Appendix 7

Kinetic Testing of Waste Rock and Ore from the Doris Deposits, Hope Bay (SRK, November 2011)

Kinetic Testing of Waste Rock and Ore from the Doris Deposits, Hope Bay

Report Prepared for

Hope Bay Mining Ltd.

Report Prepared by

SRK Consulting (Canada) Inc.
1CH008.043
November 2011

Geochemical Kinetic Testing Report for Waste Rock and Ore from the Doris Deposits, Hope Bay

Hope Bay Mining Ltd.

300 – 889 Harbourside Drive
North Vancouver, BC
Canada

SRK Consulting (Canada) Inc.
Suite 2200 – 1066 West Hastings Street
Vancouver, BC V6E 3X2

e-mail: vancouver@srk.com
website: www.srk.com

Tel: +1.604.681.4196
Fax: +1.604.687.5532

SRK Project Number 1CH008.043

November 2011

Kinetic Testing of Waste Rock and Ore from the Doris Deposits, Hope Bay – Summary

This report provides an assessment of the acid rock drainage and metal leaching potential of waste rock and ore that would be produced as part of the proposed underground mining activities. Specifically this report discusses the kinetic program, including humidity cells and barrel tests.

The leachates from all samples were neutral to alkaline, stable sulphate release rates were low, metal concentrations were low for the humidity cell tests and all samples were predicted to be not-potentially acid generating. The data from this test program has been used to validate inputs used for water quality predictions from the waste rock and ore.

Ahityiqtaqni Uuktugaqni Iqakut Uyaqat Havikhatlu talvanga Doris Piqaqni, Hope Bay – Nainaqhimayut

Una tuhagakhaliaq piqaqtitiyuq naunaiyaqninik tapkuat huguilat uyaqat quqluaqnit haviktatlu maqilaqnit tapkuat iqakut uyaqat havikhatlu pinguqtauniat piplugit ilagini tapkuat uuktugutauyut nunap iluani uyagakhiuqniqmut huliniit. Piluaqtumik ukuat tuhagakhaliat uqauhigiyai tapkuat ahityiqtaqnit havagutit, ilautitlugit kinittaqnit iliuqaqvit qattaqyuknilu uuktugaqnit.

Tapkuat maqinit tahapkunanga tamaitnit naunaiyaqni naamaktut tapkununga huguilaqnit, hunialaitni sulphate pitaqvigini aktilangi pukkittut, haviit katihimanit piukkittut kinittaqnit iliuqaqvi uuktugaqni tapkuatlu tamaita naunaiyagat atuqniagahugiyauyut huguittagahuquqnaitninut pitaqviuni. Tapkuat tuhagakhat ukunanga uuktugaqnit havagutit atuqtauyut naunaiqninut pitaqvi atuqtauni imaqmut qanugitninut atuqniagahugiyauninut tahapkunanga iqakut uyaqat havikhatlu.

ᖄᖅᑎᑦᓯᖃᑦᑕᖅᑐᑦ ᓄᓇᒥ ᖃᐅᔨᓵᖅᑐᑦ ᖃᓄᑎᒋ ᖄᖅᑎᑦᓯᕗᓗᒃ ᑎᑭᐅᑎᓲᖑᒪᖔᖅ ᐊᒃᑕᑯᓂᒃ ᐅᔭᖃᓂᒃ ᐊᒻᒪᓗ ᐲᔭᖅᑕᐅᕙᓂᒃ ᐅᔭᖁᓐᓂᐊᖅᑕᓂᒃ ᐅᕙᙵᑦ ᑐᐊᕆᔅᓯᒥᒃ Doris_ᒥ ᐱᑕᓕᖕᓂᒃ, ᐅᕙᓂ Hope Bay_ᒥ _ ᐅᑯᐊ ᑐᓴᒐᒃᓴᑦ ᓇᐃᓈᖅᓯᒪᕙᑦ

ᐅᑯᐊ ᑐᓴᒐᒃᓴᑦ ᐱᑕᖃᑦ ᖃᐅᔨᓴᖅᑕᓂᒃ ᐅᔭᖃᓂᒃ ᐆᑎᓇᕙᓐᓇᖅᑐᖅᑕᓕᖕᓂᒃ ᐊᓯᐊᓄᑦ ᖃᒥᒃᑯᑎᒃ ᐊᒻᒪᓗ ᓴᕿᔭᒃᓴᔭᖅᑕᖃᑦ ᖃᒥᓐᓂᖅᐸᑕ ᐱᕙᓂᒃ ᐅᔭᖃᓂᒃ ᐊᒃᑕᑯᓂᒃ ᐊᒻᒪᓗ ᓴᕿᔭᒃᓴᖅᑕᖃᑐᐃᓐᓇᓇᐊᖃᒻᒪᑦ ᓴᖀᐊᔭᐅᕙᓐᓇᖅᑐᑦ ᐃᓚᒋᔭᐅᒐᔭᕐᒪᑕ ᑐᒃᓯᕌᓅᖕᒐᕙᓄᑦ ᓄᓇᐅᑉ ᐃᓗᐊᓂᒃ ᐅᔭᖃᒃᓴᖅᓯᐅᖅᓗᑎᒃ ᐊᐅᓚᑦᓯᓕᖅᐸᑕ. ᐅᑯᓄᖕᒐᖕᒐᕙᑦ ᑐᓴᒐᒃᓴᑦ ᐋᖄᕈᑕᐅᒪᓕᑕ ᖄᖅᑎᑦᓯᕙᖃᖁᐃᑉᐸᑦ ᐋᑐᑕᐅᖃᑦᑕᖁᔭᖅᑐᑦ ᖃᐅᔨᓴᖅᑕᐅᒪᓕᑕ ᐱᓕᕆᐊᖑᓗᑎᒃ, ᒪᑯᐊ ᐃᓚᒋᔭᐅᓪᓗᑎᒃ ᓄᓇᐅᑉ ᐃᓗᐊᓂ ᐃᑎᖅᓴᐃᑦ ᐊᒻᒪᓗ ᖃᑦᑕᐅᔭᐃᑦ ᖃᐅᔨᓴᖅᑕᐅᖃᑦᑕᕐᓗᑎᒃ.

ᖃᒥᓂᓕᓖᑦ ᐊᓯᐊᓄᑦ ᐆᒃᑐᖁᖅᑕᐅᕙᒪᑕ ᖃᓄᖅ ᓂᖁᒍᓐᓇᖅᑐᑦ ᖃᑎᖅᑐᖅᓯᒪᓕᓂᑦ ᐸᓂᓕᖁᒥᒃ ᓯᖃᓕᐅᓂᑦ, ᑕᓇᐅᖕᒐᕙᓪᓗ ᓴᕿᐊᓂᑦ ᖃᓄᑎᒋ ᐱᕗᓕᐊᓂᖕᒋᑦ ᓂᒃᑲᐃᑦᑑᓪᓗᑎᒃ ᓂᖂᓗᐊᖕᒋᑦᑐᑦ, ᓴᕿᔭᒃᓴᖅᑕᖀᑦ ᐊᒃᐸᓯᖕᓂᖃᕙᕙᑦ ᖃᐅᔨᓴᖅᑐᖃᑦᑎᓪᓗᒍ ᖃᓄᑎᒋ ᖃᐅᓯᐅᓕᖁᒥᒃ ᐋᕙᖕᒐᓃᖑᓂᖕᒋᑦ ᐊᒻᒪᓗ ᐃᓗᓐᓇᑎᒃ ᖃᐅᔨᓴᖅᑕᑦ ᓯᕗᕐᖓᒍᑦ ᖃᐅᔨᔭᐅᕙᕙᑦ ᐱᑕᖃᖕᒋᑦᑐᓪᒎᖅ ᐆᑎᓇᕙᓐᓇᖅᑐᓂᒃ. ᓄᐊᑕᐅᓯᒪᕙᑦ ᖃᐅᔨᒪᔾᔪᑎᒃᓴᓖᑦ ᐱᔭᑦ ᐅᑯᓇᖕᒐᑦ ᖃᐅᔨᓴᖅᑕᐅᕙᕙᓂᒃ ᐊᑐᖅᑕᐅᓯᒪᓕᖅᑐᑦ ᓇᓗᓇᐃᖅᓯᒍᑕᐅᒪᓕᑕ ᐃᒥᐅᑉ ᖃᓄᐃᑦᑑᓂᖕᒐᓂᒃ ᓯᕗᕐᖓᒍᑦ ᖃᐅᔨᒪᔭᐅᓯᓐᓇᕈᑕᐅᓕᖅᒪᑕ ᐱᕙᑦ ᐅᔭᖃᓂᒃ ᐊᒃᑕᑯᓂᒃ ᐊᒻᒪᓗ ᓴᕿᔭᒃᓴᔭᖅᑕᓕᖕᓂᒃ.

Technical Summary

Hope Bay Mining Ltd. (HBML), a wholly owned subsidiary of Newmont Mining (Newmont), is undertaking a comprehensive geochemical characterization program of mine waste at the Doris and a number of other gold deposits in the Hope Bay Belt, Nunavut, Canada. The characterization program is in support of ongoing feasibility study requirements, environmental assessments and permitting studies.

HBML are now advancing plans for underground mining of the Doris deposits, and are preparing an amendment to their Doris North Type A water license for submission to the Nunavut Water Board (NWB). Along with SRK (2011), this report provides an assessment of the acid rock drainage and metal leaching (ARD/ML) potential of waste rock and ore that would be produced as part of the proposed underground mining activities. Whereas SRK (2011) presented the static test work program for the Doris deposits, this report discusses the kinetic program, including humidity cells and barrel tests.

The kinetic test program for Doris included 21 humidity cell tests and five barrel tests. Four humidity cell tests were operated by Rescan (2001) and the remaining 17 samples were from more recent geochemical characterization programs by SRK in collaboration with Newmont. Sample selection was based on lithology, economic classification (ore or waste), and acid-base accounting characteristics. Samples representing material with typical and higher than average sulphide concentrations were selected for testing. Trace elements (i.e. arsenic) were also considered, but were a secondary consideration to ABA.

The leachates from all samples were neutral to alkaline. Stable sulphate release rates were low and ranged between the limit of analytical detection (0.4 mg/kg/week) to 6 mg/kg/week. Samples with higher sulphide contents tended to exhibit higher stable sulphate release rates.

Overall, metal concentrations were low for the humidity cell tests. Notably, late gabbros with elevated sulphur levels had higher levels of antimony, arsenic and cobalt as compared to the other Doris waste rock samples. Mafic volcanics with elevated sulphur, and mafic volcanics combined with quartz vein also had elevated levels of cobalt relative to the other samples All samples were predicted to be non-PAG on the basis of AP and NP depletion times and/or low stable sulphate release rates (less than 6 mg/kg/week).

For the barrel tests, leachate concentrations were comparable to the humidity cells, however loadings were one to two orders of magnitude lower (e.g. sulphate was 0.007 to 0.2 mg/kg/week). The lower release rates for the barrel tests reflect the lower operating temperatures and the larger grain size of the test material.

The data from the kinetic test program has been used to validate inputs used for water quality predictions from the waste rock and ore.

Table of Contents

List of Tables

List of Figures

Appendices

1 Introduction

1.1 Scope

Hope Bay Mining Ltd. (HBML), a wholly owned subsidiary of Newmont Mining (Newmont), is undertaking a comprehensive geochemical characterization program of mine waste at the Doris and a number of other gold deposits in the Hope Bay Belt, Nunavut, Canada. The characterization program is in support of ongoing feasibility study requirements, environmental assessments and permitting studies.

HBML are now advancing plans for underground mining of the Doris deposits, and are preparing an amendment to their Doris North Type A water license for submission to the Nunavut Water Board (NWB). Along with SRK (2011), this report provides an assessment of the acid rock drainage and metal leaching (ARD/ML) potential of waste rock and ore that would be produced as part of the proposed underground mining activities. The geological context and development concept on which this study was based are presented in Sections 1.2 and 1.3 of SRK (2011). Whereas SRK (2011) presented the static test work program for the Doris deposits, this report discusses the kinetic program, including humidity cells and barrel tests. The program is largely based on recent test work conducted SRK in collaboration with Newmont, though relevant data from historic humidity cell tests are also presented.

1.2 Overview of Previous Kinetic Testing

The historic Doris testing programs included four humidity cell tests on waste rock material. Three of the samples were from Doris Central and one from Doris North. On the basis of results from these tests, metal leaching was not considered to be a concern (Rescan 2001, AMEC 2005). However, detection limits were high for selected parameters. Further discussion of these samples is presented in this report.

2 Methods

The Doris North, Connector and Central deposits are from the same vein system. On the basis of geology, humidity cell tests from any of the Doris areas are assumed to representative of Doris North, Connector or Central for the purpose of water quality predictions. Statistically, sulphur content was lowest for Doris North and highest for Doris Connector humidity cell samples (see Figure 3.2 in SRK (2011)).

The geochemical kinetic database compiled for the Doris project consists of both humidity cell and barrel tests. Details on the tests and testing methods used for each of these programs are presented below.

2.1 Humidity Cell Tests

There are a total of 21 humidity cell tests from the Doris deposit. Seventeen of the humidity cell tests are from geochemical characterization programs by SRK in collaboration with Newmont. The historic kinetic test work consists of four humidity cell tests (Rescan 2001).

2.1.1 Historic Samples

Four humidity cell tests of waste rock and ore samples from Doris were operated for 39 weeks using the Price (1997) method (Table 2.1). Three samples were from Doris Central and one from Doris North. The tests were operated by BC Research, in Vancouver, B.C. under the direction of Rescan. Operational details and data are provided in Rescan (2001).

SRK completed a QA/QC review of the methods and results, and determined the following:

- The Standard Sobek NP method was used to characterize samples prior to testing. Due to the presence of iron carbonates, NP/AP ratios for these historic humidity cell samples are likely overestimated.
- Alkalinity was only analyzed every second week therefore ion balances could not be assessed for half of the humidity cell test cycles.
- For all weeks with alkalinity data, ion balances for samples DUMV #5 and DUQ #1 were acceptable. For sample DUG #6, there was an ion imbalance for one week.
- Ion balances for sample DOP #12 were not acceptable for almost all weeks due to relatively low anion content. This may be related to the overestimation of cation charge, specifically sodium and potassium, which had levels below the detection limit (2 mg/L) for many cycles. When levels were below detection, concentrations were assumed to be half the detection limit, which likely overestimated the cationic charge of the ion balance.
- For all data below the detection, concentrations were assumed to half the detection limit. This assumption was used by Rescan and adopted by SRK during raw data transcription.
- The suite of trace elements analyzed did not include mercury.
- Until cycle 37, detection limits were high for many trace elements (e.g. aluminum, antimony and arsenic were 0.2 mg/L; copper and cadmium were 0.01 mg/L). Data were typically below detection and not meaningful given the high analytical limits.
- For cycle 38 and 39, low level analyses were determined for selected parameters, including aluminum, arsenic, cadmium, copper, iron, lead, molybdenum, nickel, selenium, silver and thallium.
- Selected parameters (e.g. iron, manganese and zinc) were above detection, however values above detection tended to be sporadic and anomalously high, suggesting contamination or analytical error.
- Mineralogy was not determined.

The rationale for sample selection was not documented. In Section 3.1.1, the characteristics of these samples relative to the Doris ABA database are discussed.

SRK concluded that the historic humidity cell tests from Doris should only be used for the determination of NP and AP depletion rates. However, data from the final two cycles of each test, which were completed using lower detection limits, would be suitable for representing more mineralized rock.

Table 2.1: List of Rescan (2001) Humidity Cell Tests

HC #	Zone	Lithology Code	Rock Type	Cycles
DOP #12	North	1	Mafic volcanic	39
DUMV #5	Central	1	Mafic volcanic	39
DUG #6	Central	10a	Late gabbro	39
DUQ #1	Central	12q	Quartz vein	39

2.1.2 SRK / Newmont Samples

Program Design

The overall objective of the Doris geochemical kinetic program was to characterize the significant lithologies representing waste rock and ore, as applicable. A total of seventeen humidity cell tests were selected in 2008, 2009 and 2011 by SRK. The selection criteria for each program were different and are discussed below. The most comprehensive selection of humidity cell tests was conducted in 2009. Sample intervals are listed in Appendix A.

Humidity cell samples were selected from Doris North and Doris Central for the following reasons:

- The sample set for Connector was smaller or not represented for some rock types, and
- Overall, sulphur content for Connector samples was statistically between North and Central.

Selection Rationale

2008 Humidity Cell Test Program

HC-6 and HC-7 were selected by SRK and are sub-samples of the barrel tests set up in 2008 at the Hope Bay project site (Table 2.2). Samples were selected using criteria for barrel test sample selection. As static testing data were not available at the time, barrel test intervals selected were specific lithologies with sufficient lengths of core that were easily accessible.

The humidity cell samples were obtained during barrel set-up. Each barrel test core interval was laid out in sequential order and a 3 to 5 kg sub-sample removed. The sub-sample was a composite of small (~10 cm) pieces of core taken from the middle of every third row and submitted to Maxxam Analytics (Maxxam, formerly Cantest Ltd.) for kinetic and static test work. The analytical program is described in detail later in this section.

Static test data was also generated for the HC-7 interval using archived exploration pulps (SRK 2011). The pulps were composited by Maxxam into approximately 10 m intervals under the direction of SRK. The data for the barrel interval was determined using weight-averaged calculations. This was not performed for HC-6 because this interval was not sampled during the exploration program and as a result, pulps were not available.

Table 2.2: 2008 Humidity Cell Test Selections

HC #	Zone	Lithology Code	Rock Type	Preliminary Economic Classification
HC-6	Central	7a mixed	Early gabbro	Mixed
HC-7	North	1	Mafic Volcanic	Waste

2009 Humidity Cell Test Program

Fourteen Doris humidity cell tests were selected in 2009 using an ABA database consisting of 638 samples from the Doris deposit. The sample set was composed of data from various sources including previous studies, samples recently characterized by SRK and data generated internally by Newmont. Details are provided in SRK (2011). The different static testing campaigns used different analytical and data interpretation methods. A comparison of data was made to reconcile the different analytical methods and to select surrogate parameters for the assessment of ARD and humidity cell test selection.

Selection was performed by SRK based on rock type, economic classification (ore or waste) and the statistical distribution of sulphur, neutralization potential (NP) and total inorganic carbon (TIC). The statistical distribution of specific trace elements (e.g. arsenic) was also a consideration but was secondary to the ABA characteristics. The dominant rock types for the Doris deposit were considered for humidity cell test work (Table 2.3). Rock types were assigned to each sample using geology logs and HBML's 2008 standard lithology codes. Economic classifications were assigned to each ABA sample by HBML geologists using a nominal open pit assay grade cutoff of 0.5 g/t.

For waste and ore samples of each rock type, the objective was to select samples containing either "typical" or "high" sulphur levels, and "typical" levels of NP, TIC and trace element content. "Typical" was defined as between P40 and P60 levels whereas "high" was between P90 and P95 levels. For NP, TIC and trace element content, the data from the overall Doris sample set was assessed for each rock type. The statistical assessment of sulphur varied according to the size of the sample set for each rock type, as described in Table 2.3. For rock types with larger sample sets (e.g. mafic volcanic), the statistical analysis was according to deposit zone (North or Central). Connector was not included because the sample set was small and the statistical distribution of sulphur was similar to North. For some rock types (e.g. diabase), sulphur content was consistently low and the difference in sulphur content between "typical" and "high" was small. (It is noted that some of the classifications of typical and high sulphur later changed when the ABA database was expanded. Revised percent ranks are discussed in Section 3.1.1).

Table 2.3: 2009 Humidity Cell Test Selection Considerations

Rock Type	Consideration for Selecting “Typical” and “High” Sulphur Samples
Mafic volcanic (1)	Sufficient number of samples from North and Central to select “typical” and “high” sulphur samples according to zone. Statistically, Central contained the highest sulphide content, however this may be a sampling bias as samples are typically proximal to the ore body where the geologically sulphides are higher. Connector sample set is small with statistical distribution of sulphur similar to North. Samples from North and Central are assumed to be representative of Connector.
Mafic volcanics with quartz vein (1 with 12q)	Small sample set. Selections according to overall Doris sample set.
Late gabbro (10a) and diabase (11c)	No samples from Doris Connector. Sulphur levels lower for samples from North than Central and a high proportion of North samples are distal to the deposit area. Samples were selected based on Central statistics. Small variations in sulphur content for diabase.
Quartz Vein (12q)	P40 to P60 distribution of sulphur for Doris deposit approximates North, Connector and Central zones. P95 values higher for Central.

Humidity cell samples obtained from storage were obtained from either Maxxam Analytics (Maxxam) in Burnaby, BC or Newmont Metallurgical Services (NMS) in Englewood, Colorado. Samples without jaw crushed splits in storage were obtained from drill core by HBML geologists under the direction of SRK. Samples were either a half- or quarter-round split of the drill core.

Static data was available for all samples. However, those characterized by Newmont were analyzed using internal methods referred to as net carbonate value (NCV). Samples selected for humidity cell tests with NCV data were also analyzed for ABA at Maxxam. The analytical program is described in detail later in this section.

Table 2.4: 2009 Humidity Cell Test Selections

Sample ID	Zone	Lithology Code	Rock Type	Preliminary Economic Classification	Selection Rationale[2]	Static Data Type[1]
HC-42	North	1	Mafic Volcanic	Waste	Typical S	NCV & ABA
HC-43	North	1	Mafic Volcanic	Waste	High S	NCV & ABA
HC-49	Central	1	Mafic Volcanic	Waste	High S	ABA
HC-50	Central	1	Mafic Volcanic	Waste	High S	ABA
HC-44	North	1 w. 12q	Mafic volcanic w. quartz vein	Waste	Typical S	NCV & ABA
HC-45	Central	1 w. 12q	Mafic volcanic w. quartz vein	Ore	High S	NCV & ABA
HC-46	Central	10a	Late gabbro	Waste	Typical S	NCV & ABA
HC-51	Central	10a	Late gabbro	Waste	High S	
HC-47	Central	11c	Diabase	Waste	Typical S	NCV & ABA
HC-48	Central	11c	Diabase	Waste	High S	NCV & ABA
HC-53	Central	12q	Quartz vein	Waste	Typical S (Doris)	ABA
HC-54	Central	12q	Quartz vein	Ore	Typical S (North)	ABA
HC-52	Central	12q	Quartz vein	Ore	Typical S (Central) / High S (North)	ABA
HC-36	Central	12q	Quartz vein	Ore	High S (Central)	ABA

[1]Samples originally characterized by Newmont in 2006 used the net carbonate value (NCV) method. ABA analyses were subsequently determined for NCV samples selected for humidity cell tests.
[2]These classifications were assigned during selection and have since been revised upon expansion of the ABA database.

2011 Humidity Cell Test Program

In 2011, sample coverage was reassessed in light of revised mine plans. Late gabbro reflecting the geochemical characteristics found in the vicinity of the decline were not adequately represented in the humidity cell program. Accordingly, one sample of late gabbro (HC-65) was specifically selected for this purpose.

The 29 ABA samples of gabbro from the Doris North decline contain both low TIC and sulphur levels, with maximum levels of 5 kg $CaCO_3$/t and 0.13%, respectively (SRK 2007). As a result of low TIC content, samples are typically classified as PAG, however the risk for ARD is considered to be low due to the low sulphur content, which limits the amount of acidity produced. The additional late gabbro sample was selected for kinetic testing was intended to quantify laboratory leaching rates, and verify these assumptions.

As described for the 2009 humidity cell program, the sample was selected based on the statistical distribution of ABA parameters for the Doris North gabbro sample set (SRK 2007). The sample selected for kinetic test work was on the upper end of sulphur content (0.1% or P85) to ensure sulphate production rates would be above detection. The analytical program is described in detail later in this section.

Table 2.5: 2008 Humidity Cell Test Selections

HC #	Zone	Lithology Code	Rock Type	Preliminary Economic Classification
HC-65	North decline	10a	Late gabbro	Waste

Analytical Program

All samples were submitted to Maxxam for static and kinetic test work.

The static test work included paste pH, total sulphur, sulphate sulphur, total inorganic carbon and trace element content by aqua regia digestion with ICP finish (Table 2.6) as per the methods outlined in SRK (2011). Mineralogy was determined at NMS and included XRD mineralogy with Rietveld refinement and whole pattern fitting and also mineral liberation analysis (MLA). Mineralogy for some samples is pending (Table 2.6). For the carbonate minerals with detectable levels of ferroan dolomite ($Ca(Fe,Mg)CO_3$) and magnesium-rich siderite ($(Fe,Mg)CO_3$), as determined by XRD, the iron content for each sample was determined by NMS using a scanning electron microscope (SEM). SEM was not determined for HC-47 and HC-48 because iron carbonate minerals were below the level of detection, as indicated by XRD. SEM data are pending for HC-65.

The humidity cell tests were initiated at Maxxam Analytics using the ASTM (2001) method.

Table 2.7 outlines the list of analytes and frequency.

Kinetic data are provided to SRK on a monthly basis. Each report undergoes QA/QC by SRK.

Table 2.6: Inventory of Static Test Work and Mineralogical Data, SRK Humidity Cell Tests

Program	Sample ID	Static Testing[1]				Kinetic Testing
		ABA	XRD	SEM	MLA	Date Initiated
SRK 2008	HC-6*	x	x	x	pending	Feb 2009
	HC-7*	x	x	x	pending	Feb 2009
SRK 2009	HC-36	x	x	x	x	Jan 2010
	HC-42	x	x	x	x	Jan 2010
	HC-43	x	x	x	x	Jan 2010
	HC-44	x	x	x	x	Jan 2010
	HC-45	x	x	x	x	Jan 2010
	HC-46	x	x	x	x	Jan 2010
	HC-47	x	x	n/a	x	Jan 2010
	HC-48	x	x	n/a	x	Jan 2010
	HC-49	x	x	x	x	Jan 2010
	HC-50	x	x	x	x	Jan 2010
	HC-51	x	x	x	x	Jan 2010
	HC-52	x	x	x	x	Jan 2010
	HC-53	x	x	x	x	Jan 2010
	HC-54	x	x	x	x	Apr 2010
SRK 2011	HC-65	x	pending	pending	pending	Feb 2011

[1]See text for details
n/a = not applicable.

Table 2.7: Analytical Frequency of SRK Humidity Cell Tests

General Parameters	Frequency
pH, EC, SO_4	weekly
Alkalinity, acidity	weekly
ORP or Eh	weekly
Metals	
ICP-MS (trace elements)	0, 1, 2, 4, 8, 12, 16 …, 40, 48, 56 etc.
ICP-OES suite[1]	weekly
Hg by CV	0, 1, 2, 4, 8, 12, 16 …, 40, 48, 56 etc.
Ions and Nutrients	
Fl, Cl, P, TDS	0, 1, 2, 4, 8, 12, 16 …, 40, 48, 56 etc.
NO_2, NO_3, NH_3	0, 1, 2, 4, 8, 12, 16 …, 40, 48, 56 etc.

[1]Al, Ca, Cu, Fe, Mg, K, Na, Zn

Evaluation for Completion of Humidity Cell Tests

The humidity cell results are periodically assessed to determine whether any tests can be stopped. The assessment includes the evaluation of the humidity cell data in terms of stability of sulphate and metals loadings, pH and rock type.

Of the 17 tests that were operating at the time of the most recent assessment (February 2011), 12 samples were determined to be complete. These were non-acidic and contained low sulphur content and/or had low stable sulphate and metal release rates. ABA analyses were conducted at Maxxam on the humidity cell test residues. The rationale to continue five of the samples varied, and related to increasing sulphate release rates, obtaining additional arsenic leaching data, low NP depletion times or an insufficient operational period. Testing of HC-65 was initiated in February 2011 and continues to operate.

2.1.3 Summary Humidity Cell Test Database

Table 2.8 summarizes the humidity cell test sample set for the Doris deposit. Rock types were assigned to each sample using HBML's 2008 standard lithology codes. Economic classifications were assigned to each sample by HBML geologists using the nominal open pit assay grade cut-off of 0.5 g/t. The grade cut-off will vary according to the mine plan.

For the five of the humidity cell tests still in operation, the most recent data have undergone QA/QC but re-runs may be pending.

Table 2.8: Summary of Doris Humidity Cell Tests

Sample ID	Lithology	Rock Type	Preliminary Economic Classification	Cycles	Status
DOP #12	1	Mafic Volcanic	Waste	39	Complete
DUMV #5	1	Mafic Volcanic	Waste	39	Complete
HC-7*	1	Mafic Volcanic	Waste	104	Complete
HC-42	1	Mafic Volcanic	Waste	57	Complete
HC-43	1	Mafic Volcanic	Waste	70	Operating
HC-49	1	Mafic Volcanic	Waste	57	Complete
HC-50	1	Mafic Volcanic	Waste	57	Complete
HC-44	1 w. 12q	Mafic volcanic w. quartz vein	Waste	57	Complete
HC-45	1 w. 12q	Mafic volcanic w. quartz vein	Ore	57	Complete
HC-6*	7a mixed	Early gabbro	Mixed	104	Complete
DUG #6	10a	Late gabbro	Waste	39	Complete
HC-46	10a	Late gabbro	Waste	57	Complete
HC-51	10a	Late gabbro	Waste	70	Operating
HC-65	10a	Late gabbro	Waste	11	Operating
HC-47	11c	Diabase	Waste	57	Complete
HC-48	11c	Diabase	Waste	57	Complete
HC-53	12q	Quartz vein	Waste	70	Operating
DUQ #1	12q	Quartz vein	Ore	39	Complete
HC-36	12q	Quartz vein	Ore	57	Complete
HC-54	12q	Quartz vein	Ore	56	Operating
HC-52	12q	Quartz vein	Ore	57	Complete

*Denotes barrel test sample

2.2 Barrel Tests

There are five barrel tests from the Doris area operating at the Hope Bay site (Table 2.9). In addition, there is an empty barrel test set up to provide a test blank. These barrel tests were set-up in 2008 and 2009 in a core storage area at the Windy camp. Windy camp is within the Madrid deposit area, located approximately 10 km south of the Doris deposit. The location of the tests was determined according to proximity of the Doris drill core, all of which was stored at the Windy camp. Additionally, this location is sufficiently remote in that it is unlikely to be disturbed or influenced by dust. Barrel test sample intervals are presented in Appendix A.

A barrel test is a large scale kinetic test. Each barrel is loaded with hundreds of kilograms of broken up drill core and allowed to weather under site climatic conditions. Leachate accumulates in a collection bucket and is collected approximately once per month between the months of June and September or October. Field measurements include leachate volume, pH, EC and ORP. After sampling, any excess leachate in removed from the bucket and the bucket rinsed. In 2009 and 2010, buckets were rinsed with deionized water sourced from Doris camp. The leachates are submitted for analyses at ALS Laboratory in Vancouver, BC for analysis of the following parameters:

- pH, electrical conductivity, alkalinity, sulphate;
- Bromide, chloride, fluoride;
- Ammonia, nitrate, nitrite; and
- Dissolved trace elements by ICP-MS (30 parameter). Trace element detection limits are higher than for the humidity cell tests.

For each sampling event, the QA/QC program includes one sample duplicate and one sample blank. In 2009 and 2010, the field blank was generated using the deionized water sourced from Doris camp. These samples are in addition to the sampling of the blank barrel test. QA/QC of the data is performed by SRK.

Table 2.9: Inventory of Barrel Samples

ID	Rock Code	Rock Type	Program	Sampling Events
W1[a]	1	Mafic volcanic	2008	4
W5[b]	7a	Early gabbro	2008	3
W13	10a	Late gabbro	2009	3
W10	11c	Diabase	2009	3
W9	12q with 1	Quartz vein with mafic volcanic	2009	3
W12	Blank	Blank	2009	1

[a]Same sample as HC-7

[b]Same sample as HC-6

2.2.1 2008 Barrel Test Program

Two barrel tests were set-up in 2008 (Table 2.9). The material from each test was also submitted for humidity cell tests (HC-6 and HC-7). As discussed in Section 2.1.2 (2008 Humidity Cell Program), static testing data were not available at the time of barrel sample selection. Accordingly, intervals were selected on the basis of specific lithologies with sufficient lengths of core that were easily accessible.

Geochemical characterization of the samples included acid-base accounting (ABA), total inorganic carbon (TIC), and trace element content by aqua regia digestion with ICP finish and mineralogy by XRD with Rietveld refinement and whole pattern fitting. NMS also determined the iron content of the iron carbonate minerals (i.e. ferroan dolomite ($Ca(Fe,Mg)CO_3$) and magnesium-rich siderite ($(Fe,Mg)CO_3$)), for each sample using a scanning electron microscope (SEM).

Details are provided in Section 2.1.2 (2008 Humidity Cell Test Program).

2.2.2 2009 Barrel Test Program

In 2009, three additional barrels were set up to represent rock types present in the deposit area (Table 2.9). Samples were selected based on obtaining sufficient volumes of material from drillholes characterized as part of SRK's static geochemical program (SRK 2011). It was not possible to exclusively test quartz vein material because it occurs in narrow intervals (on the order of metres) and available volumes were insufficient. Accordingly, the quartz vein material was combined with the surrounding country rock (mafic volcanics) for the barrel test.

Samples were obtained from the core boxes for static geochemical characterization by obtaining chip samples along the barrel sample interval. Samples were submitted to Maxxam for modified ABA, TIC and trace elements. Mineralogy by XRD was determined at NMS.

3 Results & Discussion

3.1 Humidity Cell Tests

3.1.1 Sample Characterization

The basic geochemical characteristics of the humidity cell samples, including mineralogy, ABA and trace element composition are described in the following text. For the humidity cell tests operated by SRK, Appendix B presents mineralogical data and trace element composition. ABA data is presented in Table 3.1. The complete data compilation for the historic humidity cell tests is presented in Rescan (2001).

Mineralogy

Mineralogy data are available for the SRK samples only. Mineralogy was determined using three methods: XRD for bulk mineralogy, MLA for trace level mineralogy (with an emphasis on carbonates and sulphides) and SEM to determine the stoichiometric formulas of iron carbonate minerals. Table 2.6 summarizes available mineralogy data.

XRD data are available for all samples characterized in recent testing programs by Newmont and SRK (SRK 2011). The XRD results for the humidity cell tests were similar to those results and showed the following:

- Carbonate content was high and predominantly present as iron carbonates (specifically ferroan dolomite ($Ca(Mg_{(x-1)}Fe_x)CO_3$) and magnesium-rich siderite (($Mg_{(x-1)}Fe_x)CO_3$). The presence of calcite ($CaCO_3$) as a secondary carbonate mineral in the humidity cell samples was also confirmed.
- Samples of mafic volcanic (HC-42), mafic volcanic mixed with quartz vein (HC-44) and early gabbro mixed with mafic volcanics (HC-6) had high levels of calcite (greater than 90th percentile levels), with mineral levels comparable to ferroan dolomite.
- Both diabase samples (HC-47 and HC-48) and one quartz vein sample (HC-53) had low levels of carbonate minerals (below or slightly above analytical detection (1%)). Low carbonate levels are consistent with the findings of SRK (2011).
- Sulphides minerals, in the form of pyrite, were only detected in samples with high total sulphur levels, as indicated by ABA.

The iron content in ferroan dolomite and magnesium-rich siderite was determined for 14 humidity cell tests using SEM. The iron content (i.e. Fe_x) is stoichiometrically up to 0.56 of the iron+magnesium content of the ferroan dolomite. Similarly, the iron content was upwards of 0.78 of the iron+magnesium content of the siderite.

The MLA method can quantitatively identify thousands of mineral grains at submicron and trace levels. Selected samples of mafic volcanic combined with the quartz veins (HC-44 and HC-45), early gabbro (HC-51) and diabase (HC-47 and HC-48) contained detectable levels of chalcopyrite ($CuFeS_2$). Pyrrhotite ($Fe_{(1-x)}S$) was also present in HC-44 and HC-55. Other sulphides identified but at levels less than analytical detection (0.01 to 0.001%) included gersdorffite ((Fe,Co,Ni)AsS), galena (PbS), cobaltite (CoAsS), sphalerite (ZnS) and tetrahedrite (Cu_3SbS).

Acid-Base Accounting

ABA data is presented in Table 3.1. The two sets of ABA data for HC-7 represent the different sampling methodologies for ABA test work (chip sample vs. assay pulps). For each humidity cell sample, the percentile rank of the ABA parameters was recalculated according to the rock type and economic classification using the 2011 ABA sample set (Table 3.2). For sulphur, comparisons were made to the overall sample set (referred to as Doris) and also each specific zone (North, Connector and Central). For NP and TIC, comparisons were to the overall Doris sample set. For HC-6 (early gabbro or 7a), a statistical comparison was not performed as gabbro has since been determined to be volumetrically insignificant at the Doris deposit.

ABA data are available for the overall Doris sample set, as discussed in SRK (2011). The ABA data for the historic humidity cell tests indicated that these samples contain high sulphur levels, with levels for all samples above P80 relative to the Doris deposit sample set.

The ABA data for the SRK/Newmont humidity cell samples were consistent with the findings of SRK (2011). More than half of the humidity cell samples contained sulphur levels in the range of P20 to P60, and samples typically contained high NP and TIC levels (greater than 100 kg $CaCO_3$ eq./t) and were classified as non-PAG.

Selected humidity cell samples were classified as uncertain or PAG. The basis for these classifications was related to the geochemical characteristics of the rock type, as described in SRK (2011) and as follows:

- Mafic volcanics (1): uncertain or PAG classifications form a small proportion of the sample set and are related to high sulphur or low TIC. Sulphur levels for humidity cell sample DUMV#5 are anomalously high (P99 or 6.5%). Moreover, NP levels for this sample are atypical for this rock type (P1 or 22 kg $CaCO_3$ eq./t).
- Mafic volcanics mixed with quartz vein (1 with 12q): uncertain or PAG classifications are related to high sulphur content, as observed for HC-45, which contained P86 (or 2.4%) levels of sulphur.
- Late gabbro (10a) and diabase (11c): these rock types tended to have low sulphur levels (median levels less than 0.1%). Carbonate levels tend to be low for these rock types and as a result, uncertain or PAG classifications are related to low TIC, and to a lesser degree, low NP values. This is observed for HC-48 and HC-65. Humidity cell sample DUG#6 is an atypical sample of late gabbro as it contains anomalously high levels of sulphur (P100 or 1.9%) and also NP and TIC (~P80 or 78 and 130 kg $CaCO_3$ eq./t, respectively).
- Quartz vein (12q): uncertain and PAG classifications are linked to either high sulphur (at least 1.9%) or low NP and TIC levels (less than 30 kg $CaCO_3$ eq./t), as observed for samples HC-53, DUQ#1, HC-36, and HC-54.

Levels of sulphur determined by ABA were typically similar to those determined by XRD and MLA (Table 3.3). When detected, sulphide levels by XRD were typically lower than those by MLA or ABA. For samples containing quartz vein (12q and 1 with 12q), sulphur by MLA was typically higher. Conversely, sulphur by ABA was generally highest for all other samples.

Table 3.1: ABA Data, Doris Humidity Cell Tests

HC #	Rock Type[1]	Preliminary Economic Classification	Sample Type	Paste pH	Total Sulphur %S	NP[2]	TIC	NP/AP	TIC/AP
						(kgCaCO$_3$/t)			
DOP #12	1	W	n/a	9.4	1.68	337	386	6.4	74
DUMV #5	1	W	n/a	8.9	6.57	229	264	1.1	1.3
HC-7	1	W	Chip	8.4	0.11	161	259	46.8	75.3
	1	W	Pulp	8.3	0.17	173	244	33.4	46.9
HC-42	1	W	Pulp	8.4	0.10	165	178	52.9	56.8
HC-43	1	W	Pulp	8.8	0.52	188	254	11.6	15.6
HC-49	1	W	Pulp	9.2	0.17	176	331	33.1	62.2
HC-50	1	W	Pulp	8.8	1.78	202	336	3.6	6.0
HC-44	1 w. 12q	W	Pulp	8.7	0.31	194	216	20.0	22.3
HC-45	1 w. 12q	O	Pulp	8.9	2.37	161	233	2.2	3.1
HC-6	7a mixed	mixed	Pulp	8.6	0.13	128	156	31.6	38.5
DUG #6	10a	W	n/a	8.3	1.85	78	130	1.3	2.2
HC-46	10a	W	Pulp	8.8	0.29	116	142	12.8	15.6
HC-51	10a	W	Pulp	9.0	1.19	246	417	6.6	11.2
HC-65	10a	Decline	Pulp	9.1	0.10	19	0.5	6.1	0.1
HC-47	11c	W	Pulp	9.5	0.10	28	18	8.9	5.6
HC-48	11c	W	Pulp	9.2	0.12	19	10	5.2	2.8
HC-53	12q	W	Pulp	8.5	0.09	3	3	1.0	1.2
DUQ #1	12q	O	n/a	8.8	1.87	68	93	1.2	1.6
HC-36	12q	O	Pulp	8.3	6.03	120	156	0.6	0.8
HC-54	12q	O	Pulp	8.8	0.61	20	28	1.1	1.5
HC-52	12q	O	Pulp	9.0	1.69	173	302	3.3	5.7

[1]Rock types: 1=mafic volcanics; 1 w. 12q=mafic volcanics mixed with quartz vein; 7a mixed=early gabbro mixed; 10a=late gabbro; 11c=diabase; 12q=quartz vein.

[2]Standard NP method used for samples DOP #12, DUMV #5, DUG #6, HC-65 and DUQ #1. Modified method used for all other sample.s

Table 3.2: Percentile Rank of Total Sulphur, NP and TIC for Humidity Cell Tests

Humidity Cell #	Rock Type	Preliminary Economic Assessment	Sample Type	Total Sulphur									NP		TIC		ARD Classification	
				%S	All zones		North		Connector		Central		($kgCaCO_3/t$)	All zones	($kgCaCO_3/t$)	All zones	NP/AP	TIC/AP
					%Rank	n	%Rank	n	%Rank	n	%Rank	n		%Rank		%Rank		
DOP #12	1	W	n/a	**1.68**	94%	361	96%	168	>100%	51	91%	142	**337**	99%	**386**	94%	non-PAG	non-PAG
DUMV #5	1	W	n/a	**6.54**	99%	361	100%	168	>100%	51	99%	142	**22**	1%	**264**	50%	PAG	Uncertain
HC-7*	1	W	Chip	**0.11**	26%	361	34%	168	30%	51	16%	142	**161**	39%	**259**	49%	non-PAG	non-PAG
			Pulp	**0.17**	59%	361	71%	168	61%	51	45%	142	**173**	50%	**244**	45%	non-PAG	non-PAG
HC-42	1	W	Pulp	**0.10**	21%	361	27%	168	22%	51	13%	142	**165**	43%	**178**	27%	non-PAG	non-PAG
HC-43	1	W	Pulp	**0.52**	85%	361	90%	168	96%	51	75%	142	**188**	63%	**254**	47%	non-PAG	non-PAG
HC-49	1	W	Pulp	**0.17**	60%	361	72%	168	62%	51	45%	142	**176**	53%	**331**	70%	non-PAG	non-PAG
HC-50	1	W	Pulp	**1.78**	95%	361	97%	168	>100%	51	91%	142	**202**	71%	**336**	73%	non-PAG	non-PAG
HC-44	1 w. 12q	W	Pulp	**0.31**	29%	8	25%	5	#N/A	1	7%	2	**194**	86%	**216**	10%	non-PAG	non-PAG
HC-45	1 w. 12q	O	Pulp	**2.37**	86%	15	>100%	5	54%	2	80%	6	**161**	59%	**233**	20%	Uncertain	non-PAG
HC-6*	7a mixed	mixed	Pulp	**0.13**	--	0	--	0	--	0	--	0	**128**	--	**156**	--	non-PAG	non-PAG
DUG #6	10a	W	n/a	**1.85**	100%	60	>100%	41	>100%	7	100%	12	**78**	77%	**130**	79%	Uncertain	Uncertain
HC-46	10a	W	Pulp	**0.29**	92%	60	94%	41	>100%	7	82%	12	**116**	82%	**142**	84%	non-PAG	non-PAG
HC-51	10a	W	Pulp	**1.19**	98%	60	>100%	41	>100%	7	91%	12	**246**	95%	**417**	100%	non-PAG	non-PAG
HC-65	10a	Decline	Pulp	**0.10**	58%	60	65%	41	80%	7	65%	12	**19**	52%	**0.5**	24%	non-PAG	PAG
HC-47	11c	W	Pulp	**0.10**	95%	41	>100%	33	>100%	1	67%	7	**28**	60%	**18**	64%	non-PAG	non-PAG
HC-48	11c	W	Pulp	**0.12**	98%	41	>100%	33	>100%	1	83%	7	**19**	57%	**10**	63%	non-PAG	Uncertain
HC-53	12q	W	Pulp	**0.09**	50%	27	67%	13	#N/A	0	38%	14	**3**	9%	**3**	13%	Uncertain	Uncertain
DUQ #1	12q	O	n/a	**1.87**	82%	52	95%	20	91%	11	65%	21	**68**	76%	**93**	73%	Uncertain	Uncertain
HC-36	12q	O	Pulp	**6.03**	100%	52	>100%	20	>100%	11	100%	21	**120**	86%	**156**	82%	PAG	PAG
HC-54	12q	O	Pulp	**0.61**	49%	52	57%	20	53%	11	40%	21	**20**	50%	**28**	56%	Uncertain	Uncertain
HC-52	12q	O	Pulp	**1.69**	76%	52	92%	20	90%	11	55%	21	**173**	88%	**302**	95%	non-PAG	non-PAG

Statistical analysis by rock type and economic classification. For HC-6, this rock type is not in the Doris database.
*Denotes samples are barrel test samples

[1]Rock types: 1=mafic volcanics; 1 w. 12q=mafic volcanics mixed with quartz vein; 7a mixed=early gabbro mixed; 10a=late gabbro; 11c=diabase; 12q=quartz vein

[2]Standard NP method used for samples DOP #12, DUMV #5, DUG #6, HC-65 and DUQ #1. Modified method used for all other samples

P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Reports & Memos\20110630_Memo_WR_HCUpdate\Working Files\[WRHCPercentRank_Doris_1CH008043_lnb_rev01.xlsx]

Table 3.3: Comparison of Sulphur Content – ABA, XRD & MLA

HC #	Rock Type	Preliminary Economic Classification	Sulphide S (%S)		
			XRD	MLA	ABA
HC-7	1	W	--	--	0.11
	1	W	--	--	0.16
HC-42	1	W	--	0.13	0.10
HC-43	1	W	--	0.59	0.58
HC-49	1	W	--	0.04	0.17
HC-50	1	W	1.60	1.02	1.78
HC-44	1 w. 12q	W	--	0.52	0.31
HC-45	1 w. 12q	O	1.07	2.50	2.37
HC-6	7a mixed	mixed	--	--	0.13
HC-46	10a	W	--	0.13	0.30
HC-51	10a	W	0.53	0.94	1.19
HC-65	10a	Decline	--	--	0.09
HC-47	11c	W	--	0.02	0.10
HC-48	11c	W	--	0.05	0.12
HC-53	12q	W	--	0.15	0.09
HC-54	12q	O	0.53	1.04	0.60
HC-52	12q	O	1.60	2.12	1.69
HC-36	12q	O	1.07	3.29	1.91

Trace Elements

Trace element data for the humidity cell samples are presented in Appendix B.

Trace element data are available for the overall Doris sample set, as discussed in SRK (2011). For a number of humidity cell samples, arsenic levels were elevated relative to ten times the average crustal abundance for basalt (Price 1997). Samples with high arsenic levels were characterized as having “high” sulphur content (though not all samples with “high” sulphur content contained elevated levels of arsenic). All rock types except early gabbro (7a) and diabase (11c) had a sample with elevated arsenic.

Arsenic levels for each humidity cell sample were statistically compared with the ABA samples corresponding to the equivalent rock type and economic classification in the static testing database for Hope Bay (Table 3.4). The exception was HC-6 because early gabbro (7a) is not a significant rock type at Doris. Humidity cell samples with arsenic levels greater than ten times the average crustal abundance for basalt had at least 60th percentile levels of arsenic.

Table 3.4: Percentile Rank of Arsenic Levels, Humidity Cell Test Samples

HC #	Rock Type	Economic Classification	As ppm	As %Rank
DOP #12	1	W	60	91
DUMV #5	1	W	166	100
HC-7	1	W	1.7	24
	1	W	1.8	25
HC-42	1	W	1.7	24
HC-43	1	W	21	70
HC-49	1	W	2.2	29
HC-50	1	W	63	92
HC-44	1 + 12q	W	12	17
HC-45	1 + 12q	O	51	69
HC-6	7a mixed*	mixed	3.2	--
DUG #6	10a	W	4	85
HC-46	10a	W	7.6	91
HC-51	10a	W	48	100
HC-65	10a	Decline	1.2	41
HC-47	11	W	1.4	87
HC-48	11	W	3.4	95
HC-53	12q	W	2.6	14
DUQ #1	12q	O	10	43
HC-36	12q	O	26	60
HC-54	12q	O	7.7	31
HC-52	12q	O	42	77

*Compared to 7a samples from Madrid.

P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Reports & Memos\20110630_Memo_WR_HCUpdate

3.1.2 Humidity Cell Data

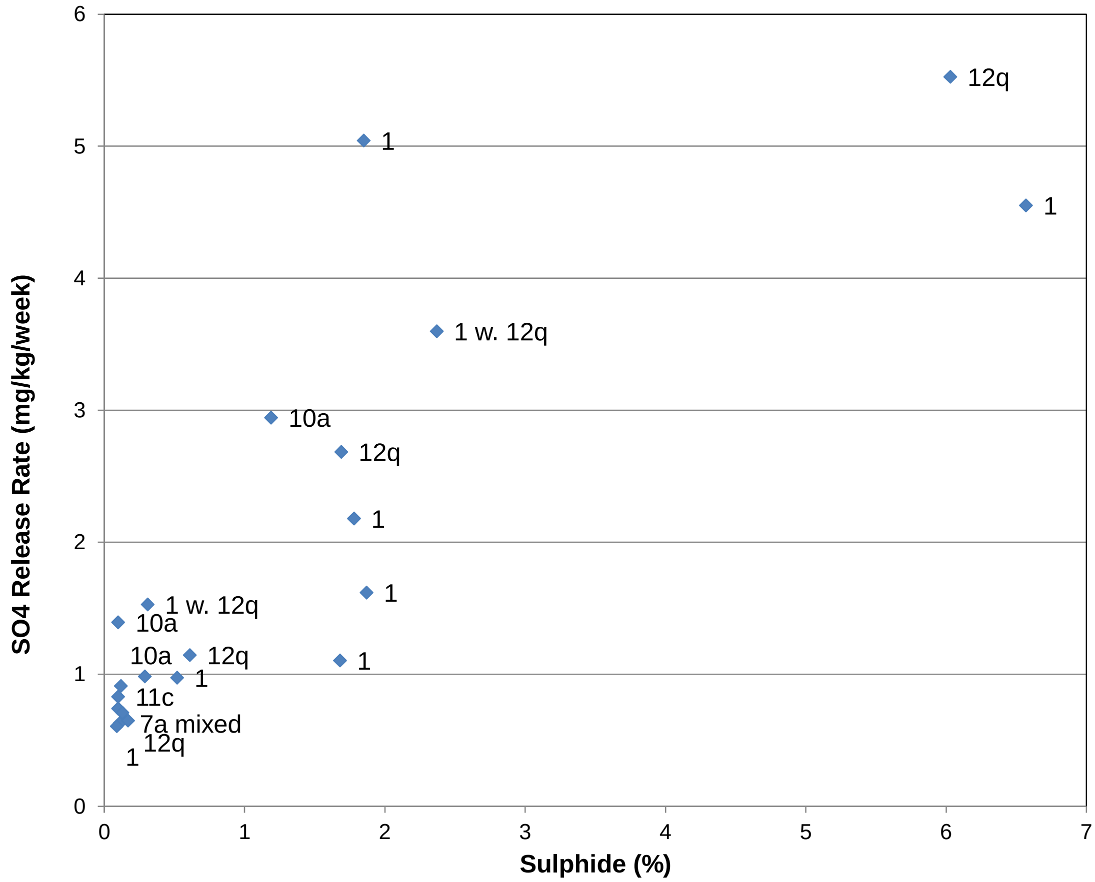
There are a total of 21 humidity cell tests. Four were operated by Rescan (2001) and 17 by SRK/Newmont. For the five SRK humidity cell tests currently in operation, this memorandum was prepared with data reported until May 24, 2011.

Table 2.8 presents operational details of all the humidity cell tests from Doris, including test duration. Figures showing trends are provided in Appendix C. Appendix D contains humidity cell results, including summaries of key results data, concentrations of key parameters and depletion calculations.

Concentrations and Trends

For the humidity cell tests, maximum concentrations and pH's were typically highest during the initial leaching stages, after which they decreased with time and levelled out. For all humidity cell tests, the pHs were neutral to alkaline for the duration of the test. Overall, the pHs for the quartz vein samples tended to be the lowest, with a minimum of 7.3.

Sulphate concentrations were initially high and decreased rapidly to levels consistently below 20 mg/L (or 5 mg/kg/week) after cycle 15. Stable sulphate release rates were low and ranged between the limit of analytical detection (0.4 mg/kg/week) to 5.5 mg/kg/week (Figure 3.1). Samples with higher sulphide content tended to exhibit higher stable sulphate release rates.



P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\WR HCs\Calculations\[HB_WR_Outcomes.mc.REV08.xlsx]

Figure 3.1: Sulphate Release Rates vs. Sulphide Content

The lowest levels of stable alkalinity leaching were exhibited from selected samples from the rock types mafic volcanics (1, HC-42), late gabbro (10a, HC-46 and HC-65), diabase (11c, HC-48) and unmixed and mixed quartz vein (12q, HC-52 and HC-53; and 1 with 12q, HC-45). For these samples of late gabbro and diabase, alkalinity levels decreased with time.

The high molar ratio of (Ca+Mg)/SO_4) suggests that the dissolution of carbonate minerals, and alkalinity production rates, is in response to the addition of deionized water, and not the oxidation of sulphides. The one exception is HC-65 (early gabbro), which has a molar ratio of less than 1, and is the newest humidity cell that is still in the early stages of operation.

For the historic humidity cell tests, the analytical detection limits were high for all cycles except for the last two. The high detection limits precluded any trend analyses. For the last two cycles, low level analyses were determined for selected parameters (e.g. Al, As, Cu, Mo), however these detection limits were typically higher than those from more recent humidity cell tests.

Selected SRK humidity cell tests had elevated[1] concentrations of trace elements. Graphs of these results are provided in Appendix C and the results are described as follows:

- Antimony levels were initially high and decreased over time. Levels were highest (median[2] of 0.00073 mg/L) for HC-51 (late gabbro, P98 sulphur levels). Concentrations were lower for all other samples, with many samples near the level of detection (NB: there are two different detection limits for the suite of tests). There was no evident relationship between stable rates for antimony leaching and pH, solid-phase antimony or sulphur content. There are no CCME guidelines for antimony.
- Similarly, arsenic leaching levels for HC-51 (late gabbro, P98 sulphur) were highest, with median[2] levels of 0.025 mg/L. The solid-phase arsenic content of HC-51 (48 mg/kg) is the highest concentration observed in any of the late gabbro samples from Doris. Initial arsenic leachate levels were also elevated for selected samples of mafic volcanic with quartz vein (HC-45) and diabase (HC-47), and the other samples of late gabbro (HC-46, HC-65). Maximum arsenic levels for the initial flushing stages for these samples ranged from 0.01 to 0.06 mg/L. Solid-phase arsenic levels ranged from 1.2 to 51 mg/kg (P40 to P100 levels). Relative percent sulphur for these samples was greater than P85, except for sample HC-65 (late gabbro), which had P60 levels. There was no evident relationship between stable rates for arsenic leaching and pH, solid-phase antimony or sulphur content.
- Cobalt levels were highest for HC-51 (late gabbro, P98 sulphur), HC-50 (mafic volcanic, P95 sulphur) and HC-45 (mafic volcanic combined with quartz vein, P86 sulphur). Median[2] levels ranged from 0.0002 to 0.0004 mg/L. Concentrations were lower for all other samples, with many samples near the level of detection (NB: there are two different detection limits for the suite of tests). There are no CCME guidelines for cobalt. There was no evident relationship between stable leaching rates for cobalt and pH, solid-phase antimony or sulphur content.
- Aluminum levels were initially elevated for all humidity cell tests, with the exception of the quartz vein samples. Maximum levels ranged from 0.12 to 1.1 mg/L. Median[2] levels were elevated for HC-49 (mafic volcanic, P60 sulphur) and HC-51 (late gabbro, P98 sulphur), with levels of 0.18 and 0.13 mg/L, respectively. Aluminum levels were also high for HC-65 (late gabbro, P58 sulphur), however the test has been operating for 11 cycles and concentrations are still decreasing. Stable rates of aluminum leaching are related to pH, with higher rates corresponding to more alkaline conditions. There was no relationship observed between leaching rates and solid-phase concentrations (aluminum or sulphur).
- Copper levels were initially elevated for all humidity cell tests, except for four samples of mafic volcanics (HC-42, HC-43, HC-49 and HC-50, P21 to P95 sulphur) and the HC-46 (late gabbro, P92 sulphur). Maximum copper levels ranged from 0.002 to 0.006 mg/L. Stable rates for copper leaching were lower and may be related to solid-phase copper content, but not to pH or sulphur.

[1] Elevated is defined as a parameter either having median leachate levels above the CCME guideline for aquatic life. This comparison is made for demonstrative purposes only, as HC tests are a lab test and are not considered representative of field conditions. Actual leachate conditions in the field can be either higher or lower than source term concentrations from a waste rock dump depending on scaling factors and other controls on solubility. For parameters discussed without a CCME guideline, the use of elevated is in comparison to other HC tests.

[2] Median levels were determined for the duration of the test, and do not necessarily correspond to the stable concentration.

Depletion Calculations

Depletion calculations are presented in Appendix D.

Depletion calculations based on stable release rates suggest that a number of humidity cell tests will remain neutral, including HC-7, HC-42 and HC-49 (mafic volcanics, P20 to P60 sulphur), HC-44 (mafic volcanics with quartz vein, P29 sulphur), HC-6 (early gabbro), and HC-46 and HC-51 (late gabbro, P92 and P58 sulphur, respectively). HC-65, a sample of late gabbro, was not assessed as there are presently insufficient cycles of data (n=11).

Depletion calculations for the other samples suggest that NP and/or TIC will be depleted prior to AP, including DOP #12, DUMV #5, HC-43 and HC-50 (mafic volcanics, P85 to P99 sulphur), HC-45 (mafic volcanics with quartz vein, P86 sulphur), DUG #6 (late gabbro, P100 sulphur), HC-47 and HC-48 (diabase, P95 and P98 sulphur, respectively), and DUQ #1, HC-53, HC-36, HC-54 and HC-52 (quartz vein, P49 to P100 sulphur).

The generation of net acidic conditions for all of the Doris humidity cell samples is unlikely for the following reasons:

- Low AP depletion rates: sulphate release rates were low, with stable rates of less than 6 mg/kg/week. These low rates of sulphide oxidation suggest that the production of acidity will be limited.
- Overestimated NP depletion rates: At low rates of sulphide oxidation, leaching of calcium and magnesium are due primarily to simple dissolution of the carbonate minerals, rather than in response to production of acidity from sulphide oxidation. This can result in an overestimation of NP depletion rates, particularly in laboratory scale data where the water to rock ratios are very high. In contrast, under field conditions, where water to rock ratios are much lower, the rate of carbonate dissolution in the waste rock piles will be limited by equilibrium with carbonate minerals. The theoretical ratio of (Ca+Mg) depletion to sulphate generation in samples where Ca+Mg is in response to sulphide oxidation is between 1 and 2. Stable (Ca+Mg)/SO_4 values in these samples are between 3 and 14, suggesting that TIC dissolution, and therefore NP depletion, is in response to the weekly addition of water rather than sulphide oxidation.

3.2 Barrel Tests

A list of samples and rock types subjected to barrel testing is presented in Appendix A.

Characterization data for the barrel test samples are provided in Appendix E. As noted previously, humidity cell tests HC-6 and HC-7 were completed on the same samples that were used to charge barrel W1 and W5. Therefore, comparison of results from these two programs provides an indication of some of the types of differences that can be observed between the lab and field. Figures for the barrel tests are provided in Appendix F.

3.2.1 Sample Characterization

Mineralogy

Mineralogy data for the barrels are presented in Appendix E. XRD data is available for all barrel samples. SEM analysis of the iron carbonates was performed for W1 and W5 only. MLA data for the other samples are pending.

XRD data are available for all samples characterized in recent testing programs by Newmont and SRK (SRK 2011). The XRD results for the humidity cell tests were comparable to those results and showed the following:

- W10 (diabase) did not have any detectable levels of carbonate minerals.
- Carbonate minerals, where present were predominantly present as iron carbonates (ferroan dolomite ($Ca(Mg_{(x-1)}Fe_x)CO_3$) and magnesium-rich siderite (($Mg_{(x-1)}Fe_x)CO_3$).
- Carbonate mineral levels were comparable to the humidity cell test samples, except for W13 (late gabbro), which contained low levels of ferroan dolomite (4%).
- Calcite was below detection for W1 (mafic volcanic), W10 (diabase) and W9 (quartz vein with mafic volcanic).
- Sulphides were detected in sample W9 only (quartz vein with mafic volcanic). Levels indicated by XRD for that sample were approximately half of those determined by ABA methods.

For the W1 and W9, the iron content (or x), as determined by SEM, was stoichiometrically 0.45 of the iron+magnesium content of the ferroan dolomite. Similarly, the iron content was roughly 0.8 of the iron+magnesium content of the siderite.

Acid-Base Accounting

ABA data for the barrel test samples is presented in Table 3.5 and the percentile rank for selected ABA parameters is presented in Table 3.6.

The ABA data for the SRK/Newmont barrel test samples were consistent with the findings of SRK (2011). With the exception of sample W9 (quartz vein with mafic volcanics), sulphur content ranged from P26 to P59 with NP and TIC levels ranging from P39 to P75. NP and TIC content for samples W13 (late gabbro) and W10 (diabase) were lower than the other barrel samples with levels ranging from 4 to 80 kg $CaCO_3$ eq./t. For sample W9, the relative sulphur, NP and TIC content were higher than the other samples (P90). Sample W9 was classified as uncertain on the basis of NP to AP ratios, whereas all other samples were classified as non-PAG. The uncertain classification for sample W9 is related to high sulphur content.

Table 3.5: ABA Data for Barrel Samples

Barrel ID	Rock Type[1]	Paste pH	Total Sulphur	Sulphide Sulphur (%S)	NP	TIC	NP/AP	TIC/AP
					(kg $CaCO_3$/Tonne)			
W1	1	8.4	0.11	0.11	161	259	46.8	75.3
	1	8.3	0.17	0.16	173	244	35.5	50.0
W5	7a mixed	8.6	0.13	0.13	128	156	31.6	38.5
W13	10a	8.8	0.06	0.05	76	80	40.8	42.5
W10	11c	9.8	0.03	0.03	21	4	22.6	4.1
W9	12q with 1	9.2	2.05	2.04	180	350	2.8	5.5

[1]Rock types: 1=mafic volcanics; 1 w. 12q=mafic volcanics mixed with quartz vein; 7a mixed=early gabbro mixed; 10a=late gabbro; 11c=diabase; 12q=quartz vein.
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Reports & Memos\20110630_Memo_WR_HCUpdate\Working Files\[2009Barrels_XRD_1CH008043_lnb.xls]

Table 3.6: Percentile Rank of Total Sulphur, NP and TIC for Barrel Tests

Barrel ID	Rock Type[1]	Total Sulphur									NP		TIC		ARD Classification	
		%S	All zones		North		Connector		Central		(kgCaCO$_3$/t)	All zones	(kgCaCO$_3$/t)	All zones	NP/AP	TIC/AP
			%Rank	n	%Rank	n	%Rank	n	%Rank	n		%Rank		%Rank		
W1	1	0.11	26%	361	34%	168	30%	51	16%	142	161	39%	259	49%	non-PAG	non-PAG
	1	0.17	59%	361	71%	168	61%	51	45%	142	173	50%	244	45%	non-PAG	non-PAG
W5	7a mixed	0.13	49%	6	#N/A	0	#N/A	0	#N/A	0	128	49%	156	49%	non-PAG	non-PAG
W13	10a	0.06	36%	60	38%	41	>100%	7	15%	12	76	75%	80	74%	non-PAG	non-PAG
W10	11c	0.03	48%	41	>100%	33	>100%	1	17%	7	21	57%	4	61%	non-PAG	non-PAG
W9	12q w. 1	2.05	90%	27	89%	13	#N/A	0	92%	14	180	91%	350	98%	Uncertain	non-PAG

Statistical analysis by rock type and preliminary economic classification
[1]Rock types: 1=mafic volcanics; 1 w. 12q=mafic volcanics mixed with quartz vein; 7a mixed=early gabbro mixed; 10a=late gabbro; 11c=diabase; 12q=quartz vein.

