Groundwater Upwelling Velocities in Remediation Areas, Onondaga Lake Bottom Subsite

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Table of Contents

Page

List of Figures iii

List of Tables iv

List of Attachments iv

Executive Summary v

Section 1 Introduction 1

Section 2 Groundwater Conditions in Remediation Areas 4

Geologic Setting 4
Onondaga Lake and Groundwater Flow 4
Hydraulic Containment Systems 6
Groundwater Flow Model 7
Groundwater Conditions and Model Area Development 7

Section 3 Measurements of Upwelling Velocities 9

Temperature and Conductivity Survey 10
Groundwater Upwelling Investigation – 2003 10
Seepage Meter Investigations 11
Seepage Meters – Phase I Investigation 11
Seepage Meters – Phase III Investigation 12
Chloride-Depth Profiles 14
Description of Method 14
Model Parameters 15
Measurement of Sediment Chloride Concentrations 16
Field Investigations 18
Initial Data Evaluations 18

Section 4 Upwelling Velocities Calculated from Chloride-Depth Profiles 21

Section 5 Upwelling Velocities for Cap Design in Areas without Hydraulic Containment 26

Results 27

Section 6 Evaluation of Uncertainty in Calculated Upwelling Velocities 29

Sensitivity to Model Parameters 29
Reproducibility of Results 29
Model Fit 30
Summary 31

Section 7 Analysis of Upward Groundwater Flow through Silt and Clay Unit 32

Section 8 Upwelling Velocities for Cap Design in Areas with Hydraulic Containment 39

Vertical Hydraulic Conductivity 39

Thickness of Silt and Clay Unit 40
Water Level Differences 40
Monte Carlo Simulation 41
Results 42
Remediation Area A – Model Area A1 44
Section 9 Conclusions 45
Section 10 References 46

List of Figures

Figure 1	Remediation Areas and Cross Section Location Map
Figure 2	Hydrogeologic Setting of Onondaga Lake
Figure 3	Thickness of Silt and Clay Unit
Figure 4	Remediation Area A - Hydrogeologic Cross Section B-B’
Figure 5	Remediation Area D - Hydrogeologic Cross Section H-H’
Figure 6	Remediation Area E - Hydrogeologic Cross Section I-I’
Figure 7	Schematic of Hydraulic Containment System and Groundwater Flow through Silt and Clay Unit
Figure 8	Upwelling Transect and Piezometer Locations
Figure 9	Upwelling Measurement and Seepage Meter Locations – Remediation Area A
Figure 10	Upwelling Measurement Locations – Remediation Area B
Figure 11	Upwelling Measurement Locations – Remediation Area C
Figure 12	Upwelling Measurement and Seepage Meter Locations – Remediation Area E
Figure 13	Average Porosity at Vibracore Locations
Figure 14	Upwelling Velocities in Model Areas A1 and A2
Figure 15	Upwelling Velocities in Remediation Area C
Figure 16	Upwelling Velocities in Model Areas E1, E2, and E3
Figure 17	Locations of Vertical Hydraulic Conductivity Measurements
Figure 18	Average Upwelling Velocities in Remediation Area B
Figure 19	Average Upwelling Velocities in Remediation Area C
Figure 20	Average Upwelling Velocities in Remediation Area D

List of Tables

Table 1	Summary of Upwelling Velocities Used to Develop Cumulative Frequency Distributions for Model Areas A1, A2, and C2, and Remediation Area E
Table 2	Comparison of Upwelling Velocities at Locations with Pore Water and Sediment Conductivity Data
Table 3	Comparison of Upwelling Velocities at Locations with Multiple Sets of Sediment Conductivity Data
Table 4	Measured Values of Vertical Hydraulic Conductivity of Silt and Clay Unit
Table 5	Calculated Vertical Groundwater Velocities across the Silt and Clay Unit at Selected Monitoring Well Locations

List of Attachments

Attachment I	Geologic Sections
Attachment II	Conductivity-Temperature Investigation Results
Attachment III	Upwelling Investigation Results – Transect TR01
Attachment IV	Seepage Meter Investigation Results
Attachment V	Vibracore Water Quality and Porosity Data
Attachment VI	Sediment Conductivity and Pore Water Correlations
Attachment VII	Chloride-Depth Profile Analyses
Attachment VIII	Transient Evaluation of Chloride-Depth Profiles
Attachment IX	Comparison of Upwelling Estimates from Pore Water and Sediment Conductivity Data from Same Location
Attachment X	Evaluation of Velocity in Silt and Clay Unit
Attachment XI	Sensitivity Evaluations
Attachment XII	Results from Diffusion Samplers – Phase III
Attachment XIII	Estimation of Hydraulic Conductivity from Consolidation Test Data

Executive Summary

This report describes the results of extensive field and analytical studies that have quantified the discharge of groundwater to the areas in Onondaga Lake where a sediment cap will be placed as part of the remedial activities undertaken to meet the requirements of the Record of Decision (ROD) for the Onondaga Lake Bottom Subsite. The data and evaluations described in this report provide an excellent foundation for the design of the remedy for Onondaga Lake. The upwelling velocities that are described in this report will be used in the chemical isolation model for purposes of cap design.

The current rates of groundwater discharge in much of Remediation Areas A and E and in the center section of Remediation Area C, which are similar to discharge rates expected after placement of the isolation cap, have been delineated based on the analysis of chloride depth profiles at over 200 locations within and in the vicinity of these remediation areas. In Remediation Area B, Remediation Area D, and the northern and southern sections of Remediation Area C, the rates of groundwater discharge after placement of the isolation cap will be significantly lower than current rates as the result of the construction and operation of hydraulic containment systems along the shoreline. Groundwater discharge rates after placement of the isolation cap in these remediation areas were calculated based on groundwater flow rates upward through the underlying regional confining unit (the silt and clay unit), as the containment systems will capture all groundwater flow to the lake above this unit.

This report describes methods that were implemented in the field to measure groundwater discharge rates, which are commonly referred to as upwelling velocities, within the remediation areas. The evaluation of upward groundwater velocity through the sediment, based on the change in chloride concentrations with depth in sediment pore water, was determined to be the best method for quantifying current upwelling velocities in the remediation areas. This report describes the theoretical basis for the use of this method to measure upwelling velocities and describes the extensive data collected on chloride concentrations in sediment pore water to accurately delineate the current distribution of upwelling velocities within the remediation areas. The mean upwelling velocities determined from this method in Model Areas A1, A2, and C2 and Remediation Area E are 1.6 cm/yr, 4.1 cm/yr, 3.1 cm/yr and 1.5 cm/yr, respectively; upwelling velocities in all of these areas will be minimally affected by the hydraulic containment systems.

In the remediation areas located offshore of proposed hydraulic containment systems, the long-term upwelling velocity after remedy implementation will be equal to the rate of groundwater movement through the regional confining unit. These containment systems are assumed to operate for the life of the remedy. The vertical hydraulic conductivity of the regional confining unit was estimated by the testing of 40 core samples collected from the silt and clay within the remediation areas; these data were combined with estimates of the hydraulic gradient across the regional confining unit and the thickness of the silt and clay unit to calculate the upward groundwater flow through the unit. The uncertainty in this calculation was evaluated based on estimates of the uncertainty in vertical hydraulic conductivity, hydraulic gradients and thickness. The mean estimated long-term upwelling velocities through the regional confining unit were estimated to be less than 2 cm/yr in all areas proposed for capping that are located offshore of proposed hydraulic containment systems.

REPORT

Section 1
Introduction

This technical report describes groundwater discharge to the areas in Onondaga Lake where a sediment cap will be placed as part of the remedial activities undertaken to meet the requirements of the ROD for the Onondaga Lake Bottom Subsite. The areas where a sediment cap will be constructed have been geographically grouped into five subareas termed Remediation Areas A through E. The locations of the remediation areas, which have a total area of about 400 acres, are shown on Figure 1. For purposes of cap design, Remediation Area D has been subdivided into four subareas: SMU2-ILWD, western, center, and eastern; Remediation Area A has been subdivided into Model Area A1 and Model Area A2; and Remediation Areas B and C have been subdivided into Model Area B2, Model Area B1/C1, Model Area C2, and Model Area C3.[1] The locations of the remediation areas and model areas are shown on Figure 1. Also shown on Figure 1 are three wetland areas along the lakeshore that will be created as part of the remedial actions: wetlands to replace the spits at the mouth of Ninemile Creek, a wetland area along the eastern shoreline of Wastebeds 1-8 ("connected wetland"), and a wetland area adjacent to Wastebed B and Harbor Brook ("outboard area wetland"). A sediment cap will be placed beneath these wetlands.

Groundwater discharge to Onondaga Lake has been evaluated in detail because groundwater flux through lake sediments can transport contaminants in the sediments into the upper layers of the cap. As a result, understanding the groundwater discharge that will occur through the sediment cap after placement is essential for predicting the long-term performance of the sediment cap. In the analytical and numerical models developed to simulate the performance of the sediment cap (see Appendix B), the parameter describing the rate of groundwater discharge is referred to as the "Darcy velocity." The Darcy velocity is the rate at which groundwater moves upward through the sediment cap. The Darcy velocity is frequently called the "upwelling velocity." The upwelling velocities that are described in this report have been used as inputs to the chemical isolation model used for cap design (see Appendix B).

In much of Remediation Areas A and E, and in Model Area C2, it is anticipated that groundwater discharge through the cap will be similar to that which is occurring today. As a result, evaluations of groundwater discharge following construction of the cap have focused on understanding and quantifying existing rates of groundwater discharge in these areas.

Hydraulic containment systems constructed or proposed for construction along the shoreline reduce the groundwater discharge to the lake in Remediation Areas B and D, and portions of Remediation Areas A and C, to negligible levels by capturing all groundwater flow towards the lake above the regional confining unit (Figure 1). In these areas, evaluations of

[1] For purposes of chemical isolation layer design, each remediation area was subdivided into distinct model areas as shown on Figure 1. In this report, estimates of upwelling velocities in each of the model areas are developed. The methods used to delineate the model areas are presented in Appendix B. Additional detail on how the influence of groundwater conditions factored into model area delineation are provided in Sections 2, 5 and 8 of this appendix. For purposes of evaluation alternatives in the Feasibility Study, Onondaga Lake was separated into eight areas or sediment management units (SMU) for ease of evaluating alternatives in different portions of the lake. The SMU delineations are shown on Figure 1. For the purpose of this document, portions of the lake remedy are referred to in terms of the remediation areas /model areas rather than the SMU delineations.

groundwater discharge following construction of the cap have focused on understanding the component of groundwater discharge that will not be captured by the hydraulic containment systems and continue to flow through the cap following completion of the remedy. The existing rates of groundwater discharge in these remediation areas provide only an upper bound estimate of the amount of groundwater discharge that will occur following construction of the hydraulic containment system. The dominant component of groundwater discharge following construction of the cap will be upward groundwater flow through the underlying regional confining unit. Thus, the evaluations described in this report focused on quantifying groundwater flow through the regional confining (silt and clay) unit.

A detailed description of groundwater flow to Onondaga Lake is contained in Appendix D: Part A to the Onondaga Lake Feasibility Study (FS) titled "Groundwater Flow to Onondaga Lake" (Parsons 2004). In addition, following publication of the FS, the United States Geological Survey (USGS) published an analysis of groundwater flow in the unconsolidated sediments underlying Onondaga Lake and the contiguous glacial valleys (Yager and others 2007a, 2007b; and Kappel and Yager, 2008). The major findings of these studies are summarized in this report.

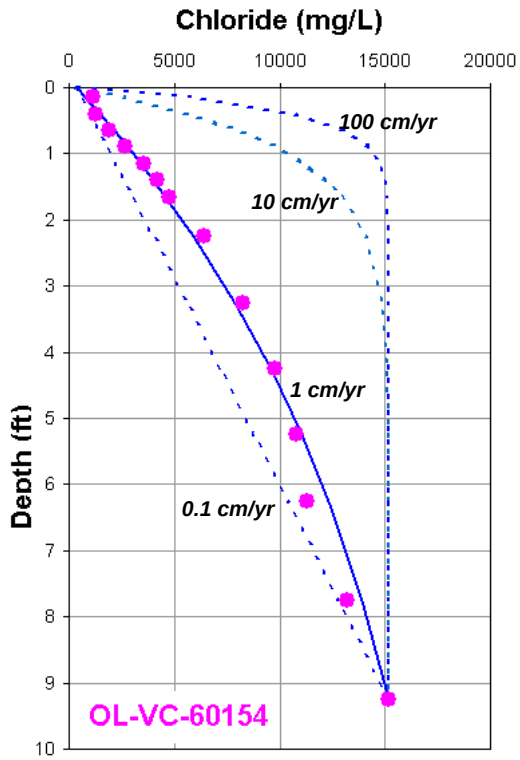
The analyses of groundwater discharge described in Appendix D of the FS indicated that in areas offshore of where a hydraulic containment system would be constructed upwelling velocities would be less than 2 cm/yr with the containment system in operation. Upwelling velocities in Remediation Areas A and E, without a hydraulic containment system, were estimated during the FS to be higher in near shore areas. Upwelling velocities in Remediation Area A ranged from 300 cm/yr within 20 ft. of the shoreline to less than 2 cm/yr beyond 700 ft. from the shoreline, and upwelling velocities in Remediation Area E ranged from 70 cm/yr near the shoreline to less than 2 cm/yr beyond 300 ft. from the shoreline.

This report focuses on the studies and investigations that have been conducted since the FS was completed to better quantify groundwater discharge to the five remediation areas. Seepage meters and chloride-depth profiles of the sediments were the field methods employed in the pre-design investigations (PDI) to quantify groundwater discharge rates. These methods and the results of these methods are described in this report as well as other methods that were considered to quantify groundwater discharge rates. In addition, as part of the pre-design investigations, many borings have been advanced into the sediments beneath the remediation areas. The data from these borings have provided a good understanding of the characteristics of the sediments and the thickness and continuity of the major stratigraphic units including the regional confining unit. This information has allowed the development of a better understanding of groundwater flow within the sediments than existed at the time the FS was prepared.

The chloride-depth profile method was judged to be the most reliable and accurate method for quantifying the relatively low groundwater discharge rates through the sediments in the remediation areas. This method relies on the observation that the pore waters in the sediments beneath Onondaga Lake have significantly higher chloride concentrations than the lake water as the result of natural brines beneath the lake and migration of leachate from the wastebeds along the shoreline of Onondaga Lake. As a result, there is a significant chloride concentration gradient from the sediments to the lake. The change in chloride concentration with depth below the lake/sediment interface provides information on the rate of upward groundwater flow through the sediment.

The shape of the chloride-depth profile is a function of chloride migration by advection with groundwater and chemical diffusion. If there is no advective transport with groundwater, the chloride-depth profile will be linear as a result of diffusion. If there is upward groundwater flow, the chloride depth profile will be convex, with the convexity a function of the magnitude of the groundwater flow, as shown on the figure below. Analysis of the convexity of the profile is the method that was used to quantify groundwater upwelling velocities. This method is useful for analyzing upwelling velocities that are less than about 50 cm/yr. At greater upwelling velocities, the chloride concentrations do not change significantly with depth.

The figure to the right shows a plot of chloride concentrations in pore water versus depth at a boring located in Remediation Area E (OL-VC-60154). This figure illustrates the large changes in chloride concentrations that occur with depth below the sediment-water interface. The measured chloride data are plotted as dots and chloride concentrations increase from about 359 mg/L at the sediment-water interface to over 15,000 mg/L at a depth of about 9 ft. below the sediment-water interface. The measured chloride data follow a convex profile indicating a relatively small upwelling velocity. Also shown on the figure are the expected chloride depth profiles for upwelling velocities of 0.1 cm/yr, 1 cm/yr, 10 cm/yr and 100 cm/yr. These expected chloride depth profiles illustrate the significant effect that changes in upwelling velocities have on the shape of the chloride depth profile. For example, the chloride depth profile with an upwelling velocity of 1 cm/yr is significantly different than that with an upwelling velocity of 10 cm/yr. The measured chloride data shown on the figure follow a trend similar to that expected with an upwelling velocity of about 1 cm/yr.



The remainder of this report is organized into eight sections; Section 2 through Section 9. Section 2 of this report describes groundwater conditions in the remediation areas. Section 3 describes the methods used to determine upwelling velocities and compares the methods. Section 4 describes the method used to analyze chloride-depth profiles to calculate upwelling velocities. Section 5 describes upwelling velocities for cap design in remediation areas located in areas without onshore hydraulic containment systems. Section 6 describes an evaluation of uncertainty in calculated upwelling velocities. Section 7 describes analyses of upward groundwater flow through the silt and clay unit, and Section 8 describes upwelling velocities for cap design in areas with onshore hydraulic containment systems. Conclusions are presented in Section 9, and the references cited in the report are listed in Section 10.

Section 2
Groundwater Conditions in Remediation Areas

Geologic Setting

Onondaga Lake overlies a deep, northwest-trending glacial trough in the Vernon Shale, the bedrock formation beneath and in the vicinity of the lake. A schematic block diagram of the southeastern end of the lake, which illustrates the trough, is shown on Figure 2. The trough averages about 300 ft. deep along the axis of the lake and is filled primarily with unconsolidated, fine-grained sediments, although a coarse-grained unit typically occurs overlying till near the base of the unconsolidated sediments. The thickness of the unconsolidated sediments decreases rapidly away from Onondaga Lake, except in the valleys of the main tributaries, which are also underlain by unconsolidated sediments. The stratigraphic sequence observed in most borings advanced beneath the lake and adjacent upland areas are similar:

- Surficial sediments typically described as silt with fine sand and fill material
- Gray clayey marl, gray-brown clayey silty marl (marl unit)
- Brown-gray clay, gray-brown silt and clay (silt and clay unit also termed regional confining unit)
- Gray-brown silt with sand layers (fine sand and silt unit)
- Sand, sometimes with gravel (sand and gravel unit)
- Till, dense clay and silt with sand and gravel (till unit)
- Green, red and gray shale (bedrock)

The silt and clay unit is an important regional confining unit or aquitard that impedes upward groundwater flow to the lake. This unit has been interpreted to be continuous beneath the entire lake, consistent with the interpretation in the USGS report by Yager and others (2007b). A thickness map of this unit based on interpretation of boring logs is shown on Figure 3.

Hydrogeologic cross sections through Remediation Areas A, D and E are shown on Figures 4 to 6 and locations of these sections are shown on Figure 1. These cross sections, at a minimum, depict the silt and clay unit and overlying sediments. Where information is available on the geologic units below the silt and clay unit, this information is also shown. The sections are annotated with notes from the boring logs regarding lithologic observations within each of the geologic units. In general, the marl is described as silt and/or silt and clay though in some logs the marl was noted as consisting of gravel and/or sand sized sediments. In Remediation Area D, relatively thick deposits of Solvay waste generated from the production of sodium carbonate (soda ash) by the Solvay process and other materials contained within the in-lake waste deposits overlie the marl unit (Figure 5). Additional hydrogeologic cross sections are contained in Attachment I.

Onondaga Lake and Groundwater Flow

Onondaga Lake, oriented along a northwest-southeast axis, is approximately 4.5 miles long and one mile wide. The lake has a mean depth of 36 ft. and a maximum depth of 65 ft. which occurs in the southern part of the lake. The average lake level during the past 20 years was

362.9 ft. above mean sea level (AMSL),[2] based on records from the USGS gage on Onondaga Lake (Site 04240495, Onondaga Lake at Liverpool, New York). The surface area of the lake at this elevation is approximately 4.5 square miles, and the volume is approximately 34,600 million gallons. Surface water inflows and outflows from the lake average about 470 cubic ft. per second based on average flows between 1998 and 2002 (Onondaga County, 2003). The groundwater component of the lake water budget is small, estimated to be less than 0.5 percent of surface water inflows (Parsons, 2004). Precipitation on the lake and evaporation from the lake are approximately equal; therefore, the net water budget associated with precipitation and evaporation is small. The average residence time of water in the lake is approximately 100 days.

Regional groundwater flow in both the bedrock and the unconsolidated sediments is towards the valleys of the major tributaries of the lake. Groundwater discharge areas include seven major tributaries: Ninemile Creek, Geddes Brook, Harbor Brook, Bloody Brook, Onondaga Creek, Saw Mill Creek, and Ley Creek. Groundwater flow towards and into the lake originates primarily as precipitation that infiltrates into the unconsolidated sediments bordering the lake. Because the saturated unconsolidated sediments are restricted to a relatively narrow band on either side of the lake, the total recharge area is relatively small, and as a result, recharge to and discharge from the unconsolidated sediments is relatively small. Most of the groundwater in the unconsolidated sediments that flows toward the lake discharges to the tributaries and to ditches and drains along the shoreline with the remainder discharging in near-shore areas of the lake. This occurs, in part, because of the thickening wedge of fine-grained, low-permeability materials beneath the lake and because of dense sodium-chloride brines in the unconsolidated sediments beneath the lake.

Most of the groundwater discharge that occurs to the lake is the result of groundwater flow through the marl and overlying units from the upland areas. These units are typically fine grained, though there are some sand stringers or lenses, as shown on the hydrogeologic cross sections. As a result, groundwater flow rates through these units are not large and most of the groundwater discharge occurs near shore in the littoral zone.

Some groundwater discharge to the lake occurs as the result of upward groundwater flow through the silt and clay unit from the deeper permeable units. The sand and gravel unit and the overlying fine sand and silt unit are the primary deeper permeable units (see Figure 2). These units are primarily recharged where they subcrop around the perimeter of the lake. Groundwater levels in the sand and gravel along the lakeshore are typically well above the lake level indicating the potential for upward groundwater flow. The vertical hydraulic conductivity of the silt and clay unit is estimated to be on the order of 10^{-7} cm/sec and, thus, the total upward groundwater flow through this unit is very small. The potential upward groundwater flow through the silt and clay unit is described in detail in Section 7.

The presence of natural sodium-chloride brines in the unconsolidated sediments beneath the lake complicates the understanding of local groundwater flow conditions. These brines are believed to have originated primarily from the dissolution of soluble minerals in the unconsolidated glacial sediments in the Onondaga Trough that originated from bedrock scour caused by glacial advance and retreat. These brines are comprised primarily of sodium and chloride. In the past, discharge of brines at salt springs was reported to have occurred around

[2] Vertical datum in this report is referenced to the North American Vertical Datum of 1988 (NAVD 88).

much of the shoreline of the southern basin of the lake (Kappel, 2000). These discharges likely occurred in areas where the silt and clay unit thinned or disappeared along the shoreline. The natural discharge of brines has ceased due to extraction of brines from wells along the shoreline. From 1797 to 1917, over 11.5 million tons of finished salt were produced from the springs and wells along the southern shoreline of the lake (USGS, 2000). This represents the salt content from the constant production of 500 gallons per minute (gpm) of brine with a chloride concentration of 60,000 mg/L over this period.

In addition to the natural sodium-chloride brines, there are natural mixed cation brines in the bedrock. These brines formed by the dissolution of evaporate beds within the Vernon Shale and overlying bedrock units. These brines are enriched in calcium, magnesium, and bromide relative to the sodium-chloride brines. In addition to the natural brines, some brines in the subsurface result from seepage of Solvay leachate[3] from the wastebeds. Solvay leachate is comprised primarily of sodium, calcium, and chloride. Solvay leachate typically has sodium to calcium ratios that are less than 1, whereas the natural sodium-chloride brines have sodium to calcium ratios that are greater than 10. The mixed cation brines typically have sodium to calcium ratios in the range of 1.4 to 4. The mixing of relatively fresh groundwater, natural sodium-chloride brines, natural mixed cation brines, and Solvay leachate from the wastebeds have created a wide variety of groundwater quality types in the vicinity of Onondaga Lake. The distribution of groundwater quality provides information on groundwater migration and origin.

Hydraulic Containment Systems

Hydraulic containment systems along the shoreline are an integral part of the lake remedy and remedies for the adjacent upland areas. Two types of hydraulic containment systems have been proposed; containment systems with a barrier wall and containment systems without a barrier wall.

The hydraulic containment systems incorporating a barrier wall will extend along the shoreline from the Willis-Semet area to south of the mouth of Harbor Brook, a total distance of about 6,700 ft. These hydraulic containment systems consists of five primary elements: 1) an impermeable barrier or wall seated in the upper portion of the silt and clay unit; 2) a gravel filled drain, completed to an elevation that is several feet below the elevation of the lowest recorded lake level, with a collection pipe embedded within, 3) wick drains within the lower portion of the fill and within the marl unit, 4) pumps to maintain the water level in the drain below lake level, and 5) a water treatment facility. These hydraulic containment systems are designed to capture the groundwater flowing towards the lake in the materials above the silt and clay unit. In addition, the drains will capture some flow from the underlying units by increasing hydraulic gradients across the confining unit. A schematic of the hydraulic containment system with a barrier wall is shown on Figure 7. A 2,850 ft. section of the hydraulic containment system has already been completed adjacent to the southern section of Remediation Area C and part of Remediation Area D (Willis/Semet IRM Barrier Wall). The impermeable barrier in this area consists of a sealed joint sheet pile wall.

[3] A slurry of Solvay waste and make-up water was discharged to the wastebeds. Solvay leachate refers to the liquid with a high total dissolved solids concentration that was released from the wastebeds during the period when the wastebeds were active. The leachate had a total dissolved solids concentration of about 100,000 mg/L and was a calcium-sodium-chloride type water (Effler, 1996).

Two segments of a hydraulic containment system without a barrier wall are proposed along the shoreline of Wastebeds 1-8; an approximately 1,060 ft. segment east of the mouth of Ninemile Creek and an approximately 6,700 ft. segment along the east side of the wastebeds extending northward from Ditch A (Figure 1). These segments of the hydraulic containment system will consist of four components: 1) a gravel filled drain, completed to an elevation that is several feet below the elevation of the lowest recorded lake level, with a collection pipe embedded within, 2) wells within the lower portion of the fill and within the marl unit that extend to the top of the underlying silt and clay unit, including the area of the former NMC channel sand and gravel deposits, 3) pumps to maintain the water level in the drain below lake level, and 4) a water treatment facility. These hydraulic containment systems will be designed to capture all groundwater flowing towards the lake from Wastebeds 1-8 in the marl and overlying fill units. A schematic of the hydraulic containment system without a barrier wall is also shown on Figure 7.

Groundwater Flow Model

A groundwater flow model has been developed to aid in the evaluation and design of the remedy for Onondaga Lake. The flow model has assisted in the development of the current understanding of groundwater flow conditions in the vicinity of the lake, which guided the detailed studies undertaken to quantify upwelling velocities. The model has been used to quantify the rates and direction of groundwater flow in the unconsolidated materials and in the upper bedrock in the vicinity of Onondaga Lake and to quantify groundwater discharge in the vicinity of Onondaga Lake. The model domain encompasses an area of approximately 30 square miles including all of Onondaga Lake and areas to the west and southwest of the lake. Revisions have been made to the model since the FS; the revised model, referred to as model Version 3.0 (S.S. Papadopulos & Associates, Inc. and O'Brien and Gere, 2009), received conditional approval by the NYSDEC on June 15, 2010. Version 1.0 of the groundwater model is described in Appendix D to the FS (Andrews and Swenson, 2004; and Swenson and Andrews, 2004).

Groundwater Conditions and Model Area Development

Groundwater discharge was an important consideration in developing the cap modeling areas for chemical isolation layer design as shown on Figure 1 and described in Appendix B. Model areas were developed to address variability in conditions across individual remediation areas to allow for robust cap designs, specific to the conditions in a particular portion of the overall remediation area. For example, the groundwater discharge at the mouth of Ninemile Creek is higher than that at other locations within Remediation Area A; therefore, to account for this spatial difference in groundwater upwelling velocities in the chemical isolation layer design, the region of higher upwelling was modeled separately from the remainder of the remediation area (and model inputs were specified separately for the two distinct areas).

In Remediation Area A, following collection of the Phase V and VI chloride-depth profiles it was determined that velocities near the mouth of Ninemile Creek were elevated compared to those in other parts of Remediation Area A. This finding was consistent with the understanding of the underlying sediment/soil structure near the mouth of Ninemile Creek. To explicitly consider the higher upwelling velocity in this area in the cap design, Model Area A2 was differentiated from the remainder of Remediation Area A, which was defined as Model Area A1.

In Remediation Area B, the primary factor in delineating model areas was contaminant concentration. However, the calculated upwelling velocities following onshore hydraulic control suggest higher upwelling velocities in the southeastern half of Remediation Area B. Therefore, separate groundwater upwelling distributions were developed for Model Area B1/C1 and B2 such that the higher upwelling velocities in B1/C1 were specifically considered in the cap design for that area. Groundwater upwelling distributions were also developed for the Wastebeds 1 through 8 connected wetlands.

The influence of the onshore hydraulic containment system was an important consideration in the delineation of model areas within Remediation Area C. The first priority in this area was the concentration and distribution of contaminants; however, the approximate influence of the hydraulic containment system was generally consistent with the delineation based on contaminant distribution. The onshore hydraulic containment system will control upwelling velocities in Model Areas B1/C1 and C3, as shown on Figure 1. In Model Area C2 upwelling velocities will be only minimally affected by the hydraulic containment systems and thus upwelling velocities were based on chloride depth profiles measured in the vicinity of Model Area C2.

Similar to Remediation Area B, Remediation Area D was modeled as four separate areas primarily due to contaminant concentration and distribution. However, groundwater velocities across Remediation Area D generally decrease moving east from the SMU 2 ILWD Area to the Eastern Area. As a result, groundwater distributions were developed for the cap model in each of the four areas of Remediation Area D as well as in three wetland areas along this shoreline (i.e., Wastebed B Outboard Area West, Center, and East).

For purposes of cap modeling Remediation Area E was subdivided into three model areas based on contaminant concentrations and distribution. However, a close review of the groundwater data and underlying geology in Remediation Area E shows a consistent silt/clay unit thickness and does not give any reason to expect spatial variability in upwelling velocities in the offshore areas. This is supported by the scatter in the upwelling data, lack of a clear spatial pattern throughout Remediation Area E, and similarity in upwelling statistics among the data from within each of the three modeling areas. Therefore, the chemical isolation layer design modeling does not use different groundwater upwelling rates in the three model areas, and rather bases each on the full upwelling data set from Remediation Area E.

Section 3
Measurements of Upwelling Velocities

Three types of field methods were implemented in an attempt to quantify groundwater discharge rates to the remediation areas in Onondaga Lake; 1) a piezometer-based method to measure hydraulic heads in the sediment pore waters, 2) seepage meters to directly measure groundwater discharge, and 3) measurement of chloride concentration profiles below the sediment-water interface to estimate groundwater flow rates through the sediments. The piezometer-based method consisted of a network of piezometers with recording devices that were installed within the lake sediments in late 2002 and monitored through July 2003 as part of a study known as the Groundwater Upwelling Investigation (Parsons, 2003). The intent of this method was to measure upward hydraulic gradients within the lake sediments and to covert the hydraulic gradients to upwelling velocities using estimates of the vertical hydraulic conductivity of the sediments. Two studies were conducted to evaluate the use of seepage meters, which directly measure groundwater discharge. An initial study was conducted with six meters in 2005 and a second study was conducted with thirteen seepage meters in 2007. Several field methods were also evaluated to measure and/or estimate sediment chloride concentrations; measurement of sediment conductivity using a direct push conductivity probe, Vibracore sampling with centrifugation of sediment samples to obtain sufficient pore water for analysis of chloride, and in-situ peepers. Each of the field methods implemented in an attempt to quantify groundwater discharge rates is described below. The work plan for the data collection activities and quality assurance plans are described in numerous documents prepared by Parsons (2003, 2005a, 2005b, 2006, 2007a, 2007b, 2007c, 2007e, 2007f, 2007g, 2007h, 2007i, 2008a, 2008b, 2008c, 2008d, 2008e, 2008f, 2008g, 2009a, 2009b, 2009c, 2009d, 2009e, and 2009f).

