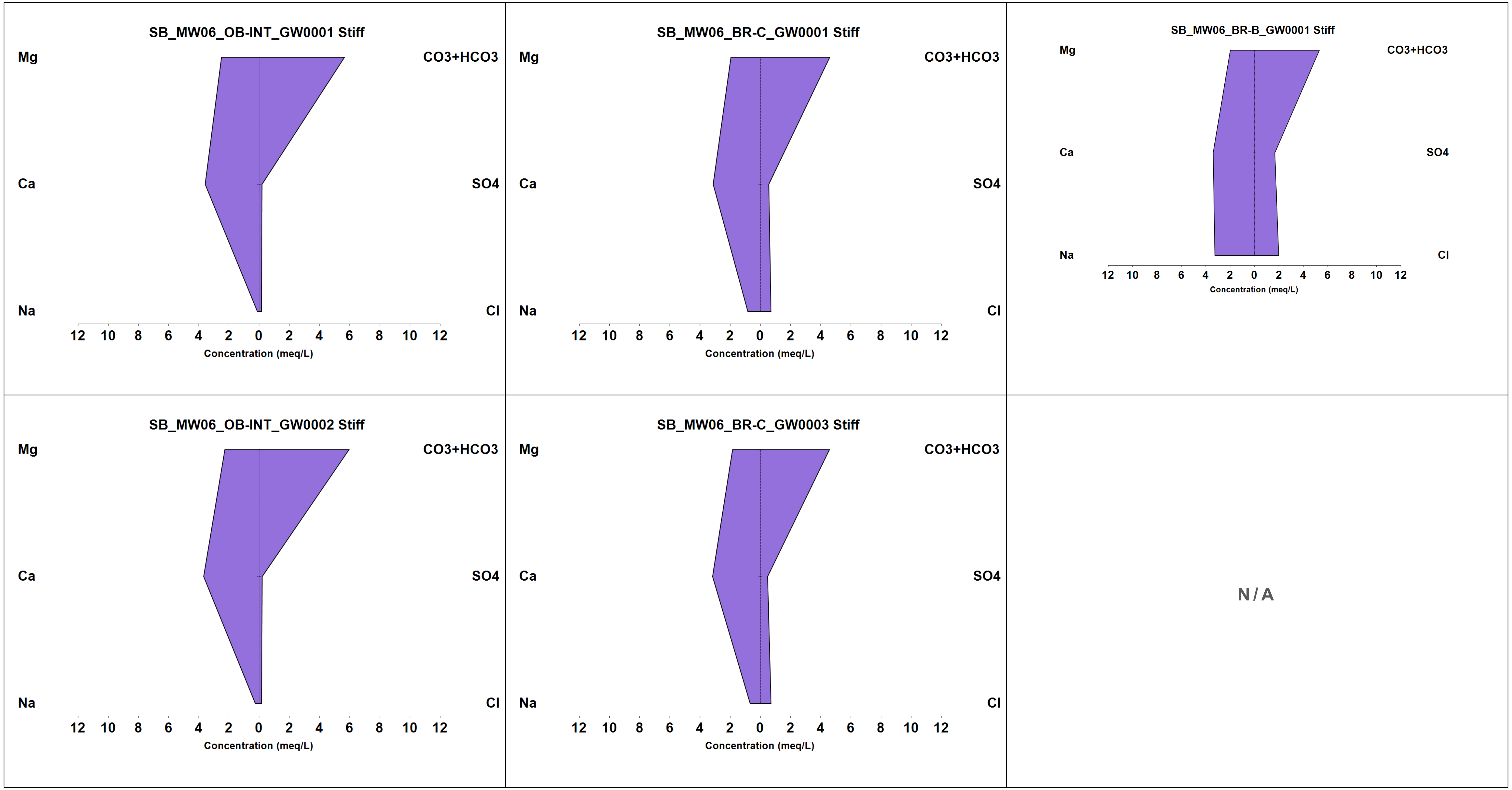


FIGURE 30: STIFF DIAGRAMS FOR WELLS SB_MW06_BR-A, SB_MW07_OB-INT, AND SB_MW07_BR-C

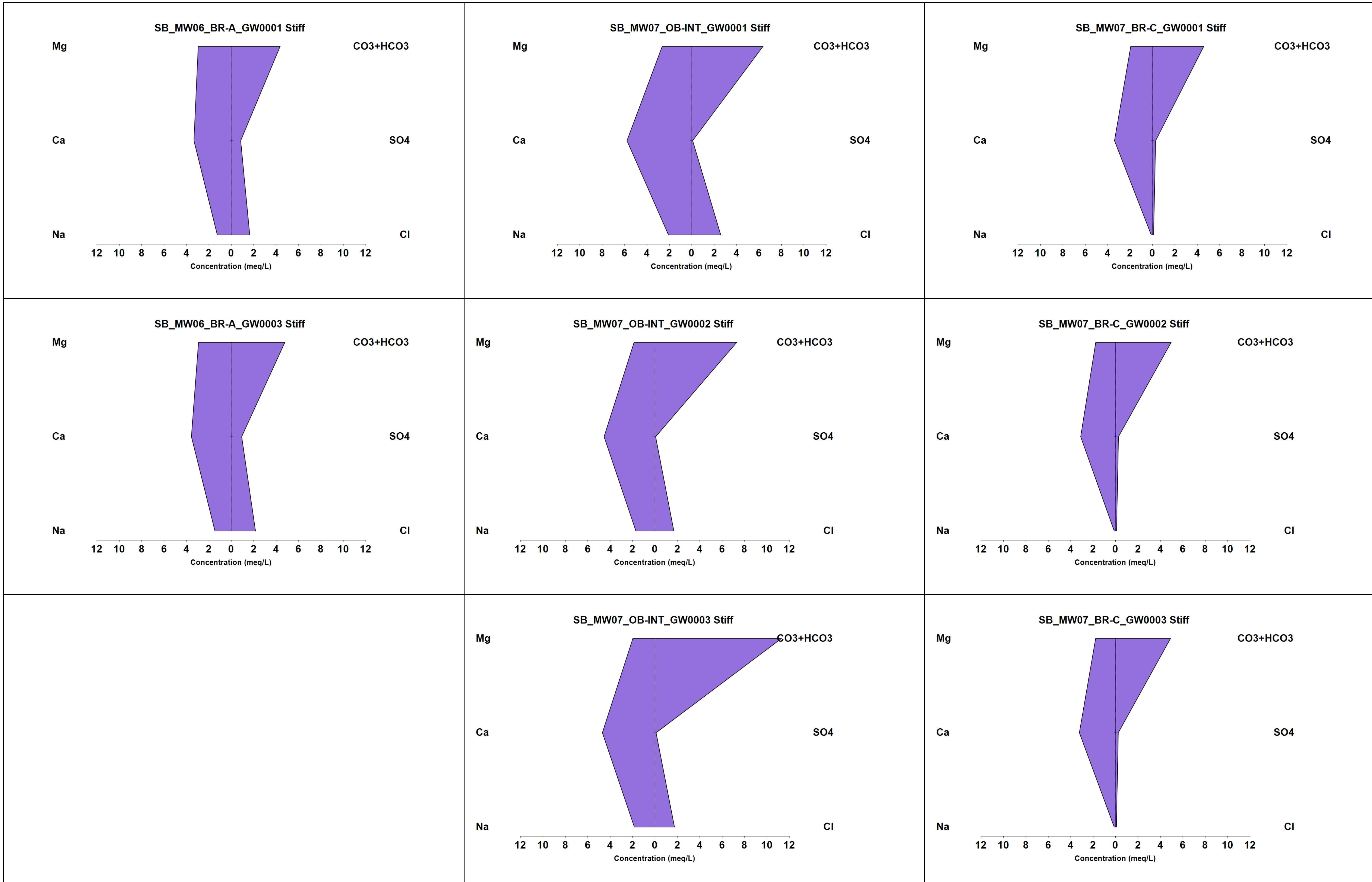
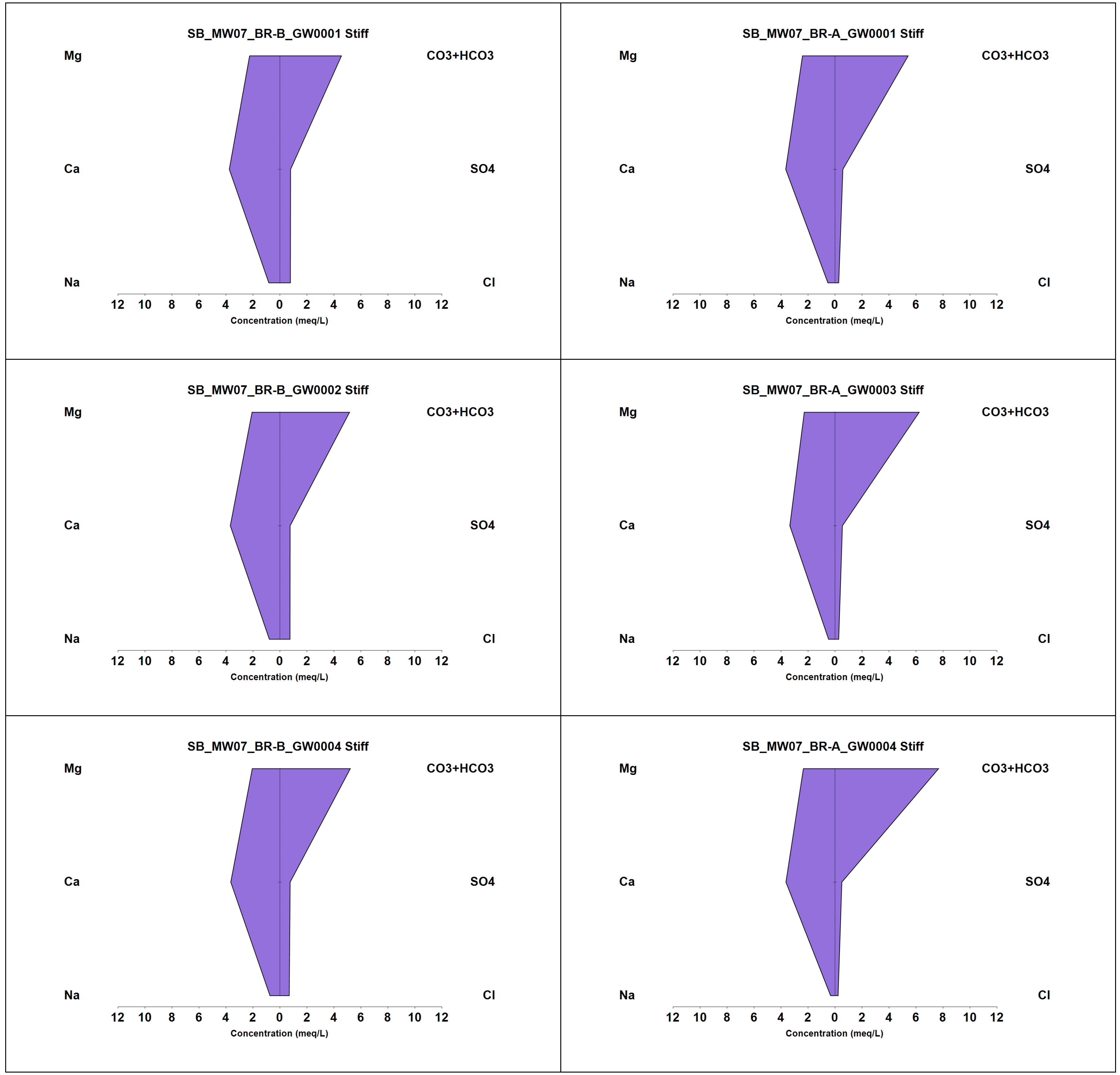