P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Reports & Memos\20110630_Memo_WR_HCUpdate\Working Files\[WRHCPercentRank_Doris_1CH008043_lnb_rev01.xlsx

Trace Elements

Trace element data is presented in Appendix E.

Trace element data are available for the overall Doris sample set, as discussed in SRK (2011). Data were compared with ten times the average crustal abundance for basalt (Price 1997) to determine if any parameters were elevated. Arsenic levels were elevated for the W9 only (quartz vein with mafic volcanics), with levels a magnitude higher as compared with the other barrel samples. Arsenic levels for each barrel test sample were statistically compared with the ABA samples corresponding to the equivalent rock type and economic classification in the static testing database for Hope Bay (Table 3.7).

Table 3.7: Percentile Rank of Arsenic Levels, Barrel Test Samples

Barrel ID	Rock Type[1]	As	
		ppm	%Rank
W1	1	1.7	24
W5	7a mixed	3.2	2
W13	10a	3	79
W10	11	1.1	80
W9	12q with 1	36.5	82

[1]Rock types: 1=mafic volcanics; 1 w. 12q=mafic volcanics mixed with quartz vein; 7a mixed=early gabbro mixed; 10a=late gabbro; 11c=diabase; 12q=quartz vein.

3.2.2 Barrel Data

Table 2.9 presents details of the five barrel tests from Doris. Figures showing trends are provided in Appendix F.

To date, each barrel has been sampled three or four times. Sampling frequency is variable for a number of reasons, including inaccessibility and the absence of leachate. In September 2010, the leachate for some tests was partially frozen and as a result, parameter levels may be higher due to concentration of the leachate.

Both the field and lab pH's for all tests were neutral to alkaline. Sulphate concentrations were lower (4 to 15 mg/L) for the samples of late gabbro (W13) and diabase (W10) as compared with the samples of mafic volcanic (W1), early gabbro (W5) and quartz vein with mafic volcanic (W9) (15 to 46 mg/L). Sulphate leaching rates were low for all barrel test samples (0.007 to 0.2 mg/kg/week) with rates for W1 (mafic volcanic) an order of magnitude higher than the other samples (Table 3.8).

The following observations were made for selected trace elements (see Appendix F for graphs and Table 3.8 for loading rates):

- Antimony levels were similar for all tests and ranged from 0.0002 to 0.003 mg/L. Two data points were not included in this range as they deviate from the overall trend of the samples. Antimony release rates were low for all samples, with highest rates an order of magnitude higher for W13 (quartz vein with mafic volcanic).

- Arsenic, cobalt and copper levels were variable but generally ranged between 0.0005 and 0.004 mg/L (arsenic), 0.0001 to 0.002 mg/L (cobalt) and 0.001 to 0.01 mg/L (copper). These ranges do not include data points that appeared to be spikes in concentrations, though this will be re-evaluated upon receipt of additional data. All samples had low arsenic, cobalt and copper release rates. For arsenic, release rates were highest for W10 (diabase) and W13 (quartz vein with mafic volcanic). For copper, release rates were highest for W10.
- Aluminum and iron levels were below 0.1 mg/L, except for diabase (W10), which had concentrations ranging from 0.13 to 0.30 mg/L and 0.2 to 0.5 mg/L, respectively. These elevated levels for W10 suggest colloids may be in the sample, which would elevate the dissolved levels.
- Lead exhibited a similar trend to aluminum and iron. Levels for the sample of diabase (W10) were elevated (0.002 to 0.004 mg/L) relative to the other samples (less than 0.0005 mg/L). Lead release rates were low for all samples, with highest rates exhibited by W10 (diabase).

Overall, concentrations are comparable to the humidity cell tests, however release rates from the barrel samples were one to two orders of magnitude lower.

Table 3.8: Release Rates for Selected Parameters, Barrel Tests

Barrel ID	Rock Type	SO4 mg/kg/week		Sb mg/kg/wk		As mg/kg/wk		Co mg/kg/wk		Cu mg/kg/wk		Pb mg/kg/wk	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
W1	1	0.01	0.07	0.0000004	0.000005	0.0000008	0.000009	0.0000003	0.000002	0.000002	0.00014	0.0000001	0.0000003
W5	7a mixed	0.007	0.08	0.0000006	0.000003	0.0000004	0.000005	0.0000001	0.000000	0.000002	0.00001	0.00000002	0.0000002
W9	10a	0.009	0.18	0.0000005	0.000006	0.0000002	0.000003	0.0000003	0.000002	0.000001	0.00001	0.00000003	0.0000003
W10	11c	0.008	0.02	0.0000005	0.000001	0.0000027	0.000012	0.0000003	0.000002	0.000018	0.00004	0.0000018	0.0000224
W13	12q with 1	0.004	0.07	0.0000011	0.000015	0.0000010	0.000021	0.0000001	0.000001	0.000001	0.00003	0.0000001	0.0000004

P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Reports & Memos\20110630_Memo_WR_HCUpdate\Working Files\[BarrelData.1CHO008.014.graphs.rtc_rev02_reprt.xlsx]

4 Conclusions

The kinetic test program for Doris included 21 humidity cell tests and five barrel tests. Four humidity cell tests were operated by Rescan (2001) and the remaining 17 samples were from more recent geochemical characterization programs by SRK in collaboration with Newmont. Sample selection was based on lithology, economic classification (ore or waste), and acid-base accounting characteristics. Trace elements (i.e. arsenic) were also considered, but were a secondary consideration to ABA.

The leachates from all samples were neutral to alkaline. Stable sulphate release rates were low and ranged between the limit of analytical detection (0.4 mg/kg/week) to 6 mg/kg/week. Samples with higher sulphide contents tended to exhibit higher stable sulphate release rates.

Overall, metal concentrations were low for the humidity cell tests. Notably, late gabbros with elevated sulphur levels had higher levels of antimony, arsenic and cobalt as compared to the other Doris waste rock samples. Mafic volcanics with elevated sulphur, and mafic volcanics combined with quartz vein also had elevated levels of cobalt relative to the other samples All samples were predicted to be non-PAG on the basis of AP and NP depletion times and/or low stable sulphate release rates (less than 6 mg/kg/week).

For the barrel tests, leachate concentrations were comparable to the humidity cells; however loadings were one to two orders of magnitude lower (e.g. sulphate was 0.007 to 0.2 mg/kg/week). The lower release rates for the barrel tests reflect the lower operating temperatures and the larger grain size of the test material.

The data from the kinetic test program has been used to validate inputs used for the water quality predictions from waste rock and ore.

This report, "**Kinetic Testing of Waste Rock and Ore from the Doris Deposits**", has been prepared by SRK Consulting (Canada) Inc.

Prepared by

Lisa Barazzuol, G.I.T.
Consultant (Environmental Geochemistry)

Reviewed by

Kelly Sexsmith M.S., P.Geo.
Principal Consultant (Environmental Geochemistry)

<u>Disclaimer</u>

"This report and the opinions and conclusions contained herein ("Report") contains the expression of the professional opinion of SRK Consulting (Canada) Inc. ("SRK") as to the matters set out herein, subject to the terms and conditions of the agreement dated [HBML.BOC-CM.PSA.003, September 30, 2008] (the "Agreement") between Consultant and Hope Bay Mining Ltd. ("Hope Bay Mining"), the methodology, procedures and sampling techniques used, SRK's assumptions, and the circumstances and constraints under which Services under the Agreement were performed by SRK. This Report is written solely for the purpose stated in the Agreement, and for the sole and exclusive benefit of Hope Bay Mining, whose remedies are limited to those set out in the Agreement. This Report is meant to be read as a whole, and sections or parts thereof should thus not be read or relied upon out of context. In addition, this report is based in part on information not within the control of SRK. Accordingly, use of such report shall be at the user's sole risk. Such use by users other than Hope Bay Mining and its corporate affiliates shall constitute a release and agreement to defend and indemnify SRK from and against any liability (including but not limited to liability for special, indirect or consequential damages) in connection with such use. Such release from and indemnification against liability shall apply in contract, tort (including negligence of SRK whether active, passive, joint or concurrent), strict liability, or other theory of legal liability; provided, however, such release, limitation and indemnity provisions shall be effective to, and only to, the maximum extent, scope or amount allowable by law."

5 References

AMEC 2005. *ARD and Metal Leaching Characterization Studies in 2003 – 2005*, *Doris North Project, Nunavut, Canada.* Report prepared for Miramar Hope Bay Ltd. by AMEC Earth & Environmental (Burnaby), October 2005.

Rescan 2001. *2000 Supplemental Environmental Baseline Data Report*, *Hope Bay Belt Project, Nunavut, Canada.* Report prepared for Hope Bay Joint Venture by Rescan Environmental Services, March 2001.

SRK 2007. *Geochemical Characterization of Portal Development Rock, Doris North Project, Hope Bay, Nunavut Canada (Revised March 2007).* Report prepared for Miramar Hope Bay Ltd. by SRK Consulting (Canada) Inc., March 2007.

SRK 2011. *Geochemical Characterization Report for Waste Rock and Ore from the Doris Deposits*, Hope Bay. Report prepared for Hope Bay Mining Ltd. by SRK Consulting (Canada) Inc., June 2011.

Appendices

Appendix A: Humidity Cell and Barrel Test Sample Intervals

Appendix A-1: List of HC Test Intervals

HC #	Rock Type	Drillhole	From (m)	To (m)	Length (m)
DOP #12	1	TDD275	54.6	54.88	0.28
DUMV #5	1	TDD390A	169.88	170.66	0.78
DUG #6	10a	TDD383	199.32	199.69	0.37
DUQ #1	12q	TDD375	202	203	1
HC-7	1	08TDD632	61.05	135.89	74.84
HC-42	1	02TDD506	39	64	25
HC-43	1	02TDD545	6.36	32	25.64
HC-49	1	TDD370	253.21	255.12	1.91
HC-50	1	TDD387	151.2	153.5	2.3
HC-44	1 w. 12q	02TDD545	82	100.73	18.73
HC-45	1 w. 12q	TDD380	245	254.5	9.5
HC-6	7a mixed	08TDD626	83.8	96.59	12.79
		08TDD626	219.68	257.81	38.13
HC-46	10a	TDD380	272	294	22
HC-51	10a	97TDD131	169.13	171.61	2.48
HC-65	10a	06TDD614	64	65	1
HC-47	11c	TDD374	61	67.6	6.6
HC-48	11c	TDD374	11.63	36	24.37
HC-53	12q	TDD368	175	178	3
HC-36	12q	08TDD631	33.5	37.3	1.47
HC-54	12q	TDD363	153.85	155.96	2.11
HC-52	12q	TDD392	214.58	216.68	2.1

Appendix A-2: Barrel Test Sample Intervals

Barrel ID	LCODE	Zone	DH	From (m)	To (m)	Length (m)	Mass (kg)	Set-up Year
W1	1a	North	08TDD632	61.05	135.89	74.84	297.9	2008
W5	7a	Central	08TDD626	83.80	96.59	50.92	239.3	2008
				219.68	257.81			
W13	10a	Connector	96TDD067	79.76	90	10.24	96.7	2009
		Central	97TDD131	169.13	193.1	23.97	94.3	
		Central	TDD383	18.53	22.91	4.38		
		Central	TDD383	27.44	31.76	4.32		
W10	11cm	Central	08TDD623	117.81	161	43.19	247.3	2009
W9	12q w. 1a	Central	08TDD628	27.97	102.22	74.25	209.9	2009

Appendix B: Static Data, Humidity Cell Tests

Appendix B-1: Carbonate and Sulphide Mineralogy by XRD, SEM & MLA

HC #	Rock Type[1]	Total Sulphur	Preliminary Economic Classification	Carbonates								Sulphides								
				Ferroan Dolomite Ca(Fe,Mg)CO3			Siderite FeCO3			Calcite CaCO3		Pyrite FeS2		Chalcopyrite CuFeS2	Gersdorffite (Fe,Co,Ni)AsS	Pyrrhotite Fe(1-x)S	Galena PbS	Cobaltite CoAsS	Sphalerite ZnS	Tetrahedrite Cu3SbS
		% Rank[2]		XRD	MLA	SEM*	XRD	MLA	SEM*	XRD	MLA	XRD	MLA	MLA	MLA	MLA	MLA	MLA	MLA	MLA
HC-7	1	26%	W	22	n/a	Ca(Mg0.56Fe0.44)CO3	1	n/a	(Mg0.23Fe0.77)CO3	bd	n/a	bd	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1	59%	W	25	--	--	bd	--	--	bd	n/a	bd	--	--	--	--	--	--	--	--
HC-42	1	21%	W	3	5.02	Ca(Mg0.57Fe0.43)CO3	bd	0.21	*	9	8.50	bd	0.24	<0.01	bd	<0.01	bd	bd	bd	bd
HC-43	1	85%	W	21	17.39	Ca(Mg0.49Fe0.51)CO3	1	1.61	(Fe0.75Mg0.25)CO3	1	1.28	<1	1.12	<0.01	bd	<0.001	bd	bd	bd	bd
HC-49	1	60%	W	23	21.99	Ca(Mg0.44Fe0.56)CO3	7	5.20	(Fe0.78Mg0.22)CO3	bd	0.04	bd	0.07	<0.01	bd	<0.01	bd	<0.001	<0.001	bd
HC-50	1	95%	W	31	28.48	Ca(Mg0.45Fe0.55)CO3	4	2.57	(Fe0.77Mg0.23)CO3	bd	0.08	3	1.91	<0.01	bd	<0.01	<0.001	<0.001	<0.001	bd
HC-44	1 w. 12q	29%	W	12	14.03	Ca(Mg0.62Fe0.38)CO3	bd	0.10	*	9	9.74	bd	0.95	0.03	<0.001	0.01	bd	<0.01	<0.01	bd
HC-45	1 w. 12q	86%	O	30	20.74	Ca(Mg0.56Fe0.44)CO3	2	1.21	(Fe0.75Mg0.25)CO3	bd	0.19	2	4.66	0.01	<0.01	0.02	bd	<0.01	<0.01	bd
HC-6	7a mixed	--	mixed	8	n/a	Ca(Mg0.54Fe0.46)CO3	tr	n/a	(Mg0.19Fe0.81)CO3	7	n/a	bd	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
HC-46	10a	92%	W	13	13.51	Ca(Mg0.48Fe0.52)CO3	bd	0.61	*	4	3.38	bd	0.24	<0.01	bd	<0.001	bd	bd	<0.001	bd
HC-51	10a	98%	W	34	36.96	Ca(Mg0.67Fe0.33)CO3	1	1.53	(Fe0.53Mg0.47)CO3	bd	0.30	1	1.74	0.03	<0.01	<0.001	<0.001	<0.01	<0.001	<0.001
HC-65	10a	58%	Decline	n/a																
HC-47	11c	95%	W	bd	0.48	*	bd	0.11	*	3	0.78	<1	0.03	0.02	bd	<0.01	bd	bd	bd	bd
HC-48	11c	98%	W	bd	1.43	*	bd	0.12	*	1	1.03	<1	0.08	0.01	<0.01	<0.01	bd	bd	<0.001	<0.001
HC-53	12q	50%	W	1	0.65	Ca(Mg0.64Fe0.36)CO3	bd	<0.01	*	bd	<0.01	bd	0.28	<0.001	bd	<0.01	bd	bd	bd	bd
HC-54	12q	49%	O	3	4.12	Ca(Mg0.62Fe0.38)CO3	bd	<0.01	*	bd	<0.01	1	1.94	<0.01	bd	<0.01	bd	bd	bd	bd
HC-52	12q	76%	O	8	5.35	Ca(Mg0.57Fe0.43)CO3	bd	0.16	*	bd	0.03	3	3.97	<0.001	bd	<0.01	<0.001	<0.001	<0.01	<0.001
HC-36	12q	100%	O	27	11.95	Ca(Mg0.55Fe0.45)CO3	bd	0.72	*	1	0.06	2	6.17	<0.01	bd	<0.01	bd	bd	<0.001	bd

n/a: sample currently unavailable for characterization. Data pending.

*SEM analyses not conducted because mineral level below detection, as indicated by XRD.

-- indicates analysis performed on alternate static sample

P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\WR HCs\Calculations\[HB_WR_Outcomes.mc.REV09.xlsx]

Appendix B-2: Solid-Phase Trace Metal Data - ICP Metals by Aqua Regia Digestion

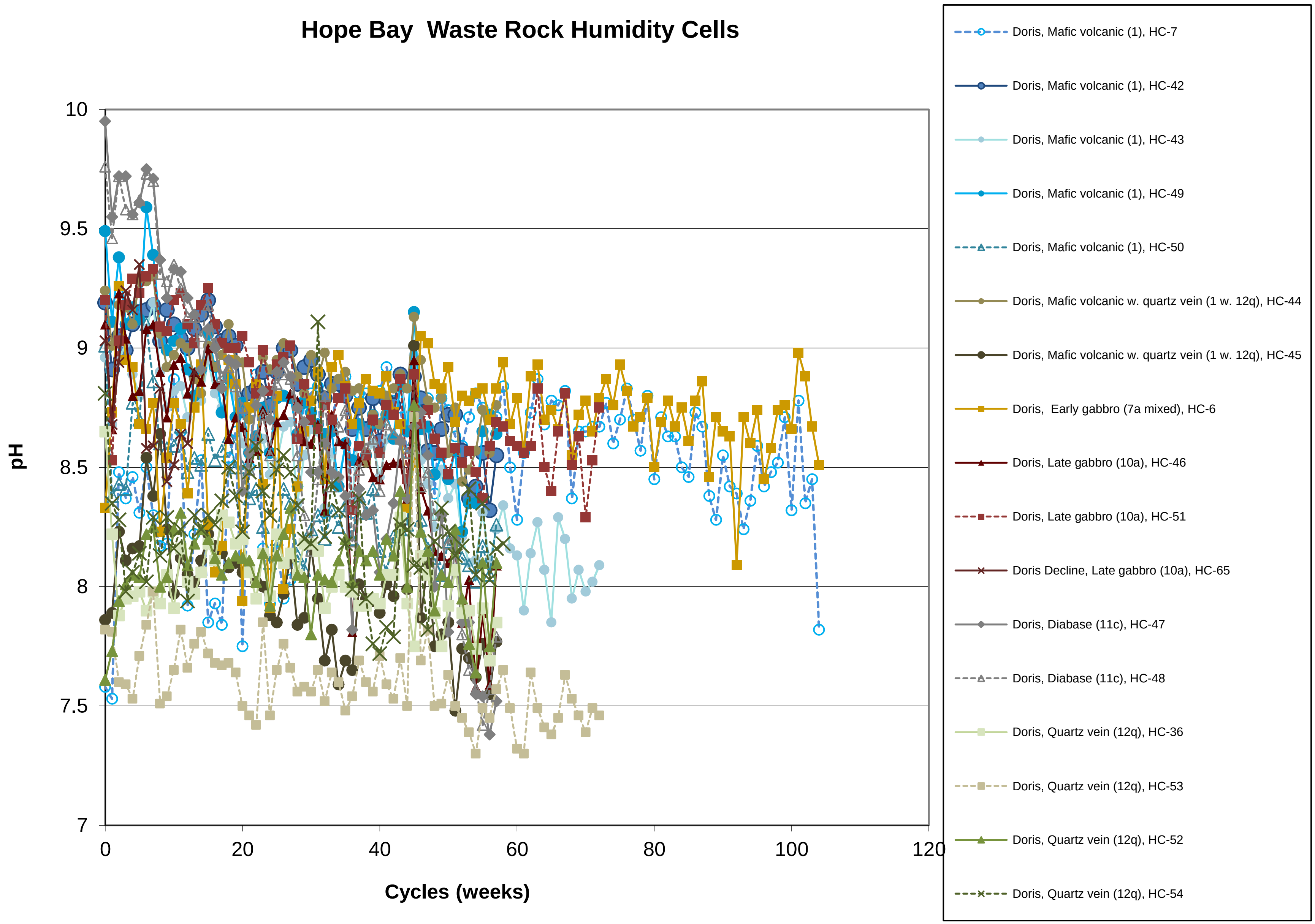
HC #	Rock Type[1]	Total Sulphur % Rank[2]	Preliminary Economic Classification	Al ppm	Sb ppm	As ppm	Ba ppm	Bi ppm	B ppm	Cd ppm	Ca ppm	Cr ppm	Co ppm	Cu ppm	Fe ppm
HC-7	1	26%	W	27,600	0.1	1.7	17	0.1	20	0.1	45,300	14	29.5	31.6	103,200
	1	59%	W	28,980	0.1	1.7837	13.598	0.1	20	0.1	52,355	33.5	28.3	39.017	104,934
HC-42	1	21%	W	38,700	0.1	1.7	12	0.1	20	0.1	60,500	22	30	32	96,200
HC-43	1	85%	W	24,900	0.1	20.6	22	0.1	20	0.1	48,500	13	28.2	26.9	89,400
HC-49	1	60%	W	7,400	0.06	2.2	17	0.03	20	0.33	53,000	26.4	29.7	38.18	94,500
HC-50	1	95%	W	2,100	0.08	62.8	7.6	0.1	20	0.16	69,700	47.1	27.4	29.83	87,100
HC-44	1 w. 12q	29%	W	26,900	0.1	12.4	18	0.1	20	0.4	61,400	43	31.9	71.3	68,300
HC-45	1 w. 12q	86%	O	7,200	0.1	50.9	7	0.2	20	0.2	44,000	42	32.8	84.2	68,900
HC-6	7a mixed	--	mixed	31,100	0.1	3.2	5	0.1	20	0.1	45,000	72	33.3	89.6	74,000
HC-46	10a	92%	W	31,300	0.1	7.6	5	0.1	20	0.1	35,600	10	35.8	40.3	98,300
HC-51	10a	98%	W	11,800	0.1	47.8	3.8	0.08	20	0.2	85,000	63.1	44.5	90.13	89,500
HC-65	10a	58%	Decline	22,200	0.2	1.2	32	0.1	11	0.1	7,400	25	33.1	44.5	63,200
HC-47	11c	95%	W	34,000	0.1	1.4	3	0.1	20	0.1	12,500	36	46.9	74.3	92,900
HC-48	11c	98%	W	28,500	0.1	3.4	6	0.1	20	0.1	12,900	22	39.7	96.8	79,600
HC-53	12q	50%	W	200	0.04	2.6	0.7	0.02	29	0.03	700	130	1.1	2.64	2,900
HC-36	12q	100%	O	1,600	0.1	89.5	8	0.5	20	0.1	33,100	106	26.4	37.3	72,200
HC-54	12q	49%	O	400	0.04	7.7	1.6	0.04	34	0.02	5,300	146	6.3	15.21	10,400
HC-52	12q	76%	O	600	0.16	41.9	3.1	0.19	20	0.09	12,800	138	12.2	16.74	23,800
Average Crustal Abundance for Basalt (Price 1997)				*78,000*	*0.2*	*2*	*330*	*0.007*	*5*	*0.22*	*76,000*	*170*	*48*	*87*	*86,500*

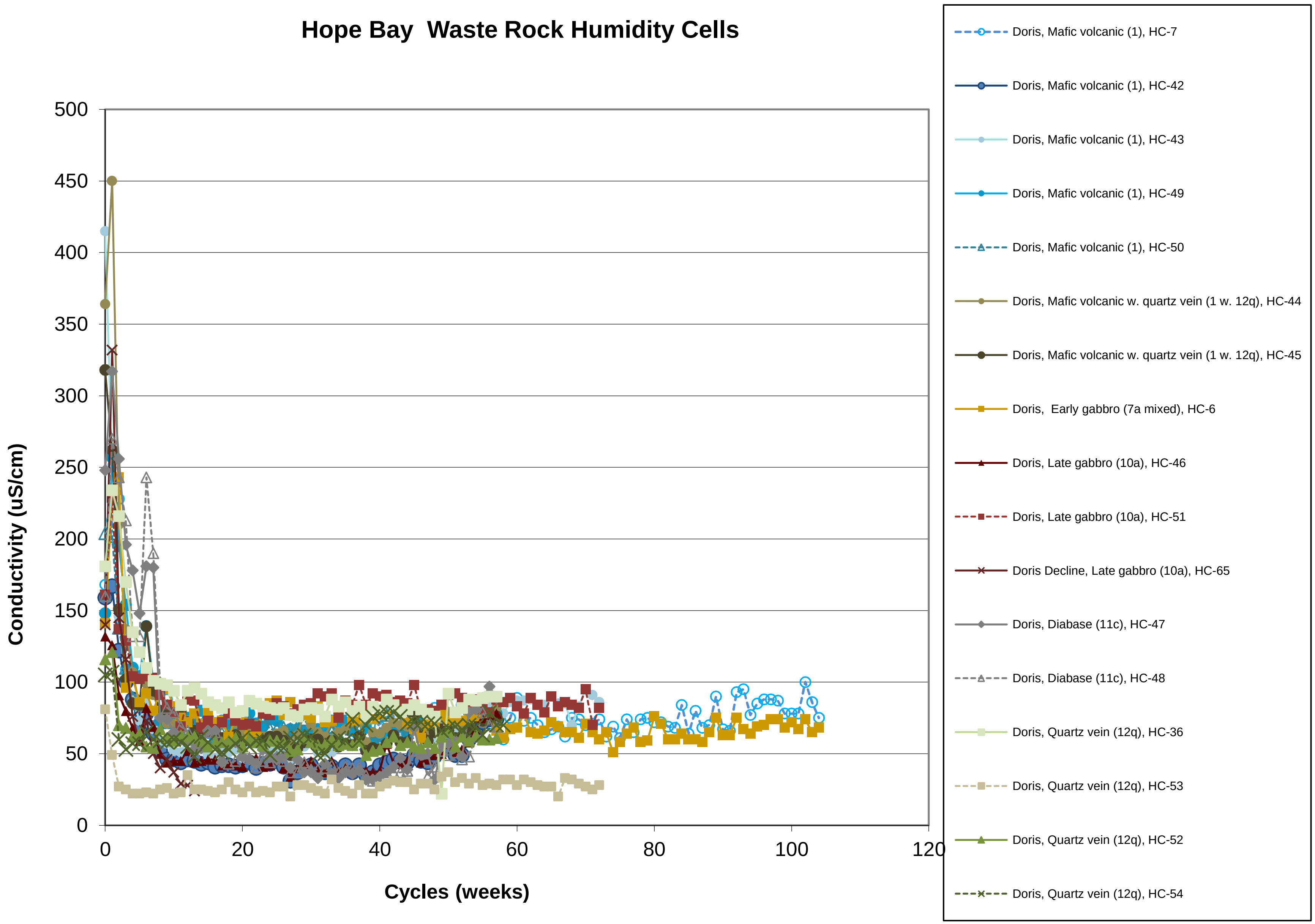
HC #	Pb ppm	Mg ppm	Mn ppm	Hg ppm	Mo ppm	Ni ppm	P ppm	K ppm	Se ppm	Ag ppm	Na ppm	Sr ppm	Tl ppm	Th ppm	Ti ppm	U ppm	V ppm	W ppm	Zn ppm
HC-7	0.9	15,700	2,377	0.00001	1.2	4.2	820	800	0.5	0.1	200	44	0.1	0.2	40	0.1	53	0.1	121
	0.506	16,658	2,645	0.00001	0.26	3.598	876	681	0.557	0.1	412	60.02	0.1	0.229	51	0.1	52.61	0.149	119.4
HC-42	0.6	13,400	1,692	0.00001	1.7	3.2	790	600	0.5	0.1	80	56	0.1	0.3	130	0.1	70	0.1	144
HC-43	0.9	17,400	2,210	0.00001	0.7	2.3	810	1,300	0.5	0.1	620	36	0.1	0.2	80	0.1	45	0.1	91
HC-49	1.69	13,500	1,930	0.005	2.25	1.8	880	700	0.3	40	930	45.1	0.02	0.4	10	0.1	18	0.1	196.8
HC-50	10.36	15,800	2,467	0.005	3.8	3.1	780	800	0.6	251	300	56.9	0.02	0.2	10	0.1	7	0.1	61.9
HC-44	2.3	17,800	1,606	0.00001	1.5	33	570	1,200	0.5	0.1	670	36	0.1	0.3	410	0.1	57	0.1	212
HC-45	2.4	13,100	1,548	0.00001	2.7	18.2	680	500	1.2	0.5	500	28	0.1	0.1	20	0.1	19	0.2	81
HC-6	2.7	23,900	1,605	0.00001	1.7	35	520	200	0.5	0.1	280	32	0.1	0.3	1,060	0.1	115	0.1	88
HC-46	0.7	15,500	1,706	0.00001	0.7	2.5	780	400	0.5	0.1	120	32	0.1	0.4	1,090	0.1	76	0.1	129
HC-51	4.52	31,800	2,197	0.005	0.92	63.2	270	700	0.7	441	260	69.4	0.02	0.1	10	0.1	47	0.1	73.7
HC-65	2.8	20,800	544	0.01	0.5	39.6	560	2,800	0.5	0.1	1,310	28	0.1	0.3	1,640	0.1	174	0.1	42
HC-47	0.5	25,400	1,389	0.00001	0.3	34.5	550	600	0.5	0.1	410	14	0.1	0.4	3,760	0.1	160	0.1	111
HC-48	2.2	20,800	966	0.00001	0.5	22.3	540	500	0.5	0.1	560	25	0.1	0.4	4,500	0.1	162	0.1	82
HC-53	1.18	200	37	0.005	10.7	2.9	20	100	0.1	33	60	1.5	0.02	0.1	10	0.1	2	0.1	5.6
HC-36	3	9,100	1,185	0.01	0.3	4.2	520	500	3	1.2	380	24	0.1	0.1	10	-0.1	4	0.1	27
HC-54	0.49	1,600	200	0.005	12.3	3.8	30	100	0.3	525	90	3.5	0.02	0.1	10	0.1	2	0.1	5.3
HC-52	4.21	3,800	351	0.005	10.7	14.7	80	200	0.8	383	180	12.6	0.02	0.1	10	0.1	3	0.1	14.6
Average Crustal Abundance for Basalt (Price 1997)	*6*	*46,000*	*1,500*	*0.09*	*1.5*	*130*	*1,100*	*8,300*	*0.05*	*0.11*	*18,000*	*465*	*0.21*	*4*	*13,800*	*1*	*250*	*0.7*	*105*

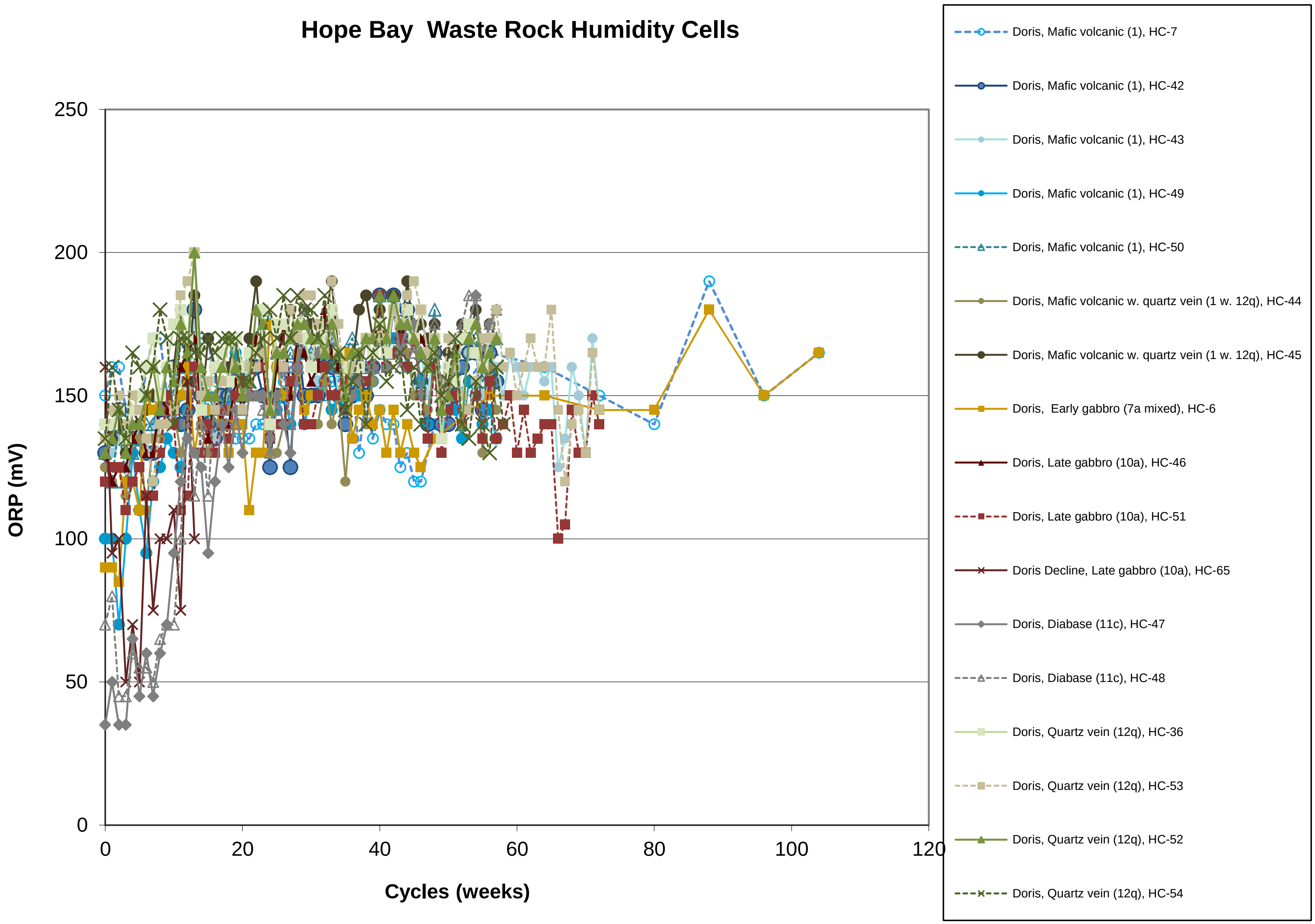
[1]Rock codes as follows: **1** = mafic volcanics; **7a**= early gabbro; **10a** = late gabbro; **11c** = diabase; **12q** = quartz vein

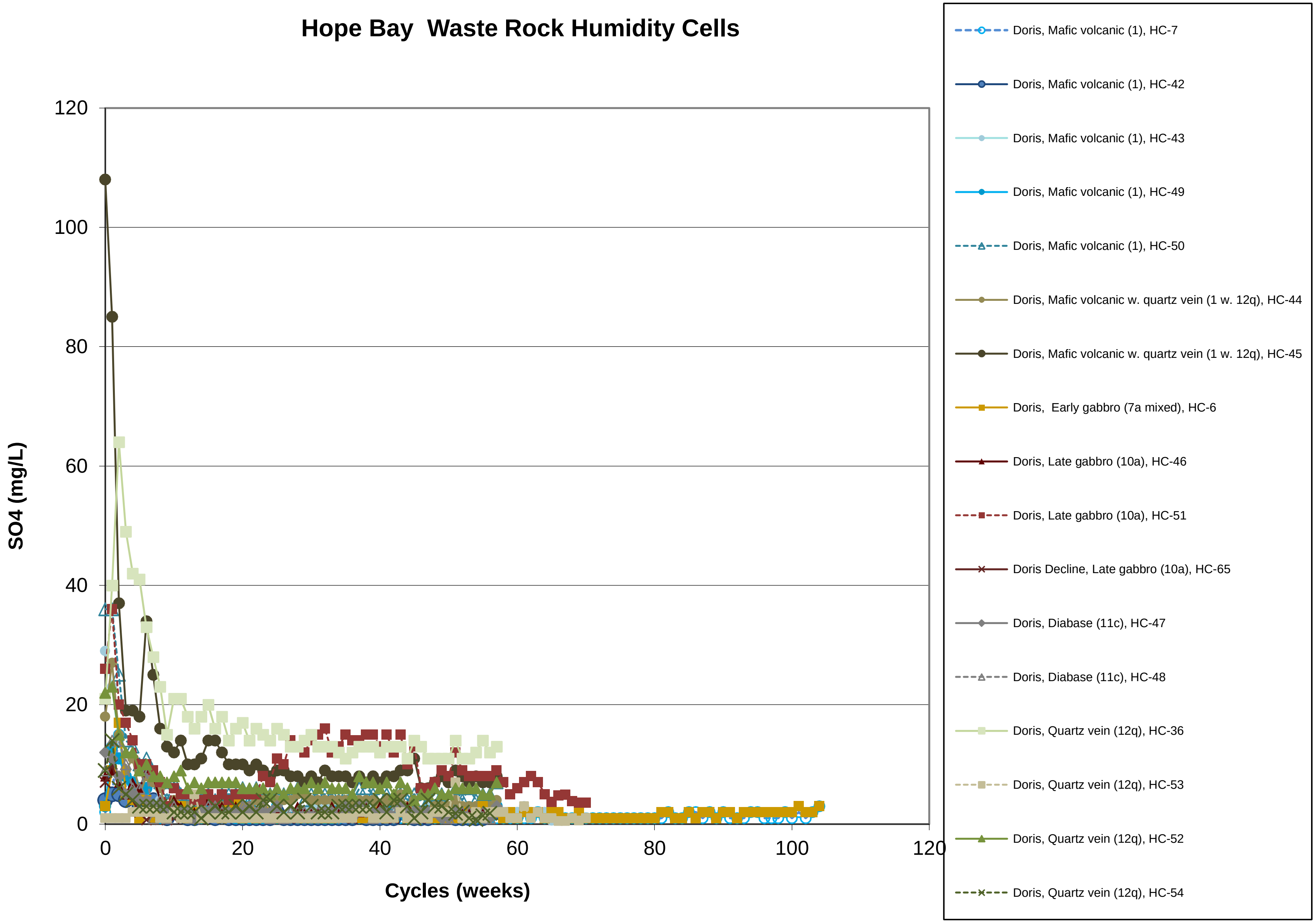
[2]Rank relative to Doris (2011) sample set except for HC-6. No rank for HC-6 because 7a is an insignificant rock type for the Doris deposit.

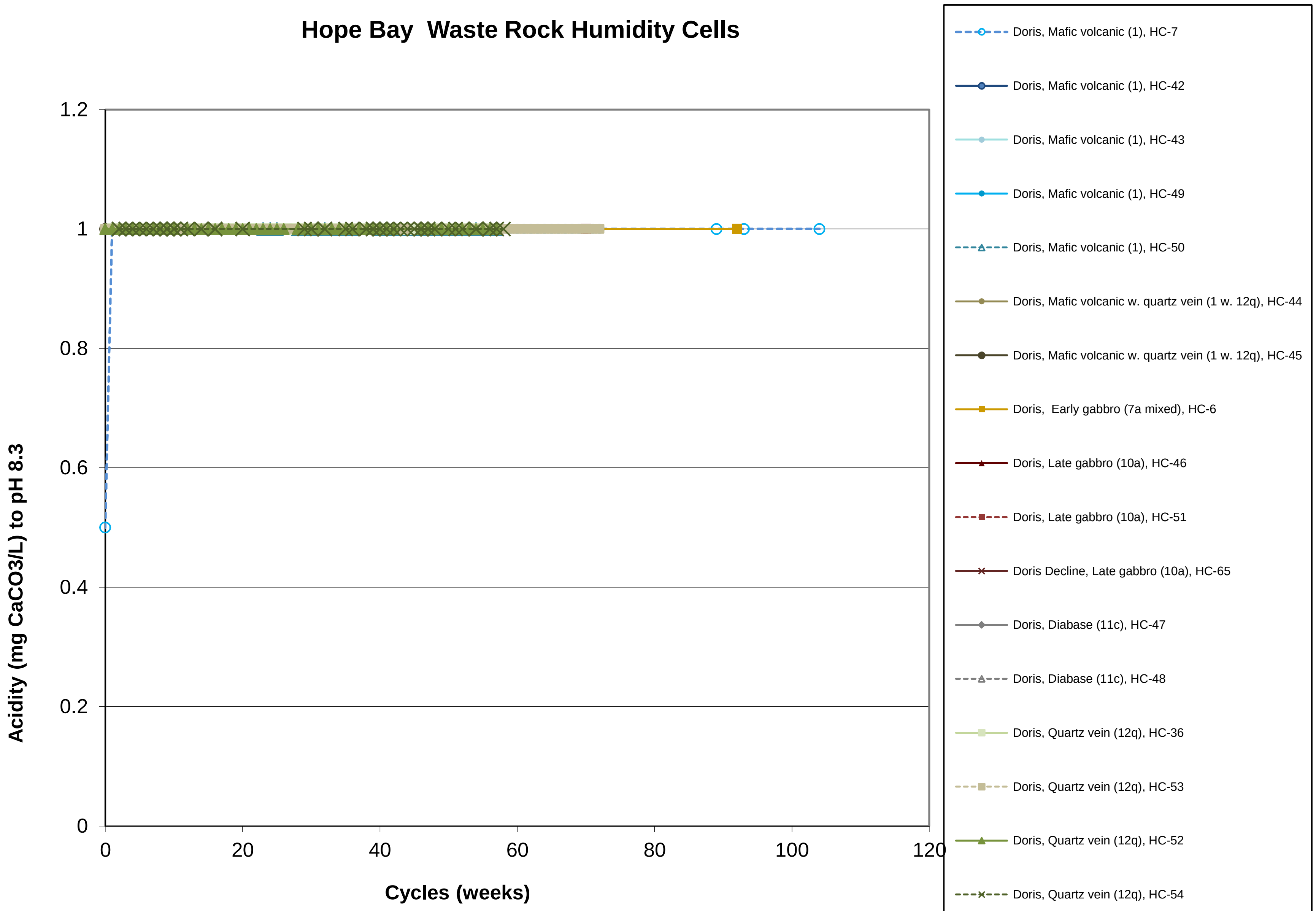
Appendix C: Figures, Humidity Cell Tests

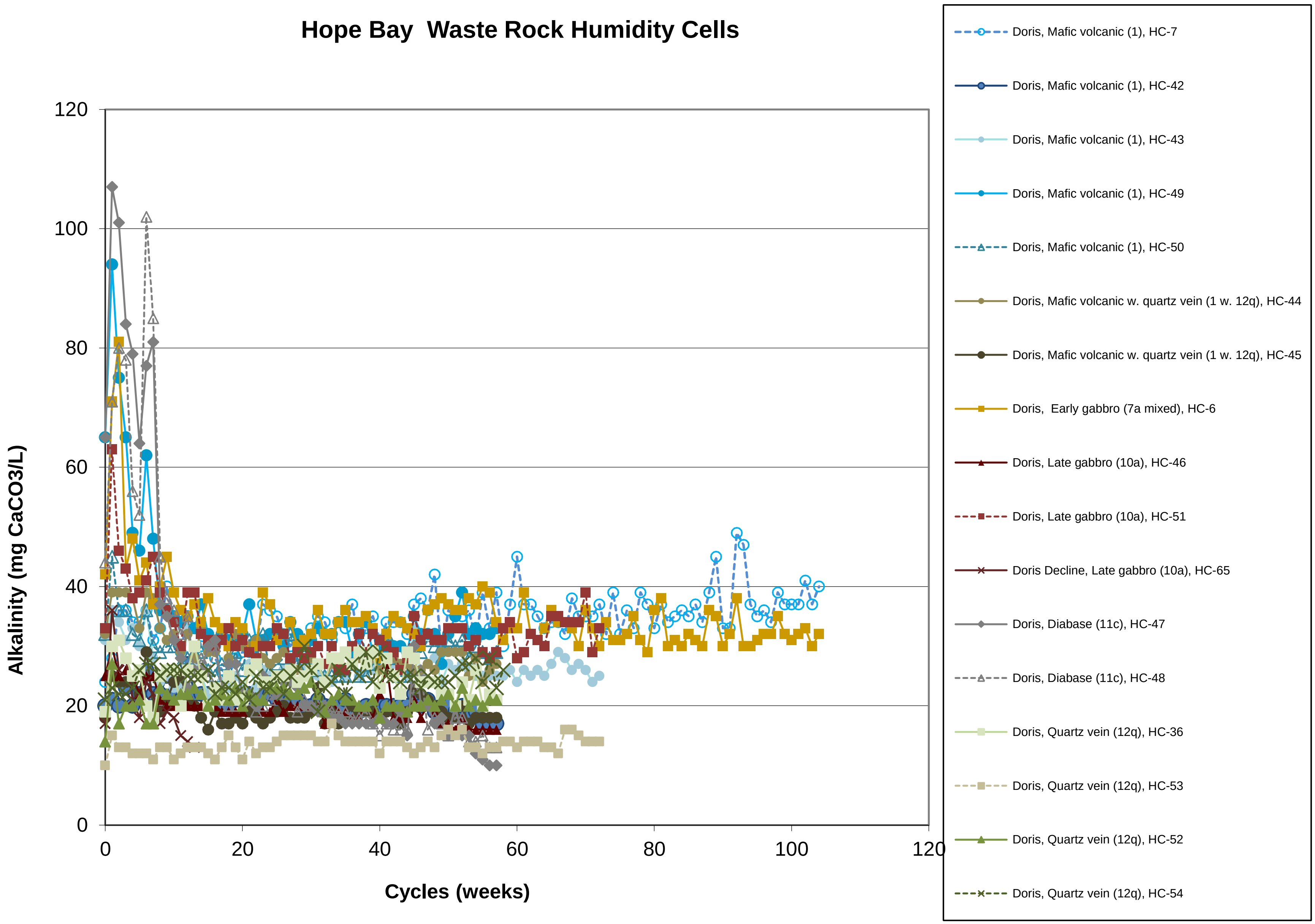

Hope Bay Waste Rock Humidity Cells
pH
10
9.5
9
8.5
8
7.5
7
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54


Hope Bay Waste Rock Humidity Cells
Conductivity (uS/cm)
500
450
400
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

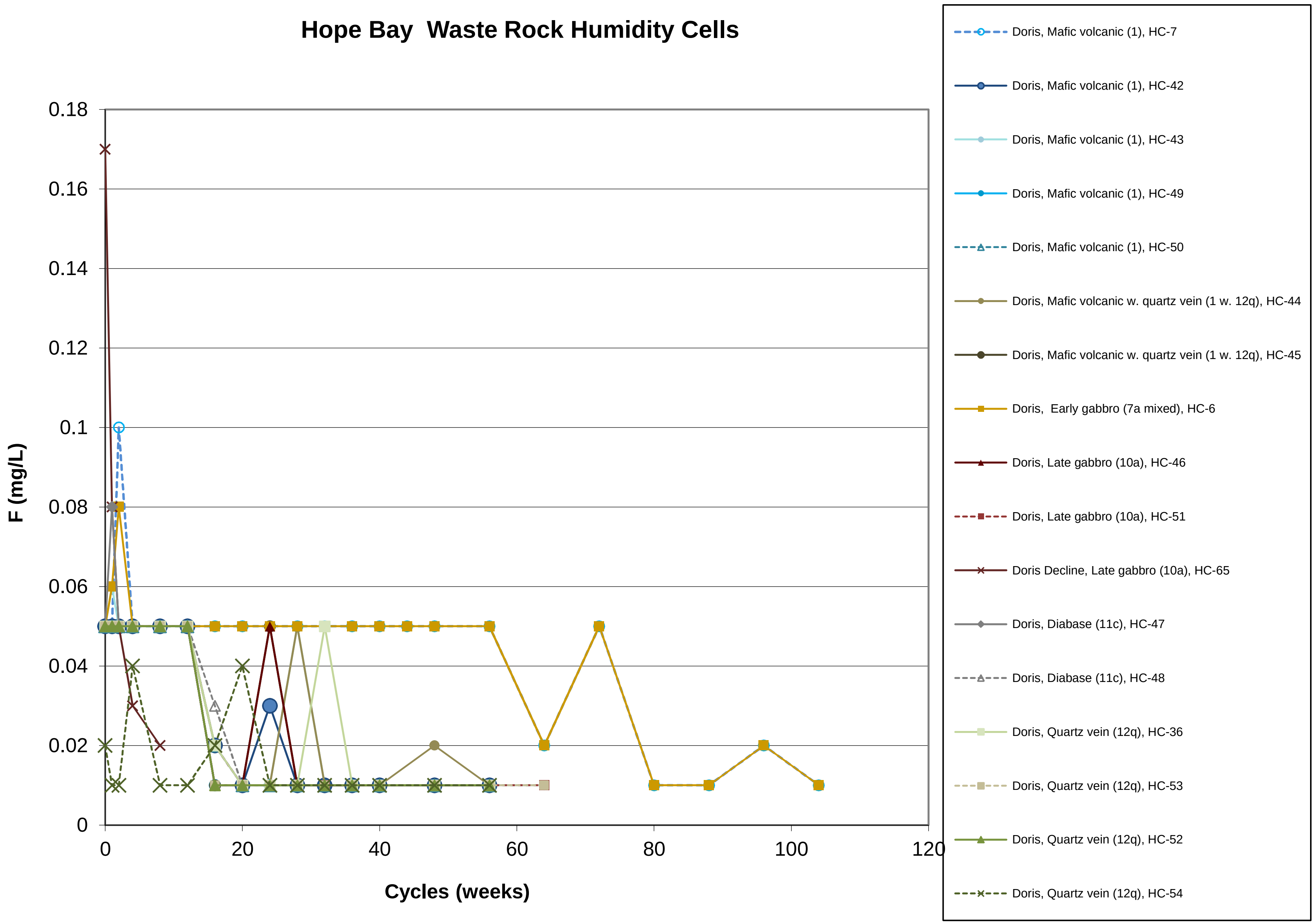

Hope Bay Waste Rock Humidity Cells
ORP (mV)
0
50
100
150
200
250
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

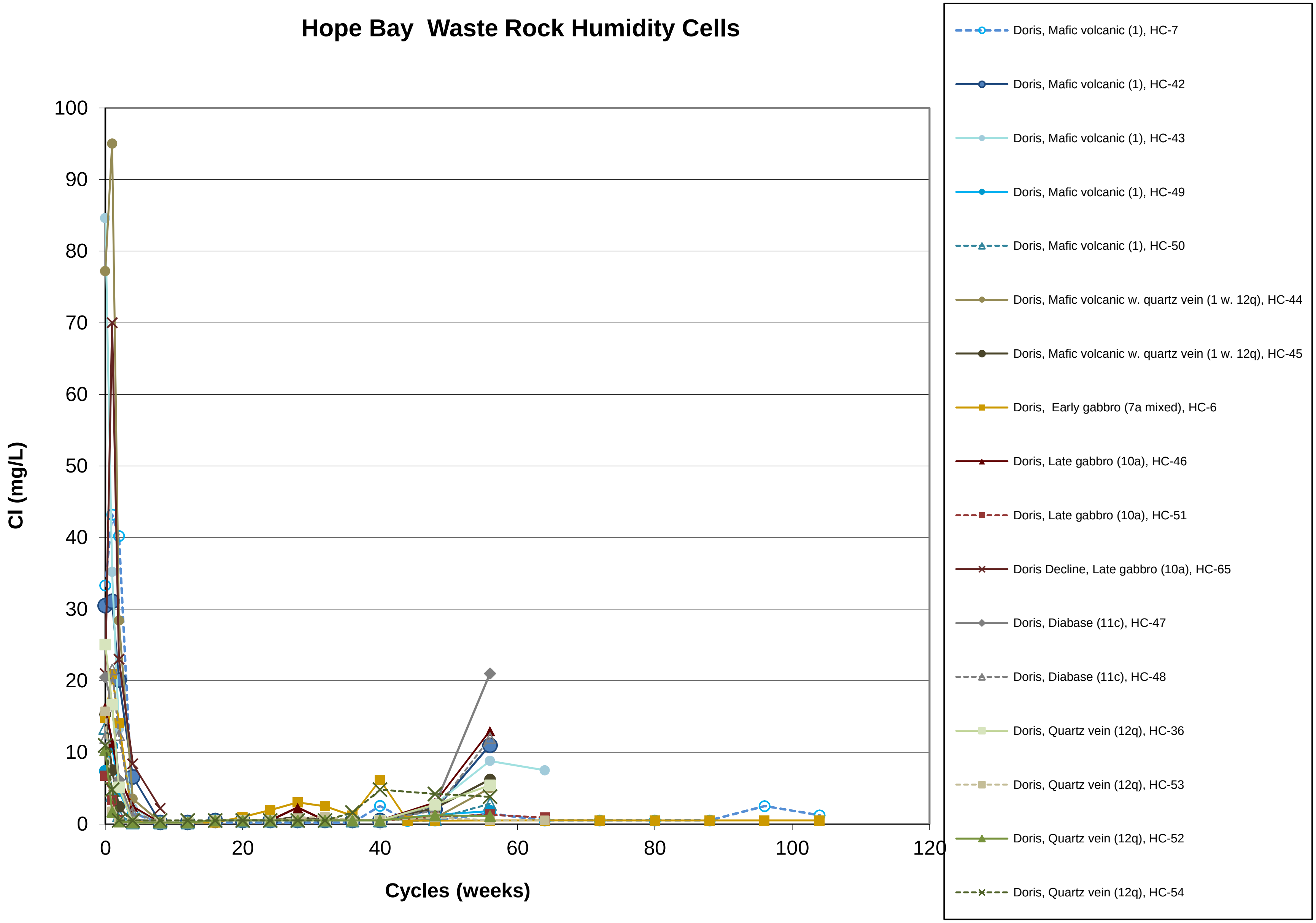

Hope Bay Waste Rock Humidity Cells
SO4 (mg/L)
120
100
80
60
40
20
0
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

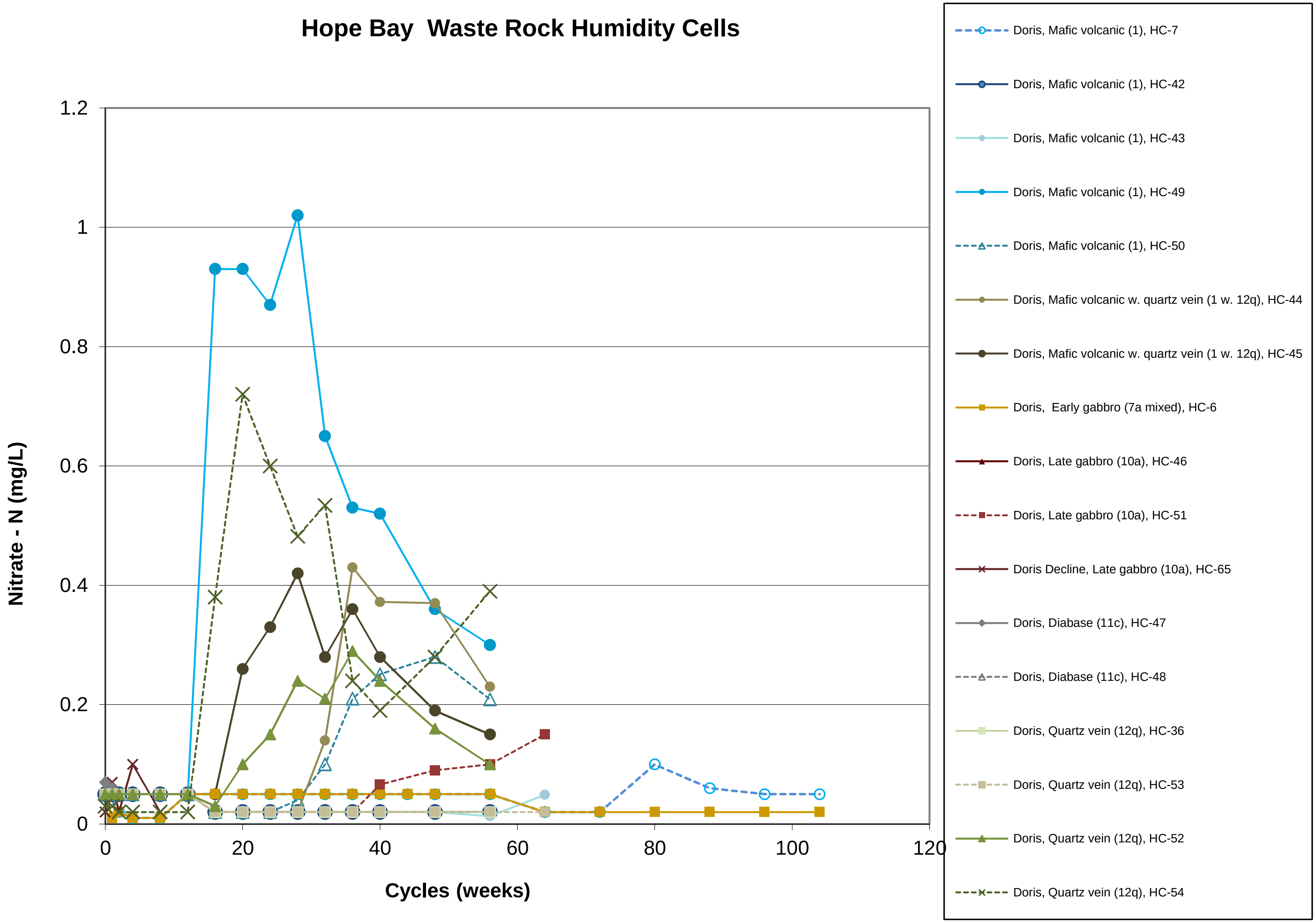

Hope Bay Waste Rock Humidity Cells
Acidity (mg CaCO3/L) to pH 8.3
1.2
1
0.8
0.6
0.4
0.2
0
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

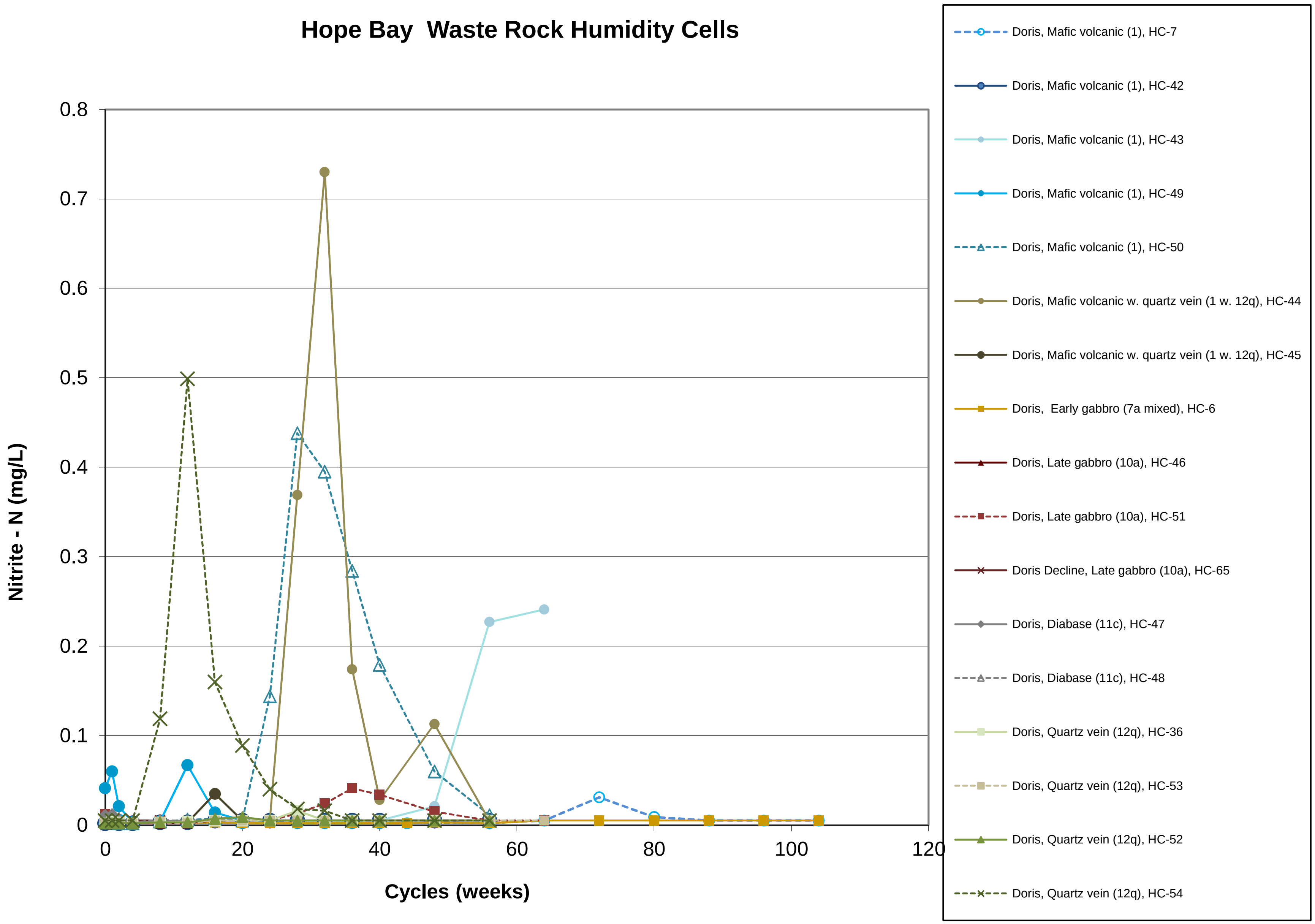


Hope Bay Waste Rock Humidity Cells
Alkalinity (mg CaCO3/L)
Cycles (weeks)
0
20
40
60
80
100
120
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

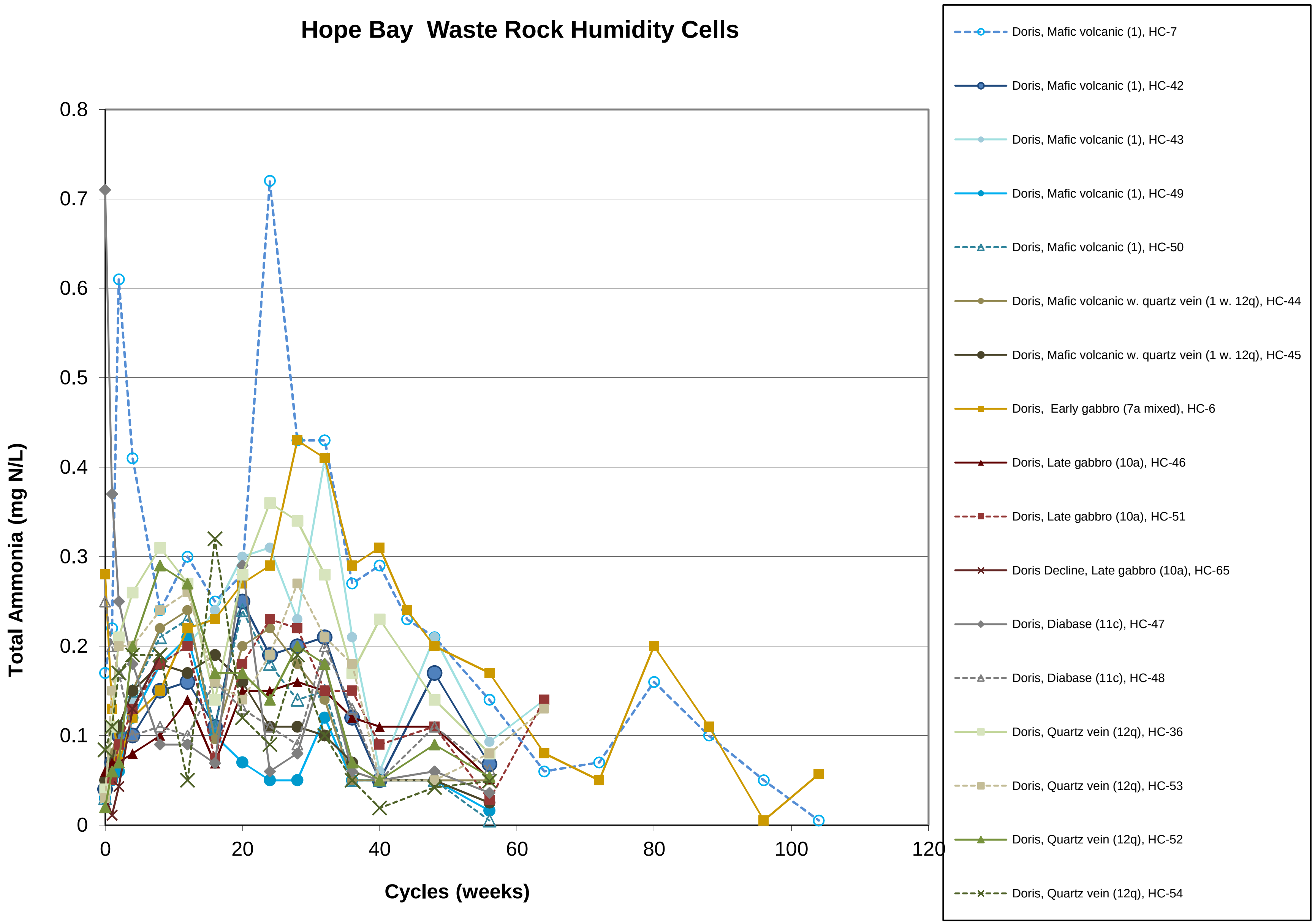

Hope Bay Waste Rock Humidity Cells
F (mg/L)
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