In addition to the quantitative methods implemented in the field, an additional method was used to qualitatively screen the lake bottom for locations with potentially anomalous groundwater discharge rates such as subaqueous springs and seeps. This method consisted of towing a conductivity and temperature sensor near the lake bottom and analyzing the data for anomalous temperature and conductivity readings that might potentially indicate areas of elevated groundwater discharge. Two surveys were conducted: one in 2005 and a second in 2007. This qualitative investigation of groundwater discharge is described below followed by a discussion of the quantitative methods.

Other techniques for estimating groundwater fluxes were considered but rejected as not feasible for use in Onondaga Lake. An excellent review of field techniques for estimating water fluxes between groundwater and surface water has been published by the USGS (Rosenberry and LaBaugh, 2008). A technique frequently used for quantitatively estimating groundwater fluxes is temperature. The seminal paper regarding this issue is Bredehoeft and Papadopulos (1965) "Rates of vertical groundwater movement estimated from earth's thermal profile." Temperature techniques for estimating groundwater velocities, as noted by Sayles and Jenkins (1982), work best for upwelling velocities of greater than 50 cm/yr. A recently developed technique for using temperature to quantify groundwater discharge is based on collecting time-series data at various depths below the sediment-water interface and evaluating how the temperature signal is attenuated with depth. A description of this method is contained in Keery and others (2006). An evaluation of this method indicated that the resolution of this method was on the order of 200 cm/yr. Recent advances in fiber-optic temperature sensing have indicated the potential of

this technique to accurately define temperatures at the sediment water interface but the technique does not yet lend itself to the quantitative estimation of upwelling velocities (Day-Lewis and others, 2006).

Temperature and Conductivity Survey

Two temperature and conductivity surveys were conducted in the lake to identify areas of groundwater discharge. These surveys were designed to qualitatively identify areas of groundwater discharge, but not to quantify the rate of groundwater discharge. The areas of potential groundwater discharge identified by these methods were then investigated by other methods in an attempt to quantify the discharge rates.

The first survey was conducted on September 7 and 8, 2005 using a Hanna S6T2 temperature and conductivity meter that was towed near the lake bottom from a slowly moving boat. Measurements were conducted in transects along the shoreline east of Ninemile Creek and conducted along the northern portion of the shoreline in Remediation Area E. The measurements along the shoreline east of Ninemile Creek did not identify potential groundwater discharge areas, as neither temperature nor conductivity changed significantly across the survey transects. In Remediation Area E, one potential upwelling location, which was identified by an approximately 1.5°F decrease in temperature and an increase in conductivity, was observed. A seepage meter was located at the observed temperature and conductivity anomaly (meter 60052 as described below).

A second and much more comprehensive temperature and conductivity survey was conducted from April 24 to 26, 2007 in Remediation Areas A and E. For these surveys, a YSI 6600 series multi-parameter sonde was used to measure water temperature, specific conductance, salinity, dissolved oxygen, turbidity, and sensor depth. The sensor was mounted in a custom built steel cage and towed with a 15-ft. jon boat as close to the bottom as possible. As an initial calibration step, the unit was tested on a known brine spring in Onondaga Creek to ensure it would identify a large anomaly in the groundwater discharging through the sediments. This screening step was successful in identifying the location of a large spring in lower Onondaga Creek. The survey was conducted by running transects approximately 25 ft. apart along the shoreline from water depths of about two ft. to six ft. Figures displaying the temperature and conductivity data collected during this survey are contained in Attachment II. For the most part, the temperature and conductivity patterns are consistent and uniform with very few anomalies suggesting potential groundwater seeps. One distinct anomaly of higher conductivity was observed along the shoreline east of the mouth of Ninemile Creek and a seepage meter cluster was located in this area (Seepage Meter Cluster 4-2 as described below). Another conductivity anomaly was observed adjacent to the shoreline east of Harbor Brook and a seepage meter cluster was located in this area (Cluster 7-1 as described below).

Groundwater Upwelling Investigation – 2003

A groundwater upwelling study was conducted in Remediation Area A near the mouth of Ninemile Creek and in Remediation Areas C and D in 2002 and 2003 (Parsons, 2003). The study consisted of vibrating wire piezometers emplaced in pairs at depths of 4.5 and 14.5 ft. below the sediment-water interface at three or four locations along each of six transects oriented approximately perpendicular to the shoreline. The locations of the piezometers are shown on Figure 8. Hydraulic pressures were recorded every twelve hours at these locations from December 27, 2002 through August 1, 2003.

The data from the one transect with three sets of piezometers in Remediation Area A provided relatively consistent estimates of hydraulic heads in the sediments. The piezometer pairs in the transect in Remediation Area A were located 25 ft., 538 ft. and 1,011 ft. from the shoreline. The sediments along this transect are primarily silts with some sands and clays (refer to hydrogeologic cross-section shown on Figure 4; the cross-section trace is shown in Figure 1).

The average upward hydraulic gradient, during the period investigated, calculated as the pressure head difference between the piezometers at a depth of 14.5 ft. and the one at a depth of 4.5 ft., ranged between 0.01 and 0.027 ft. per foot at the three piezometer pairs (Attachment III). The estimated vertical hydraulic conductivity of the sediments based on the lithologic characteristics of the sediments between a depth of 4.5 ft. and 14.5 ft. is approximately 10^{-5} cm/sec. Based on this estimate of the hydraulic conductivity, the upwelling velocity along the transect ranges from about 3 to 8 cm/yr, with the range merely reflecting the variability in the estimate of the hydraulic gradient. There is also uncertainty associated with the hydraulic conductivity estimate.

The piezometer-based method was determined not to be a suitable method for estimating groundwater discharge rates to the lake for purposes of cap design. There were two main reasons why it was judged to not be suitable: 1) it is logistically difficult to collect data from a large number of locations, and 2) it is difficult to obtain reliable estimates of pore water pressures from the vibrating wire piezometers for reasons that could not be fully explained. It is hypothesized that the accumulation of biogenically generated gas in the sand packed interval in which the piezometers were placed led to anomalous pressure measurements.

Seepage Meter Investigations

Two seepage meter investigations were conducted during pre-design investigations for the lake. One was conducted with six seepage meters as part of the Phase I Pre-Design Investigations in 2005 and the second was conducted with 13 seepage meters as part of the Phase III Pre-Design Investigations in 2007. The seepage meters used in this study were an adaptation of the type of seepage meter described by Lee (1977).[4] These two seepage meter investigations are described below.

Seepage Meters – Phase I Investigation

The seepage meters used in the Phase I Investigation were constructed with two-foot diameter PVC housing and an interior acrylic dome. Each meter consisted of two sections: a lower section that was installed into the sediment, and an upper section that housed the dome and a thin-walled Teflon sample bag. The two sections joined at a sealed male-to-female fitting to ensure that there was no leakage. The seepage meters were installed as a two-step process. First, the lower section of the seepage meter was slowly pushed 12 to 18 in. into the lakebed. After a stabilization period of at least 24 hours, the top and bottom sections of the meter were attached with a gasket to create a water-tight seal and bolted together using threaded steel rods. Finally, the four-liter measurement bags were prefilled with 60 ml of water and attached to the seepage meters.

[4] A useful review of seepage meters is contained in Rosenberry (2005) and Roseberry and LaBaugh (2008). The use of seepage meters to investigate groundwater discharge to lakes in central New York is discussed in Schneider and others (2004) and Sebestyen and others (2001).

Three seepage meters were installed in Remediation Area A and three were installed in Remediation Area E at the locations shown on Figures 9 and 12. One of the meters installed in Remediation Area A was located adjacent to a piezometer pair installed as part of the upwelling investigation described above. The meters in Remediation Area A were installed between 325 ft. and 820 ft. from shore, and the meters in Remediation Area E were installed between 200 ft. and 430 ft. from shore based on access and water depth constraints. The meters were monitored approximately weekly from September 16 through November 15, 2005.

There was significant variability in the weekly measurements of upwelling velocities at each of the meters, even though the piezometer data indicated that hydraulic gradients were relatively constant during the period of the study. An analysis of the data that were collected indicates that the volume of water collected in the seepage meter bags was influenced by multiple factors in addition to the ambient flux of groundwater through the sediments. Initially following seepage meter installation, gas production from decaying vegetation appears to have significantly influenced the rate of water accumulation, and as a result, data from the early period are not useful for estimating groundwater fluxes through the sediments. Settlement of the seepage meters was also a major factor influencing the rate of water accumulation resulting from high winds and resulting waves impart forces on the meters. A very small amount of settlement results in a relatively large volume of water accumulation in the collection bags relative to the amount of water accumulation from the ambient seepage flux. As a result, the groundwater flux through the sediments could not accurately be estimated directly from the water that accumulated in the seepage meter collection bags. The measured weekly upwelling velocities at the six seepage meters are shown on figures in Attachment IV.

Lake levels were relatively stable and gas production, at five of the six meters, was relatively constant during the period October 27 to November 15, 2005. Therefore, the amount of water that accumulated in the collection bags during this period can be attributed both to settlement (in part caused by wind and wave action) and ambient groundwater flux. Based on data from this period, the median combined settlement-induced flux and groundwater flux at each of the meters, with the exception of 60053 (SM-6) where gas production varied significantly during this period, are the following:

40013 (SM-1) – 19 cm/yr
40014 (SM-2) – 4 cm/yr
40015 (SM-3) – 44 cm/yr
60051 (SM-4) – 9 cm/yr
60052 (SM-5) – 10 cm/yr

These fluxes represent an upper bound estimate of the groundwater flux as it is likely that the settlement induced flux was significant but insufficient reference data were available to determine the exact amount of settlement.

Seepage Meters – Phase III Investigation

The seepage meters used in the Phase I Investigation were redesigned for the Phase III Investigation based on issues identified with the original meters. The meters were redesigned to reduce impacts of waves (e.g., wave breaks, stabilization poles, etc.) and to reduce settlement. In addition, larger volume bags were used for sample collection and control bags were used at each

meter to assess outside factors influencing water accumulation in the bags. The control bags were based on the design described in Cable and others (2004). In addition, wave height was monitored to account for any influences caused by wave action, centimeter scale measurements of meter elevations were made to assess settlement, and water levels were monitored in the lake and in on-shore monitoring wells to assess changes in horizontal gradients towards the lake during the investigation. A photograph of a redesigned seepage meter is shown in Attachment IV.

Seepage meters were installed at five locations during the Phase III Investigation: three in Remediation Area A, and two in Remediation Area E. Multiple meters were used at each location to assess the reproducibility of results. At three of the locations, three seepage meters were installed in close proximity to each other. At the other two locations, two meters were installed in close proximity to one another. The seepage meters were located as follows:

- Cluster 4-1 was located near the shoreline approximately 900 ft. east of Ninemile Creek to evaluate a temperature and conductivity anomaly at this location. These meters are labeled 40097, 40098, and 40122 on Figure 9.
- Cluster 4-2 was located about 1,300 ft. east of Ninemile Creek to evaluate a temperature and conductivity anomaly at this location. These meters are labeled 40095 and 40096 on Figure 9.
- Cluster 4-3 was located approximately 1,600 ft. east of Ninemile Creek to evaluate potential groundwater discharge from the distal end of a buried former channel of Ninemile Creek. These meters are labeled 40099, 40100, and 40101 on Figure 9.
- Cluster 7-1 was located approximately 350 ft. east of Harbor Brook to evaluate a conductivity anomaly at this location. These meters are labeled 70067, 70068 and 70069 on Figure 12.
- Cluster 7-2 was located approximately 1,000 ft. east of Harbor Brook. These meters are labeled 70065 and 70066 in Figure 12.

The seepage meters were monitored approximately weekly from June through August, 2007. The measured upwelling velocities at each of the seepage meter clusters are shown on figures in Attachment IV.

The results of the Phase III seepage meter study indicated that seepage meters are not a reliable method for measuring small upwelling velocities in Onondaga Lake. The results indicated that seepage meters do not consistently provide a reliable estimate of the “true” upwelling velocity. This conclusion is based on the following observations:

- The seepage meter data from the near-shore portion of Remediation Area A indicate negligible groundwater discharge whereas other lines of evidence (pore water chloride profiles and groundwater modeling) indicate that quantifiable groundwater discharge is occurring.
- The upwelling velocities at seepage meter pairs and triplicates showed little correlation between/among meters.
- The upwelling velocities calculated from the control bags were of the same order of magnitude as the rates calculated from the meters. In addition, upwelling velocities calculated from the control bags do not correlate temporally among locations.

Overall, the lack of reproducibility between/among meters at the five cluster locations indicated that the seepage meters were not a reliable method for estimating upwelling velocities of the magnitude that occur in Onondaga Lake. Therefore the data collected in the seepage meter investigations were not used for the development of the upwelling estimates for the cap design.

Chloride-Depth Profiles

Effler and others (1990) noted that chloride concentrations in the shallow sediments beneath Onondaga Lake increased nearly linearly with depth. They noted that this indicated a diffusive flux of chloride to the lake from a deep source of chloride. The source of chloride is now understood to be primarily halite brines within the glacial deposits that fill the Onondaga Trough and leachate from seepage from the wastebeds. TAMS (2002) noted that the chloride gradients beneath Onondaga Lake were not truly linear and that the deviation from linearity could be used to estimate the upwelling velocity.

The use of chemical concentration gradients in sediments to investigate upwelling velocities was first reported in the literature in 1982 when two studies were published that quantified upwelling velocities in the Pacific Ocean. One study used calcium and magnesium ion gradients to quantify upwelling velocities in the range of 1 cm/yr to 20 cm/yr near the Galapagos Islands, and the other study in the equatorial East Pacific Ocean quantified upwelling velocities of about 20 cm/yr using calcium ion gradients and the ratio of helium-4 to helium-2 (Maris and Bender, 1982; Sayles and Jenkins, 1982). Additional studies that have described the use of chemical concentration gradients in sediments to estimate upwelling velocities include Berg and Risgaard-Petersen (1998), Maris and others (1984), and Anati (1994). All of these studies have indicated that the use of chemical concentration gradients is a useful method for quantifying upwelling velocities that are less than approximately 50 cm/yr. Groundwater flow rates through lake sediments were also evaluated using tritium and chloride concentration depth profiles in sediments by Cornett and others (1989).

The section below describes the theoretical basis for the use of chemical concentration gradients in sediments to estimate upwelling velocities, the field methods that were investigated for measuring and/or estimating chloride concentrations in pore water, and the method of data evaluation.

<u>Description of Method</u>

At steady state conditions, the governing equation for vertical migration of chloride by advection with groundwater and diffusion is:

$$0 = -v\frac{\partial c}{\partial z} + D\frac{\partial^2 c}{\partial z^2} \qquad \text{for} \quad 0 \le z \le L \tag{1}$$

with the following boundary conditions:

$$c(z,0) = c_o; \quad c(0,t) = c_o; \quad \text{and } c(L,t) = c_L$$

where: c = chloride concentration,
c_o = chloride concentration at upper boundary;
c_L = chloride concentration at lower boundary;

L = length of domain;
v = seepage velocity (Darcy velocity divided by porosity);
D = sum of diffusion and dispersion coefficients.

An analytical solution to this equation developed by Al-Niami and Rushton (1977) was used to solve Equation 1 and was implemented in a Microsoft Excel spreadsheet to analyze the chloride depth profiles. The upwelling velocity was calculated by solving Equation 1 in an iterative manner until there was a good correspondence between the calculated and the measured chloride depth profile.

In evaluating chloride-depth profiles using Equation 1, it is important to note that the steepest concentration gradients occur near the sediment-water interface. As a result, calculated upwelling velocities are most sensitive to the chloride data collected near the interface. In applying Equation 1 to the evaluation of upwelling velocities for purposes of this report, a preference was given to using only data from the upper 5 ft. of sediment to estimate the upwelling velocity as deviations from linearity, if there were any, were most pronounced in this depth range. All profiles, though, were analyzed using data from the upper 5 ft. as well as data from the entire depth profile, which typically consisted of data to a nominal depth of about 9 ft. below the interface.

Model Parameters

The use of Equation 1 to analyze steady-state concentration profiles requires the definition of the parameter D, which is the sum of the diffusion and dispersive coefficients. The parameter D is defined as:

$$D = \omega D^* + \alpha_L v \qquad (2)$$

where D^* is the diffusion coefficient, ω is coefficient related to tortuosity and α_L is dispersion length.

The coefficient related to tortuosity is defined based on Boudreau (1996) as:

$$\omega = n/(1 - \ln(n^2)) \qquad (3)$$

where n is the porosity.

These parameters are a function of two characteristics of the sediment media, porosity and dispersion length; and a function of the diffusion coefficient of chloride in pore water. For purposes of the analysis of the chloride depth profiles from sediments of Onondaga Lake, the following values for these characteristics were used:

- A porosity value of 0.65 was used for evaluation of chloride depth profiles from Remediation Area C, a value of 0.75 was used for Remediation Area A, and a value of 0.70 was used for Remediation Area E. Sediment porosity was measured at multiple depths at 64 Vibracore locations; the average porosity at these 64 locations is shown on Figure 13. The available porosity data are listed in Attachment V.

- The dispersion length was calculated using equation (26) in Neuman (1990), which was developed to calculate the scale dependence of the dispersion length. This equation is: $\alpha_L = 0.0169L^{1.53}$, where L is length of the flow field in meters (note that equation requires that L be in units of meters). For a flow field length of 5 ft. the calculated dispersion length is about 0.1 ft. The use of this method to estimate the dispersion length and alternative methods for estimating the dispersion length are discussed in detail in Attachment XI.
- The effective diffusion coefficient for chloride was specified as 1.235 cm^2/day based on Felmy and Weare (1991) for a brine at 11º C.

An assumption implicit in the use of Equation 1 to estimate upwelling velocities is that the chloride concentrations in the sediments are at steady state; that is concentrations are not changing with time. A series of evaluations was conducted to determine the time required to reach steady state in shallow sediments after the sediments were disturbed. The calculations indicate that steady state is typically reached within a few decades. These calculations are described in Attachment VIII. In addition, it is assumed that chloride is neither being produced by dissolution nor lost by precipitation or sorption within the sediments. This is a valid assumption in most of the remediation areas but in some locations, particularly in areas with in-lake waste deposits, it appears that this assumption may not be valid. As a result, this method was not used to evaluate upwelling velocities in areas known to contain in-lake waste deposits.

Measurement of Sediment Chloride Concentrations

The initial method used to measure sediment chloride concentrations in sediment pore water was to collect cores using the Vibracore method, section the cores into 1.0 ft. intervals, centrifuge the cores, and then analyze the pore water for chloride and specific conductance. After evaluation of the data from the Phase I Pre-Design Investigation, it was determined that data at closer intervals were required for accurate analysis of the chloride-depth profiles. As a result, in Phase II the cores were sectioned into 0.5-ft. intervals. In Phase III, the upper 2 ft. of core were sectioned into 0.2 ft. intervals, but the pore water centrifuged from these small sections was only sufficient for analysis of chloride and specific conductance. All other pore water samples from Phase III were analyzed for common anions and cations, including chloride, and specific conductance. The cation-anion balance and the correlation between specific conductance and chloride were used to evaluate data quality.

In Phase II, the use of diffusion samplers (peepers) also was investigated for obtaining estimates of chloride concentrations in pore water. Fourteen extended peepers were installed at the five seepage meter clusters to approximate depths of 8 to 9 ft. The stainless steel peepers consist of a series of cells spaced at 0.5 ft. intervals that are filled with deionized water and covered with a membrane. Ions in the sediment pore water diffuse across the membrane and the peeper is kept in place ideally until equilibrium is reached between the cell and the pore water. The peepers in the Phase II investigation were left in place for approximately one week prior to retrieval. Pore water samples were collected from locations adjacent to each of the peepers and the concentrations measured in the pore water by centrifugation were compared to those determined from the peepers. In almost all cases, the measured chloride concentrations in the pore water were higher than the chloride concentrations in the peepers. This is consistent with the results of the laboratory study conducted by Jackson and Anderson (2007) that indicated that chloride equilibrium requires much longer deployment time than one week. Diffusion samplers

were also installed in each of the five seepage meters cluster in the Phase III investigations. These samplers were left in place for approximately three to five weeks and in general the chloride concentrations determined from these diffusion samplers were also lower than those measured in centrifuged pore water. The chloride depth profiles determined from the diffusion samplers in Phase III are shown along with the chloride depth profile from a nearby vibracore location in Attachment XII.

Because it is labor intensive to collect and centrifuge core samples for pore water analyses and to use extended peepers, alternative techniques were investigated for rapidly estimating sediment pore water chloride concentrations. The most promising technique identified was the measurement of sediment conductivity with a probe advanced into the sediment and subsequent conversion of conductivity to equivalent chloride concentrations. The main technical weakness of this technique is that sediment conductivity is not the same as pore water conductivity as a conductivity probe in contact with sediment measures a response that is both a function of the sediment matrix and the characteristics of the pore water. In these investigations it was determined that there was a relatively good correlation between sediment conductivity and pore water conductivity. The relationship between sediment conductivity and pore water conductivity, though, is a function of sediment characteristics and at locations where sediment characteristics were variable, conductivity depth profiles were also variable as the result of changing sediment characteristics.

A Geoprobe SC4000 soil conductivity probe was used for measuring sediment conductivity. The probe uses a four-pole Wenner-type array; current is passed through the outer contacts of this array and voltage is measured on the inner two contacts. Conductivity and temperature measurements were made at 0.05 ft. intervals as the probe was advanced. Most probes were advanced to a depth of approximately 10 ft.

The conductivity data were converted to equivalent chloride concentrations using a conversion factor. A conversion factor of 0.89 was used to convert from conductivity in uS/cm^2 to mg/L chloride in Remediation Areas A, B and C and a factor of 0.80 was used in Remediation Areas D and E. These factors were developed from comparisons of pore water chloride and sediment conductivity data collected in close proximity to each other. The calculated upwelling velocities are not sensitive to the conversion factor as the conversion factor merely scales the chloride depth profile and does not affect the convexity of the profile. Attachment VI contains plots of chloride concentrations and conductivity versus depth for 31 locations where both pore water and sediment conductivity data were collected. In general, the shapes of the depth profiles are similar for both the pore water data and the sediment conductivity data.

There are inherent strengths and weaknesses with both methods used to construct chloride depth profiles. The chloride-depth profiles constructed from chemical analyses of pore water provide a more accurate estimate of actual changes in chemical concentrations with depth because the parameter of interest, chloride, is measured directly. The main weakness with the chloride-depth profiles developed from pore water is related to the fact that the measured concentrations represent an average concentration over the section of core analyzed. As a result, it is not possible to accurately define the chloride-depth profile very near the sediment-water interface where the chloride concentrations change rapidly with depth. The sediment-conductivity data collected with the Geoprobe conductivity probe, on the other hand, are an approximate analog for chloride concentrations in pore water, but because the probe does not measure pore water properties alone; variations in conductivity measurements with depth are

also related to changes in the physical/chemical properties of the sediment. This method, though, allows variations in conductivity near the sediment water interface to be determined very precisely. Recognizing the strengths and limitations of the two methods leads to the conclusion that both methods can be used to provide reliable estimates of upwelling velocity.

Field Investigations

Chloride-depth profiles were constructed and used to calculate upwelling velocities at 356 locations within and in the vicinity of the Remediation Areas[5]. At 156 locations chloride-depth profiles were developed from analyses of pore water collected from cores during the Phase II, Phase III, Phase V and Phase VI Investigations, and at 245 locations chloride-depth profiles were developed from sediment conductivity data collected in the Phase III and Phase IV Investigation in 2007 and 2008[6]. Pore water data from 72 locations sampled as part of the Lake RI and 10 locations as part of the Phase I Pre-Design Investigation were not used for estimating upwelling velocities because of a limited number of depth-discrete samples collected at each location. In addition, sediment conductivity data collected as part of the DNAPL Investigation (Parsons, 2006) near the Causeway and in Phase II were not used for estimating upwelling velocities because of a lack of standardization in collection of the data. The table on the following page lists all of the investigations in which pore water and sediment conductivity data were collected, the number of locations at which data were collected, and comments regarding data collection.

Only limited sediment conductivity data and pore water data were collected for purposes of estimating upwelling velocities in areas with thick Solvay deposits. During the early phases of this study it was determined that chloride-depth profiles in the Solvay deposits could not be interpreted to reliably estimate upwelling velocities. This has been interpreted to be the result of chemical interactions between the pore water and the Solvay matrix that affect pore water chloride concentrations

Initial Data Evaluations

The following steps were completed initially to evaluate the data that were collected:

1. Anion-cation balances were calculated for the pore water analyses; the balances are listed in Attachment V. In a number of instances, the error in the anion-cation balance was greater than twenty percent. Based on an evaluation of chloride concentrations and specific conductance, it was determined that the error was generally attributable to an under-reporting of cation concentrations. Plots were completed of conductivity versus chloride for data from each Vibracore location with applicable data, to identify chloride data that were outliers.
2. Plots of conductivity versus depth and chloride versus depth were developed for each location with co-located Geoprobe and Vibracore data, and a relationship was developed between the conductivity values from the Geoprobe and the chloride concentrations from pore water collected from the cores. These plots are contained in

[5] Upwelling velocities were estimated from the analysis of 474 chloride-depth profiles collected at 356 locations; 167 profiles developed from pore water data and 307 profiles developed from sediment conductivity data. Data from 25 chloride-depth profiles were not analyzable.

[6] At 31 locations chloride-depth profiles were developed from both pore water data and sediment conductivity data.

Attachment VI for 31 locations with Geoprobe and Vibracore data. A linear factor relating the chloride concentration to conductivity was calculated using the Solver routine in Excel in which the sum of the squared differences between calculated chloride concentrations and observed chloride concentrations were minimized. The calculated factors for each of the thirty-one locations are listed in Attachment VI.

Pore-Water and Sediment Conductivity Data

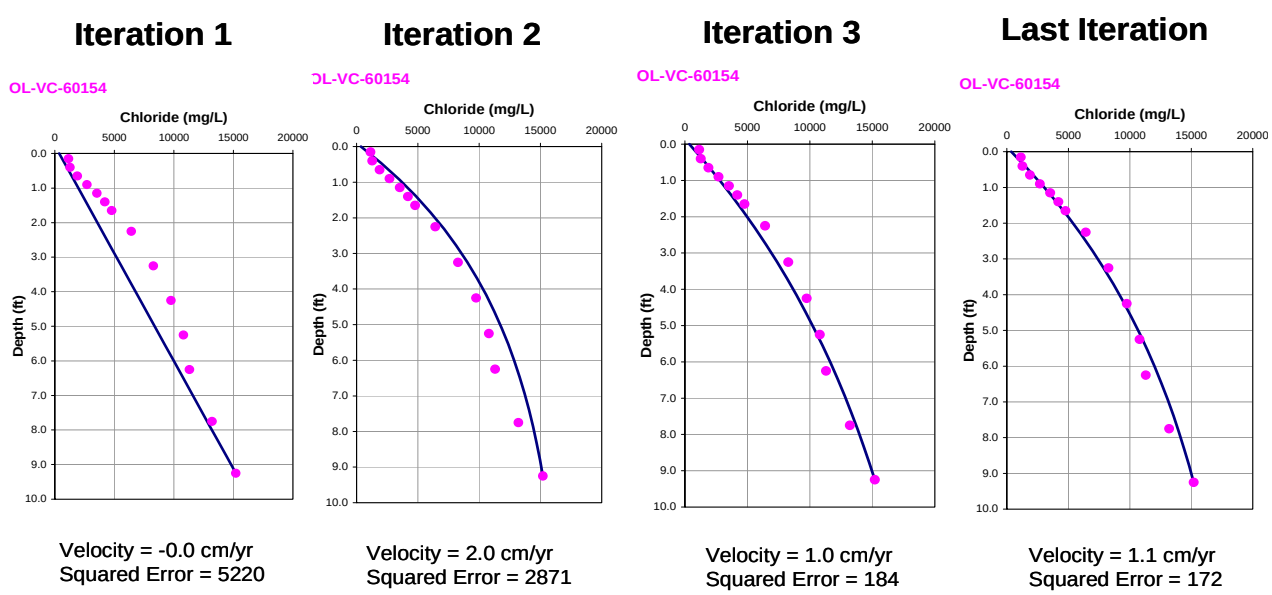
Type	Study Phase	Date	Locations	Comments
Pore Water	RI	1992	72	Borings were advanced throughout the lake to a nominal depth of 3 ft. and generally three to five subsamples from each boring analyzed for chloride. These data were not used to calculate upwelling velocities because of limited depth-discrete data.
	Phase 1 PDI	2005	10	Sediment samples collected at nominal depths of 1, 3, and 5 ft. and pore water collected by centrifuging the samples. These data were not used to calculate upwelling velocities because of limited depth-discrete data.
	Phase II PDI	2006	13	Sediment samples collected at 1 ft. depth intervals to 10 ft. and pore water collected by centrifuging the samples.
	Phase III PDI	2007	21	Sediment samples collected at 1 ft. depth intervals to 10 ft. and pore water collected by centrifuging the samples. Collocated with seepage meters and Geoprobes.
	Phase III PDI Addendum 5	Dec 2007	30	Pore water collected by centrifuging sediments from approximate intervals of 0.0-0.3 ft., 0.3-0.5 ft., 0.5-0.8 ft., 0.8-1.0 ft., 1.0-1.3 ft., 1.3-1.5 ft., 1.5-1.8 ft., 2-2.5 ft., 3-3.5 ft., 4-4.5 ft., 5-5.5 ft., 6-6.5 ft., 7-7.5 ft., 8-8.5 ft., and 9-9.5 ft.
	Phase V	2009	23	Pore water collected by centrifuging sediments from intervals of 0-0.25 ft., 0.25-0.5 ft., 0.5-0.75 ft., 0.75-1.0 ft., 1.0-1.25 ft., 1.25-1.50 ft., 1.50-1.75 ft., 2.0-2.5 ft., 3.0-3.5 ft., 4.0-4.5 ft., 5.0-5.5 ft., 6.0-6.5 ft., 7.5-8.0 ft. and 9.0-9.50 ft..
	Phase VI	2010	69	Pore water collected by centrifuging sediment from same intervals as in Phase V.
Sediment Conductivity	DNAPL Investigation	2006	20	Advanced along the causeway in SMU 2 to a nominal depth of 45 ft. using a Geoprobe fitted with a MIPs and conductivity detector. These data were not used to estimate upwelling velocities.
	Phase II PDI	2006	68	Advanced using Geoprobe method to nominal depth of 10 ft. These data were not used to estimate upwelling velocities.
	Phase III PDI	2007	39	Advanced using Geoprobe method to nominal depth of 10 ft. in proximity to five seepage meters in SMU 4 and SMU 7.
	Phase III PDI Addendum 5	2007	82	Advanced using Geoprobe method to nominal depth of 10 ft.
	Phase IV PDI	2008	124	Advanced using Geoprobe method to nominal depth of 10 ft.