FIGURE 31: STIFF DIAGRAMS FOR WELLS SB_MW07_BR-B, AND SB_MW07_BR-A



APPENDIX C

2022 General Chemistry Laboratory Results Summary Table

Sample ID	Lab Tracking Number	Date & Time Sampled (dd/mm/yyyy hh:mm)	Comments	pH (Lab)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Hydroxide (OH)	Total Alkalinity (as $CaCO_3$)	Ammonia as N	Bromide	Chloride	Fluoride	Iodide	Nitrate (as NO_3)	Nitrite (as NO_2)	Nitrate and Nitrite as N	Total Kjeldahl Nitrogen	Total Nitrogen
			Units:	-	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
			Detection Limit:	0.1	1.2	0.6	0.34	1	0.01	0.1	0.5	0.02	0.2	0.089	0.033	0.07	0.05	0
SB_MW01_BR_GW0001	L2733079-1	12/09/2022 17:30		8.43 PEHT	-	-	-	228	0.037	<0.10	6.33	1.32	<0.20	<0.089	<0.033	-	0.070	0.070[#1]
SB_MW01_BR_GW0002	L2733487-6	08/09/2022 13:40		6.76 PEHR	-	-	-	1.9 PEHT	0.011	<0.10	<0.50	<0.020	<0.20	<0.089	<0.033	-	<0.050	-
SB_MW01_BR_GW0003	L2743397-1	16/12/2022 14:40		7.96	249[#1]	<0.60[#1]	<0.34[#1]	204	0.058	<0.10	4.09	1.36	<0.20	<0.089	<0.033	<0.070[#1]	<0.20	<0.20[#1]
SB_MW01_BR_GW0004	L2743397-19	16/12/2022 14:40	Field Duplicate of SB_MW01_BR_GW0003	8.04	244[#1]	<0.60[#1]	<0.34[#1]	200	0.050	<0.10	4.05	1.35	<0.20	<0.089	<0.033	<0.070[#1]	<0.20	<0.20[#1]
SB_MW01_OB-INT_GW0001	L2733079-2	12/09/2022 17:50		8.06 PEHT	-	-	-	230	0.017	<0.10	9.60	0.568	<0.20	57.147	<0.033	-	1.11 TKNI	1.11[#1]
SB_MW01_OB-INT_GW0002	L2743397-2	14/12/2022 15:00		7.91	294[#1]	<0.60[#1]	<0.34[#1]	241	0.035	<0.10	12.8	0.395	<0.20	39.604	<0.033	8.94[#1]	0.24 TKNI	9.18[#1]
SB_MW01_OB-INT_GW0002	L2743397-24	17/12/2022 11:50		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW02_BR_R-B_GW0001	L2733283-6	16/09/2022 18:45		8.34 PEHT	-	-	-	238	<0.010	<0.10	<0.50	1.32	-	<0.089	<0.033	-	<0.050	-
SB_MW02_BR_R-B_GW0002	L2743397-26	17/12/2022 10:35		7.95	296[#1]	<0.60[#1]	<0.34[#1]	243	-	<0.10	<0.50	1.35	-	<0.089	<0.033	<0.070[#1]	-	-
SB_MW02_BR_R-B_GW0002	L2743397-4	13/12/2022 18:35		-	-	-	-	-	0.027	-	-	-	<0.20	-	-	-	<0.20	<0.20[#1]
SB_MW02_BR-A_GW0001	L2733283-5	16/09/2022 15:10		8.20	-	-	-	225	0.018	<0.10	0.77	1.12	-	<0.089	<0.033	-	<0.050	-
SB_MW02_BR-A_GW0002	L2743397-25	17/12/2022 10:30		7.85	276[#1]	<0.60[#1]	<0.34[#1]	227	-	<0.10	0.76	1.15	-	<0.089	<0.033	<0.070[#1]	-	-
SB_MW02_BR-A_GW0002	L2743397-3	13/12/2022 15:50		-	-	-	-	-	0.017	-	-	-	<0.20	-	-	-	<0.20	<0.20[#1]
SB_MW02_BR-A_GW0003	L2743397-21		Trip Blank	5.24	<1.2[#1]	<0.60[#1]	<0.34[#1]	<1.0	0.066	<0.10	<0.50	<0.020	<0.20	<0.089	<0.033	<0.070[#1]	<0.20	<0.20[#1]
SB_MW02_BR-C_GW0001	L2733283-7	16/09/2022 16:35		8.15 PEHT	-	-	-	250	0.027	<0.10	3.19	1.28	-	0.230	<0.033	-	<0.50 DLM	-
SB_MW02_BR-C_GW0002	L2743397-27	17/12/2022 10:40		7.96	470[#1]	<0.60[#1]	<0.34[#1]	385	-	<0.10	3.91	1.22	-	7.531	0.121	1.74[#1]	-	-
SB_MW02_BR-C_GW0002	L2743397-5	13/12/2022 16:40		-	-	-	-	-	0.054	-	-	-	<0.20	-	-	-	<10 DLM	<10[#1]
SB_MW02_OB-INT_GW0001	L2733283-8	16/09/2022 17:25		7.98 PEHT	-	-	-	305	<0.010	<0.10	5.01	0.517	-	36.725	<0.033	-	<0.50 RRR	-
SB_MW02_OB-INT_GW0002	L2743397-28	17/12/2022 10:45		7.78	467[#1]	<0.60[#1]	<0.34[#1]	383	-	<0.10	4.32	0.530	-	24.897	<0.033	5.62[#1]	-	-
SB_MW02_OB-INT_GW0002	L2743397-6	13/12/2022 19:20		-	-	-	-	-	0.022	-	-	-	<0.20	-	-	-	<2.0 DLM	<2.0[#1]
SB_MW03_BR-A_GW0001	L2733283-1	15/09/2022 15:40		8.17 PEHT	-	-	-	229	0.045	<0.10	0.70	1.34	-	<0.089	<0.033	-	<0.050	-
SB_MW03_BR-B_GW0001	L2733283-2	15/09/2022 17:10		8.32 PEHT	-	-	-	230	0.043	<0.10	<0.50	1.41	-	<0.089	<0.033	-	0.064	-
SB_MW03_BR-C_GW0001	L2733283-3	15/09/2022 17:50		8.16 PEHT	-	-	-	228	0.048	<0.10	0.63	1.43	-	<0.089	<0.033	-	0.054	-
SB_MW03_OB-INT_GW0001	L2733283-4	15/09/2022 18:50		8.09 PEHT	-	-	-	230	0.040	<0.10	0.65	1.46	-	<0.089	<0.033	-	<0.50 DLM	-
SB_MW04_BR-A_GW0001	L2733079-3	13/09/2022 11:35		8.16 PEHT	-	-	-	216	0.028	<0.10	1.10	1.03	<0.20	<0.089	<0.033	-	0.065	0.065[#1]
SB_MW04_BR-A_GW0002	L2743397-29	17/12/2022 12:00		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW04_BR-A_GW0002	L2743397-7	14/12/2022 17:15		7.51	268[#1]	<0.60[#1]	<0.34[#1]	220	0.023	<0.20 DLM	1.1	1.05	<0.20	<0.177 DLM	<0.066 DLM	<0.070[#1]	<0.20	<0.20[#1]
SB_MW04_BR-B_GW0001	L2733079-4	13/09/2022 12:35		8.05 PEHT	-	-	-	220	0.023	<0.10	1.02	1.02	<0.20	<0.089	<0.033	-	<0.050	<0.050[#1]
SB_MW04_BR-B_GW0002	L2733079-5	13/09/2022 12:35	Field Duplicate of SB_MW04_BR-B_GW0001	8.11 PEHT	-	-	-	220	0.024	<0.10	1.02	1.02	<0.20	<0.089	<0.033	-	<0.050	<0.050[#1]
SB_MW04_BR-B_GW0003	L2743397-30	14/12/2022 12:05		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW04_BR-B_GW0003	L2743397-8	14/12/2022 18:20		7.55	269[#1]	<0.60[#1]	<0.34[#1]	221	0.022	<0.20 DLM	<1.0 DLM	1.06	<0.20	<0.177 DLM	<0.066 DLM	<0.070[#1]	<0.20	<0.20[#1]
SB_MW04_BR-B_GW0004	L2743397-20	14/12/2022 18:20	Field Duplicate of SB_MW04_BR-B_GW0003	7.74	267[#1]	<0.60[#1]	<0.34[#1]	219	0.040	<0.20 DLM	1.0	1.06	<0.20	<0.177 DLM	<0.066 DLM	<0.070[#1]	<0.20	<0.20[#1]
SB_MW04_BR-B_GW0004	L2743397-23	17/12/2022 12:05	Field Duplicate of SB_MW04_BR-B_GW0003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW04_BR-C_GW0001	L2733079-6	13/09/2022 13:35		8.07 PEHT	-	-	-	222	0.025	<0.10	1.01	1.14	<0.20	<0.089	<0.033	-	<0.050	<0.050[#1]
SB_MW04_BR-C_GW0002	L2733079-7	13/09/2022 13:50		6.83 PEHT	-	-	-	1.3	<0.010	<0.10	<0.50	<0.020	<0.20	<0.089	<0.033	-	<0.050	<0.050[#1]
SB_MW04_BR-C_GW0003	L2743397-31	17/12/2022 12:10		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW04_BR-C_GW0003	L2743397-9	14/12/2022 19:15		7.53	272[#1]	<0.60[#1]	<0.34[#1]	223	0.031	<0.20 DLM	1.0	1.19	<0.20	<0.177 DLM	<0.066 DLM	<0.070[#1]	<0.40 DLM	<0.40[#1]