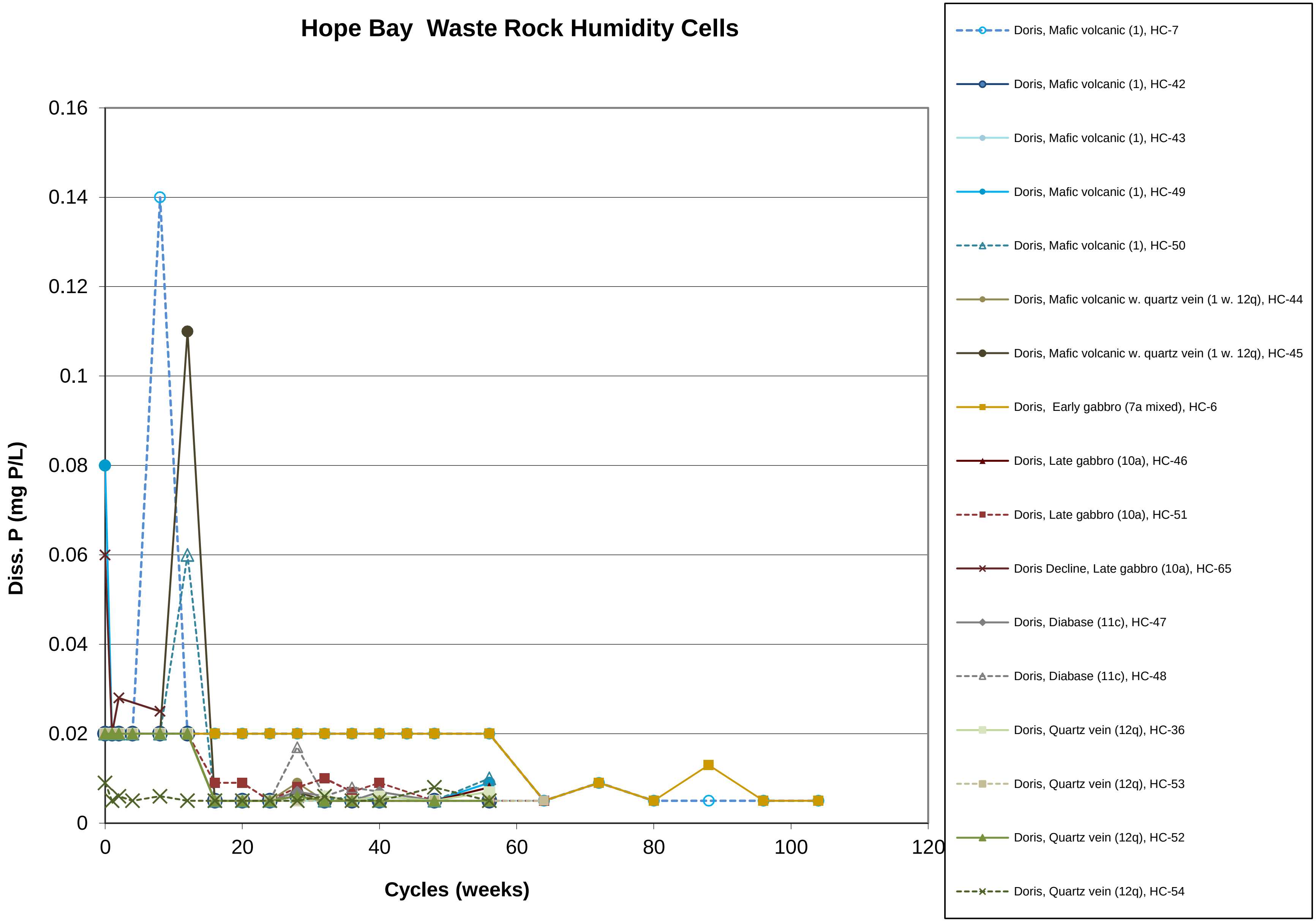

Hope Bay Waste Rock Humidity Cells
Cl (mg/L)
100
90
80
70
60
50
40
30
20
10
0
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

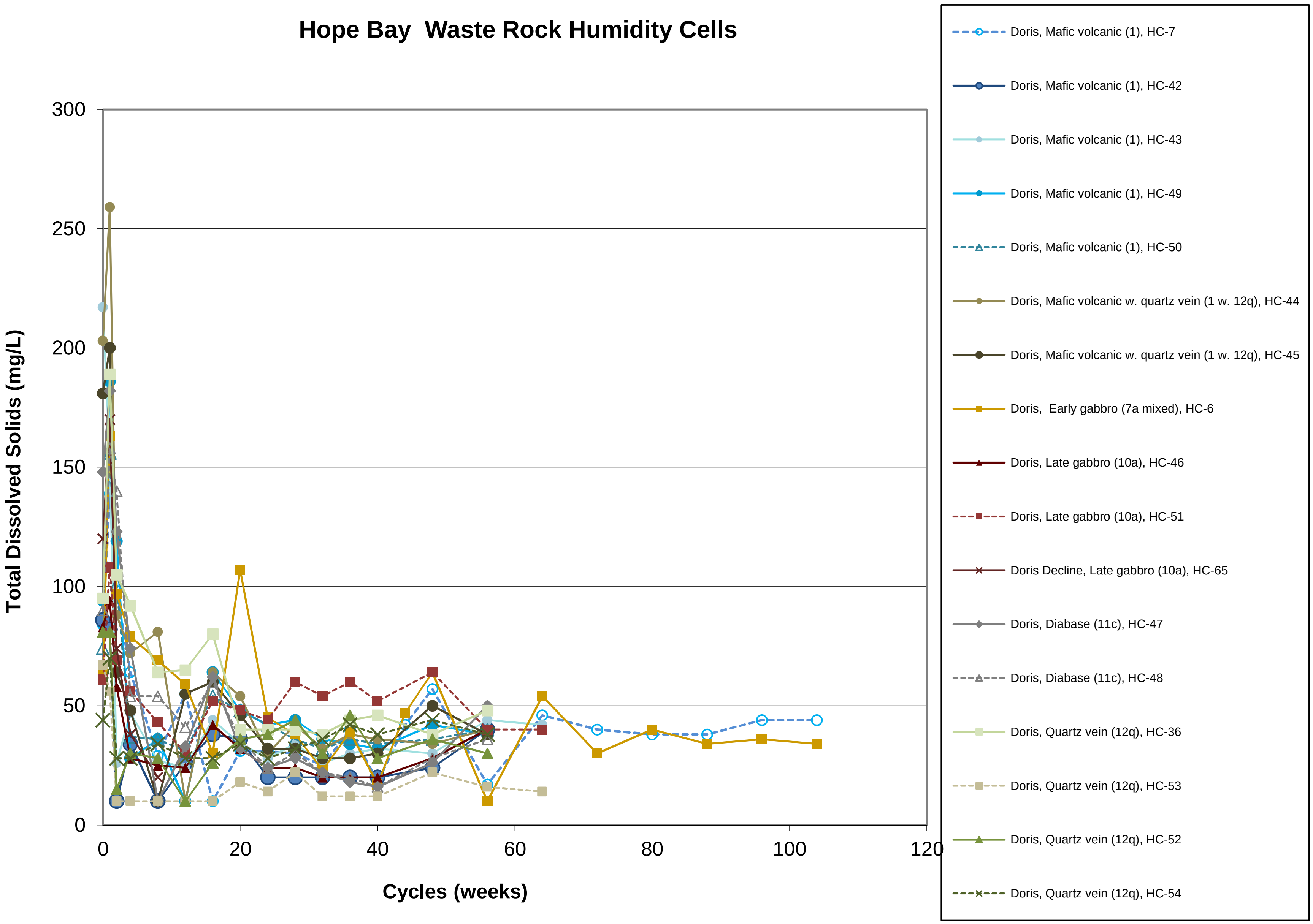

Hope Bay Waste Rock Humidity Cells
Nitrate - N (mg/L)
Cycles (weeks)
0
0.2
0.4
0.6
0.8
1
1.2
0
20
40
60
80
100
120
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

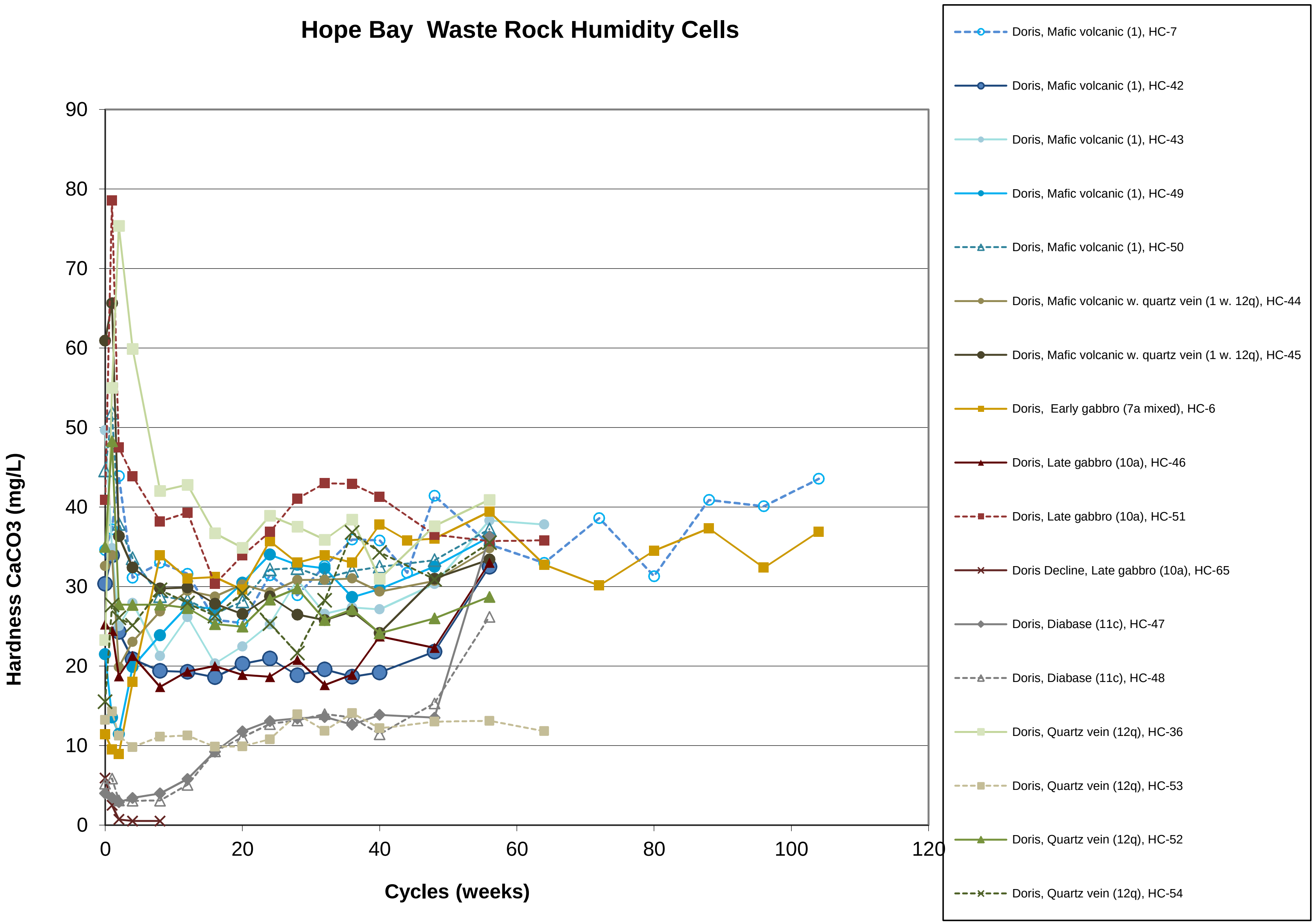


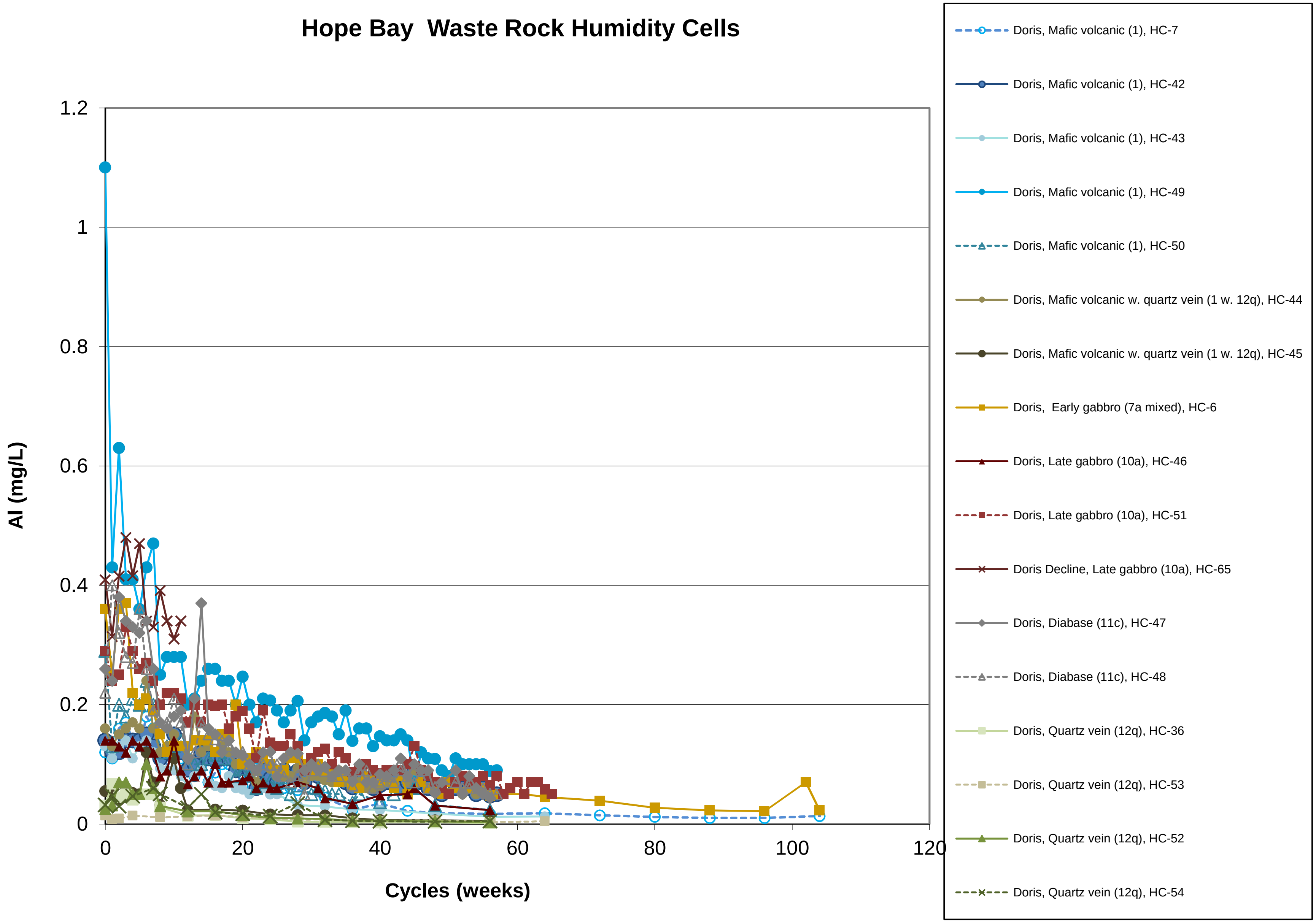
Hope Bay Waste Rock Humidity Cells
Nitrite - N (mg/L)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

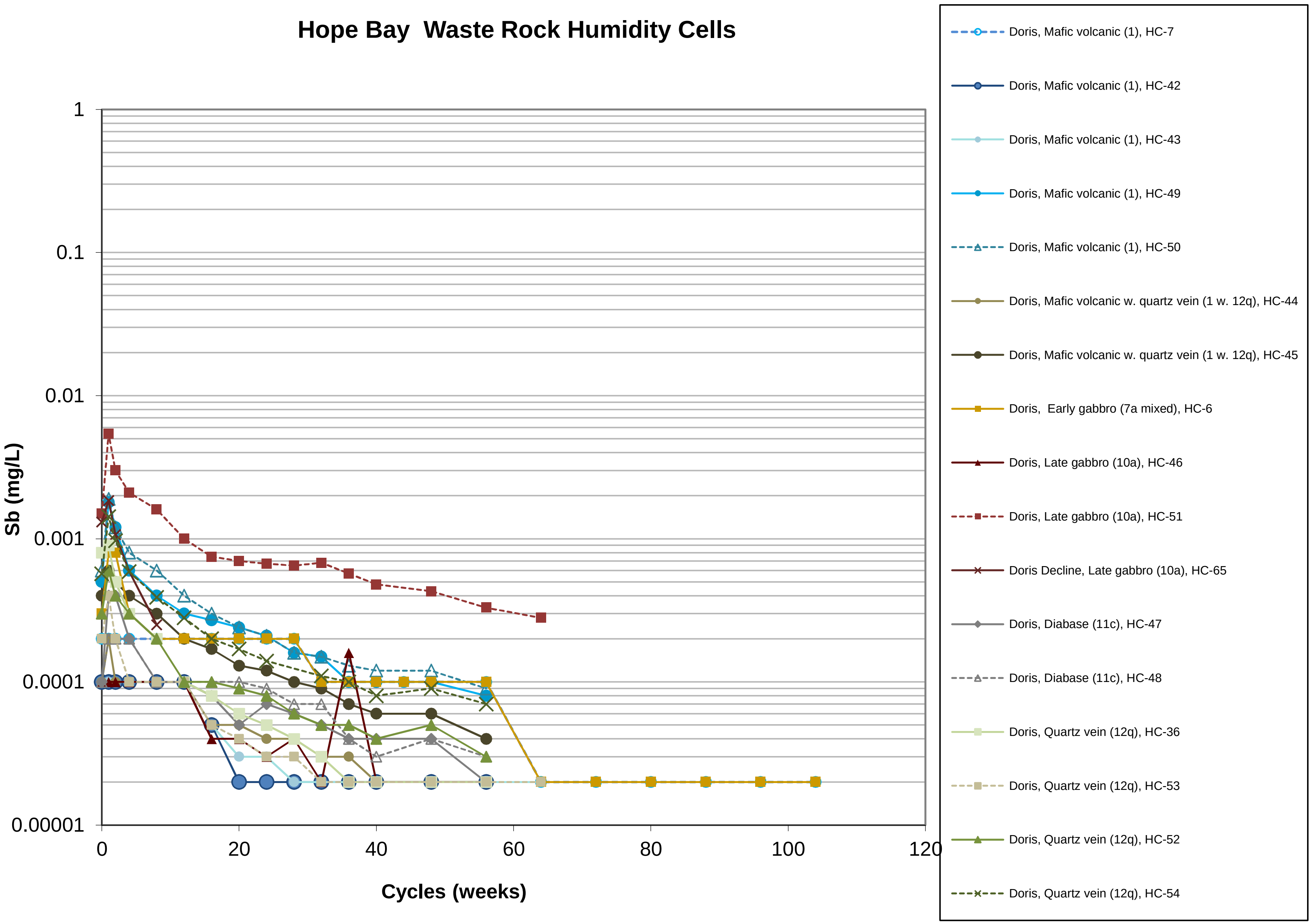

Hope Bay Waste Rock Humidity Cells
Total Ammonia (mg N/L)
Cycles (weeks)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0
20
40
60
80
100
120
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

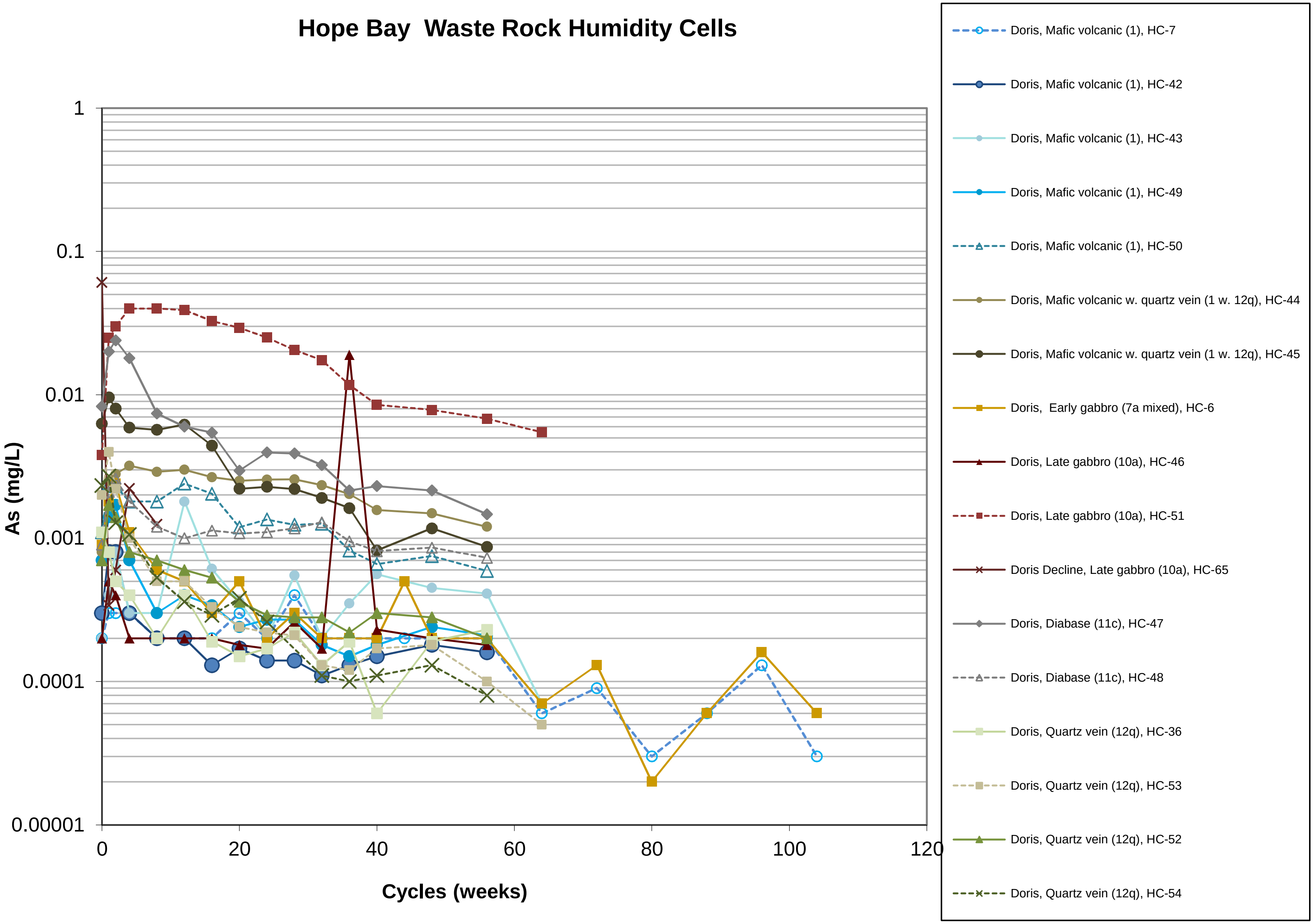

Hope Bay Waste Rock Humidity Cells
Diss. P (mg P/L)
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

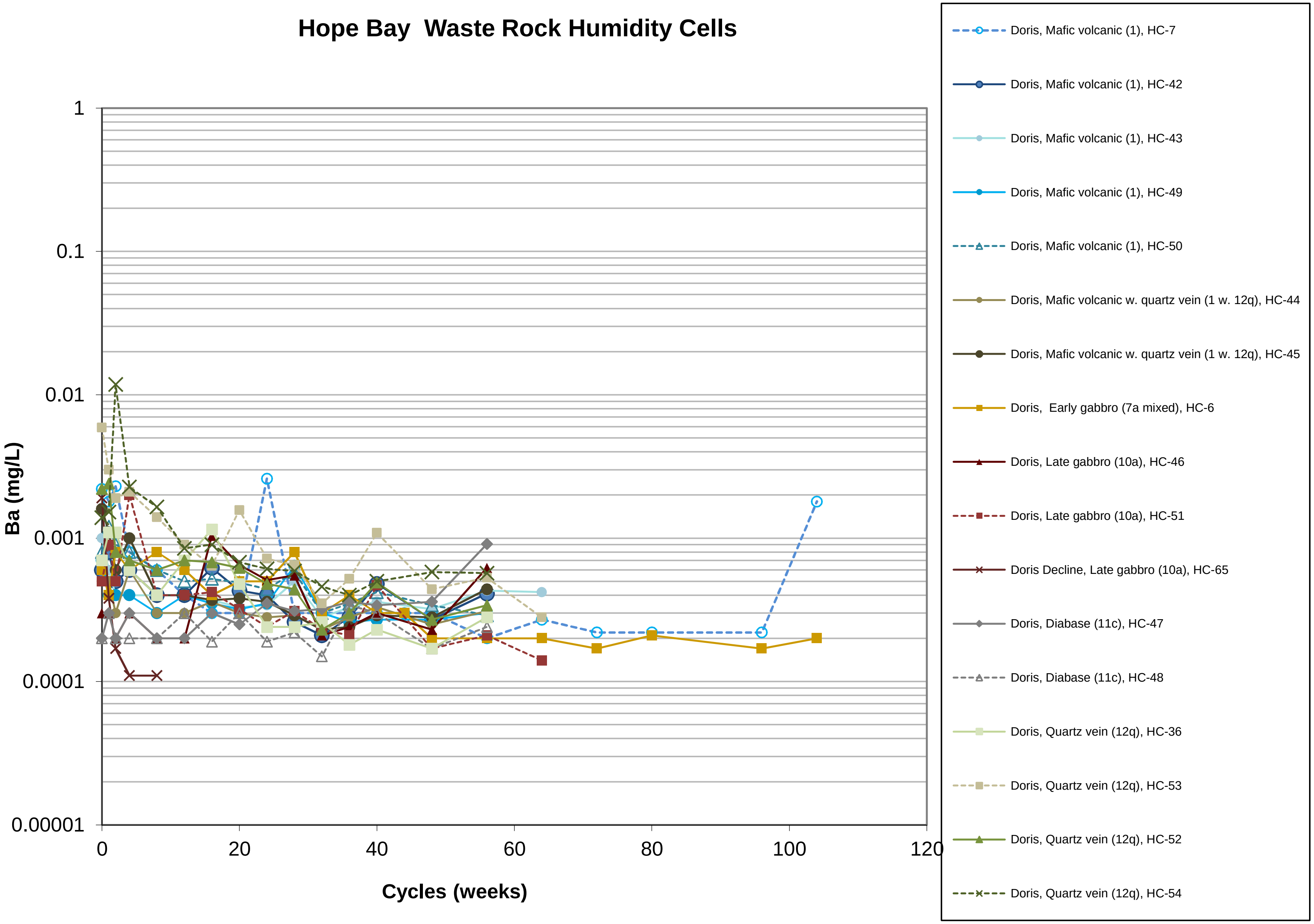

Hope Bay Waste Rock Humidity Cells
Total Dissolved Solids (mg/L)
300
250
200
150
100
50
0
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

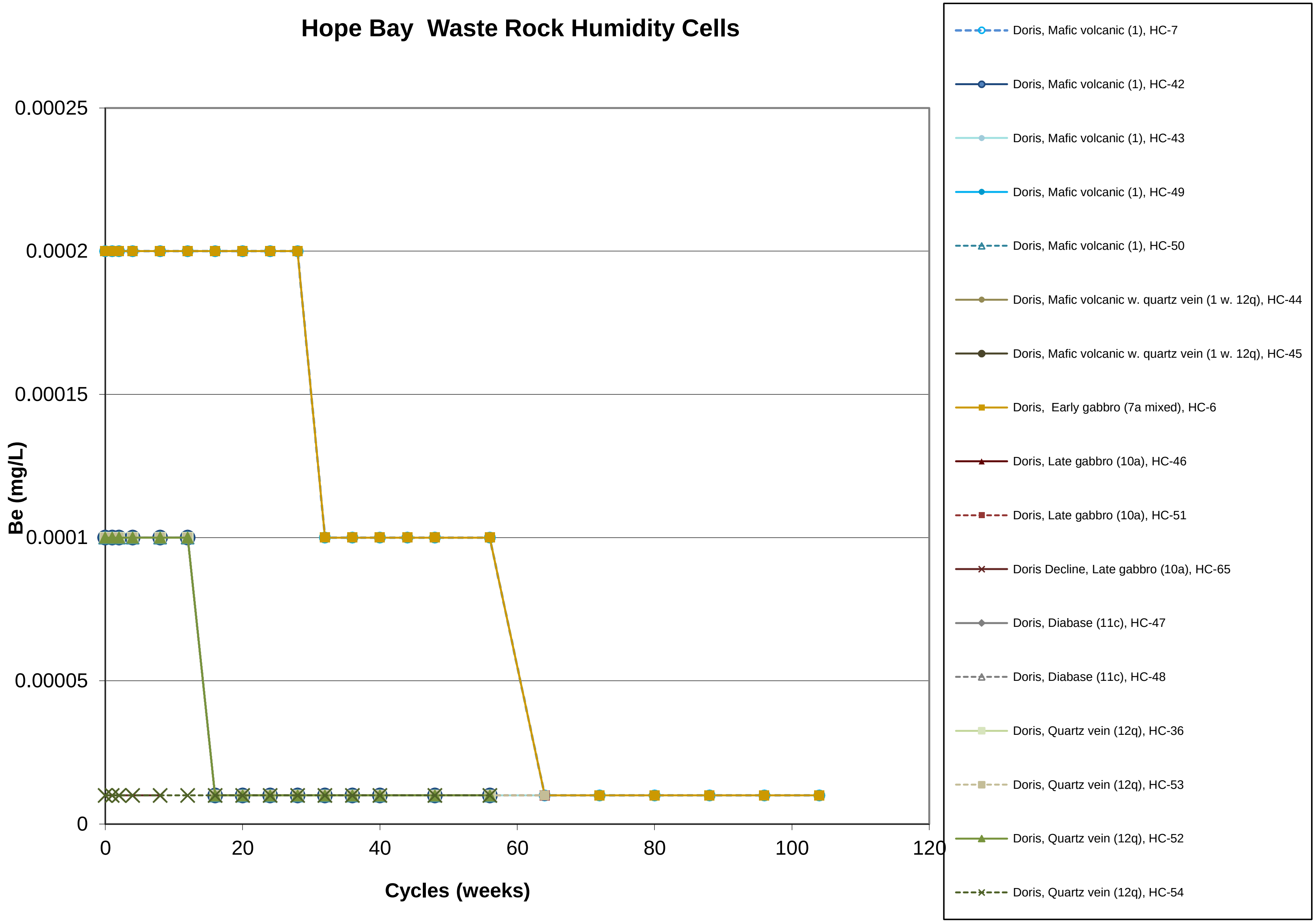

Hope Bay Waste Rock Humidity Cells
Hardness CaCO3 (mg/L)
Cycles (weeks)
0
10
20
30
40
50
60
70
80
90
0
20
40
60
80
100
120
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

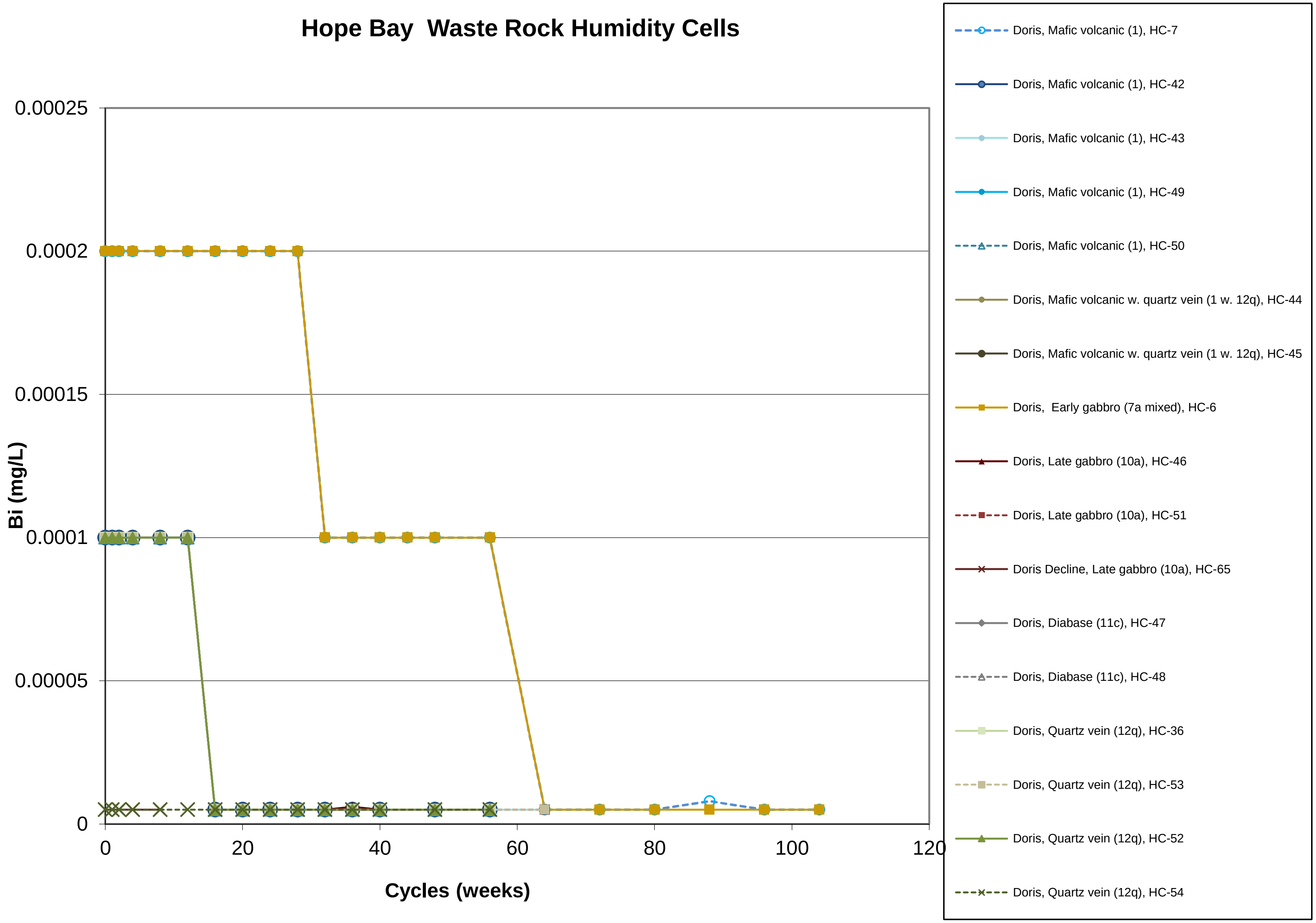

Hope Bay Waste Rock Humidity Cells
Al (mg/L)
1.2
1
0.8
0.6
0.4
0.2
0
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

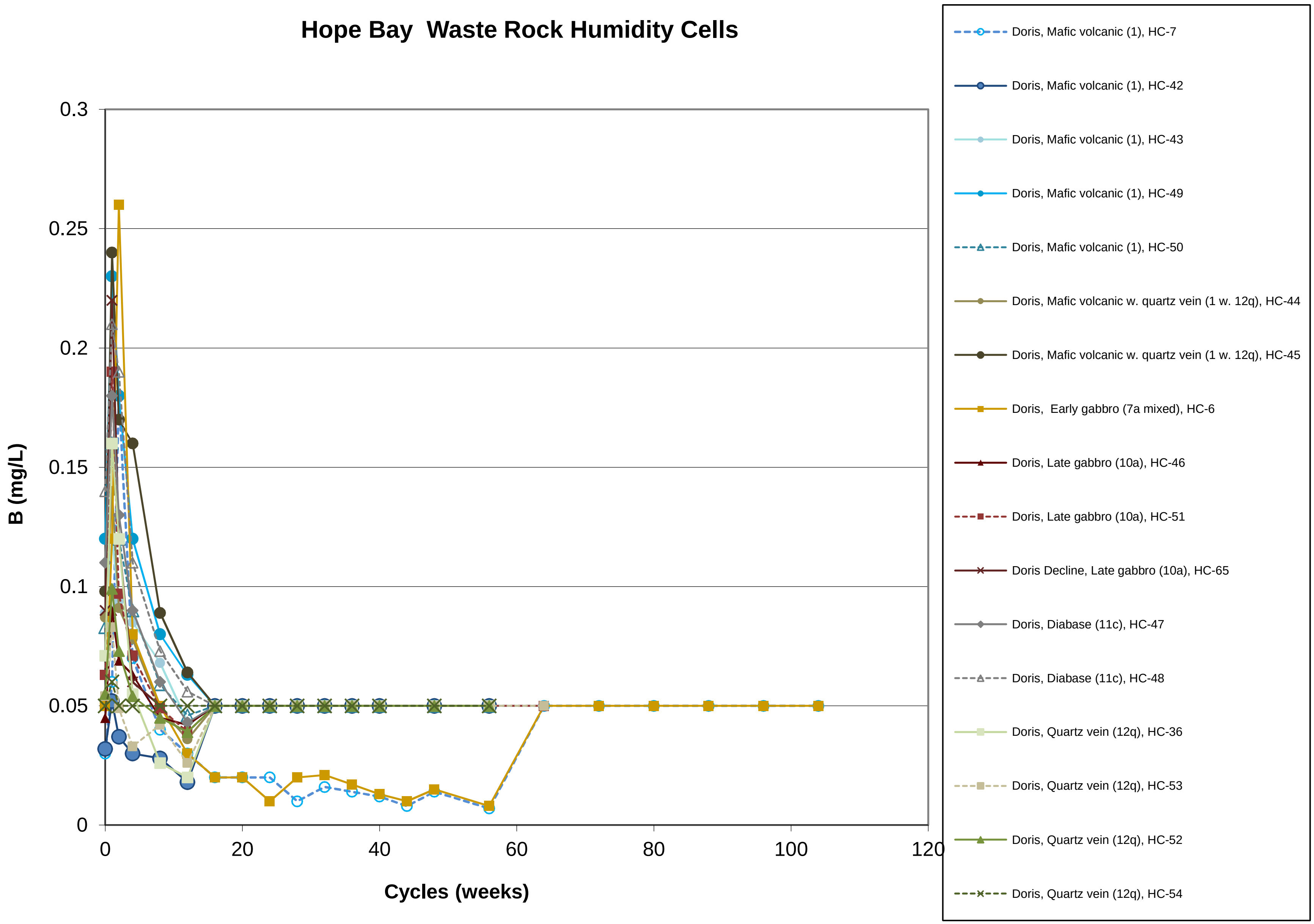

Hope Bay Waste Rock Humidity Cells
Sb (mg/L)
1
0.1
0.01
0.001
0.0001
0.00001
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

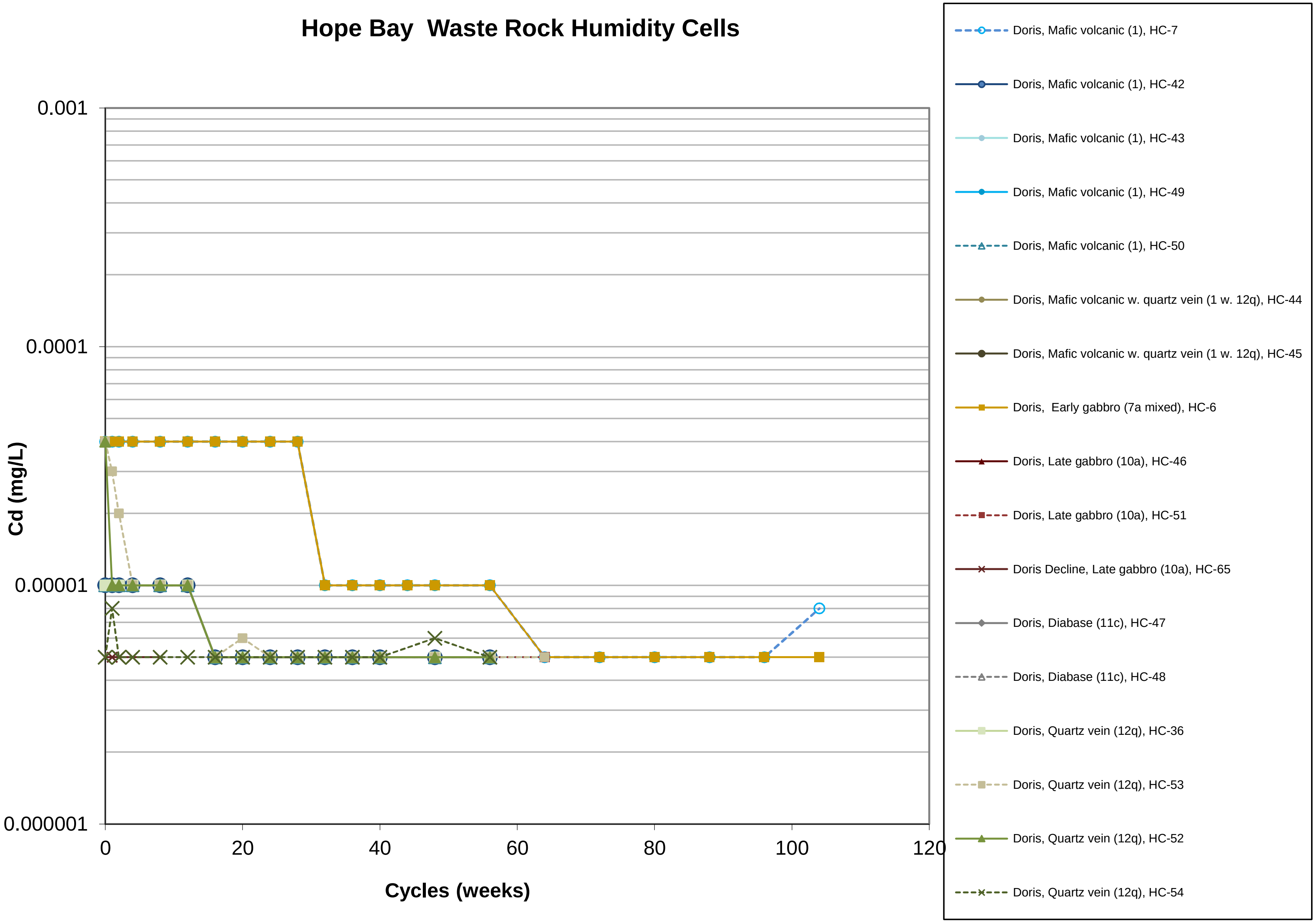

Hope Bay Waste Rock Humidity Cells
As (mg/L)
1
0.1
0.01
0.001
0.0001
0.00001
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

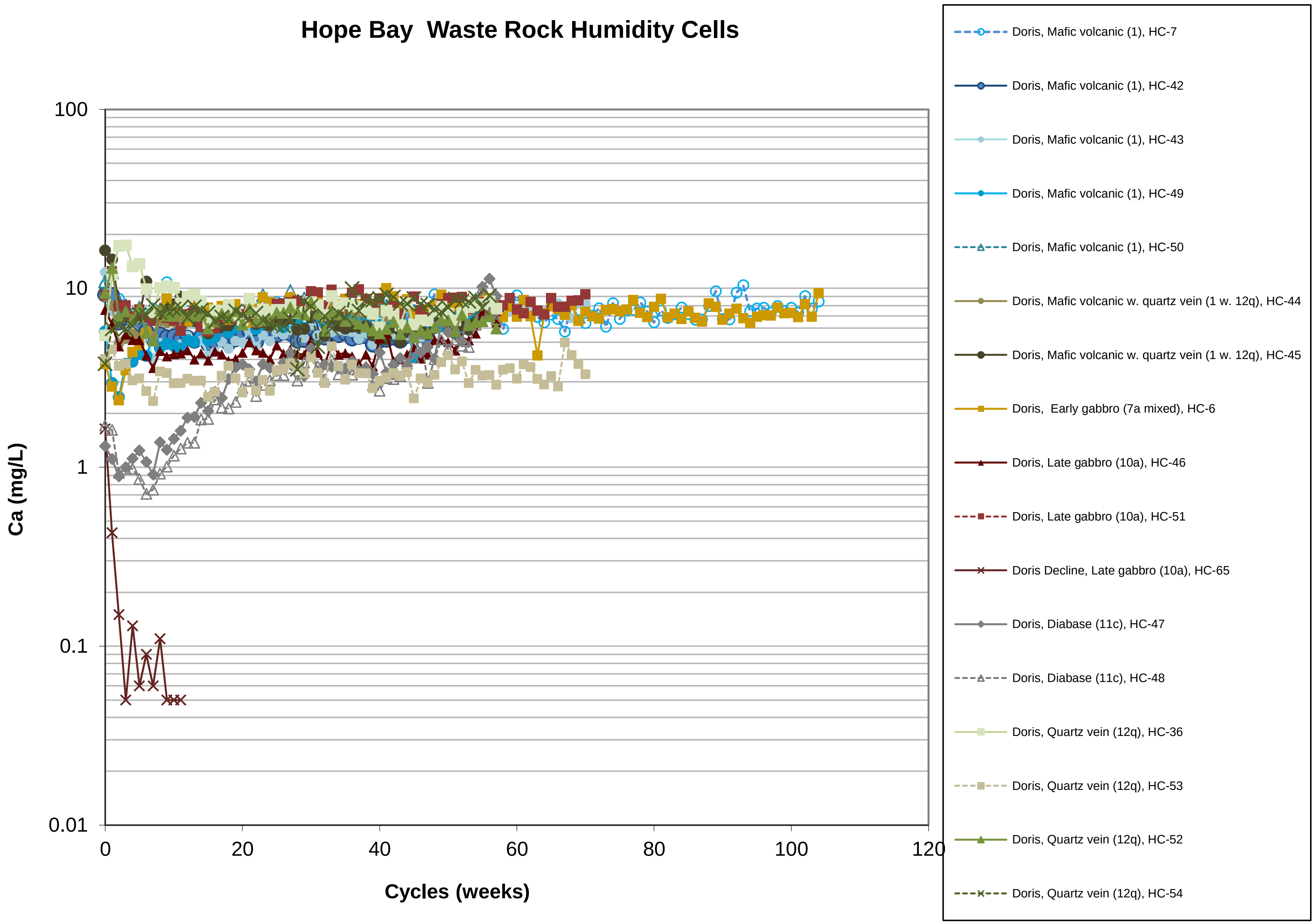

Hope Bay Waste Rock Humidity Cells
Ba (mg/L)
1
0.1
0.01
0.001
0.0001
0.00001
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

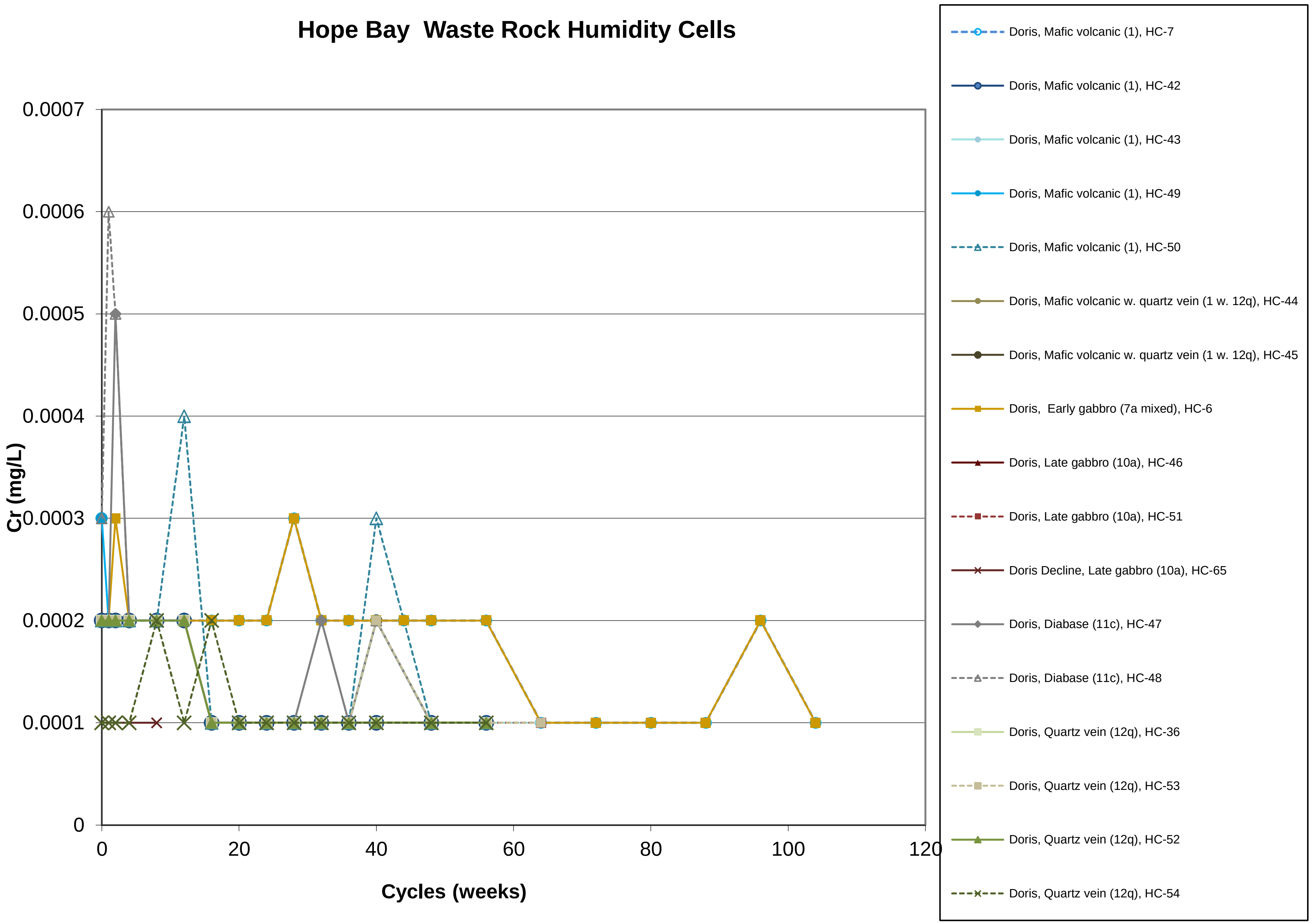

Hope Bay Waste Rock Humidity Cells
0.00025
0.0002
0.00015
0.0001
0.00005
0
Be (mg/L)
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

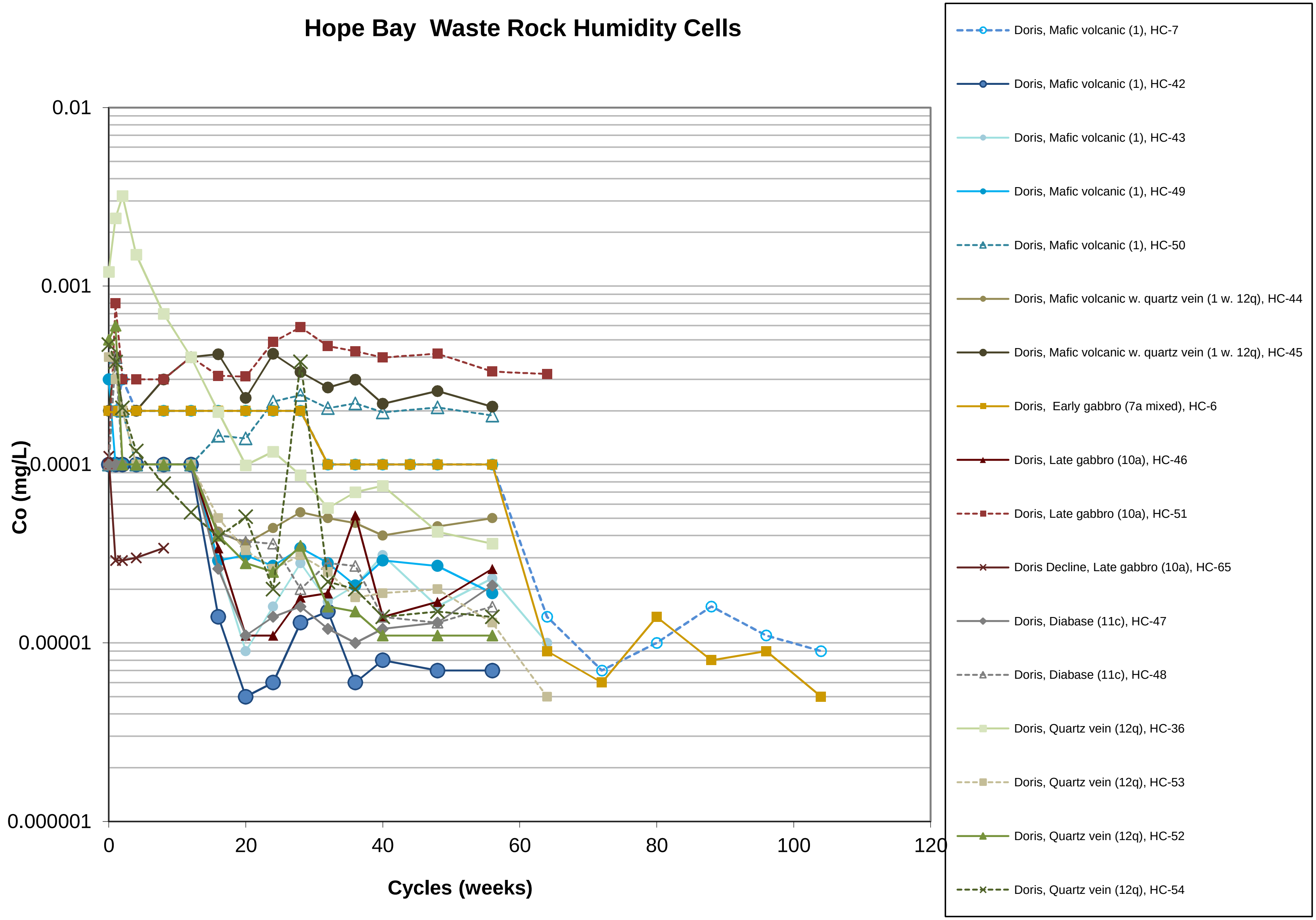

Hope Bay Waste Rock Humidity Cells
Bi (mg/L)
0.00025
0.0002
0.00015
0.0001
0.00005
0
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

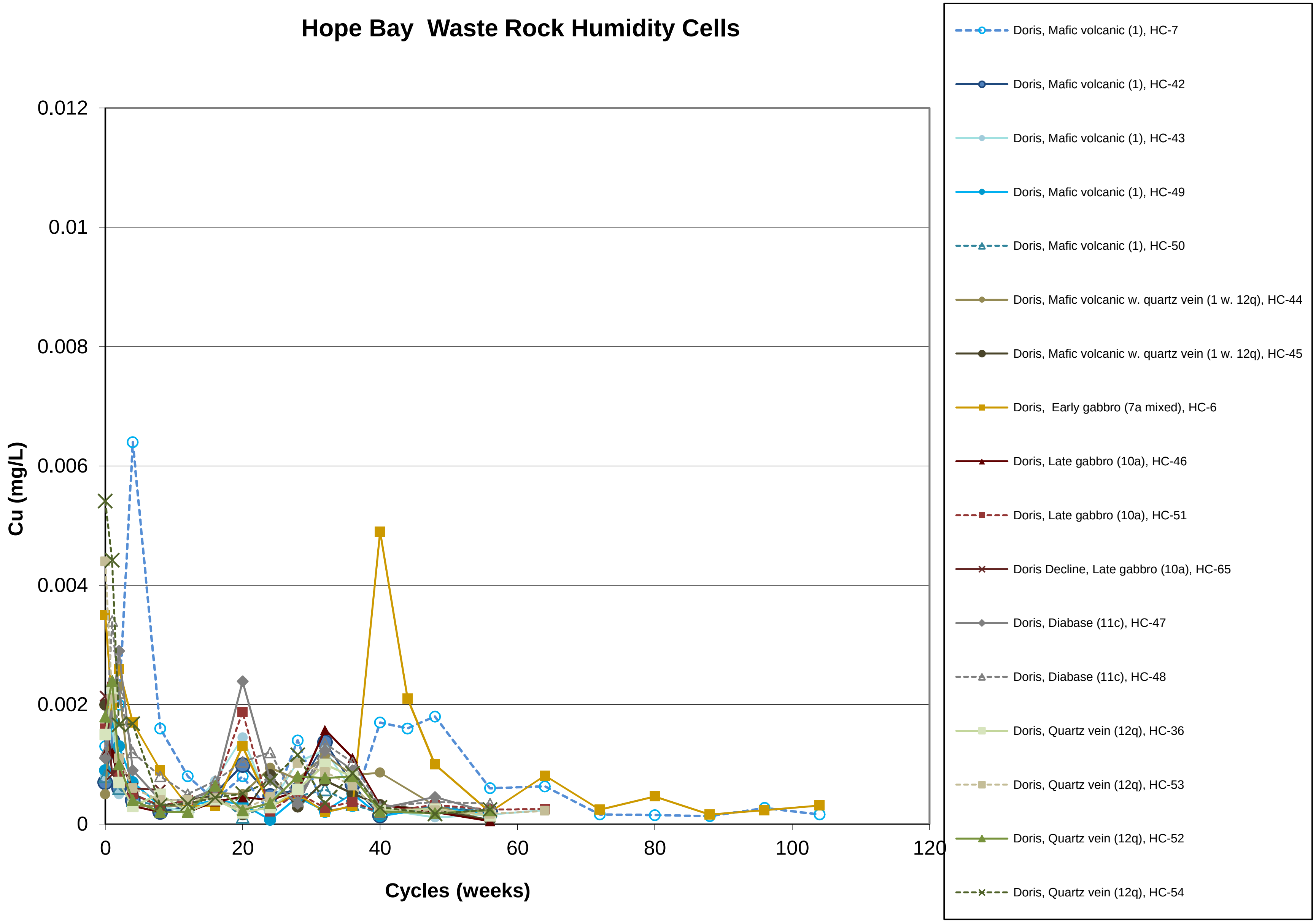

Hope Bay Waste Rock Humidity Cells
B (mg/L)
Cycles (weeks)
0
0.05
0.1
0.15
0.2
0.25
0.3
0
20
40
60
80
100
120
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

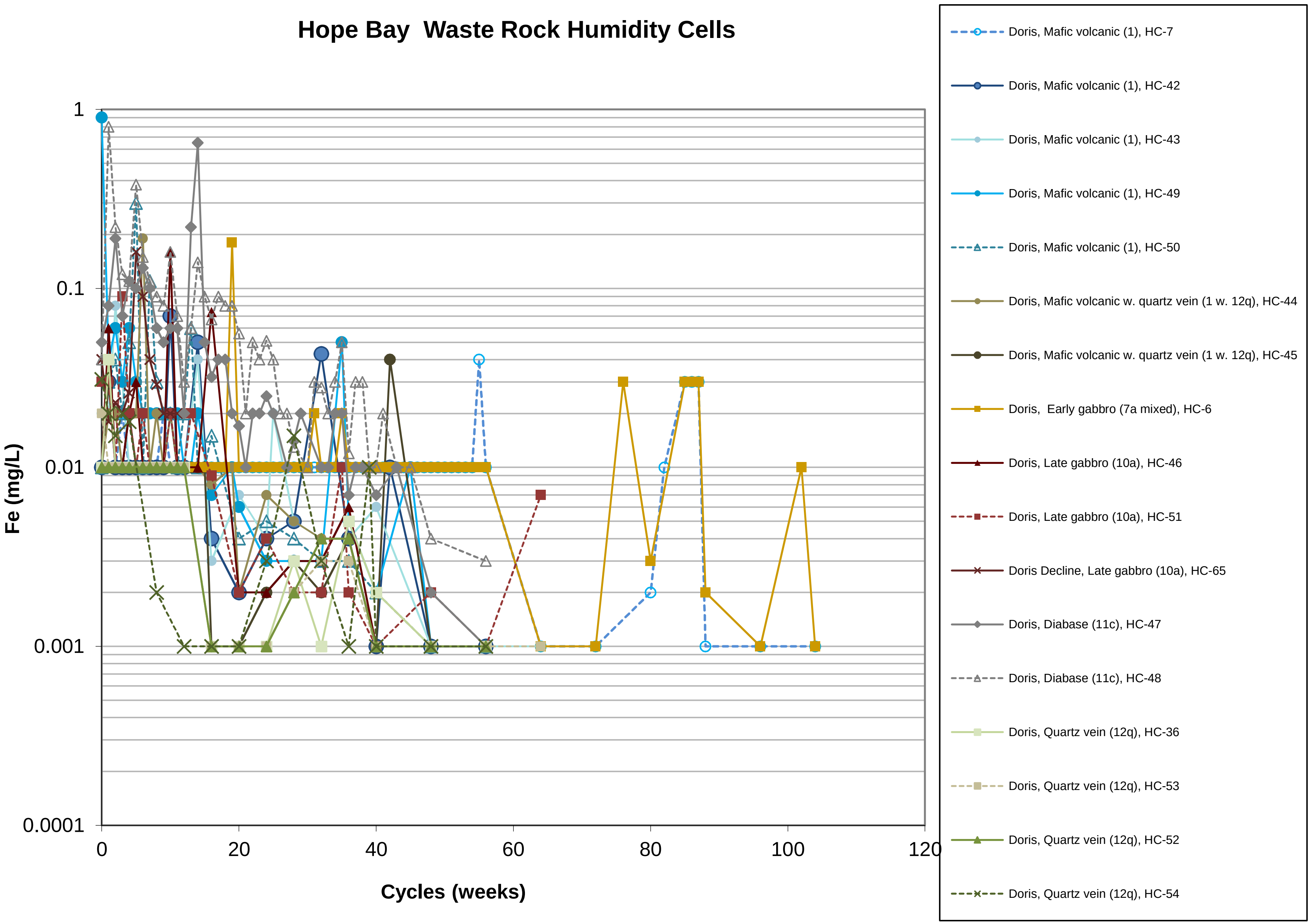

Hope Bay Waste Rock Humidity Cells
Cd (mg/L)
0.001
0.0001
0.00001
0.000001
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

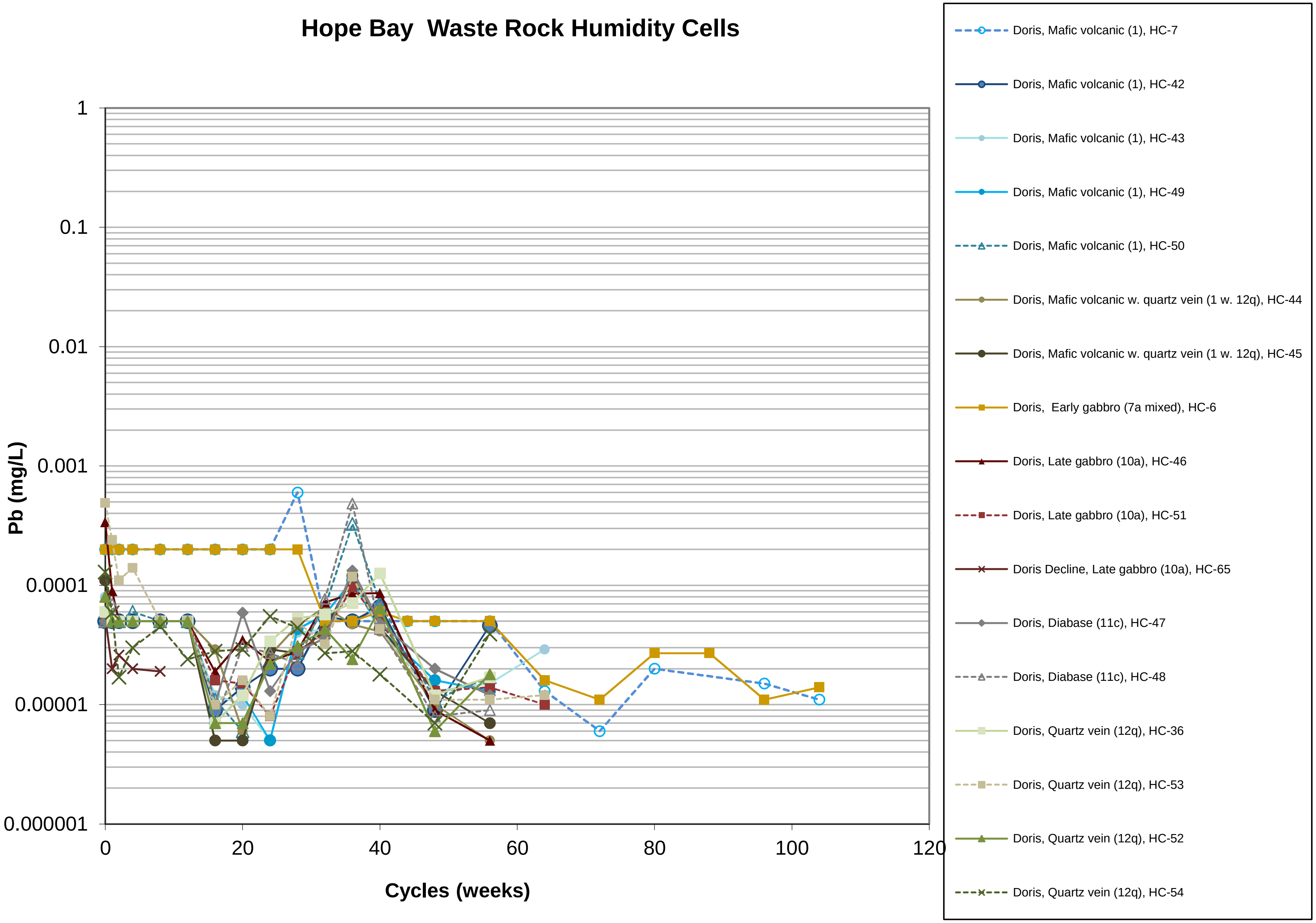

Hope Bay Waste Rock Humidity Cells
Ca (mg/L)
100
10
1
0.1
0.01
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