3. Plots of porosity versus depth were prepared for each of the Vibracore locations. These plots are contained in Attachment V. The porosity was determined in the laboratory according to method ATSM D-2216 from samples collected with Vibracore. An average porosity was calculated for each location and the average porosity values at each of the Vibracore locations are shown on Figure 13.

4. Plots of sodium and sodium-calcium ratio versus depth were prepared for each of the Vibracore locations. These plots are contained in Attachment V.

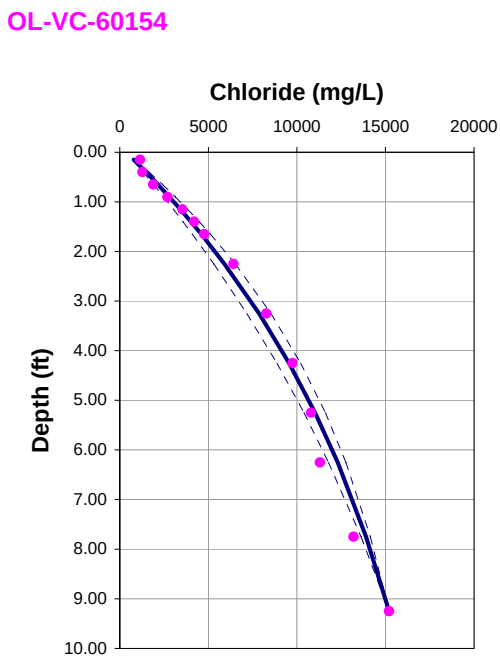
Section 4
Upwelling Velocities Calculated from Chloride-Depth Profiles

The chloride-depth profiles developed from pore water data and sediment conductivity data collected in the littoral zone in, and in the vicinity of, the remediation areas were analyzed using the procedures described in the previous section. Plots of the chloride-depth profiles are contained in Attachment VII. In total, as a result of duplicate and triplicate data collected at some locations, 474 chloride-depth profiles were developed for 356 locations. The analysis consisted of iteratively solving Equation 1, described in Section 3, using various values of the upwelling velocity until a "best fit" between the calculated and the measured chloride depth profile was obtained. The "best fit" was, in the ideal case, defined as a solution in which the sum of the squared differences between the measured and calculated chloride values was minimized. An example of the iterative process is illustrated below for the analysis of the pore water chloride data from location OL-VC-60154. An initial estimate of the upwelling velocity is 0.0 cm/yr, which produces a sum of the squared differences between the calculated and measured values (squared error) of 5220. A second estimate of the upwelling velocity of 2.0 cm/yr[7] produces a squared error of 2871, a third estimate of the upwelling velocity of 1.0 cm/yr produces a squared error of 184 cm/yr, and finally after many more iterations a final solution of 1.1 cm/yr is calculated with a squared error of 172.



[7] In this text a positive upwelling velocity indicates groundwater flow towards the sediment-water interface. This direction is opposite the standard groundwater convention in which a "positive" velocity indicates downward flow. In Attachment VII, the standard groundwater convention was used; thus for location OL-VC-60154 the "best fit" velocity is listed as "-1.0" rather than "1.0" as described above.

The iterative solutions were calculated with the assistance of the Solver routine in Excel,[8] which is designed to find the solution that minimizes the squared error. In this example, relatively small changes in the upwelling velocity produce large changes in the squared error; for example changing the velocity from 2 cm/yr to 1 cm/yr reduces the squared error from 2871 to 184. This sensitivity of the squared error to the velocity in this example indicates that the upwelling velocity can be accurately quantified from the measured data[9]. The upwelling velocities that were calculated for each of the chloride-depth profiles are shown on Figures 14 through 16 for Remediation Areas A, C, and E, respectively. On these figures, the values from the "best fit" solutions to Equation 1 for each of the chloride-depth profiles that were analyzed are shown on the plots in Attachment VII along with the parameter values used in solving Equation 1.



An example plot for pore water data from OL-VC-60154 is shown above. The solid line indicates the "best fit" solution with a velocity of 1.1 cm/yr, and the dashed lines indicate solutions for velocities of 1.1 ± 30% cm/yr. A rigorous quantitative evaluation of the uncertainty associated with the "best fit" solution is described in Section 6.

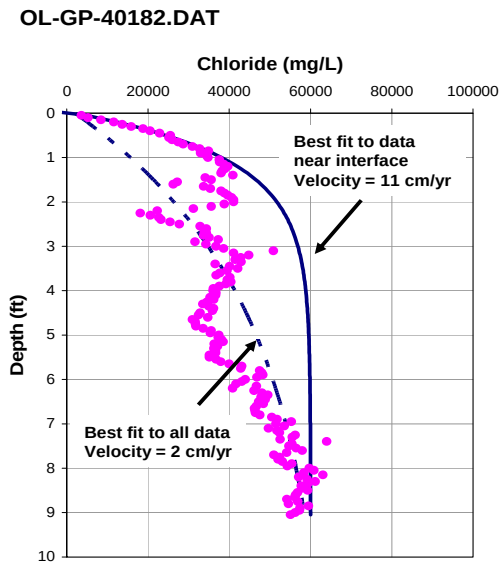
In analyzing the chloride-depth profiles, a "best fit" solution was calculated based on an analysis of data from the sediments within 5 ft. of the sediment-water interface and a "best fit" solution was calculated based on data from within the upper 10 ft. of the sediment-water interface. "Best fit" solutions were calculated using the two data sets to check the consistency of the calculated upwelling velocity and these results are shown on the plots in Attachment VII. In most cases, similar upwelling velocities were calculated using data from the upper 5 ft. and data from the upper 10 ft. In general for purposes of evaluating the spatial distribution of upwelling velocities, the higher of the two estimates was used and this value is posted on Figures 14 through 16[10].

[8] Microsoft Office Excel 2003 was used for these analyses.

[9] This example oversimplifies the analysis of the data from OL-VC-60154 since in determining the "best fit" solution both the velocity and the concentration at the lower boundary were adjusted in the iteration process.

[10] An exception was when the data from the upper five ft did not correspond to the "best-fit" depth profile as well as data from the upper 10 ft. (or vice versa); in these cases, the "best-fit" solution that better fits the data is the value listed on Table 1 and posted on Figures 14 through 16, and a comment is included in Table 1 and Table VII-1.

At some locations, the measured chloride-depth profile did not exhibit a smooth change in chloride concentrations with depth. As a result, the correspondence between the "best-fit" solution to Equation 1 and the measured data is poor. An example of a chloride-depth profile where the "best-fit" solution poorly matches the observed data is at location OL-GP-40182 where the chloride-depth profile was developed from sediment-conductivity data; the data from this location is shown on the figure to the right. A "best-fit" solution to the entire data set and a "best-fit" solution to the data near the sediment-water interface for this location are also shown on that figure. The upwelling velocity corresponding to the "best-fit" solution to the data near the interface is about 11 cm/yr and the velocity corresponding to the "best-fit" solution to the entire data set is about 2 cm/yr.

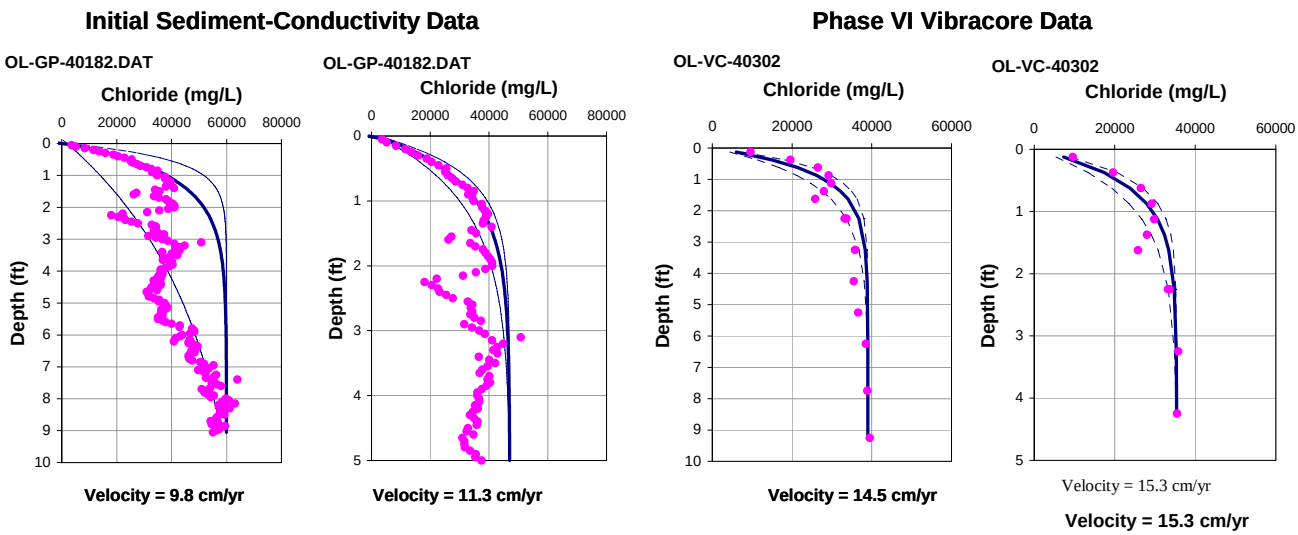


The calculated chloride-depth profiles of the "best-fit" solutions increase monotonically with depth whereas the data from OL-GP-40182 display significant scatter between a depth of about 1 ft. and 5 ft. below the sediment-water interface that is inconsistent with the calculated "best-fit" profiles. The deviation between the form of the measured data and the underlying model could be caused by a number of factors, but insufficient information is available to identify the main factors. It is suspected that a major factor is a poor correspondence between the sediment conductivity reading and the conductivity of the pore water due to variations in lithology with depth and variations in the contact between the probe and the sediment with depth. The sediment-conductivity data from near the sediment-water interface are judged to be more representative of actual conditions because the data provide a smooth chloride-depth profile that is consistent with the analytical model at this sampling location. Therefore, the "best-fit" solution to the data near the sediment-water interface provides a better estimate of actual upwelling velocity than the "best-fit" solution to the entire data set from the upper 9 ft. of sediment.

Table VII-1 includes notes indicating the quality of the upwelling analysis, which is a qualitative assessment of how well the measured data matched the chloride-depth profiles calculated using Equation 1. The quality of the upwelling analysis for about 65 percent of the chloride-depth profiles based on pore water data and for about 54 percent of the chloride-depth profiles based on sediment-conductivity data are judged to be "good." For these chloride-depth profiles the chloride concentrations generally increase monotonically with depth with little scatter and there is a good correspondence between the observed and calculated chloride-depth profiles. For these analyses, there is a high degree of confidence in the calculated upwelling velocities. On the other hand, the quality of the upwelling analysis for about 8 percent of the chloride-depth profiles based on pore water data and about 14 percent of the chloride-depth profiles based on sediment conductivity data are described as "poor." In general, these analyses are judged to be "poor" because the observed chloride concentrations do not increase monotonically with depth as illustrated above for location OL-GP-40182. For these analyses there is significant uncertainty associated with the calculated upwelling velocity. A few of the chloride-depth profiles were not analyzable either because of sparse or sporadic data; a total of

seven of the chloride-depth profiles developed from pore-water data and 18 of the profiles developed from sediment-conductivity data were not analyzable.

At locations where the analysis of the chloride-depth profiles were judged to be poor and that are located within remediation areas that will be unaffected by operation of the hydraulic containment systems, additional borings were advanced in the Phase VI Pre-Design investigation to collect pore-water data with Vibracores to better determine the upwelling velocities. An example of such a location is OL-GP-40182, which is located at the mouth of Ninemile Creek and was discussed above. Plots of the chloride-depth profiles developed from sediment conductivity data from this location and plots of the chloride-depth profiles developed from pore-water data from a Phase VI Vibracore located near (OL-VC-40302) are shown below.



The analysis of the chloride-depth profiles developed from sediment-conductivity data from the upper 10 ft. and the upper 5 ft. from OL-GP-40182 resulted in estimated upwelling velocities of 9.8 cm/yr and 11.3 cm/yr, respectively[11]. These analyses, though, are based solely on fitting the data from the upper 1.25 ft. as the data from greater depths have significant scatter and do not correspond with the calculated chloride-depth profile. The analysis of the chloride-depth profiles developed from pore-water data from the upper 10 ft. and the upper 5 ft. from the Phase VI data collected at OL-VC-40302 resulted in estimated upwelling velocities of 14.5 cm/yr and 15.3 cm/yr, respectively. These data, with the exception of one data point from about 1.5 ft., fit the calculated chloride-depth profiles quite well. As a result, the upwelling velocity calculated from the Phase VI pore-water data is judged to be a better estimate of the actual upwelling velocity at this location.

At some locations, the calculated upwelling velocity based on the "best-fit" solution exceeded a seepage velocity (as defined in Equation 1) of 50 cm/yr, which was judged to be the upper bound velocity that could be estimated by this method. For these locations, Table VII-1 notes that the velocity is greater than the Darcy velocity that corresponds to a seepage velocity of

[11] The NYSDEC has indicated that their analyses of these data produce an upwelling velocity as high as 21 cm/yr (NYSDEC, April 25, 2010).

50 cm/yr[12]. None of the locations where the seepage velocity was estimated to be greater than 50 cm/yr are located within proposed capping areas. The hydraulic containment system proposed to the east of the mouth Ninemile Creek was designed specifically to reduce groundwater upwelling velocities in that portion of Remediation Area A where seepage velocities estimated from the chloride-depth profile method exceeded 50 cm/yr.

[12] The upwelling velocities listed on Table 1 are Darcy velocities. The Darcy velocity by definition is equal to the seepage velocity multiplied by the porosity. Since the porosity is always less than one, the Darcy velocity is always less than the seepage velocity.

Section 5
Upwelling Velocities for Cap Design in Areas without Hydraulic Containment

Groundwater upwelling velocities in Remediation Area E and in Model Areas A1, A2 and C2 are expected to be only minimally affected by operation of the hydraulic containment systems and thus upwelling velocities with the cap are expected to be similar to current upwelling velocities[13]. For each of these areas, a cumulative frequency distribution of upwelling velocities was developed based on the chloride-depth profiles within the areas for use in cap design. In calculating the frequency distributions the following data treatment criteria were used to obtain a data set in which point estimates of upwelling velocities were relatively uniformly distributed within the areas:

1. At locations with upwelling velocity estimates from both pore-water and sediment-conductivity data, the velocity calculated from the pore-water data was selected.
2. At locations with duplicate or triplicate sets of pore-water data or sediment-conductivity data, the highest calculated upwelling velocity from the replicates was selected.
3. When upwelling velocities were calculated from both chloride-depth profiles from the upper 5 ft. and chloride-depth profiles from the upper 10 ft., the higher calculated upwelling velocity was selected unless one of the analyses were judged to be poor.
4. At locations where the 90 percent upper confidence interval on the calculated upwelling velocity was greater than 50 percent of the best-fit value, the value corresponding to the 90 percent upper confidence interval was selected.
5. In Model Area A1, the upwelling velocity in the near shore area that will be affected by the hydraulic containment system was specified as 2.2 cm/yr, which corresponds to the upwelling velocity through the silt and clay unit (refer to Section 8).
6. In Remediation Area E, the upwelling velocity in the near shore area that will be affected by the Harbor Brook containment system was not considered in developing the cumulative frequency distribution of upwelling velocities in Remediation Area E because the area affected by the containment system is only a very small portion of Remediation Area E.
7. In Model Area C2[14] only upwelling estimates from pore-water data were selected as chloride-profiles constructed with sediment-conductivity data were "noisy" and apparently affected by presence of Solvay materials in the sediment.

[13] Exceptions are 1) in that portion of Model Area A1 that is located in proximity to the proposed hydraulic containment system located east of the mouth of Ninemile Creek, and 2) in that portion of Remediation Area E located in proximity to the eastern end of the Harbor Brook hydraulic containment system.

[14] The upwelling velocity frequency distribution for Model Area C2 is based on upwelling velocity estimates from the area offshore of the Department of Transportation turnaround that will be unaffected or only partially affected by hydraulic containment systems as shown on Figure 15.

8. In Remediation Area E there are two small areas with radii of about 25 ft. where many sets of chloride-depth profiles were obtained and for which an upwelling velocity was calculated for each set. A single upwelling velocity was selected to represent the upwelling velocity in each of these areas; this value was specified as the average of the estimates from pore-water data.

These data treatment criteria for developing cumulative frequency distributions of upwelling velocities are biased towards overestimating the actual upwelling velocity, as the higher of the estimates was selected at several decision points.

Results

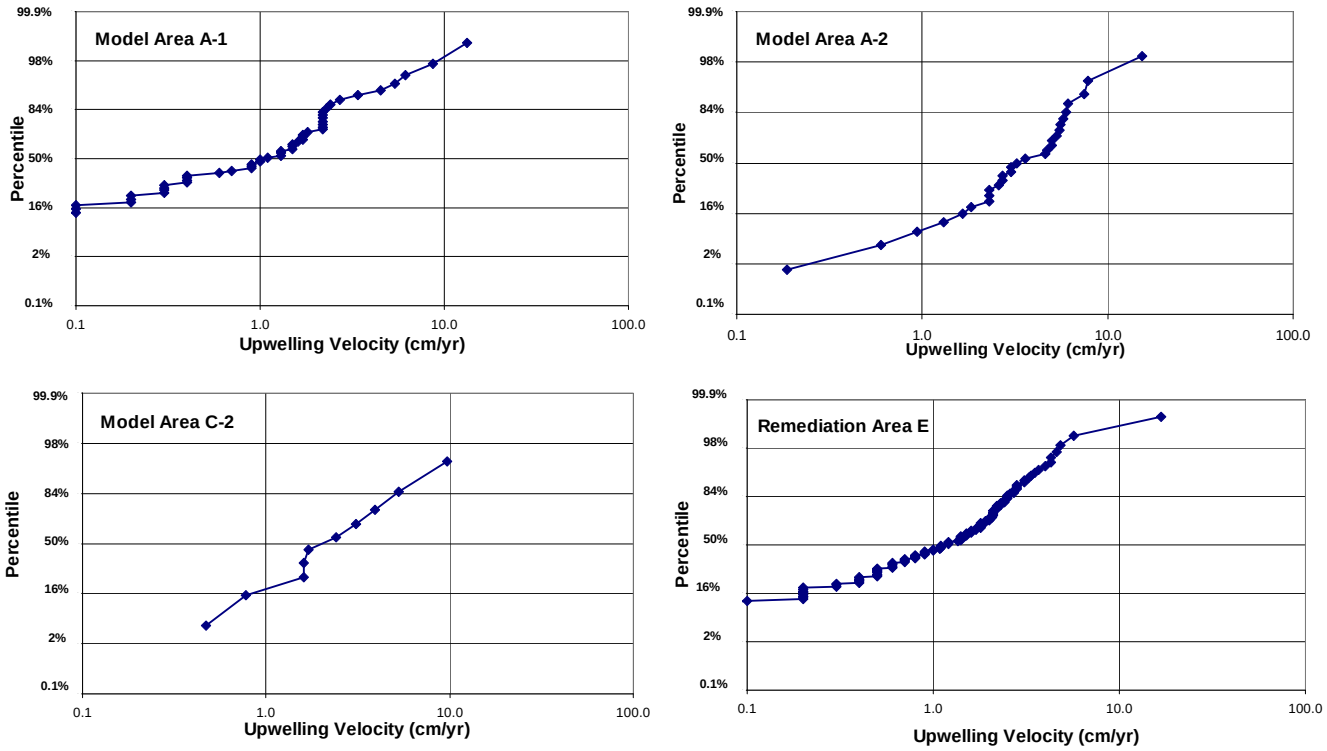
The upwelling velocities used to calculate the cumulative frequency distributions are listed on Table 1 and the selected data are shown in map view on Figures 14 to 16[15]. On these figures, the values used to develop the cumulative frequency distribution are shown in bold typeface, the values not used are shown in light-grey typeface. Selected statistics of the cumulative frequency distribution for each of the areas, and the number of upwelling velocities used to construct the distribution, are listed below.

	Model Area A1	**Model Area A2**	**Model Area C2**	**Remediation Area E**
count	56	29	10	126
median	1.05	3.22	2.05	1.15
mean	1.64	4.10	3.05	1.51
standard deviation	2.28	2.95	2.75	1.82

The mean calculated upwelling velocity in Model Area A1 is 1.64 cm/yr with a standard deviation of 2.28 cm/yr, the mean upwelling velocity in Model Area A2 is 4.10 cm/yr with a standard deviation of 2.95 cm/yr, the mean upwelling velocity is Model Area C2 is 3.05 cm/yr with a standard deviation of 2.75 cm/yr, and the mean upwelling velocity in Remediation Area E is 1.51 cm/yr with a standard deviation of 1.82 cm/yr. The highest upwelling velocities occur in Model Area A2 and are associated with recent deposits from Ninemile Creek.

Probability plots of the upwelling distributions are shown in graphic form below with the upwelling velocity plotted on a logarithmic scale on the x-axis and the frequency percentile plotted on a probability scale on the y-axis.

[15] The values shown on Figures 14 to 16 represent the values listed on Table 1 in the column labeled "Upwelling Velocity" and the values adjusted for the confidence interval where appropriate.



No pore-water or sediment-conductivity data were collected along the spits at the mouth of Ninemile Creek that will be removed and restored as wetlands as part of lake remedy. Under existing conditions, the upwelling velocities on the spits are likely downward because of recharge that occurs on the spits. Following construction of the wetlands, upwelling velocities will be consistent with those observed in adjacent areas in Model Area A2. Therefore, for cap design purposes the upwelling velocities in the proposed wetland area were assumed to be the same as those in Model Area A-2.

Section 6
Evaluation of Uncertainty in Calculated Upwelling Velocities

This section evaluates the uncertainties associated with upwelling velocities calculated with the chloride-depth profile method. In evaluating the chloride-depth profiles, the best estimates of aquifer and chemical parameters have been utilized in the analyses. This section briefly discusses the uncertainty associated with the input parameters, the uncertainty associated with reproducibility of results from co-located borings, and the uncertainty associated with the use of a "best fit" solution to Equation 1 to estimate the upwelling velocity.

Sensitivity to Model Parameters

The sensitivity of calculated upwelling velocities to dispersion length, porosity and chloride factor was evaluated. Sensitivity analyses were conducted using the data from a subset of sample locations (specifically Geoprobe location GP-40168 and Vibracore locations VC-30179, VC-40091, VC-40092, VC-40297, VC-40302, VC-60303, and VC-70058) having estimated upwelling velocities that ranged from 3.3 to 15.3 cm/yr. The sensitivity analyses consisted of the following four evaluations:

1. Increasing the dispersion length from 0.1 ft. to 0.8 ft
2. Decreasing the porosity to the lowest porosity value measured in the vicinity of the location
3. Increasing the factor that converts conductivity to chloride from 0.8 to 1.0 (only for sediment conductivity data)
4. Decreasing the factor that converts conductivity to chloride from 0.8 to 0.64 (only for sediment conductivity data)

The results of these sensitivity evaluations indicate the calculated upwelling velocities are sensitive to porosity and dispersion length, but not very sensitive to the chloride adjustment factor. The porosity and dispersion lengths used in the analyses of upwelling velocities described in Attachment VII and shown on Figures 14 to 16 are the best-estimates of the parameter values. The results of the sensitivity evaluations for porosity and dispersion length that were conducted for the chloride-depth profiles from the selected sample locations are contained in Attachment XI.

Reproducibility of Results

The reproducibility of calculated upwelling velocities was evaluated by comparing the upwelling velocities calculated from sediment conductivity data with those calculated from the Vibracore data at each of the thirty locations with both types of data and by comparing calculated upwelling velocities from multiple sediment-conductivity borings advanced close to one another. Overall the calculated velocities from co-located Vibracore and sediment-conductivity borings compare well. The results of these evaluations are listed on Table 2 and plots of these data are contained in Attachment IX.

At 47 locations, multiple sets of sediment conductivity data were collected. The upwelling velocities at locations with multiple sets of conductivity data are listed on Table 3. At most locations, the upwelling velocities calculated from each set of data are similar.

The reproducibility of calculated upwelling velocity was also assessed by comparing sediment conductivity data taken in different seasons at the same location. Chloride profiles based on sediment conductivity were obtained during spring and fall seasons at several locations (OL-GP-40183, OL-GP-40184, OL-GP-40185, OL-GP-40186, and OL-GP-70107). The upwelling velocities determined in different seasons for these locations are comparable, except in cases where the data are difficult to analyze due to exceeding the maximum measurement capability of the probe (OL-GP-70107). Distinct seasonal trends could not be reliably identified. At four locations, profiles were obtained during the summer months in both 2007 and 2008 (OL-GP-40074, OL-GP-40010, OL-GP-70053, and OL-GP-70054). The upwelling velocity determinations were comparable, except in cases where the data were difficult to analyze due to the measured values exceeding the maximum measurement capability of the probe.

Model Fit

The uncertainty of the upwelling velocities calculated with a "best fit" solution to Equation 1 was evaluated by calculation of a confidence interval (CI) for the calculated velocity. This uncertainty is primarily related to scatter in the chloride or conductivity depth profile data. The confidence interval is calculated as:

$$b \pm f \cdot s_b \tag{4}$$

where b is the calibrated parameter value, f is the confidence interval factor (for a 90% CI, f=1.645), and s_b is the standard deviation of the estimated parameter value. The standard deviation of a parameter value is a function of the perturbation sensitivities and the observation variances (Aster et al. 2005, Doherty, 2008):

$$s_b^2 = \sigma^2 \left(\underline{X}^T \underline{X} \right)^{-1} \tag{5}$$

where $\underline{X}$ is a matrix of the sensitivities of observations to parameters (calculated using forward difference perturbations) and σ^2 is an *m*-vector containing the observation variance calculated according to (Doherty, 2008):

$$\sigma^2 = \frac{\Phi}{m-n} \tag{6}$$

where Φ is the residual sum of squares, *m* is the number of observations, and *n* is the number of parameters.

Because there is only one parameter, the sensitivity matrix $\underline{X}$ has *m* rows and only one column, making it a vector. As such, calculation of $\underline{X}^T\underline{X}$ is simply:

$$\sum_{i=1}^{m} x_i^2 \tag{7}$$

where x_i is the *i*th row in the sensitivity vector.

The calculated confidence intervals for each of the upwelling velocities are listed on Table 1. At most locations, the confidence interval is relatively small compared to the magnitude of the estimated upwelling velocity.

This formal analysis of uncertainty is based on the assumption that the boundary conditions for Equation 1 are fixed. In practice though, there is some uncertainty relative to the lower boundary condition. For the analyses that were judged to be "good" as listed on Table 1, the uncertainty related to the lower boundary condition is small, but for analyses judged as "fair" or "poor," there may be additional uncertainty related to the magnitude of the lower boundary condition.

Another measure of model fit is the correspondence between the upwelling velocities calculated based on "best-fit" solution to the upper 5 ft. of data and the upwelling velocities based on "best-fit" solution to the upper 10 ft. of data. For locations where the upwelling results from the two sets of analyses are similar, this is an indication that the uncertainty associated with the upwelling estimate is low; whereas, when the two estimates differ significantly it indicates uncertainty regarding the estimated upwelling velocity. The upwelling velocities estimated from the upper 5 ft. of data and the upper 10 ft. of data are listed in Attachment VII.

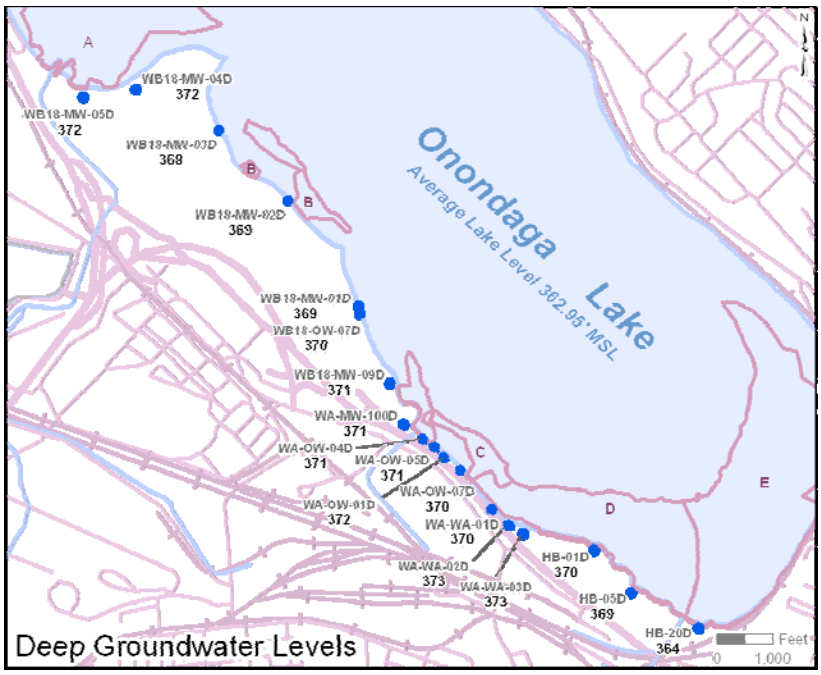
Summary

The evaluations of the uncertainties in the upwelling velocities quantified with the chloride-depth profile method have indicated a high degree of confidence in the calculated upwelling velocities, but as with all evaluations based on field data, there is some uncertainty associated with individual evaluations of upwelling velocities. The spatial consistency of results, as shown on Figures 14, 15 and 16, increased the confidence associated with estimates at individual locations.

Section 7
Analysis of Upward Groundwater Flow through Silt and Clay Unit

Groundwater discharge in remediation areas offshore from the hydraulic containment systems will be less than current rates following construction and operation of the systems. In areas offshore of the hydraulic containment systems, groundwater discharge will potentially come from two sources; recharge in the area between the lake shore and the hydraulic barrier and upward groundwater flow through the silt and clay layer. Some recharge will occur to the wetlands outboard of the barrier wall as the result of fluctuating lake levels, but the engineered design for these wetlands will create a high permeability layer beneath the wetlands through which any recharge will migrate directly to the lake and thus minimize any migration through the underlying contaminated materials. The locations of proposed outboard wetlands are shown on Figure 1. As a result, the only significant potential source of groundwater discharge is upward migration of groundwater through the silt and clay layer.

Groundwater levels, and hydraulic heads, in the permeable units below the silt and clay unit in Remediation Areas A, B, C and D are higher than the average water level in Onondaga Lake. This creates the potential for upward groundwater flow from the deeper units to the lake. Some of the monitoring wells completed in the sand and gravel unit along the shoreline flow at the surface, which illustrates realization of this potential. The water levels in the sand and gravel in onshore wells in the vicinity of the remediation areas are shown on the figure below (elevations are in feet AMSL)[16]. Water levels in the wells in the vicinity of the lakeshore range from 364 to 372 ft. AMSL. The average lake level is about 362.95 ft. AMSL; therefore, the water level differences between the sand and gravel zone and the lake range from about 1 ft. to 9 ft., with the smallest differences occurring at the sample location in the southeast corner of the lake near the mouth of Harbor Brook.