SB_MW04_OB-INT_GW0001	L2733079-8	13/09/2022 14:10		8.03 PEHT	-	-	-	274	<0.010	<0.10	6.37	0.197	<0.20	20.511	<0.033	-	<0.50 DLM	<0.50[#1]
SB_MW04_OB-INT_GW0002	L2743397-10	14/12/2022 19:40		7.72	410[#1]	<0.60[#1]	<0.34[#1]	336	<0.020 DLM	<0.10	6.27	0.241	<0.20	22.416	<0.033	5.06[#1]	0.70	5.76[#1]
SB_MW04_OB-INT_GW0002	L2743397-32	17/12/2022 12:15		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW05_BR-A_GW0001	L2733079-9	13/09/2022 17:20		7.98 PEHT	-	-	-	219	0.051	<0.10	168	1.39	<0.20	<0.089	<0.033	-	<0.050	<0.050[#1]
SB_MW05_BR-A_GW0002	L2743397-11	15/12/2022 15:50		7.64	269[#1]	<0.60[#1]	<0.34[#1]	221	0.050	<0.50 DLM	166	1.53	<0.20	<0.443 DLM	<0.164 DLM	<0.11[#1]	<0.20	<0.20[#1]
SB_MW05_BR-A_GW0002	L2743397-33	17/12/2022 11:25		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW05_BR-B_GW0001	L2733079-10	13/09/2022 18:25		8.06 PEHT	-	-	-	235	0.039	<0.10	88.8	1.57	<0.20	<0.089	<0.033	-	<0.050	<0.050[#1]
SB_MW05_BR-B_GW0002	L2743397-12	15/12/2022 17:00		7.68	287[#1]	<0.60[#1]	<0.34[#1]	235	0.036	<0.20 DLM	85.5	1.66	<0.20	<0.177 DLM	<0.066 DLM	<0.070[#1]	<0.20	<0.20[#1]
SB_MW05_BR-B_GW0002	L2743397-34	17/12/2022 11:30		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW05_BR-B_GW0003	L2743397-22	16/12/2022 20:22	Field Blank	5.48	<1.2[#1]	<0.60[#1]	<0.34[#1]	<1.0	0.012	<0.10	<0.50	<0.020	<0.20	<0.089	<0.033	<0.070[#1]	<0.20	<0.20[#1]
SB_MW05_BR-C_GW0001	L2733079-11	13/09/2022 19:05		8.06 PEHT	-	-	-	237	0.031	<0.10	91.1	1.57	<0.20	<0.089	<0.033	-	<0.050	<0.050[#1]
SB_MW05_BR-C_GW0002	L2743397-13	15/12/2022 18:05		7.82	286[#1]	<0.60[#1]	<0.34[#1]	235	0.072	<0.20 DLM	81.6	1.69	<0.20	<0.177 DLM	<0.066 DLM	<0.070[#1]	<0.20	<0.20[#1]
SB_MW05_BR-C_GW0002	L2743397-35	17/12/2022 11:35		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW05_OB-INT_GW0001	L2733079-12	14/09/2022 08:40		8.03 PEHT	-	-	-	300	-	<0.10	55.1	0.731	<0.20	<0.089	<0.033	-	-	0.0[#1]
SB_MW05_OB-INT_GW0001	L2733283-9	16/09/2022 19:40		-	-	-	-	-	0.159	-	-	-	-	-	-	-	0.278	-
SB_MW05_OB-INT_GW0002	L2743397-14	16/12/2022 15:20		7.91	541[#1]	<0.60[#1]	<0.34[#1]	444	0.197	<0.10	49.7	0.778	<0.20	0.261	0.066	0.078[#1]	0.93	1.01[#1]
SB_MW06_BR-A_GW0001	L2725656-6	27/07/2022 15:10		8.15	-	-	-	218	<0.010	<0.10	58.3	1.41	<0.20	<0.089	<0.033	-	0.067	0.067[#1]
SB_MW06_BR-A_GW0002	L2725656-9	27/07/2022 12:50	Field Blank	5.86	-	-	-	<1.0	<0.010	<0.10	<0.50	<0.020	<0.20	<0.089	<0.033	-	<0.050	<0.050[#1]
SB_MW06_BR-A_GW0003	L2733079-13	14/09/2022 14:25		8.17 PEHT	-	-	-	239	0.011	<0.10	76.5	1.28	<0.20	<0.089	<0.033	-	<0.050	<0.050[#1]
SB_MW06_BR-A_GW0004	L2733079-14	14/09/2022 14:25	Field Duplicate of SB_MW06_BR-A_GW0003	8.26 PEHT	-	-	-	238	0.012	<0.10	76.6	1.28	<0.20	<0.089	<0.033	-	<0.050	<0.050[#1]
SB_MW06_BR-B_GW0001	L2725656-7	27/07/2022 17:20		8.00	-	-	-	266	0.015	<0.10	70.2	1.34	<0.20	<0.089	<0.033	-	0.496	0.496[#1]
SB_MW06_BR-C_GW0001	L2725656-8	27/07/2022 18:15		8.08	-	-	-	230	<0.010	<0.10	24.9	1.62	<0.20	<0.089	<0.033	-	0.065	0.065[#1]
SB_MW06_BR-C_GW0002	L2725656-10	27/07/2022 18:15	Field Duplicate of SB_MW06_BR-C_GW0001	8.06	-	-	-	225	<0.010	<0.10	25.4	1.65	<0.20	<0.089	<0.033	-	0.091	0.091[#1]
SB_MW06_BR-C_GW0003	L2733079-15	14/09/2022 17:10		8.11 PEHT	-	-	-	229	<0.010	<0.10	25.0	1.52	<0.20	<0.089	<0.033	-	<0.050	<0.050[#1]
SB_MW06_OB-INT_GW0001	L2725656-11	27/07/2022 18:55		7.92	-	-	-	283	0.015	<0.10	5.57	0.577	<0.20	9.790	<0.033	-	2.16 DLM	2.16[#1]
SB_MW06_OB-INT_GW0002	L2733079-16	14/09/2022 18:00		7.96 PEHT	-	-	-	298	<0.010	<0.10	5.72	0.511	<0.20	11.518	<0.033	-	<0.50 DLM	<0.50[#1]
SB_MW07_BR-A_GW0001	L2725656-1	26/07/2022 17:30		7.90	-	-	-	271	<0.010	<0.10	9.73	1.17	<0.20	5.493	<0.033	-	0.313	0.313[#1]
SB_MW07_BR-A_GW0002	L2725656-5	26/07/2022 17:00	Trip Blank	6.22	-	-	-	<1.0	<0.010	<0.10	<0.50	<0.020	<0.20	<0.089	<0.033	-	0.067	0.067[#1]
SB_MW07_BR-A_GW0003	L2733487-1	17/09/2022 13:40		7.94 PEHT	-	-	-	312	0.022	<0.10	9.64	1.17	<0.20	5.803	<0.033	-	0.214	-
SB_MW07_BR-A_GW0004	L2743397-15	16/12/2022 17:25		7.72	467[#1]	<0.60[#1]	<0.34[#1]	383	0.016	<0.10	8.01	1.20	<0.20	6.113	<0.033	1.38[#1]	0.56	1.94[#1]
SB_MW07_BR-B_GW0001	L2725656-2	26/07/2022 20:20		8.01	-	-	-	228	<0.010	<0.10	27.5	1.55	<0.20	0.097	0.039	-	0.088	0.088[#1]
SB_MW07_BR-B_GW0002	L2733487-2	17/09/2022 15:15		8.21	-	-	-	258	0.015	<0.10	26.4	1.48	<0.20	0.115	<0.033	-	<0.050	-
SB_MW07_BR-B_GW0003	L2733487-3	17/09/2022 15:15	Field Duplicate of SB_MW07_BR-B_GW0002	7.89	-	-	-	258	<0.010	<0.10	26.2	1.49	<0.20	0.111	<0.033	-	0.059	-
SB_MW07_BR-B_GW0004	L2743397-16	16/12/2022 18:40		7.83	317[#1]	<0.60[#1]	<0.34[#1]	260	<0.020 DLM	<0.10	24.5	1.52	<0.20	0.226	<0.033	<0.070[#1]	<0.20	<0.20[#1]
SB_MW07_BR-C_GW0001	L2725656-3	26/07/2022 19:00		8.02	-	-	-	229	0.033	<0.10	3.49	1.44	<0.20	0.239	0.125	-	0.226	0.226[#1]
SB_MW07_BR-C_GW0002	L2733487-5	18/09/2022 11:05		8.23	-	-	-	248	0.041	<0.10	3.23	1.41	<0.20	0.102	0.069	-	<0.050	-
SB_MW07_BR-C_GW0003	L2743397-17	16/12/2022 19:30		7.86	298[#1]	<0.60[#1]	<0.34[#1]	244	0.047	<0.10	2.72	1.47	<0.20	0.106	<0.033	<0.070[#1]	<0.20	<0.20[#1]
SB_MW07_OB-INT_GW0001	L2725656-4	28/07/2022 13:00		7.78	-	-	-	318	<0.010	<0.10	91.7	0.051	<0.20	2.423	<0.033	-	9.51 DLM	9.51[#1]
SB_MW07_OB-INT_GW0002	L2733487-4	17/09/2022 16:10		7.66 PEHT	-	-	-	365	<0.010	<0.10	59.8	0.083	<0.20	0.514	<0.033	-	<0.50 DLM	-
SB_MW07_OB-INT_GW0003	L2743397-18	16/12/2022 19:55		7.60	688[#1]	<0.60[#1]	<0.34[#1]	564	0.023	<0.10	61.7	0.066	<0.20	2.016	<0.033	0.455[#1]	0.44	0.90[#1]