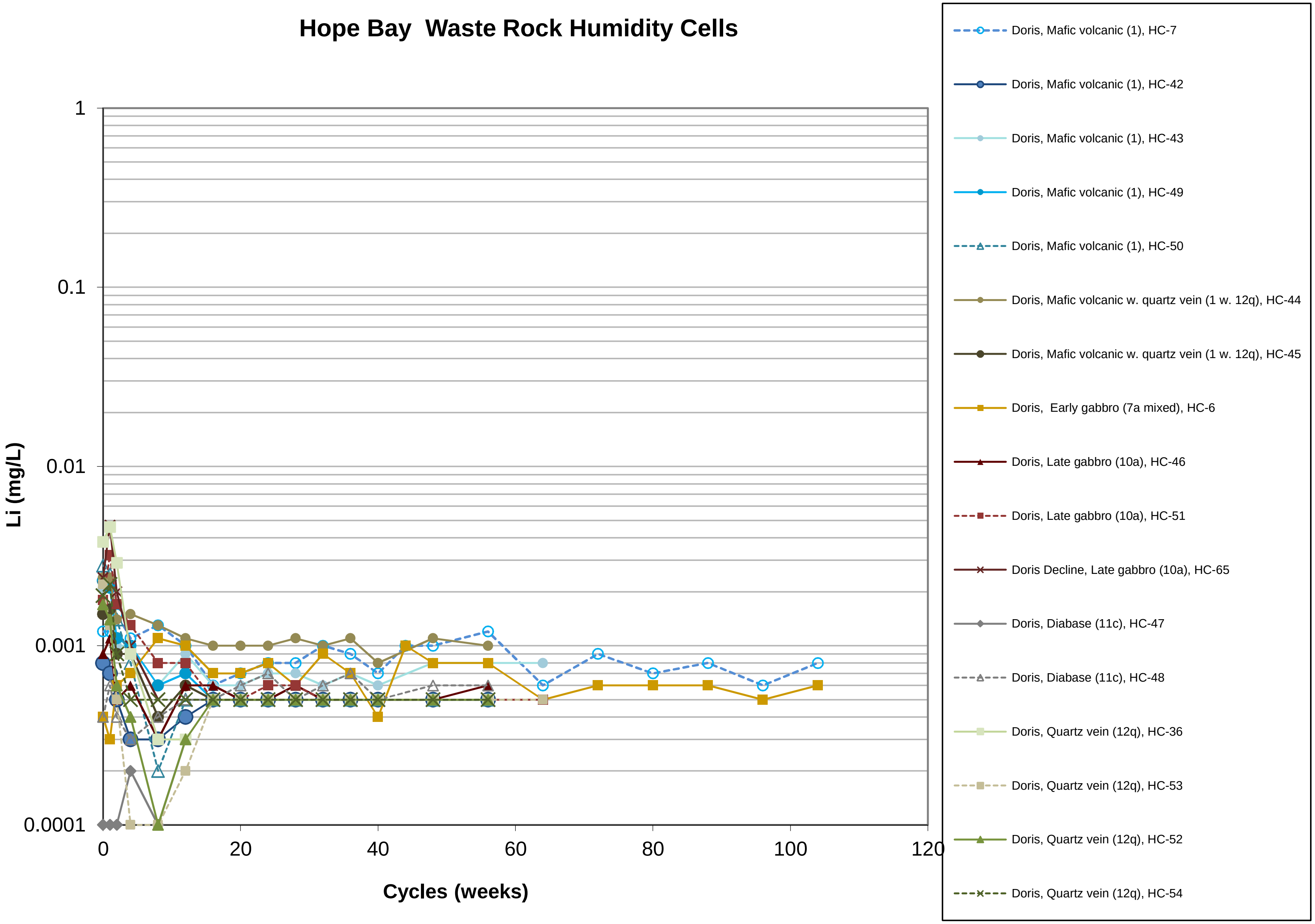

Hope Bay Waste Rock Humidity Cells
0.0007
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0
Cr (mg/L)
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

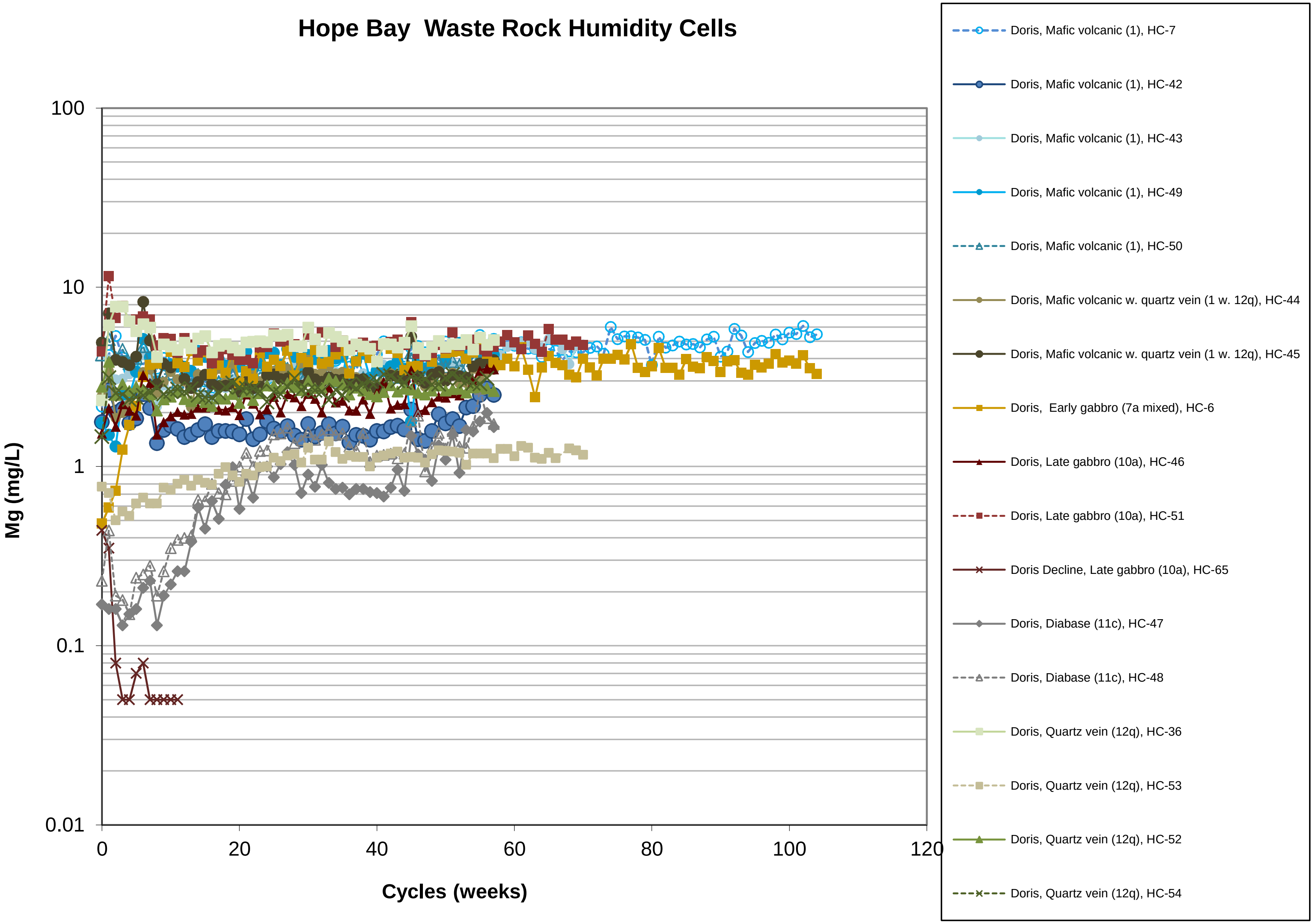

Hope Bay Waste Rock Humidity Cells
Co (mg/L)
0.01
0.001
0.0001
0.00001
0.000001
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

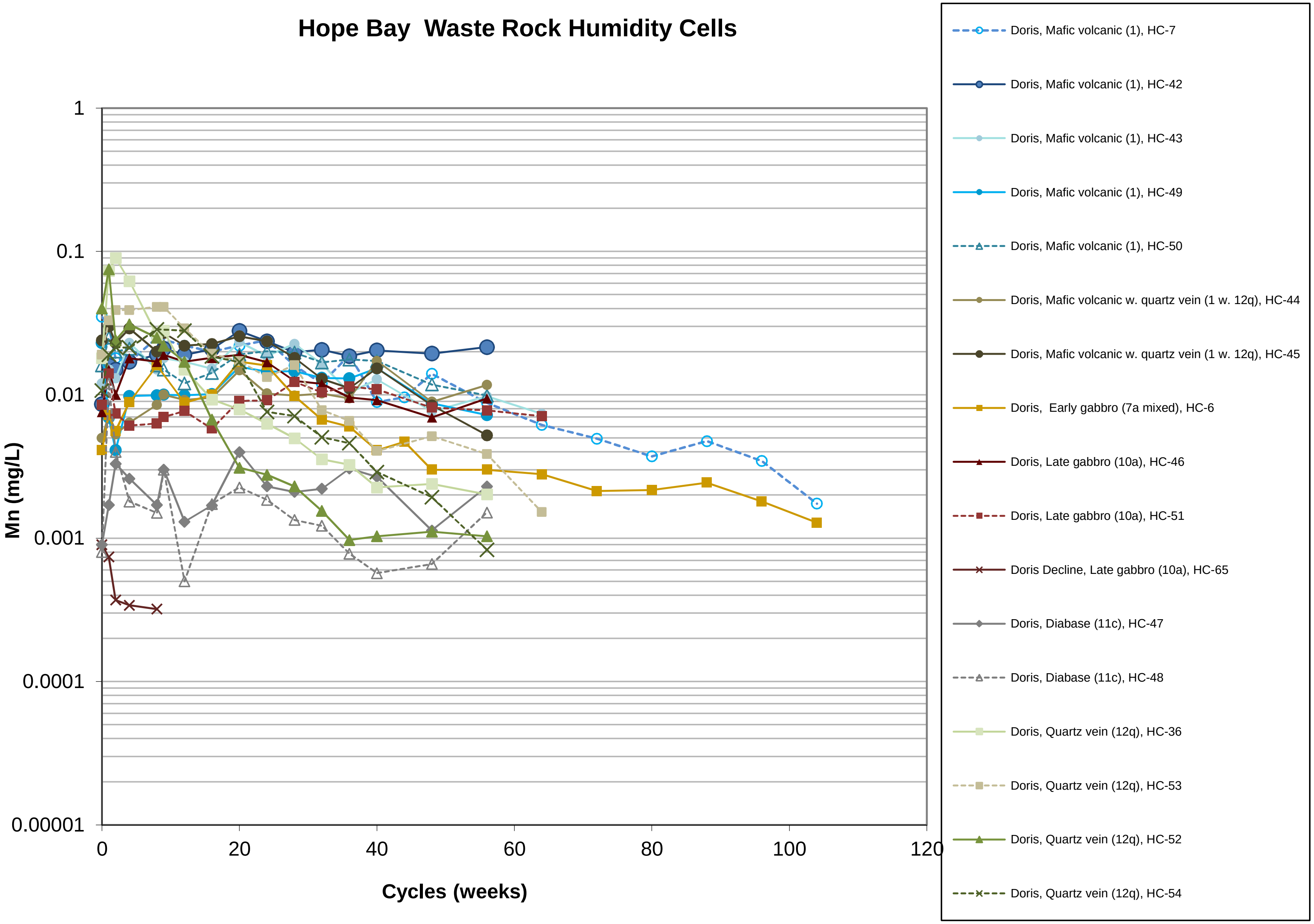

Hope Bay Waste Rock Humidity Cells
Cu (mg/L)
0.012
0.01
0.008
0.006
0.004
0.002
0
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

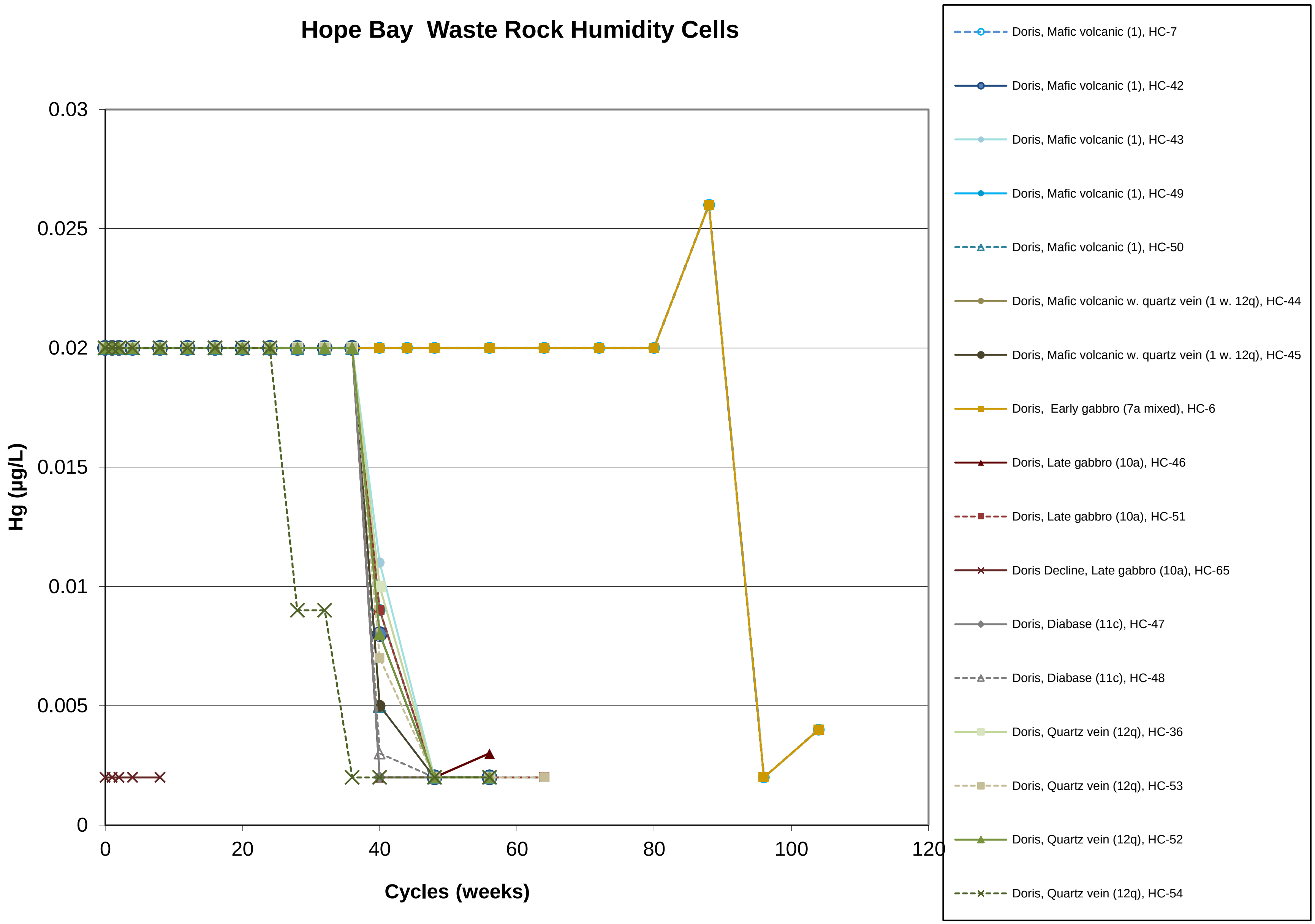

Hope Bay Waste Rock Humidity Cells
1
0.1
0.01
0.001
0.0001
Fe (mg/L)
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

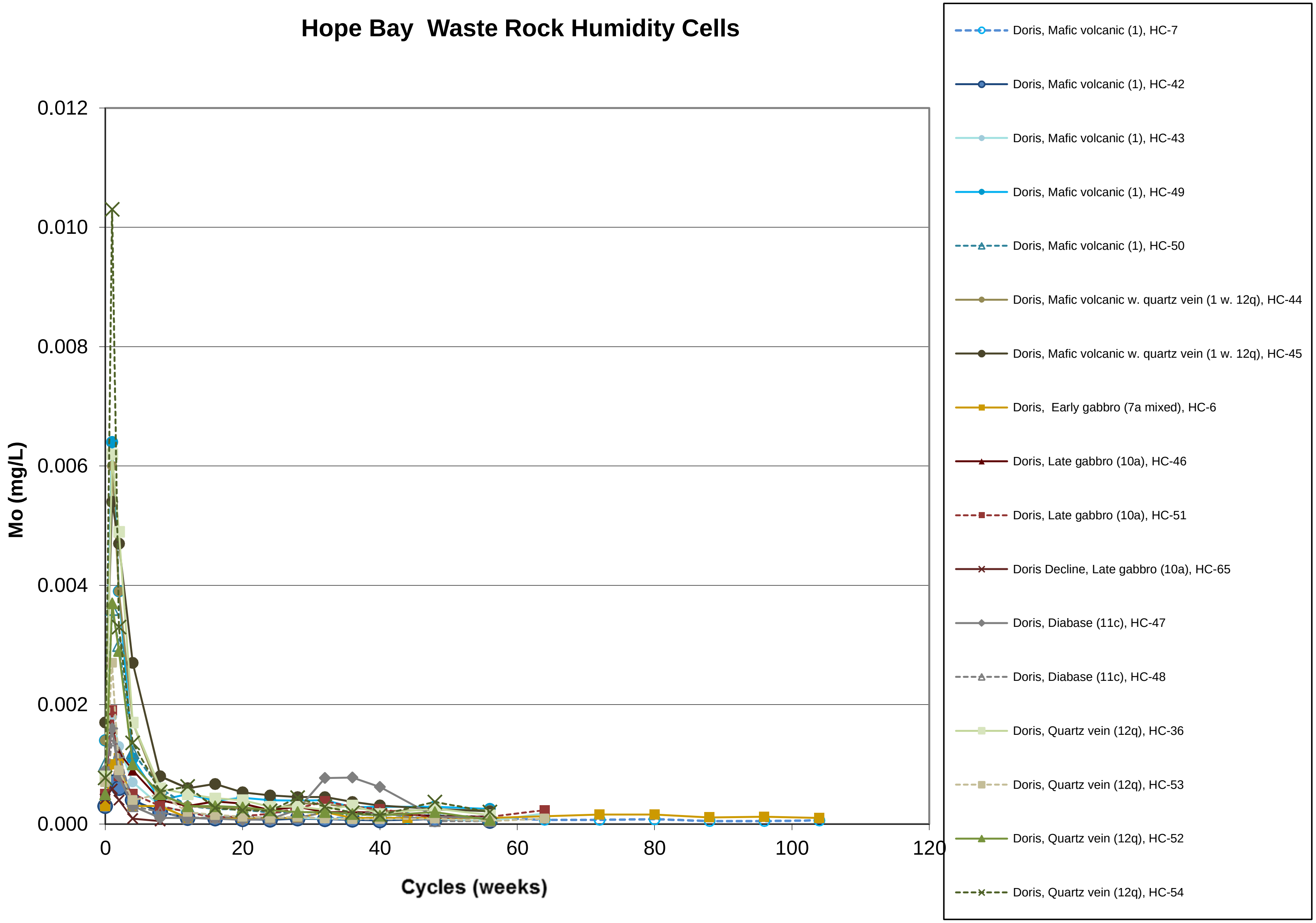

Hope Bay Waste Rock Humidity Cells
Pb (mg/L)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

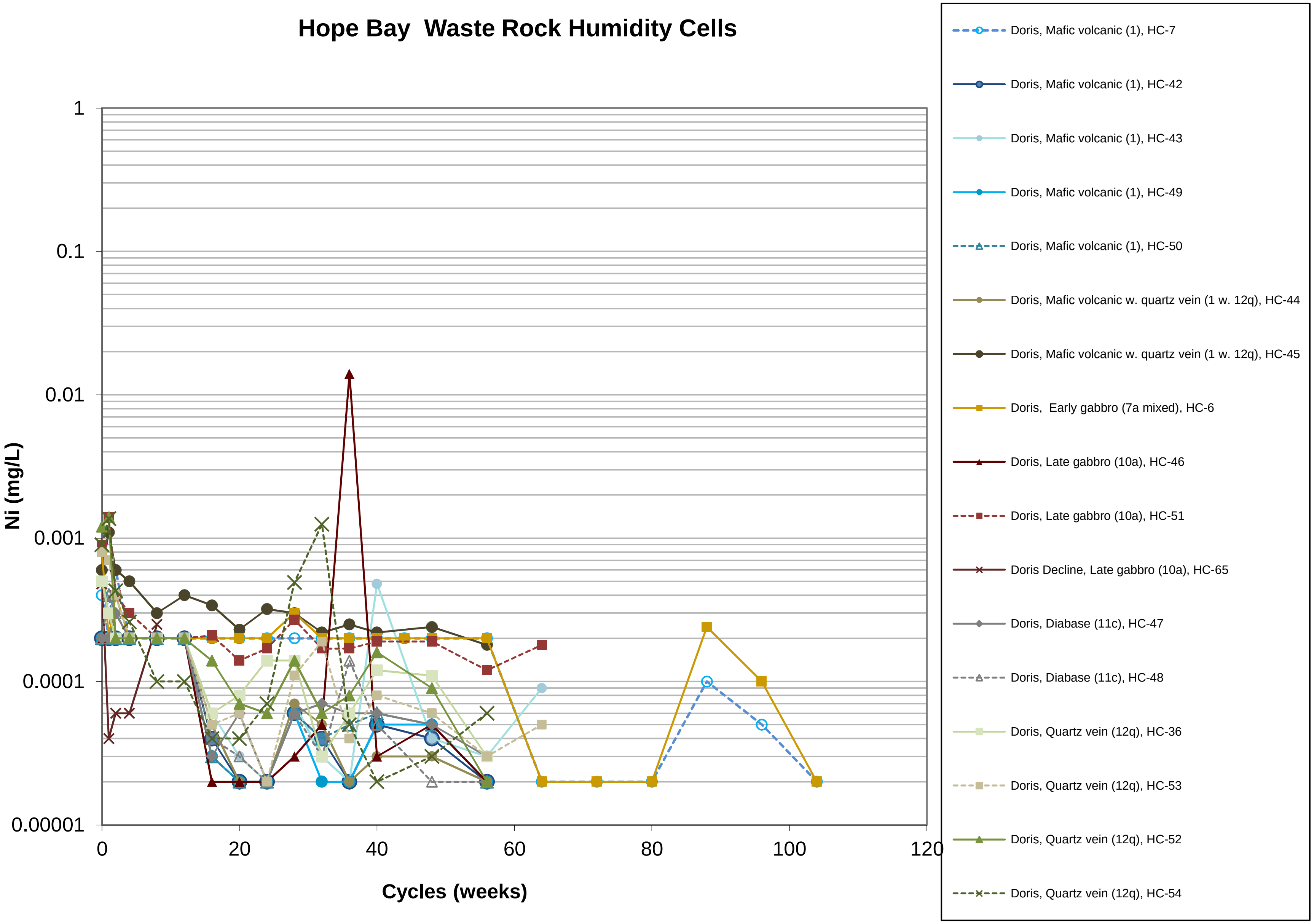

Hope Bay Waste Rock Humidity Cells
Li (mg/L)
1
0.1
0.01
0.001
0.0001
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

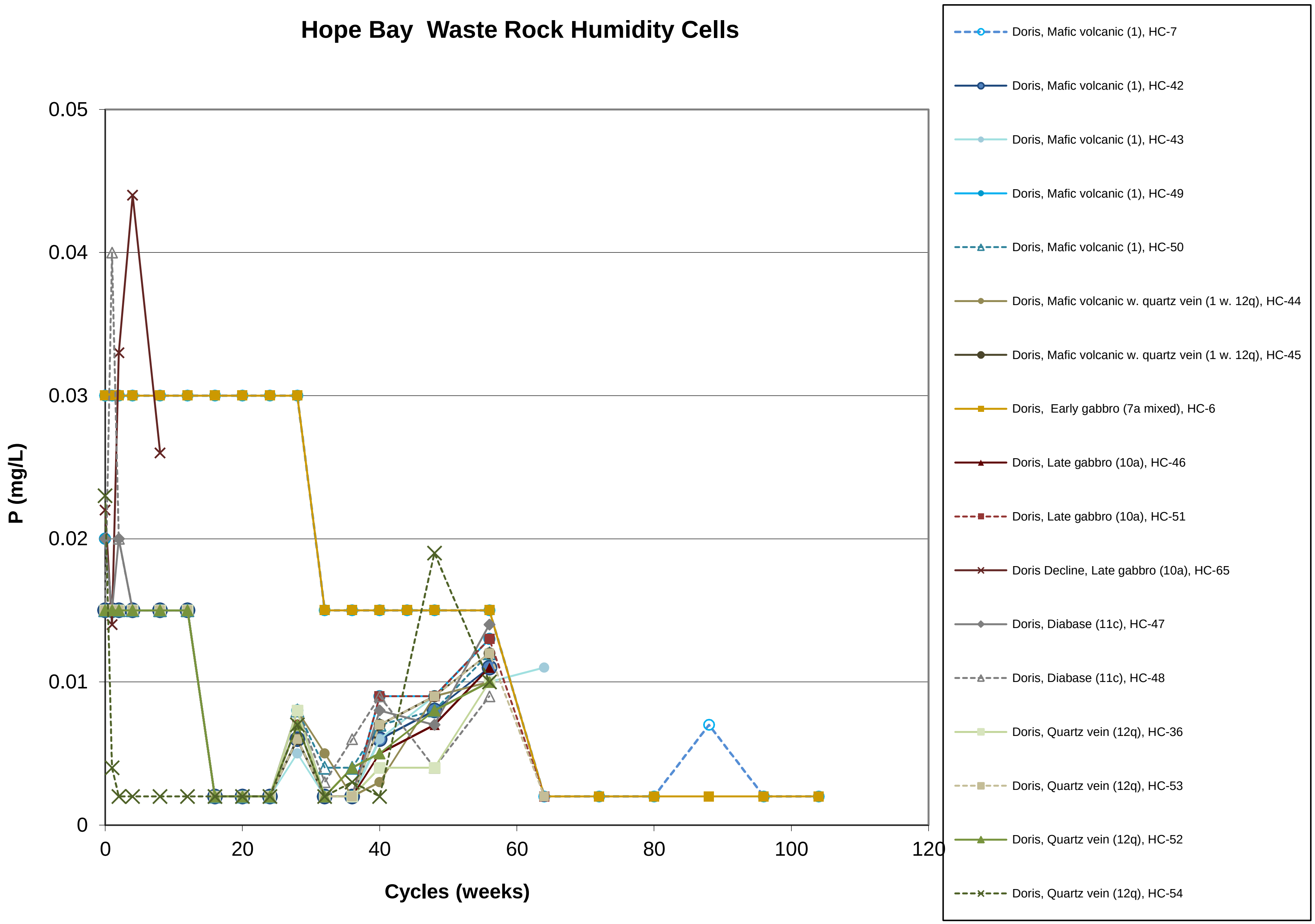

Hope Bay Waste Rock Humidity Cells
Mg (mg/L)
100
10
1
0.1
0.01
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

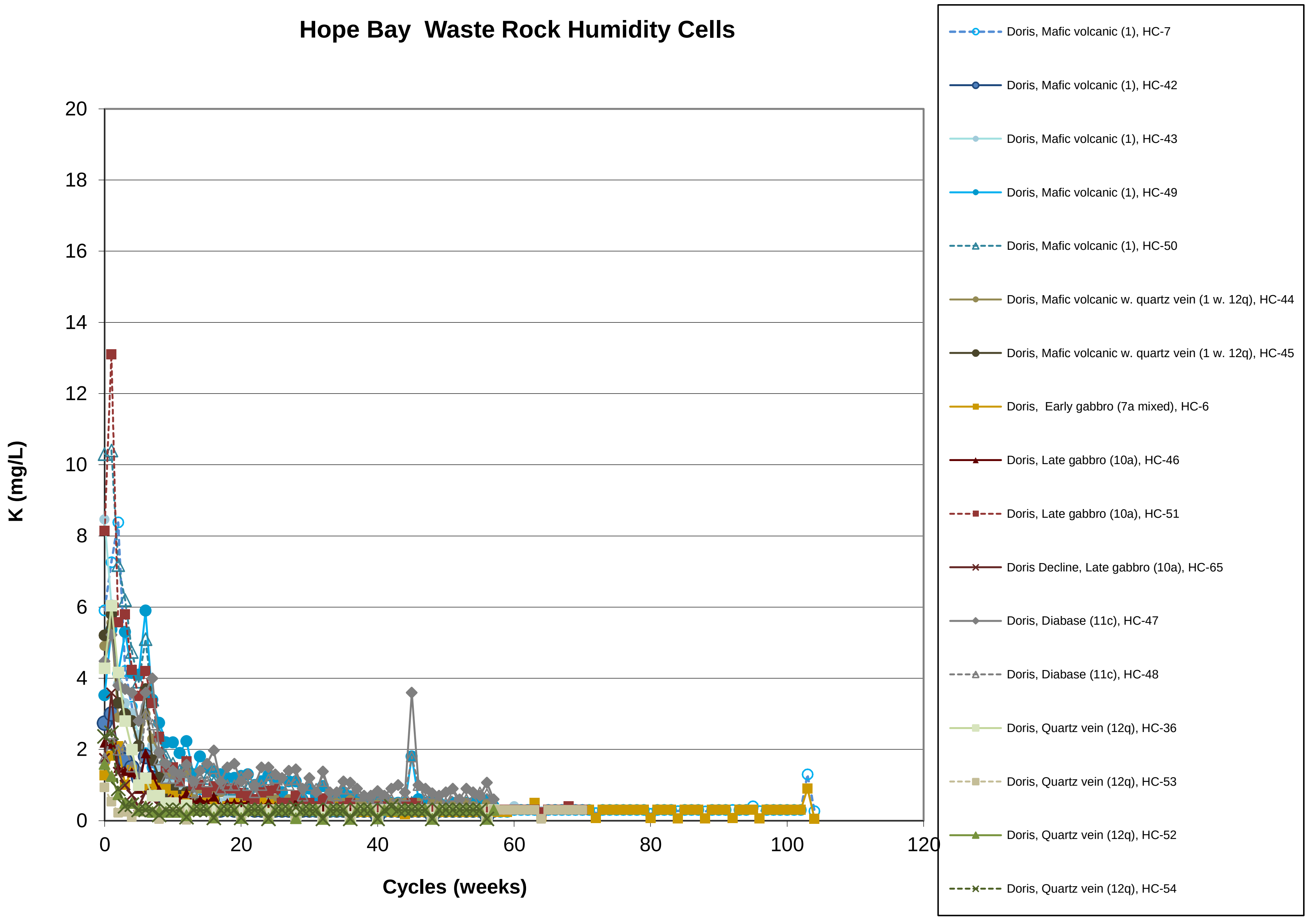

Hope Bay Waste Rock Humidity Cells
Mn (mg/L)
1
0.1
0.01
0.001
0.0001
0.00001
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

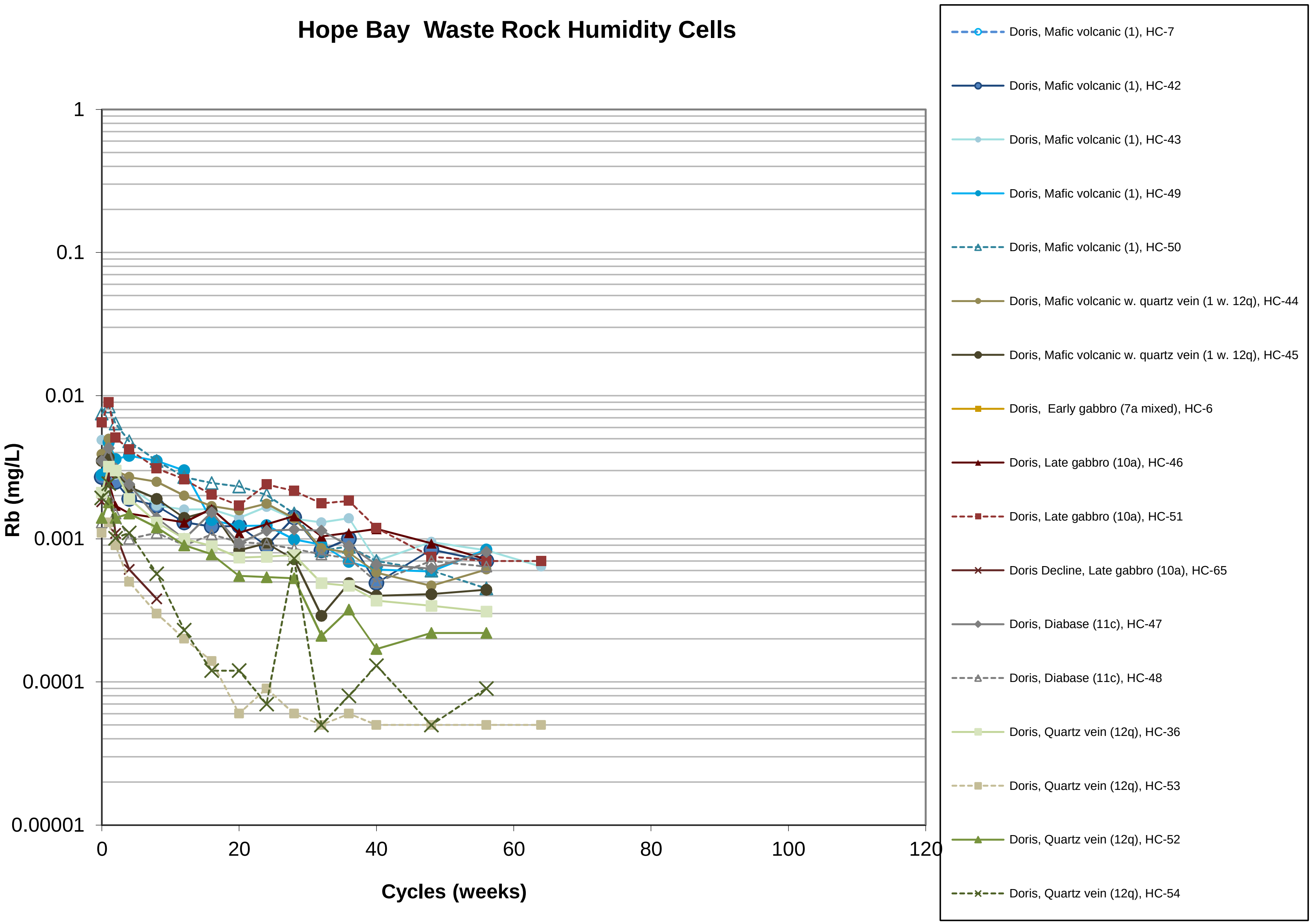

Hope Bay Waste Rock Humidity Cells
0.03
0.025
0.02
0.015
0.01
0.005
0
Hg (µg/L)
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

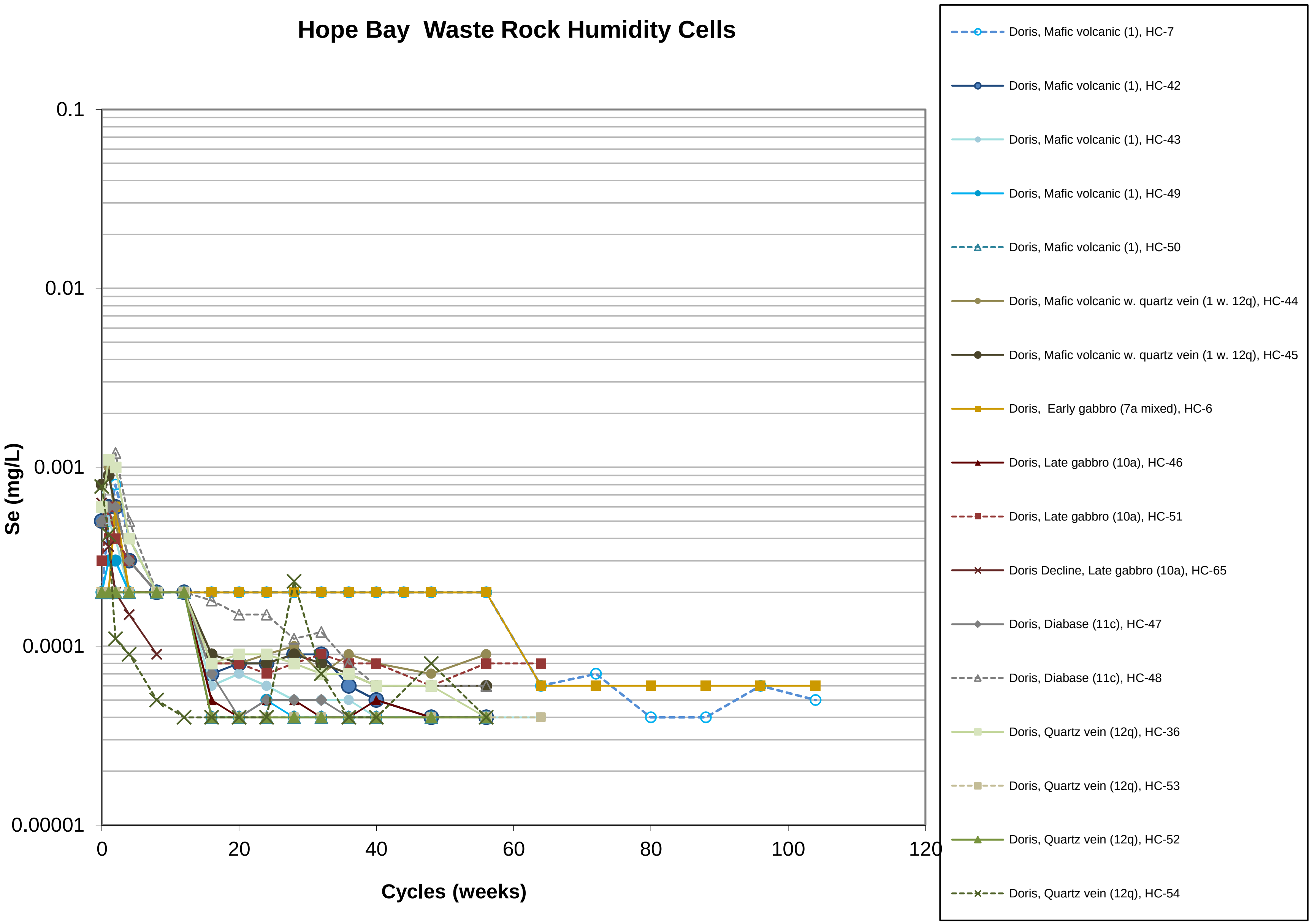

Hope Bay Waste Rock Humidity Cells
Mo (mg/L)
0.012
0.010
0.008
0.006
0.004
0.002
0.000
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

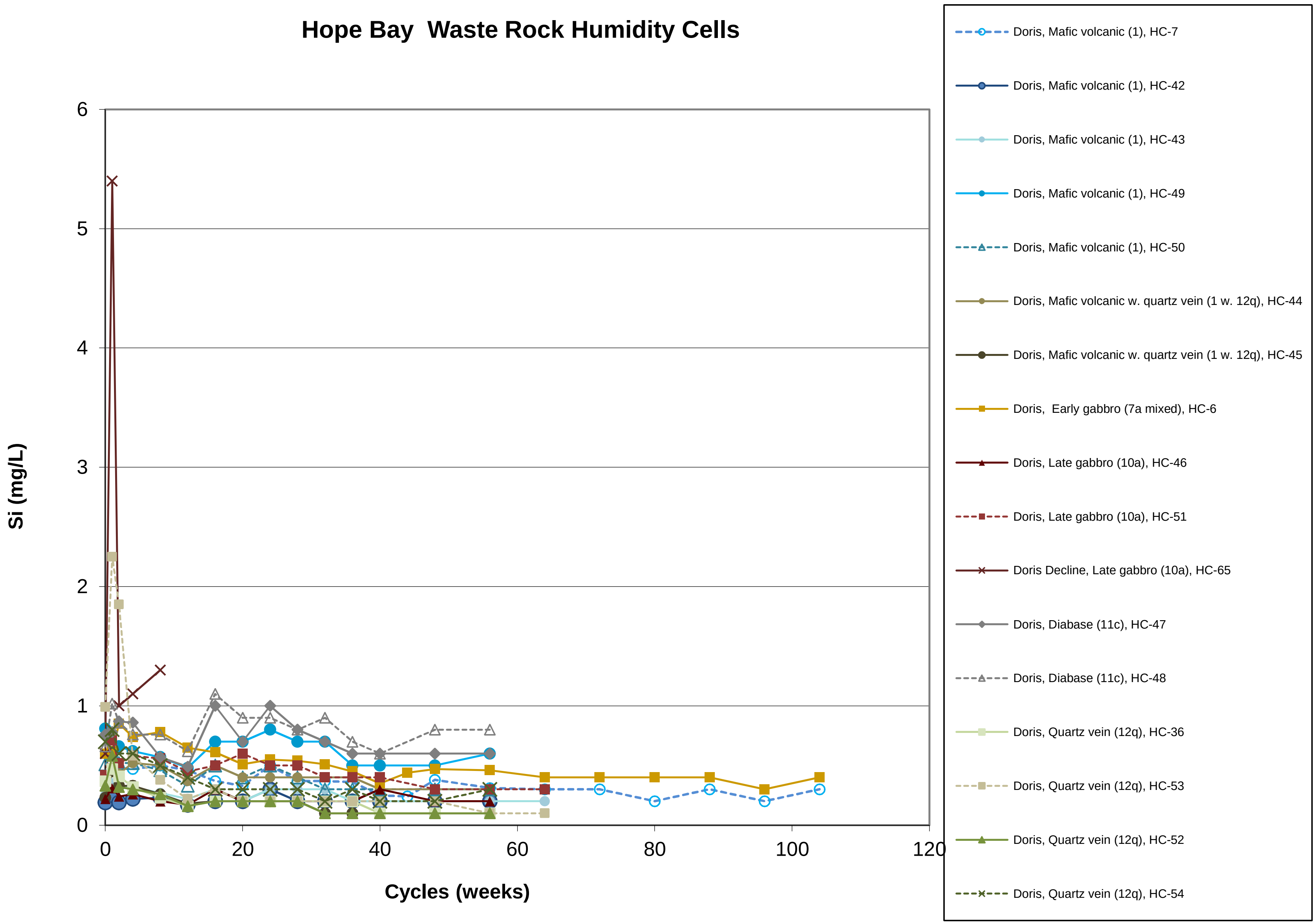

Hope Bay Waste Rock Humidity Cells
Ni (mg/L)
1
0.1
0.01
0.001
0.0001
0.00001
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

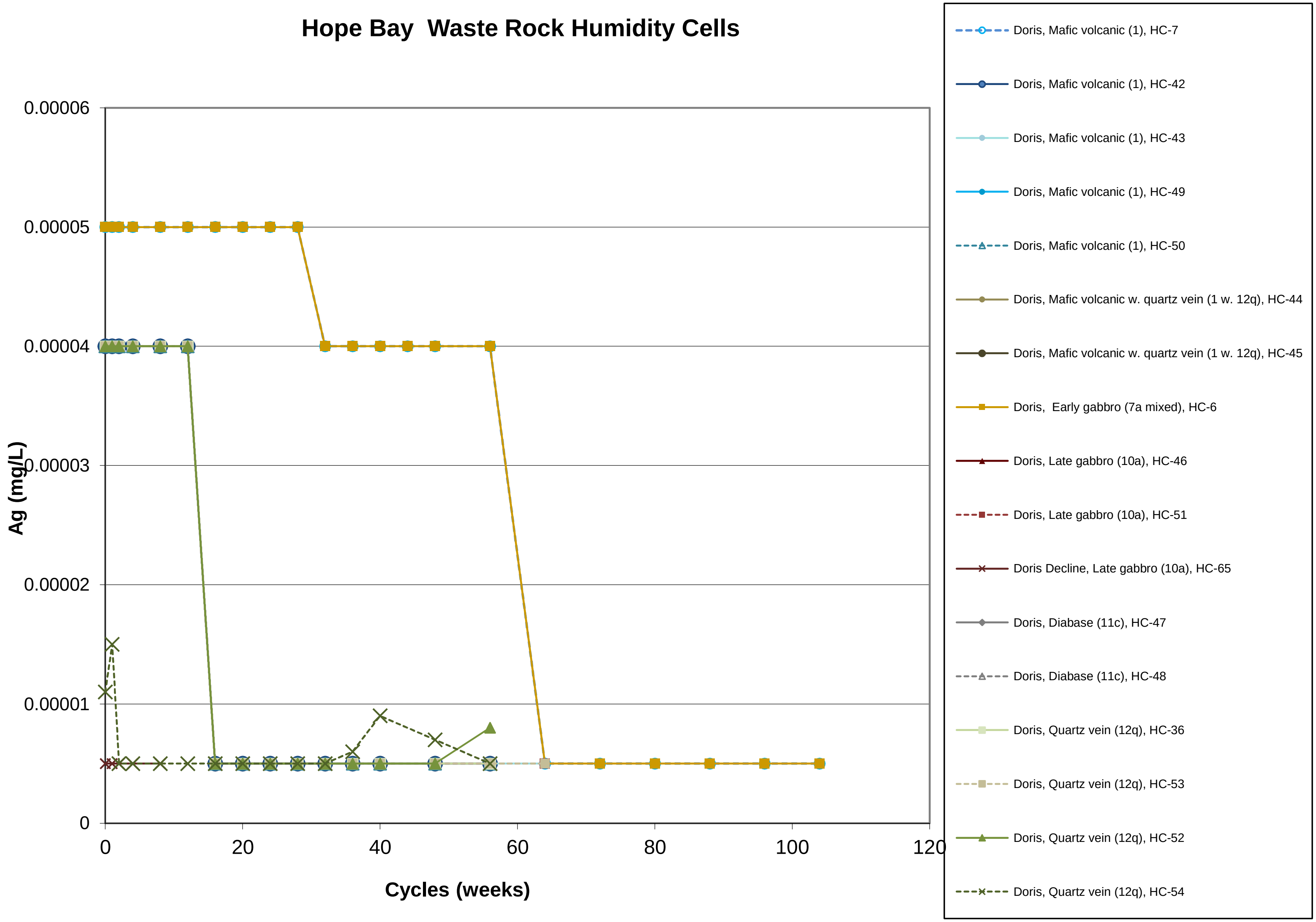

Hope Bay Waste Rock Humidity Cells
P (mg/L)
0.05
0.04
0.03
0.02
0.01
0
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

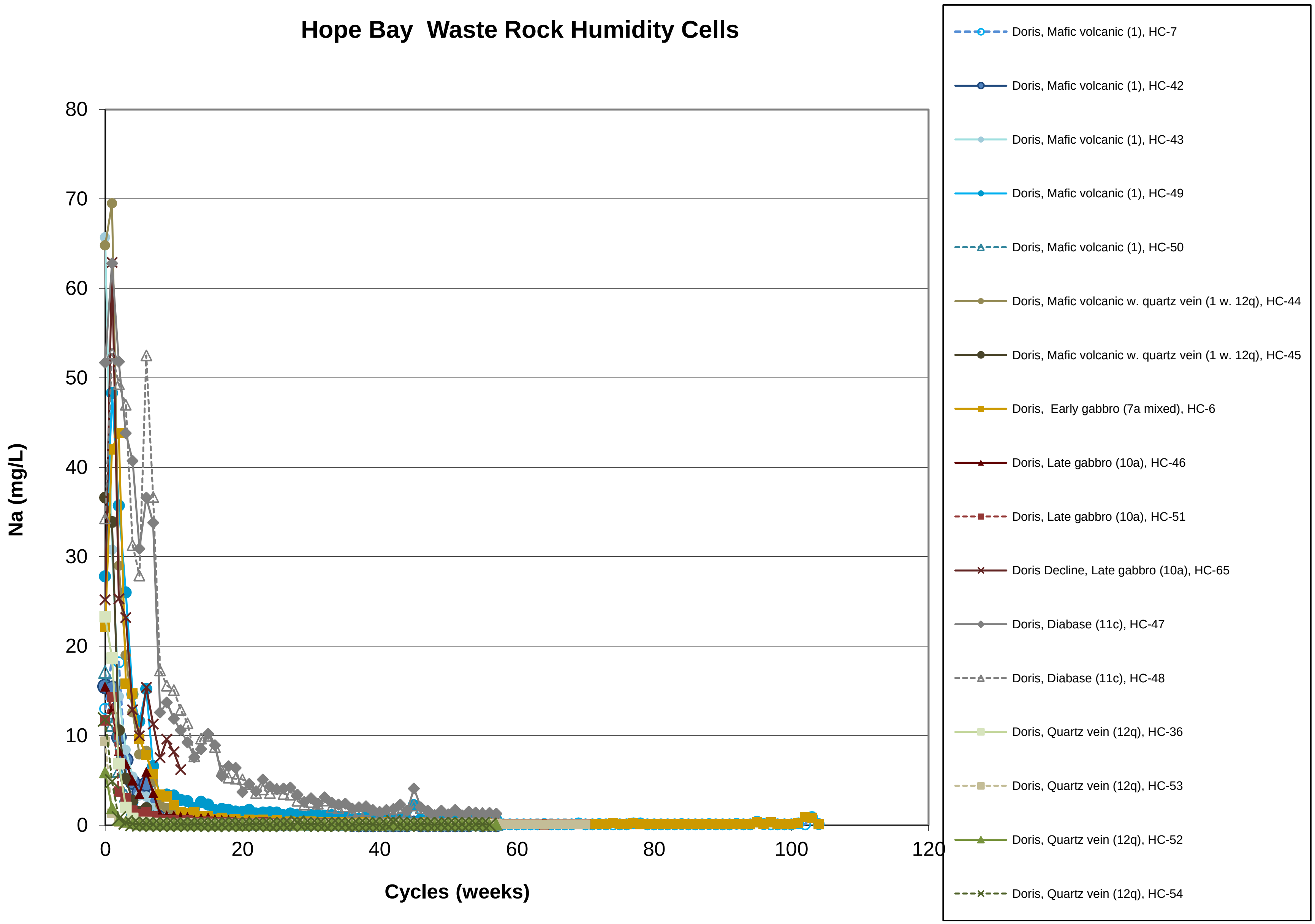

Hope Bay Waste Rock Humidity Cells
K (mg/L)
Cycles (weeks)
20
18
16
14
12
10
8
6
4
2
0
0
20
40
60
80
100
120
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

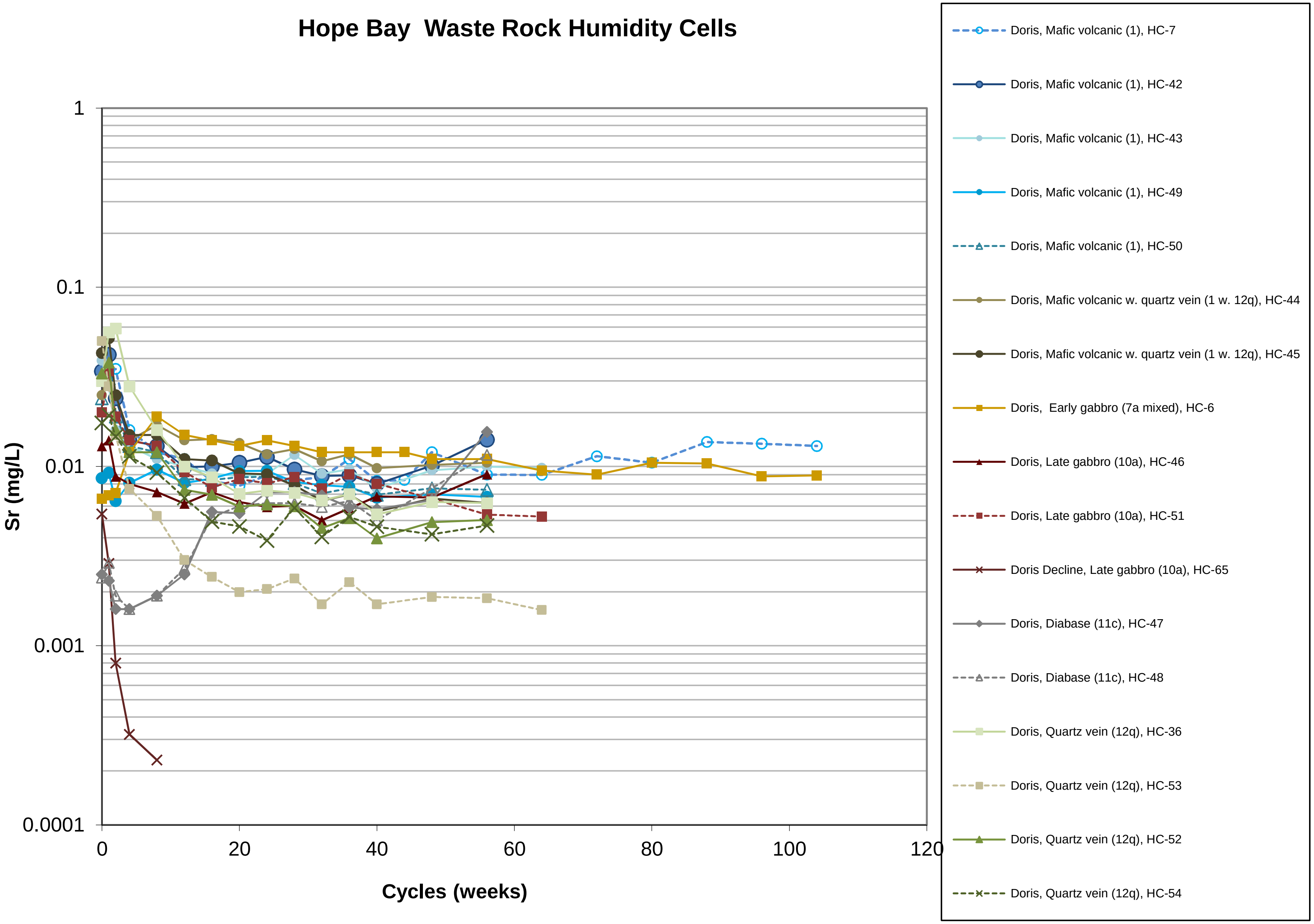

Hope Bay Waste Rock Humidity Cells
1
0.1
0.01
0.001
0.0001
0.00001
Rb (mg/L)
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

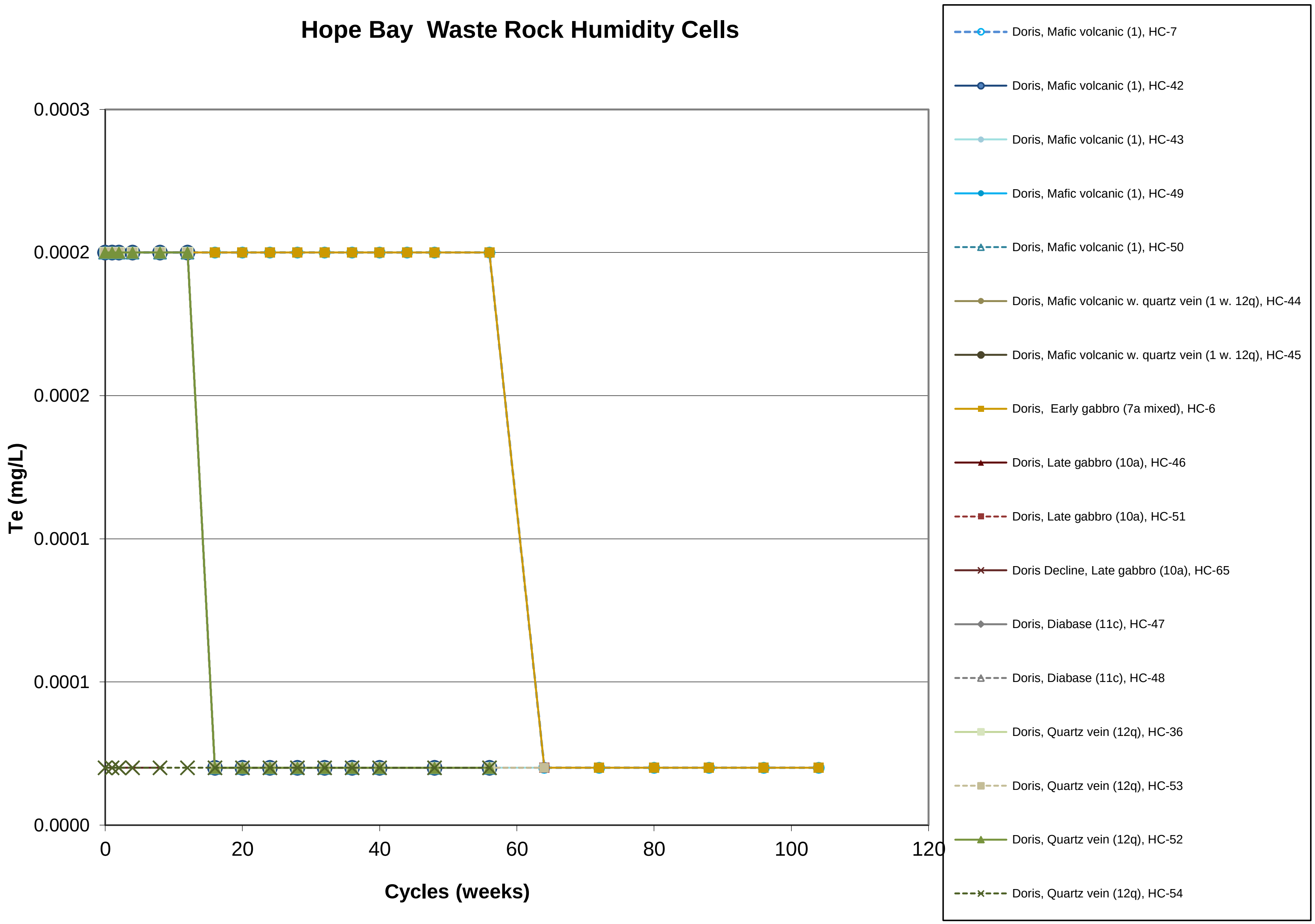

Hope Bay Waste Rock Humidity Cells
Se (mg/L)
0.1
0.01
0.001
0.0001
0.00001
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

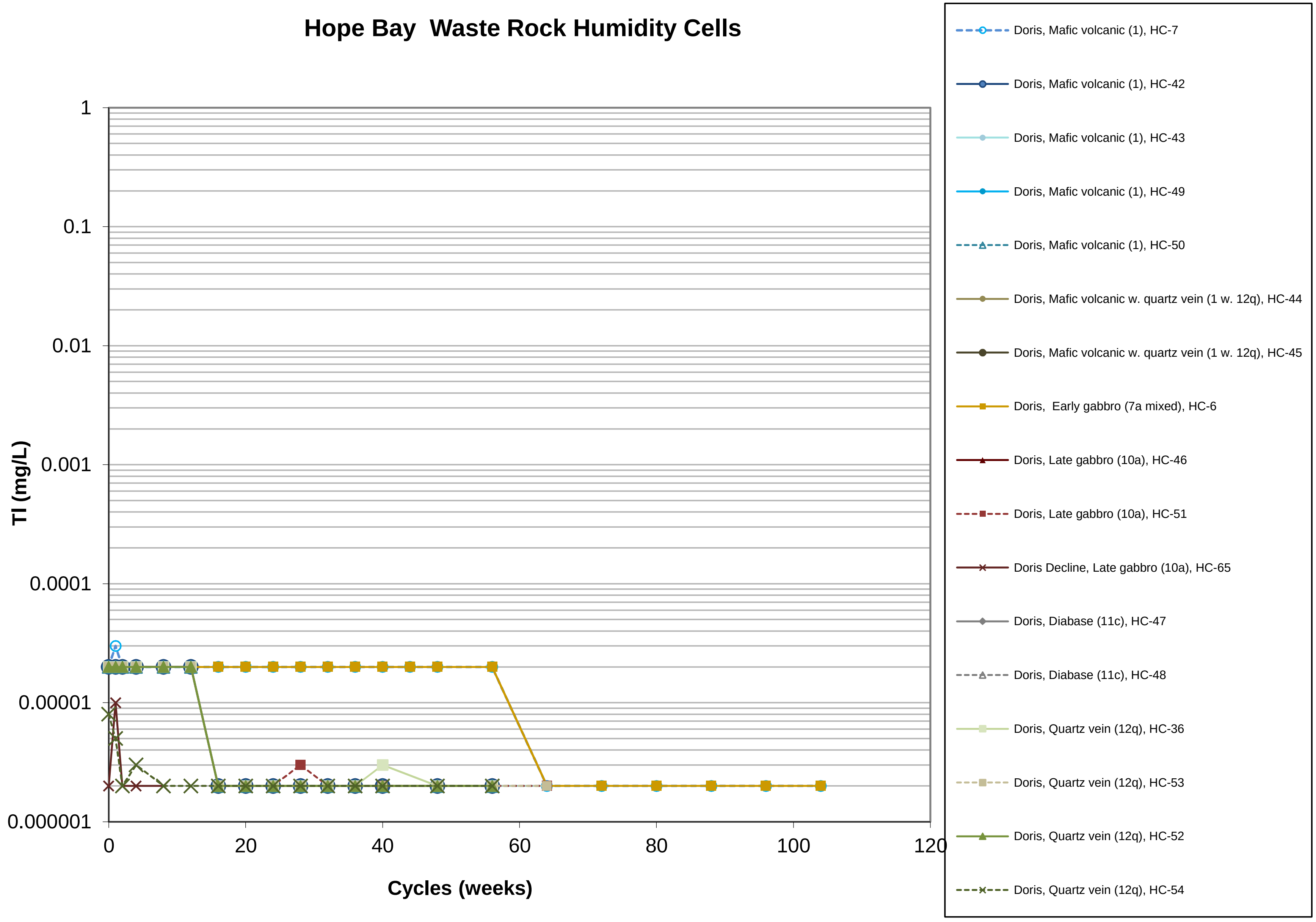

Hope Bay Waste Rock Humidity Cells
Si (mg/L)
Cycles (weeks)
0
1
2
3
4
5
6
0
20
40
60
80
100
120
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

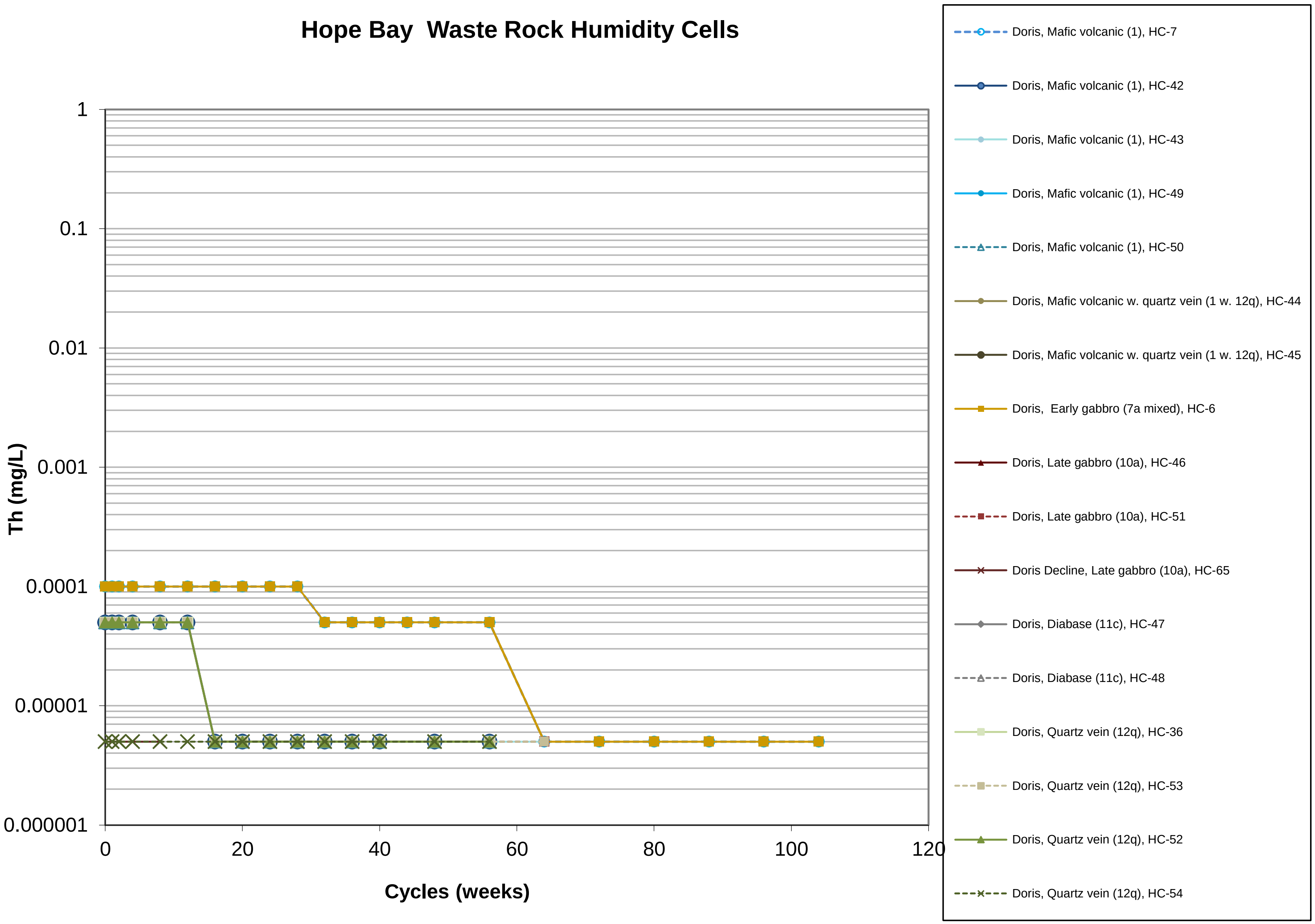

Hope Bay Waste Rock Humidity Cells
Ag (mg/L)
0.00006
0.00005
0.00004
0.00003
0.00002
0.00001
0
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