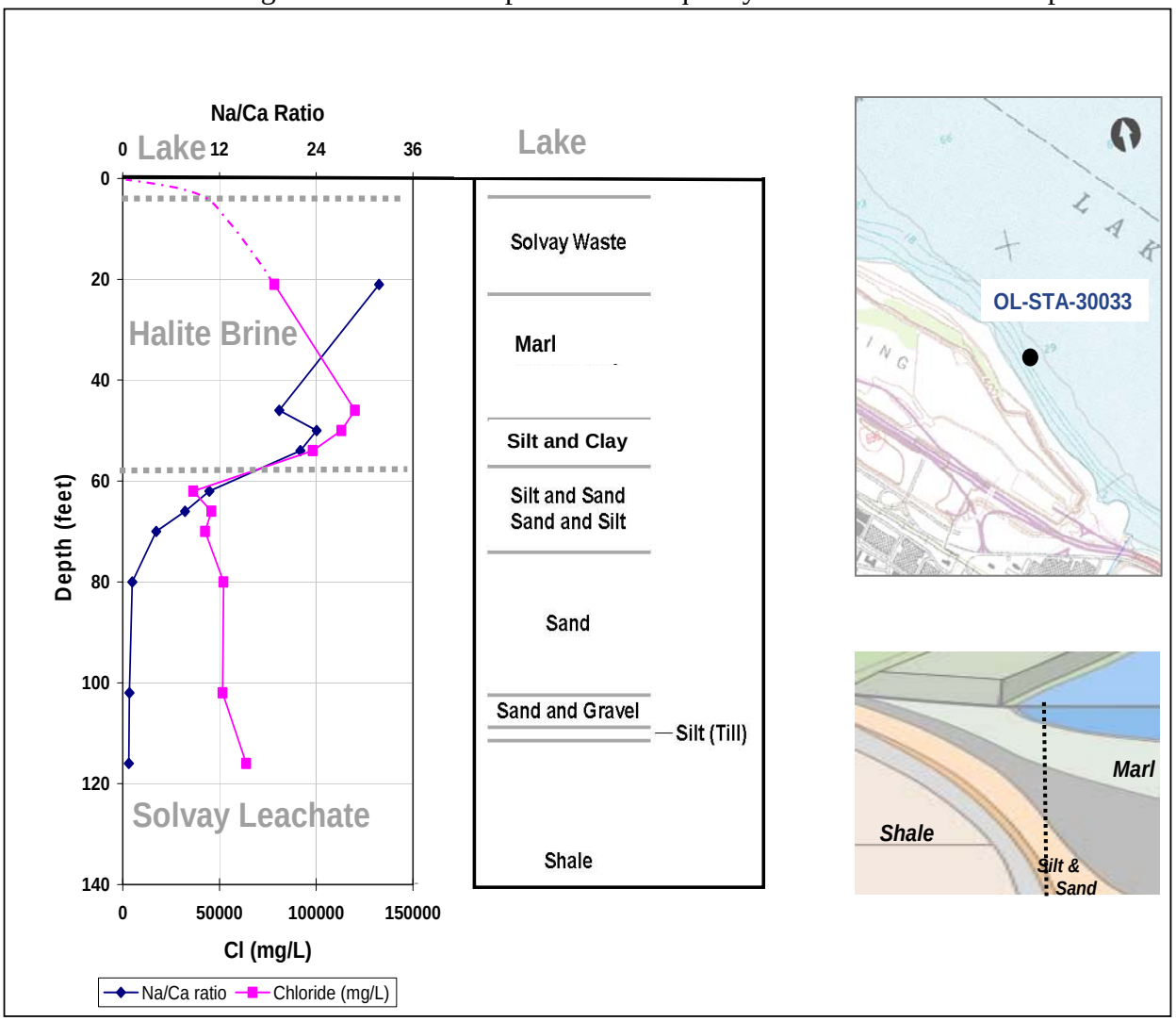
The potential for upward flow from the deep units is proportional to the water level difference. Therefore, the potential for upward flow is smaller in the southeast corner of the lake. The magnitude of the

[16] Water level data represent best estimate of average water levels in the deep zone (O'Brien & Gere, 2009).

upward flow is also related to the thickness and permeability of the silt and clay unit and differences in groundwater density between the sand and gravel zone and the lake.

Several lines of evidence have been used to estimate the upward groundwater flow through the silt and clay unit, and all of these lines of evidence indicate the rate of groundwater flow is very small. From a large-scale perspective, the presence of halite brines in the unconsolidated units beneath the lake provides very strong evidence that the rate of upward groundwater flow through the sediments is very small. The existence of the brine in the sand and gravel aquifer is consistent with only the diffusive flux of chloride across the silt and clay unit as discussed in Appendix D of the Lake FS and in the USGS report by Yager and others (2007b). If upward flow of any appreciable magnitude was occurring across the silt and clay unit, the halite brine in the deep zone, which originated about 16,000 years ago during the end of the last period of glaciation, would have dissipated long ago.

Water-quality data collected from a deep boring (OL-STA-30033) advanced to bedrock in the lake in Remediation Area B also provide qualitative information on the negligible rate of upward groundwater flow through the silt and clay unit. In this boring, pore water samples were collected as the boring was advanced. A plot of water-quality data variations with depth in this



deep boring is shown above along with a geologic log, location map and a schematic cross section with the well location.

An abrupt change in water quality occurs in deep boring OL-STA-3033 at a depth of about 58 feet which corresponds with the contact between the silt and clay unit and the underlying fine sand and silt unit. For example, the chloride concentration in groundwater at a depth of 54 feet was 98,100 mg/L and the chloride concentration at a depth of 62 feet was 36,500 mg/L.. At an upward groundwater velocity of 2 cm/yr, over a period of 60 years, groundwater with chloride concentrations similar to that measured at a depth of 62 feet would have migrated about 10 ft. into the silt and clay unit[17]. The fact that groundwater with lower chloride concentrations has apparently not migrated into the silt and clay unit suggests that the upward groundwater flow rate through the silt and clay unit is significantly less than 2 cm/yr in Remediation Area B.

An estimate of groundwater flow across the silt and clay unit was also made using chloride concentration gradients in an analogous manner to that used to estimate upwelling velocities near the sediment-water interface. Pore water samples were collected in three borings in SMU 2[18] from the upper 8 ft. of the silt and clay unit and analyzed for chloride concentrations in the pore. The pore water chloride data from these borings were interpreted using Equation 1 to quantify groundwater velocity through the silt and clay unit. The calculated velocity through the silt and clay unit at all three borings was less than 0.5 cm/yr. The estimate though has significant uncertainty because the chloride concentration gradient within the silt and clay unit is small due to the fact that this unit is located tens of feet below the sediment-water interface. The results of these evaluations are contained in Attachment X.

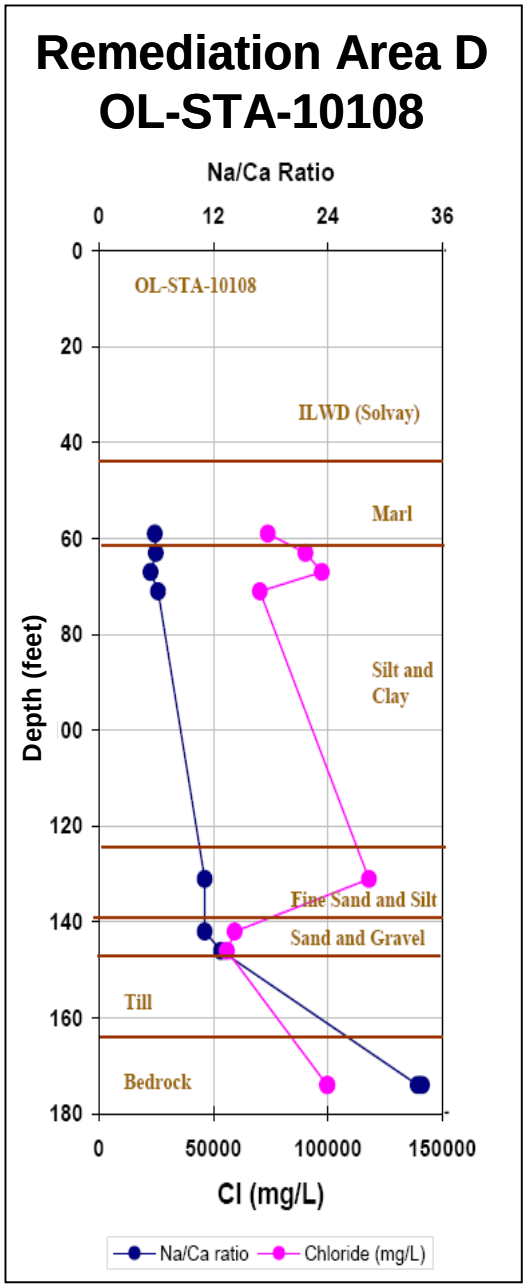
A deep boring was advanced in Remediation Area D, approximately 2,000 ft. offshore, into bedrock which was encountered at a depth of 169 ft. below the sediment-water interface. In this boring, unlike the boring in Remediation Area B, all the pore water had the characteristics of a natural sodium-chloride brine. The chloride-depth profile from this boring could not be analyzed to determine upwelling velocities because chloride concentrations in the sand and gravel unit were lower than in the overlying fine sand and silt and the underlying bedrock, likely reflecting changes in water quality induced by historic brine production[19]. A plot of chloride concentrations with depth in this boring (OL-STA-10108), as well as sodium to calcium ratios, are shown on the figure below.

[17] This distance is based on an upwelling velocity of 2 cm/yr, an effective porosity of 0.4, and a 60 year migration time frame.

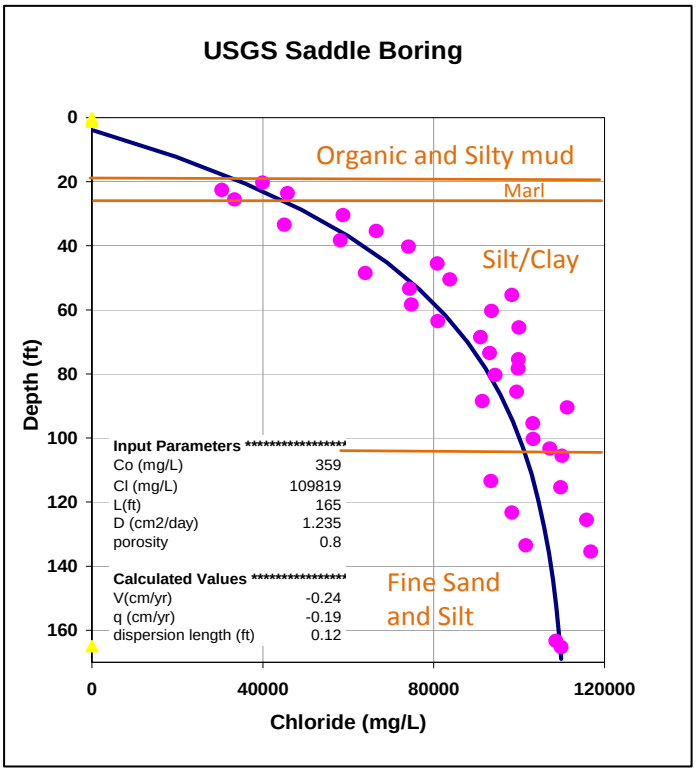
[18] Borings OL-STA-20042, OL-STA-20053, OL-STA-20058 advanced in May 2006.

[19] The USGS (2000) reported that 11.5 million tons of salt were removed from brines produced from the groundwater system at Onondaga Lake from 1797 to 1917. This represents the salt content from the constant production of 500 gpm of brine with a chloride concentration of 60,000 mg/L over this period. Most of this production occurred from the permeable sand and gravel unit. This production lowered groundwater levels throughout the connected portion of the sand and gravel unit and induced the migration of fresher groundwater from the landward margins of the sand and gravel unit.

The USGS advanced a boring to a depth of 181 ft. near the center of the lake in the profundal zone beyond Remediation Area A. Sediment samples were collected as the boring was advanced and subsequently centrifuged in the laboratory to obtain pore water samples. These samples were analyzed for a number of analytes including calcium, sodium and chloride. The chloride-depth data have been analyzed using the techniques described above to estimate the upwelling velocity. The calculated upwelling velocity is 0.24 cm/yr as shown on the figure below.



The silt and clay unit typically is described in the field as brown to dark gray clay with some silt with medium to high plasticity. The vertical hydraulic



conductivity of the silt and clay unit averages about 1.4×10^{-7} cm/second based on testing of the silt and clay unit within the remediation areas. The vertical hydraulic conductivity of the silt and clay unit was measured[20] in multiple Shelby tube samples collected from eight borings advanced through the silt and clay unit in the Remediation Areas in the Phase VI Pre-Design Investigation. The vertical hydraulic conductivities measured in samples from the eight borings are listed on Table 4 and the locations of the borings are shown on Figure 17. At each boring location, an effective vertical hydraulic

[20] The vertical hydraulic conductivity was measured using a flexible wall permeameter by ASTM D 5084.

conductivity[21] was calculated from the individual measurements of hydraulic conductivity by the following equation:

$$K_{Veff} = \frac{b_T}{\sum_i^n b_i / K_{Vi}} \tag{8}$$

where K_{Veff} is the effective vertical hydraulic conductivity for the silt and clay unit, b_T is the total thickness of the silt and clay unit, n is the number of vertical hydraulic conductivity measurements in the silt and clay unit at the boring, b_i is the thickness corresponding to measurement i, and K_{Vi} is the measured vertical hydraulic conductivity. The effective vertical hydraulic conductivities at the eight borings ranged from 5×10^{-8} cm/sec to 3×10^{-7} cm/sec, a relatively narrow range indicating that the effective vertical hydraulic conductivity of the silt and clay unit is relatively uniform.

In addition, vertical hydraulic conductivity values were calculated from consolidation test results from 11 Shelby tube samples collected from the silt and clay unit beneath Remediation Area D in the Phase I Pre-Design Investigation. The locations of the borings in which these samples were collected are also shown on Figure 17, and the calculated vertical hydraulic conductivies are listed on Table 4. The calculated vertical hydraulic conductivities ranged from 6×10^{-8} cm/sec to 3×10^{-7} cm/sec, a range that is consistent with the data collected in the Phase VI Pre-Design Investigation. The method used to analyze these data and the results of the analyses are described in detail in Attachment XIII.

The thickness of the silt and clay unit beneath the lake is variable, ranging from about 15 ft. to over 70 ft. across the Remediation Areas. A map of the thicknesses of the silt and clay unit beneath much of Onondaga Lake is shown on Figure 3. In much of the eastern part of Remediation Area D and in adjacent Remediation Area E, the silt and clay unit is over 60 ft. thick. The unit is thinnest along the shoreline in the western portion of Remediation Area D, but the unit thickens rapidly away from the shoreline.

The rate of upward groundwater flow through the silt and clay unit can be estimated with Darcy's law: $v = ki$ where v is the upwelling velocity, k is the vertical hydraulic conductivity, and i is the hydraulic gradient. This equation is valid if the density of the groundwater on either side of the silt and clay unit is approximately the same, which is generally the case as brines occur both in the marl overlying the silt and clay unit and in the underlying fine sand and silt unit and the sand and gravel unit. If the density is not the same, the velocity can be estimated with the following equation:

$$v = -k\left(\frac{\partial h_f}{\partial z} + \left(\frac{\rho - \rho_f}{\rho_f}\right)\right) \tag{9}$$

[21] The effective vertical hydraulic conductivity is defined as the value of the vertical hydraulic conductivity that will produce the correct estimate of groundwater flux through the silt and clay unit using the equation $v = K_v$ * *hydraulic gradient* where the hydraulic gradient is the water-level difference across the silt and clay unit divided by the total thickness of the silt and clay unit.

where h_f is equivalent fresh-water head, ρ is average density between two locations where head is measured, and ρ_f is freshwater density (Parsons, 2004; Appendix D: Part A).

The large variations in the thickness of the silt and clay unit result in differences in the upward groundwater flow in Remediation Area D, with the larger upward groundwater flows occurring near the shoreline where the silt and clay unit is the thinnest. Evaluations of potential upwelling velocities were conducted considering the water level differences measured at the various monitoring locations along the shoreline in Remediation Area D and the density variations in groundwater[22]. These evaluations indicate that upwelling velocities will generally be less than 2 cm/yr adjacent to the shoreline where the silt and clay unit is thinnest, to less than 1 cm/yr where the silt and clay unit is greater than about 30 ft. thick[23]. The calculated upwelling velocities at selected monitoring locations, based on water levels in deep and intermediate well pairs, are listed on Table 5.

The silt and clay unit beneath the lake at Remediation Area D appears to be the thinnest adjacent to the East Flume. A boring was advanced and monitoring wells were installed on the spit of land beneath the East Flume and the lake to determine the characteristics of the silt and clay unit and groundwater conditions in this area (boring HB-SB-213 and monitoring wells HB-MW-213D, HB-MW-213I and HB-MW-213S). Monitoring wells HB-MW-213I and HB-MW-213D are screened in the marl above the silt and clay unit and in the sand and silt unit below the silt and clay unit, respectively. Based on the water level difference between these two wells, the thickness of the silt and clay unit and the higher of the two estimates of the vertical hydraulic conductivity described above, the upward groundwater velocity is less than 3 cm/yr[24].

In Remediation Area A offshore of the proposed hydraulic containment system the thickness of the silt and clay unit is slightly greater than 30 ft., and the water level difference between the deep zone and the lake is greater than 9 ft. Based on these parameter values, the estimated upwelling velocity through the silt and clay unit in this area is about 2.2 cm/yr. In Remediation Area B offshore of the proposed hydraulic containment system the thickness of the silt and clay unit ranges from about 20 to 60 ft. and the water level difference between the deep zone and the lake is on the order of 6 ft. Based on these parameters, the upwelling velocity through the silt and clay unit is in the range of 0.4 to 1.3 cm/yr. In Remediation Area C offshore of the proposed hydraulic containment system the thickness of the silt and clay unit ranges from about 15 to 40 ft. and the water level difference between the deep zone and the lake is on the order of 7.5 ft. Based on these parameters, the upwelling velocity through the silt and clay unit is in the range of about 1cm/yr to a little more than 2 cm/yr

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[22] Groundwater density was estimated based on the total dissolved solids concentrations in groundwater. Standard QA/QC procedures were used to validate the water quality data that were the basis for the measurements of total dissolved solids.

[23] These estimates were calculated using a water-level difference across the silt and clay unit of 7 ft. and vertical hydraulic conductivities for the silt and clay unit in the range of 1.4×10^{-7} cm/yr.

[24] The upward groundwater velocity is calculated based on a vertical hydraulic conductivity of 1.4×10^{-7} cm/sec, a water level difference across the silt and clay unit of 4.92 ft. based on water levels collected on November 3, 2008 (O'Brien & Gere, 2009) and a silt and clay unit thickness of 8 ft. The hydraulic gradient is calculated as the water-level difference divided by the silt and clay thickness. The densities of groundwater at HB-MW-213I and HB-MW-213D are similar as measured total dissolved solids concentrations were 48,900 mg/L and 47,000 mg/L, respectively in November 2008.

Summary

The presence of upward hydraulic gradients from the deep groundwater zones to Onondaga Lake indicates that there is the potential for upward groundwater flow from the deep zones to Onondaga Lake. The hydraulic containment systems that will be operated along the lakeshore at Remediation Area D, portions of Remediation Area A, and portions of Remediation Area B will capture shallow groundwater flowing towards the lake but will have a negligible effect on the potential upward flowing groundwater from the deeper groundwater zones to the lake. The evaluations described above indicate that the upwelling velocities with the hydraulic containment system in operation will generally be less than 2 cm/yr. Upwelling velocities may approach 2 cm/yr along the shoreline in the western portion of Remediation Area D where the silt and clay unit is the thinnest, but upwelling velocities may be much less than 2 cm/yr in the remainder of Remediation Area D where the silt and clay unit is much thicker. Upwelling velocities will be less than or approximately equal to 2 cm/yr in areas offshore of the hydraulic containment systems in Remediation Areas A and B.

Section 8
Upwelling Velocities for Cap Design in Areas with Hydraulic Containment

Based on the multiple lines of evidence described in Section 7, estimates of the upwelling rates in Remediation Areas affected by operation of the hydraulic containment system, and wetland areas located between the containment system and the lake, have been developed. These estimates are based on the assumption that groundwater discharge in the remediation areas and the wetland areas with operation of the hydraulic containment system will be the result only of upward groundwater flow through the silt and clay unit. The rate of groundwater flow through the silt and clay unit is a function of the hydraulic gradient across this unit, the thickness of the unit and the effective vertical hydraulic conductivity of this unit. Contour maps of equal upwelling velocities within Remediation Areas B, C and D have been developed based on best estimates[25] of vertical hydraulic conductivity for the silt and clay unit, thickness of the silt and clay unit, and groundwater level difference across the silt and clay unit. These contour maps are shown on Figures 18, 19, and 20 for Remediation Areas B, C and D, respectively.

For purposes of cap design, upwelling velocities based on best-estimates of groundwater gradient, silt and clay unit thickness and vertical hydraulic conductivity were supplemented by developing cumulative frequency distributions of upwelling velocities based on a consideration of the uncertainty/variability in the estimates of each of these three parameters. The cumulative frequency distributions were calculated using a Monte Carlo approach that is described below, following a discussion of the uncertainty/variability in each of the individual parameters.

Vertical Hydraulic Conductivity

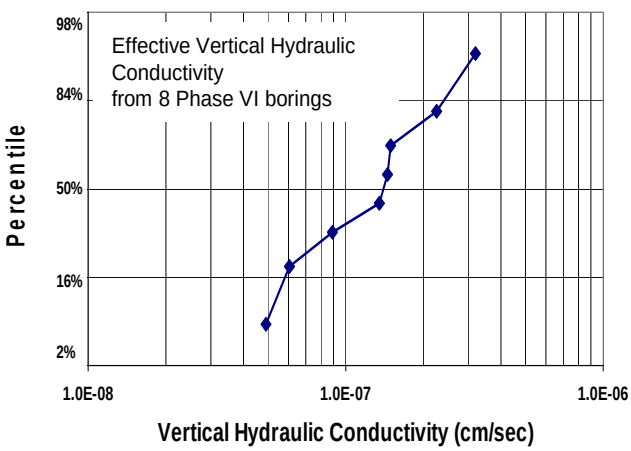
During the Phase VI Pre-Design Investigation the vertical hydraulic conductivity of the silt and clay unit was measured in multiple Shelby tube samples collected from eight borings advanced through the silt and clay unit in the remediation areas and in addition vertical hydraulic conductivity was calculated from consolidation test results from 13 Shelby tube samples collected from the silt and clay unit in Remediation Area D in the Phase I Pre-Design Investigation. For the eight borings in which multiple measurements of vertical hydraulic conductivity were obtained, an effective vertical hydraulic conductivity for the silt and clay unit at that location was calculated. A cumulative frequency distribution of these eight effective vertical hydraulic conductivities is shown on the left-most graph below, in which vertical hydraulic conductivity is plotted along on a logarithmic scale on the x-axis and the percentile frequency is plotted on a probability scale on the y-axis. The data points on the graph plot approximately along a straight line indicating that vertical hydraulic conductivity is log-normally distributed. For purposes of the Monte Carlo simulations used to calculate the uncertainty/variability in estimated upwelling velocities, the uncertainty/variability in the vertical hydraulic conductivity was described by a log normal distribution with a mean of -6.906 log cm/sec (1.24×10^{-7} cm/sec) and a standard deviation of 0.275.

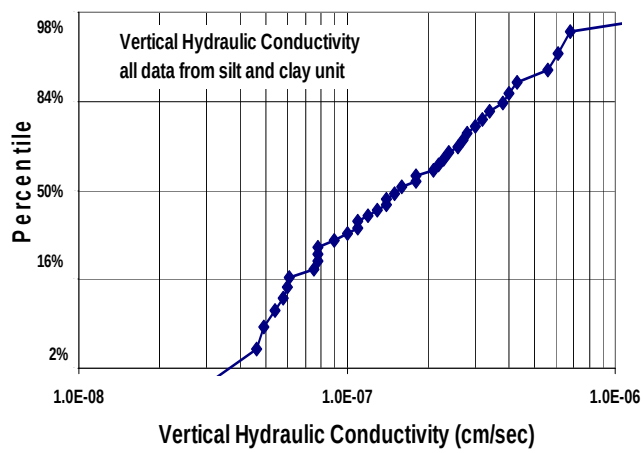
[25] In developing these maps, a vertical hydraulic conductivity of 1.4×10^{-7} was used, the thicknesses shown on Figure 3 were used, and water-level differences based on average levels in sand and gravel unit monitoring wells along the shoreline as shown on page 33 subtracted from average lake levels were used.

For comparison purposes, a probability plot for all 40 individual measurements of vertical hydraulic conductivity was also prepared (the right-most graph above). These data also plot approximately along a straight line, with the exception of one extreme value at each end of the distribution, indicating that these data are also log-normally distributed. The calculated mean and standard deviation of this distribution is -6.80 log cm/sec (1.6×10^{-7} cm/sec) and 0.32, respectively. This distribution is similar to that calculated based on effective vertical hydraulic conductivities.

Thickness of Silt and Clay Unit

The uncertainty in the thickness of the silt and clay unit is related to the accuracy with which the contacts with the overlying marl and underlying silt and fine sand unit were picked





and is related to the density of borings that penetrated the silt and clay unit. The uncertainty in picking the contacts with overlying and underlying units, for purposes of the Monte Carlo simulations, was specified as a normal distribution with ±5 ft. corresponding to a 95 percent degree of confidence. The uncertainty related to density of borings was not explicitly represented in the Monte Carlo simulations as in most areas there is a relatively good density of borings. In addition to the uncertainty described above, the silt and clay thickness varies spatially, according to the contours shown on Figure 3.

Water Level Differences

The groundwater-level difference across the silt and clay unit has not been measured at any location within the remediation areas primarily because of logistical difficulties in obtaining representative water-level measurements beneath the lake. As a conservative assumption, the water-level difference for purposes of the Monte Carlo simulations was specified based on water-levels in monitoring wells completed in the sand and gravel unit along the shoreline and lake water levels. This overestimates the actual water-level difference across the silt and clay unit, as the silt and clay unit is only a portion of the total sediment thickness between the sand and gravel unit and the bottom of the lake. If groundwater-level measurements were available for monitoring wells completed at the base of the marl and at the top of the silt and fine sand unit, the difference in water-levels across the silt and clay unit could be accurately computed and they would likely be smaller than those computed from monitoring wells in the sand and gravel unit and lake level.

For the sand and gravel monitoring wells along the lakeshore, the difference between the groundwater level in the well and lake level[26] was calculated for each date with available groundwater level data. The average and standard deviation of the water-level difference was then calculated for each monitoring location along the shoreline, and these statistics were used in the Monte Carlo simulations (assuming a normal distribution) to represent the uncertainty in water-level difference across the silt and clay unit. The average water-level differences and the standard deviations of the differences are listed in the table below.

	HB HB-01D	HB HB-05D	HB-20D	WA WA-01D	WA MW100D	WA OW-04D	WA OW-05D	WA OW-07D	WB18 MW-02D	MW18 MW-03D	WB18 MW-05D
Remediation Area	D	D	D	D	C	C	C	C	B	B	A
Average (feet)	7.07	5.55	0.71	7.45	8.49	7.74	8.18	7.46	6.26	5.16	9.45
Standard Deviation (feet)	1.16	0.70	0.32	0.45	0.40	0.51	0.56	0.60	0.63	1.05	0.49

Monte Carlo Simulation

The basic model used in the Monte Carlo simulation was the following (i.e., Darcy's Law):

$$V = K_V * \frac{\Delta H}{b} \tag{10}$$

where V is the upwelling velocity, ΔH is the water-level difference across the silt and clay unit, and b is the thickness of the silt and clay unit. This equation assumes that the density of groundwater does not change significantly across the silt and clay unit. The steps in the Monte Carlo analysis were the following:

1. One hundred sets of stochastic random fields were generated for each of the three parameters in the basic model: vertical hydraulic conductivity, water-level difference and silt and clay thickness. For Remediation Area D parameter values were defined on a 50-ft. by 50-ft. grid, and in Remediation Areas B and C parameter values were defined a 25-ft. by 25-ft. grid. In the connected wetland and the outboard area wetland parameters values were defined on a 10-ft by 10-ft grid. The stochastic random vertical hydraulic conductivity fields were generated using the FIELDGEN utility in the computer program PEST (Doherty, 2008). The random fields for thickness of the silt and clay unit were generated by randomly selecting a value from the normal distribution describing the uncertainty in estimated thickness, adding this value to the best-estimate of thickness, and then kriging these values within the domain of interest. The random water-level difference fields were generated by randomly selecting a value from the normal distribution described above at each monitoring well location along the shoreline shown on the figure on page 30 and then kriging the selected values assuming that the water-level difference is constant perpendicular to the shoreline within the domain of interest.

[26] The lake level was specified based on daily data from the U.S. Geological Survey gage 04240495 Onondaga Lake at Liverpool, New York.

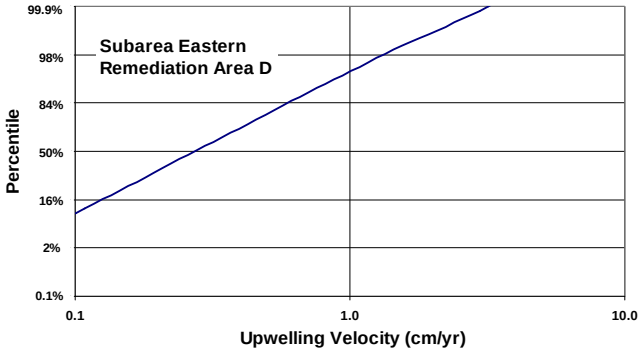
2. One hundred sets of parameter combinations were generated by randomly selecting values from 100 sets of random fields generated in the previous step for each parameter.
3. The upwelling velocity was calculated using Equation 10 at each grid cell in Remediation Area D, in Remediation Areas B and C and in the wetland areas for each 100 sets of parameter combinations.
4. The statistics of the calculated upwelling velocities within each subarea in Remediation Area D, in Model Areas B1/C1, B2, and C3, and in the wetland areas were computed. For the outboard wetland area separate statistics were calculated for the eastern, central, and western portions of the area.