Sample ID	Lab Tracking Number	Orthophosphate (PO_4)	Total Phosphorus (P_{tot})	Total Reactive Phosphorus (TRP)	Sulphate (SO_4)	Dissolved Inorganic Carbon (DIC)	Reactive Silica	Aluminum (Al) diss.	Antimony (Sb) diss.	Arsenic (As) diss.	Barium (Ba) diss.	Beryllium (Be) diss.	Bismuth (Bi) diss.	Boron (B) diss.	Cadmium (Cd) diss.	Calcium (Ca) diss.	Cesium (Cs) diss.	Chromium (Cr) diss.	Cobalt (Co) diss.	Copper (Cu) diss.	Iron (Fe) diss.	Lead (Pb) diss.
Units:		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Detection Limit:		0.001	0.001	0.001	0.3	0.5	0.01	0.001	0.0001	0.0001	0.0001	0.0001	0.00005	0.01	0.000005	0.05	0.00001	0.0001	0.0001	0.0002	0.01	0.00005
SB_MW01_BR_GW0001	L2733079-1	<0.0030	0.0078	-	24.6	-	-	<0.0050	<0.00010	0.00197	0.104	<0.00010	<0.000050	0.012	<0.0000050	61.2	<0.000010	<0.00050	<0.00010	<0.00020	0.866	<0.000050
SB_MW01_BR_GW0002	L2733487-6	<0.0030	<0.0030	-	<0.30	<1.0	-	0.0056 RRV	<0.00010	<0.00010	0.00018 RRV	<0.00010	<0.000050	<0.010	<0.0000050	0.197 RRV	<0.000010	0.00013 RRV	<0.00010	<0.00020	<0.010	<0.000050
SB_MW01_BR_GW0003	L2743397-1	<0.0010 OPF	0.0135	<0.0010 OPF	9.90	40.9	6.56	<0.0010	0.00015	0.00057	0.0436	<0.00010	<0.000050	0.013	<0.0000050	39.8	<0.000010	<0.00010	<0.00010	0.00085	2.30	<0.000050
SB_MW01_BR_GW0004	L2743397-19	0.0011 OPF	0.0128	<0.0010 OPF	9.87	39.3	6.44	<0.0010	0.00014	0.00061	0.0390	<0.00010	<0.000050	0.018	<0.0000050	37.9	<0.000010	<0.00010	<0.00010	<0.00020	2.48	<0.000050
SB_MW01_OB-INT_GW0001	L2733079-2	<0.0030	0.249 DLM	-	4.26	-	-	<0.0050	<0.00010	<0.00010	0.0222	<0.00010	<0.000050	<0.010	<0.0000050	73.4	<0.000010	0.00053	<0.00010	0.00065	<0.010	<0.000050
SB_MW01_OB-INT_GW0002	L2743397-2	-	0.0282	-	5.05	-	6.70	0.0051	<0.00010	0.00011	0.0239	<0.00010	<0.000050	0.010	<0.0000050	69.3	<0.000010	0.00030	<0.00010	0.00320	<0.010	0.000127
SB_MW01_OB-INT_GW0002	L2743397-24	<0.0010 OPF	-	<0.0010 OPF	-	42.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW02_BR_R-B_GW0001	L2733283-6	<0.0030	0.0039	-	32.6	45.8 DLM	7.36	0.0050	0.00012	0.00195	0.120	<0.00010	<0.000050	0.017	<0.0000050	62.8	0.000043	0.00015	<0.00010	<0.00020	0.040	<0.000050
SB_MW02_BR_R-B_GW0002	L2743397-26	<0.0010 OPF	-	<0.0010 OPF	32.1	42.5	7.37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW02_BR_R-B_GW0002	L2743397-4	-	0.0051	-	-	-	-	0.0022	<0.00010	0.00179	0.0920	<0.00010	<0.000050	0.017	<0.0000050	64.4	<0.000010	<0.00010	<0.00010	<0.00020	0.064	<0.000050
SB_MW02_BR-A_GW0001	L2733283-5	<0.0030	0.0053	-	241	43.5 DLM	7.06	0.0027	<0.00010	0.00232	0.0316	<0.00010	<0.000050	0.058	<0.0000050	117	0.000010	0.00018	<0.00010	0.00167	0.167	0.000084
SB_MW02_BR-A_GW0002	L2743397-25	<0.0010 OPF	-	<0.0010 OPF	211	38.6	7.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW02_BR-A_GW0002	L2743397-3	-	0.0668	-	-	-	-	0.0015	0.00012	0.00538	0.0460	<0.00010	<0.000050	0.051	<0.0000050	104	<0.000010	<0.00010	<0.00010	0.00155	0.159	0.000057
SB_MW02_BR-A_GW0003	L2743397-21	<0.0010 OPF	<0.0010	<0.0010 OPF	<0.30	<0.50	<0.010	<0.0010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000050	<0.010	<0.0000050	<0.050	<0.000010	<0.00010	<0.00010	<0.00020	<0.010	<0.000050
SB_MW02_BR-C_GW0001	L2733283-7	<0.0030	0.101 DLM	-	31.0	47.9 DLM	11.6	0.0020	<0.00010	0.0119	0.195	<0.00010	<0.000050	<0.010	<0.0000050	58.5	0.000042	0.00015	0.00021	<0.00020	0.424	<0.000050
SB_MW02_BR-C_GW0002	L2743397-27	<0.0010 OPF	-	<0.0010 OPF	52.4	51.9	11.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW02_BR-C_GW0002	L2743397-5	-	1.38	-	-	-	-	0.0228	<0.00010	0.00803	0.108	<0.00010	<0.000050	0.013	<0.0000050	49.7	0.000072	<0.00010	0.00034	0.00422	0.198	0.000055
SB_MW02_OB-INT_GW0001	L2733283-8	<0.0030	0.493 DLM	-	11.4	58.0 DLM	9.40	0.0019	<0.00010	0.00021	0.108	<0.00010	<0.000050	<0.010	<0.0000050	83.3	<0.000010	0.00069	<0.00010	0.00056	<0.010	<0.000050
SB_MW02_OB-INT_GW0002	L2743397-28	<0.0010 OPF	-	<0.0010 OPF	14.3	54.5	9.93	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW02_OB-INT_GW0002	L2743397-6	-	0.430	-	-	-	-	0.0038	<0.00010	0.00019	0.133	<0.00010	<0.000050	<0.010	<0.0000050	83.6	<0.000010	0.00029	<0.00010	0.00328	<0.010	0.000101
SB_MW03_BR-A_GW0001	L2733283-1	0.0036	0.0595	-	31.2	42.9 DLM	7.97	0.0029	<0.00010	0.00214	0.128	<0.00010	<0.000050	0.017	<0.0000050	60.9	<0.000010	0.00024	<0.00010	0.00086	0.198	<0.000050
SB_MW03_BR-B_GW0001	L2733283-2	<0.0030	0.0092	-	32.7	43.5 DLM	8.15	0.0020	<0.00010	0.00299	0.126	<0.00010	<0.000050	0.016	<0.0000050	63.7	<0.000010	0.00017	<0.00010	0.00080	0.255	<0.000050
SB_MW03_BR-C_GW0001	L2733283-3	<0.0030	0.0299	-	36.0	42.6 DLM	8.11	0.0017	<0.00010	0.00512	0.0893	<0.00010	<0.000050	0.018	<0.0000050	59.0	<0.000010	0.00017	<0.00010	<0.00020	0.255	<0.000050
SB_MW03_OB-INT_GW0001	L2733283-4	<0.0030	0.111 DLM	-	32.0	43.9 DLM	8.40	0.0014	<0.00010	0.00267	0.108	<0.00010	<0.000050	0.016	<0.0000050	60.2	<0.000010	0.00015	<0.00010	<0.00020	0.227	<0.000050
SB_MW04_BR-A_GW0001	L2733079-3	<0.0030	0.0036	-	441	-	-	<0.0050	<0.00010	0.00192	0.0248	<0.00010	<0.000050	0.080	<0.0000050	170	<0.000010	<0.00050	<0.00010	0.00074	0.175	<0.000050
SB_MW04_BR-A_GW0002	L2743397-29	<0.0010 OPF	-	<0.0010 OPF	-	31.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW04_BR-A_GW0002	L2743397-7	-	0.0064	-	441	-	7.04	<0.0010	<0.00010	0.00178	0.0106	<0.00010	<0.000050	0.073	<0.0000050	165	<0.000010	<0.00010	<0.00010	<0.00020	0.158	<0.000050
SB_MW04_BR-B_GW0001	L2733079-4	<0.0030	0.0032	-	399	-	-	<0.0050	<0.00010	0.00040	0.0104	<0.00010	<0.000050	0.080	<0.0000050	157	<0.000010	<0.00050	<0.00010	<0.00020	0.060	<0.000050
SB_MW04_BR-B_GW0002	L2733079-5	<0.0030	0.0031	-	400	-	-	<0.0050	<0.00010	0.00039	0.0245	<0.00010	<0.000050	0.079	<0.0000050	157	<0.000010	<0.00050	<0.00010	0.00098	0.062	<0.000050
SB_MW04_BR-B_GW0003	L2743397-30	<0.0010 OPF	-	<0.0010 OPF	-	38.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW04_BR-B_GW0003	L2743397-8	-	0.0023	-	399	-	6.96	<0.0010	<0.00010	0.00036	0.00962	<0.00010	<0.000050	0.077	<0.0000050	151	<0.000010	<0.00010	<0.00010	<0.00020	0.056	<0.000050
SB_MW04_BR-B_GW0004	L2743397-20	-	0.0023	-	397	-	6.84	<0.0010	<0.00010	0.00033	0.00954	<0.00010	<0.000050	0.080	<0.0000050	153	<0.000010	<0.00010	<0.00010	<0.00020	0.056	<0.000050
SB_MW04_BR-B_GW0004	L2743397-23	<0.0010 OPF	-	<0.0010 OPF	-	38.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW04_BR-C_GW0001	L2733079-6	<0.0030	0.0054	-	361	-	-	<0.0050	<0.00010	0.00679	0.0319	<0.00010	<0.000050	0.071	<0.0000050	149	0.000011	<0.00050	0.00012	0.00060	0.109	<0.000050
SB_MW04_BR-C_GW0002	L2733079-7	<0.0030	<0.0030	-	<0.30	-	-	<0.0050	<0.00010	<0.00010	0.0107 RRV	<0.00010	<0.000050	<0.010	<0.0000050	<0.050	<0.000010	<0.00050	<0.00010	0.00161 RRV	<0.010	<0.000050
SB_MW04_BR-C_GW0003	L2743397-31	<0.0010 OPF	-	<0.0010 OPF	-	39.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW04_BR-C_GW0003	L2743397-9	-	0.0182	-	368	-	7.68	0.0027	<0.00010	0.00659	0.0258	<0.00010	<0.000050	0.069	<0.0000050	142	0.000014	<0.00010	0.00013	0.00149	0.129	0.000060
SB_MW04_OB-INT_GW0001	L2733079-8	<0.0030	0.135	-	6.41	-	-	0.0055	<0.00010	0.00011	0.0578	<0.00010	<0.000050	<0.010	<0.0000050	82.5	<0.000010	<0.00050	<0.00010	0.00072	<0.010	<0.000050