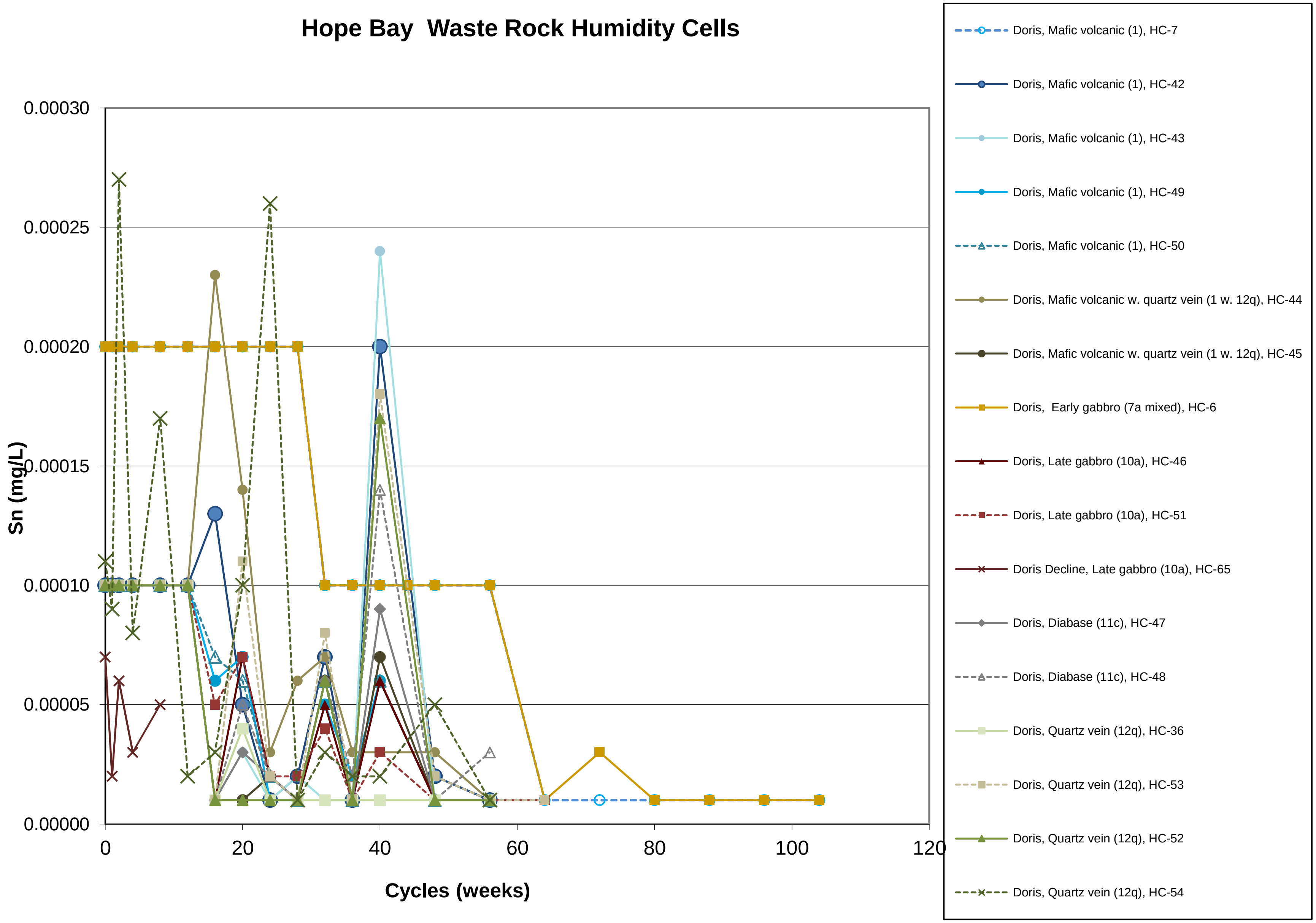

Hope Bay Waste Rock Humidity Cells
Na (mg/L)
80
70
60
50
40
30
20
10
0
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

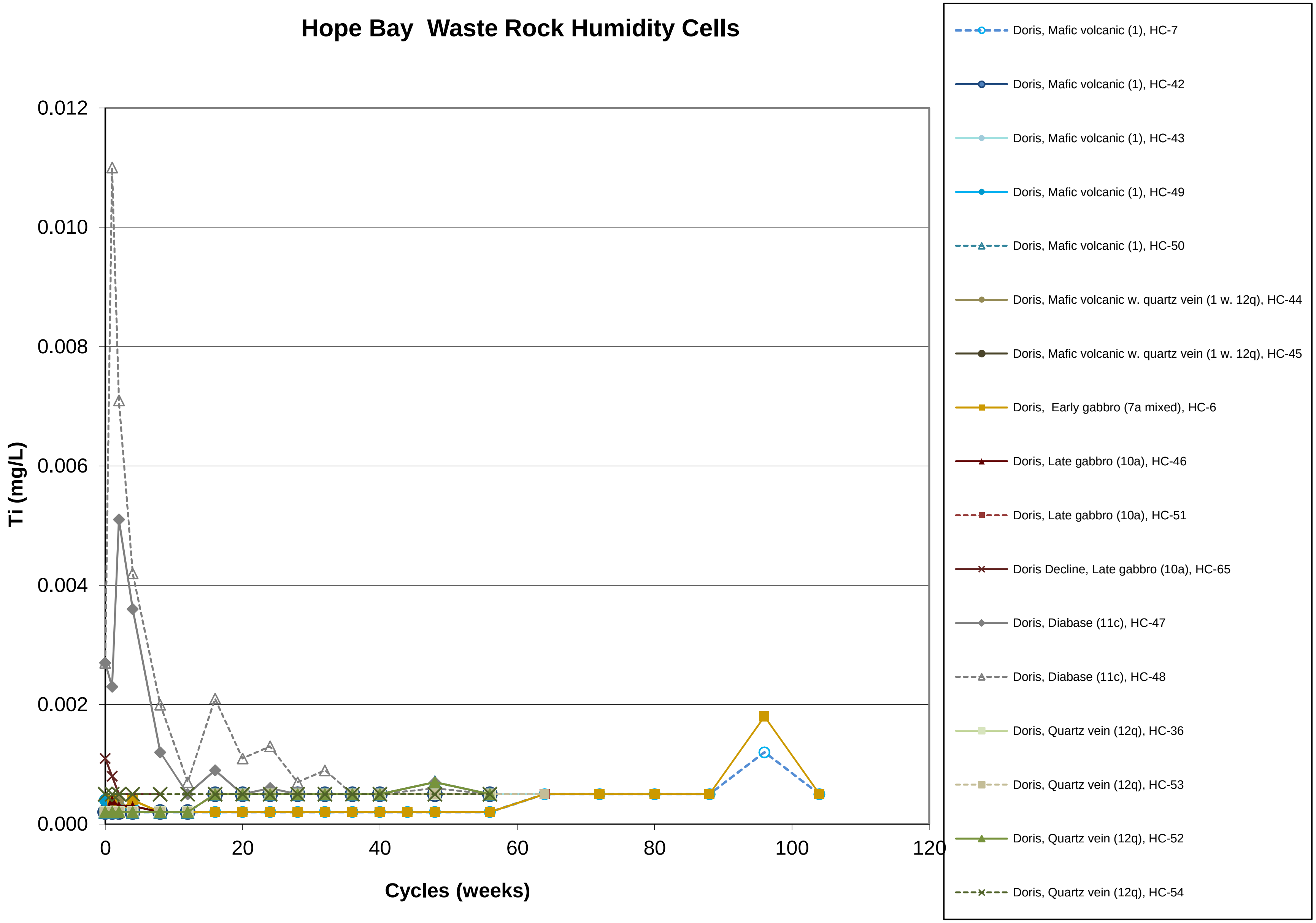

Hope Bay Waste Rock Humidity Cells
Sr (mg/L)
1
0.1
0.01
0.001
0.0001
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

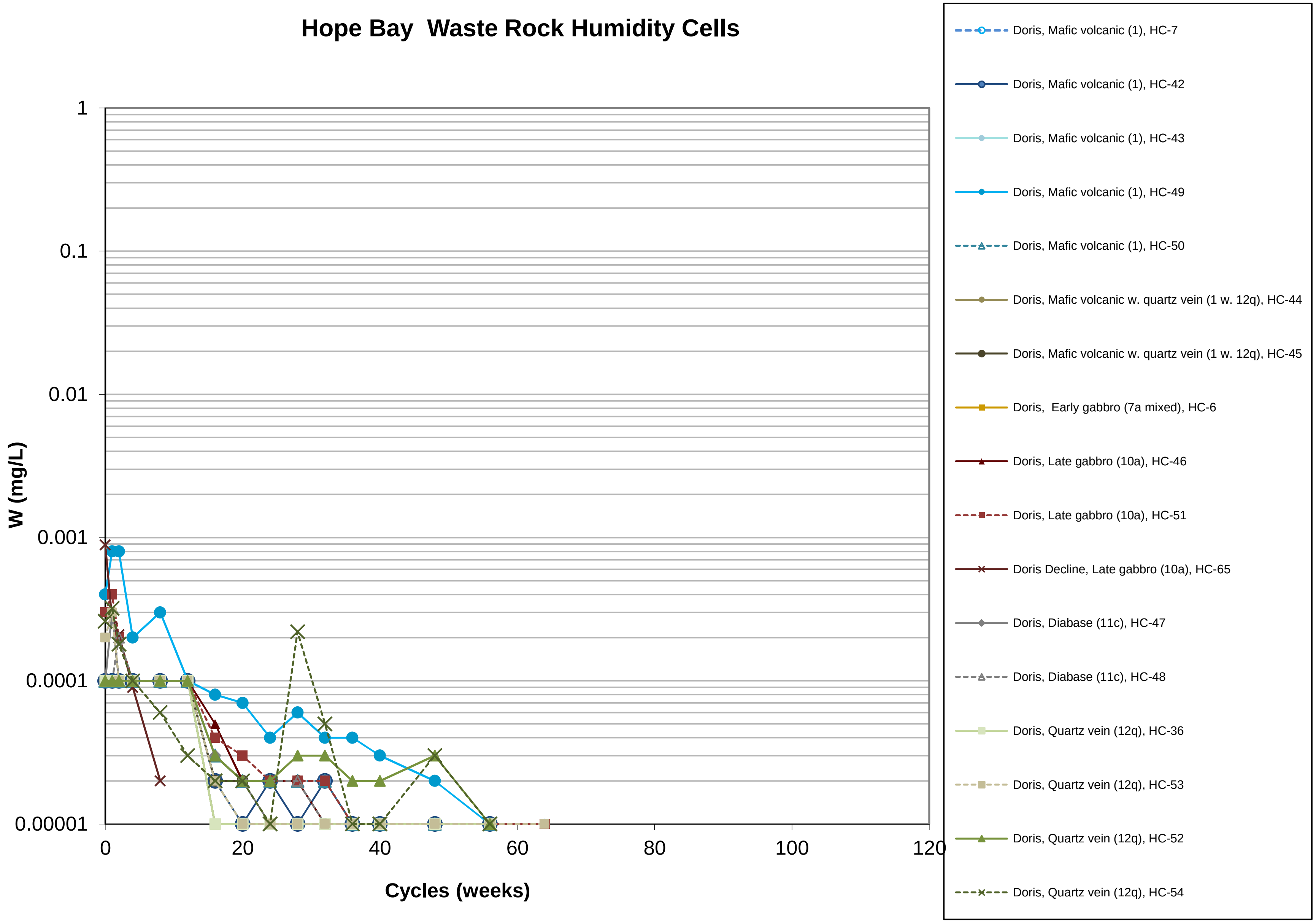

Hope Bay Waste Rock Humidity Cells
Te (mg/L)
0.0003
0.0002
0.0002
0.0001
0.0001
0.0000
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

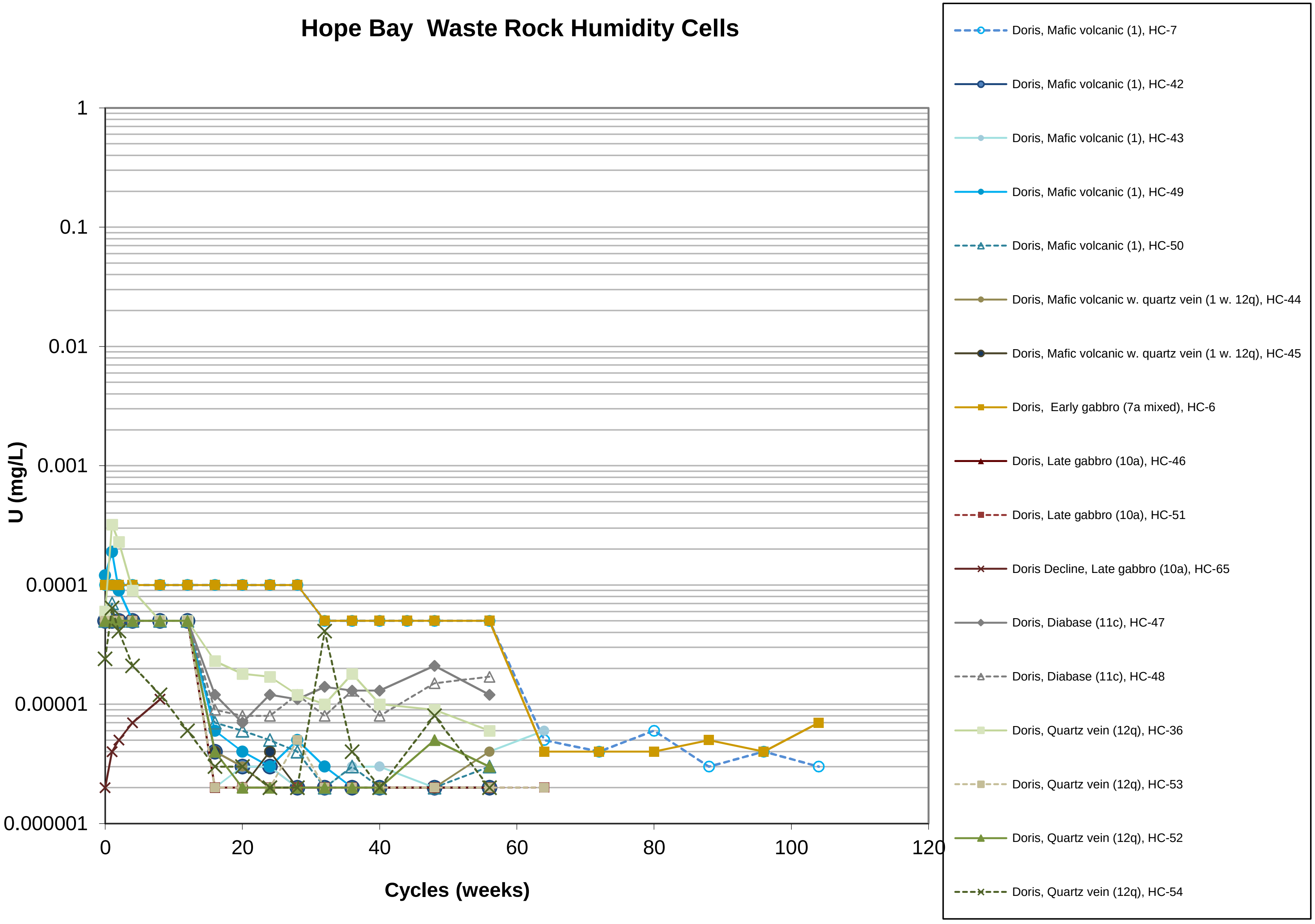

Hope Bay Waste Rock Humidity Cells
Tl (mg/L)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

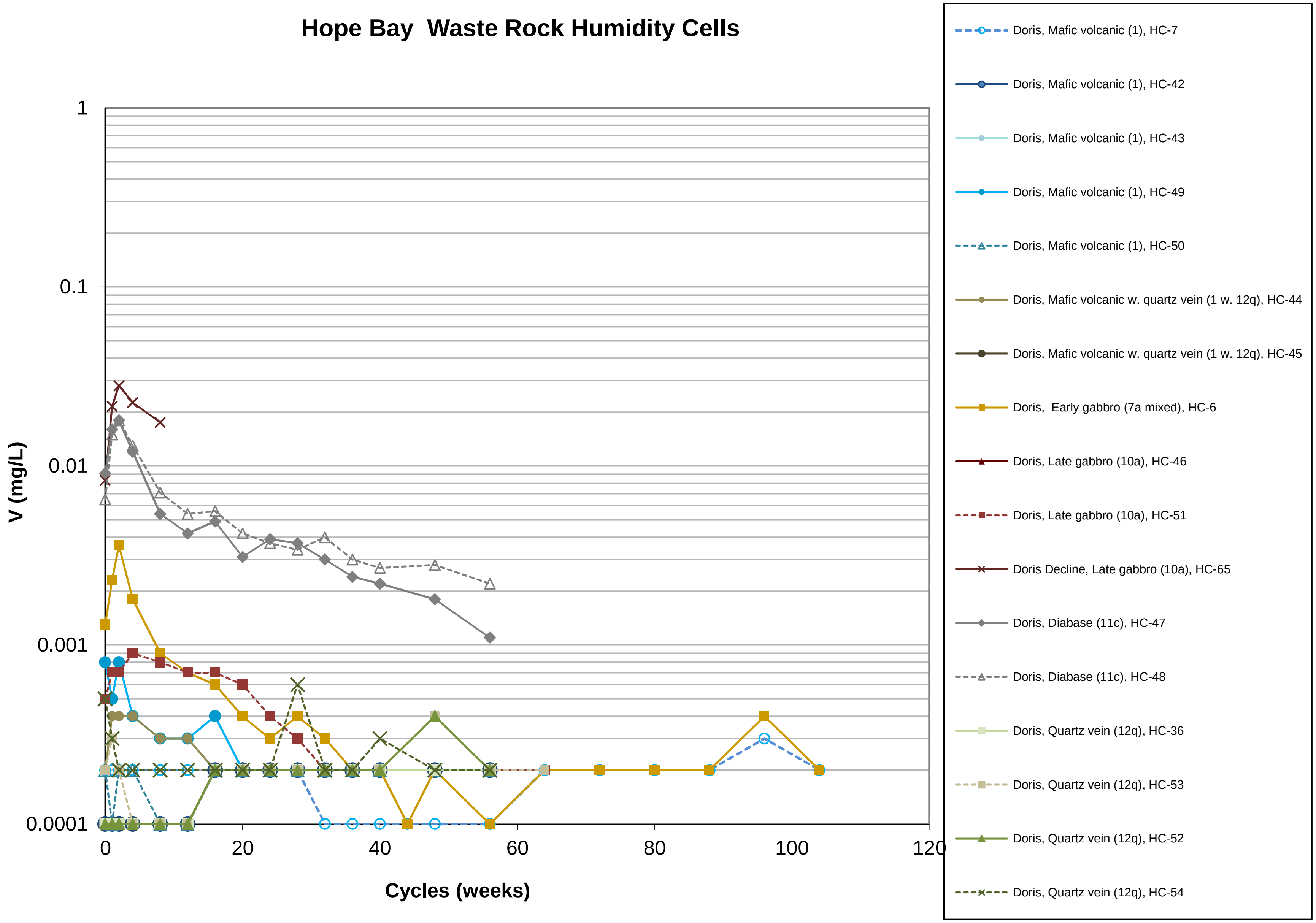

Hope Bay Waste Rock Humidity Cells
Th (mg/L)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

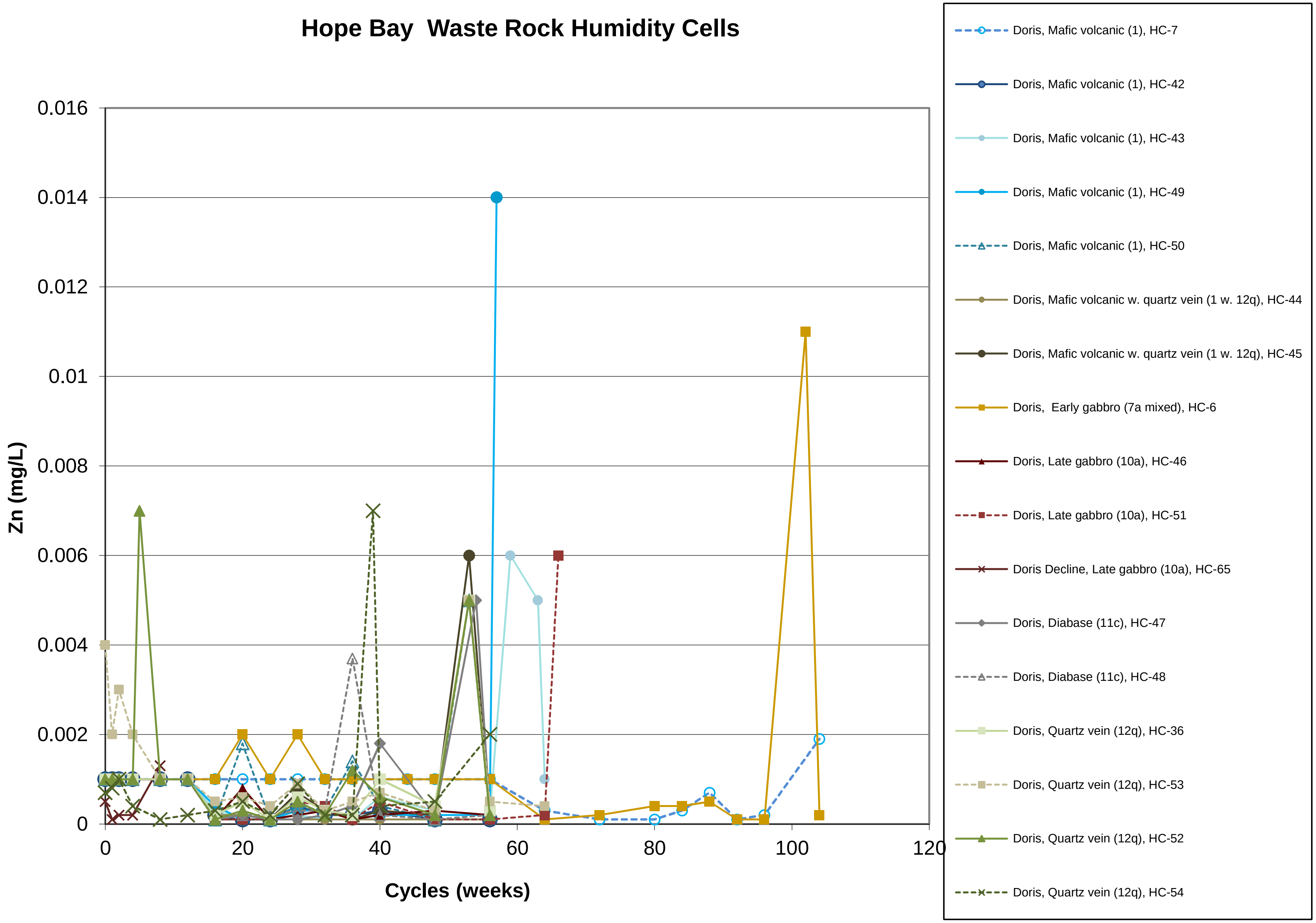

Hope Bay Waste Rock Humidity Cells
Sn (mg/L)
0.00030
0.00025
0.00020
0.00015
0.00010
0.00005
0.00000
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

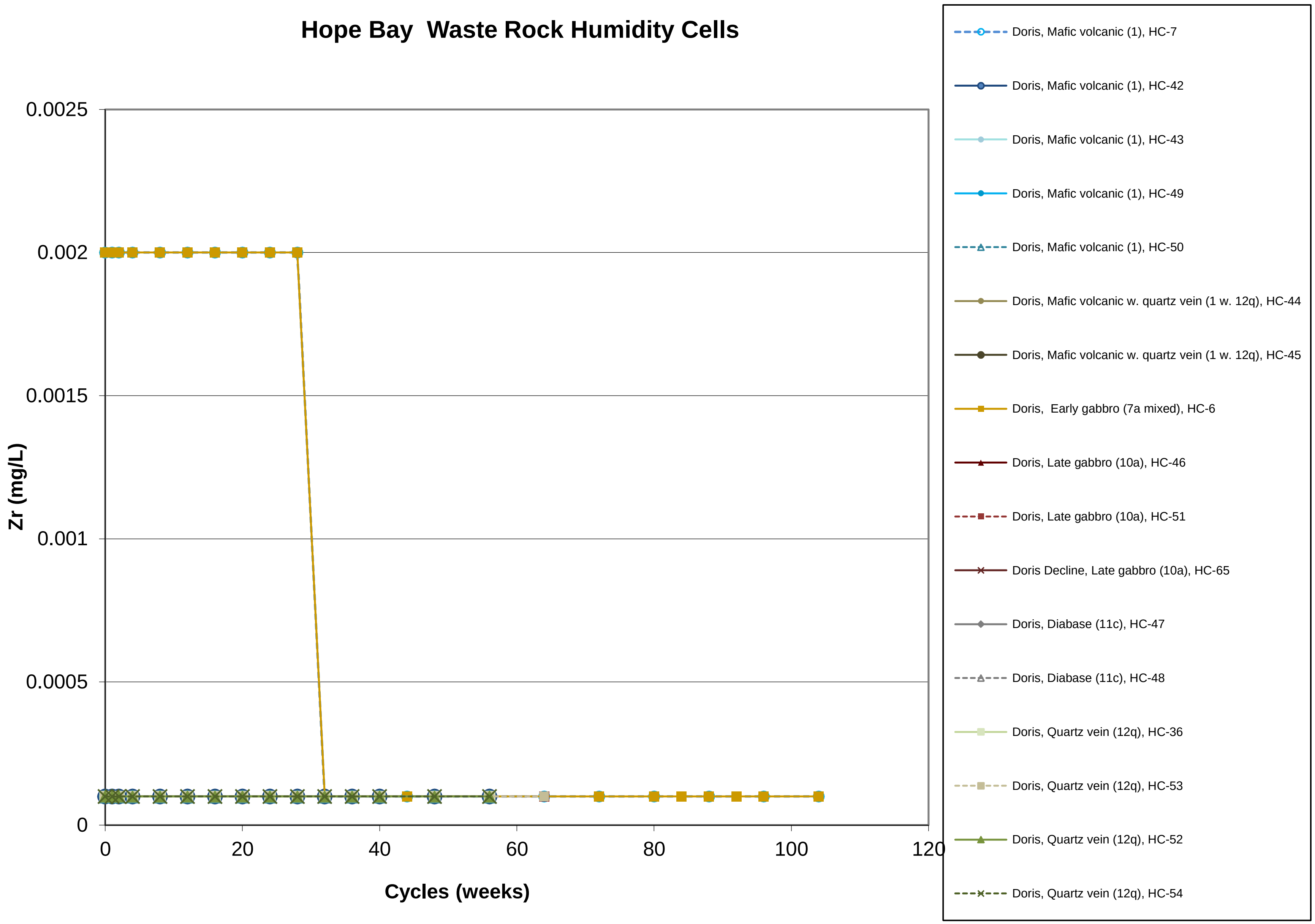

Hope Bay Waste Rock Humidity Cells
Ti (mg/L)
0.012
0.010
0.008
0.006
0.004
0.002
0.000
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

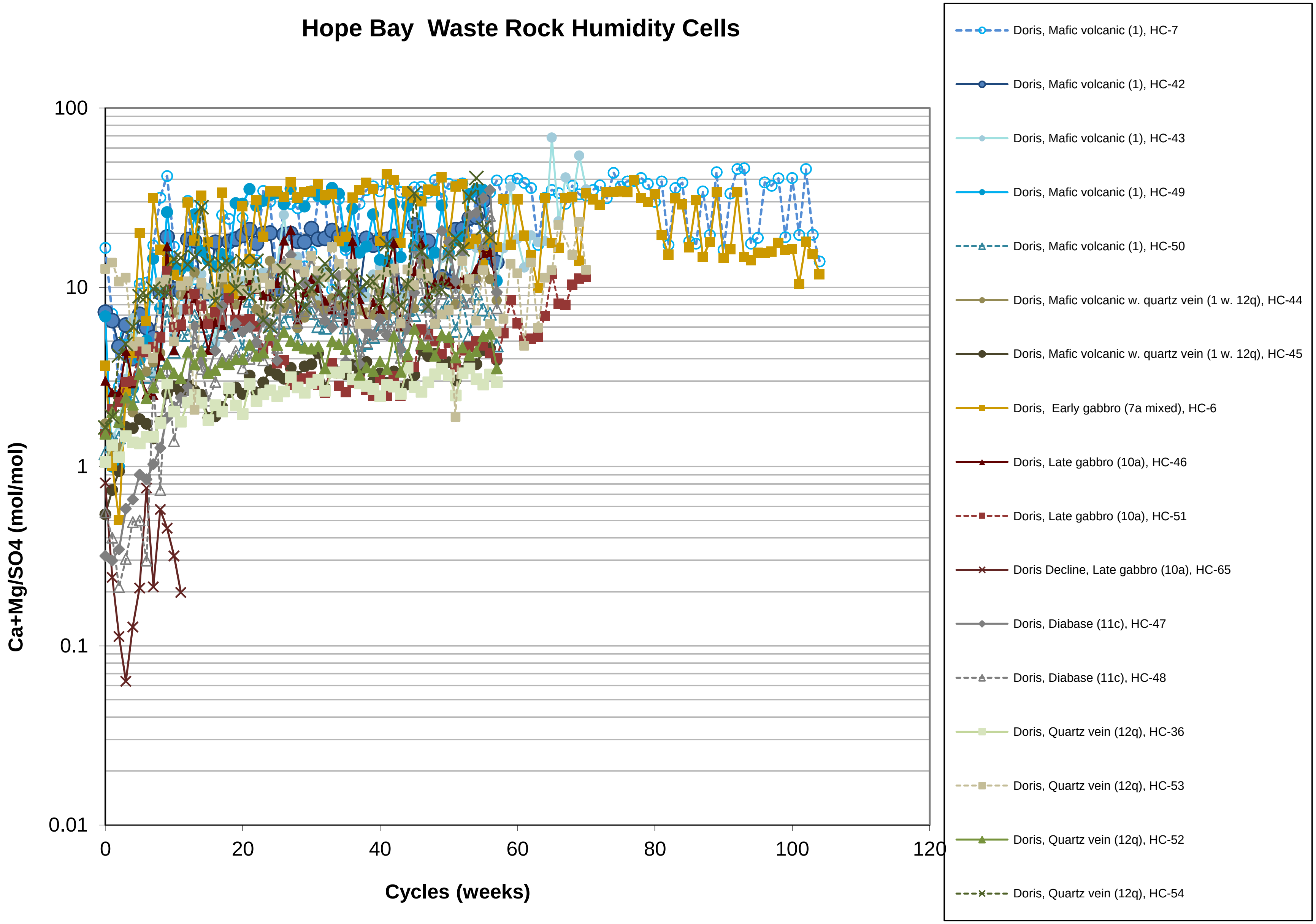

Hope Bay Waste Rock Humidity Cells
W (mg/L)
1
0.1
0.01
0.001
0.0001
0.00001
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

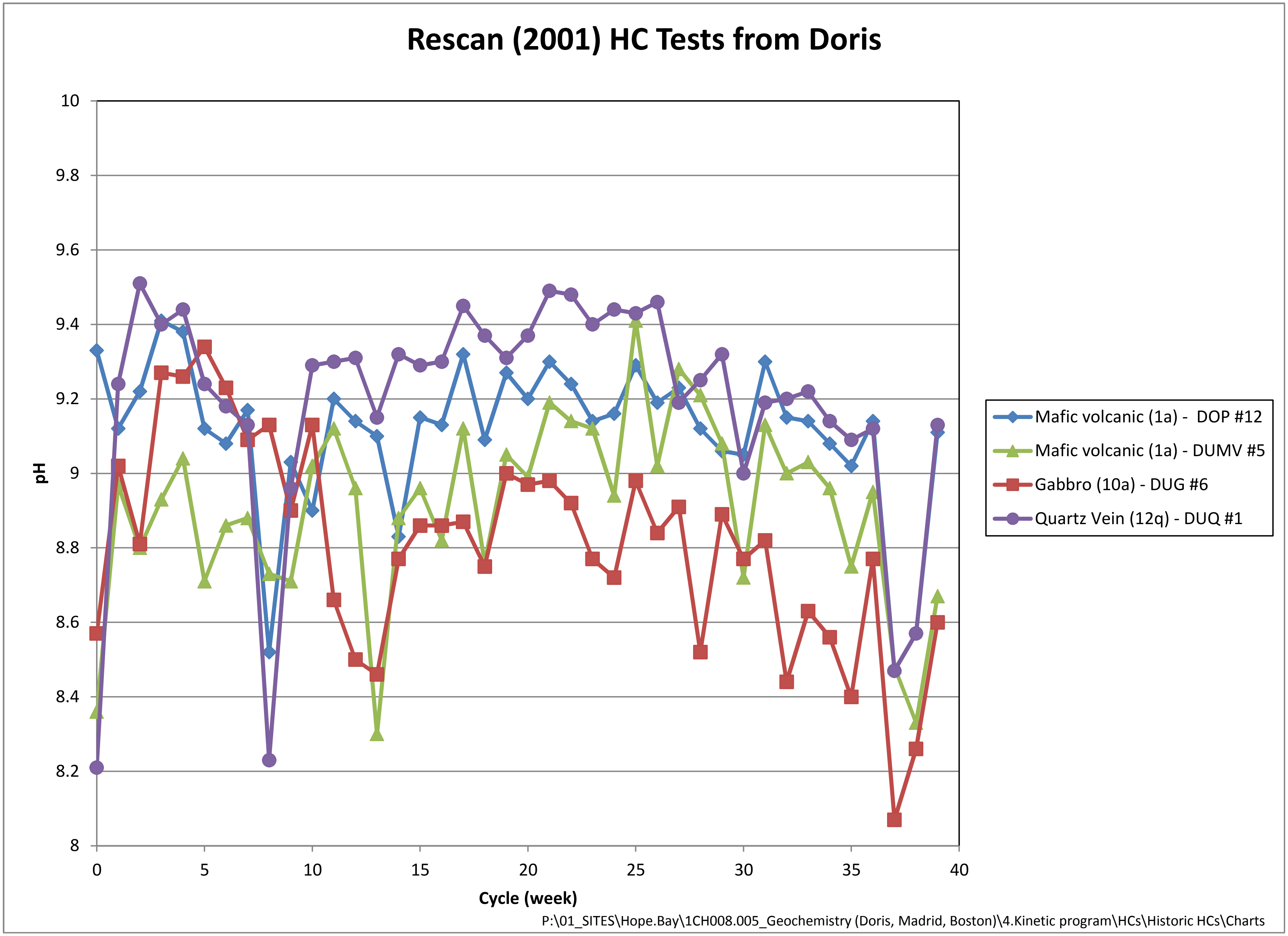

Hope Bay Waste Rock Humidity Cells
U (mg/L)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

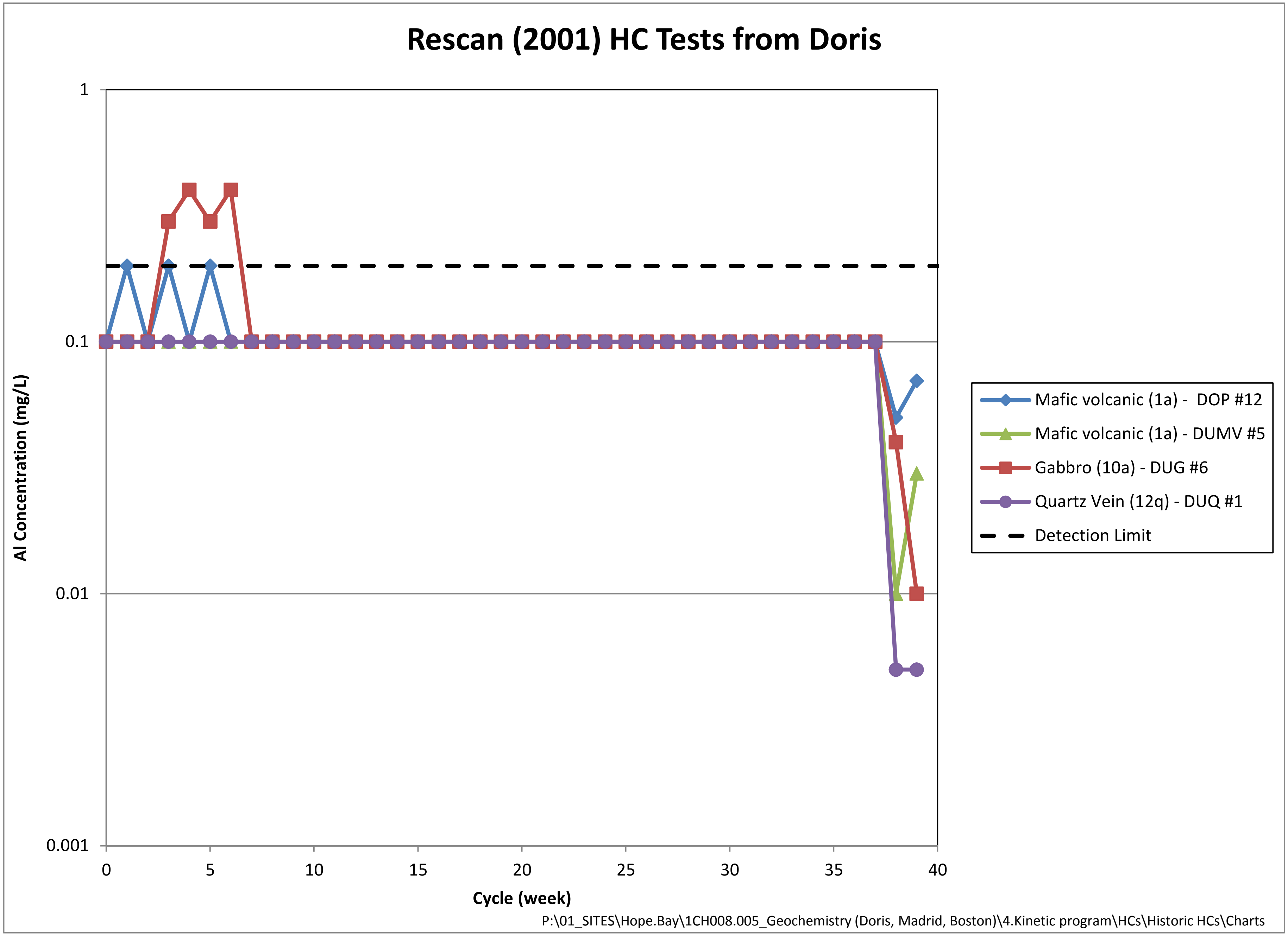

Hope Bay Waste Rock Humidity Cells
V (mg/L)
1
0.1
0.01
0.001
0.0001
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54


Hope Bay Waste Rock Humidity Cells
Zn (mg/L)
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

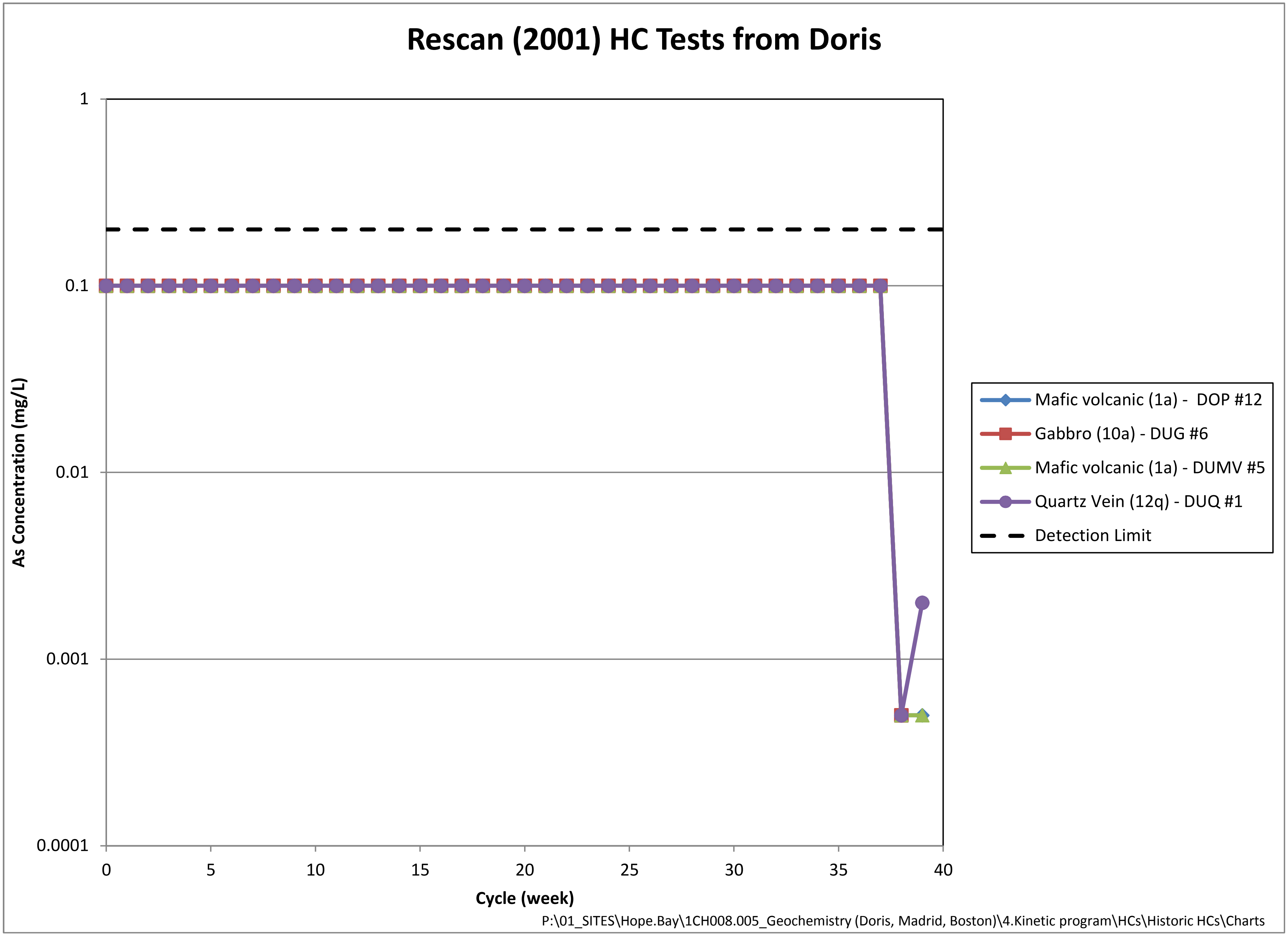

Hope Bay Waste Rock Humidity Cells
Zr (mg/L)
0.0025
0.002
0.0015
0.001
0.0005
0
0
20
40
60
80
100
120
Cycles (weeks)
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54

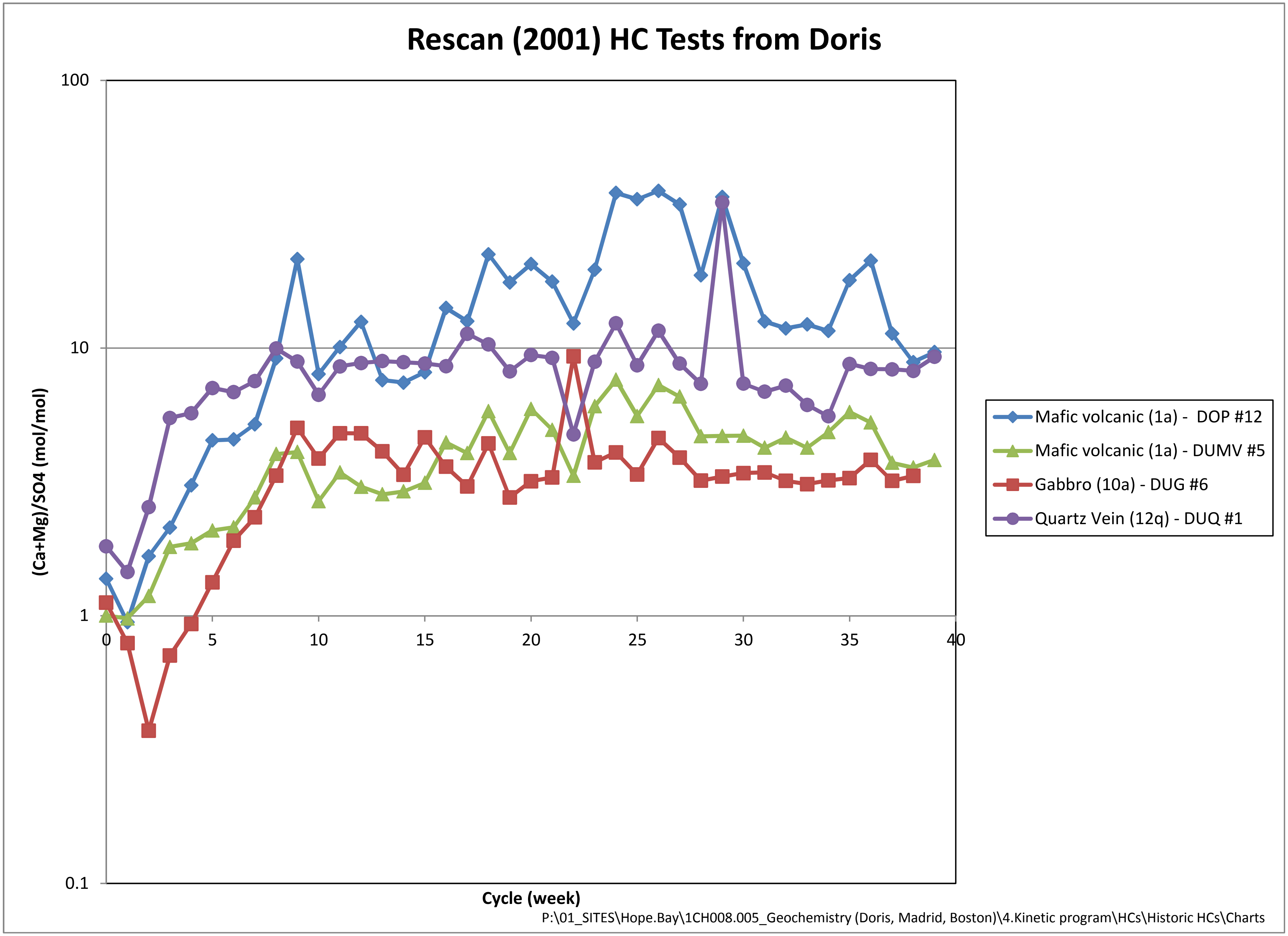

Hope Bay Waste Rock Humidity Cells
Ca+Mg/SO4 (mol/mol)
Cycles (weeks)
100
10
1
0.1
0.01
0
20
40
60
80
100
120
Doris, Mafic volcanic (1), HC-7
Doris, Mafic volcanic (1), HC-42
Doris, Mafic volcanic (1), HC-43
Doris, Mafic volcanic (1), HC-49
Doris, Mafic volcanic (1), HC-50
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-44
Doris, Mafic volcanic w. quartz vein (1 w. 12q), HC-45
Doris, Early gabbro (7a mixed), HC-6
Doris, Late gabbro (10a), HC-46
Doris, Late gabbro (10a), HC-51
Doris Decline, Late gabbro (10a), HC-65
Doris, Diabase (11c), HC-47
Doris, Diabase (11c), HC-48
Doris, Quartz vein (12q), HC-36
Doris, Quartz vein (12q), HC-53
Doris, Quartz vein (12q), HC-52
Doris, Quartz vein (12q), HC-54


Rescan (2001) HC Tests from Doris
pH
Cycle (week)
10
9.8
9.6
9.4
9.2
9
8.8
8.6
8.4
8.2
8
0
5
10
15
20
25
30
35
40
Mafic volcanic (1a) - DOP #12
Mafic volcanic (1a) - DUMV #5
Gabbro (10a) - DUG #6
Quartz Vein (12q) - DUQ #1
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\HCs\Historic HCs\Charts



Rescan (2001) HC Tests from Doris
Al Concentration (mg/L)
1
0.1
0.01
0.001
0
5
10
15
20
25
30
35
40
Cycle (week)
Mafic volcanic (1a) - DOP #12
Mafic volcanic (1a) - DUMV #5
Gabbro (10a) - DUG #6
Quartz Vein (12q) - DUQ #1
Detection Limit
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\HCs\Historic HCs\Charts


Rescan (2001) HC Tests from Doris
1
0.1
0.01
0.001
0.0001
As Concentration (mg/L)
0
5
10
15
20
25
30
35
40
Cycle (week)
Mafic volcanic (1a) - DOP #12
Gabbro (10a) - DUG #6
Mafic volcanic (1a) - DUMV #5
Quartz Vein (12q) - DUQ #1
Detection Limit
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\HCs\Historic HCs\Charts


Rescan (2001) HC Tests from Doris
100
10
1
0.1
(Ca+Mg)/SO4 (mol/mol)
0
5
10
15
20
25
30
35
40
Cycle (week)
Mafic volcanic (1a) - DOP #12
Mafic volcanic (1a) - DUMV #5
Gabbro (10a) - DUG #6
Quartz Vein (12q) - DUQ #1
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\HCs\Historic HCs\Charts

Appendix D: Kinetic Data, Humidity Cell Tests

Appendix D-1: Summary of ABA and Kinetic Test Results

Humidity Cell #	Rock Type[1]	Total Sulphur % Rank[2]	Preliminary Economic Classification	Static Test Results					Kinetic Test Results					
				Total Sulphur	NP	TIC	NP/AP	TIC/AP	pH		SO4 Release Rates		As Release Rates	
											Initial	Stable	Initial	Stable
HC-7	1	26%	W	0.11	161	259	46.8	75.3	7.5	8.9	1.2	0.6	0.0001	0.0001
	1	59%	W	0.17	173	244	33.4	46.9						
HC-42	1	21%	W	0.10	165	178	52.9	56.8	8.3	9.2	2.4	0.7	0.0002	0.0001
HC-43	1	85%	W	0.52	188	254	11.6	15.6	7.9	9.2	18	1.0	0.0001	0.0002
HC-49	1	60%	W	0.17	176	331	33.1	62.2	8.2	9.6	1.7	0.6	0.0004	0.0001
HC-50	1	95%	W	1.78	202	336	3.6	6.0	8.0	9.1	21	2	0.0007	0.0005
HC-44	1 w. 12q	29%	W	0.31	194	216	20.0	22.3	8.4	9.3	11	1.5	0.0005	0.0009
HC-45	1 w. 12q	86%	O	2.37	161	233	2.2	3.1	7.5	9.0	66	4	0.0038	0.0007
HC-6	7a mixed	--	mixed	0.13	128	156	31.6	38.5	7.9	9.3	1.7	0.7	0.0005	0.0001
HC-46	10a	92%	W	0.29	116	142	12.8	15.6	7.6	9.2	4.8	1.0	0.0001	0.0008
HC-51	10a	98%	W	1.19	246	417	6.6	11.2	8.3	9.3	16	3	0.0023	0.0033
HC-65	10a	58%	Decline	0.10	19	0.5	6.1	0.1	8.4	9.4	5	1	0.0401	0.0006
HC-47	11c	95%	W	0.10	28	18	8.9	5.6	7.4	10.0	7	1	0.0050	0.0018
HC-48	11c	98%	W	0.12	19	10	5.2	2.8	7.4	9.8	5.4	0.9	0.0005	0.0005
HC-53	12q	50%	W	0.09	3	3	1.0	1.2	7.3	8.7	0.6	0.6	0.0012	0.0001
HC-36	12q	100%	O	6.03	120	156	0.6	0.8	7.7	8.7	12	5.5	0.0006	0.0001
HC-54	12q	49%	O	0.61	20	28	1.1	1.5	7.7	9.1	5	1	0.0014	0.0001
HC-52	12q	76%	O	1.69	173	302	3.3	5.7	7.6	8.8	17	2.7	0.0005	0.0001

[1]Rock codes as follows: **1** = mafic volcanics; **7a**= early gabbro; **10a** = late gabbro; **11c** = diabase; **12q** = quartz vein

[2]Rank relative to Doris (2011) sample set except for HC-6. No rank for HC-6 because 7a is an insignificant rock type for the Doris deposit.

Appendix D-2: Summary of Trace Element Concentrations for Humidity Cell Tests

	HC #	Rock Type[1]	Total Sulphur % Rank[2]	Preliminary Economic Classification	Al mg/l	Sb mg/l	As mg/l	Ba mg/l	Be mg/l	Bi mg/l	B mg/l	Cd mg/l	Ca mg/l
Median	HC-7	1	26%	W	0.08	0.0001	0.0002	0.0003	0.0001	0.0001	0.03	0.00001	7.4
	HC-42	1	21%	W	0.08	0.00002	0.0002	0.0004	0.00001	0.00001	0.05	0.00001	5.5
	HC-43	1	85%	W	0.07	0.00003	0.0004	0.0004	0.00001	0.00001	0.05	0.00001	5.7
	HC-49	1	60%	W	0.18	0.0002	0.0003	0.0004	0.00001	0.00001	0.05	0.00001	6.2
	HC-50	1	95%	W	0.08	0.0002	0.0013	0.0005	0.00001	0.00001	0.05	0.00001	7.6
	HC-44	1 w. 12q	29%	W	0.08	0.00005	0.0025	0.0003	0.00001	0.00001	0.05	0.00001	7.3
	HC-45	1 w. 12q	86%	O	0.03	0.0001	0.0023	0.0004	0.00001	0.00001	0.05	0.00001	6.5
	HC-6	7a mixed	--	mixed	0.09	0.0001	0.0002	0.0004	0.0001	0.0001	0.04	0.00001	7.5
	HC-46	10a	92%	W	0.07	0.00004	0.0002	0.0003	0.00001	0.00001	0.05	0.00001	4.4
	HC-51	10a	98%	W	0.13	0.0007	0.0251	0.0004	0.00001	0.00001	0.05	0.00001	7.7
	HC-65	10a	58%	Decline	0.37	0.001	0.0013	0.0002	0.00001	0.00001	0.09	0.00001	0.1
	HC-47	11c	95%	W	0.10	0.00007	0.0040	0.0003	0.00001	0.00001	0.05	0.00001	3.6
	HC-48	11c	98%	W	0.09	0.0001	0.0011	0.0002	0.00001	0.00001	0.05	0.00001	3.1
	HC-53	12q	50%	W	0.01	0.00004	0.0002	0.0008	0.00001	0.00001	0.05	0.00001	3.3
	HC-36	12q	100%	O	0.01	0.00006	0.0002	0.0004	0.00001	0.00001	0.05	0.00001	7.8
	HC-54	12q	49%	O	0.03	0.0002	0.0003	0.0007	0.00001	0.00001	0.05	0.00001	7.5
	HC-52	12q	76%	O	0.02	0.00009	0.0004	0.0006	0.00001	0.00001	0.05	0.00001	6.7
Maximum	HC-7	1	26%	W	0.18	0.0002	0.0004	0.0026	0.0002	0.0002	0.18	0.00004	10.8
	HC-42	1	21%	W	0.15	0.0001	0.0008	0.0008	0.0001	0.0001	0.05	0.00001	9.2
	HC-43	1	85%	W	0.14	0.0001	0.0018	0.0010	0.0001	0.0001	0.12	0.00001	12.3
	HC-49	1	60%	W	1.10	0.0018	0.0017	0.0007	0.0001	0.0001	0.23	0.00001	8.1
	HC-50	1	95%	W	0.29	0.0019	0.0024	0.0012	0.0001	0.0001	0.16	0.00001	12.3
	HC-44	1 w. 12q	29%	W	0.24	0.0002	0.0032	0.0006	0.0001	0.0001	0.14	0.00001	9.0
	HC-45	1 w. 12q	86%	O	0.12	0.0006	0.0096	0.0016	0.0001	0.0001	0.24	0.00001	16.3
	HC-6	7a mixed	--	mixed	0.37	0.0008	0.0024	0.0008	0.0002	0.0002	0.26	0.00004	10.0
	HC-46	10a	92%	W	0.14	0.0002	0.0190	0.0010	0.0001	0.0001	0.09	0.00001	7.6
	HC-51	10a	98%	W	0.33	0.0054	0.0400	0.0020	0.0001	0.0001	0.19	0.00001	12.5
	HC-65	10a	58%	Decline	0.48	0.0019	0.0607	0.0019	0.00001	0.00001	0.22	0.00001	1.6
	HC-47	11c	95%	W	0.38	0.0004	0.0240	0.0009	0.0001	0.0001	0.18	0.00001	11.3
	HC-48	11c	98%	W	0.40	0.0002	0.0026	0.0003	0.0001	0.0001	0.21	0.00001	10.1
	HC-53	12q	50%	W	0.01	0.0004	0.0040	0.0059	0.0001	0.0001	0.08	0.00004	5.0
	HC-36	12q	100%	O	0.07	0.0009	0.0011	0.0012	0.0001	0.0001	0.16	0.00001	17.4
	HC-54	12q	49%	O	0.06	0.0014	0.0027	0.0118	0.00001	0.00001	0.06	0.00001	10.0
	HC-52	12q	76%	O	0.10	0.0006	0.0017	0.0024	0.0001	0.0001	0.10	0.00004	13.0

	HC #	Cr mg/l	Co mg/l	Cu mg/l	Fe mg/l	Pb mg/l	Li mg/l	Mg mg/l	Mn mg/l	Hg ug/L	Mo mg/l	Ni mg/l	P mg/l	K mg/l	Se mg/l
Median	HC-7	0.0002	0.0001	0.001	0.01	0.0001	0.001	4.35	0.015	0.02	0.0001	0.0002	0.015	0.3	0.0002
	HC-42	0.0001	0.00001	0.001	0.01	0.0001	0.001	1.63	0.020	0.02	0.0001	0.0001	0.008	0.3	0.0001
	HC-43	0.0001	0.00003	0.001	0.01	0.0000	0.001	3.36	0.015	0.02	0.0001	0.0001	0.010	0.4	0.0001
	HC-49	0.0001	0.000031	0.0003	0.02	0.0001	0.001	3.81	0.010	0.02	0.0004	0.0001	0.009	1.0	0.00004
	HC-50	0.0001	0.00020	0.0003	0.01	0.0001	0.001	3.32	0.017	0.02	0.0002	0.0001	0.008	0.5	0.00004
	HC-44	0.0001	0.00005	0.001	0.01	0.0000	0.001	3.20	0.009	0.02	0.0003	0.0001	0.009	0.6	0.0001
	HC-45	0.0001	0.00027	0.0005	0.01	0.00004	0.001	3.12	0.022	0.02	0.0005	0.0003	0.009	0.3	0.0001
	HC-6	0.0002	0.0001	0.0005	0.01	0.0001	0.001	3.78	0.005	0.02	0.0001	0.0002	0.015	0.3	0.0002
	HC-46	0.0001	0.000034	0.0004	0.01	0.0001	0.001	2.20	0.014	0.02	0.0003	0.0001	0.008	0.4	0.0001
	HC-51	0.0001	0.00040	0.0005	0.01	0.0000	0.001	4.75	0.009	0.02	0.0003	0.0002	0.009	0.6	0.0001
	HC-65	0.0001	0.00003	0.001	0.02	0.0000	0.002	0.05	0.0004	0.002	0.0004	0.0001	0.026	0.7	0.0002
	HC-47	0.0001	0.000021	0.001	0.02	0.0001	0.001	0.76	0.002	0.02	0.0002	0.0001	0.008	1.1	0.0001
	HC-48	0.0001	0.000037	0.001	0.04	0.0001	0.001	1.19	0.002	0.02	0.0002	0.0001	0.009	1.0	0.0002
	HC-53	0.0001	0.000032	0.0004	0.01	0.00005	0.001	1.11	0.017	0.02	0.0001	0.0001	0.008	0.3	0.00004
	HC-36	0.0001	0.000118	0.0004	0.01	0.0001	0.001	4.83	0.009	0.02	0.0004	0.0001	0.008	0.3	0.0001
	HC-54	0.0001	0.000051	0.001	0.003	0.00003	0.001	2.73	0.011	0.02	0.0004	0.0001	0.002	0.3	0.0001
	HC-52	0.0001	0.000035	0.0004	0.01	0.00004	0.001	2.65	0.005	0.02	0.0003	0.0001	0.008	0.3	0.00004
Maximum	HC-7	0.0003	0.0003	0.0064	0.040	0.0006	0.002	6.080	0.035	0.026	0.0011	0.0006	0.030	8.380	0.0008
	HC-42	0.0002	0.0001	0.0014	0.070	0.0001	0.001	2.730	0.028	0.02	0.0007	0.0002	0.015	3.000	0.0006
	HC-43	0.0002	0.0001	0.0017	0.080	0.0001	0.002	5.130	0.023	0.02	0.0018	0.0005	0.015	8.460	0.0008
	HC-49	0.0003	0.0003	0.0017	0.900	0.0001	0.002	5.130	0.023	0.02	0.0064	0.0002	0.020	5.900	0.0003
	HC-50	0.0004	0.0004	0.0012	0.300	0.0003	0.003	5.130	0.025	0.02	0.0036	0.0004	0.015	10.400	0.0002
	HC-44	0.0002	0.0001	0.0023	0.190	0.0001	0.002	3.940	0.017	0.02	0.0060	0.0002	0.015	5.560	0.0010
	HC-45	0.0002	0.0004	0.0023	0.040	0.0001	0.002	8.280	0.030	0.02	0.0054	0.0011	0.015	5.800	0.0009
	HC-6	0.0003	0.0002	0.0049	0.180	0.0002	0.001	5.200	0.017	0.026	0.0011	0.0008	0.030	2.090	0.0006
	HC-46	0.0002	0.0001	0.0016	0.160	0.0003	0.001	3.530	0.019	0.02	0.0016	0.0140	0.015	2.200	0.0002
	HC-51	0.0002	0.0008	0.0023	0.090	0.0001	0.003	11.500	0.014	0.02	0.0019	0.0014	0.015	13.100	0.0006
	HC-65	0.0001	0.0001	0.0021	0.160	0.0001	0.005	0.440	0.001	0.002	0.0006	0.0005	0.044	3.590	0.0006
	HC-47	0.0005	0.0001	0.0029	0.650	0.0001	0.001	1.990	0.004	0.02	0.0016	0.0003	0.020	5.220	0.0006
	HC-48	0.0006	0.0004	0.0034	0.800	0.0005	0.001	2.700	0.012	0.02	0.0014	0.0004	0.040	3.000	0.0012
	HC-53	0.0002	0.0004	0.0044	0.020	0.0005	0.002	1.380	0.041	0.02	0.0027	0.0008	0.015	0.930	0.0002
	HC-36	0.0002	0.0032	0.0022	0.040	0.0001	0.005	7.820	0.090	0.02	0.0062	0.0005	0.015	6.040	0.0011
	HC-54	0.0002	0.0005	0.0054	0.031	0.0001	0.002	3.270	0.029	0.02	0.0103	0.0014	0.023	2.470	0.0008
	HC-52	0.0002	0.0006	0.0024	0.010	0.0001	0.002	3.840	0.075	0.02	0.0037	0.0014	0.015	1.590	0.0002

	HC #	Si mg/l	Ag mg/l	Na mg/l	Sr mg/l	Te mg/l	Tl mg/l	Th mg/l	Sn mg/l	Ti mg/l	U mg/l	V mg/l	Zn mg/l
Median	HC-7	0.33	0.00004	0.1	0.011	0.00020	0.00002	0.0001	0.0001	0.0002	0.00005	0.0002	0.001
	HC-42	0.20	0.00001	0.2	0.011	0.00002	0.000002	0.00001	0.0001	0.0005	0.000003	0.0002	0.000
	HC-43	0.26	0.00001	0.2	0.010	0.00002	0.000002	0.00001	0.0000	0.0005	0.000004	0.0002	0.001
	HC-49	0.62	0.00001	1.1	0.008	0.00002	0.000002	0.00001	0.0001	0.0005	0.00001	0.0002	0.0004
	HC-50	0.40	0.00001	0.2	0.009	0.00002	0.000002	0.00001	0.0001	0.0005	0.00001	0.0002	0.001
	HC-44	0.40	0.00001	0.3	0.014	0.00002	0.000002	0.00001	0.0001	0.0005	0.000004	0.0002	0.0002
	HC-45	0.20	0.00001	0.1	0.009	0.00002	0.000002	0.00001	0.0001	0.0005	0.000004	0.0002	0.0005
	HC-6	0.49	0.00004	0.2	0.012	0.00020	0.00002	0.0001	0.0001	0.0002	0.00005	0.0003	0.0010
	HC-46	0.20	0.00001	0.4	0.007	0.00002	0.000002	0.00001	0.0001	0.0005	0.000002	0.0002	0.0003
	HC-51	0.50	0.00001	0.2	0.009	0.00002	0.000003	0.00001	0.0001	0.0005	0.000002	0.0006	0.0005
	HC-65	1.10	0.00001	12.1	0.001	0.00002	0.000002	0.00001	0.0001	0.0005	0.00001	0.02	0.0002
	HC-47	0.70	0.00001	3.6	0.006	0.00002	0.000002	0.00001	0.0001	0.0006	0.00001	0.004	0.0007
	HC-48	0.80	0.00001	2.7	0.005	0.00002	0.000002	0.00001	0.0001	0.0011	0.00002	0.004	0.0003
	HC-53	0.20	0.00001	0.1	0.002	0.00002	0.000002	0.00001	0.0001	0.0005	0.000002	0.0002	0.0007
	HC-36	0.20	0.00001	0.1	0.007	0.00002	0.000002	0.00001	0.0000	0.0005	0.00002	0.0002	0.0008
	HC-54	0.30	0.00001	0.1	0.005	0.00002	0.000002	0.00001	0.0001	0.0005	0.00001	0.0002	0.0005
	HC-52	0.20	0.00001	0.1	0.006	0.00002	0.000002	0.00001	0.0001	0.0005	0.000004	0.0002	0.001
Maximum	HC-7	0.500	0.00005	18.7	0.035	0.00020	0.00003	0.0001	0.0002	0.0012	0.00010	0.0003	0.0019
	HC-42	0.300	0.00004	15.5	0.042	0.00020	0.00002	0.0001	0.0002	0.0005	0.00005	0.0002	0.0010
	HC-43	0.350	0.00004	65.7	0.039	0.00020	0.00002	0.0001	0.0002	0.0005	0.00005	0.0002	0.0060
	HC-49	0.810	0.00004	48.3	0.010	0.00020	0.00002	0.0001	0.0001	0.0005	0.00019	0.0008	0.0140
	HC-50	0.600	0.00004	17.1	0.031	0.00020	0.00002	0.0001	0.0001	0.0007	0.00007	0.0002	0.0050
	HC-44	0.520	0.00004	69.5	0.034	0.00020	0.00002	0.0001	0.0002	0.0005	0.00005	0.0004	0.0010
	HC-45	0.450	0.00004	36.6	0.052	0.00020	0.00002	0.0001	0.0001	0.0005	0.00005	0.0002	0.0060
	HC-6	0.850	0.00005	43.8	0.019	0.00020	0.00002	0.0001	0.0002	0.0018	0.00010	0.0036	0.0110
	HC-46	0.310	0.00004	15.5	0.014	0.00020	0.00002	0.0001	0.0001	0.0005	0.00005	0.0002	0.0010
	HC-51	0.710	0.00004	14.3	0.034	0.00020	0.00002	0.0001	0.0001	0.0005	0.00005	0.0009	0.0010
	HC-65	5.400	0.00001	62.9	0.005	0.00002	0.00001	0.0000	0.0001	0.0011	0.00001	0.0281	0.0013
	HC-47	1.000	0.00004	62.8	0.016	0.00020	0.00002	0.0001	0.0001	0.0051	0.00005	0.0180	0.0050
	HC-48	1.100	0.00004	52.7	0.012	0.00020	0.00002	0.0001	0.0001	0.0110	0.00005	0.0180	0.0037
	HC-53	2.250	0.00004	9.4	0.050	0.00020	0.00002	0.0001	0.0002	0.0005	0.00005	0.0004	0.0050
	HC-36	0.470	0.00004	23.3	0.059	0.00020	0.00002	0.0001	0.0001	0.0005	0.00032	0.0002	0.0050
	HC-54	0.800	0.00002	11.8	0.019	0.00002	0.00001	0.0000	0.0003	0.0005	0.00006	0.0006	0.0070
	HC-52	0.580	0.00004	5.9	0.038	0.00020	0.00002	0.0001	0.0002	0.0007	0.00005	0.0004	0.0070

[1]Rock codes as follows: **1** = mafic volcanics; **7a**= early gabbro; **10a** = late gabbro; **11c** = diabase; **12q** = quartz vein

[2]Rank relative to Doris (2011) sample set except for HC-6. No rank for HC-6 because 7a is an insignificant rock type for the Doris deposit.