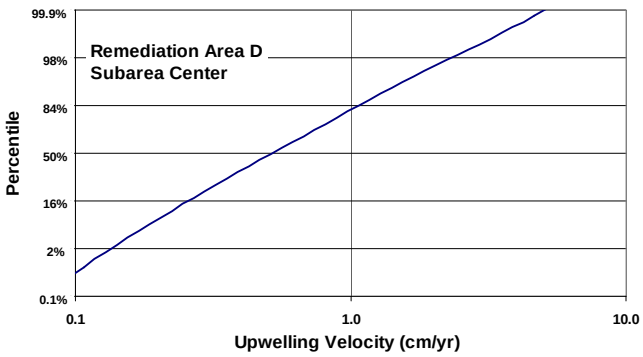
Results

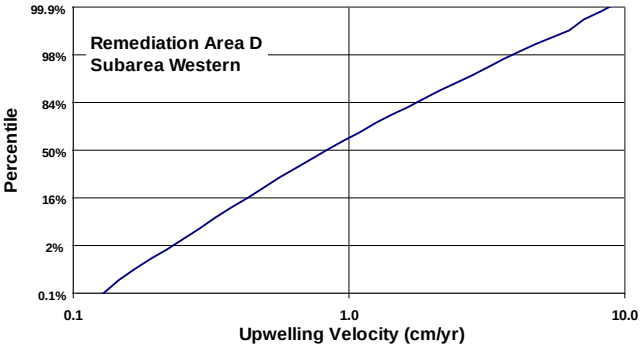
Selected statistics on the upwelling frequency distributions generated for each model area and the wetland areas are listed on the table below. These statistics are based on the upwelling velocities calculated at each of the grid cells within the model area in the Monte Carlo simulations. The number of calculated upwelling velocities used to construct the frequency distribution for each model area is listed in the column labeled "count" in the table below. The mean and standard deviation of the log-transformed distributions were used to generate upwelling distributions for the Monte Carlo simulations conducted with the cap model.

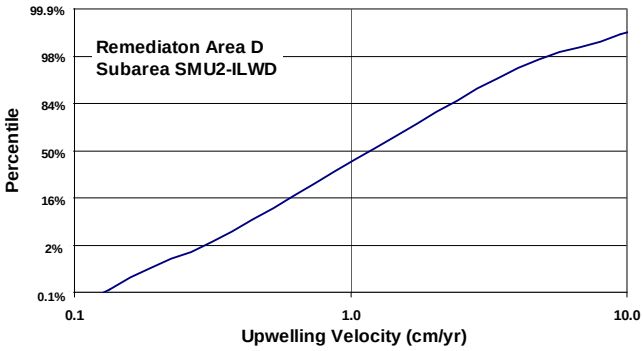
Remediation Area	**Area**	**Count**	**Mean (cm/year)**	**Log-Transformed Values**	
				Mean log(cm/yr)	**Std Dev** log(cm/yr)
B and C	**B1/C1**	104700	1.02	-0.09	0.30
	B2	48400	0.51	-0.39	0.29
	C3	76300	1.50	0.07	0.30
	Connected Wetland	131900	1.11	-0.04	0.26
D	**East**	85000	0.37	-0.56	0.34
	Center	51700	0.68	-0.28	0.31
	Western	20000	1.11	-0.06	0.31
	SMU2-ILWD	11900	1.53	0.08	0.31
	Outboard - West	31800	1.73	0.12	0.33
	Outboard - Central	26500	1.22	-0.14	0.44
	Outboard - East	35400	0.06	-1.43	0.39

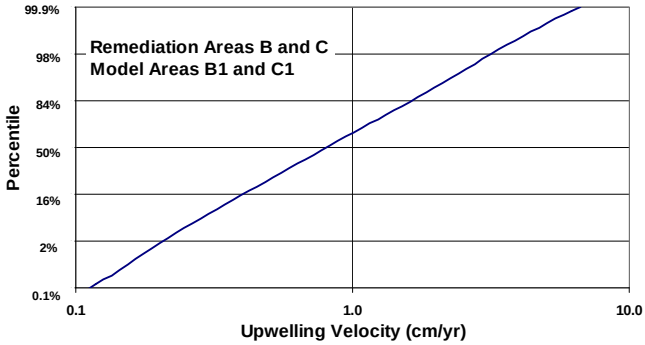
Probability plots of the distributions generated from the Monte Carlo simulations are shown in graphic form below; the x-axis of each plot is the upwelling velocity plotted on a logarithmic scale and the y-axis is the frequency percentile plotted on a probability scale. Each of the distributions plots approximately as a straight line indicating that the distributions are normally distributed.

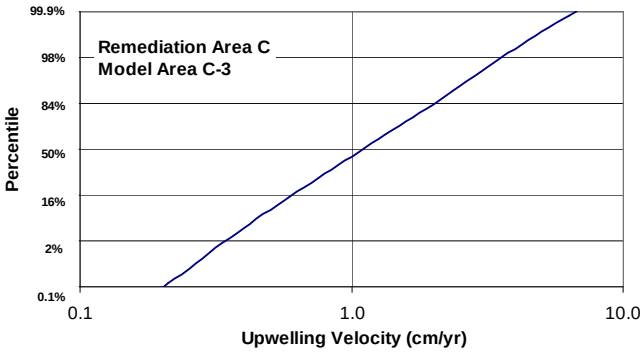

Subarea Eastern
Remediation Area D
Percentile
99.9%
98%
84%
50%
16%
2%
0.1%
0.1
1.0
10.0
Upwelling Velocity (cm/yr)

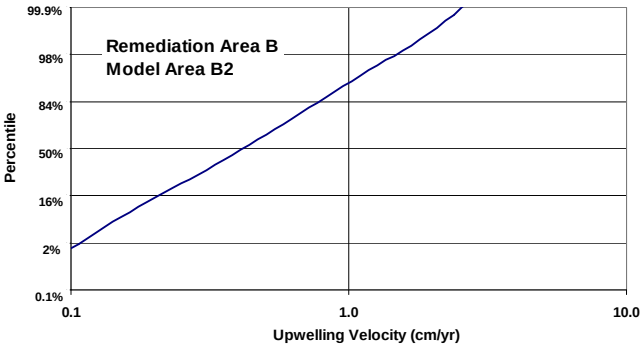

Remediation Area D
Subarea Center
Percentile
99.9%
98%
84%
50%
16%
2%
0.1%
0.1
1.0
10.0
Upwelling Velocity (cm/yr)

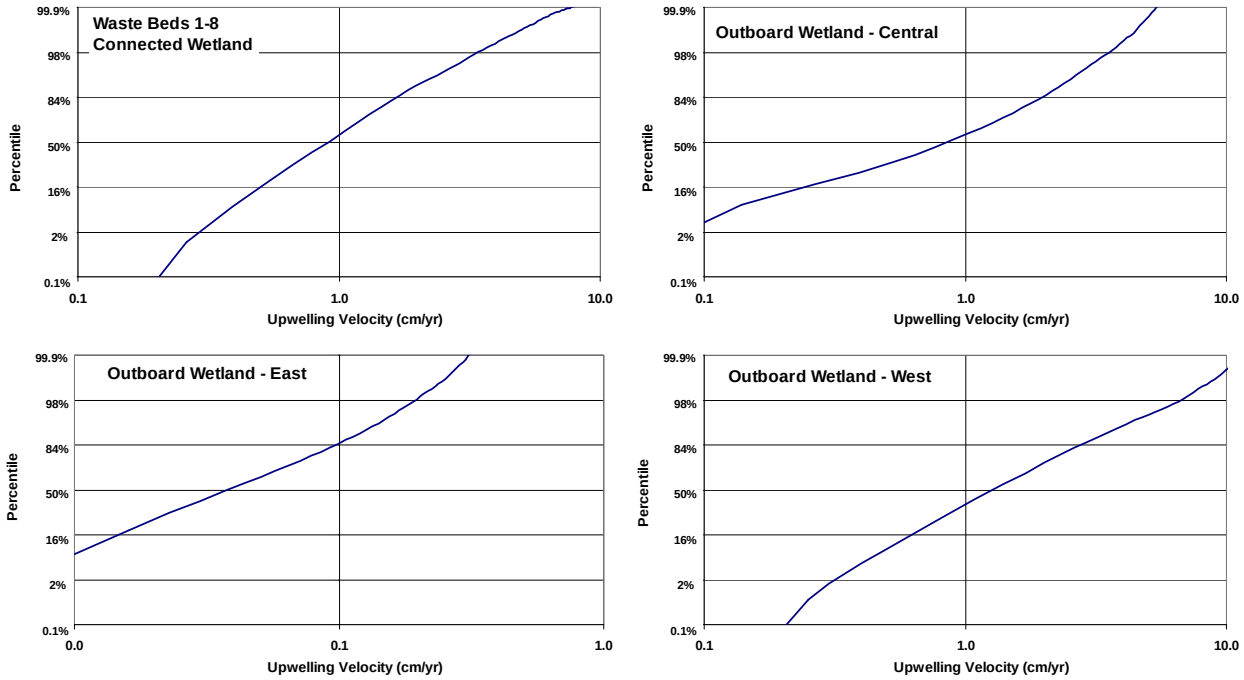

Remediation Area D
Subarea Western
Percentile
99.9%
98%
84%
50%
16%
2%
0.1%
0.1
1.0
10.0
Upwelling Velocity (cm/yr)


Remediaton Area D
Subarea SMU2-ILWD
Percentile
99.9%
98%
84%
50%
16%
2%
0.1%
0.1
1.0
10.0
Upwelling Velocity (cm/yr)


Remediation Areas B and C
Model Areas B1 and C1
Percentile
99.9%
98%
84%
50%
16%
2%
0.1%
0.1
1.0
10.0
Upwelling Velocity (cm/yr)


Remediation Area C
Model Area C-3
Percentile
99.9%
98%
84%
50%
16%
2%
0.1%
0.1
1.0
10.0
Upwelling Velocity (cm/yr)


Remediation Area B
Model Area B2
Percentile
99.9%
98%
84%
50%
16%
2%
0.1%
0.1
1.0
10.0
Upwelling Velocity (cm/yr)



Remediation Area A – Model Area A1

A hydraulic containment system is also proposed along the shoreline of Remediation Area A just east of the mouth of Ninemile Creek because of the high upwelling velocities determined in the area from analysis of chloride-depth profiles constructed from both sediment-conductivity and pore-water data in this area. Conservatively it was calculated that the effect of the containment system on upwelling velocity would extend 500 ft. outward from the shoreline[27]. In the region near the shoreline the average upwelling velocity was calculated to be 2.2 cm/yr with the containment system in operation based on the thickness of silt and clay unit in this area, the average silt and clay vertical hydraulic conductivity in this area, and the water-level difference between the sand and gravel unit and the lake in this area. This value was used in the calculation of the upwelling frequency distribution in Model Area A1 by specifying an upwelling velocity of 2.2 cm/yr at five sample locations present in the influenced area.

[27] The effect of hydraulic containment systems on upwelling velocities was discussed in Appendix D of the FS. A comparison of the tabulated upwelling velocities with distance from shore on pages DA.11-1 and DA.12-1, which show current upwelling velocities and upwelling velocities with hydraulic containment system in place, clearly shows that the effect of the hydraulic containment system extends outward at least 500 ft.

Section 9
Conclusions

This report describes the results of extensive field and analytical studies that have quantified the discharge of groundwater to the areas in Onondaga Lake where a sediment cap will be placed as part of the remedial activities undertaken to meet the requirements of the Record of Decision for the Onondaga Lake Bottom Subsite. The current rates of groundwater discharge in Remediation Areas A and E and Model Area C2, which are similar to discharge rates expected after placement of the cap, have been delineated based on the analysis of chloride depth profiles at more than 200 locations within and in the vicinity of these remediation areas. In Remediation Area D and Model Areas B1/C1, B2 and C3 the rates of groundwater discharge after placement of the cap will be significantly lower than current rates as the result of the construction and operation of a hydraulic containment system along the shoreline. Groundwater discharge rates in Remediation Area D and Model Areas B1/C1, B2 and C3 after placement of the cap were calculated based on groundwater flow rates upward through the underlying regional confining unit (the silt and clay unit).

This report describes a number of methods that were implemented in the field to estimate groundwater discharge rates, which are commonly referred to as upwelling velocities. The evaluation of upward groundwater velocity through the sediment based on the change in chloride concentrations with depth in sediment pore water was determined to be the best method for estimating current upwelling velocities in the remediation areas. This report describes the theoretical bases for the use of this method to estimate upwelling velocities and describes the extensive data collected on chloride concentrations in sediments to accurately delineate the current distribution of upwelling velocities within the remediation areas.

The upwelling velocities within the remediation areas are low. The mean measured upwelling velocity in Remediation Area E is 1.5 cm/yr, and the mean upwelling velocities in Model Areas A1, A2, and C2 are 1.6 cm/yr, 4.1 cm/yr, and 3.1 cm/yr, respectively. In Remediation Area D and Model Areas B1/C1, B2 and C2, calculated upwelling velocities with the hydraulic containment system in place are less than 2 cm/yr.

The data and evaluations described in this report provide an excellent foundation for the design of the remedy for Onondaga Lake. The upwelling velocities that are described in this report will be used in the cap model for purposes of cap design.

Section 10
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FIGURES

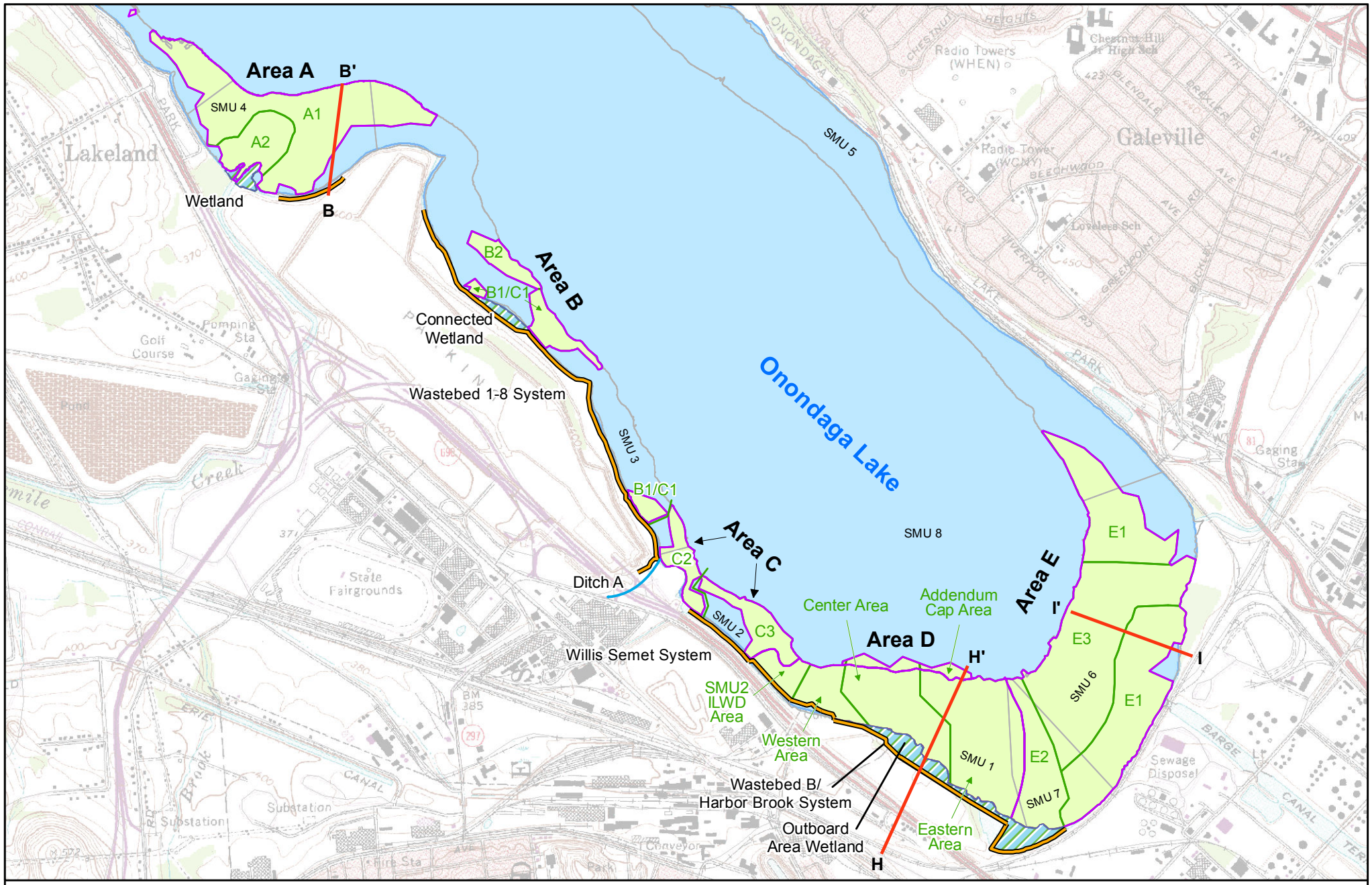


FIGURE 1

Honeywell

Onondaga Lake
Syracuse, New York

Remediation Areas and Cross Section Location Map

$\Sigma^2\Pi$ S. S. Papadopulos & Assoc.

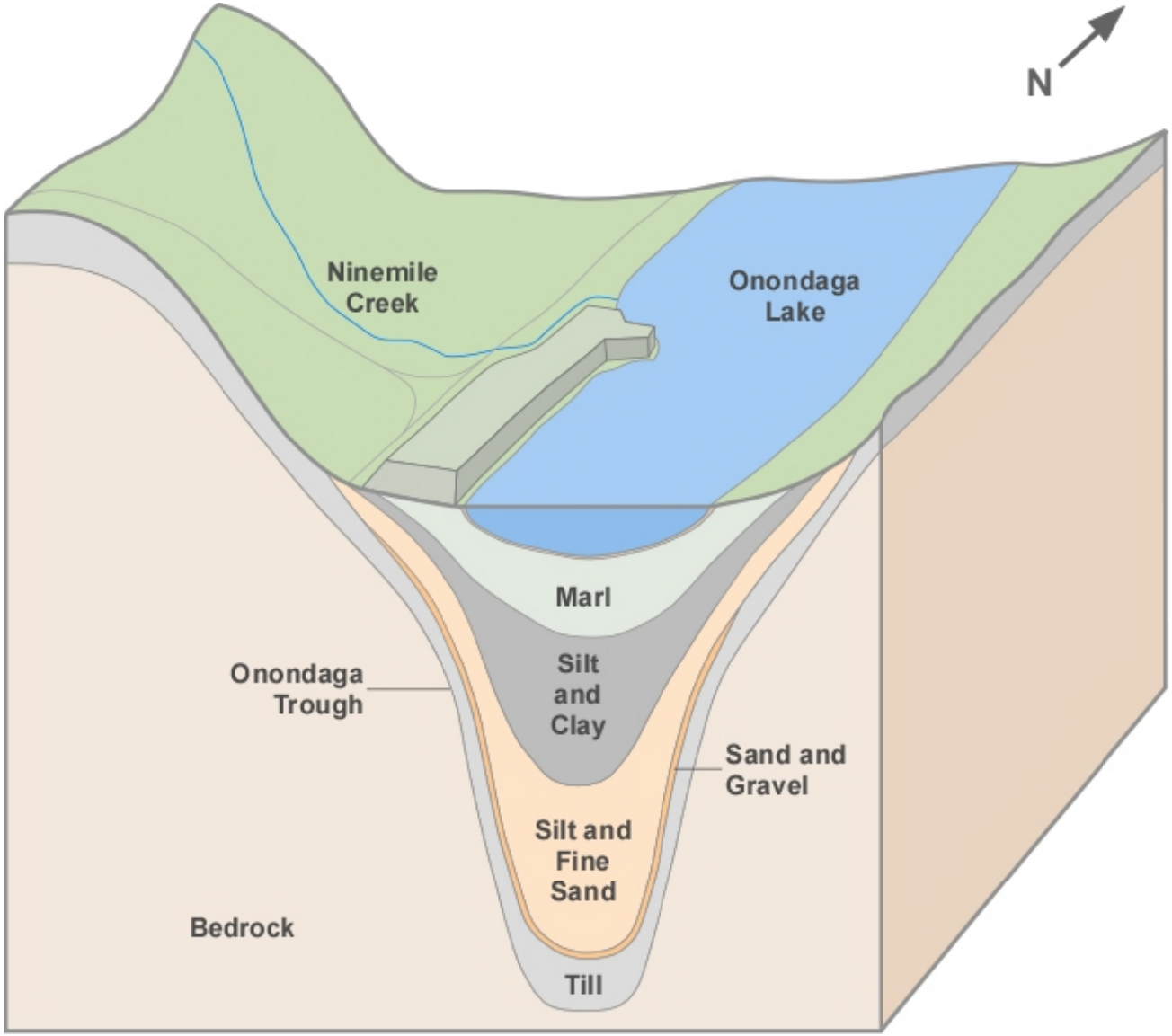
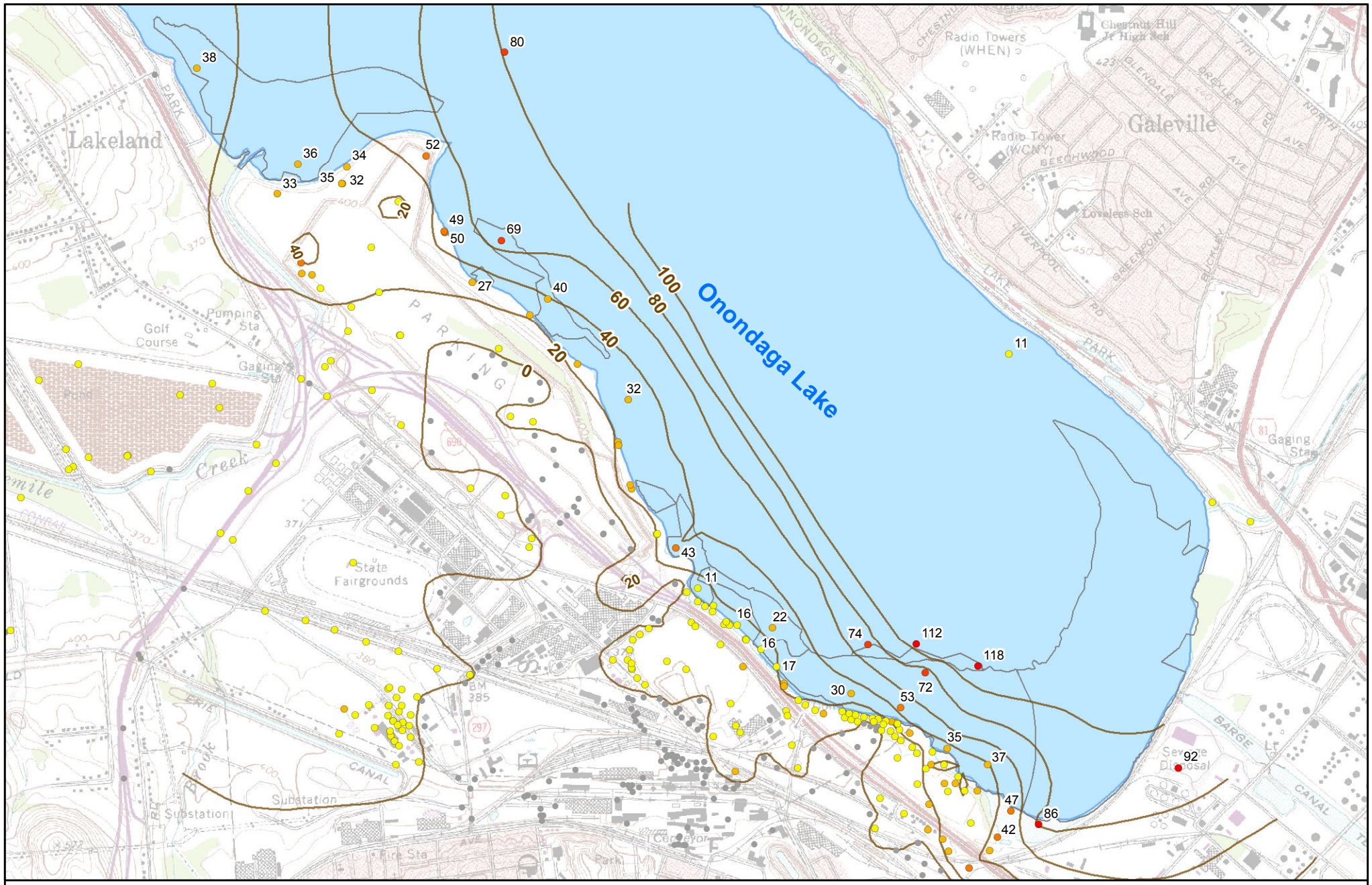


Figure 2 Hydrogeologic Setting of Onondaga Lake



Thickness of Silt/Clay (feet)

- < 20
- 20 - 40
- 40 - 60
- 60 - 80
- > 80
- Unit Absent

Thickness Contours (feet)

Remediation Area

N

0 1,000 2,000 4,000

Feet

FIGURE 3

Honeywell

Onondaga Lake
Syracuse, New York

Thickness of Silt and Clay Unit

$\Sigma^2\Pi$ S. S. Papadopulos & Assoc.

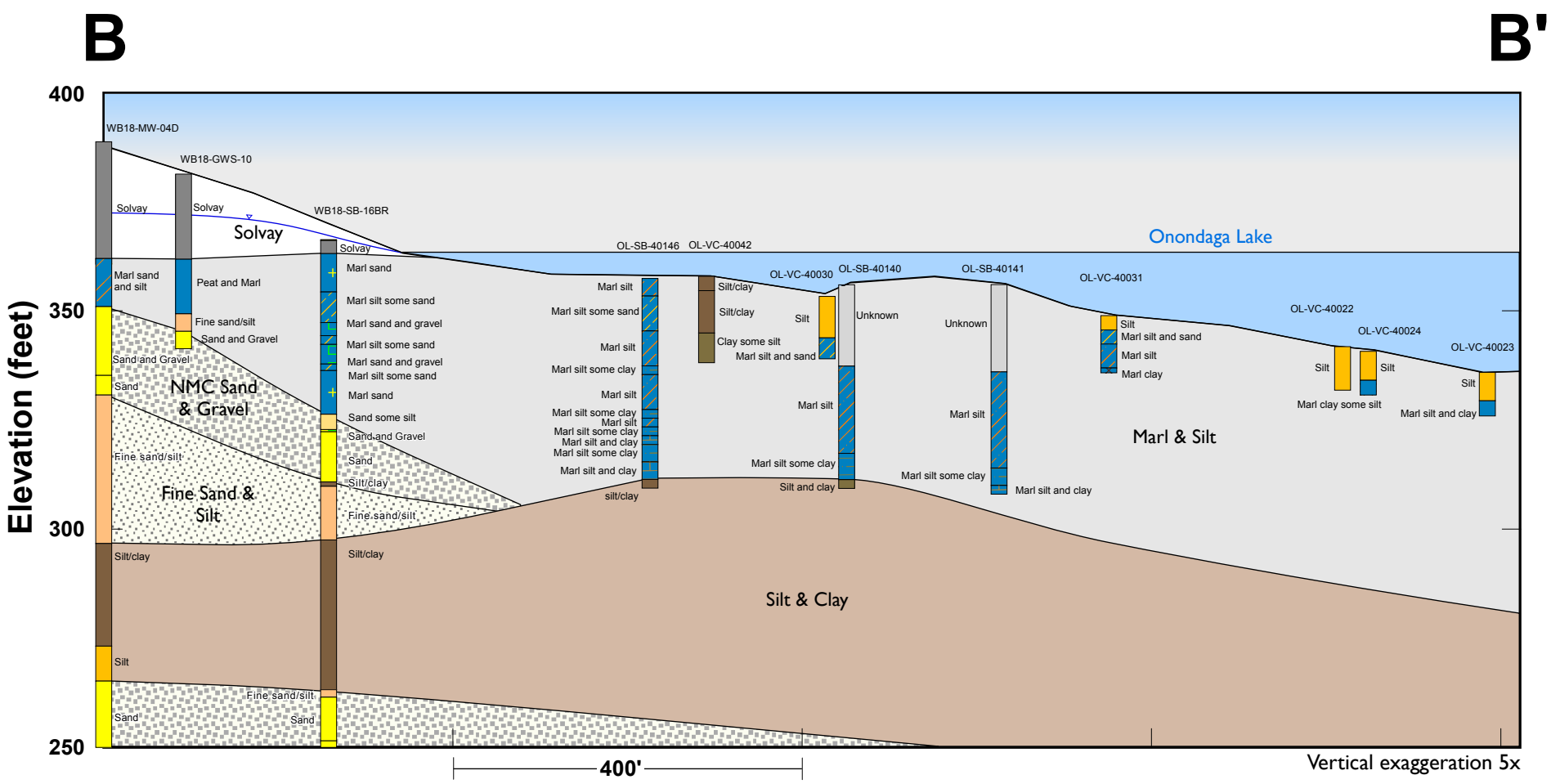


Figure 4 Remediation Area A - Hydrogeologic Cross Section B-B'