SB_MW04_OB-INT_GW0002	L2743397-10	-	0.387	-	5.41	-	5.92	0.0019	<0.00010	0.00010	0.0605	<0.00010	<0.000050	<0.010	<0.0000050	78.5	<0.000010	0.00026	<0.00010	0.00594	<0.010	<0.000050
SB_MW04_OB-INT_GW0002	L2743397-32	<0.0010 OPF	-	<0.0010 OPF	-	51.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW05_BR-A_GW0001	L2733079-9	<0.0030	0.0039	-	347	-	-	<0.0050	<0.00010	0.00151	0.0130	<0.00010	<0.000050	0.114	<0.0000050	133	<0.000010	<0.00050	<0.00010	<0.00020	0.233	<0.000050
SB_MW05_BR-A_GW0002	L2743397-11	-	0.0026	-	353	-	7.05	0.0017	<0.00010	0.00137	0.0127	<0.00010	<0.000050	0.108	<0.0000050	130	<0.000010	<0.00010	<0.00010	<0.00020	0.229	<0.000050
SB_MW05_BR-A_GW0002	L2743397-33	<0.0010 OPF	-	<0.0010 OPF	-	36.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW05_BR-B_GW0001	L2733079-10	<0.0030	0.0344	-	138	-	-	<0.0050	<0.00010	0.0109	0.0285	<0.00010	<0.000050	0.057	<0.0000050	77.8	<0.000010	<0.00050	<0.00010	0.00049	0.258	<0.000050
SB_MW05_BR-B_GW0002	L2743397-12	-	0.0273	-	139	-	9.20	0.0129	<0.00010	0.00991	0.0347	<0.00010	<0.000050	0.058	<0.0000050	81.5	<0.000010	<0.00010	<0.00010	0.00154	0.258	0.000058
SB_MW05_BR-B_GW0002	L2743397-34	<0.0010 OPF	-	<0.0010 OPF	-	46.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW05_BR-B_GW0003	L2743397-22	<0.0010 OPF	<0.0010	<0.0010 OPF	<0.30	<0.50	<0.010	<0.0010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000050	<0.010	<0.0000050	<0.050	<0.000010	<0.00010	<0.00010	<0.00020	<0.010	<0.000050
SB_MW05_BR-C_GW0001	L2733079-11	<0.0030	0.0239	-	166	-	-	<0.0050	<0.00010	0.00460	0.0433	<0.00010	<0.000050	0.061	<0.0000050	91.0	<0.000010	<0.00050	0.00011	0.00046	1.25	<0.000050
SB_MW05_BR-C_GW0002	L2743397-13	-	0.0151	-	145	-	9.51	0.0042	<0.00010	0.00505	0.0542	<0.00010	<0.000050	0.057	<0.0000050	87.9	<0.000010	<0.00010	0.00012	0.00604	1.07	<0.000050
SB_MW05_BR-C_GW0002	L2743397-35	<0.0010 OPF	-	<0.0010 OPF	-	46.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW05_OB-INT_GW0001	L2733079-12	0.0061	-	-	72.9	-	-	0.116	0.00012	0.00120	0.0550	<0.00010	<0.000050	0.069	0.0000074	67.5	0.000011	<0.00050	0.00068	0.00143	0.090	0.000118
SB_MW05_OB-INT_GW0001	L2733283-9	-	0.0677	-	-	52.7 DLM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW05_OB-INT_GW0002	L2743397-14	<0.0010 OPF	0.557	<0.0010 OPF	72.7	58.5	9.39	0.0080	<0.00010	0.00132	0.0450	<0.00010	<0.000050	0.076	0.0000079	65.7	<0.000010	<0.00010	0.00061	0.00961	<0.010	0.000059
SB_MW06_BR-A_GW0001	L2725656-6	<0.0030	0.0039	0.0013 OPF	40.2	60.1	6.78	<0.0050	<0.00010	0.00027	0.0938	<0.00010	<0.000050	0.026	<0.0000050	66.9	<0.000010	<0.00050	<0.00010	<0.00020	0.136	<0.000050
SB_MW06_BR-A_GW0002	L2725656-9	<0.0030	<0.0030	<0.0010 OPF	<0.30	1.3	0.073	<0.0050	<0.00010	<0.00010	0.00175 RRV	<0.00010	<0.000050	<0.010	<0.0000050	<0.050	<0.000010	<0.00050	<0.00010	0.00033 RRV	<0.010	<0.000050
SB_MW06_BR-A_GW0003	L2733079-13	<0.0030	0.0030	-	44.5	50.4	-	<0.0050	<0.00010	0.00022	0.0967	<0.00010	<0.000050	0.030	<0.0000050	71.4	<0.000010	<0.00050	<0.00010	<0.00020	0.123	<0.000050
SB_MW06_BR-A_GW0004	L2733079-14	<0.0030	<0.0030	-	44.5	51.4	-	<0.0050	<0.00010	0.00020	0.109	<0.00010	<0.000050	0.030	<0.0000050	68.8	<0.000010	<0.00050	<0.00010	0.00087	0.123	<0.000050
SB_MW06_BR-B_GW0001	L2725656-7	<0.0030	0.727	<0.0010 OPF	79.9	49.7	8.05	<0.0050	<0.00010	0.00064	0.0962	<0.00010	<0.000050	0.018	<0.0000050	68.0	0.000019	<0.00050	0.00023	<0.00020	0.093	<0.000050
SB_MW06_BR-C_GW0001	L2725656-8	<0.0030	0.0204	<0.0010 OPF	26.8	52.3	6.96	<0.0050	<0.00010	0.00169	0.176	<0.00010	<0.000050	<0.010	<0.0000050	62.7	<0.000010	<0.00050	<0.00010	<0.00020	0.232	<0.000050
SB_MW06_BR-C_GW0002	L2725656-10	<0.0030	0.0277	<0.0010 OPF	28.0	<1.0	7.20	<0.0050	<0.00010	0.00173	0.177	<0.00010	<0.000050	<0.010	<0.0000050	62.5	0.000010	<0.00050	<0.00010	<0.00020	0.230	<0.000050
SB_MW06_BR-C_GW0003	L2733079-15	<0.0030	0.0099	-	23.0	49.7	-	<0.0050	<0.00010	0.00138	0.160	<0.00010	<0.000050	<0.010	<0.0000050	63.5	<0.000010	<0.00050	<0.00010	0.00404	0.195	<0.000050
SB_MW06_OB-INT_GW0001	L2725656-11	<0.0030	0.568 DLM	<0.0050 DLM	9.22	57.4	6.23	<0.0050	<0.00010	0.00014	0.0493	<0.00010	<0.000050	0.016	<0.0000050	71.7	<0.000010	0.00070	<0.00010	0.00097	<0.010	<0.000050
SB_MW06_OB-INT_GW0002	L2733079-16	<0.0030	0.103	-	9.75	59.7	-	0.0056	0.00013	0.00014	0.0578	<0.00010	<0.000050	0.018	<0.0000050	73.7	<0.000010	0.00074	<0.00010	0.00146	<0.010	0.000076
SB_MW07_BR-A_GW0001	L2725656-1	<0.0030	0.0263	<0.0020 DLM	27.9	50.1	7.37	<0.0050	0.00063	0.00052	0.318	<0.00010	<0.000050	<0.010	<0.0000050	73.2	<0.000010	<0.00050	0.00014	<0.00020	0.052	<0.000050
SB_MW07_BR-A_GW0002	L2725656-5	<0.0030	<0.0030	<0.0010 OPF	<0.30	<1.0	0.092	<0.0050	<0.00010	<0.00010	<0.00010	<0.00010	<0.000050	<0.010	<0.0000050	<0.050	<0.000010	<0.00050	<0.00010	<0.00020	<0.010	<0.000050
SB_MW07_BR-A_GW0003	L2733487-1	<0.0030	0.0591	-	26.3	57.9 DLM	-	0.0257	0.00049	0.00045	0.290	<0.00010	<0.000050	<0.010	<0.0000050	67.1	0.000011	0.00018	0.00014	<0.00020	0.099	<0.000050
SB_MW07_BR-A_GW0004	L2743397-15	<0.0010 OPF	0.181	<0.0010 OPF	24.2	52.9	7.35	0.0022	0.00038	0.00038	0.320	<0.00010	<0.000050	0.021	<0.0000050	72.9	<0.000010	<0.00010	<0.00010	0.00169	0.031	0.000050
SB_MW07_BR-B_GW0001	L2725656-2	0.0051	0.0101	<0.0010 RRV	37.9	51.5	6.81	0.0062	0.00228	0.00255	0.297	<0.00010	<0.000050	<0.010	0.0000053	75.2	<0.000010	<0.00050	0.00029	<0.00020	0.035	<0.000050
SB_MW07_BR-B_GW0002	L2733487-2	0.0033	0.0064	-	36.3	52.8 DLM	-	0.0046	0.00198	0.00303	0.276	<0.00010	<0.000050	<0.010	<0.0000050	73.7	<0.000010	0.00015	0.00026	<0.00020	0.023	<0.000050
SB_MW07_BR-B_GW0003	L2733487-3	0.0033	0.0063	-	36.1	53.2 DLM	-	0.0120	0.00192	0.00287	0.273	<0.00010	<0.000050	<0.010	<0.000010 DLM	70.8	<0.000010	0.00028	0.00026	0.00051	0.030	<0.000050
SB_MW07_BR-B_GW0004	L2743397-16	0.0018 OPF	0.0072	0.0016 OPF	36.3	46.5	6.90	0.0063	0.00145	0.00416	0.274	<0.00010	<0.000050	0.018	<0.0000050	73.0	<0.000010	<0.00010	0.00024	0.00199	0.074	0.000053
SB_MW07_BR-C_GW0001	L2725656-3	<0.0030	0.0174	<0.0010 OPF	13.5	48.7	6.92	<0.0050	0.00034	0.00091	0.475	<0.00010	<0.000050	<0.010	<0.000020 DLM	68.0	0.000011	<0.00050	0.00026	0.00156	0.030	<0.000050
SB_MW07_BR-C_GW0002	L2733487-5	<0.0030	0.0120	-	12.5	52.6 DLM	-	0.0055	0.00025	0.00158	0.439	<0.00020 DLA	<0.00010 DLA	<0.020 DLA	<0.000020 DLM	62.4	<0.000020 DLA	<0.00020 DLA	0.00024	0.00147	0.088	<0.00010 DLA
SB_MW07_BR-C_GW0003	L2743397-17	<0.0010 OPF	0.0203	<0.0010 OPF	11.7	45.7	6.89	0.0024	0.00020	0.00299	0.433	<0.00010	<0.000050	0.015	0.0000174	64.7	<0.000010	<0.00010	0.00019	0.00239	0.174	0.000091
SB_MW07_OB-INT_GW0001	L2725656-4	<0.0030	0.467 DLM	<0.0010 OPF	3.75	72.6	7.10	0.224	<0.00010	0.00024	0.0284	<0.00010	<0.000050	<0.010	0.0000058	116	0.000014	0.00101	0.00021	0.00059	0.239	0.000383
SB_MW07_OB-INT_GW0002	L2733487-4	<0.0030	0.307 DLM	-	2.81	68.6 DLM	-	0.0222	0.00014	<0.00010	0.0202	<0.00010	<0.000050	<0.010	<0.0000050	91.1	<0.000010	0.00064	<0.00010	0.00066	<0.010	<0.000050
SB_MW07_OB-INT_GW0003	L2743397-18	<0.0010 OPF	1.10	<0.0010 OPF	4.76	58.1	7.31	0.0137	<0.00010	0.00011	0.0266	<0.00010	<0.000050	0.018	<0.0000050	94.1	<0.000010	0.00046	<0.00010	0.00182	0.018	0.000080