Appendix D-3: Summary of General Parameter, Nutrient & Ionic Concentrations for Humidity Cell Tests

	Humidity Cell #	Rock Type[1]	Total Sulphur % Rank[2]	Preliminary Economic Classification	SO4 mg/l	Alkalinity mgCaCO3/l	Fluoride mg/l	Chloride mg/l	Nitrate-N mg/l	Nitrite-N mg/l	Total Ammonia mg/l	Diss.-P mg/l	TDS mg/l
Median	HC-7	1	26%	W	1	35	0.05	0.50	0.05	0.00	0.24	0.02	40
	HC-42	1	21%	W	1	20	0.02	0.50	0.02	0.01	0.12	0.01	24
	HC-43	1	85%	W	2	26	0.02	0.60	0.02	0.01	0.19	0.01	33
	HC-49	1	60%	W	2	32	0.01	0.50	0.36	0.01	0.05	0.01	42
	HC-50	1	95%	W	5	29	0.01	0.50	0.05	0.01	0.11	0.01	37
	HC-44	1 w. 12q	29%	W	4	28	0.02	0.50	0.05	0.01	0.11	0.01	42
	HC-45	1 w. 12q	86%	O	9	19	0.01	0.50	0.15	0.01	0.11	0.01	46
	HC-6	7a mixed	--	mixed	2	34	0.05	0.50	0.05	0.00	0.20	0.02	42.5
	HC-46	10a	92%	W	2	20	0.01	0.50	0.02	0.01	0.11	0.01	28
	HC-51	10a	98%	W	10	31	0.02	0.50	0.05	0.01	0.14	0.01	55
	HC-65	10a	58%	Decline	1.8	18.5	0.05	21.00	0.02	0.01	0.04	0.03	74
	HC-47	11c	95%	W	2	21	0.01	0.50	0.02	0.01	0.09	0.01	32
	HC-48	11c	98%	W	2	20	0.01	0.50	0.02	0.01	0.11	0.01	36
	HC-53	12q	50%	W	1	14	0.01	0.50	0.02	0.01	0.17	0.01	13
	HC-36	12q	100%	O	14	25	0.02	0.50	0.02	0.01	0.23	0.01	48
	HC-54	12q	49%	O	3	25	0.01	0.50	0.24	0.01	0.10	0.01	34
	HC-52	12q	76%	O	6	21	0.01	0.50	0.10	0.01	0.14	0.01	30
Maximum	HC-7	1	26%	W	15	49	0.10	43.20	0.10	0.03	0.72	0.14	139
	HC-42	1	21%	W	5	27	0.05	31.10	0.05	0.01	0.25	0.02	86
	HC-43	1	85%	W	29	36	0.06	84.60	0.05	0.24	0.41	0.02	217
	HC-49	1	60%	W	13	94	0.05	10.90	1.02	0.07	0.21	0.08	186
	HC-50	1	95%	W	36	45	0.05	13.40	0.28	0.44	0.24	0.06	156
	HC-44	1 w. 12q	29%	W	27	39	0.05	95.00	0.43	0.73	0.24	0.02	259
	HC-45	1 w. 12q	86%	O	108	29	0.05	15.30	0.42	0.04	0.19	0.11	200
	HC-6	7a mixed	--	mixed	17	81	0.08	20.90	0.05	0.01	0.43	0.02	163
	HC-46	10a	92%	W	9	30	0.05	16.30	0.05	0.01	0.16	0.02	94
	HC-51	10a	98%	W	36	63	0.05	6.75	0.09	0.04	0.23	0.02	108
	HC-65	10a	58%	Decline	10	36	0.17	70.00	0.10	0.01	0.19	0.06	170
	HC-47	11c	95%	W	12	107	0.08	21.00	0.07	0.01	0.71	0.02	182
	HC-48	11c	98%	W	14	102	0.05	21.60	0.06	0.01	0.25	0.02	158
	HC-53	12q	50%	W	7	17	0.05	15.70	0.05	0.01	0.27	0.02	67
	HC-36	12q	100%	O	64	31	0.05	25.10	0.05	0.02	0.36	0.02	189
	HC-54	12q	49%	O	14	30	0.04	11.00	0.72	0.50	0.32	0.01	70
	HC-52	12q	76%	O	23	27	0.05	10.30	0.29	0.01	0.29	0.02	81

[1]Rock codes as follows: **1** = mafic volcanics; **7a**= early gabbro; **10a** = late gabbro; **11c** = diabase; **12q** = quartz vein
[2]Rank relative to Doris (2011) sample set except for HC-6. No rank for HC-6 because 7a is an insignificant rock type for the Doris deposit.

Appendix D-4: Summary of Kinetic Test Depletion Rates

HC #	Rock Type[1]	Total Sulphur	Preliminary Economic Classification	Total Sulphur	NP/AP	TIC/AP	Ca+Mg/SO4	Stable SO4 Release Rate	Time to Depletion			NP Depletion > AP Depletion	TIC Depletion > AP Depletion	Ca+Mg/ SO4 < NP/AP	Ca+Mg/ SO4 < TIC/AP	Prediction	
									NP	TIC	Suphide					Neutral	Acidic
		% Rank[2]		%S				mg/kg/wk	years								
HC-7	1	26%	W	0.11	46.8	75.3	24.0	0.63	196	314	98	Yes	Yes	Yes	Yes	likely	
	1	59%	W	0.17	33.4	46.9	24.0	0.63	211	296	140	Yes	Yes	Yes	Yes	likely	
HC-42	1	21%	W	0.10	52.9	56.8	12.4	0.74	330	355	76	Yes	Yes	Yes	Yes	likely	
HC-43	1	85%	W	0.52	11.6	15.6	12.9	0.97	274	370	305	No	Yes	No	Yes		theoretically possible
HC-49	1	60%	W	0.17	33.1	62.2	20.5	0.65	243	456	149	Yes	Yes	Yes	Yes	likely	
HC-50	1	95%	W	1.78	3.6	6.0	6.3	2.18	270	448	467	No	No	No	No		theoretically possible
HC-44	1 w. 12q	29%	W	0.31	20.0	22.3	8.7	1.53	268	299	115	Yes	Yes	Yes	Yes	likely	
HC-45	1 w. 12q	86%	O	2.37	2.2	3.1	3.4	3.60	243	352	377	No	No	No	No		theoretically possible
HC-6	7a mixed	--	mixed	0.13	31.6	38.5	20.3	0.71	164	200	103	Yes	Yes	Yes	Yes	likely	
HC-46	10a	92%	W	0.29	12.8	15.6	9.2	0.98	237	288	168	Yes	Yes	Yes	Yes	likely	
HC-51	10a	98%	W	1.19	6.6	11.2	5.8	2.94	265	450	231	Yes	Yes	Yes	Yes	likely	
HC-65	10a	58%	Decline	0.10	6.1	0.1	0.2	1.39	1247	30	37	Yes	No	Yes	No		theoretically possible
HC-47	11c	95%	W	0.10	8.9	5.6	6.7	0.83	92	58	68	Yes	No	Yes	No		theoretically possible
HC-48	11c	98%	W	0.12	5.2	2.8	6.2	0.91	63	34	74	No	No	No	No		theoretically possible
HC-53	12q	50%	W	0.09	1.0	1.2	8.8	0.61	9	12	84	No	No	No	No		theoretically possible
HC-36	12q	100%	O	6.03	0.6	0.8	3.0	5.53	134	174	624	No	No	No	No		theoretically possible
HC-54	12q	49%	O	0.61	1.1	1.5	11.2	1.14	29	40	305	No	No	No	No		theoretically possible
HC-52	12q	76%	O	1.69	3.3	5.7	4.3	2.68	272	477	360	No	Yes	No	Yes		theoretically possible

[1]Rock codes as follows: **1** = mafic volcanics; **7a**= early gabbro; **10a** = late gabbro; **11c** = diabase; **12q** = quartz vein
[2]Rank relative to Doris (2011) sample set except for HC-6. No rank for HC-6 because 7a is an insignificant rock type for the Doris deposit.

Appendix E: Static Data, Barrel Tests

Appendix E-1: Carbonate and Sulphide Mineralogy for Barrel Samples

Barrel ID	Rock Type	Carbonates					Sulphides		
		Ferroan Dolomite Ca(Fe,Mg)CO3		Siderite FeCO3		Calcite CaCO3	Pyrite FeS2	Sulphide S	
		XRD	SEM*	XRD	SEM	XRD	XRD	XRD	ABA
							mineral %	%S	
W1	1	22	Ca(Mg0.56Fe0.44)CO3	1	(Mg0.23Fe0.77)CO3	bd	bd	bd	0.11
	1	25	n/a	bd	n/a	bd	bd	bd	0.16
W5	7a mixed	8	Ca(Mg0.54Fe0.46)CO3	tr	(Mg0.19Fe0.81)CO3	7	bd	bd	0.13
W13	10a	4	n/a	bd	n/a	3	bd	bd	0.06
W10	11c	bd	n/a	bd	n/a	bd	bd	bd	0.03
W9	12q with 1	22	n/a	9	n/a	bd	2	1.07	2.05

bd: below detection

n/a: data not available

[1]Rock codes as follows: **1** = mafic volcanics; **7a**= early gabbro; **10a** = late gabbro; **11c** = diabase; **12q** = quartz vein

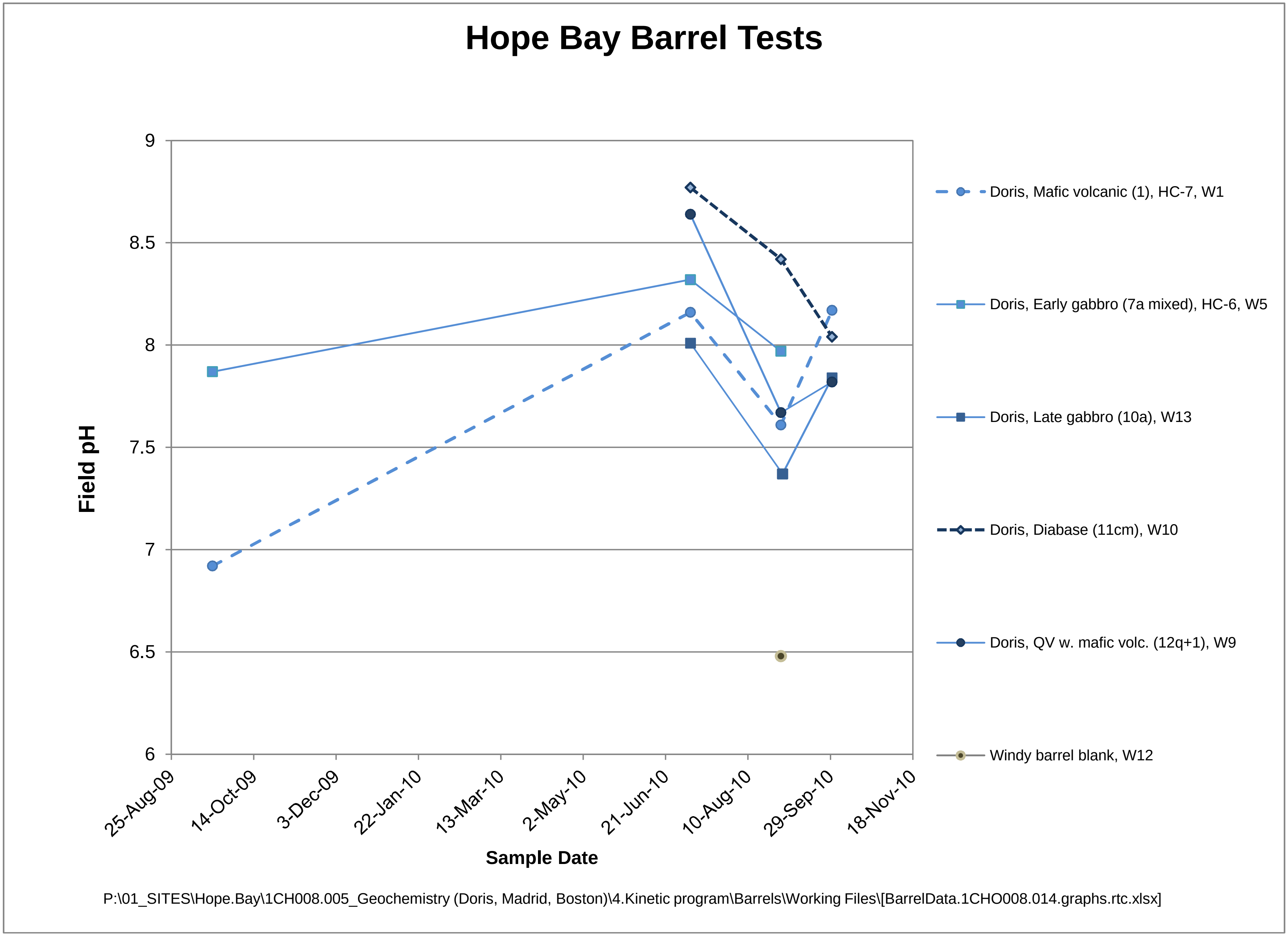
\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Reports & Memos\20110630_Memo_WR_HCUpdate\Working Files\[2009Barrels_XRD_1CH008043_lnb.xls

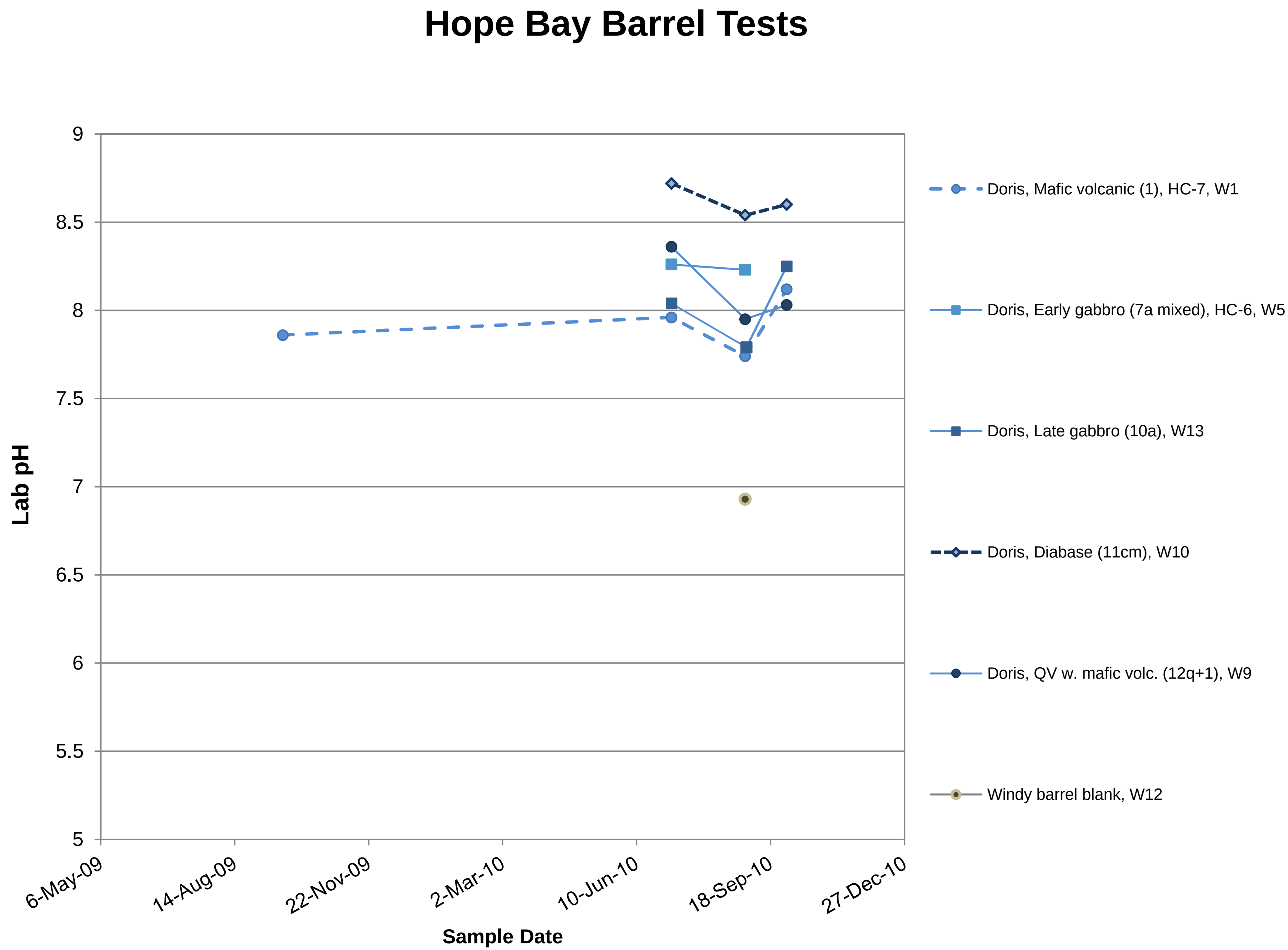
Appendix E-2: Solid-Phase Trace Metal Data - ICP Metals by Aqua Regia Digestion, Barrel Test Samples, Doris Deposit

HC #	Rock Type	Al	Sb	As	Ba	Bi	B	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Hg	Mo	Ni	P	K	Se	Ag	Na	Sr	Tl	Th	Ti	U	V	W	Zn
		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
HC-7	1	27,600	0.1	1.7	17	0.1	20	0.1	45,300	14	29.5	31.6	103,200	0.9	15,700	2,377	0.00001	1.2	4.2	820	800	0.5	0.1	200	44	0.1	0.2	40	0.1	53	0.1	121
	1	28,980	0.1	1.8	13.59754	0.1	20	0.1	52,355	33.53554	28.30339	39.01664	104,934	0.506013	16,658	2,645	0.00001	0.261772	3.597902	876	681	0.6	0.1	412	60.02432	0.1	0.228728	51	0.1	52.60877	0.149372	119.425
HC-6	7a mixed	31,100	0.1	3.2	5	0.1	20	0.1	45,000	72	33.3	89.6	74,000	2.7	23,900	1,605	0.00001	1.7	35	520	200	0.5	0.1	280	32	0.1	0.3	1,060	0.1	115	0.1	88
W13	10a	36,300	-0.1	3	4	-0.1	-20	-0.1	26,500	130	40.2	114.3	58,700	1	30,900	973	-0.01	0.3	94.5	210	400	-0.5	-0.1	250	31	-0.1	-0.1	1,520	-0.1	132	-0.1	75
W10	11c	42,900	-0.1	1.1	24	-0.1	-20	-0.1	24,600	58	22.9	139.8	37,800	4.5	15,000	297	-0.01	0.4	55.8	420	2,200	-0.5	-0.1	5,750	75	-0.1	2.1	1,960	0.4	179	-0.1	53
W9	12q with 1	4,300	-0.1	36.5	13	-0.1	-20	0.1	49,700	16	28.6	37	97,100	4	18,200	2,192	-0.01	0.6	2.9	890	800	1.1	0.3	710	32	-0.1	0.2	-10	-0.1	10	-0.1	63
		78,000	*0.2*	*2*	*330*	*0.007*	*5*	*0.22*	*76,000*	*170*	*48*	*87*	*86,500*	*6*	*46,000*	*1,500*	*0.09*	*1.5*	*130*	*1,100*	*8,300*	*0.05*	*0.11*	*18,000*	*465*	*0.21*	*4*	*13,800*	*1*	*250*	*0.7*	*105*

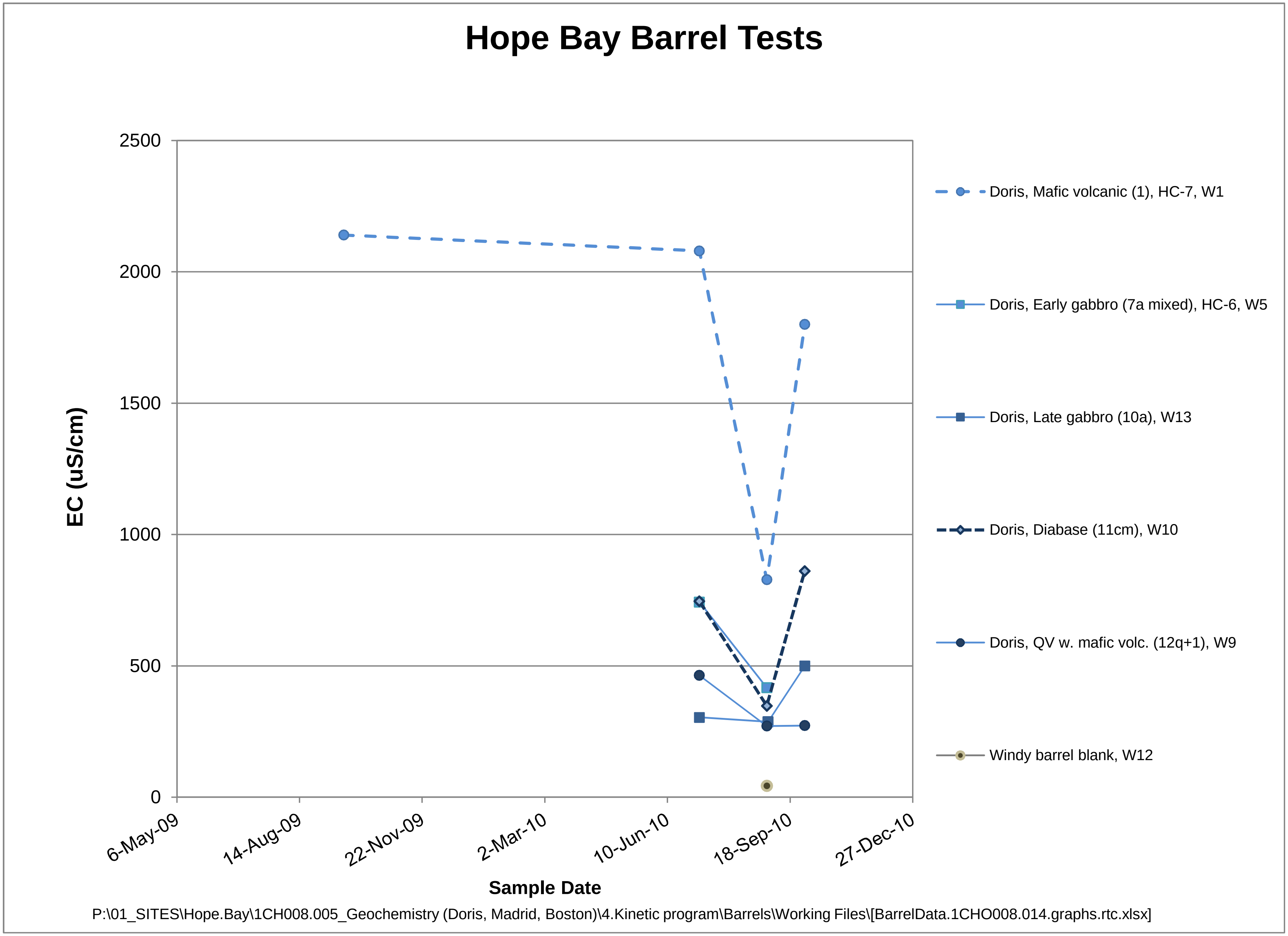
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\WR HCs\Calculations\[HB_WR_Outcomes.mc.REV08.xlsx]

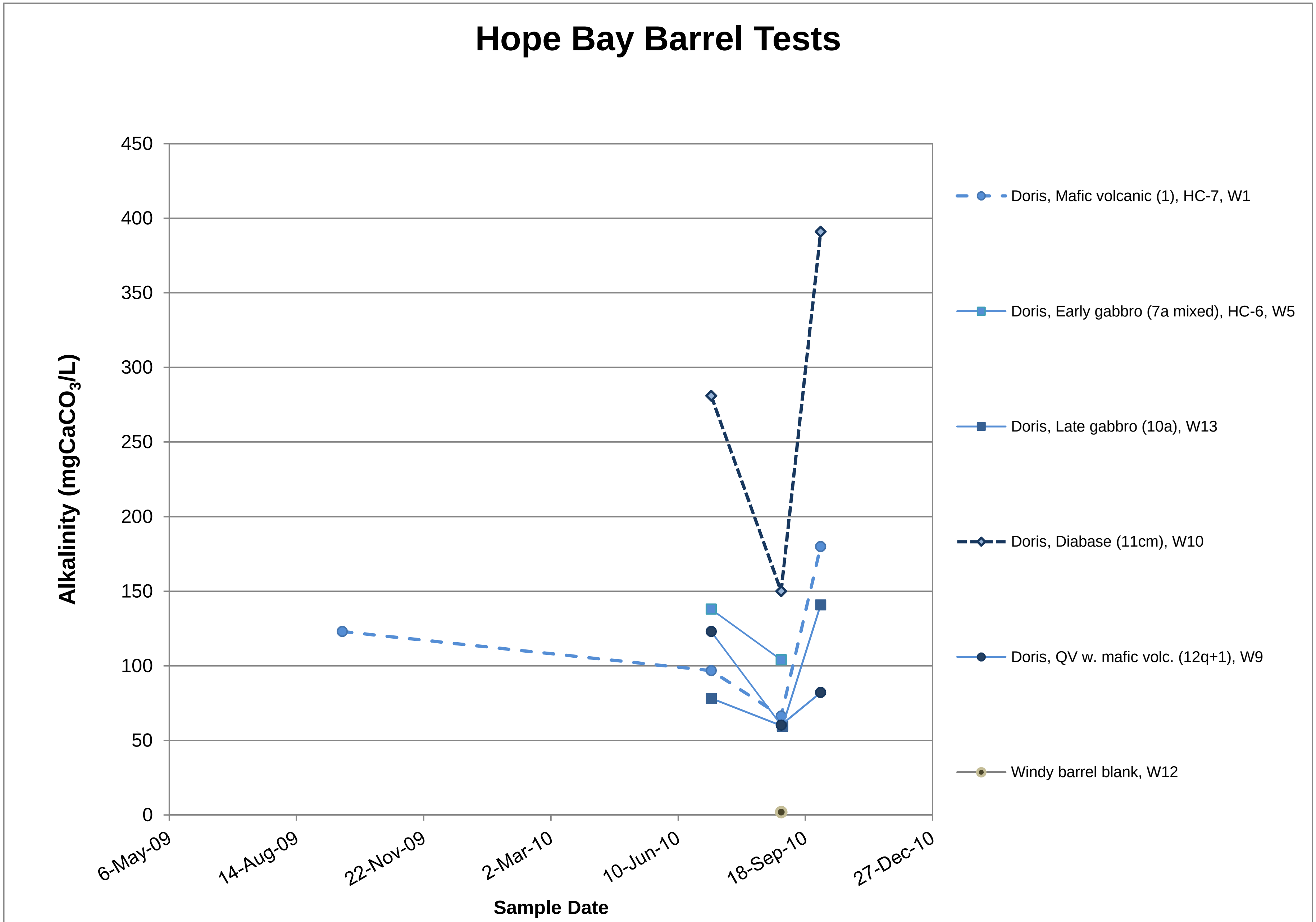
Appendix F: Figures, Barrel Tests


Hope Bay Barrel Tests
Field pH
9
8.5
8
7.5
7
6.5
6
25-Aug-09
14-Oct-09
3-Dec-09
22-Jan-10
13-Mar-10
2-May-10
21-Jun-10
10-Aug-10
29-Sep-10
18-Nov-10
Sample Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
Windy barrel blank, W12
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

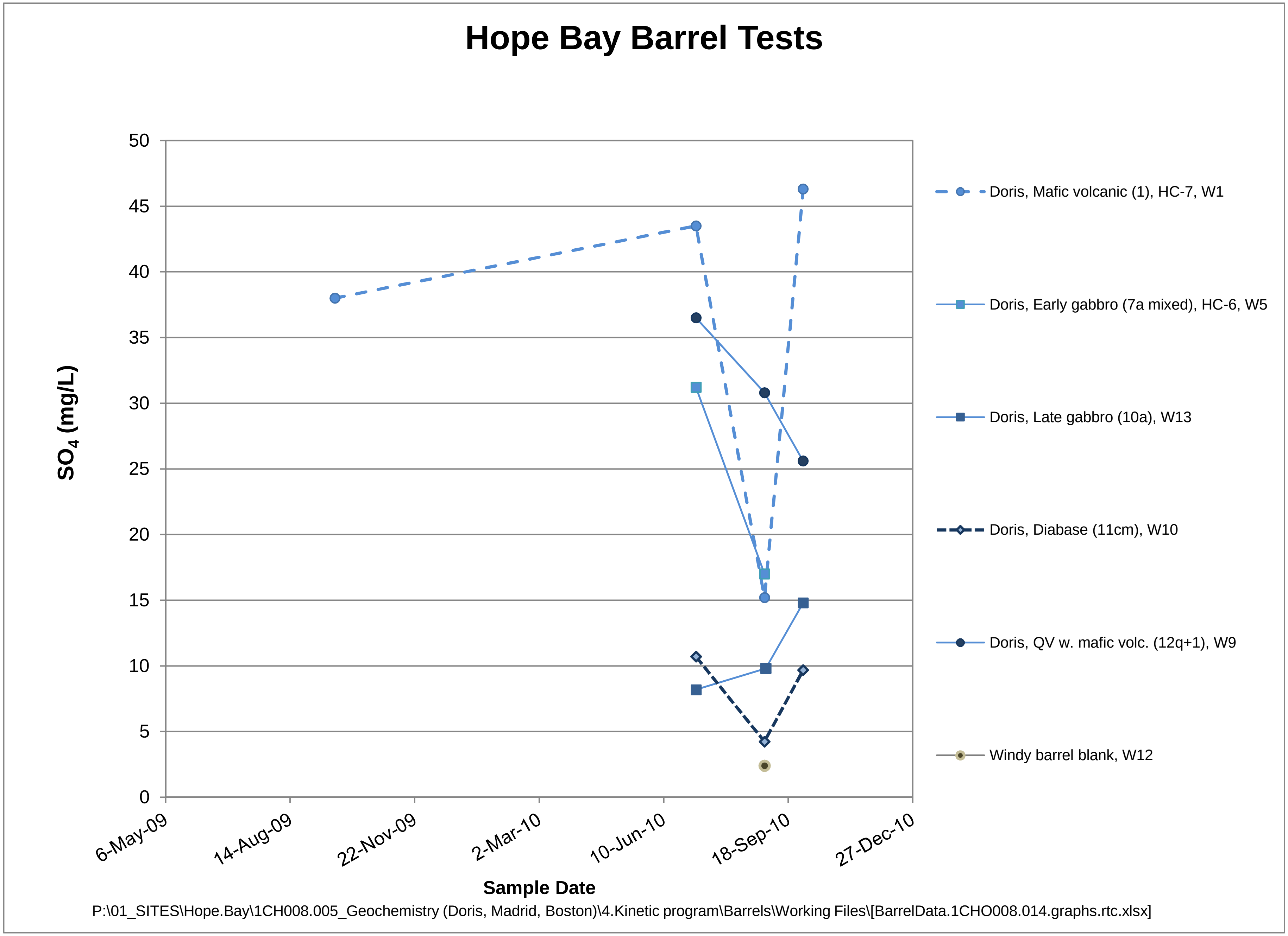


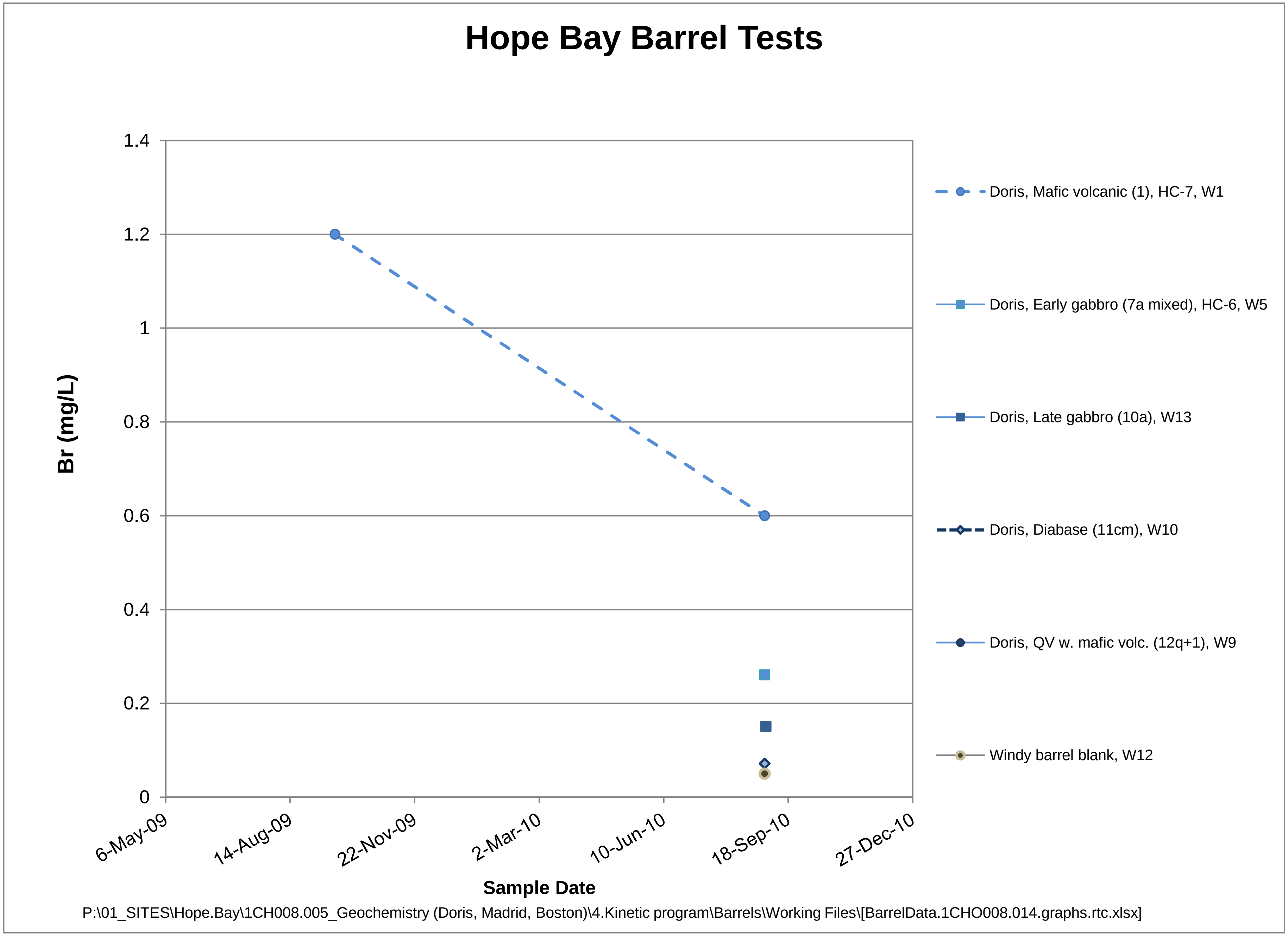
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

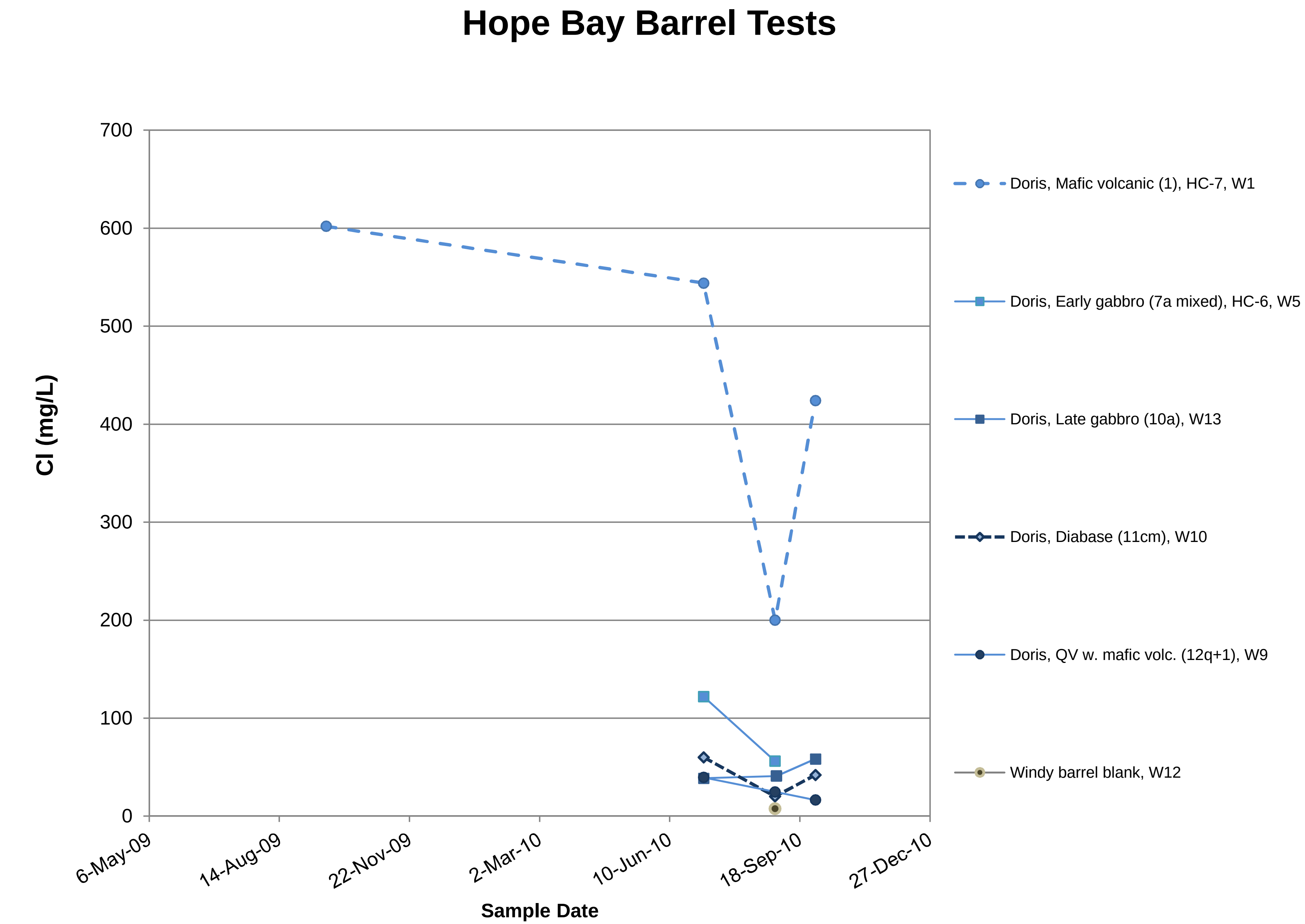

Hope Bay Barrel Tests
EC (uS/cm)
2500
2000
1500
1000
500
0
6-May-09
14-Aug-09
22-Nov-09
2-Mar-10
10-Jun-10
18-Sep-10
27-Dec-10
Sample Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
Windy barrel blank, W12
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]



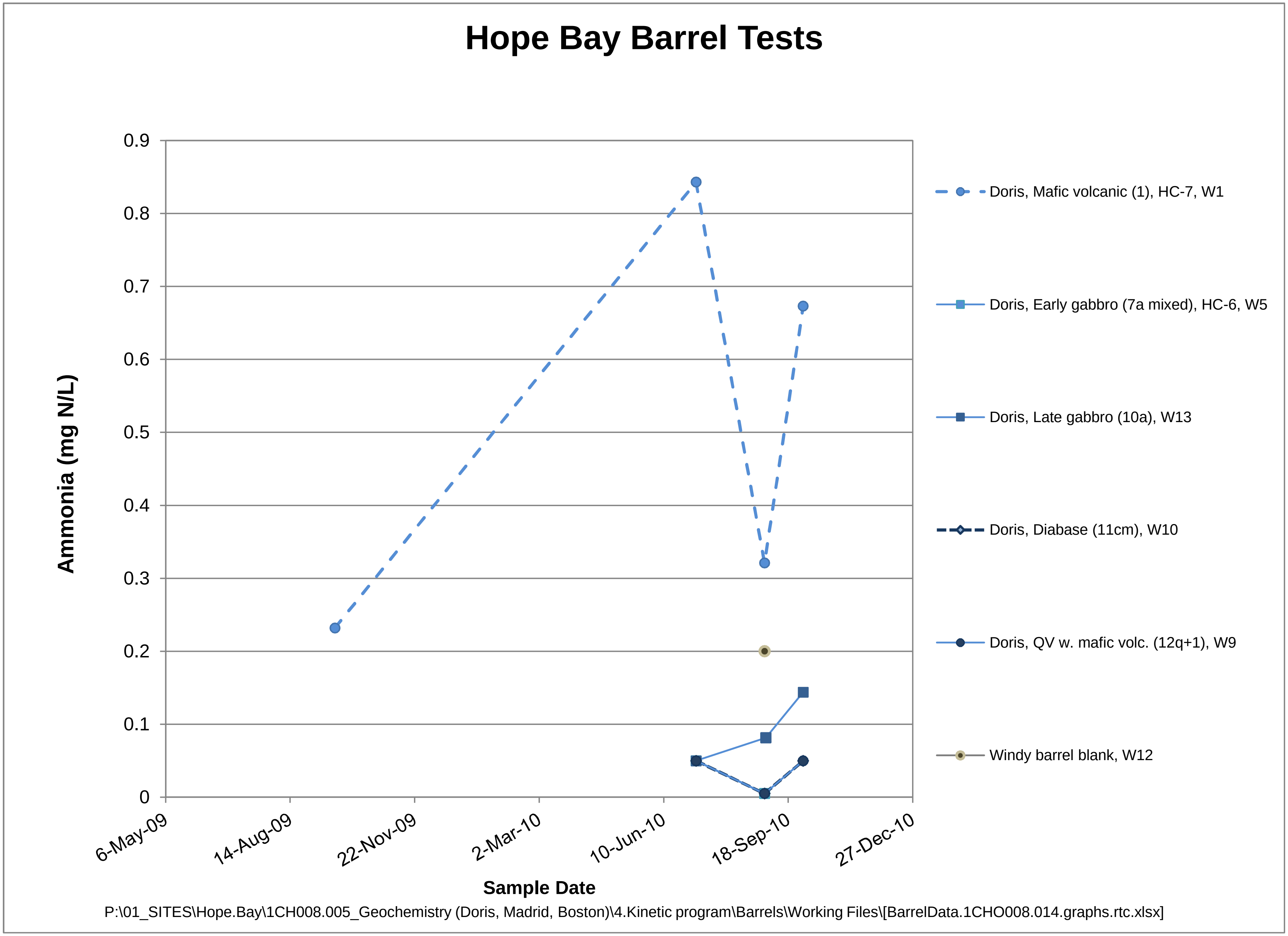
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

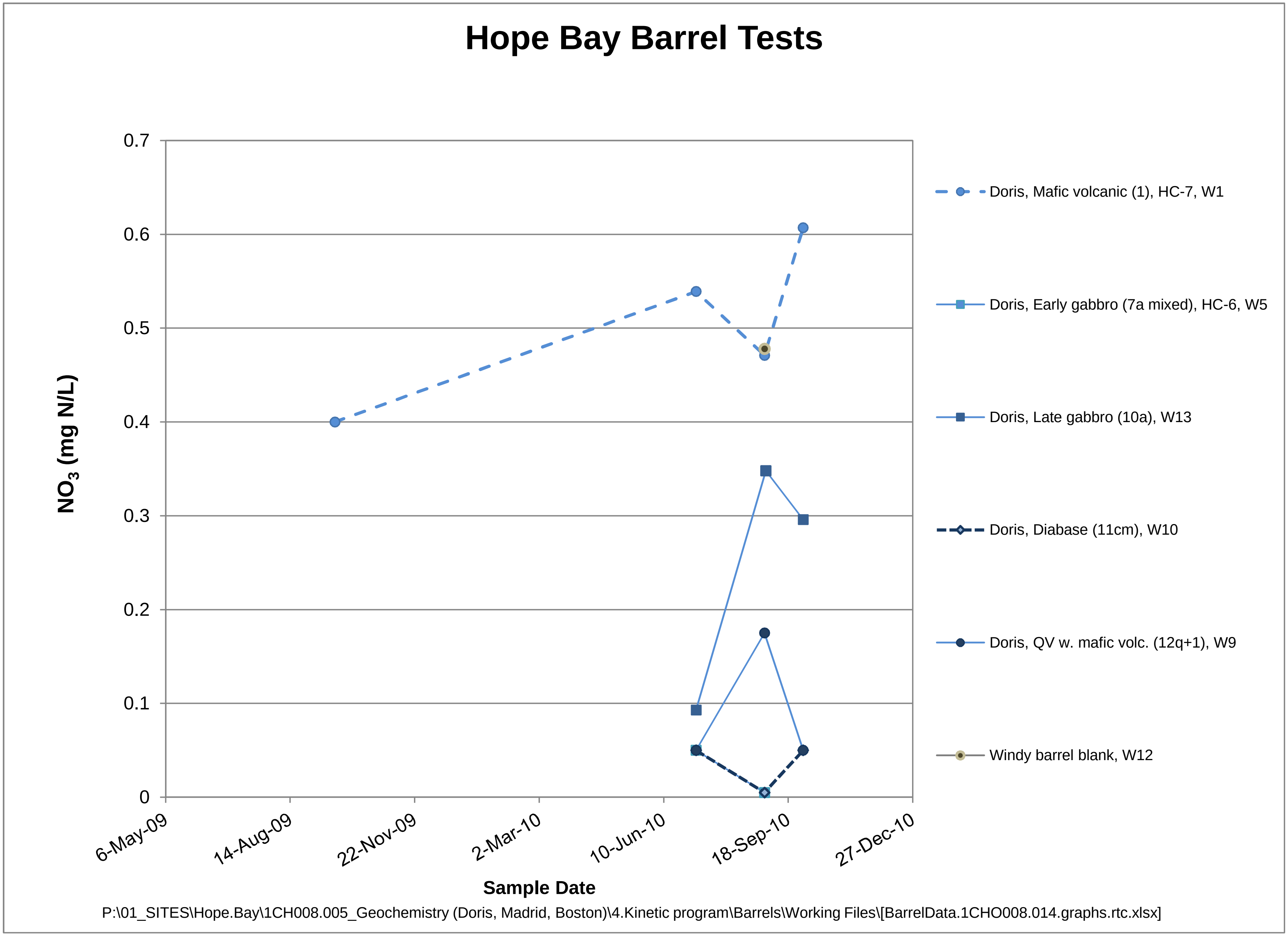

Hope Bay Barrel Tests
SO_4 (mg/L)
50
45
40
35
30
25
20
15
10
5
0
6-May-09
14-Aug-09
22-Nov-09
2-Mar-10
10-Jun-10
18-Sep-10
27-Dec-10
Sample Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
Windy barrel blank, W12
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

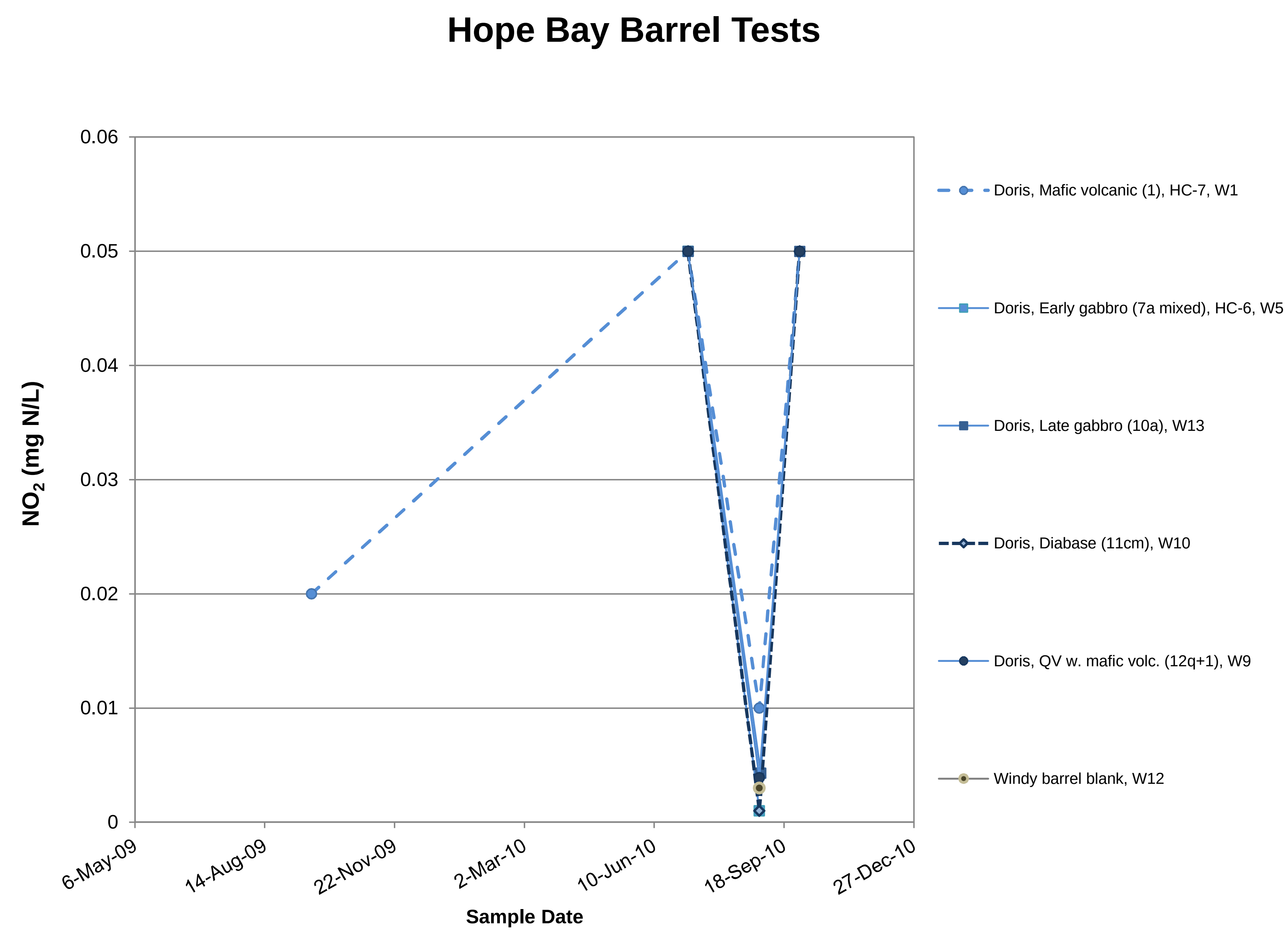

Hope Bay Barrel Tests
Br (mg/L)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
6-May-09
14-Aug-09
22-Nov-09
2-Mar-10
10-Jun-10
18-Sep-10
27-Dec-10
Sample Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
Windy barrel blank, W12
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]



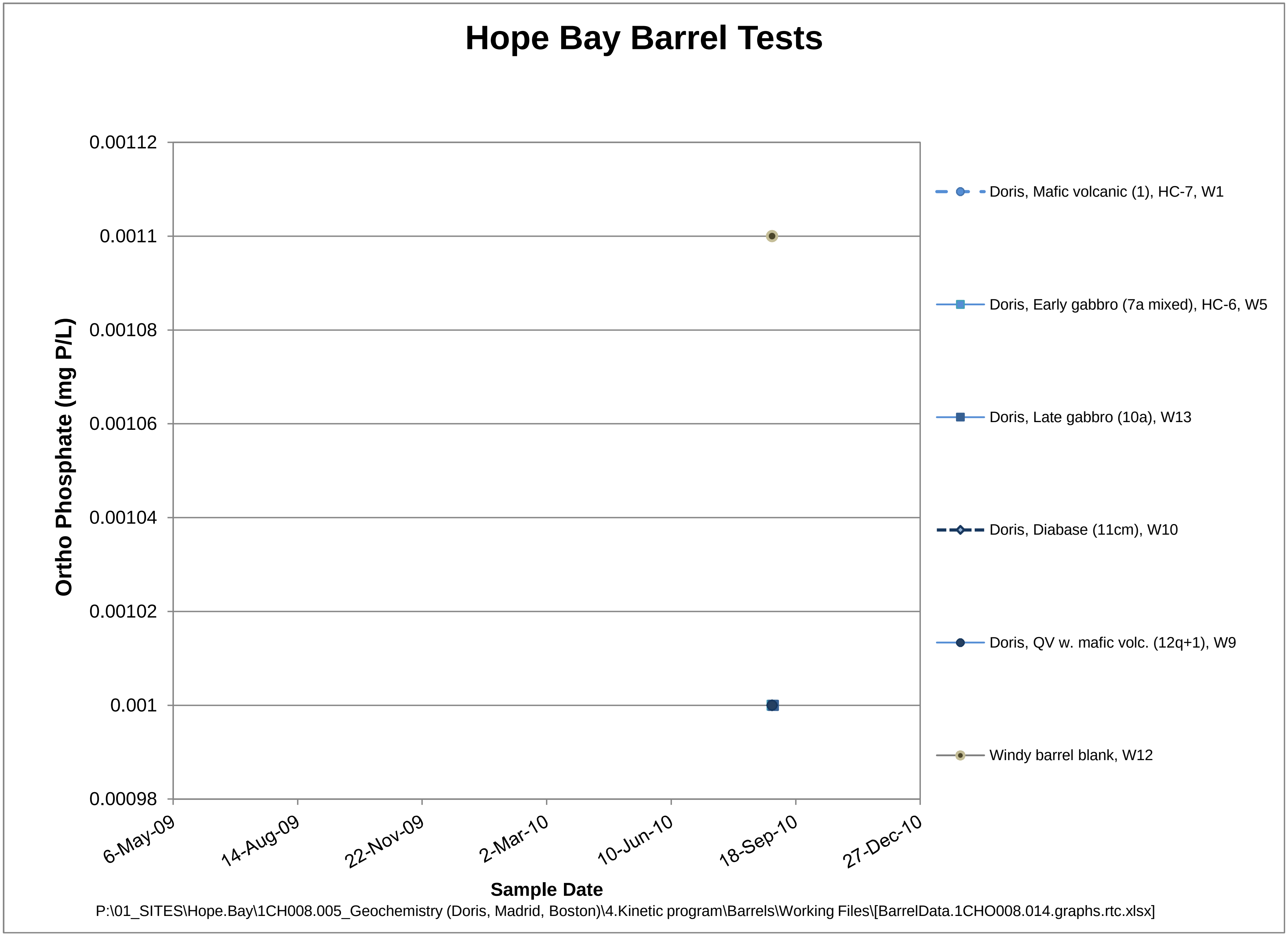
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

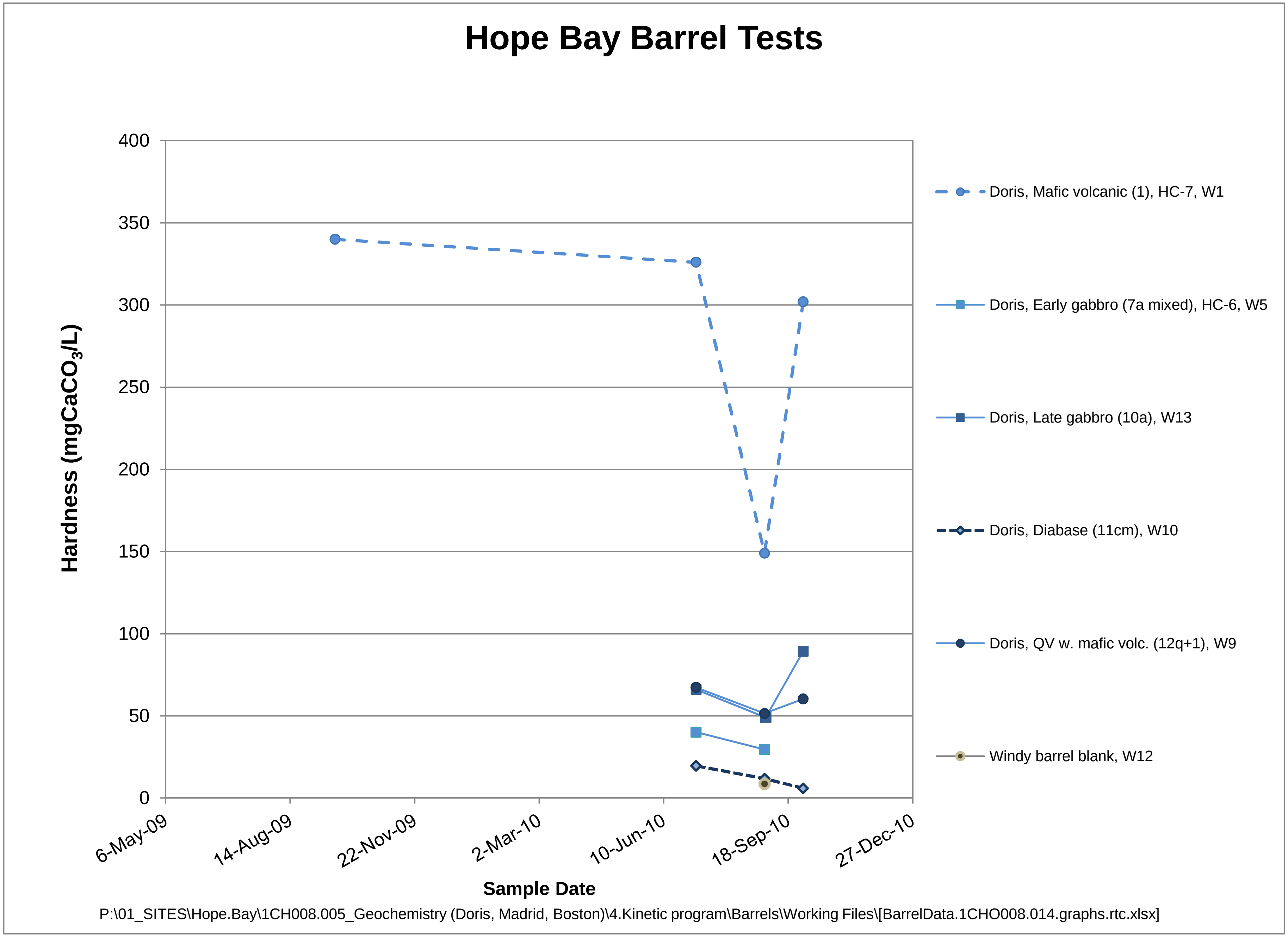

Hope Bay Barrel Tests
Ammonia (mg N/L)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
6-May-09
14-Aug-09
22-Nov-09
2-Mar-10
10-Jun-10
18-Sep-10
27-Dec-10
Sample Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
Windy barrel blank, W12
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