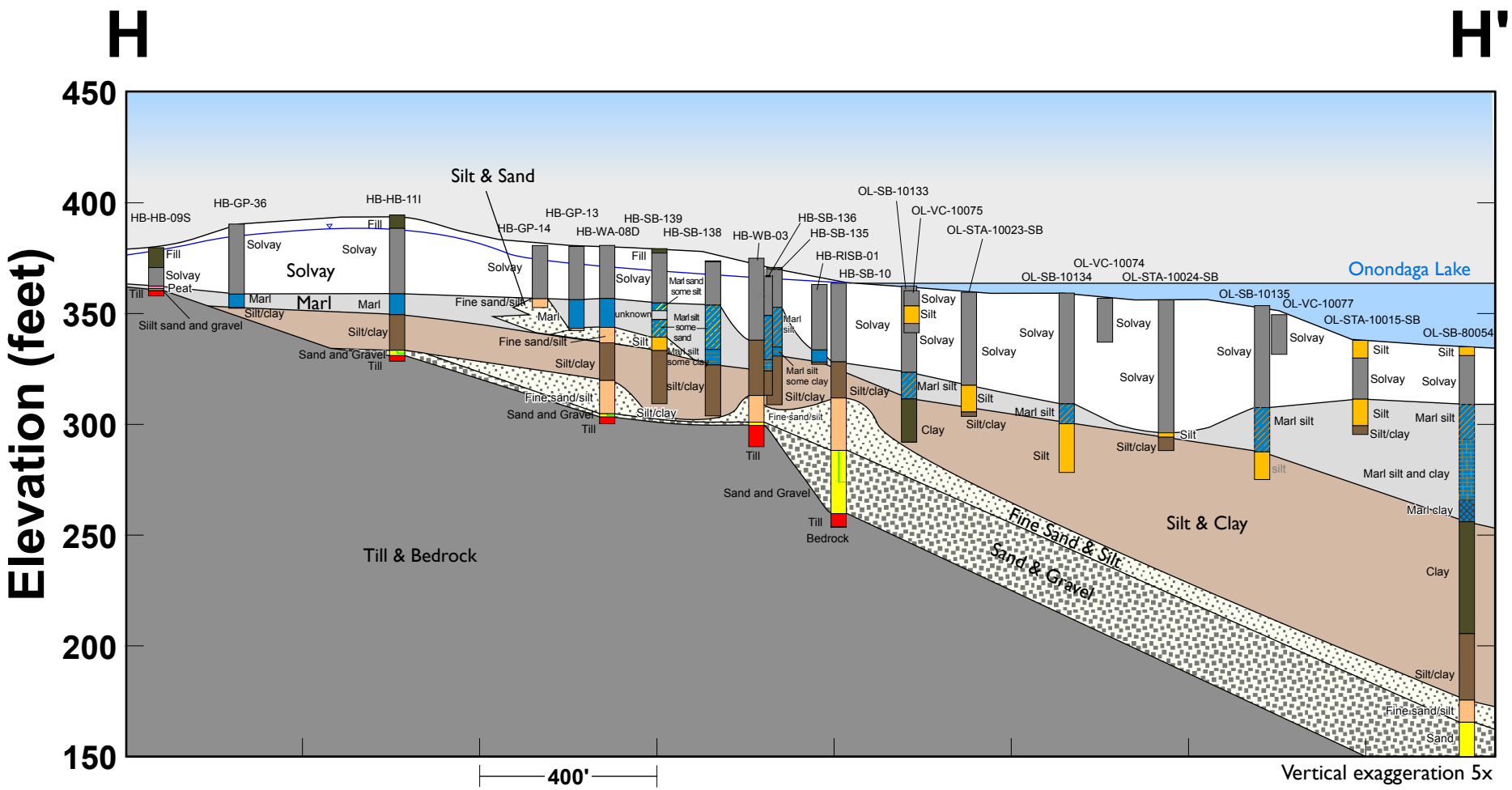
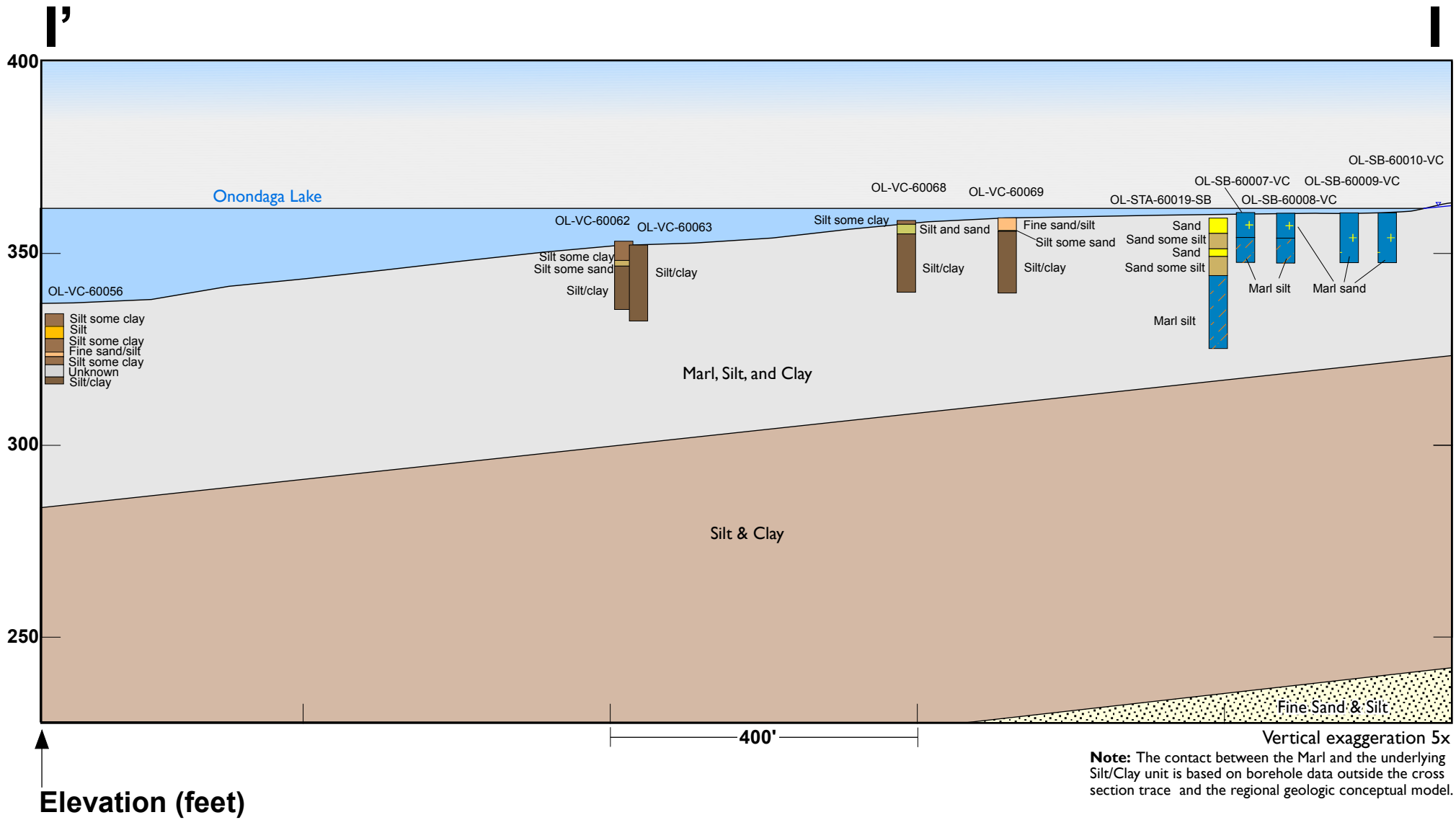
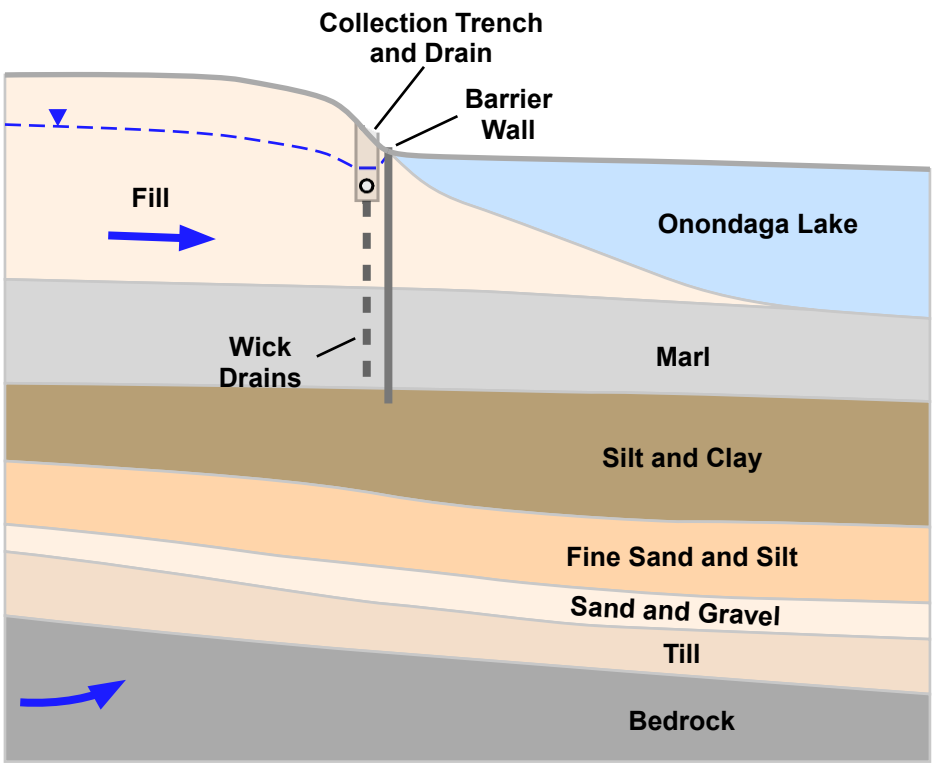


Figure 5 Remediation Area D - Hydrogeologic Cross Section H-H'

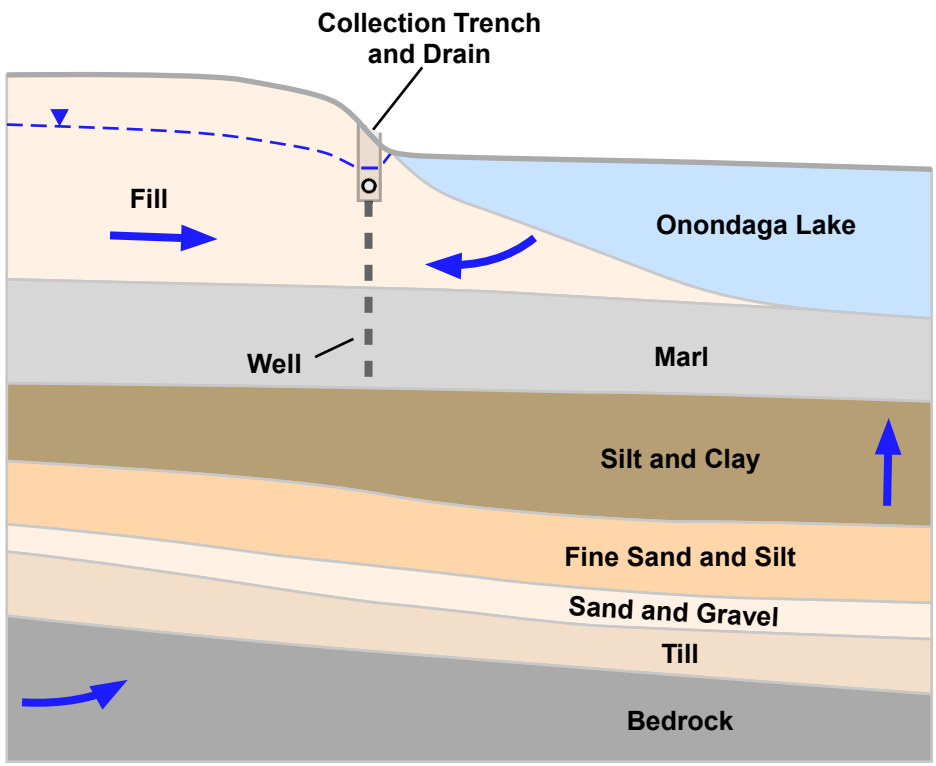


Note: The contact between the Marl and the underlying Silt/Clay unit is based on borehole data outside the cross section trace and the regional geologic conceptual model.

Figure 6 Remediation Area E - Hydrogeologic Cross Section I-I'

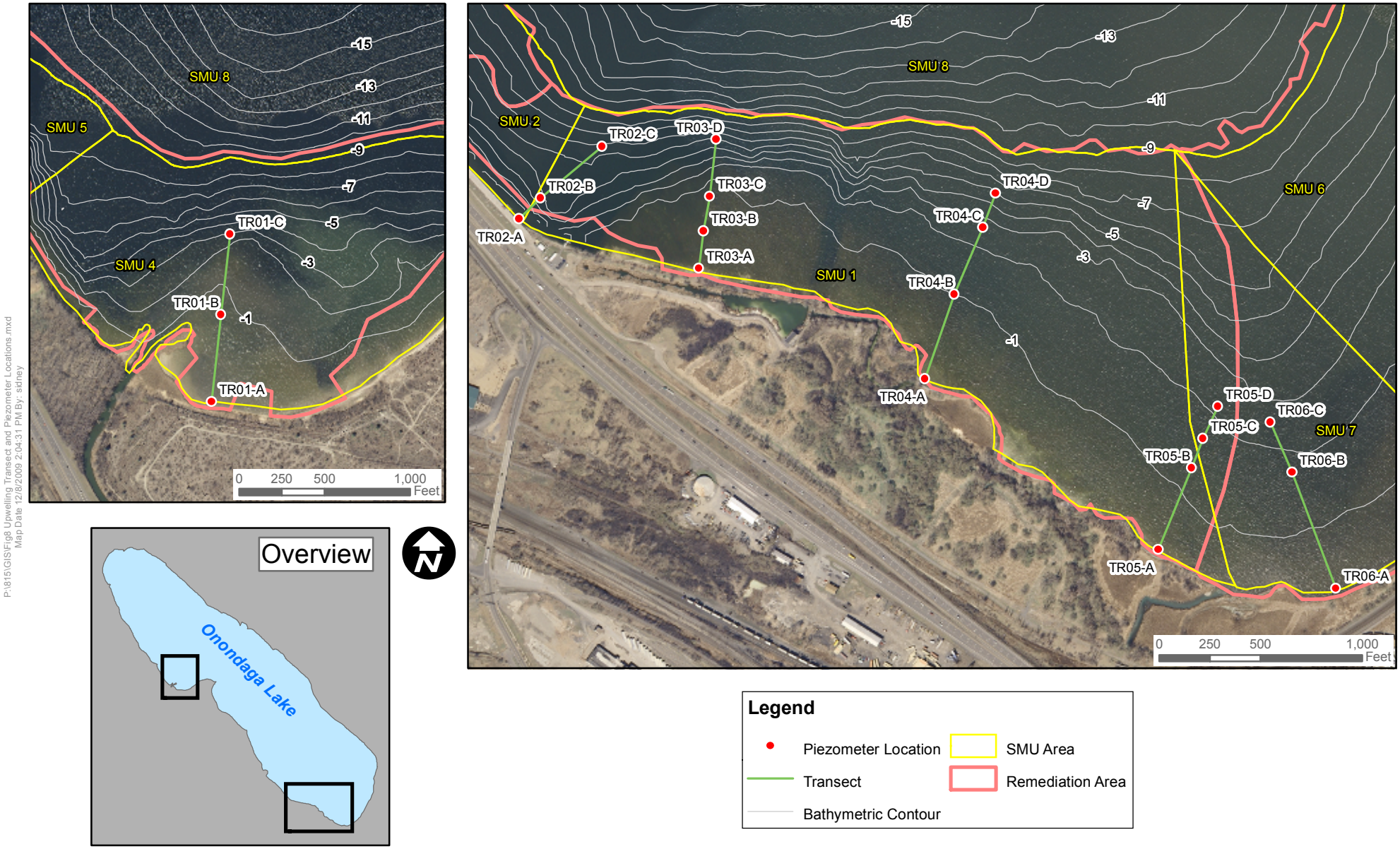


Hydraulic Containment System with Barrier Wall



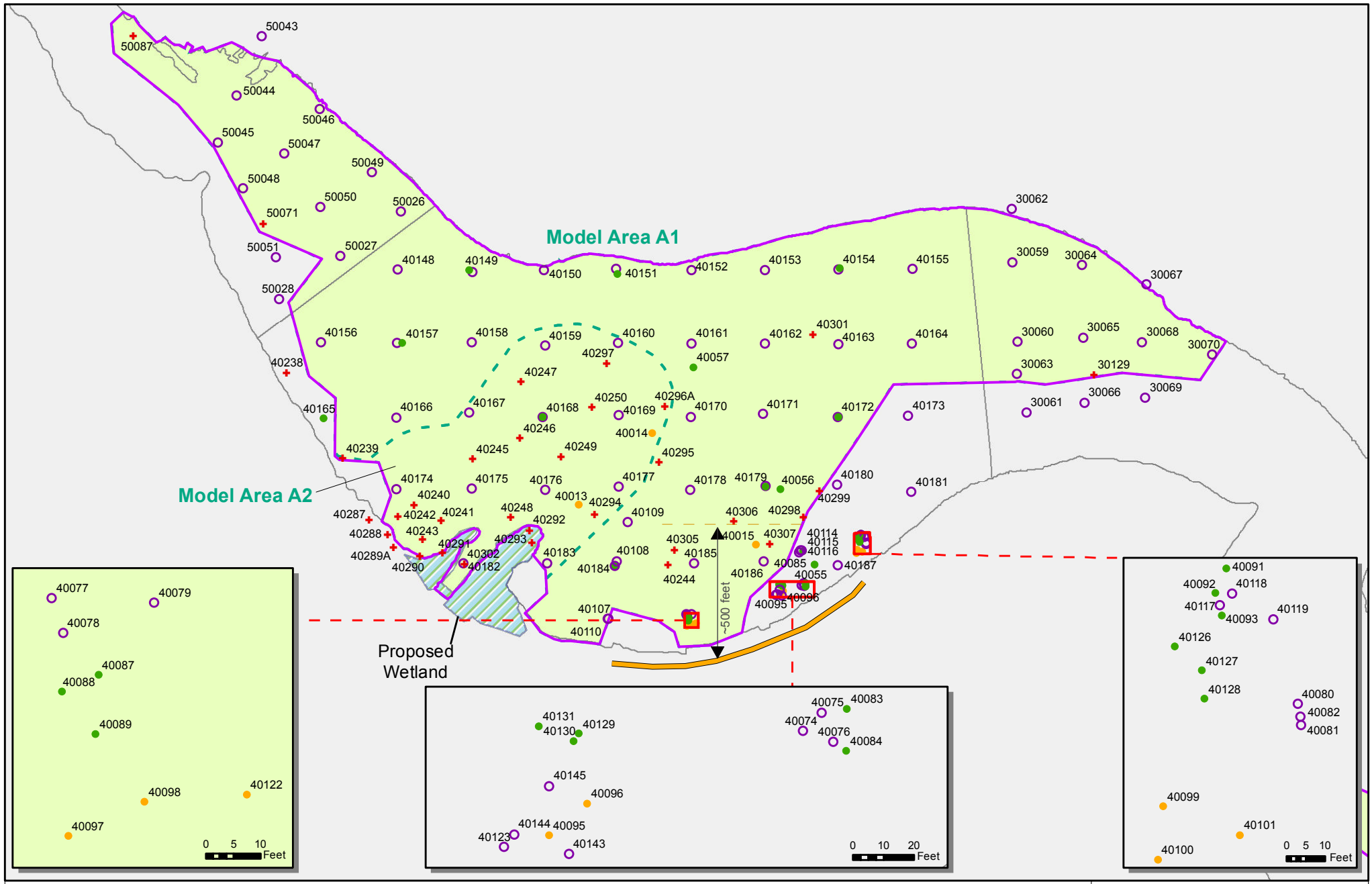
Hydraulic Containment System without Barrier Wall

Figure 7 Schematic of Hydraulic Containment System and Groundwater Flow Through Silt and Clay Unit



P:\815\GIS\Fig8 Upwelling Transect and Piezometer Locations.mxd
Map Date 12/8/2009 2:04:31 PM By: sidney