Notes
#1 - Calculated by lab
PEHT - Parameter Exceeded Recommended Holding Time Prior to Analysis
PEHR - Parameter Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested
DLM - Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DLA - Detection Limit Adjusted for required dilution
DLHC - Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
TKNI - TKN result may be biased low due to Nitrate interference. Nitrate-N is >10x TKN.
OPF - Orthophosphate test was conducted on frozen (preserved) sample. CCME hold time (72 hrs) was exceeded, but freezing can extend hold time to 30 days according to ISO 5667-3 (2012).
RRV - Reported Result Verified By Repeat Analysis
Nitrate is reported by lab as Nitrate (as N) in mg/L. "Nitrate as N" is converted to "Nitrate as NO3" using the expression: Nitrate-NO3 = (Nitrate-N)*4.43. Nitrate molecule weighs 62 g/mole; the nitrogen content of nitrate is 22.5% of the total weight of the molecule.
Nitrite is reported by lab as Nitrite (as N) in mg/L. "Nitrite as N" is converted to "Nitrite as NO2" using the expression: Nitrite-NO2 = (Nitrate-N)*3.28. Nitrite molecule weighs 46 g/mole; the nitrogen content of nitrite is 30.4% of the total weight of the molecule.

Sample ID	Lab Tracking Number	Date & Time Sampled (dd/mm/yyyy hh:mm)	Comments	Lithium (Li) diss.	Magnesium (Mg) diss.	Manganese (Mn) diss.	Molybdenum (Mo) diss.	Nickel (Ni) diss.	Phosphorus (P) diss	Potassium (K) diss.	Rubidium (Rb) diss.	Ruthenium (Ru) diss.	Selenium (Se) diss.	Silicon (Si) diss	Silver (Ag) diss	Sodium (Na) diss.	Strontium (Sr) diss.	Sulfur (S) diss.	Tellurium (Te) diss.	Thallium (Tl) diss.	Thorium (Th) diss.	Tin (Sn) diss.	Titanium (Ti) diss.	Tungsten (W) diss.	Uranium (U) diss.	Vanadium (V) diss.	Zinc (Zn) diss.	Zirconium (Zr) diss.	Cations Total	Anions Total	Cation - Anion Balance
			Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mEq/L	mEq/L	%
			Detection Limit:	0.001	0.005	0.0001	0.00005	0.0005	0.03	0.05	0.0002	0.001	0.00005	0.05	0.00001	0.05	0.0001	0.5	0.0002	0.00001	0.0001	0.0001	0.0003	0.0001	0.00001	0.0005	0.001	0.0002	0.1	0.1	
SB_MW01_BR_GW0001	L2733079-1	12/09/2022 17:30		0.0034	26.5	0.0134	0.00140	<0.00050	<0.050	0.797	0.00027	-	0.000126	6.38	<0.000050	5.76	0.197	8.79	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.000562	<0.00050	<0.0010	<0.00020	5.51[#1]	4.59[#1]	9[#1]
SB_MW01_BR_GW0002	L2733487-6	08/09/2022 13:40		<0.0010	<0.0050	<0.00010	<0.000050	<0.00050	<0.050	<0.050	<0.00020	-	<0.000050	0.962 RRV	<0.000010	0.246 RRV	0.00026 RRV	<0.50	<0.00020	<0.000010	<0.00010	0.00027 RRV	<0.00030	<0.00010	<0.000010	<0.00050	<0.0010	<0.00020	<0.10[#1]	<0.10[#1]	-
SB_MW01_BR_GW0003	L2743397-1	16/12/2022 14:40		0.0037	26.4	0.0904	0.00114	<0.00050	<0.030	0.873	0.00033	-	<0.000050	3.21	<0.000010	5.20	0.0999	3.12	<0.00020	<0.000010	<0.00010	0.00288	<0.00030	<0.00010	0.000069	<0.00050	0.0010	<0.00020	4.41[#1]	4.47[#1]	-0.7
SB_MW01_BR_GW0004	L2743397-19	16/12/2022 14:40	Field Duplicate of SB_MW01_BR_GW0003	0.0036	27.1	0.0897	0.00116	<0.00050	<0.030	0.881	0.00028	-	<0.000050	3.19	<0.000010	5.32	0.0965	3.42	<0.00020	<0.000010	<0.00010	0.00270	<0.00030	<0.00010	0.000068	<0.00050	<0.0010	<0.00020	4.38[#1]	4.39[#1]	-0.1
SB_MW01_OB-INT_GW0001	L2733079-2	12/09/2022 17:50		<0.0010	24.4	<0.00050	0.000161	<0.00050	<0.050	0.617	0.00055	-	0.000398	3.81	<0.000050	1.75	0.0824	1.57	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.000297	<0.00050	<0.0010	<0.00020	5.76[#1]	5.11[#1]	6[#1]
SB_MW01_OB-INT_GW0002	L2743397-2	14/12/2022 15:00		<0.0010	21.8	0.00033	0.000479	<0.00050	<0.030	0.752	0.00060	-	0.000378	3.07	<0.000010	3.78	0.0635	1.58	<0.00020	<0.000010	<0.00010	0.00015	<0.00030	<0.00010	0.000329	<0.00050	0.0016	<0.00020	5.44[#1]	5.94[#1]	-4.4
SB_MW01_OB-INT_GW0002	L2743397-24	17/12/2022 11:50		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW02_BR_R-B_GW0001	L2733283-6	16/09/2022 18:45		0.0033	23.5	0.0165	0.00853	0.00062	<0.050	0.758	0.00130	-	0.000080	3.76	<0.000010	12.5	0.816	14.1	<0.00020	<0.000010	<0.00010	0.00013	<0.00030	0.00119	0.00793	<0.00050	<0.0010	<0.00020	5.63[#1]	4.73[#1]	9[#1]
SB_MW02_BR_R-B_GW0002	L2743397-26	17/12/2022 10:35		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.41	5.63	-2
SB_MW02_BR_R-B_GW0002	L2743397-4	13/12/2022 18:35		0.0022	25.5	0.00549	0.00561	<0.00050	<0.030	0.513	0.00046	-	<0.000050	3.35	<0.000010	1.41	0.730	10.3	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	0.00034	0.00406	<0.00050	<0.0010	<0.00020	-	-	-
SB_MW02_BR-A_GW0001	L2733283-5	16/09/2022 15:10		0.0066	46.4	0.00473	0.00379	0.00053	<0.050	1.19	0.00122	-	<0.000050	3.52	<0.000010	4.05	4.06	87.7	<0.00020	<0.000010	<0.00010	0.00013	<0.00030	<0.00010	0.00369	<0.00050	0.0016	<0.00020	9.87[#1]	8.85[#1]	5[#1]
SB_MW02_BR-A_GW0002	L2743397-25	17/12/2022 10:30		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.16	9.03	0.7
SB_MW02_BR-A_GW0002	L2743397-3	13/12/2022 15:50		0.0059	44.7	0.00420	0.00520	0.00073	<0.030	0.965	0.00105	-	0.000056	3.30	<0.000010	4.38	3.12	71.8	<0.00020	<0.000010	<0.00010	0.00010	<0.00030	<0.00010	0.00658	<0.00050	0.0015	<0.00020	-	-	-
SB_MW02_BR-A_GW0003	L2743397-21		Trip Blank	<0.0010	<0.0050	<0.00010	<0.000050	<0.00050	<0.030	<0.050	<0.00020	-	<0.000050	<0.050	<0.000010	<0.050	<0.00010	<0.50	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	<0.000010	<0.00050	<0.0010	<0.00020	-	-	-
SB_MW02_BR-C_GW0001	L2733283-7	16/09/2022 16:35		0.0040	19.8	0.0151	0.0218	0.00072	<0.050	0.885	0.00164	-	0.000100	5.91	<0.000010	22.3	0.319	10.4	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.0194	<0.00050	<0.0010	<0.00020	5.55[#1]	4.96[#1]	6[#1]
SB_MW02_BR-C_GW0002	L2743397-27	17/12/2022 10:40		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.54	9.02	-15.9
SB_MW02_BR-C_GW0002	L2743397-5	13/12/2022 16:40		0.0071	14.5	0.0300	0.0141	<0.00050	<0.030	1.55	0.00336	-	0.00131	5.23	<0.000010	64.8	0.417	16.4	<0.00020	<0.000010	<0.00010	0.00012	<0.00030	<0.00010	0.0190	<0.00050	0.0014	<0.00020	-	-	-
SB_MW02_OB-INT_GW0001	L2733283-8	16/09/2022 17:25		0.0015	29.5	<0.00010	0.000425	<0.00050	<0.050	0.631	0.00042	-	0.000220	4.77	<0.000010	2.38	0.101	4.80	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.000575	<0.00050	<0.0010	<0.00020	6.70[#1]	6.04[#1]	5[#1]
SB_MW02_OB-INT_GW0002	L2743397-28	17/12/2022 10:45		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.74	8.22	-9.8
SB_MW02_OB-INT_GW0002	L2743397-6	13/12/2022 19:20		0.0014	29.9	0.00017	0.000363	<0.00050	<0.030	0.488	0.00038	-	0.000269	4.63	<0.000010	2.19	0.0898	4.74	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.000524	<0.00050	0.0034	<0.00020	-	-	-
SB_MW03_BR-A_GW0001	L2733283-1	15/09/2022 15:40		0.0027	22.6	0.00317	0.00158	<0.00050	<0.050	0.824	0.00053	-	<0.000050	3.82	<0.000010	4.26	1.16	11.3	<0.00020	<0.000010	<0.00010	0.00014	<0.00030	0.00011	0.00158	<0.00050	0.0019	<0.00020	5.11[#1]	4.55[#1]	6[#1]
SB_MW03_BR-B_GW0001	L2733283-2	15/09/2022 17:10		0.0025	23.7	0.00219	0.00222	0.00072	<0.050	0.788	0.00041	-	<0.000050	3.99	<0.000010	2.25	1.16	11.8	<0.00020	<0.000010	<0.00010	0.00012	<0.00030	<0.00010	0.00308	<0.00050	0.0023	<0.00020	5.26[#1]	4.61[#1]	7[#1]
SB_MW03_BR-C_GW0001	L2733283-3	15/09/2022 17:50		0.0028	22.7	0.00572	0.00202	0.00172	<0.050	0.820	0.00046	-	<0.000050	3.90	<0.000010	4.28	1.31	12.5	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.00504	<0.00050	<0.0010	<0.00020	5.02[#1]	4.64[#1]	4[#1]