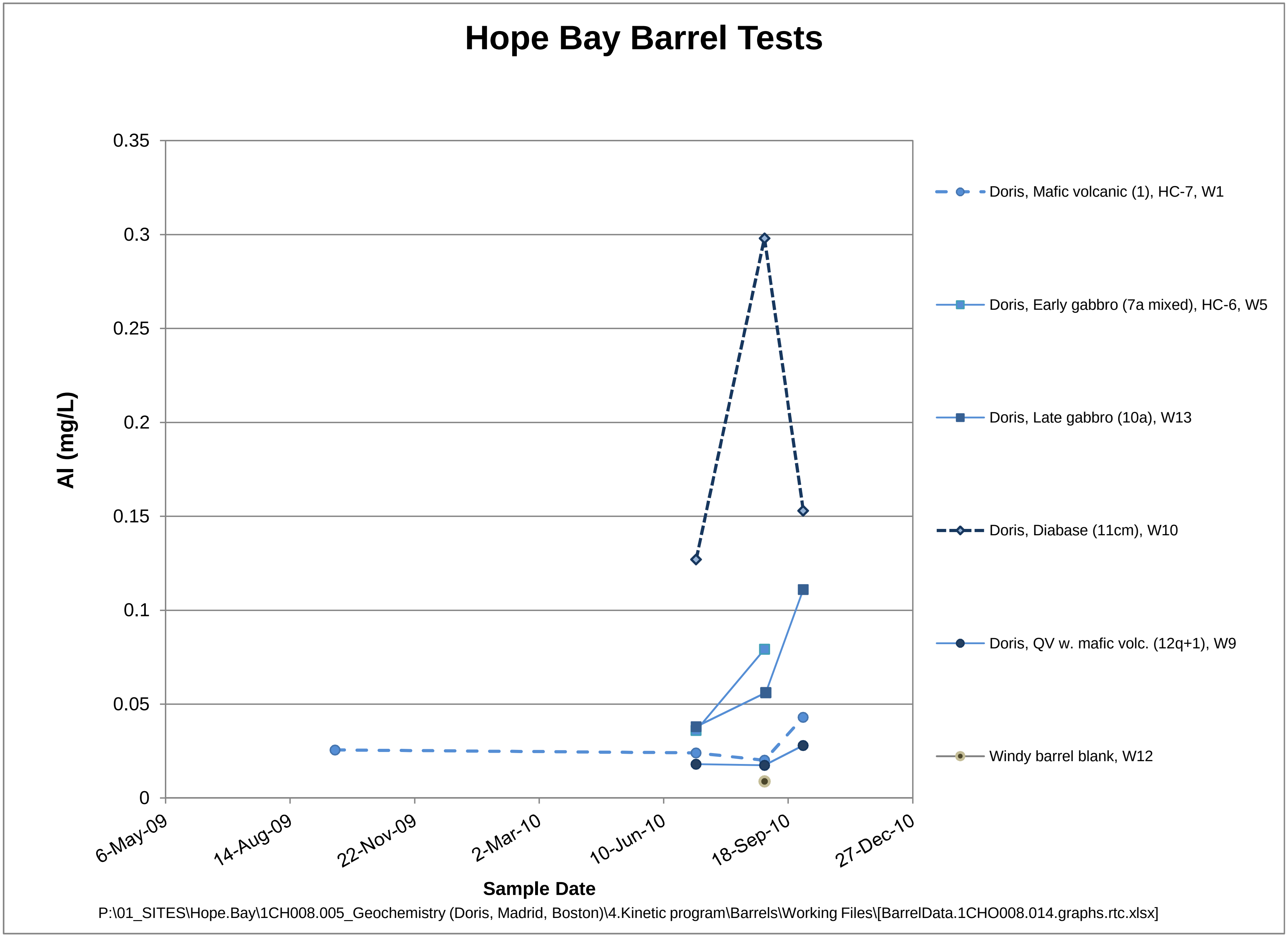

Hope Bay Barrel Tests
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
NO3 (mg N/L)
6-May-09
14-Aug-09
22-Nov-09
2-Mar-10
10-Jun-10
18-Sep-10
27-Dec-10
Sample Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
Windy barrel blank, W12
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

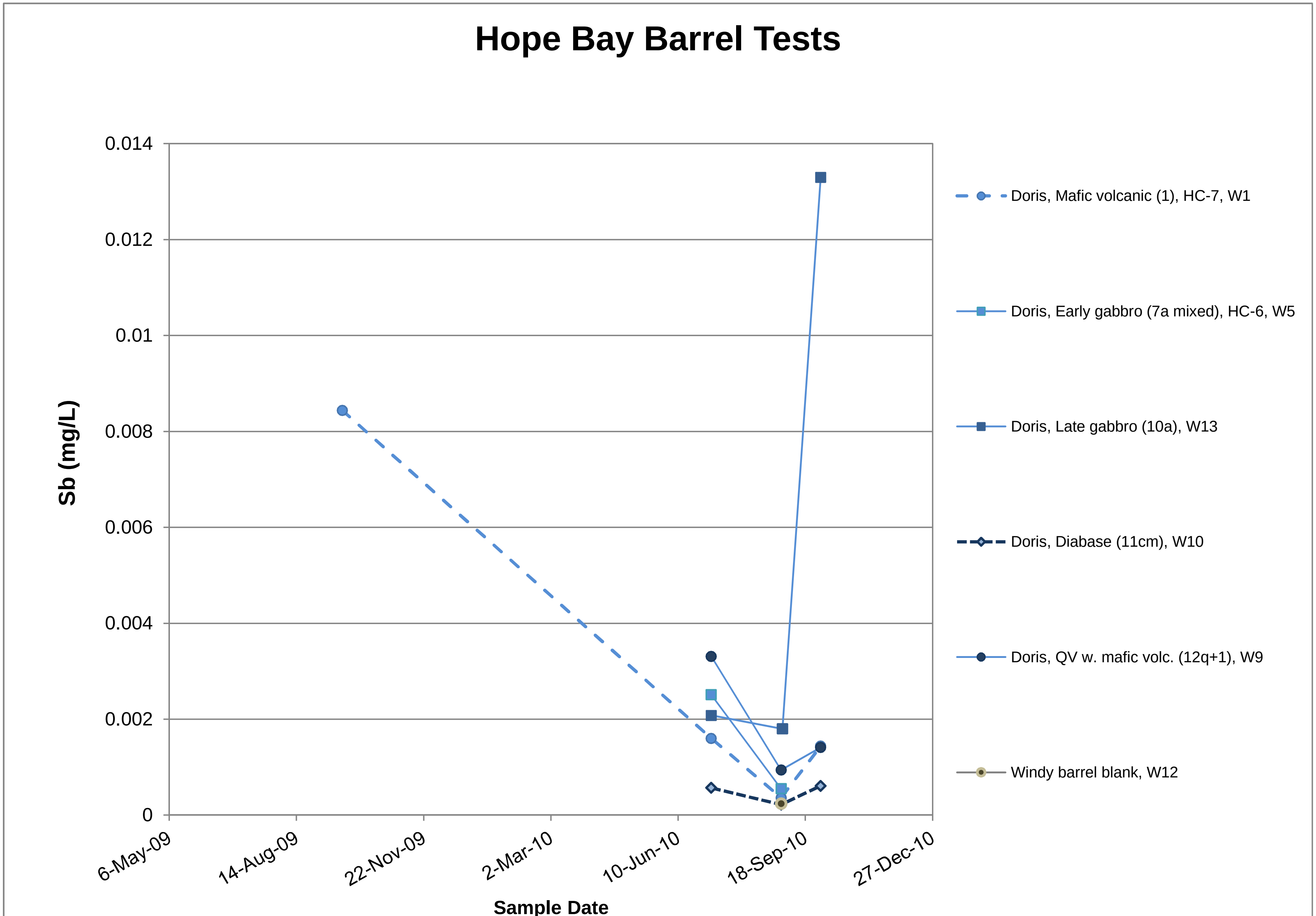


P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

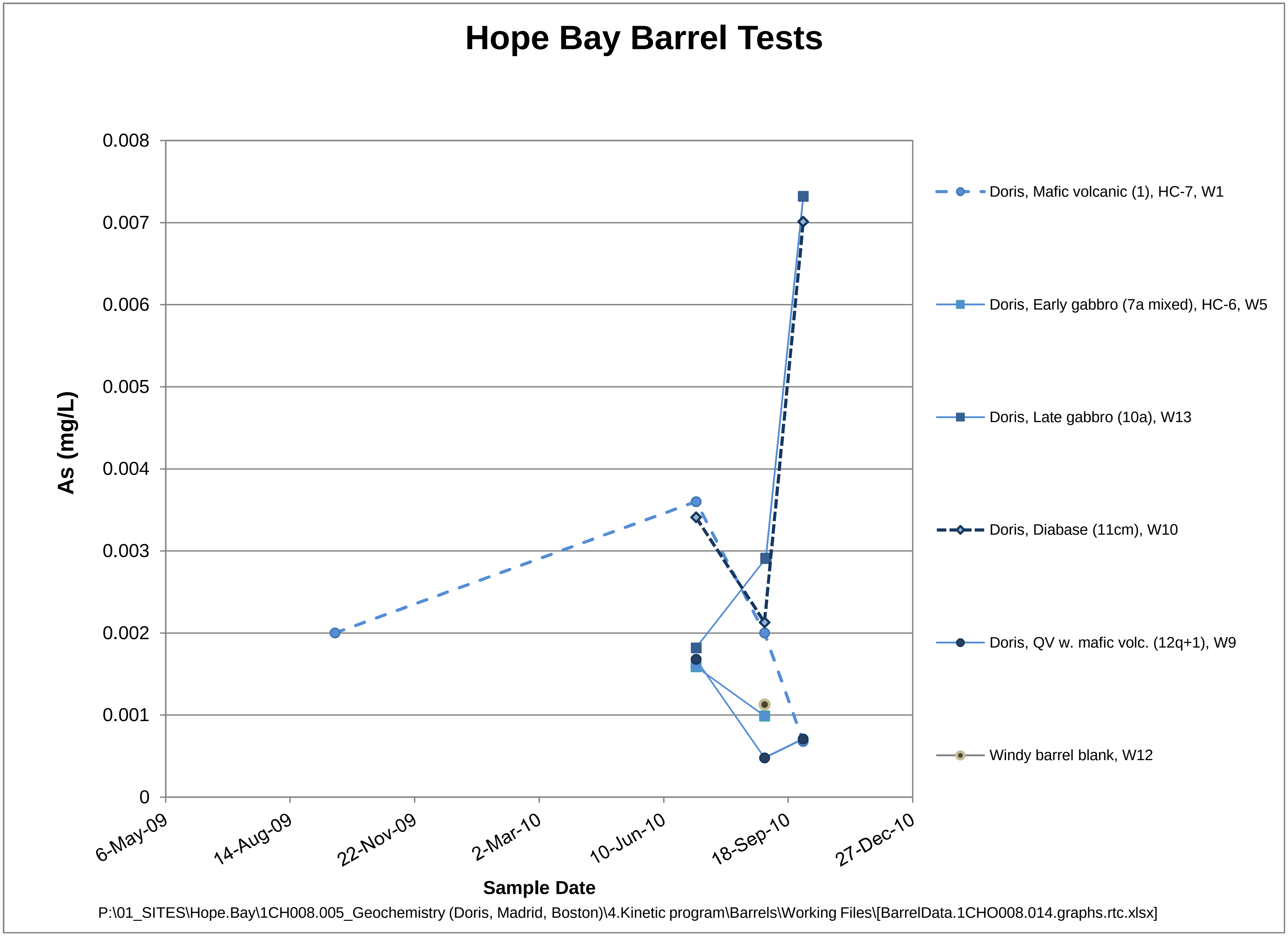

Hope Bay Barrel Tests
0.00112
0.0011
0.00108
0.00106
0.00104
0.00102
0.001
0.00098
Ortho Phosphate (mg P/L)
6-May-09
14-Aug-09
22-Nov-09
2-Mar-10
10-Jun-10
18-Sep-10
27-Dec-10
Sample Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
Windy barrel blank, W12
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

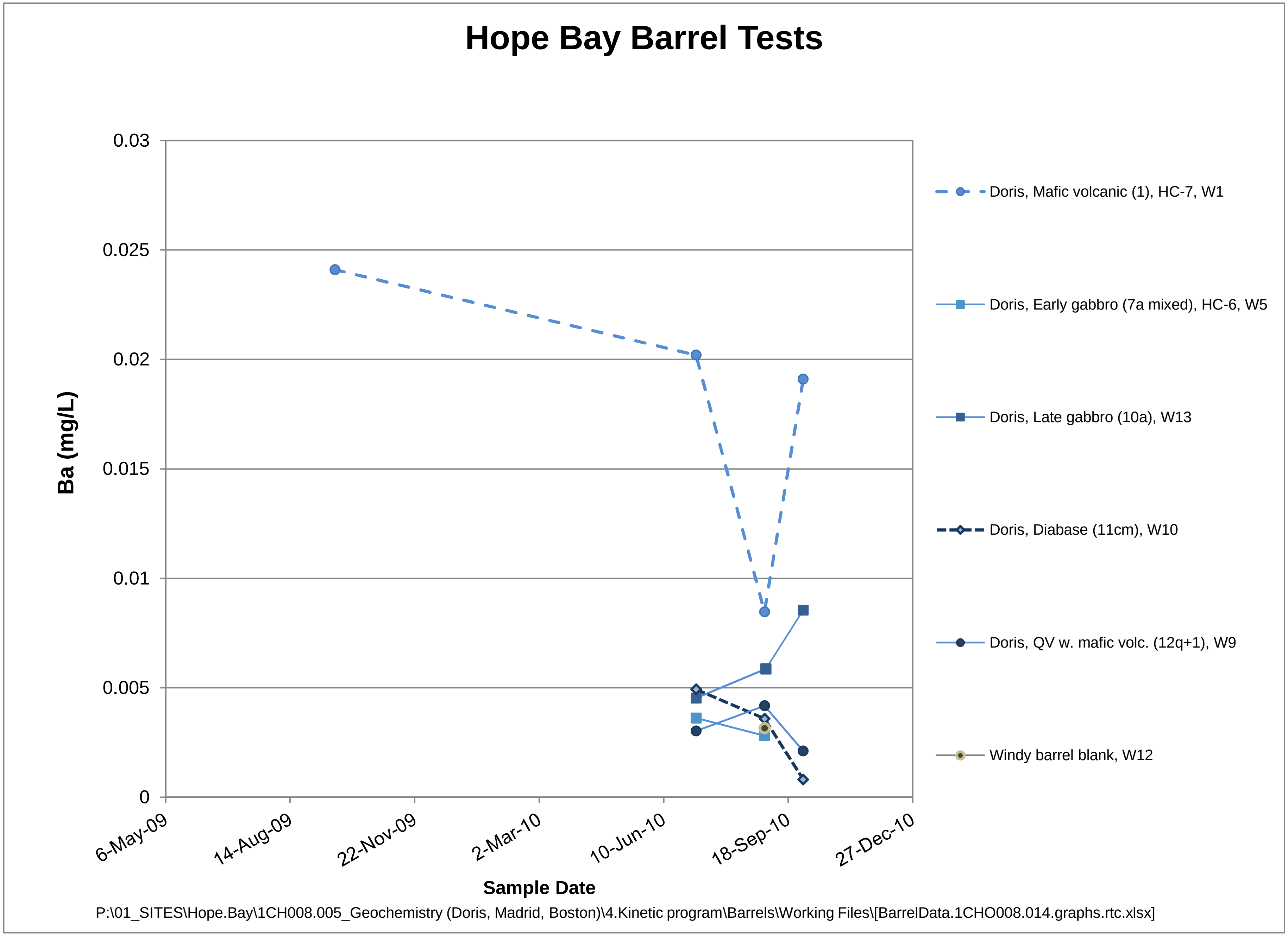

Hope Bay Barrel Tests
Hardness (mgCaCO3/L)
400
350
300
250
200
150
100
50
0
6-May-09
14-Aug-09
22-Nov-09
2-Mar-10
10-Jun-10
18-Sep-10
27-Dec-10
Sample Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
Windy barrel blank, W12
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

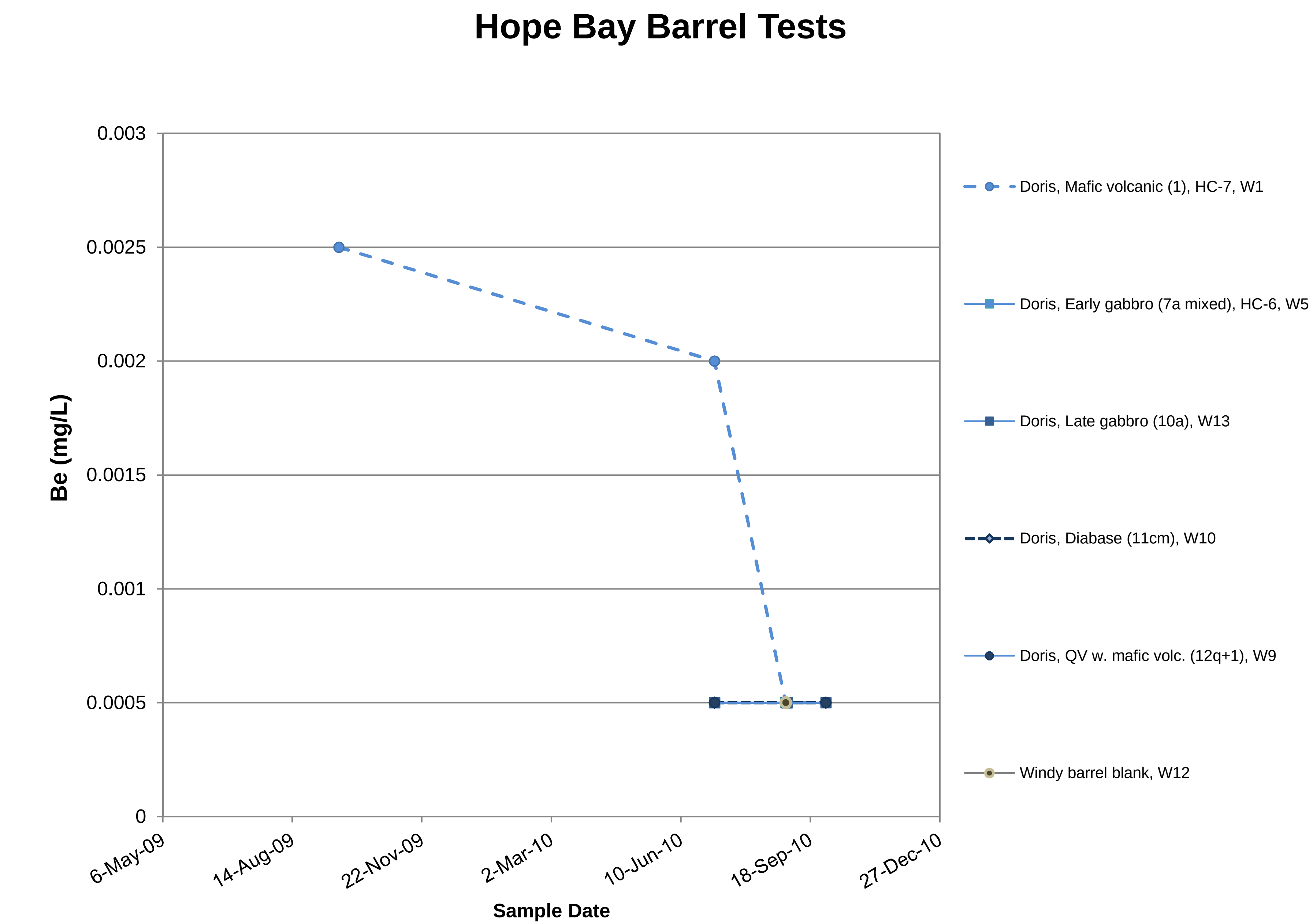

Hope Bay Barrel Tests
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Al (mg/L)
6-May-09
14-Aug-09
22-Nov-09
2-Mar-10
10-Jun-10
18-Sep-10
27-Dec-10
Sample Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
Windy barrel blank, W12
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]



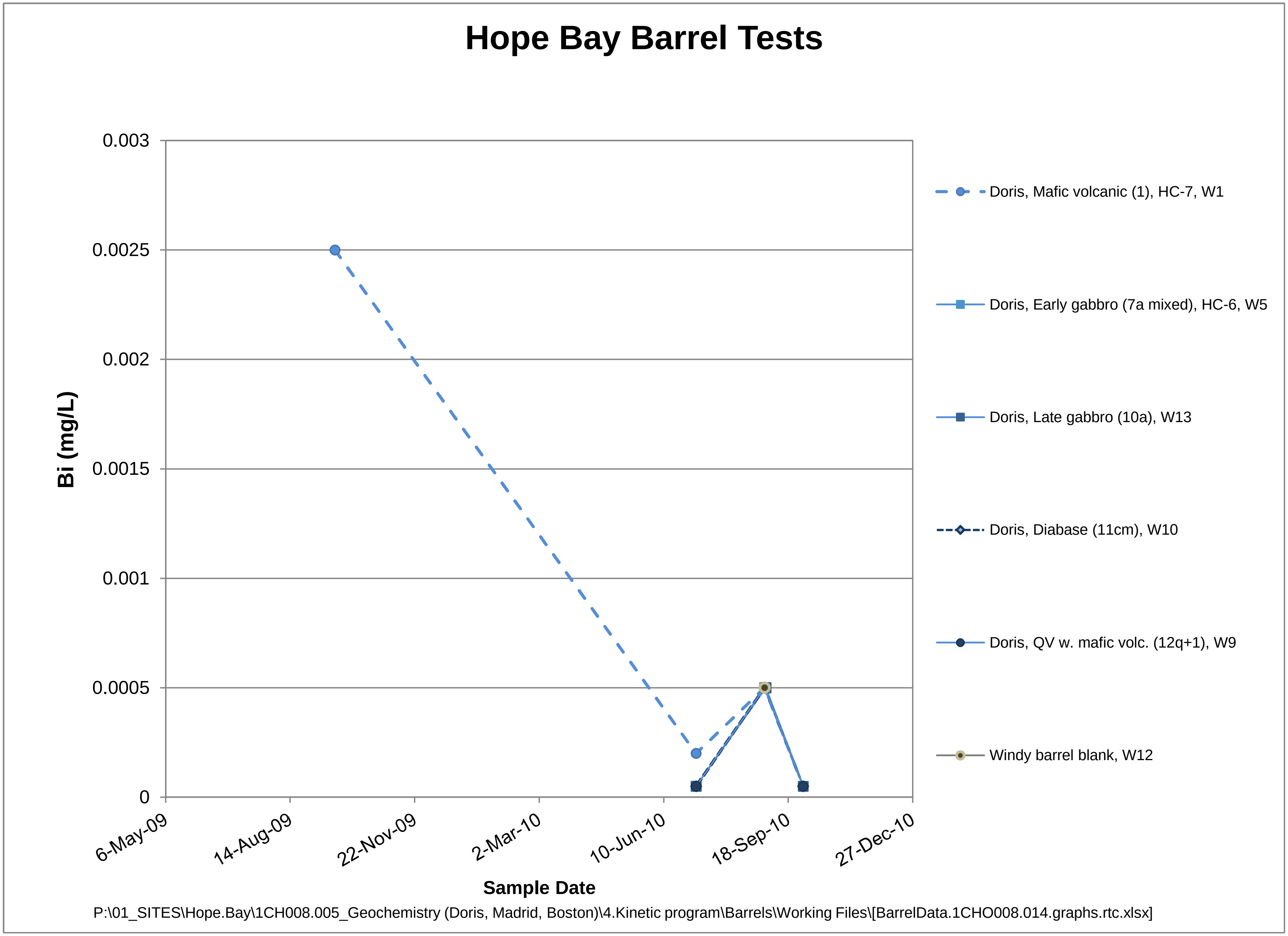
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

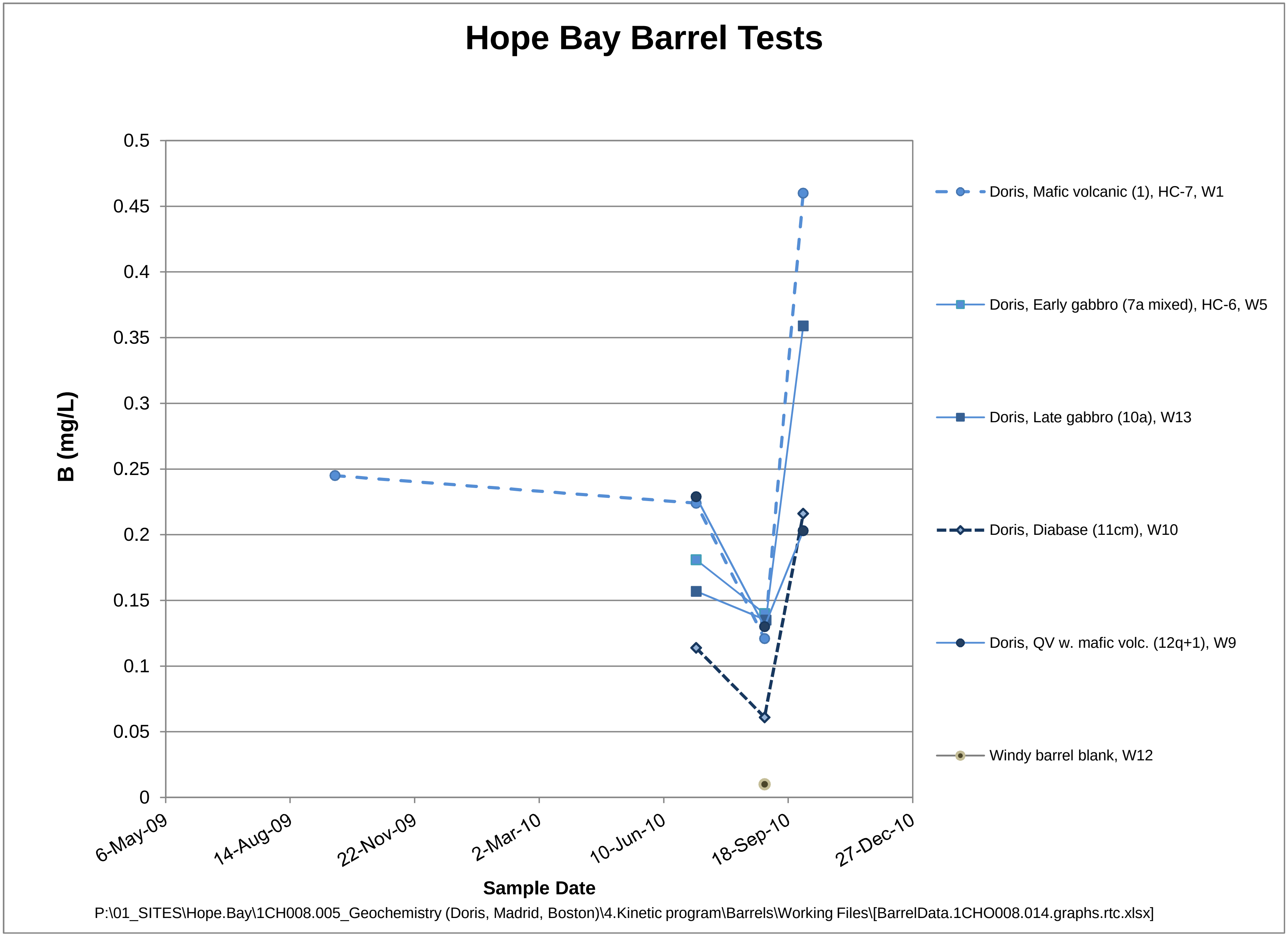

Hope Bay Barrel Tests
As (mg/L)
0
0.001
0.002
0.003
0.004
0.005
0.006
0.007
0.008
6-May-09
14-Aug-09
22-Nov-09
2-Mar-10
10-Jun-10
18-Sep-10
27-Dec-10
Sample Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
Windy barrel blank, W12
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]


Hope Bay Barrel Tests
Ba (mg/L)
0.03
0.025
0.02
0.015
0.01
0.005
0
6-May-09
14-Aug-09
22-Nov-09
2-Mar-10
10-Jun-10
18-Sep-10
27-Dec-10
Sample Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
Windy barrel blank, W12
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

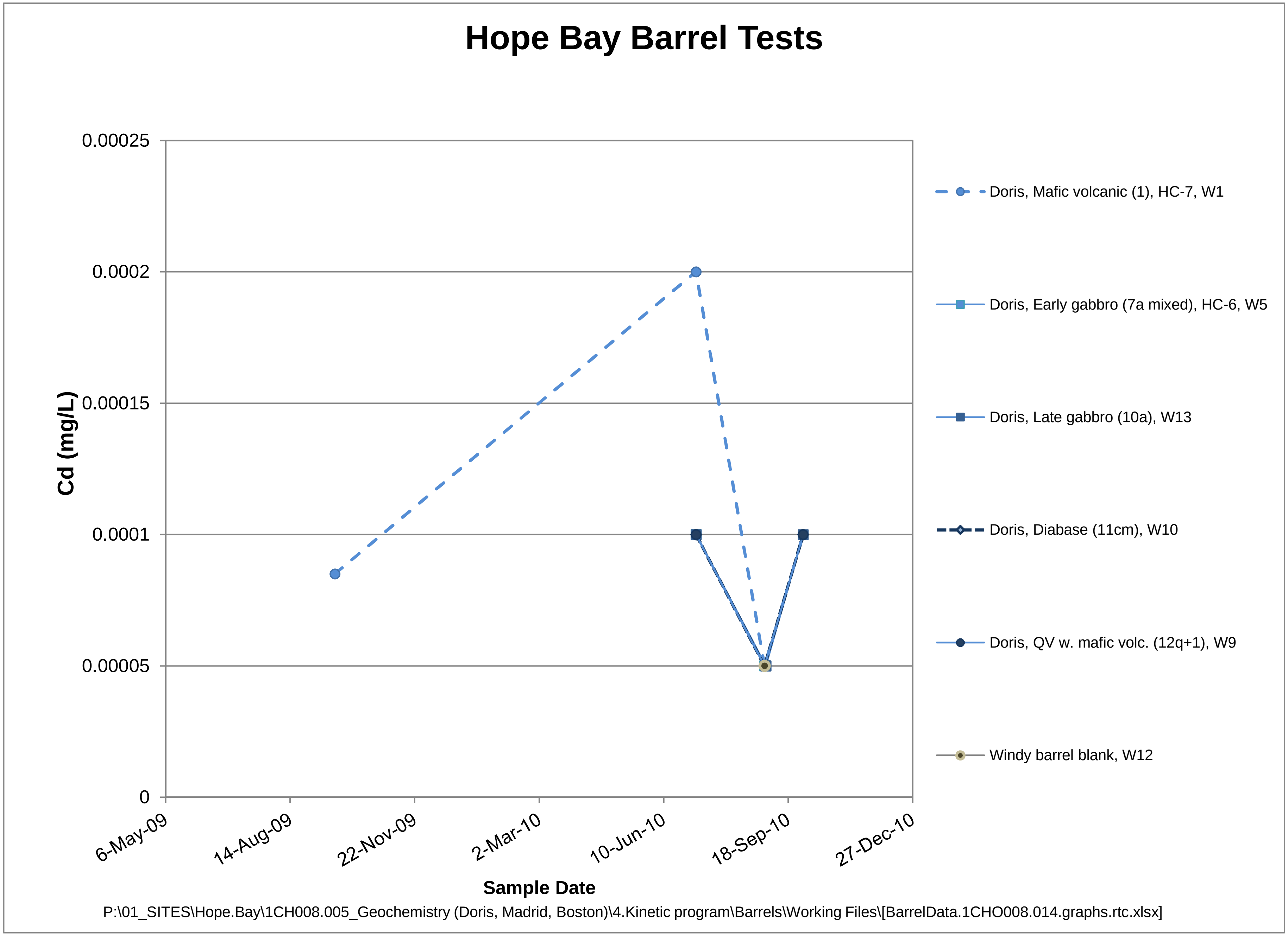


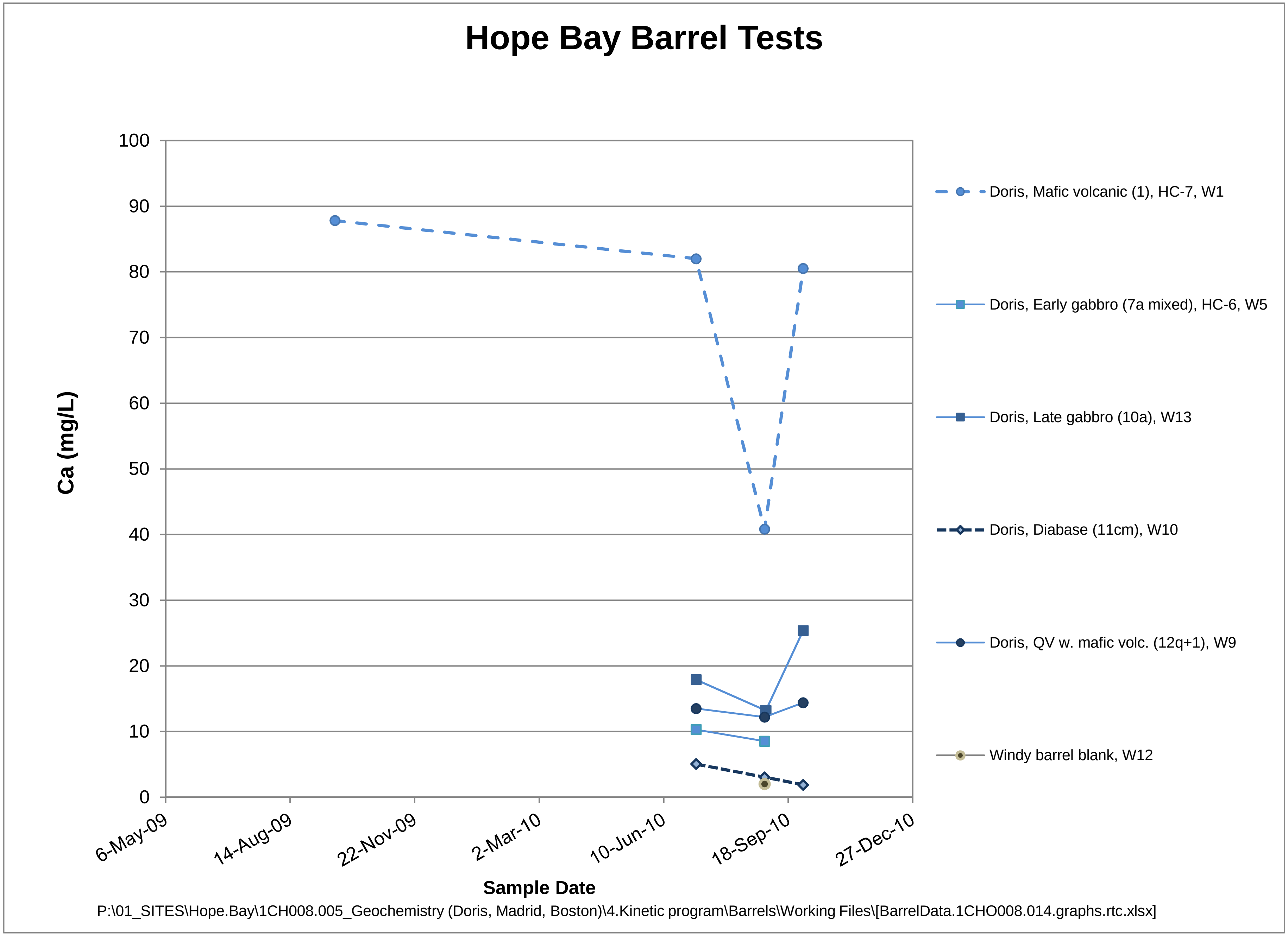
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

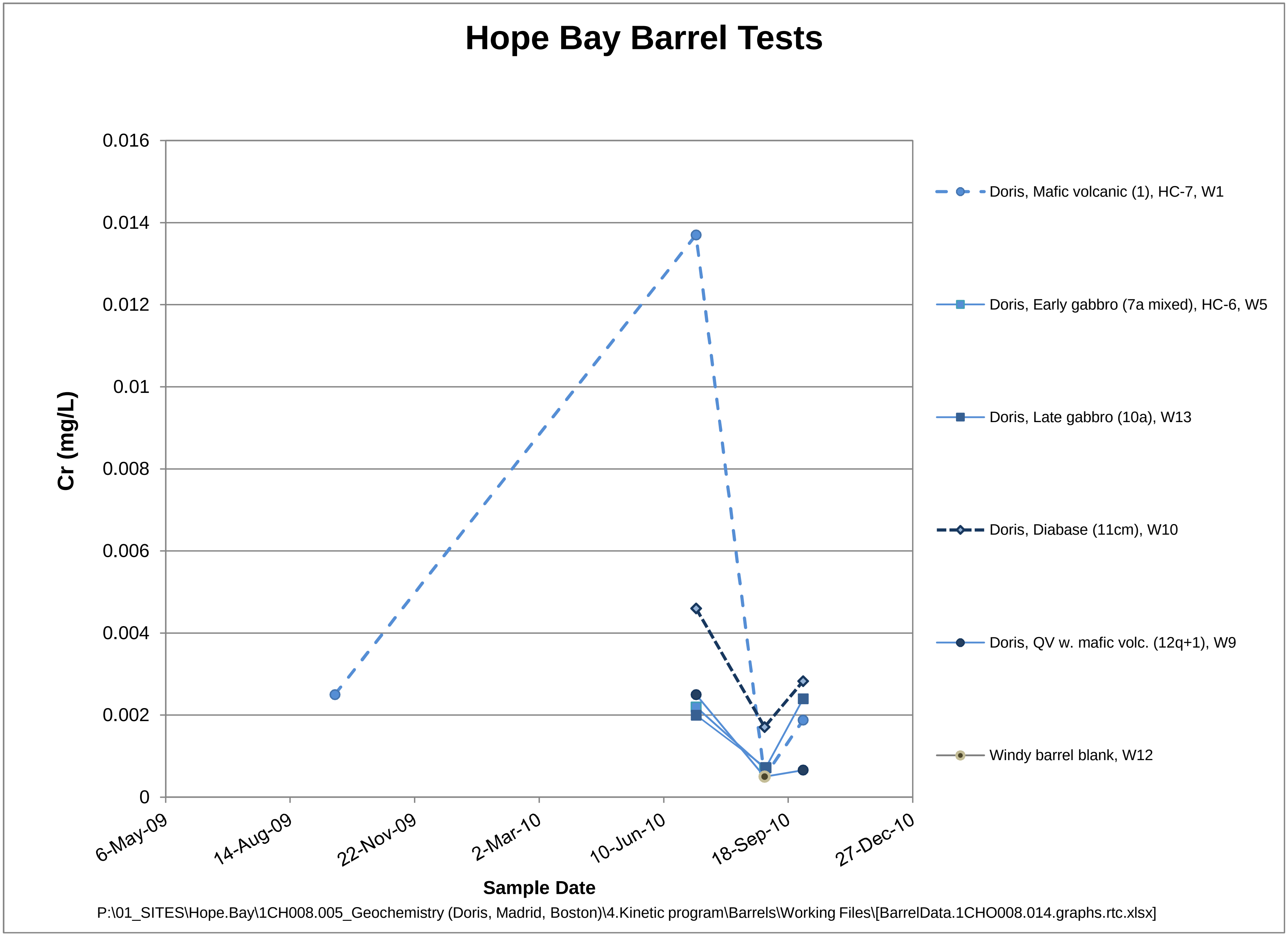

Hope Bay Barrel Tests
Bi (mg/L)
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
6-May-09
14-Aug-09
22-Nov-09
2-Mar-10
10-Jun-10
18-Sep-10
27-Dec-10
Sample Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
Windy barrel blank, W12
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

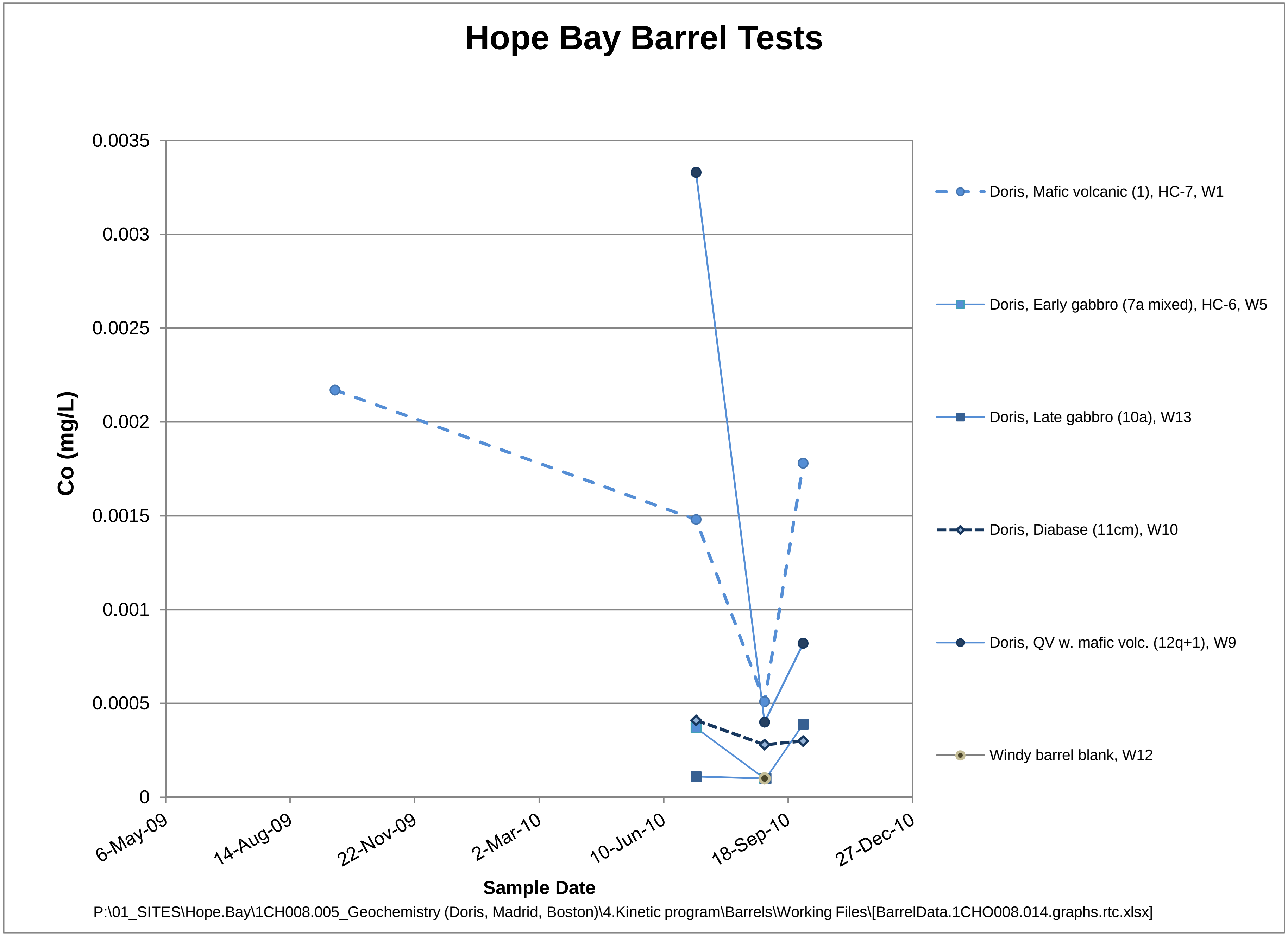


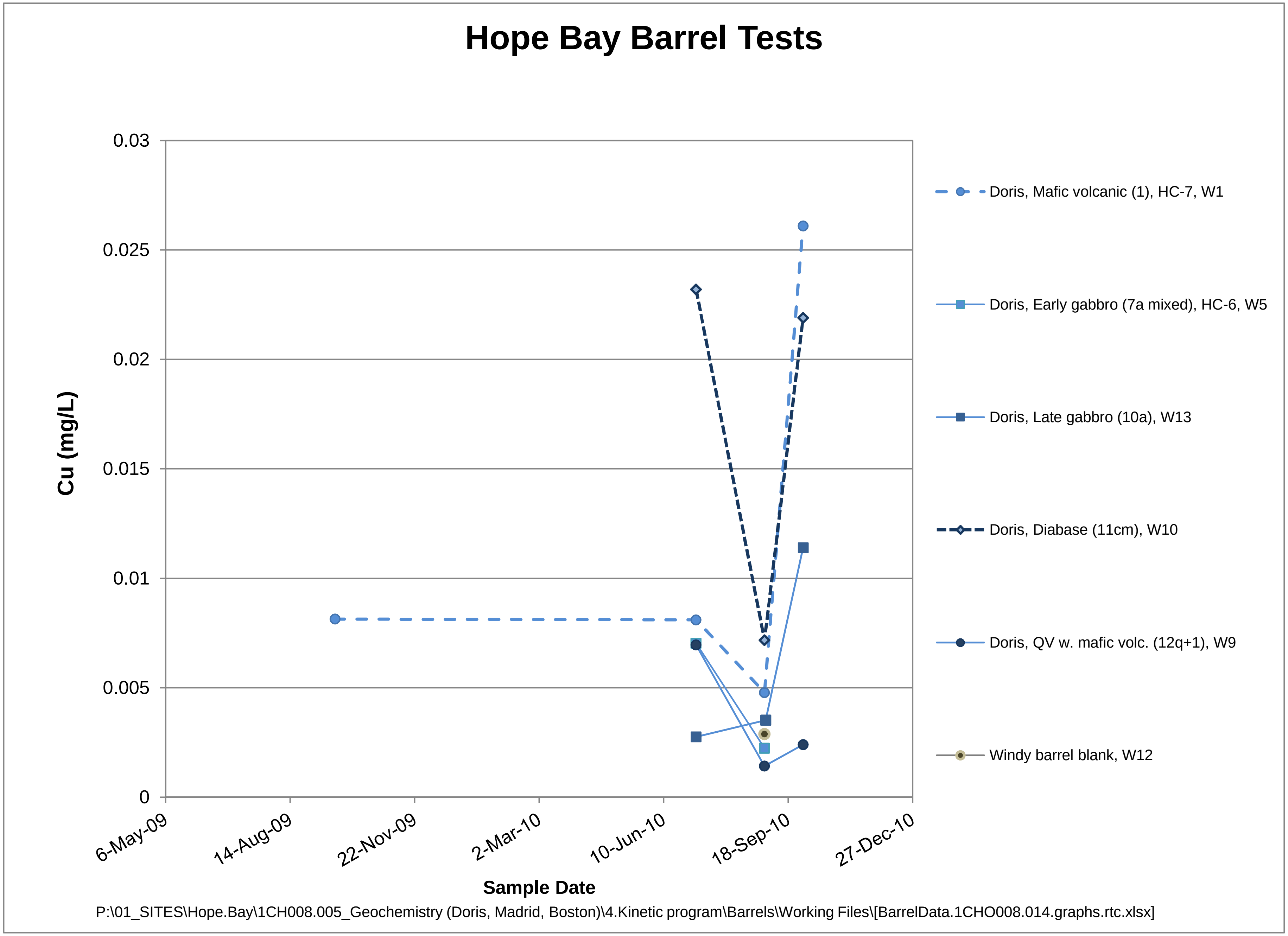
Hope Bay Barrel Tests
B (mg/L)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
6-May-09
14-Aug-09
22-Nov-09
2-Mar-10
10-Jun-10
18-Sep-10
27-Dec-10
Sample Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
Windy barrel blank, W12
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

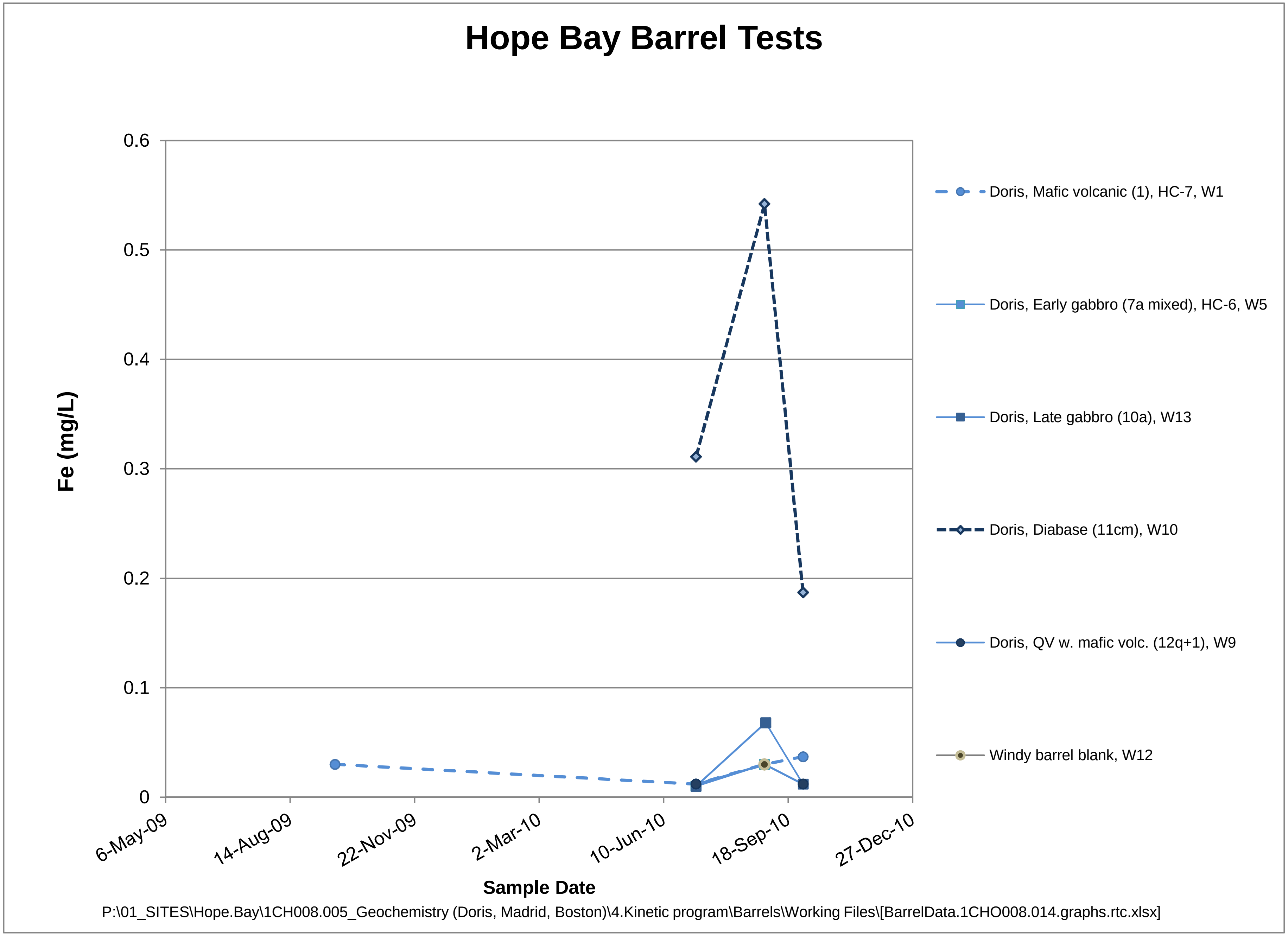

Hope Bay Barrel Tests
0.00025
0.0002
0.00015
0.0001
0.00005
0
Cd (mg/L)
6-May-09
14-Aug-09
22-Nov-09
2-Mar-10
10-Jun-10
18-Sep-10
27-Dec-10
Sample Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
Windy barrel blank, W12
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

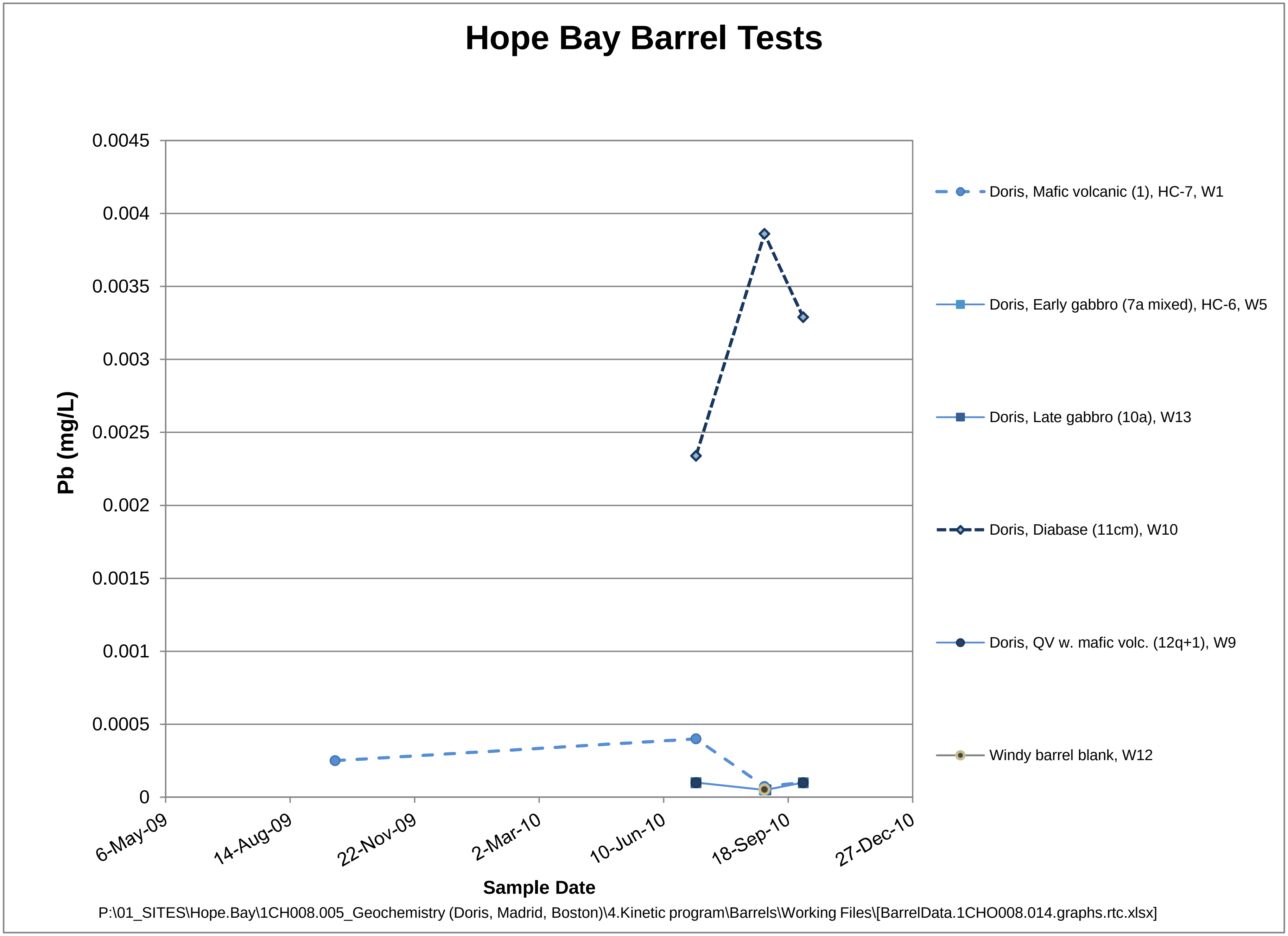

Hope Bay Barrel Tests
Ca (mg/L)
100
90
80
70
60
50
40
30
20
10
0
6-May-09
14-Aug-09
22-Nov-09
2-Mar-10
10-Jun-10
18-Sep-10
27-Dec-10
Sample Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
Windy barrel blank, W12
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

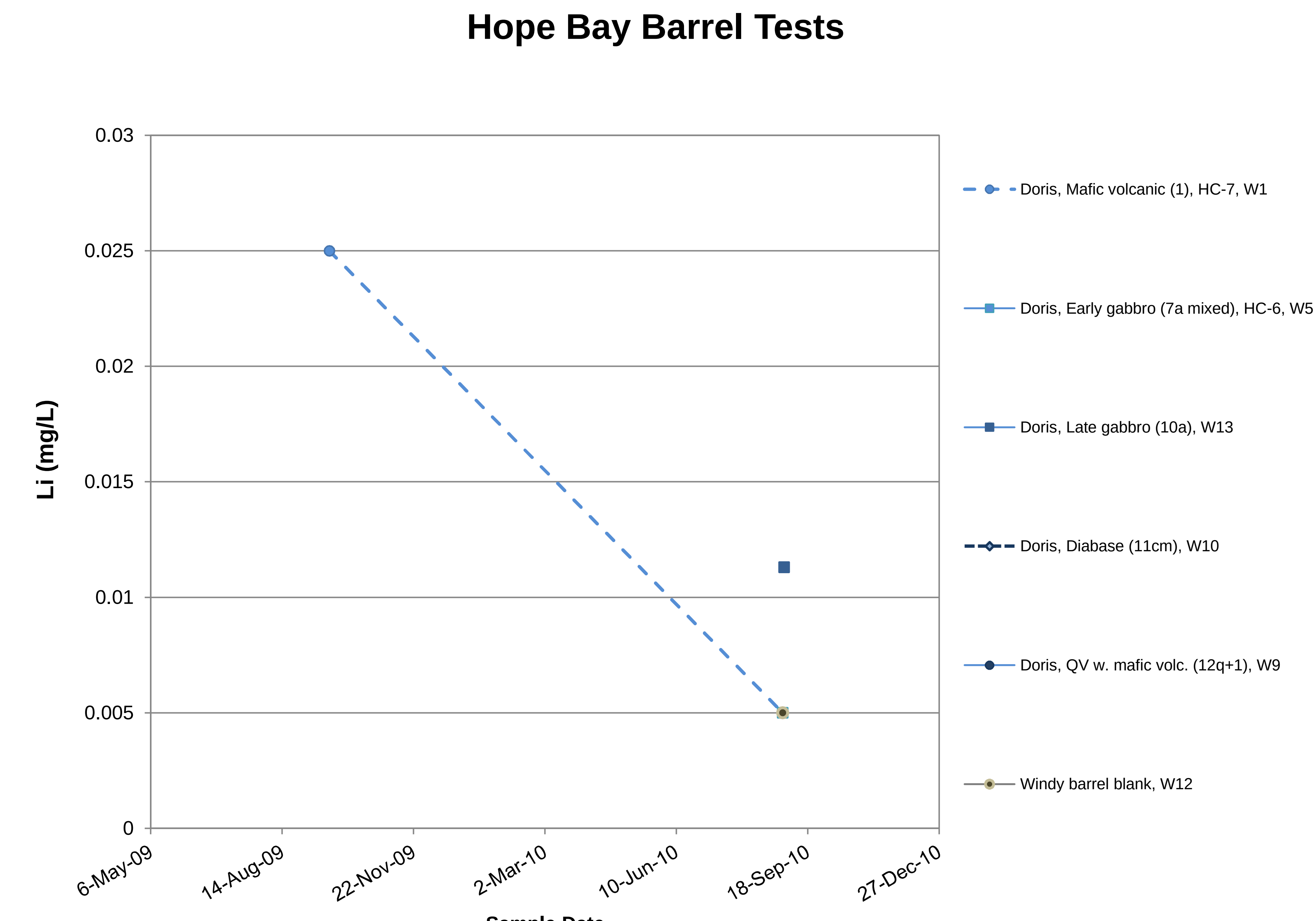

Hope Bay Barrel Tests
Cr (mg/L)
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
6-May-09
14-Aug-09
22-Nov-09
2-Mar-10
10-Jun-10
18-Sep-10
27-Dec-10
Sample Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
Windy barrel blank, W12
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]


Hope Bay Barrel Tests
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
Co (mg/L)
6-May-09
14-Aug-09
22-Nov-09
2-Mar-10
10-Jun-10
18-Sep-10
27-Dec-10
Sample Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
Windy barrel blank, W12
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

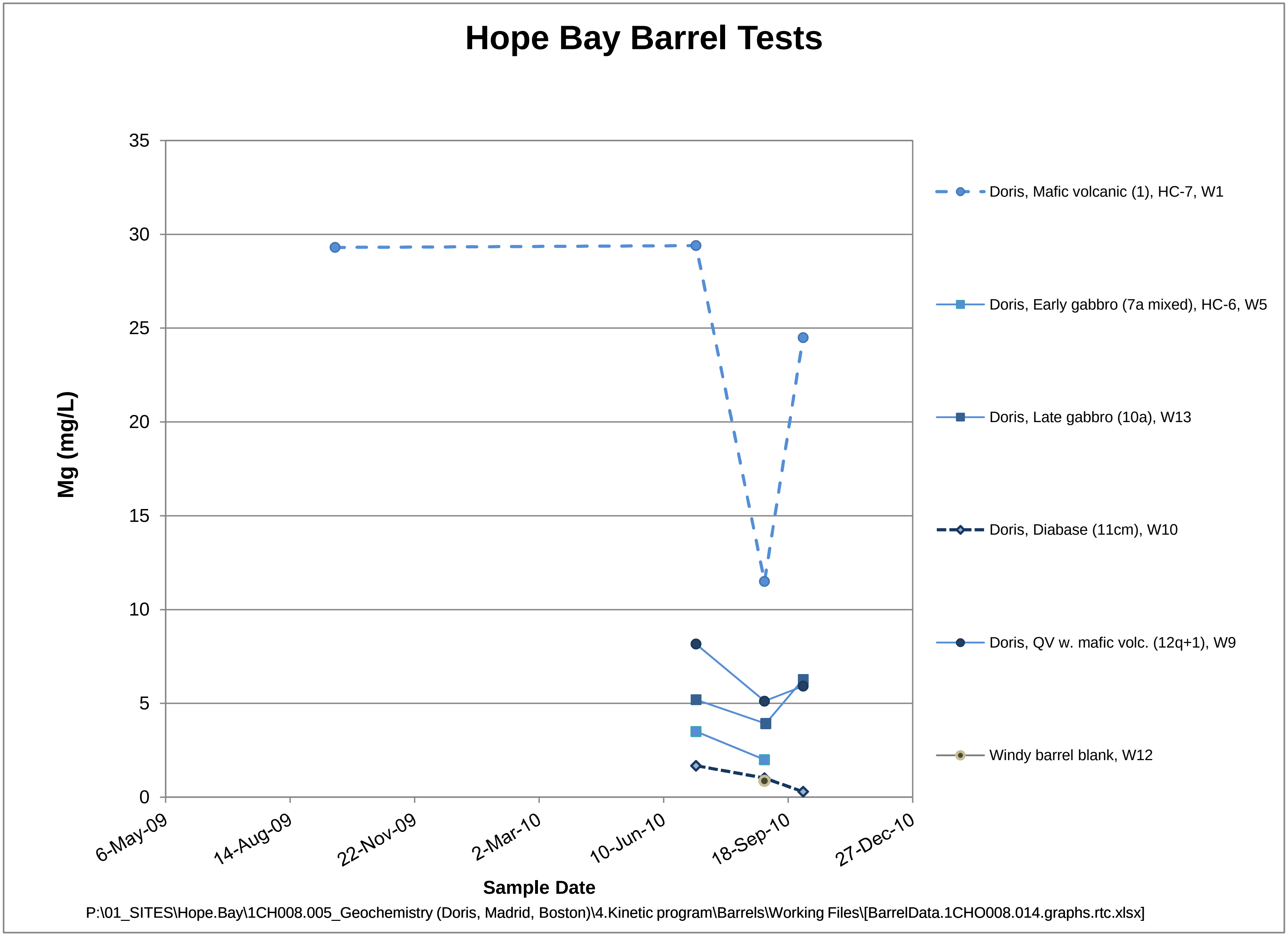

Hope Bay Barrel Tests
Cu (mg/L)
0.03
0.025
0.02
0.015
0.01
0.005
0
6-May-09
14-Aug-09
22-Nov-09
2-Mar-10
10-Jun-10
18-Sep-10
27-Dec-10
Sample Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
Windy barrel blank, W12
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

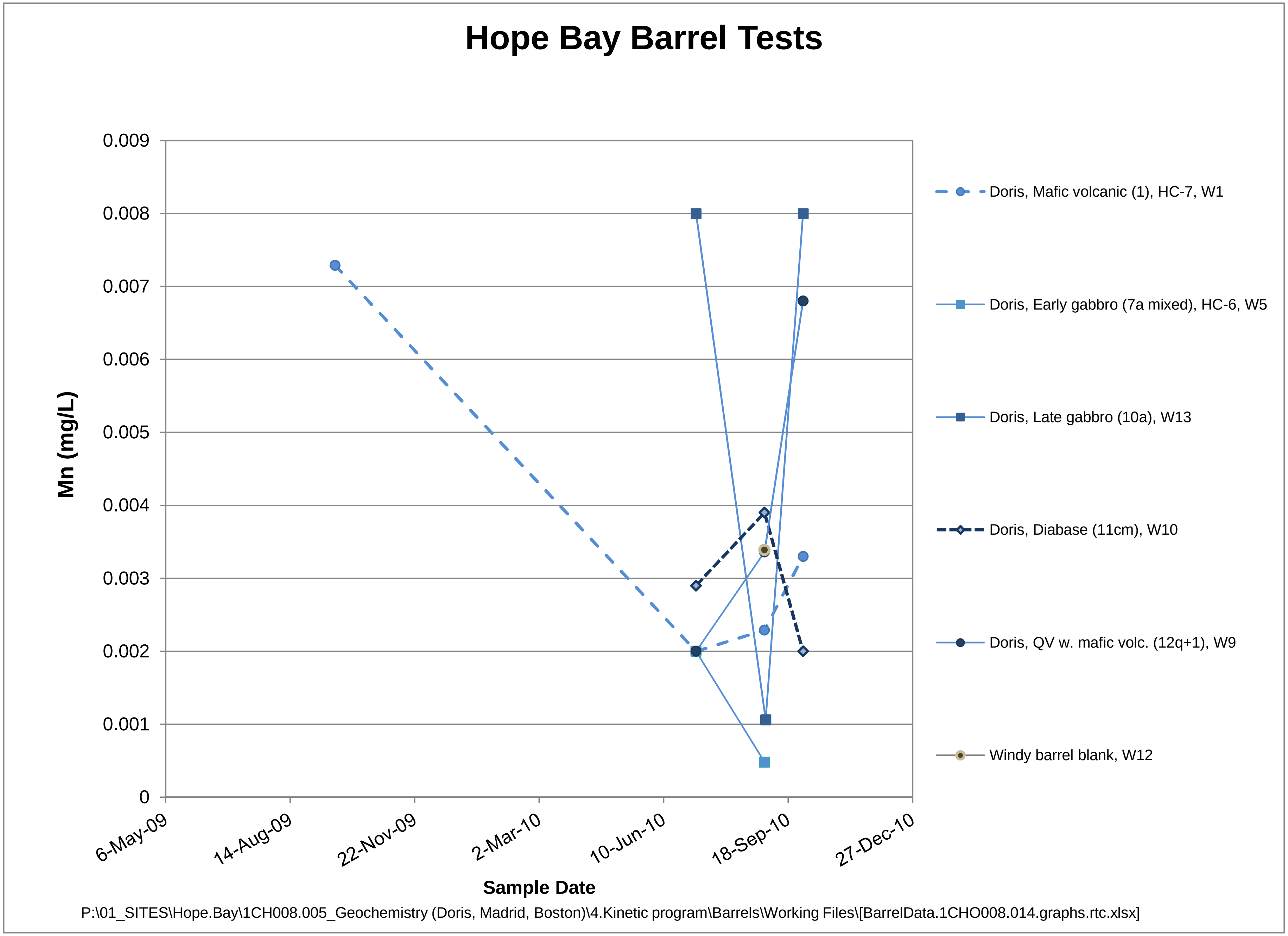

Hope Bay Barrel Tests
Fe (mg/L)
0.6
0.5
0.4
0.3
0.2
0.1
0
6-May-09
14-Aug-09
22-Nov-09
2-Mar-10
10-Jun-10
18-Sep-10
27-Dec-10
Sample Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
Windy barrel blank, W12
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