Figure 8 Upwelling Transect and Piezometer Locations



40013 Seepage Meter Location

40301 Phase V & VI Upwelling Velocity Pore Water Data Location

40162 Upwelling Velocity Sediment Conductivity Data Location

40057 Upwelling Velocity Pore Water Data Location

Hydraulic Containment System

Remediation Area

Model Area Boundary

Wetland

SMU Boundary

Isolation Cap Area

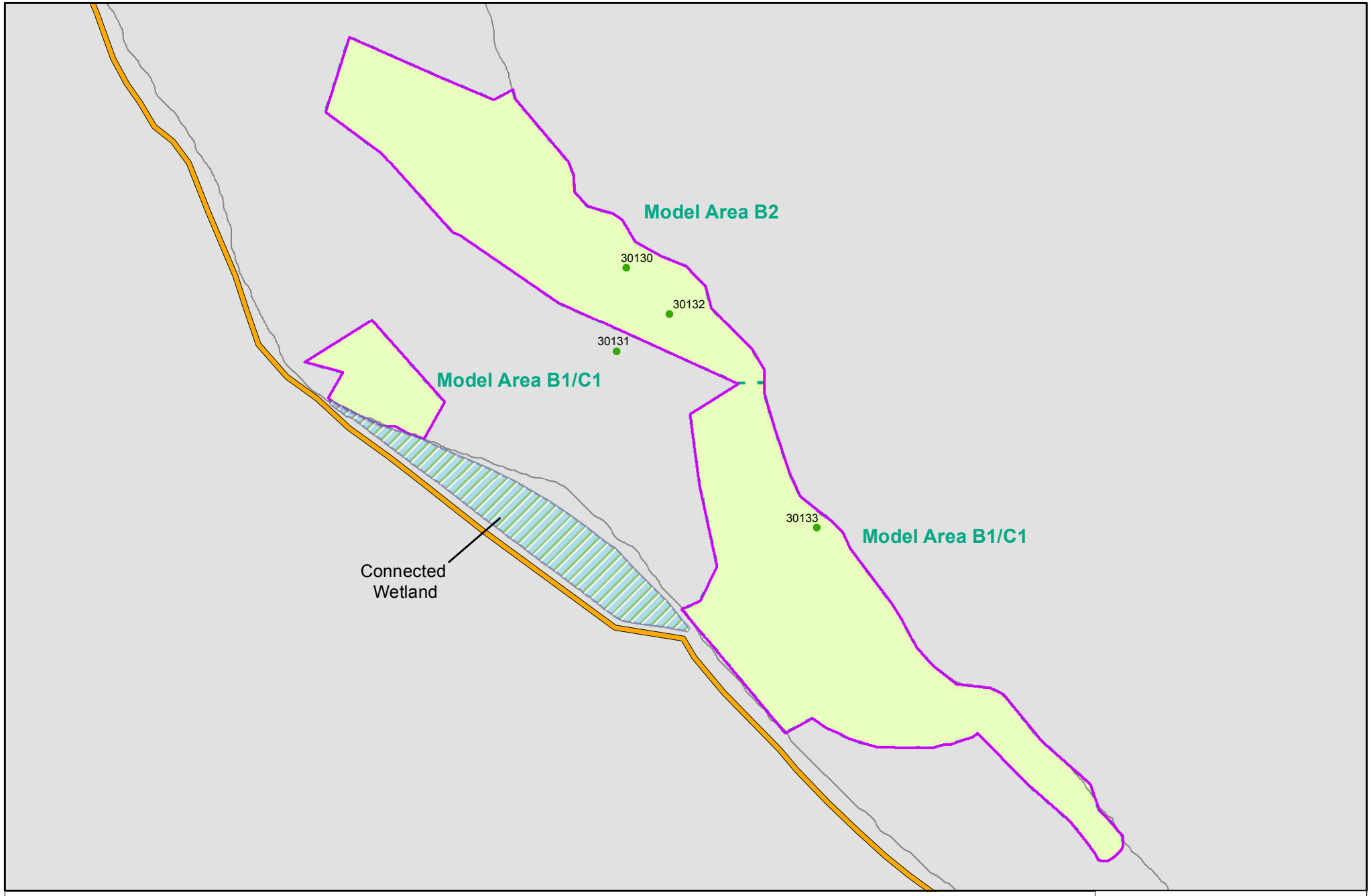
FIGURE 9

Honeywell

Onondaga Lake
Syracuse, New York

Upwelling Measurement and Seepage Meter Locations - Remediation Area A

S. S. Papadopulos & Assoc.



30133 Upwelling Velocity Pore Water Data Location

Hydraulic Containment System

Remediation Area

Wetland

Model Area Boundary

SMU Boundary

Isolation Cap Area

0 150 300 600

Feet

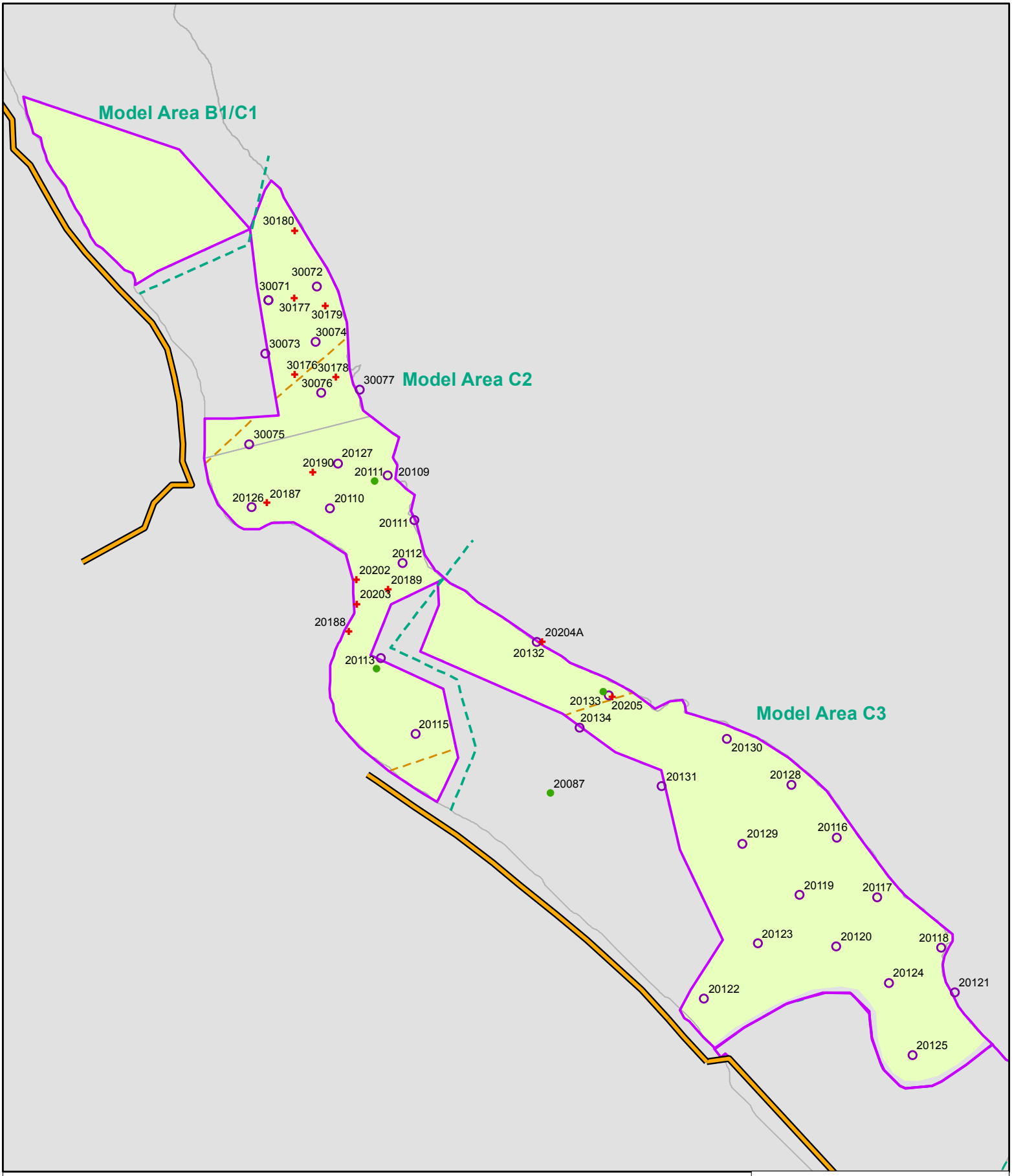
FIGURE 10

Honeywell

Onondaga Lake
Syracuse, New York

Upwelling Measurement Locations - Remediation Area B

S. S. Papadopulos & Assoc.



20202 Phase V & VI Upwelling Velocity Pore Water Data Location

20115 Upwelling Velocity Sediment Conductivity Data Location

20133 Upwelling Velocity Pore Water Data Location

Hydraulic Containment System

Extent of the Effect of the Hydraulic Containment System

Remediation Area

Model Area Boundary

SMU Boundary

Isolation Cap Area

0 125 250 500

Feet

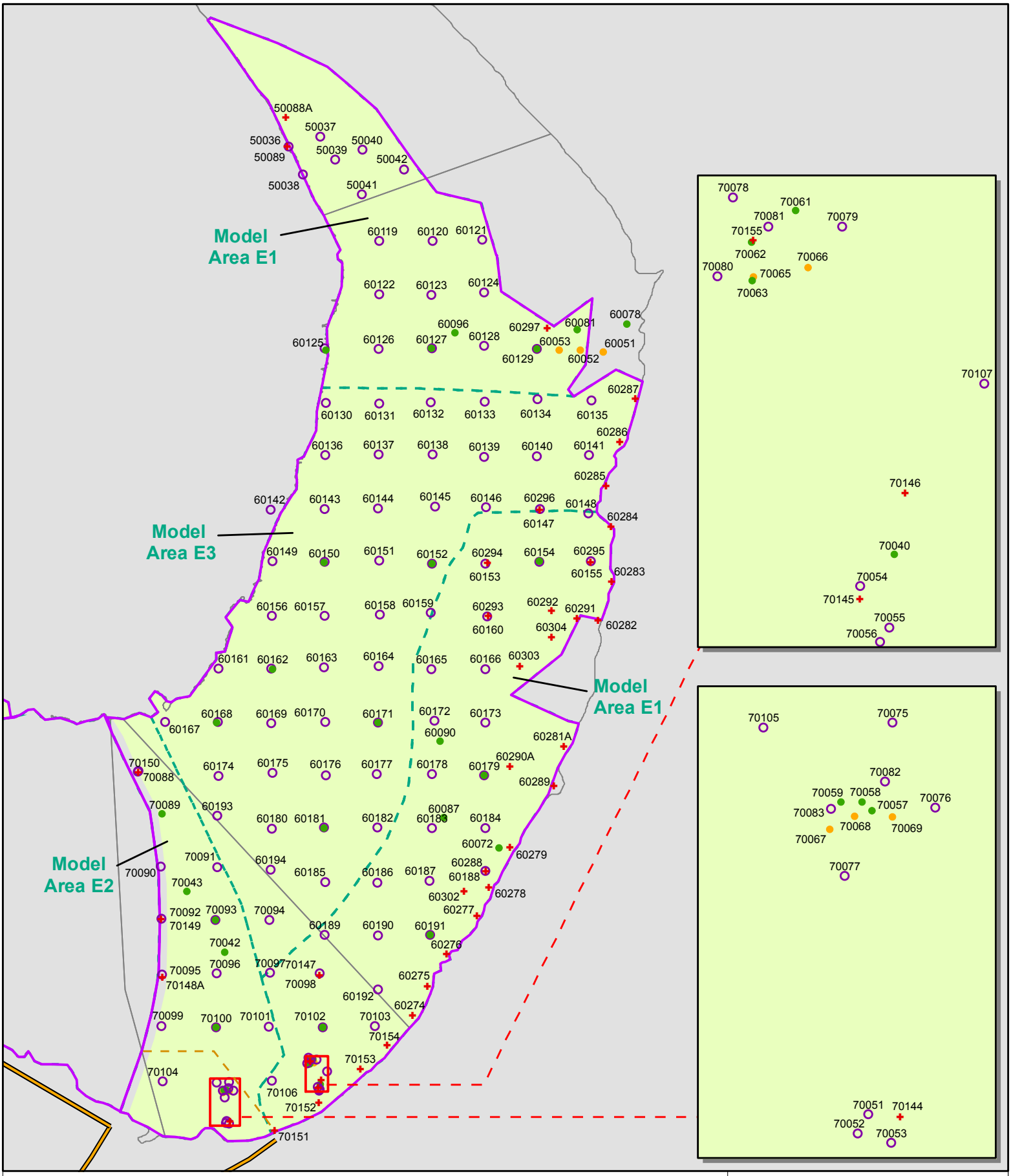
FIGURE 11

Honeywell

Onondaga Lake
Syracuse, New York

Upwelling Measurement Locations - Remediation Area C

S. S. Papadopulos & Assoc.



70067 Seepage Meter

70154 Phase V & VI Upwelling Velocity Sediment Conductivity Location

50041 Upwelling Velocity Sediment Conductivity Data Location

60154 Upwelling Velocity Pore Water Data Location

Hydraulic Containment System

Remediation Area

Model Area Boundaries

SMU Boundary

Isolation Cap Area

0 250 500 1,000

Feet

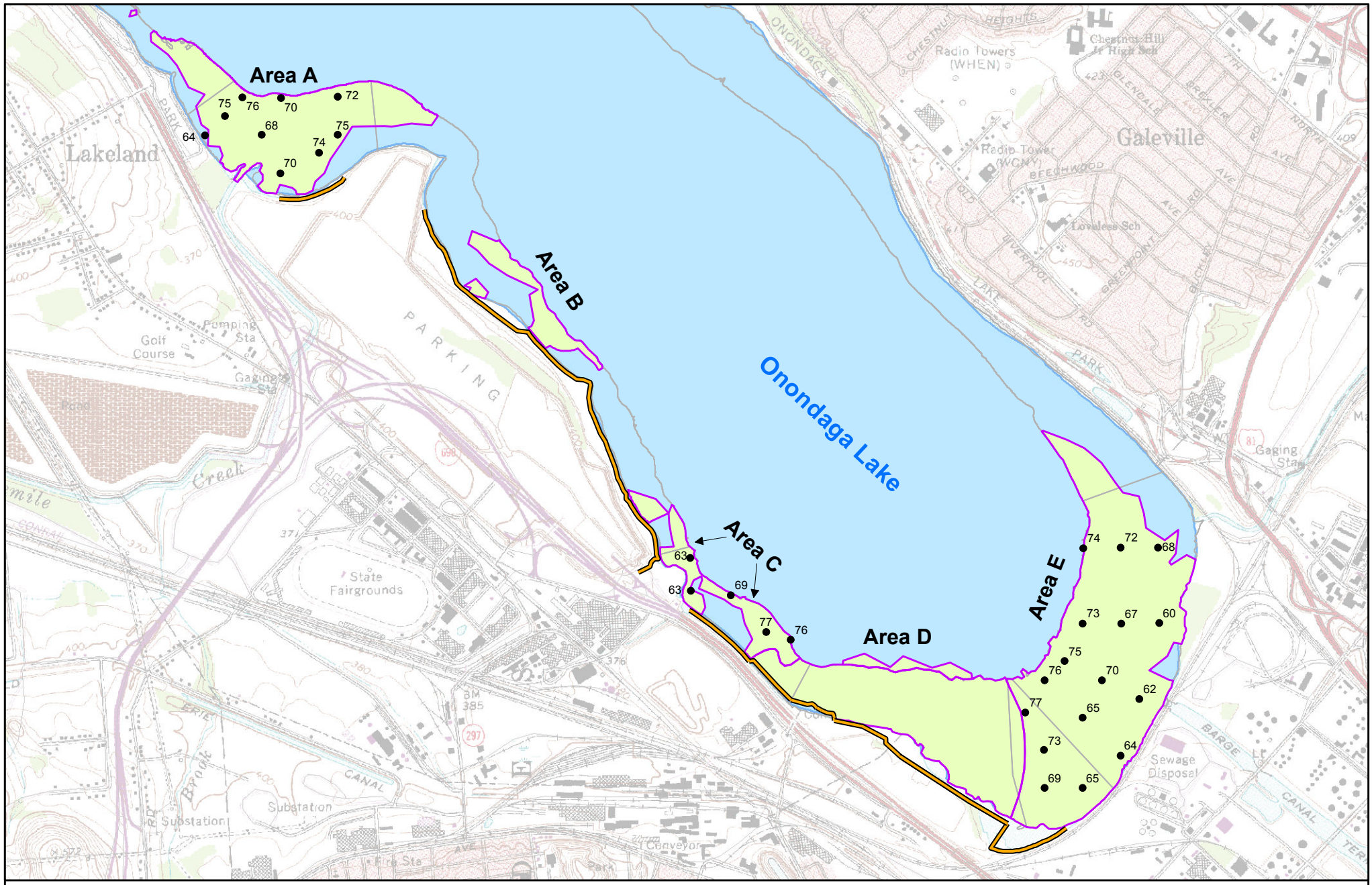
FIGURE 12

Honeywell

Onondaga Lake
Syracuse, New York

Upwelling Measurement and Seepage Meter Locations - Remediation Area E

S. S. Papadopulos & Assoc.



75 Sample Location and Measured Porosity (percent)

Hydraulic Containment System

Remediation Area

SMU Boundary

Isolation Cap Area

0 1,000 2,000 4,000

Feet

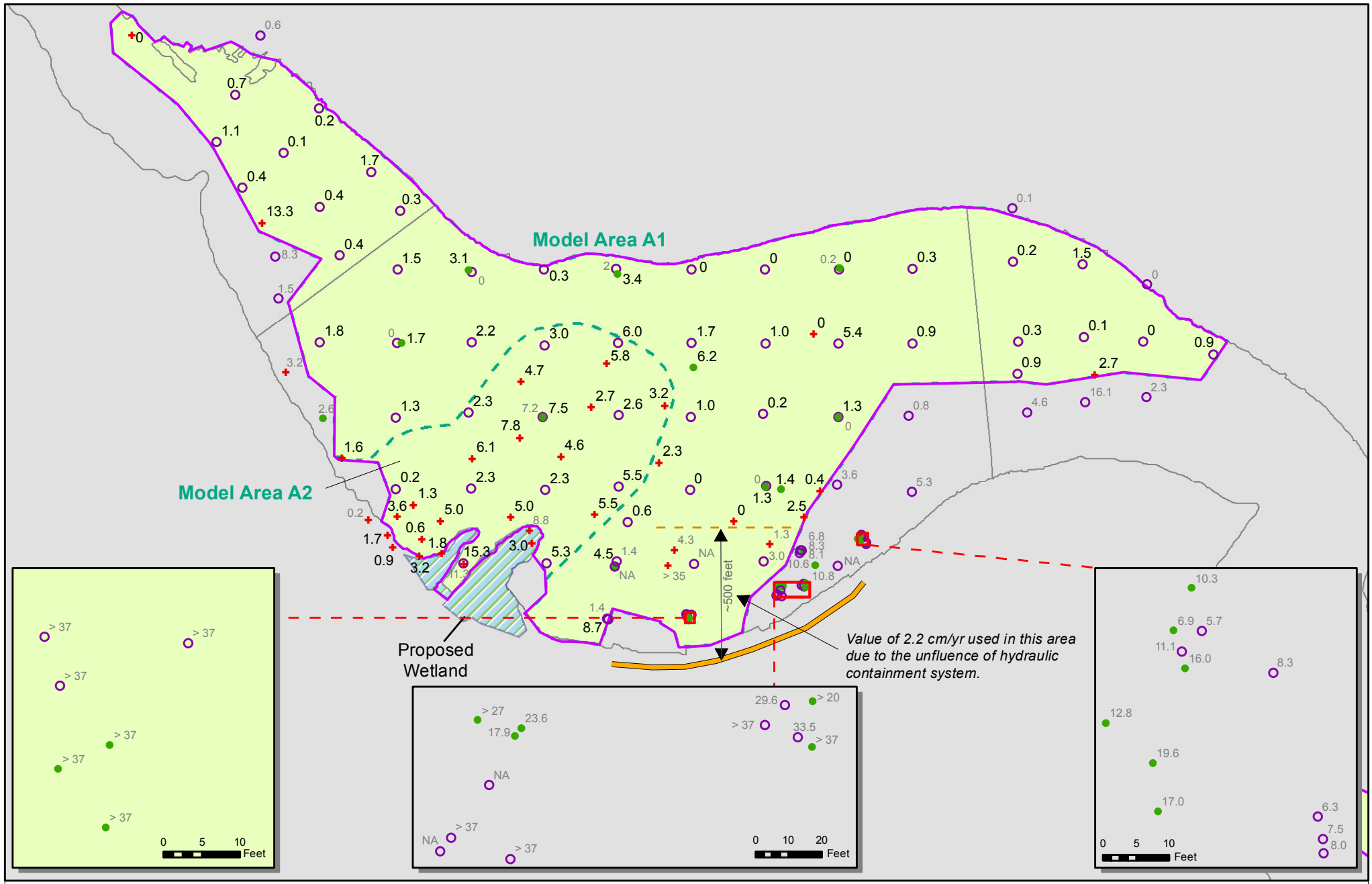
FIGURE 13

Honeywell

Onondaga Lake
Syracuse, New York

Average Porosity at Vibracore Locations

S. S. Papadopulos & Assoc.



6.1 Phase V & VI Upwelling Velocity Pore Water Data (cm/yr)

5.4 Upwelling Velocity Sediment Conductivity Data (cm/yr)

1.2 Upwelling Velocity Pore Water Data (cm/yr)

Hydraulic Containment System

Remediation Area

Wetland

Model Area Boundary

SMU Boundary

Isolation Cap Area

Note: Upwelling velocity values that are in light grey type are not used in the cap design analysis.

0 250 500 1,000 Feet

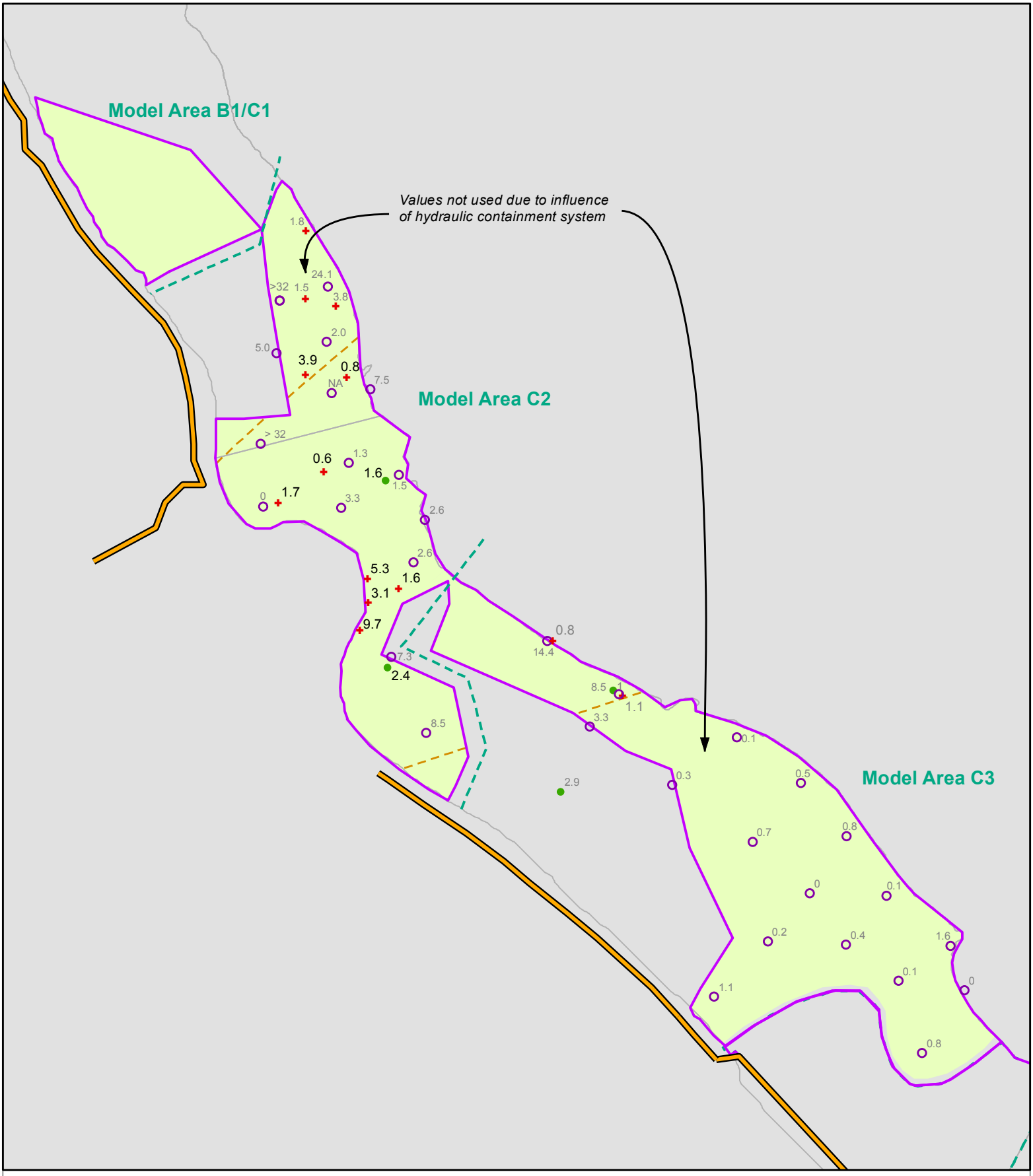
FIGURE 14

Honeywell

Onondaga Lake
Syracuse, New York

Upwelling Velocities in Model Areas A1 and A2

S. S. Papadopulos & Assoc.



Note: Upwelling velocity values that are in light grey type are not used in the cap design analysis.

- 2.1 Phase V & VI Upwelling Velocity Pore Water Data (cm/yr)
- 1.7 Upwelling Velocity Sediment Conductivity Data (cm/yr)
- 0.7 Upwelling Velocity Pore Water Data (cm/yr)
- Hydraulic Containment System
- Extent of the Effect of the Hydraulic Containment System
- Remediation Area
- Model Area Boundary
- SMU Boundary
- Isolation Cap Area

0 125 250 500
Feet

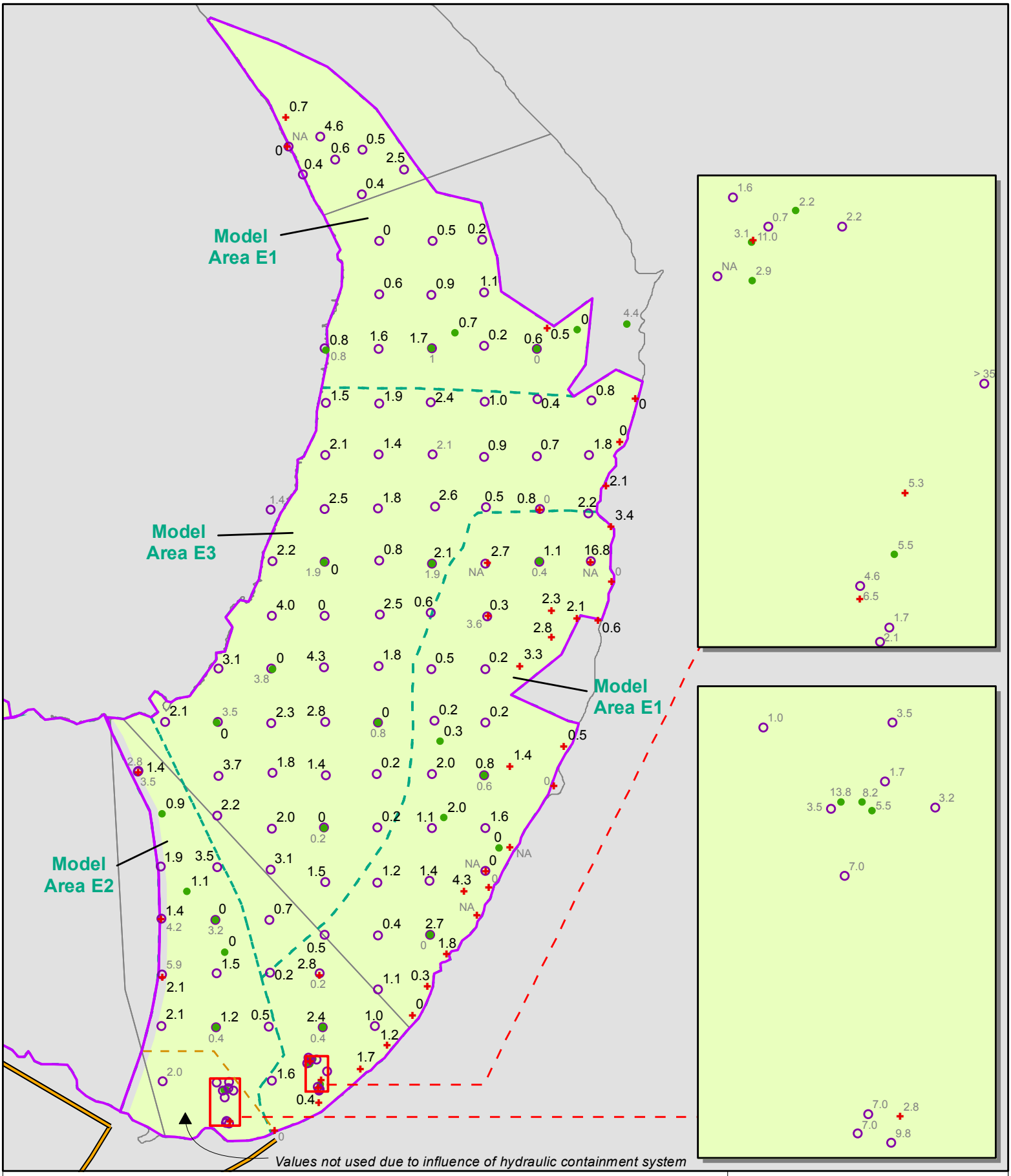
FIGURE 15

Honeywell

Onondaga Lake
Syracuse, New York

Upwelling Velocities in Remediation Area C

S. S. Papadopulos & Assoc.



1.8 Phase V & VI Upwelling Velocity Sediment Conductivity Data (cm/yr)

3.6 Upwelling Velocity Sediment Conductivity Data (cm/yr

4.2 *Upwelling Velocity Pore Water Data (cm/yr)*

Note: Upwelling velocity values thata re in light grey type are not used in the cap design analysis.

Remediation Area

Model Area Boundaries

SMU Boundary

Isolation Cap Area

Hydraulic Containment System

** Represents an average value.*

0 250 500 1,000

Feet

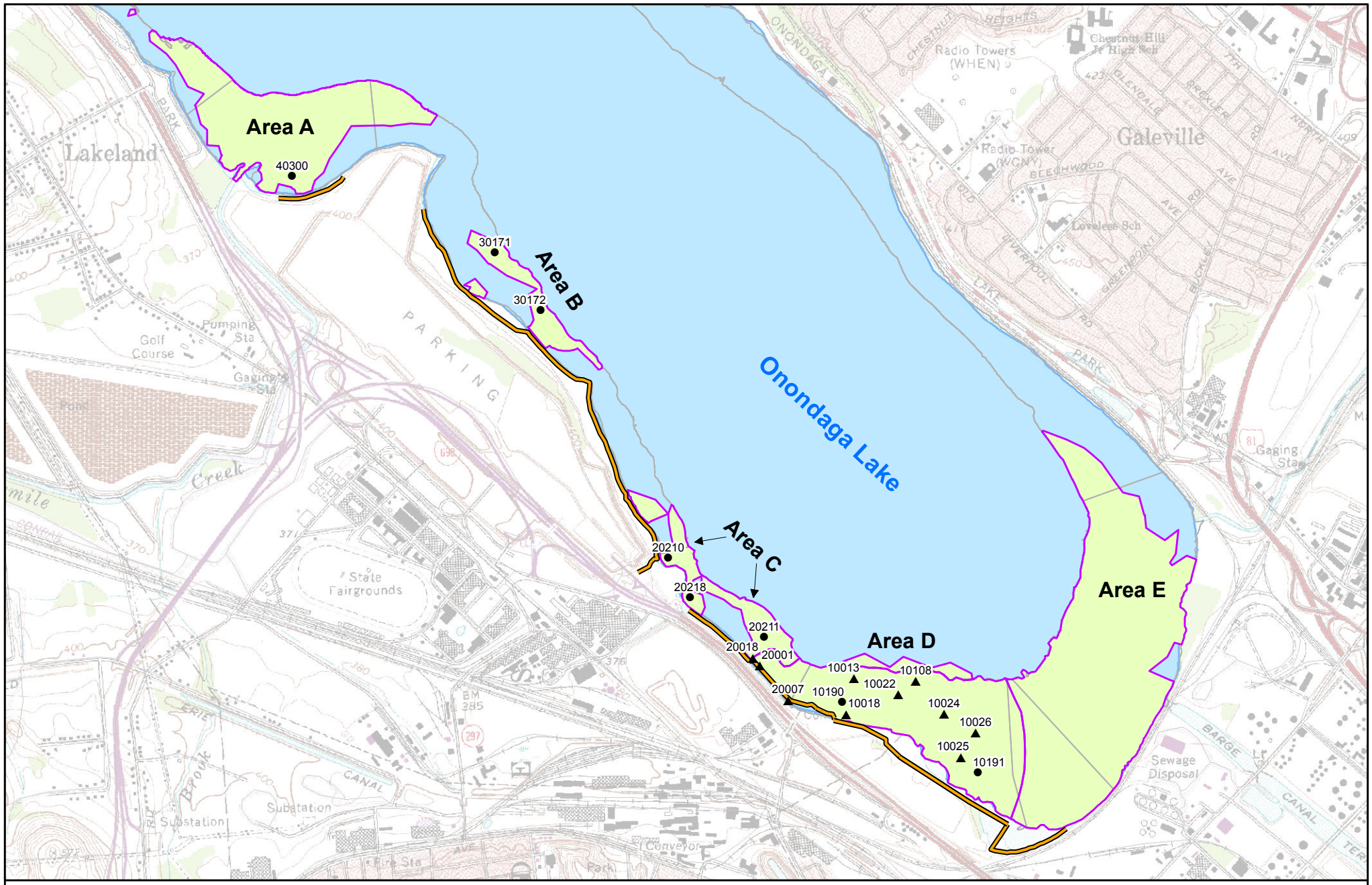
FIGURE 16

Honeywell

Onondaga Lake
Syracuse, New York

Upwelling Velocities in Model Areas E1, E2, and E3

S. S. Papadopulos & Assoc.



Vertical Hydraulic Conductivity Location

10108 ▲ Phase I

10191 ● Phase VI

Hydraulic Containment System

Remediation Area

SMU Boundary

Isolation Cap Area

0 1,000 2,000 4,000

Feet

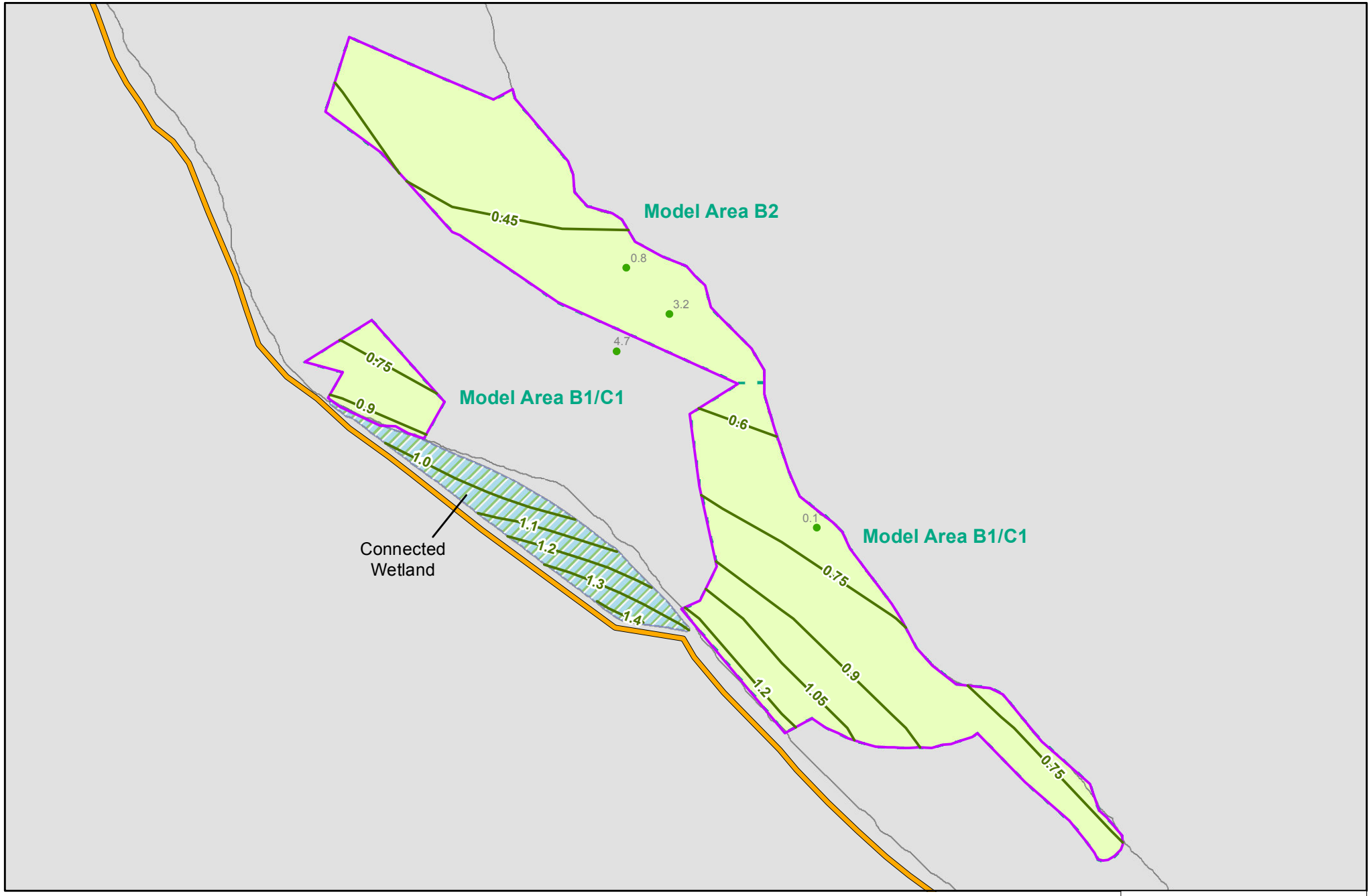
FIGURE 17

Honeywell

Onondaga Lake
Syracuse, New York

Locations of Vertical Hydraulic Conductivity Measurements

S. S. Papadopulos & Assoc.



4.7 Phase I to V Upwelling Velocity Pore Water Data (cm/yr)

Upwelling Velocity Contours

Hydraulic Containment System

Remediation Area

Wetland

Model Area Boundary

SMU Boundary

Isolation Cap Area

0 150 300 600
Feet

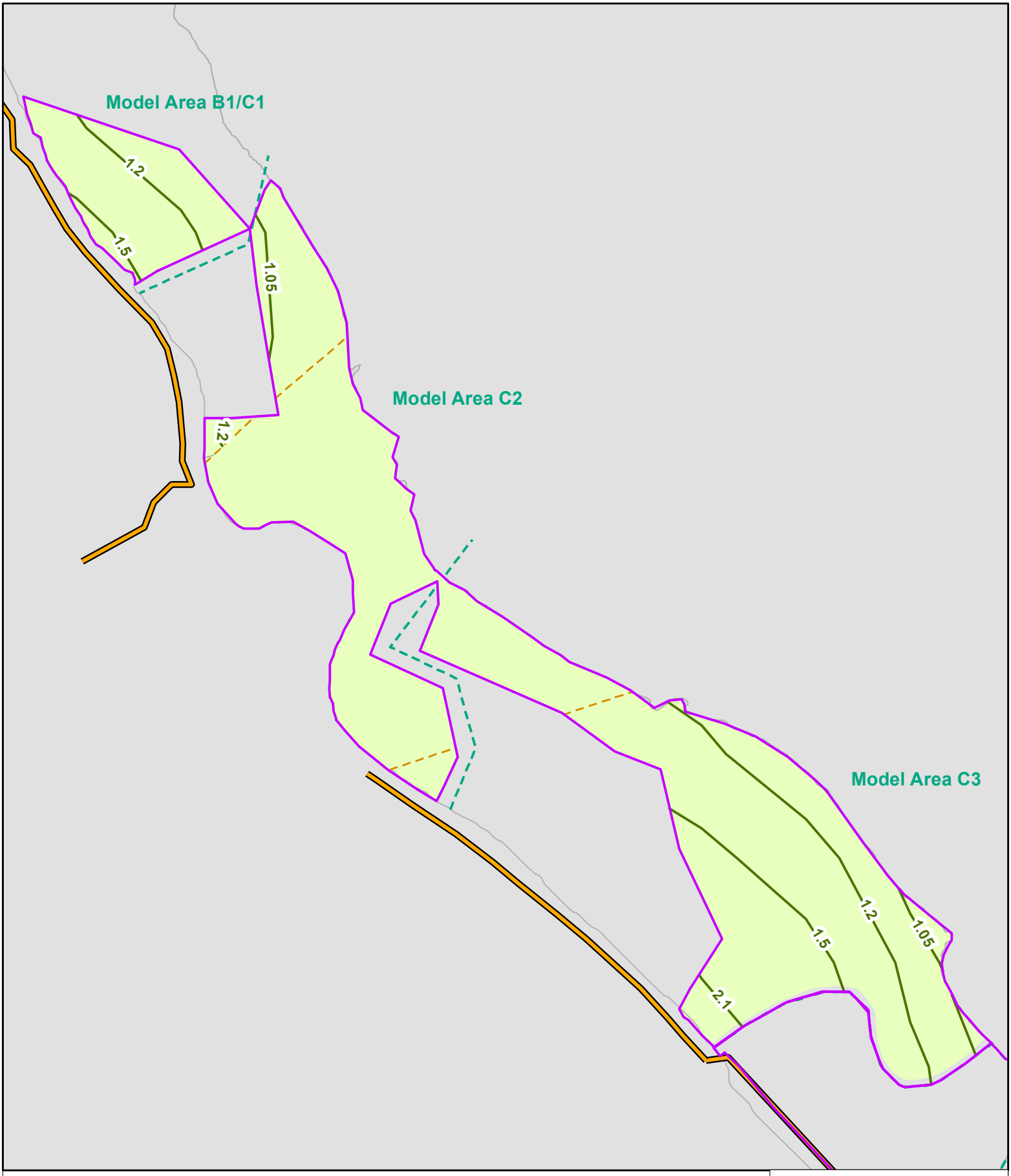
FIGURE 18

Honeywell

Onondaga Lake
Syracuse, New York

Average Upwelling Velocity in Remediation Area B

S. S. Papadopulos & Assoc.



–1.2– Upwelling Velocity Contour (cm/yr)