SB_MW03_OB-INT_GW0001	L2733283-4	15/09/2022 18:50		0.0025	22.9	0.00853	0.00213	0.00116	<0.050	0.828	0.00056	-	<0.000050	4.07	<0.000010	2.05	1.09	11.6	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.00631	<0.00050	<0.0010	<0.00020	5.00[#1]	4.58[#1]	4[#1]
SB_MW04_BR-A_GW0001	L2733079-3	13/09/2022 11:35		0.0095	62.5	0.00430	0.00268	<0.00050	<0.050	1.32	0.00096	-	<0.000050	3.33	<0.000050	4.24	6.38 DLHC	161	0.00021	<0.000010	<0.00010	0.00012	<0.00030	<0.00010	0.00148	<0.00050	0.0023	<0.00020	13.8[#1]	12.9[#1]	4[#1]
SB_MW04_BR-A_GW0002	L2743397-29	17/12/2022 12:00		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW04_BR-A_GW0002	L2743397-7	14/12/2022 17:15		0.0088	63.0	0.00402	0.00243	<0.00050	<0.030	1.24	0.00087	-	<0.000050	3.19	<0.000010	4.23	5.86	146	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.00124	<0.00050	<0.0010	<0.00020	13.6[#1]	13.7[#1]	-0.1
SB_MW04_BR-B_GW0001	L2733079-4	13/09/2022 12:35		0.0089	59.7	0.00452	0.00243	<0.00050	<0.050	1.34	0.00091	-	<0.000050	3.20	<0.000050	3.96	6.07 DLHC	140	0.00023	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.00108	<0.00050	<0.0010	<0.00020	13.0[#1]	12.0[#1]	4[#1]
SB_MW04_BR-B_GW0002	L2733079-5	13/09/2022 12:35	Field Duplicate of SB_MW04_BR-B_GW0001	0.0086	58.4	0.00462	0.00243	<0.00050	<0.050	1.30	0.00090	-	<0.000050	3.15	<0.000050	3.95	5.93 DLHC	144	0.00026	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.00109	<0.00050	0.0026	<0.00020	12.9[#1]	12.1[#1]	3[#1]
SB_MW04_BR-B_GW0003	L2743397-30	14/12/2022 12:05		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW04_BR-B_GW0003	L2743397-8	14/12/2022 18:20		0.0086	62.0	0.00444	0.00211	<0.00050	<0.030	1.29	0.00084	-	<0.000050	3.09	<0.000010	4.19	5.50	137	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.000898	<0.00050	0.0013	<0.00020	12.9[#1]	12.8[#1]	0.3[#1]
SB_MW04_BR-B_GW0004	L2743397-20	14/12/2022 18:20	Field Duplicate of SB_MW04_BR-B_GW0003	0.0089	60.7	0.00432	0.00212	<0.00050	<0.030	1.26	0.00083	-	<0.000050	3.11	<0.000010	4.11	5.35	127	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.000904	<0.00050	<0.0010	<0.00020	12.8[#1]	12.7[#1]	0.5[#1]
SB_MW04_BR-B_GW0004	L2743397-23	17/12/2022 12:05	Field Duplicate of SB_MW04_BR-B_GW0003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW04_BR-C_GW0001	L2733079-6	13/09/2022 13:35		0.0079	58.6	0.00874	0.00294	<0.00050	<0.050	1.24	0.00086	-	0.000945	3.55	<0.000050	4.62	5.62 DLHC	129	<0.00020	<0.000010	<0.00010	0.00011	<0.00030	<0.00010	0.00205	<0.00050	0.0025	<0.00020	12.5[#1]	11.3[#1]	5[#1]
SB_MW04_BR-C_GW0002	L2733079-7	13/09/2022 13:50		<0.0010	0.0067 RRV	<0.00050	<0.000050	<0.00050	<0.050	<0.050	<0.00020	-	<0.000050	0.632 RRV	<0.000050	0.294 RRV	<0.0010	<0.50	<0.00020	<0.000010	<0.00010	0.00057 RRV	<0.00030	<0.00010	<0.000010	<0.00050	0.0019 RRV	<0.00020	<0.10[#1]	<0.10[#1]	-
SB_MW04_BR-C_GW0003	L2743397-31	17/12/2022 12:10		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW04_BR-C_GW0003	L2743397-9	14/12/2022 19:15		0.0075	61.3	0.00875	0.00275	<0.00050	<0.030	1.21	0.00082	-	<0.000050	3.55	<0.000010	5.09	4.86	129	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.00180	<0.00050	0.0017	<0.00020	12.4[#1]	12.2[#1]	0.7[#1]
SB_MW04_OB-INT_GW0001	L2733079-8	13/09/2022 14:10		<0.0010	26.8	<0.00050	0.000204	<0.00050	<0.050	0.604	0.00037	-	0.000189	2.66	<0.000050	1.48	0.0978	1.83	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.000436	<0.00050	<0.0010	<0.00020	6.40[#1]	5.19[#1]	10[#1]
SB_MW04_OB-INT_GW0002	L2743397-10	14/12/2022 19:40		<0.0010	26.5	0.00012	0.000211	<0.00050	<0.030	0.582	0.00038	-	0.000176	2.59	<0.000010	1.59	0.0829	1.82	<0.00020	<0.000010	<0.00010	0.00012	<0.00030	<0.00010	0.000386	<0.00050	0.0013	<0.00020	6.18[#1]	7.38[#1]	-8.8
SB_MW04_OB-INT_GW0002	L2743397-32	17/12/2022 12:15		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW05_BR-A_GW0001	L2733079-9	13/09/2022 17:20		0.0157	55.7	0.00291	0.00198	<0.00050	<0.050	3.15	0.00193	-	<0.000050	3.21	<0.000050	125	12.7 DLHC	127	0.00037	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.000757	<0.00050	<0.0010	<0.00020	16.7[#1]	15.7[#1]	3[#1]
SB_MW05_BR-A_GW0002	L2743397-11	15/12/2022 15:50		0.0161	56.7	0.00298	0.00185	<0.00050	<0.030	2.83	0.00181	-	<0.000050	3.20	<0.000010	130	11.1	120	0.00036	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.000711	<0.00050	<0.0010	<0.00020	16.9[#1]	16.5[#1]	1.1[#1]
SB_MW05_BR-A_GW0002	L2743397-33	17/12/2022 11:25		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW05_BR-B_GW0001	L2733079-10	13/09/2022 18:25		0.0099	34.1	0.0174	0.00451	0.00075	<0.050	1.92	0.00084	-	0.000681	4.27	<0.000050	73.9	7.43 DLHC	48.9	0.00029	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.00578	<0.00050	<0.0010	<0.00020	9.95[#1]	9.36[#1]	3[#1]
SB_MW05_BR-B_GW0002	L2743397-12	15/12/2022 17:00		0.0105	36.0	0.0222	0.00372	0.00067	<0.030	1.92	0.00080	-	0.000061	4.34	<0.000010	80.4	7.26	46.0	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.00484	<0.00050	0.0015	<0.00020	10.6[#1]	10.1[#1]	2.3[#1]
SB_MW05_BR-B_GW0002	L2743397-34	17/12/2022 11:30		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW05_BR-B_GW0003	L2743397-22	16/12/2022 20:22	Field Blank	<0.0010	<0.0050	<0.00010	<0.000050	<0.00050	<0.030	<0.050	<0.00020	-	<0.000050	<0.050	<0.000010	<0.050	<0.00010	<0.50	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	<0.000010	<0.00050	<0.0010	<0.00020	-	-	-
SB_MW05_BR-C_GW0001	L2733079-11	13/09/2022 19:05		0.0105	36.6	0.0365	0.00279	0.00057	<0.050	1.98	0.00107	-	0.00137	4.40	<0.000050	73.9	8.20 DLHC	58.8	0.00030	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.00597	<0.00050	<0.0010	<0.00020	10.8[#1]	10.0[#1]	4[#1]
SB_MW05_BR-C_GW0002	L2743397-13	15/12/2022 18:05		0.0099	37.2	0.0346	0.00241	0.00069	<0.030	1.79	0.00086	-	<0.000050	4.36	<0.000010	68.1	7.38	47.5	0.00023	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.00421	<0.00050	0.0013	<0.00020	10.5[#1]	10.1[#1]	1.8[#1]
SB_MW05_BR-C_GW0002	L2743397-35	17/12/2022 11:35		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW05_OB-INT_GW0001	L2733079-12	14/09/2022 08:40		0.0016	39.1	0.362	0.0128	0.00176	<0.050	3.20	0.00065	-	0.000075	4.70	<0.000050	42.3	1.82	25.9	<0.00020	<0.000010	<0.00010	0.00011	0.00440	<0.00010	0.00581	0.00065	0.0043	0.00020	8.51[#1]	8.08[#1]	3[#1]
SB_MW05_OB-INT_GW0001	L2733283-9	16/09/2022 19:40		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB_MW05_OB-INT_GW0002	L2743397-14	16/12/2022 15:20		0.0010	39.1	0.327	0.0105	0.00188	<0.030	3.01	0.00036	-	0.000062	4.16	<0.000010	43.3	1.53	22.0	<0.00020	<0.000010	<0.00010	0.00011	<0.00030	<0.00010	0.00393	<0.00050	0.0019	<0.00020	8.47[#1]	11.8[#1]	-16.5
SB_MW06_BR-A_GW0001	L2725656-6	27/07/2022 15:10		0.0050	35.9	0.00164	0.00277	<0.00050	<0.050	0.952	0.00080	<0.0020 DLA	<0.000050	3.39	<0.000050	28.8	5.14 DLHC	15.1	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.000499	<0.00050	<0.0010	<0.00020	7.57[#1]	6.18[#1]	10[#1]
SB_MW06_BR-A_GW0002	L2725656-9	27/07/2022 12:50	Field Blank	<0.0010	<0.0050	<0.00050	<0.000050	<0.00050	<0.050	<0.050	<0.00020	<0.0010	<0.000050	<0.050	<0.000050	<0.050	<0.0010	<0.50	<0.00020	<0.000010	<0.00010	0.00011 RRV	<0.00030	<0.00010	<0.000010	<0.00050	<0.0010	<0.00020	<0.10[#1]	<0.10[#1]	-