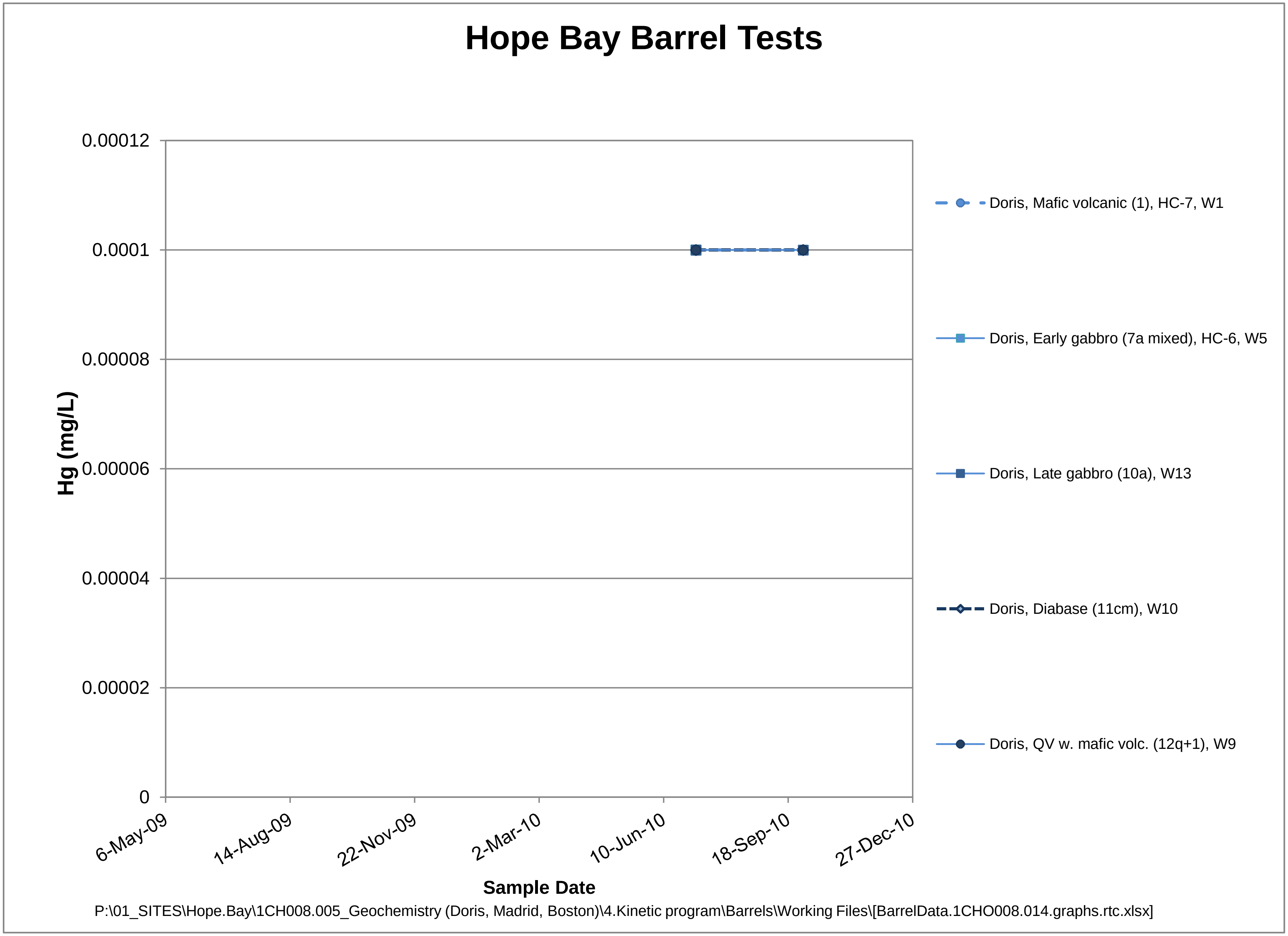

Hope Bay Barrel Tests
Pb (mg/L)
0.0045
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
6-May-09
14-Aug-09
22-Nov-09
2-Mar-10
10-Jun-10
18-Sep-10
27-Dec-10
Sample Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
Windy barrel blank, W12
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

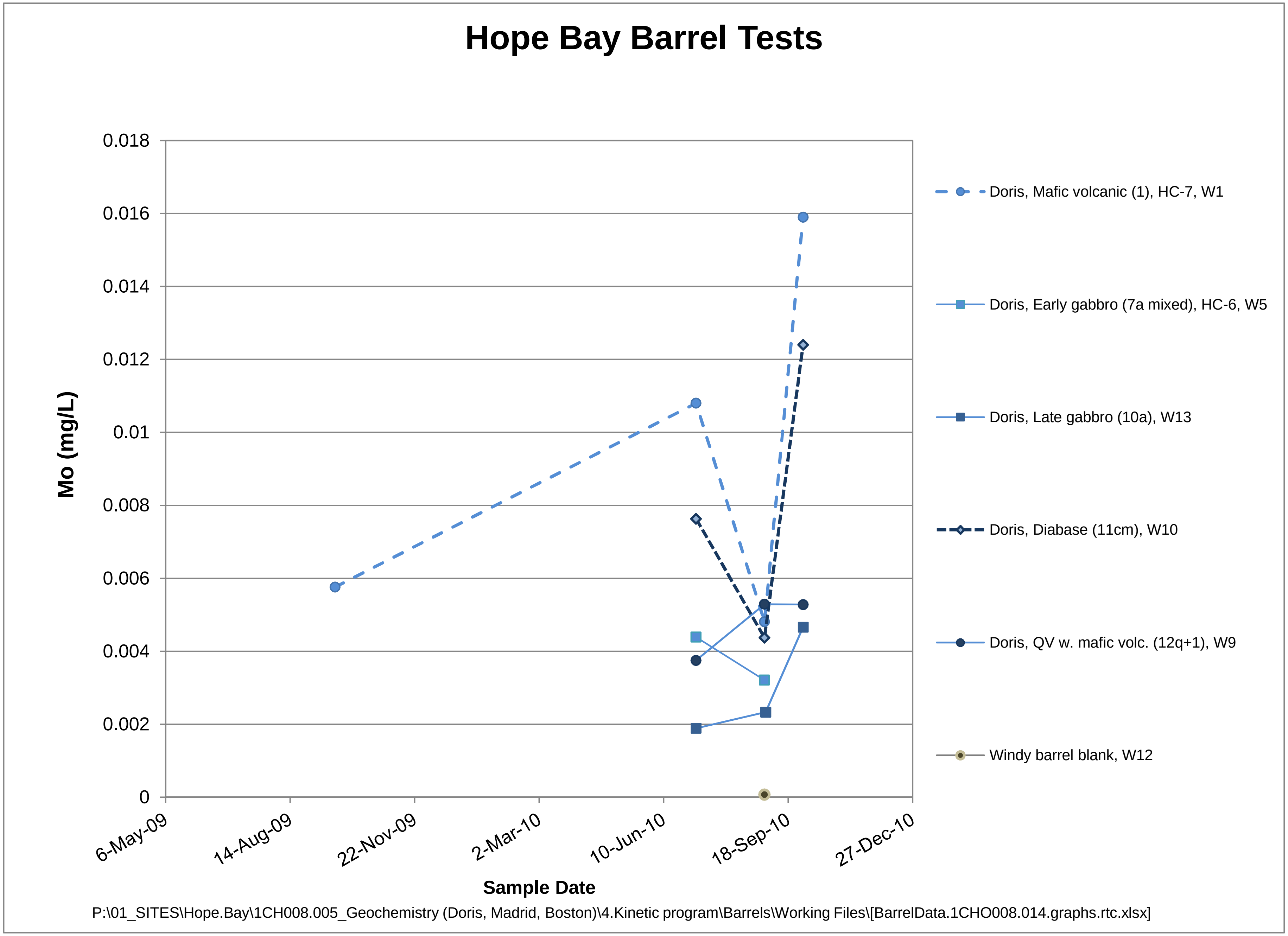


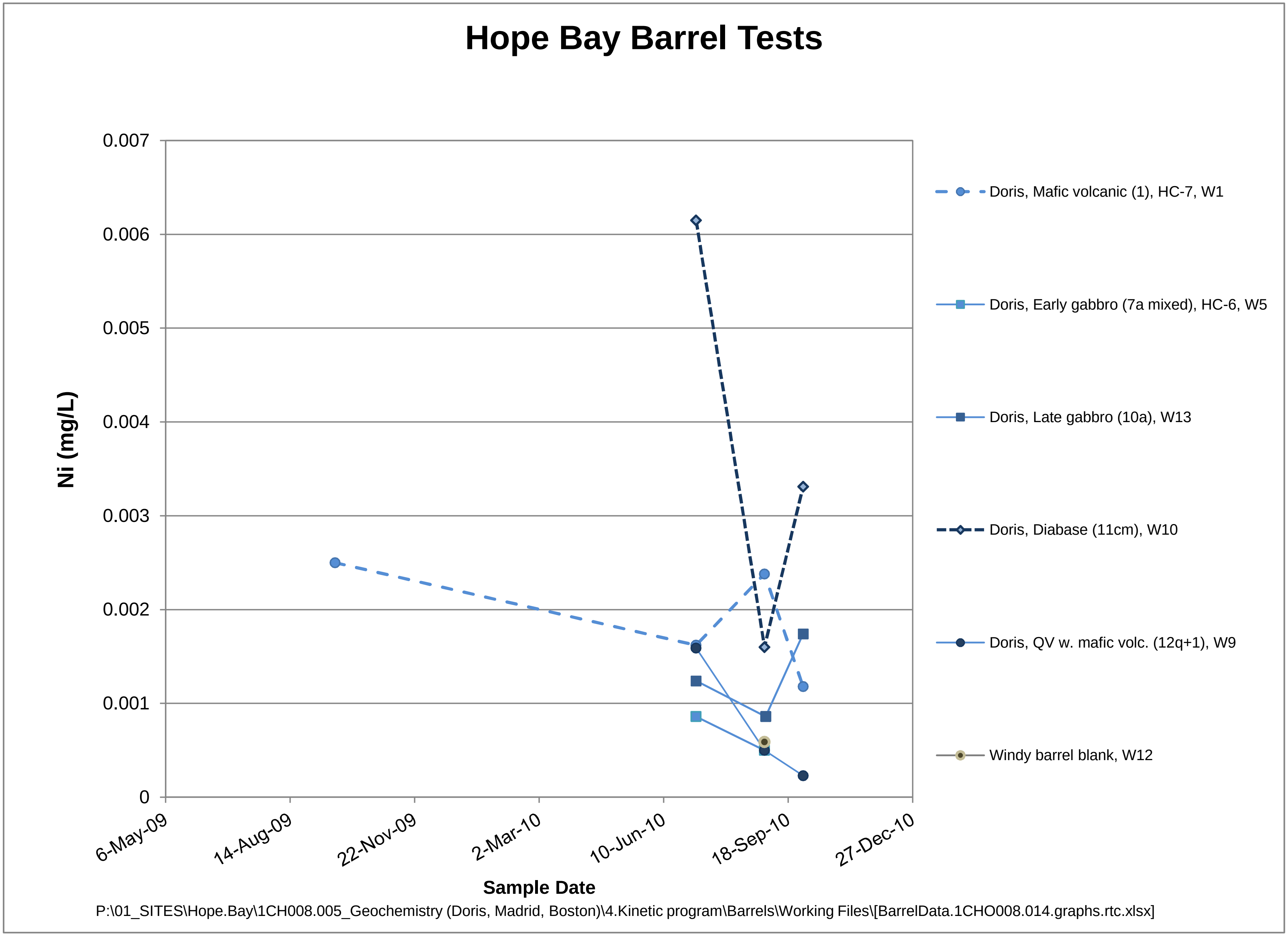
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

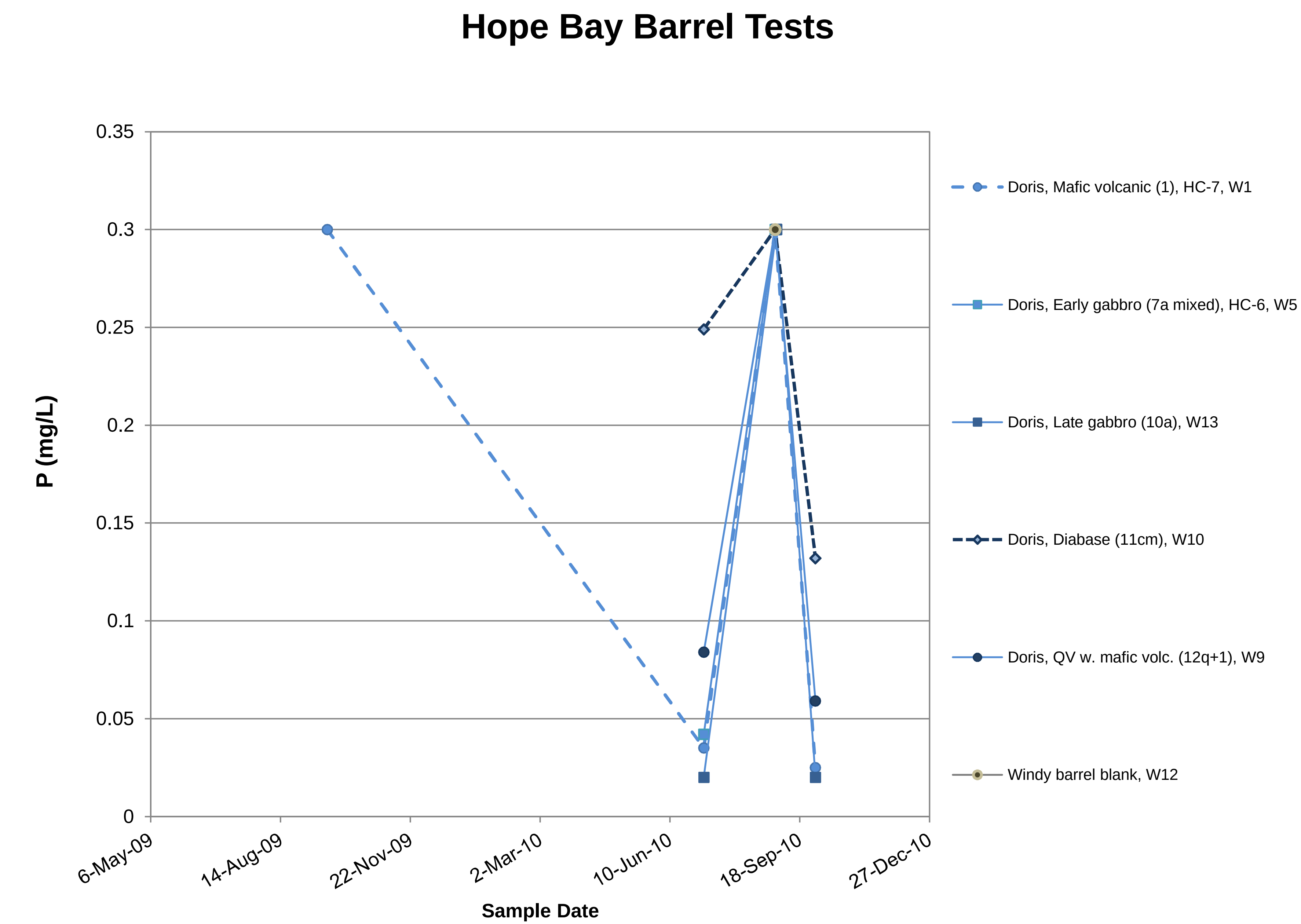

Hope Bay Barrel Tests
Mg (mg/L)
35
30
25
20
15
10
5
0
6-May-09
14-Aug-09
22-Nov-09
2-Mar-10
10-Jun-10
18-Sep-10
27-Dec-10
Sample Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
Windy barrel blank, W12
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]


Hope Bay Barrel Tests
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
Mn (mg/L)
6-May-09
14-Aug-09
22-Nov-09
2-Mar-10
10-Jun-10
18-Sep-10
27-Dec-10
Sample Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
Windy barrel blank, W12
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

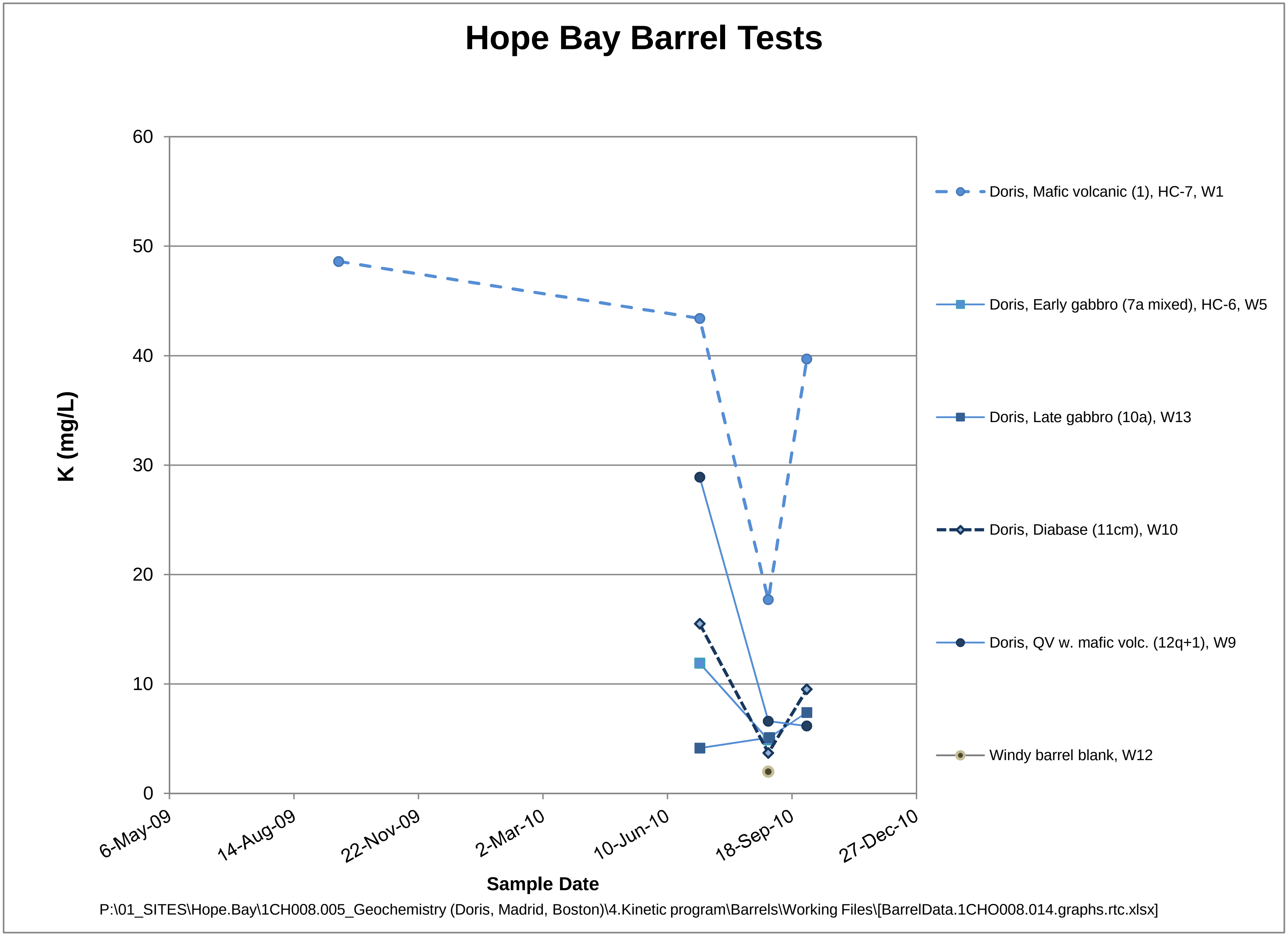

Hope Bay Barrel Tests
Hg (mg/L)
0.00012
0.0001
0.00008
0.00006
0.00004
0.00002
0
6-May-09
14-Aug-09
22-Nov-09
2-Mar-10
10-Jun-10
18-Sep-10
27-Dec-10
Sample Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

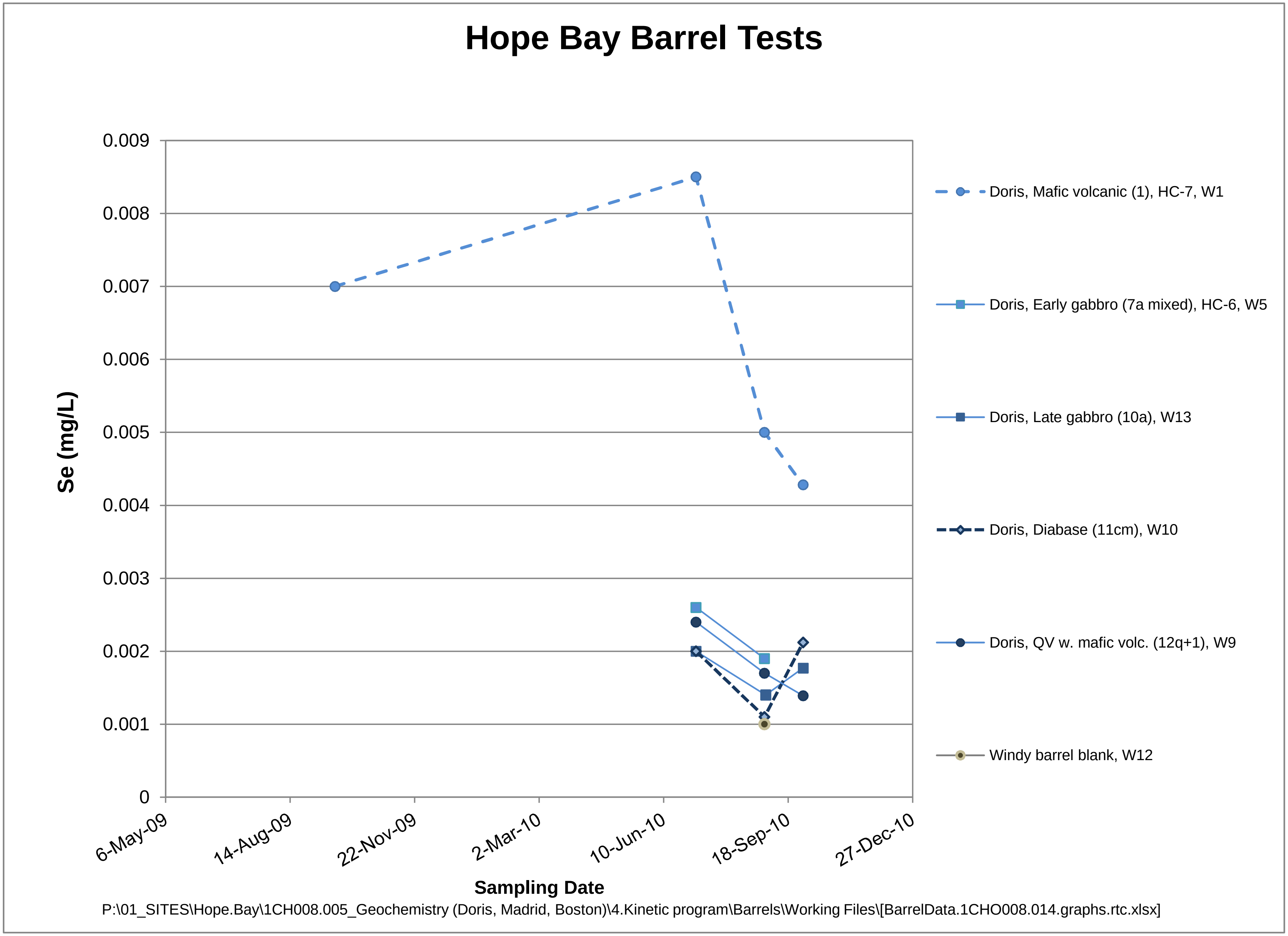

Hope Bay Barrel Tests
Mo (mg/L)
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
6-May-09
14-Aug-09
22-Nov-09
2-Mar-10
10-Jun-10
18-Sep-10
27-Dec-10
Sample Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
Windy barrel blank, W12
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

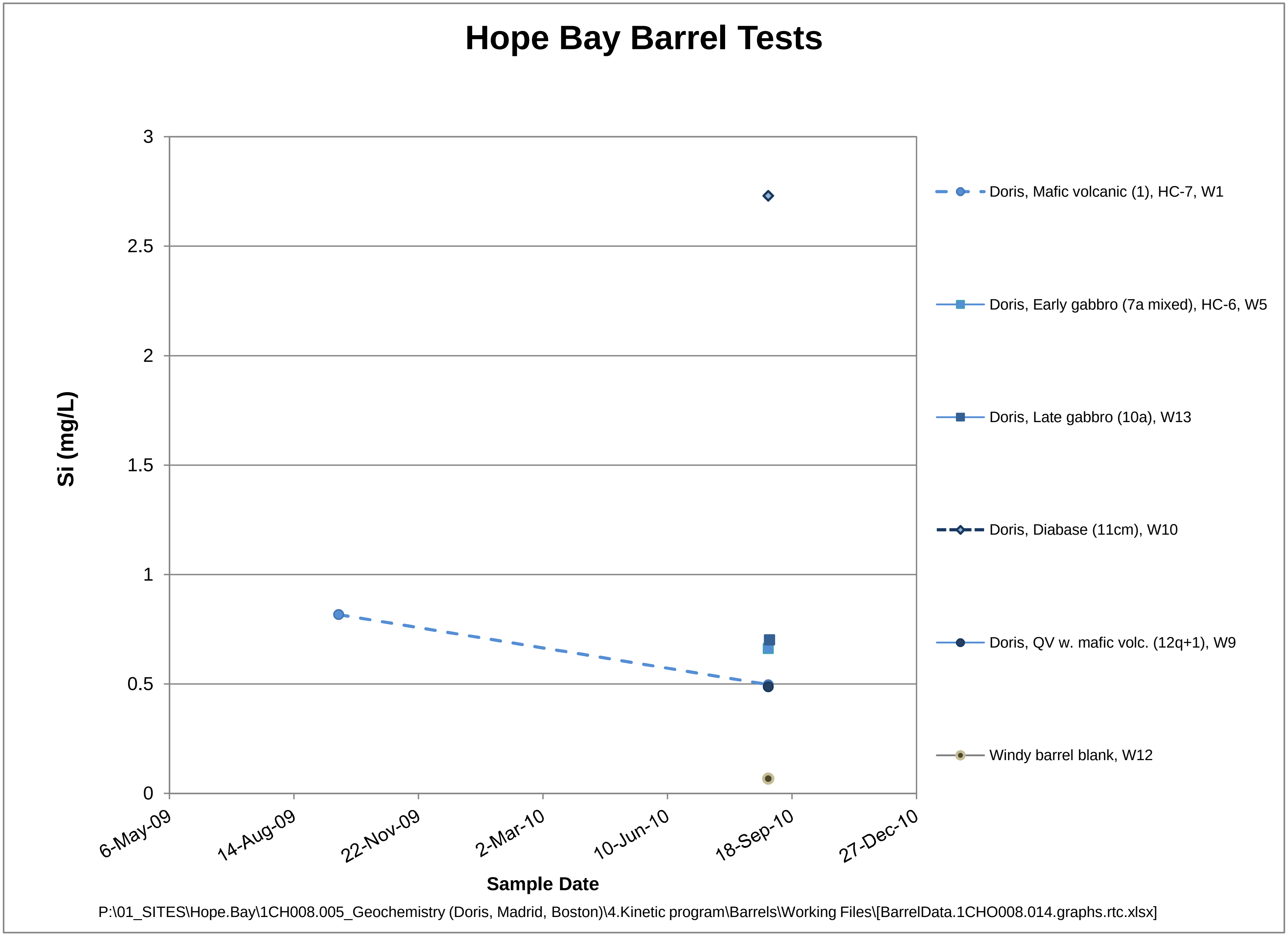

Hope Bay Barrel Tests
Ni (mg/L)
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
6-May-09
14-Aug-09
22-Nov-09
2-Mar-10
10-Jun-10
18-Sep-10
27-Dec-10
Sample Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
Windy barrel blank, W12
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

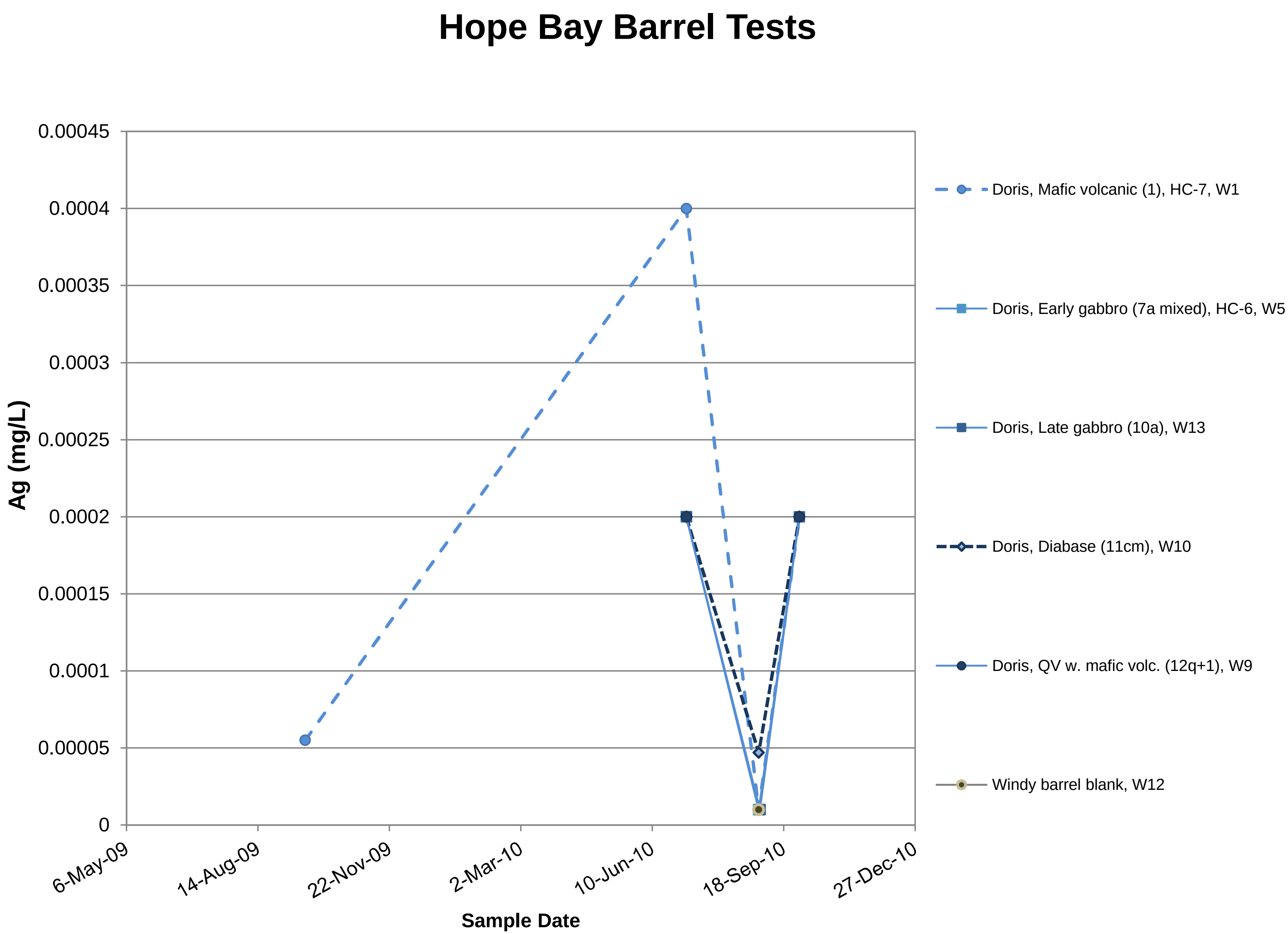


P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

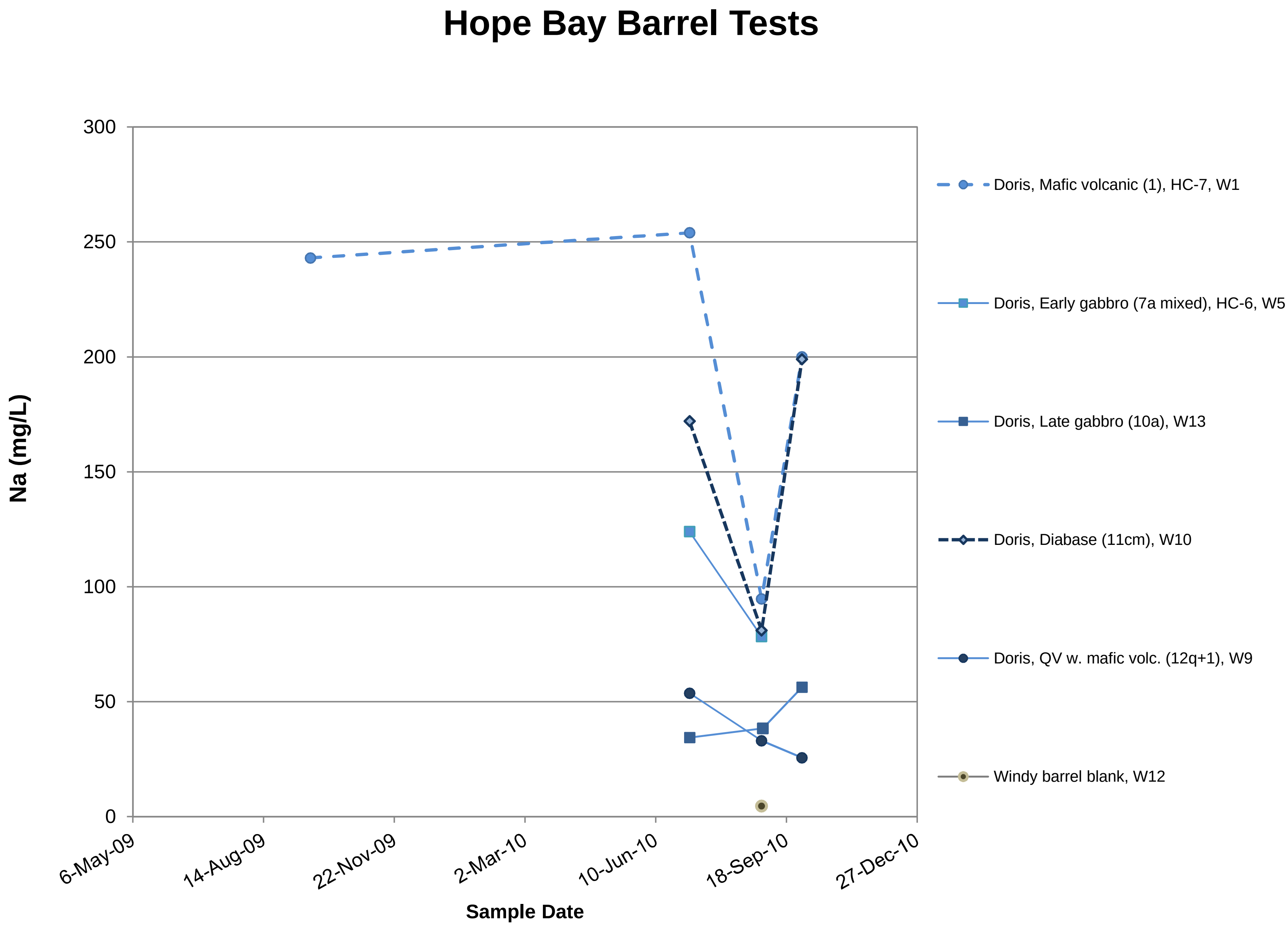

Hope Bay Barrel Tests
K (mg/L)
60
50
40
30
20
10
0
6-May-09
14-Aug-09
22-Nov-09
2-Mar-10
10-Jun-10
18-Sep-10
27-Dec-10
Sample Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
Windy barrel blank, W12
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]


Hope Bay Barrel Tests
Se (mg/L)
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
6-May-09
14-Aug-09
22-Nov-09
2-Mar-10
10-Jun-10
18-Sep-10
27-Dec-10
Sampling Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
Windy barrel blank, W12
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

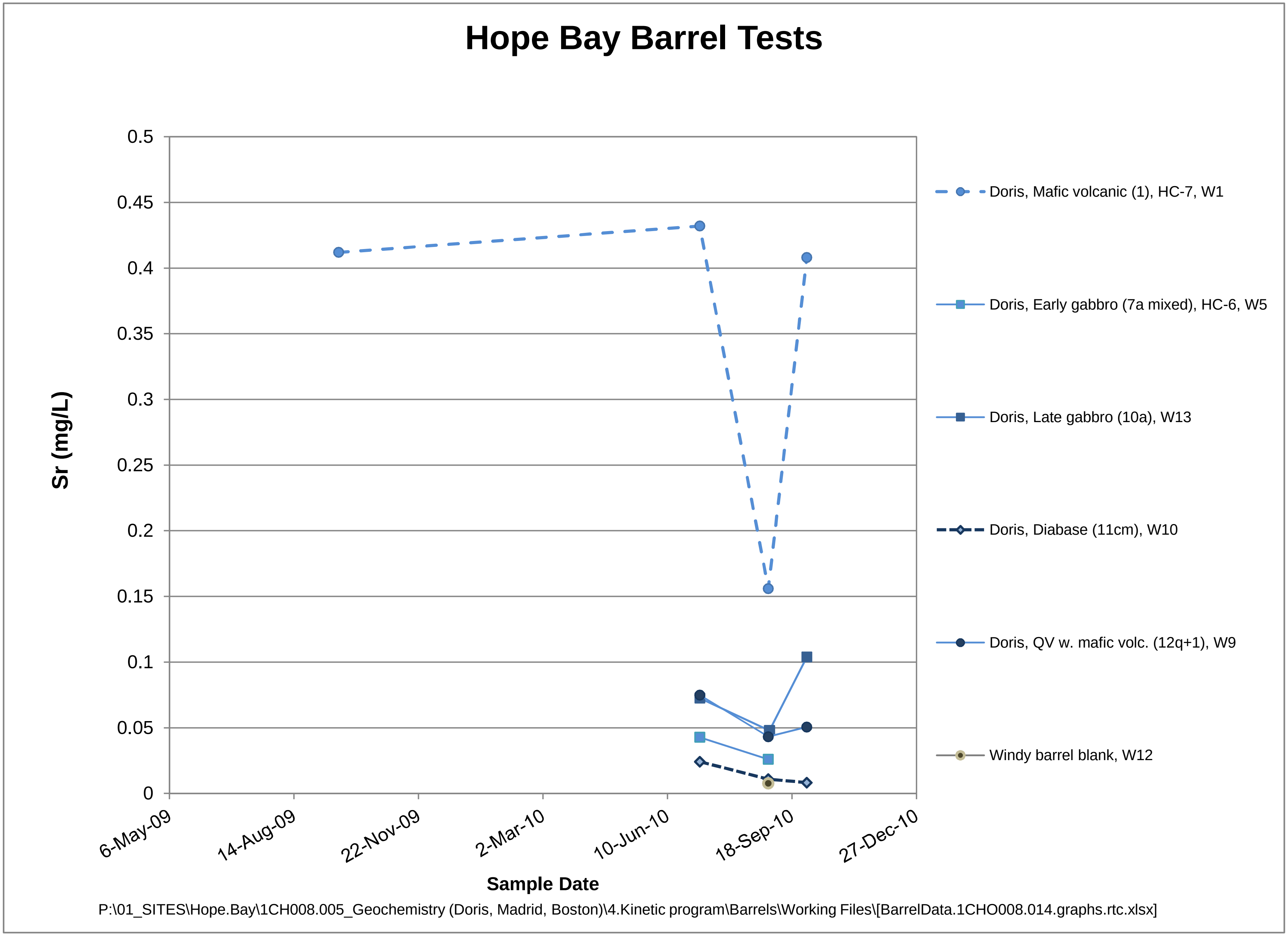

Hope Bay Barrel Tests
Si (mg/L)
3
2.5
2
1.5
1
0.5
0
6-May-09
14-Aug-09
22-Nov-09
2-Mar-10
10-Jun-10
18-Sep-10
27-Dec-10
Sample Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
Windy barrel blank, W12
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

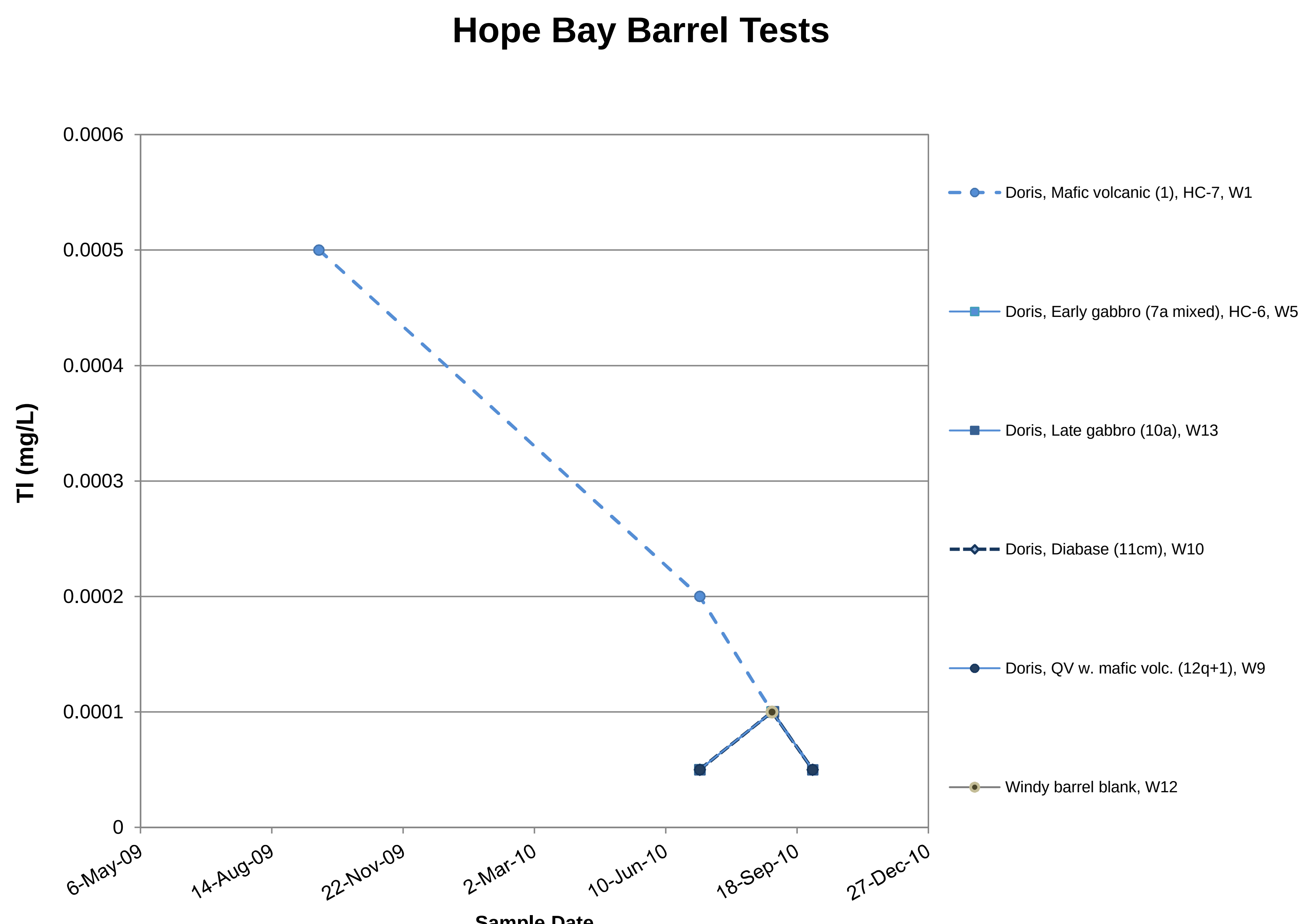


P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

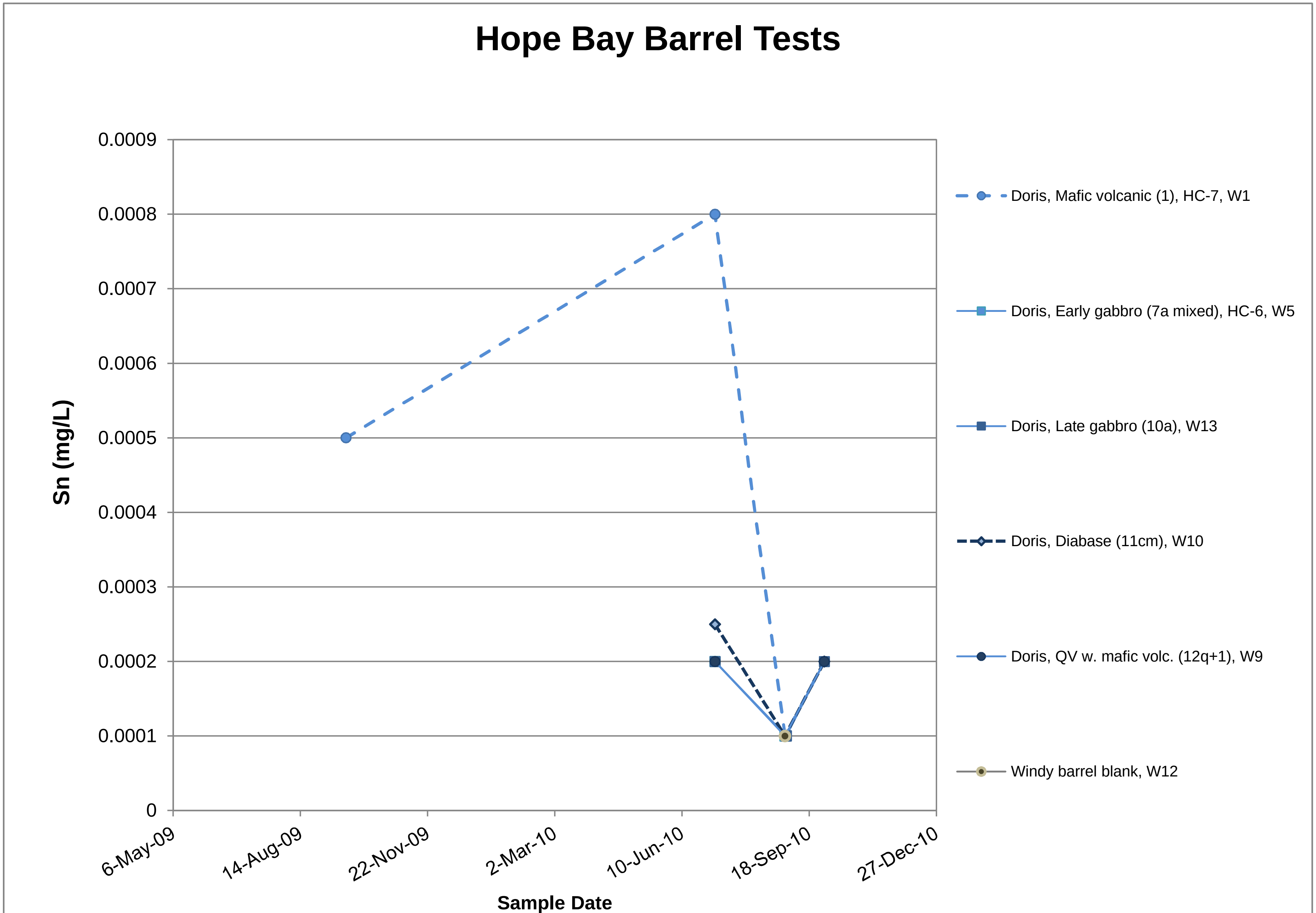


P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]

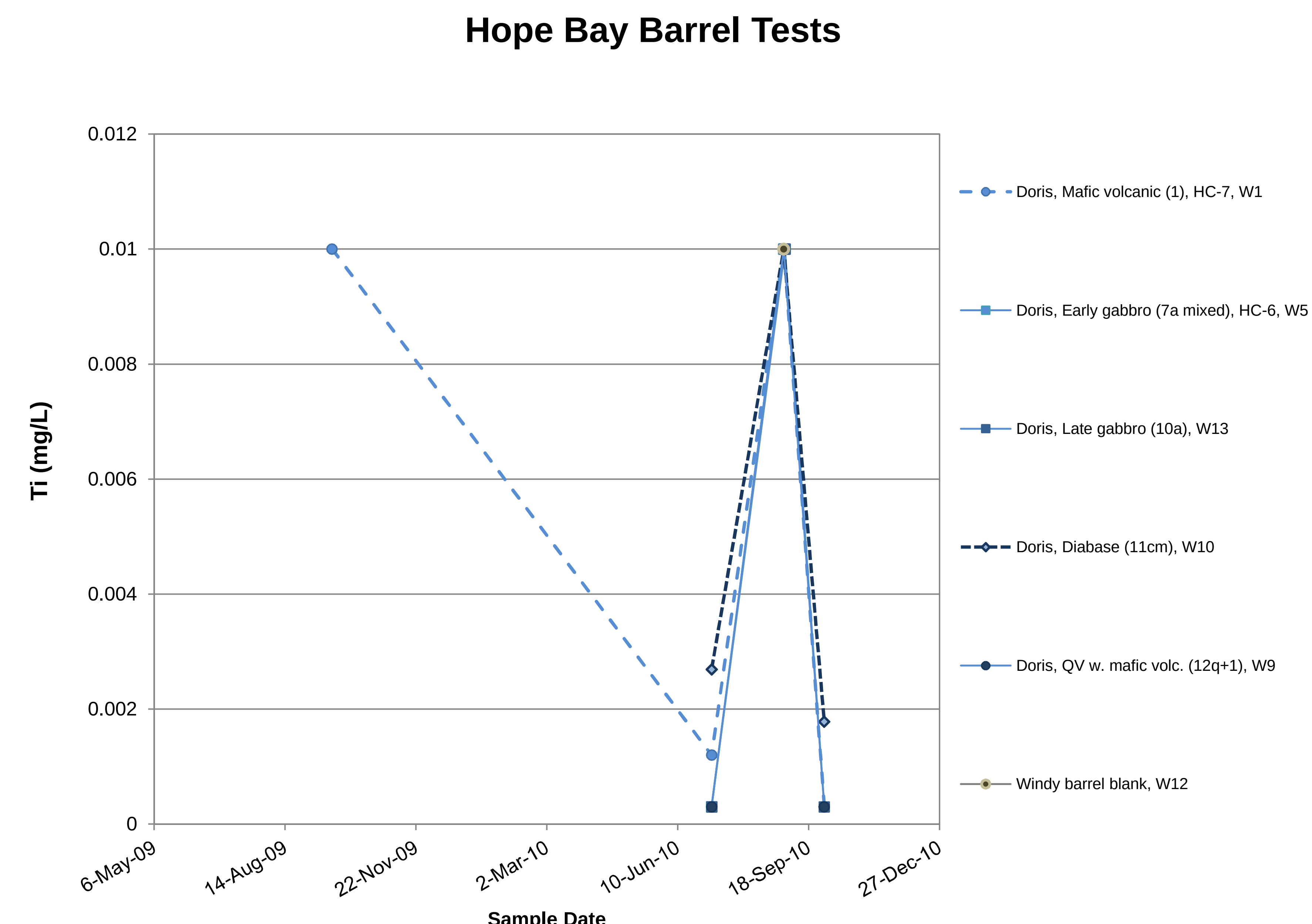

Hope Bay Barrel Tests
Sr (mg/L)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
6-May-09
14-Aug-09
22-Nov-09
2-Mar-10
10-Jun-10
18-Sep-10
27-Dec-10
Sample Date
Doris, Mafic volcanic (1), HC-7, W1
Doris, Early gabbro (7a mixed), HC-6, W5
Doris, Late gabbro (10a), W13
Doris, Diabase (11cm), W10
Doris, QV w. mafic volc. (12q+1), W9
Windy barrel blank, W12
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]



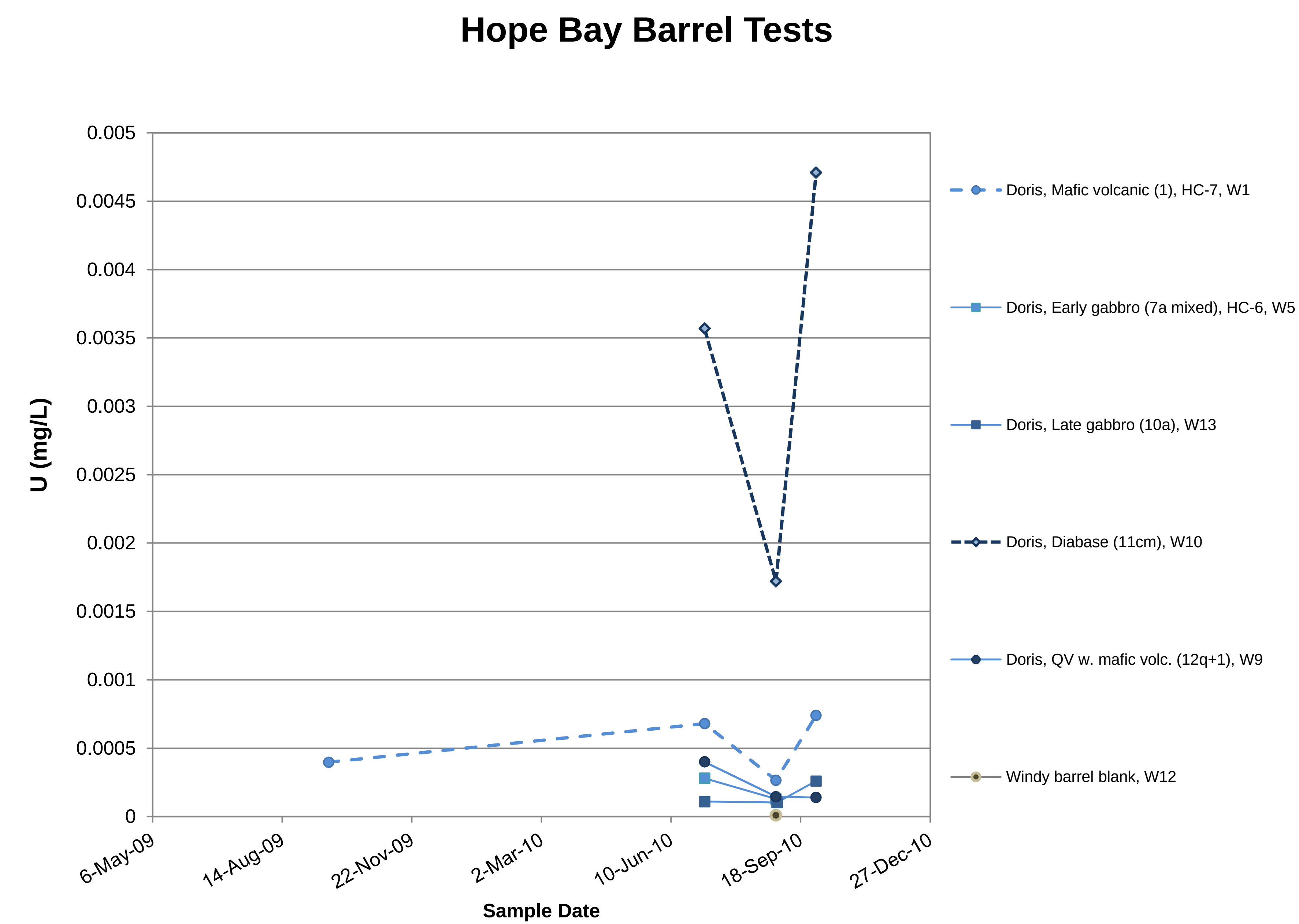
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]



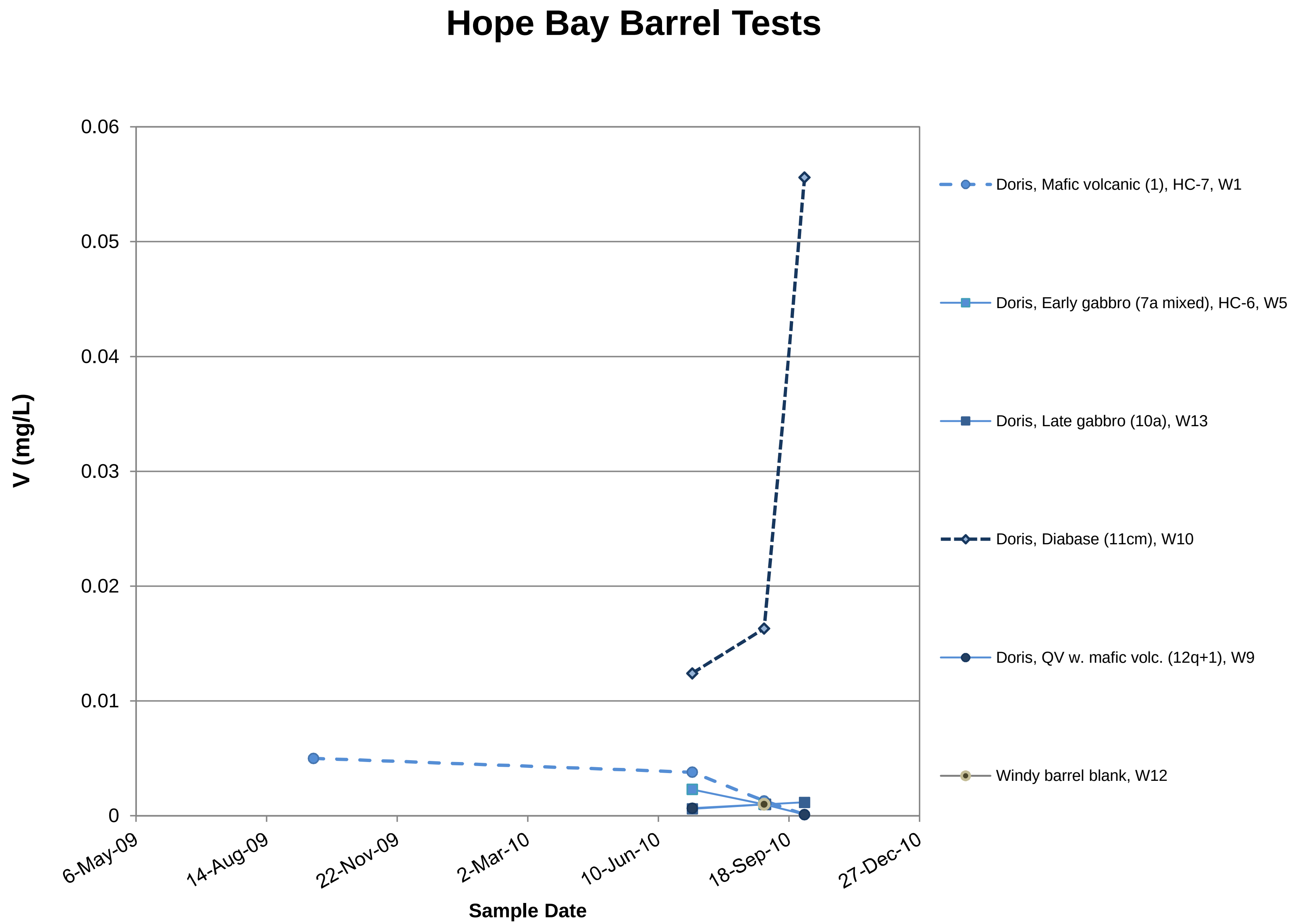
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]



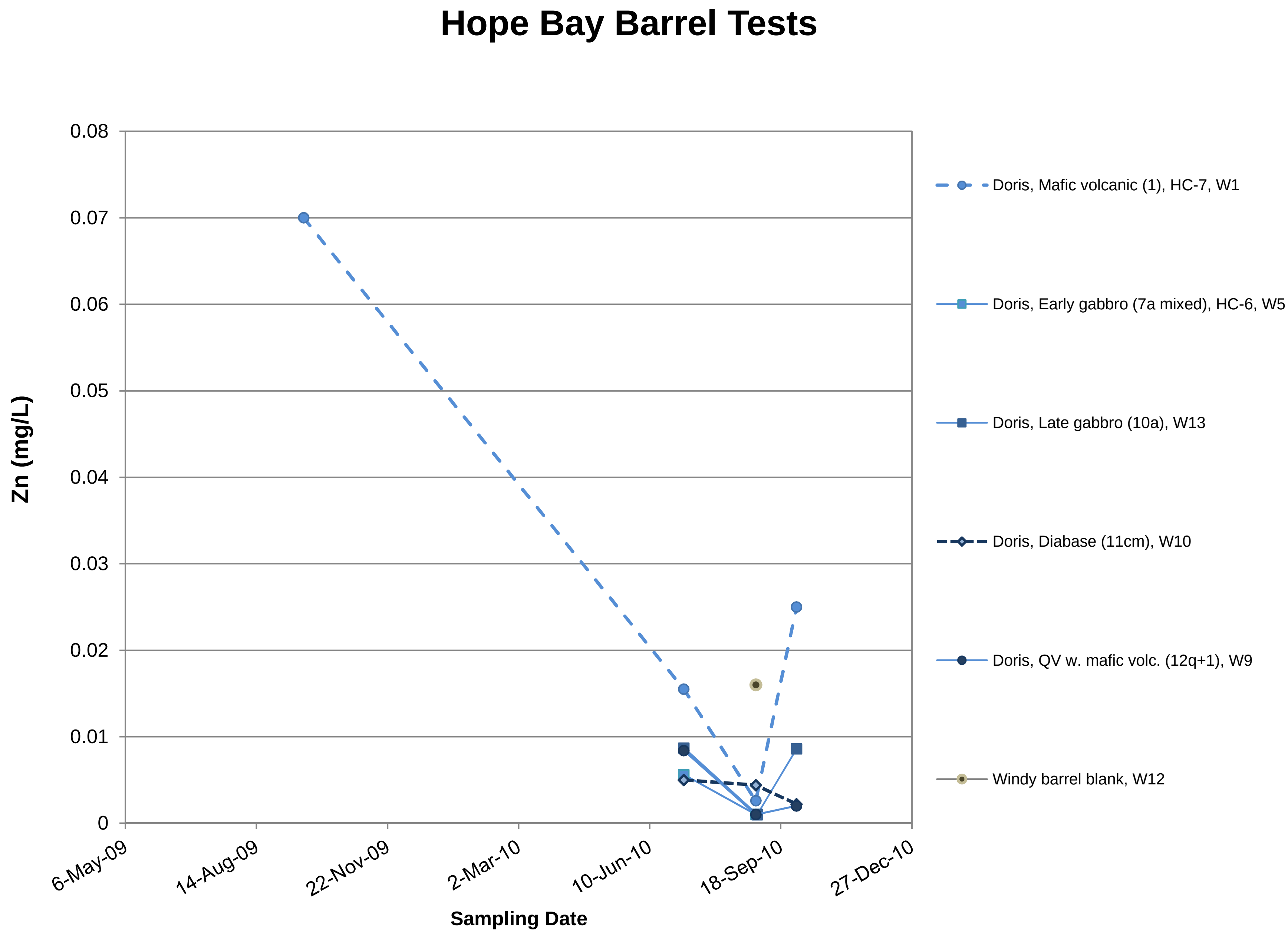
P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]



P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]



P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]



P:\01_SITES\Hope.Bay\1CH008.005_Geochemistry (Doris, Madrid, Boston)\4.Kinetic program\Barrels\Working Files\[BarrelData.1CHO008.014.graphs.rtc.xlsx]