SB_MW06_BR-A_GW0003	L2733079-13	14/09/2022 14:25		0.0064	35.6	0.00146	0.00278	<0.00050	<0.050	0.903	0.00083	-	0.000140	3.14	<0.000050	33.6	5.63 DLHC	15.2	0.00021	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.000541	<0.00050	<0.0010	<0.00020	7.98[#1]	7.13[#1]	6[#1]
SB_MW06_BR-A_GW0004	L2733079-14	14/09/2022 14:25	Field Duplicate of SB_MW06_BR-A_GW0003	0.0062	35.8	0.00153	0.00275	<0.00050	<0.050	0.907	0.00078	-	0.000069	3.19	<0.000050	33.3	5.55 DLHC	15.8	0.00020	<0.000010	<0.00010	0.00012	<0.00030	<0.00010	0.000528	<0.00050	0.0025	<0.00020	7.85[#1]	7.12[#1]	5[#1]
SB_MW06_BR-B_GW0001	L2725656-7	27/07/2022 17:20		0.0041	24.1	0.0623	0.00448	<0.00050	<0.050	1.50	0.00147	<0.0010	<0.000050	3.78	<0.000050	74.7	2.45 DLHC	29.9	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.00612	<0.00050	<0.0010	<0.00020	8.66[#1]	8.13[#1]	3[#1]
SB_MW06_BR-C_GW0001	L2725656-8	27/07/2022 18:15		0.0012	23.7	0.0133	0.00527	0.00057	<0.050	0.680	0.00051	<0.0010	<0.000050	3.49	<0.000050	19.2	1.11	9.87	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.00233	<0.00050	0.0018	<0.00020	5.93[#1]	5.16[#1]	7[#1]
SB_MW06_BR-C_GW0002	L2725656-10	27/07/2022 18:15	Field Duplicate of SB_MW06_BR-C_GW0001	0.0012	23.8	0.0133	0.00546	0.00056	<0.050	0.667	0.00049	<0.0010	<0.000050	3.55	<0.000050	19.0	1.13	10.0	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.00240	<0.00050	<0.0010	<0.00020	5.92[#1]	5.13[#1]	7[#1]
SB_MW06_BR-C_GW0003	L2733079-15	14/09/2022 17:10		0.0016	22.4	0.0109	0.00549	0.00063	<0.050	0.563	0.00045	-	0.000344	3.21	<0.000050	15.6	1.15	8.10	<0.00020	<0.000010	<0.00010	0.00012	<0.00030	<0.00010	0.00189	<0.00050	0.0028	<0.00020	5.71[#1]	5.07[#1]	6[#1]
SB_MW06_OB-INT_GW0001	L2725656-11	27/07/2022 18:55		<0.0010	30.3	0.00249	0.00319	0.00073	<0.050	1.63	0.00084	<0.0010	0.000242	3.24	<0.000050	2.79	0.214	3.61	<0.00020	0.000011	<0.00010	<0.00010	<0.00030	<0.00010	0.000966	<0.00050	<0.0010	<0.00020	6.24[#1]	5.22[#1]	9[#1]
SB_MW06_OB-INT_GW0002	L2733079-16	14/09/2022 18:00		<0.0010	27.6	0.00098	0.00378	0.00080	<0.050	1.52	0.00086	-	0.000286	3.01	<0.000050	5.86	0.208	3.63	<0.00020	0.000010	<0.00010	0.00014	<0.00030	<0.00010	0.00106	<0.00050	0.0033	<0.00020	6.25[#1]	5.50[#1]	6[#1]
SB_MW07_BR-A_GW0001	L2725656-1	26/07/2022 17:30		<0.0010	29.3	0.0112	0.00598	0.00294	<0.050	1.00	0.00083	<0.0010	0.00212	3.69	<0.000050	12.2	0.558	10.8	<0.00020	0.000037	<0.00010	<0.00010	<0.00030	<0.00010	0.0124	0.00051	0.0015	<0.00020	6.62[#1]	5.48[#1]	9[#1]
SB_MW07_BR-A_GW0002	L2725656-5	26/07/2022 17:00	Trip Blank	<0.0010	<0.0050	<0.00050	<0.000050	<0.00050	<0.050	<0.050	<0.00020	<0.0010	<0.000050	<0.050	<0.000050	<0.050	<0.0010	<0.50	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	<0.000010	<0.00050	<0.0010	<0.00020	<0.10[#1]	<0.10[#1]	-
SB_MW07_BR-A_GW0003	L2733487-1	17/09/2022 13:40		<0.0010	27.7	0.0116	0.00574	0.00288	<0.050	1.03	0.00078	-	0.00217	3.54	<0.000010	11.0	0.524	9.53	<0.00020	0.000024	<0.00010	<0.00010	0.00051	<0.00010	0.00989	<0.00050	0.0019	<0.00020	6.14[#1]	6.13[#1]	0[#1]
SB_MW07_BR-A_GW0004	L2743397-15	16/12/2022 17:25		<0.0010	28.5	0.00665	0.00281	0.00153	<0.030	0.671	0.00051	-	0.00187	3.26	<0.000010	7.59	0.370	7.91	<0.00020	0.000014	<0.00010	<0.00010	<0.00030	<0.00010	0.00925	<0.00050	0.0013	<0.00020	6.33[#1]	8.54[#1]	-14.9
SB_MW07_BR-B_GW0001	L2725656-2	26/07/2022 20:20		0.0012	27.3	0.0174	0.0168	0.00650	<0.050	0.820	0.00066	<0.0010	0.00266	3.41	<0.000050	18.9	0.445	14.2	<0.00020	0.000153	<0.00010	<0.00010	<0.00030	<0.00010	0.0312	<0.00050	0.0087	<0.00020	6.84[#1]	5.42[#1]	12[#1]
SB_MW07_BR-B_GW0002	L2733487-2	17/09/2022 15:15		0.0015	25.1	0.0171	0.0181	0.00626	<0.050	0.826	0.00075	-	0.00267	3.26	<0.000010	18.0	0.424	12.8	<0.00020	0.000153	<0.00010	<0.00010	<0.00030	<0.00010	0.0282	<0.00050	0.0097	<0.00020	6.55[#1]	5.88[#1]	5[#1]
SB_MW07_BR-B_GW0003	L2733487-3	17/09/2022 15:15	Field Duplicate of SB_MW07_BR-B_GW0002	0.0015	24.4	0.0179	0.0172	0.00633	<0.050	0.811	0.00066	-	0.00251	3.18	<0.000010	17.6	0.405	12.7	<0.00020	0.000148	<0.00010	<0.00010	<0.00030	<0.00010	0.0278	<0.00050	0.0093	<0.00020	6.33[#1]	5.83[#1]	4[#1]
SB_MW07_BR-B_GW0004	L2743397-16	16/12/2022 18:40		0.0014	24.9	0.0142	0.0152	0.00501	<0.030	0.661	0.00061	-	0.00188	2.96	<0.000010	17.0	0.339	11.6	<0.00020	0.000097	<0.00010	<0.00010	<0.00030	<0.00010	0.0216	<0.00050	0.0079	<0.00020	6.45[#1]	6.73[#1]	-2.1
SB_MW07_BR-C_GW0001	L2725656-3	26/07/2022 19:00		<0.0010	23.6	0.00728	0.0978	0.0157	<0.050	1.31	0.00079	<0.0020 DLA	0.000294	3.42	<0.000050	2.55	9.02 DLHC	5.14	0.00033	0.000114	<0.00010	0.00010	<0.00030	<0.00010	0.0196	<0.00050	0.0021	<0.00020	5.48[#1]	4.26[#1]	13[#1]
SB_MW07_BR-C_GW0002	L2733487-5	18/09/2022 11:05		<0.0020 DLA	21.5	0.00867	0.0898	0.0131	<0.10 DLA	1.25	0.00080	-	0.00011	3.25	<0.000020 DLA	2.79	8.64	4.6	0.00045	0.000078	<0.00020 DLA	<0.00020 DLA	<0.00060 DLA	<0.00020 DLA	0.0181	<0.0010 DLA	0.0025	<0.00040 DLA	5.04[#1]	4.57[#1]	5[#1]
SB_MW07_BR-C_GW0003	L2743397-17	16/12/2022 19:30		<0.0010	21.6	0.00753	0.0761	0.00919	<0.030	1.01	0.00068	-	0.000110	3.02	<0.000010	2.84	7.53	3.97	0.00028	0.000038	<0.00010	0.00011	<0.00030	<0.00010	0.0149	<0.00050	0.0021	<0.00020	5.16[#1]	5.28[#1]	-1.2
SB_MW07_OB-INT_GW0001	L2725656-4	28/07/2022 13:00		<0.0010	32.1	0.0268	0.000085	0.00068	<0.050	0.744	0.00050	<0.0010	0.000068	4.12	<0.000050	47.8	0.151	1.55	<0.00020	<0.000010	0.00013	<0.00010	0.00645	<0.00010	0.000651	0.00086	0.0017	0.00029	10.6[#1]	7.94[#1]	14[#1]
SB_MW07_OB-INT_GW0002	L2733487-4	17/09/2022 16:10		<0.0010	22.7	0.00110	0.000091	<0.00050	<0.050	0.746	0.00028	-	0.000056	3.39	<0.000010	39.2	0.126	1.20	<0.00020	<0.000010	<0.00010	0.00011	<0.00030	<0.00010	0.000200	<0.00050	0.0018	<0.00020	8.13[#1]	7.77[#1]	2[#1]
SB_MW07_OB-INT_GW0003	L2743397-18	16/12/2022 19:55		<0.0010	24.0	0.00190	0.000236	<0.00050	<0.030	0.545	<0.00020	-	0.000084	3.28	<0.000010	42.4	0.105	1.72	<0.00020	<0.000010	<0.00010	<0.00010	0.00034	<0.00010	0.000251	<0.00050	0.0018	<0.00020	8.53[#1]	13.2[#1]	-21.3

Notes

#1 - Calculated by lab

PEHT - Parameter Exceeded Recommended Holding Time Prior to Analysis

PEHR - Parameter Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested

DLM - Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).

DLA - Detection Limit Adjusted for required dilution

DLHC - Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

TKNI - TKN result may be biased low due to Nitrate interference. Nitrate-N is >10x TKN.

OPF - Orthophosphate test was conducted on frozen (preserved) sample. CCME hold time (72 hrs) was exceeded, but freezing can extend hold time to 30 days according to ISO 5667-3 (2012).

RRV - Reported Result Verified By Repeat Analysis

Nitrate is reported by lab as Nitrate (as N) in mg/L. "Nitrate as N" is converted to "Nitrate as NO3" using the expression: Nitrate-NO3 = (Nitrate-N)*4.43. Nitrate molecule weighs 62 g/mole; the nitrogen content of nitrate is 22.5% of the total weight of the molecule.

Nitrite is reported by lab as Nitrite (as N) in mg/L. "Nitrite as N" is converted to "Nitrite as NO2" using the expression: Nitrite-NO2 = (Nitrate-N)*3.28. Nitrite molecule weighs 46 g/mole; the nitrogen content of nitrite is 30.4% of the total weight of the molecule.

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