Hydraulic Containment System

Extent of the Effect of the Hydraulic Containment System

Remediation Area

Model Area Boundary

SMU Boundary

Isolation Cap Area

0 125 250 500
Feet

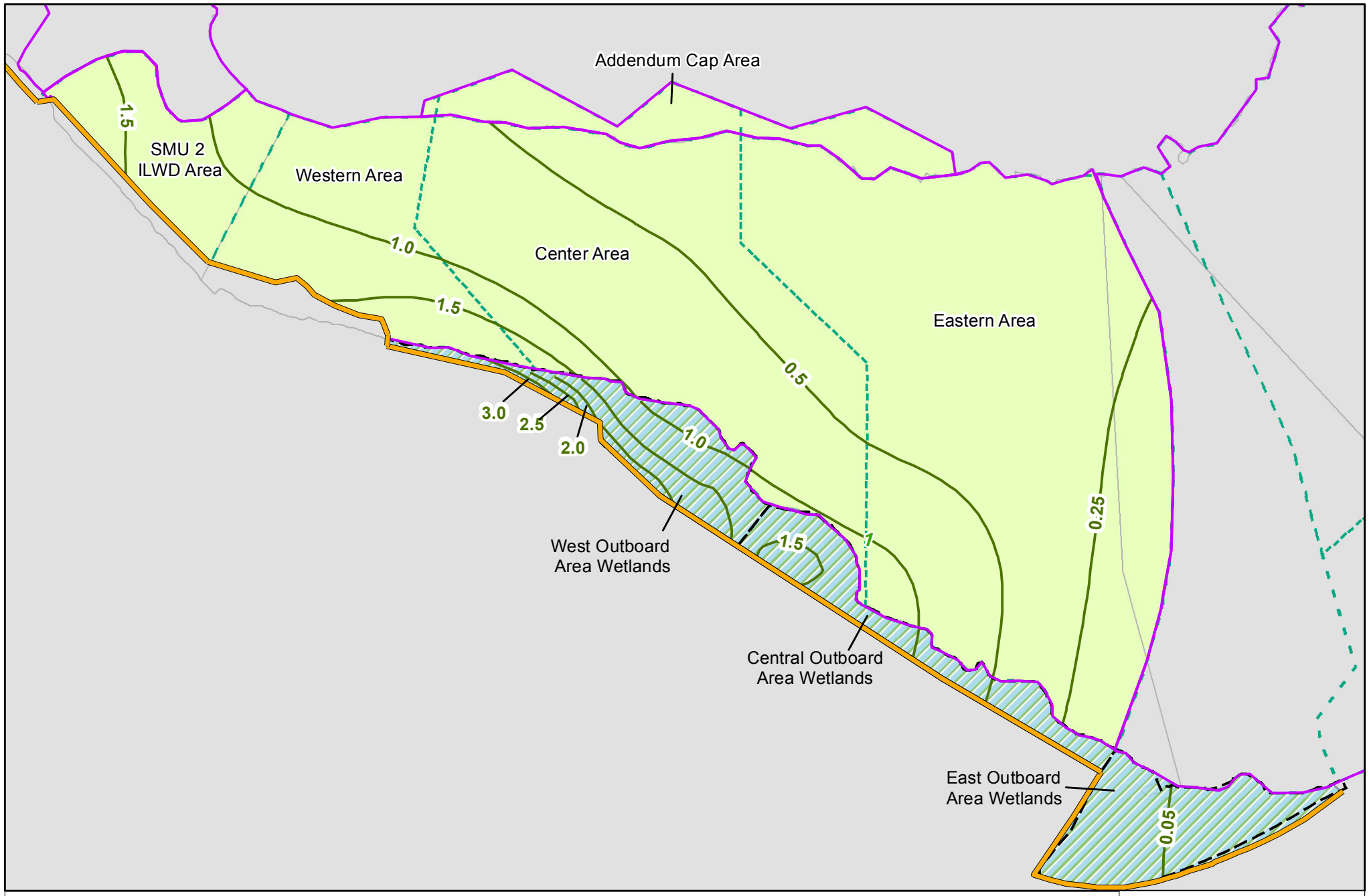
FIGURE 19

Honeywell

Onondaga Lake
Syracuse, New York

Average Upwelling Velocities in Remediation Area C

S. S. Papadopulos & Assoc.



Hydraulic Containment System
Remediation Area
1.5 Upwelling Velocity (cm/yr)
Wetland
Model Area Boundary
SMU Boundary
Isolation Cap Area

0 500 1,000
Feet

FIGURE 20

Honeywell
Onondaga Lake
Syracuse, New York

Average Upwelling Velocities in Remadiation Area D

S. S. Papadopulos & Assoc.

TABLES

Table 1

Summary of Upwelling Velocities used to Develop Cumulative Frequency Distributions for Model Areas A1, A2, and C2 and Remediation Area E

Location ID	Remediation Area	Type[1]	Upwelling Velocity (cm/year)	90% Confidence Interval (+/-) (cm/year)	Depth Interval Used (feet)	Comments
30059	A1	GP	0.2	0.03	5	good
30060	A1	GP	0.3	0.05	10	good
30063	A1	GP	0.9	0.05	5	fair
30064	A1	GP	1.5	0.11	5	fair
30065	A1	GP	0.1	0.02	5	fair
30068	A1	GP	~0.0	0.04	5	fair
30070	A1	GP	0.9	0.04	5	good
30129	A1	VC	2.7	0.64	5	good
40056	A1	VC	1.4	0.18	5	good
40057	A1	VC	6.2	2.25	10	10-foot anlysis fair, 5-foot analysis poor, used 10' analysis, adusted based on confidence interval, best-fit value is 3.9 cm/yr
40109	A1	GP	0.6	0.01	5	fair
40110	A1	GP	8.7	0.55	5	fair to good
40148	A1	GP	1.5	0.15	5	fair
40149	A1	VC	3.1	1.64	5	fair, adjusted based on confidence interval, best-fit value is 1.5 cm/yr
40150	A1	GP	0.3	0.03	5	good
40151	A1	VC	3.4	0.70	5	fair
40152	A1	GP	~0.0	0.02	5	good
40153	A1	GP	~0.0	0.02	5	good
40154	A1	VC	~0.0	0.16	5	good
40155	A1	GP	0.3	0.01	5	good
40156	A1	GP	1.8	0.10	10	good
40157	A1	VC	1.7	0.34	5	good
40158	A1	GP	2.2	0.12	5	good
40161	A1	GP	1.7	0.07	10	good
40162	A1	GP	1.0	0.06	5	good
40163	A1	GP	5.4	0.23	5	fair
40164	A1	GP	0.9	0.03	5	good
40166	A1	GP	1.3	0.04	5	good
40170	A1	GP	1.0	0.02	10	fair
40171	A1	GP	0.2	0.02	5	good
40172	A1	VC	1.3	0.45	5	good
40178	A1	GP	~0.0	0.11	5	good
40179	A1	VC	1.3	0.37	10	good
40184	A1	GP	4.5	0.33	10	poor as data off scale below 1.5 feet; good fit above 1.5 feet
40239	A1	VC	1.6	0.11	10	good

Table 1

Summary of Upwelling Velocities used to Develop Cumulative Frequency Distributions for Model Areas A1, A2, and C2 and Remediation Area E

Location ID	Remediation Area	Type[1]	Upwelling Velocity (cm/year)	90% Confidence Interval (+/-) (cm/year)	Depth Interval Used (feet)	Comments
40295	A1	VC	2.3	0.25	5	good
40298	A1	VC	2.4	0.27	5	good
40299	A1	VC	0.4	0.01	10	good
40301	A1	VC	~0.0	0.11	5	good
40306	A1	VC	~0.0	0.1	5	good
50026	A1	GP	0.3	0.02	5	good
50027	A1	GP	0.4	0.04	5	good
50044	A1	GP	0.7	0.02	10	good
50045	A1	GP	1.1	0.05	5	good
50046	A1	GP	0.2	0.03	5	good
50047	A1	GP	0.1	0.02	10	good
50048	A1	GP	0.4	0.07	5	fair to poor
50049	A1	GP	1.7	0.12	5	good
50050	A1	GP	0.4	0.02	5	good
50071	A1	VC	13.3	3.42	5	good
50087	A1	VC	~0.0	0.17	5	good
40159	A2	GP	3.0	0.23	5	fair
40160	A2	GP	6.0	0.57	10	good
40167	A2	GP	2.3	0.06	10	fair
40168	A2	VC	7.5	1.38	5	good
40169	A2	GP	2.6	0.08	10	good
40174	A2	GP	0.2	0.02	5	good
40175	A2	GP	2.3	0.11	10	good
40176	A2	GP	2.3	0.57	5	fair based on upper two feet
40177	A2	GP	5.5	0.29	5	good
40183	A2	GP	5.3	0.75	10	poor
40240	A2	VC	1.3	0.39	5	good
40241	A2	VC	5.0	0.42	5	good
40242	A2	VC	3.6	0.70	5	good
40243	A2	VC	0.6	0.18	10	good
40245	A2	VC	6.1	0.38	5	good
40246	A2	VC	7.8	1.31	5	good
40247	A2	VC	4.7	0.49	10	good
40248	A2	VC	5.0	0.99	10	good
40249	A2	VC	4.6	1.38	10	good

Table 1

Summary of Upwelling Velocities used to Develop Cumulative Frequency Distributions for Model Areas A1, A2, and C2 and Remediation Area E

Location ID	Remediation Area	Type[1]	Upwelling Velocity (cm/year)	90% Confidence Interval (+/-) (cm/year)	Depth Interval Used (feet)	Comments
40250	A2	VC	2.7	0.90	10	good
40288	A2	VC	1.7	0.28	5	good
40289	A2	VC	0.9	0.31	5	good
40290	A2	VC	3.2	1.13	5	fair
40291	A2	VC	1.8	0.44	5	good
40293	A2	VC	3.0	1.15	5	fair
40294	A2	VC	5.5	0.51	5	fair
40296	A2	VC	3.2	0.33	5	good
40297	A2	VC	5.8	0.78	10	good
40302	A2	VC	15.3	4.22	5	fair
20111	C2	VC	1.6	0.54	5	fair
20113	C2	VC	2.4	0.56	5	good
20187	C2	VC	1.7	0.58	10	good
20188	C2	VC	9.7	2.81	5	good
20189	C2	VC	1.6	0.54	5	good
20190	C2	VC	0.6	0.39	10	good, adjusted based on confidence interval, best-fit value is 0.2 cm/yr
20202	C2	VC	5.3	1.65	5	fair at 5 foot, poor at 10 foot analysis
20203	C2	VC	3.1	1.36	5	fair
30176	C2	VC	3.9	1.86	5	fair
30178	C2	VC	0.8	0.39	5	good
50037	E1	GP	4.6	0.88	5	fair
50038	E1	GP	0.4	0.02	5	good
50039	E1	GP	0.6	0.02	5	good
50040	E1	GP	0.5	0.02	10	good
50041	E1	GP	0.4	0.01	5	good
50042	E1	GP	2.5	0.09	5	fair
50088	E1	VC	0.7	0.13	5	good
50089	E1	VC	~0.0	0.21	5	good
60072	E1	VC	~0.0	0.24	5	fair
60081	E1	VC	~0.0	0.25	5	fair
60087	E1	VC	2.0	0.15	5	good
60090	E1	VC	0.3	0.08	5	good
60096	E1	VC	0.7	0.13	5	good
60119	E1	GP	~0.0	0.03	5	good
60120	E1	GP	0.5	0.02	5	good

Table 1

Summary of Upwelling Velocities used to Develop Cumulative Frequency Distributions for Model Areas A1, A2, and C2 and Remediation Area E

Location ID	Remediation Area	Type[1]	Upwelling Velocity (cm/year)	90% Confidence Interval (+/-) (cm/year)	Depth Interval Used (feet)	Comments
60121	E1	GP	0.2	0.02	10	good
60122	E1	GP	0.6	0.02	5	good
60123	E1	GP	0.9	0.03	5	good
60124	E1	GP	1.1	0.05	5	good
60125	E1	VC	0.8	0.34	5	good
60126	E1	GP	1.6	0.05	10	good
60127	E1	VC	1.7	0.47	5	fair, first data points offset
60128	E1	GP	0.2	0.02	10	good
60129	E1	VC	0.6	0.30	10	fair, adjusted based on confidence interval, best-fit value is 0.3 cm/yr
60148	E1	GP	2.2	0.22	5	fair
60154	E1	VC	1.1	0.10	10	good
60155	E1	GP	16.8	3.55	5	fair to poor
60165	E1	GP	0.5	0.02	10	good
60166	E1	GP	0.2	0.04	10	good
60172	E1	GP	0.2	0.02	5	good
60173	E1	GP	0.2	0.04	5	good to five feet
60178	E1	GP	2.0	0.06	5	good
60179	E1	VC	0.8	0.60	10	fair, adjusted based on confidence interval, best-fit value is 0.2 cm/yr
60184	E1	GP	1.6	0.07	5	good to five feet
60186	E1	GP	1.2	0.11	5	fair
60187	E1	GP	1.4	0.07	5	fair
60189	E1	GP	0.5	0.04	10	fair
60190	E1	GP	0.4	0.05	10	fair to 5 feet
60191	E1	VC	2.7	0.84	10	fair
60192	E1	GP	1.1	0.04	5	good
60274	E1	VC	~0.0	0.29	5	good
60275	E1	VC	0.3	0.2	5	fair to poor, adjusted based on confidence interval, best-fit value is 0.1 cm/yr
60276	E1	VC	1.8	0.9	5	fair
60281	E1	VC	0.5	0.24	10	fair
60282	E1	VC	0.6	0.29	5	fair to poor
60284	E1	VC	3.4	0.49	5	good
60288	E1	VC	~0.0	0.08	5	good
60290	E1	VC	1.3	0.62	5	good
60291	E1	VC	2.1	0.19	5	fair
60292	E1	VC	2.3	0.35	5	fair

Table 1

Summary of Upwelling Velocities used to Develop Cumulative Frequency Distributions for Model Areas A1, A2, and C2 and Remediation Area E

Location ID	Remediation Area	Type[1]	Upwelling Velocity (cm/year)	90% Confidence Interval (+/-) (cm/year)	Depth Interval Used (feet)	Comments
60293	E1	VC	0.3	0.15	10	good
60294	E1	VC	2.7	0.25	5	good
60297	E1	VC	0.5	0.07	5	good
60302	E1	VC	4.3	0.53	5	good
60303	E1	VC	3.3	0.58	5	good
60304	E1	VC	2.8	0.1	5	good
70040	E1	VC	5.8	NA	5	Average based on locations 70040, 70145 and 70146
70062	E1	VC	4.8	NA	NA	Average based on locations 70061, 70062, 70063, and 70057
70097	E1	GP	0.2	0.04	10	good
70102	E1	VC	2.4	0.63	10	good
70103	E1	GP	1.0	0.10	5	fair to 6 feet
70106	E1	GP	1.6	0.02	10	fair to 4.5 feet
70147	E1	VC	2.8	0.19	5	fair to poor
70152	E1	VC	0.4	0.2	10	fair
70153	E1	VC	1.7	0.66	10	good
70154	E1	VC	1.2	0.58	10	fair at 10 foot analysis, poor at 5 foot analysis
70042	E2	VC	~0.0	0.14	5	good
70043	E2	VC	1.1	0.49	5	good, adjusted based on confidence interval, best-fit value is 0.6 cm/yr
70089	E2	VC	0.9	0.17	10	good
70090	E2	GP	1.9	0.08	5	good
70091	E2	GP	3.5	0.29	5	fair to 6.5 feet
70093	E2	VC	~0.0	0.27	5	good
70096	E2	GP	1.5	0.06	5	good
70099	E2	GP	2.1	0.14	5	good to fair
70100	E2	VC	1.2	0.45	5	good
70101	E2	GP	0.5	0.02	10	good
70148	E2	VC	2.1	0.21	5	good
70149	E2	VC	1.4	0.38	5	good
70150	E2	VC	1.4	0.29	5	good
60130	E3	GP	1.5	0.10	5	good
60131	E3	GP	1.9	0.08	5	fair to poor
60132	E3	GP	2.4	0.15	5	good
60133	E3	GP	1.0	0.06	5	good
60134	E3	GP	0.4	0.04	10	good
60135	E3	GP	0.8	0.02	10	fair

Table 1

Summary of Upwelling Velocities used to Develop Cumulative Frequency Distributions for Model Areas A1, A2, and C2 and Remediation Area E

Location ID	Remediation Area	Type[1]	Upwelling Velocity (cm/year)	90% Confidence Interval (+/-) (cm/year)	Depth Interval Used (feet)	Comments
60136	E3	GP	2.0	0.07	5	good
60137	E3	GP	1.4	0.08	5	good
60139	E3	GP	0.9	0.10	5	fair
60140	E3	GP	0.7	0.04	10	fair
60141	E3	GP	1.8	0.27	5	fair to poor
60143	E3	GP	2.5	0.12	5	good
60144	E3	GP	1.8	0.09	5	good
60145	E3	GP	2.6	0.18	5	good
60146	E3	GP	0.5	0.02	10	good
60149	E3	GP	2.2	0.12	5	good
60150	E3	VC	~0.0	0.10	5	good
60151	E3	GP	0.8	0.08	5	fair to good
60152	E3	VC	2.1	0.47	5	good
60156	E3	GP	4.0	0.20	5	good
60157	E3	GP	~0.0	0.11	10	fair at 10' analysis
60158	E3	GP	2.5	0.15	5	good
60159	E3	GP	0.6	0.05	5	good to fair
60161	E3	GP	3.1	0.13	5	good
60162	E3	VC	~0.0	0.23	5	fair
60163	E3	GP	4.3	0.22	5	good
60164	E3	GP	1.8	0.21	5	fair
60167	E3	GP	2.1	0.06	5	good
60168	E3	VC	~0.0	0.23	5	good
60169	E3	GP	2.3	0.13	5	fair
60170	E3	GP	2.8	0.09	5	good
60171	E3	VC	~0.0	0.18	5	good
60174	E3	GP	3.7	0.15	5	good
60175	E3	GP	1.8	0.11	5	good
60176	E3	GP	1.4	0.06	5	good
60177	E3	GP	0.2	0.04	5	good
60180	E3	GP	2.0	0.06	5	good
60181	E3	VC	~0.0	0.04	5	good
60182	E3	GP	0.2	0.05	5	good
60185	E3	GP	1.5	0.21	5	fair
60193	E3	GP	2.2	0.08	5	good

Table 1

Summary of Upwelling Velocities used to Develop Cumulative Frequency Distributions for Model Areas A1, A2, and C2 and Remediation Area E

Location ID	Remediation Area	Type[1]	Upwelling Velocity (cm/year)	90% Confidence Interval (+/-) (cm/year)	Depth Interval Used (feet)	Comments
60194	E3	GP	3.1	0.30	10	5-foot analysis good, 10-foot analysis poor
60285	E3	VC	2.1	0.63	5	good
60286	E3	VC	~0.0	0.35	5	fair
60287	E3	VC	~0.0	0.77	5	good
60296	E3	VC	0.8	0.24	5	fair
70094	E3	GP	0.7	0.02	5	good

Notes:

1 The upwelling estimates are based on evaluations of chloride-depth profiles developed from pore water analyses obtained from Vibracore (VC) borings and from sediment conductivity data collected with a Geoprobe (GP) direct push conductivity probe.

"NA" - indicates the chloride depth profile does not have a form suitable for analysis.

Table 2

Comparison of Upwelling Velocities at Locations with Pore Water and Sediment Conductivity Data

Location ID	Upwelling Velocity (cm/year)	
	Pore Water	Sediment Conductivity
20111	1.6	~ 0, 2.6
20113	2.4	1.0, 7.3
20118	0.7	0.5, 1.6
20119	~ 0	~ 0
20133	8.5	1.0
40149	1.5	~ 0
40151	3.4	2.0
40154	~ 0	0.2
40157	1.7	~ 0
40165	2.6	0.5
40168	7.5	7.1
40172	1.3	~ 0
40179	1.3	~ 0
40184	NA	4.5, 0.4
60125	0.8	0.6, 0.8, 0.9
60127	1.7	1.0
60129	0.3	~ 0
60150	~ 0	2.4, 1.9, 2.1
60152	2.1	1.9
60154	1.1	0.4
60162	~ 0	2.1, 3.8, 2.6
60168	~ 0	3.2, 3.5, 3.5
60171	~ 0	0.8
60179	0.2	0.6
60181	~ 0	0.2
60191	2.7	2.1
70089	0.9	2.5
70093	~ 0	3.2
70100	1.2	0.4
70102	2.4	0.4

Note: "NA" indicates the chloride-depth profile does not have a form suitable for analysis.

Table 3

Comparison of Upwelling Velocities at Locations with Multiple Sets of Sediment Conductivity Data

Location	Upwelling Velocity (cm/yr)	
	Largest	Other
20111	2.6	~ 0
20113	7.3	1.0
20115	8.5	1.0
20116	0.8	~ 0
20117	0.1	~ 0
20118	1.6	0.5
20121	~ 0	~ 0
20122	1.1	0.9
20123	0.2	~ 0
20128	0.5	0.1
20129	0.7	0.3
20130	0.1	~ 0
20132	14.4	1.1
30061	4.6	4.2
30071	>32	0.9
30072	24.1	1.2
30073	5.0	4.8
30075	>32	18.9, 7.7, 13.0, NA, NA, NA
30076	>32	1.3, 0.5, NA
40074	>37	>37
40076	33.5	NA
40079	>37	>37
40110	8.7	NA
40163	5.4	5.4
40183	5.3	2.3
40184	4.5	0.4
40185	NA	NA
40186	3.0	NA
60125	0.9	0.8, 0.6
60130	1.5	0.3, 0.5

Table 3

Comparison of Upwelling Velocities at Locations with Multiple Sets of Sediment Conductivity Data

Location	Upwelling Velocity (cm/yr)	
	Largest	Other
60136	2.1	2.0, 1.8, 1.1
60142	1.4	1.3, 0.7
60143	2.5	2.5, 0.4
60149	2.2	2.2, 2.1
60150	2.4	2.1, 1.9
60156	4.0	3.4
60161	3.1	2.5, 1.9
60162	3.8	2.6, 2.1
60163	4.3	3.3
60167	2.1	1.9, 1.9
60168	3.5	3.5, 3.2
60170	2.8	2.2, 1.8
70051	7.0	4.9
70053	9.8	6.3, NA
70054	4.6	0.8
70088	3.5	2.8, 1.9
70107	>35	~ 0 , NA

Note: "NA" indicates the chloride-depth profile does not have a form suitable for analysis.

Table 4

Measured Values of Vertical Hydraulic Conductivity of Silt and Clay Unit

Location	Sample Interval (feet, BGS)	Representative Thickness (feet)	Vertical Hydraulic Conductivity (cm/sec)	Silt and Clay Thickness (feet)	Effective Vertical Hydraulic Conductivity (cm/sec)
Phase VI Data					
OL-SB-10190	42-44	6	4.30E-07	30	8.89E-08
	52-54	10	5.40E-08		
	62-64	10	7.80E-08		
	72-74	4	4.00E-07		
OL-SB-10191	60-62		1.00E-06	37	3.19E-07
	70-72	13	6.80E-07		
	80-82	10	1.80E-07		
	90-92	14	3.40E-07		
OL-SB-20210	28-30	6	2.80E-08	43	1.36E-07
	38-40	10	3.00E-07		
	48-50	10	4.60E-08		
	58-60	10	2.20E-07		
	68-70	6.5	3.80E-07		
OL-SB-20211	37-39	8	6.00E-08	22	6-07e-8
	47-49	14	6.10E-08		
	59-61	0	4.70E-05		
OL-SB-20218	18-20	11	4.90E-08	11	4.90E-08
	27-29	0	6.60E-06		
	37-39		2.10E-04		
OL-SB-30171	25-27	14	1.10E-07	69	1.50E-07
	47-49	16	2.60E-07		
	57-59	15	6.10E-07		
	77-79	16.5	1.10E-07		
	90-92	7.5	7.80E-08		
OL-SB-30172	20-22	8	1.80E-07	40	1.45E-07
	28-30	9	5.60E-07		
	38-40	10	7.50E-08		
	48-50	12.5	1.60E-07		
OL-SB-40300	53-54	10	1.50E-07	36	2.26E-07
	62--64	9.5	2.70E-07		
	71-73	10	2.40E-07		
	82-84	6.5	3.20E-07		
Phase I Data					
OL-STA-10013	41-43		1.40E-07		
OL-STA-10018	48-50		7.80E-08		
OL-STA-10022	64-66		2.30E-07		
OL-STA-10024	64-66		1.20E-07		
OL-STA-10025	52-54		9.00E-08		
OL-STA-10026	50-52		5.80E-08		
OL-STA-20001	45-47		1.30E-07		
OL-STA-20007	39-41		1.00E-07		
OL-STA-20018	47-49		1.40E-07		
OL-STA-10108	64-66		2.80E-07		
OL-STA-10108	68-70		2.10E-07		

Table 5

Calculated Vertical Groundwater Velocities across the Silt and Clay Unit at Selected Monitoring Well Locations

Well ID	Water Level Elevation (feet, NAVD 88)	Density (g/cm3)	Midscreen Elevation (feet, NAVD 88)	Freshwater Head (feet, NAVD 88)	Silt and Clay Thickness (feet)	Vertical Velocity (cm/year)
HB-HB-20D	363.7	1.11	233.5	378.0	86	0.31
HB-HB-20I	363.5	1.02	330.5	364.2		
HB-HB-05D	368.7	1.07	275	375.3	30	0.82
HB-HB-05I	365.1	1.07	328.9	367.6		
WA-WA-1D	370.3	1.04	268.5	374.4	24	1.43
WA-WA-1I	364.5	1.04	335.4	365.7		
WA-WA-3D	373.2	1.02	311.9	374.4	23	1.15
WA-WA-3I	367.2	1.03	345.5	367.9		
WB18-MW-03D	368.3	1.06	233.3	376.4	55	0.30
WB18-MW-03I	365.3	1.08	321.3	368.8		
WB18-MW-02D	369.1	1.06	273.3	374.8	21	1.62
WB18-MW-02I	364.0	1.07	338.3	365.8		

Notes: Water level data, density data and silt and clay thickness from (O'Brien & Gere 2008 and 2009). Water level data represent best estimate of average water levels. Upwelling velocity calculated using Equation (4).

ATTACHMENTS

List of Attachments

Attachment I	Geologic Sections
Attachment II	Conductivity-Temperature Investigation Results
Attachment III	Upwelling Investigation Results – Transect TR01
Attachment IV	Seepage Meter Investigation Results
Attachment V	Vibracore Water Quality and Porosity Data
Attachment VI	Sediment Conductivity and Pore Water Correlations
Attachment VII	Chloride-Depth Profile Analyses
Attachment VIII	Transient Evaluation of Chloride-Depth Profiles
Attachment IX	Comparison of Upwelling Estimates from Pore Water and Sediment Conductivity Data from Same Location
Attachment X	Evaluation of Velocity in Silt and Clay Unit
Attachment XI	Sensitivity Evaluations
Attachment XII	Results from Diffusion Samplers – Phase III
Attachment XIII	Estimation of Hydraulic Conductivity from Consolidation Test Data

Attachment I

Geologic Sections

Attachment I
Geologic Sections

This attachment contains a series of ten geologic sections through the five Remediation Areas. These cross sections, at a minimum, depict the silt and clay unit and overlying sediments. Where information is available in the vicinity of these cross sections on the geologic units below the silt and clay unit, this information is also shown. The sections are annotated with notes from the boring logs regarding lithologic observations within each of the geologic units. In general the marl is described as silt and/or silt and clay though in some logs the marl was noted as consisting of gravel and/or sand-sized sediments. The figures that are contained in this Attachment are the following:

Figure 1	Cross Section Location Map
Figure 2	Remediation Area A – Hydrogeologic Cross Section A-A’
Figure 3	Remediation Area A – Hydrogeologic Cross Section B-B’
Figure 4	Remediation Area B – Hydrogeologic Cross Section C-C’
Figure 5	Remediation Area B – Hydrogeologic Cross Section D-D’
Figure 6	Remediation Area C – Hydrogeologic Cross Section E-E’
Figure 7	Remediation Area C – Hydrogeologic Cross Section F-F’
Figure 8	Remediation Area D – Hydrogeologic Cross Section G-G’
Figure 9	Remediation Area D – Hydrogeologic Cross Section H-H’
Figure 10	Remediation Area E – Hydrogeologic Cross Section I-I’
Figure 11	Remediation Area E – Hydrogeologic Cross Section J-J’1

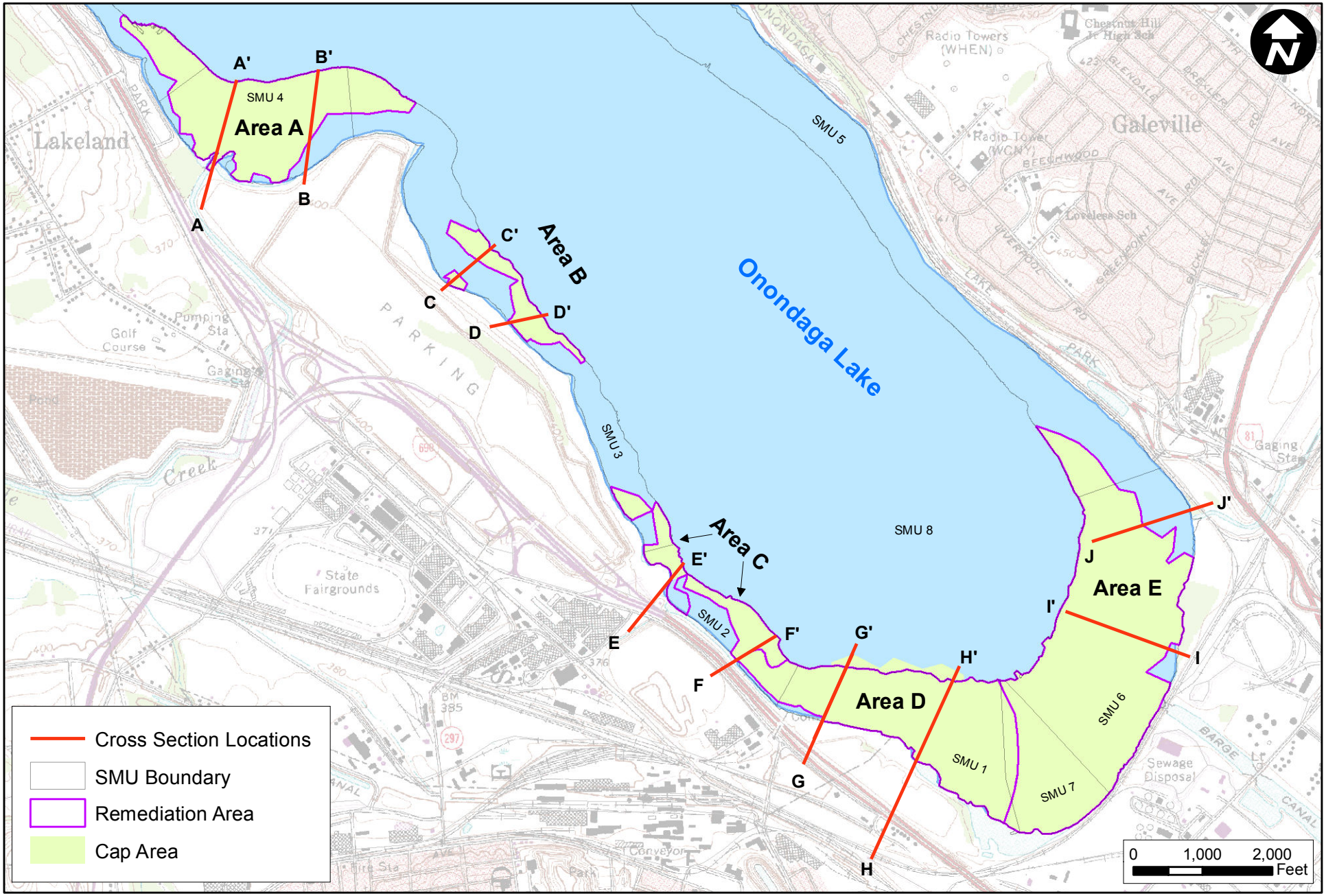


Figure I-1 Cross Section Location Map

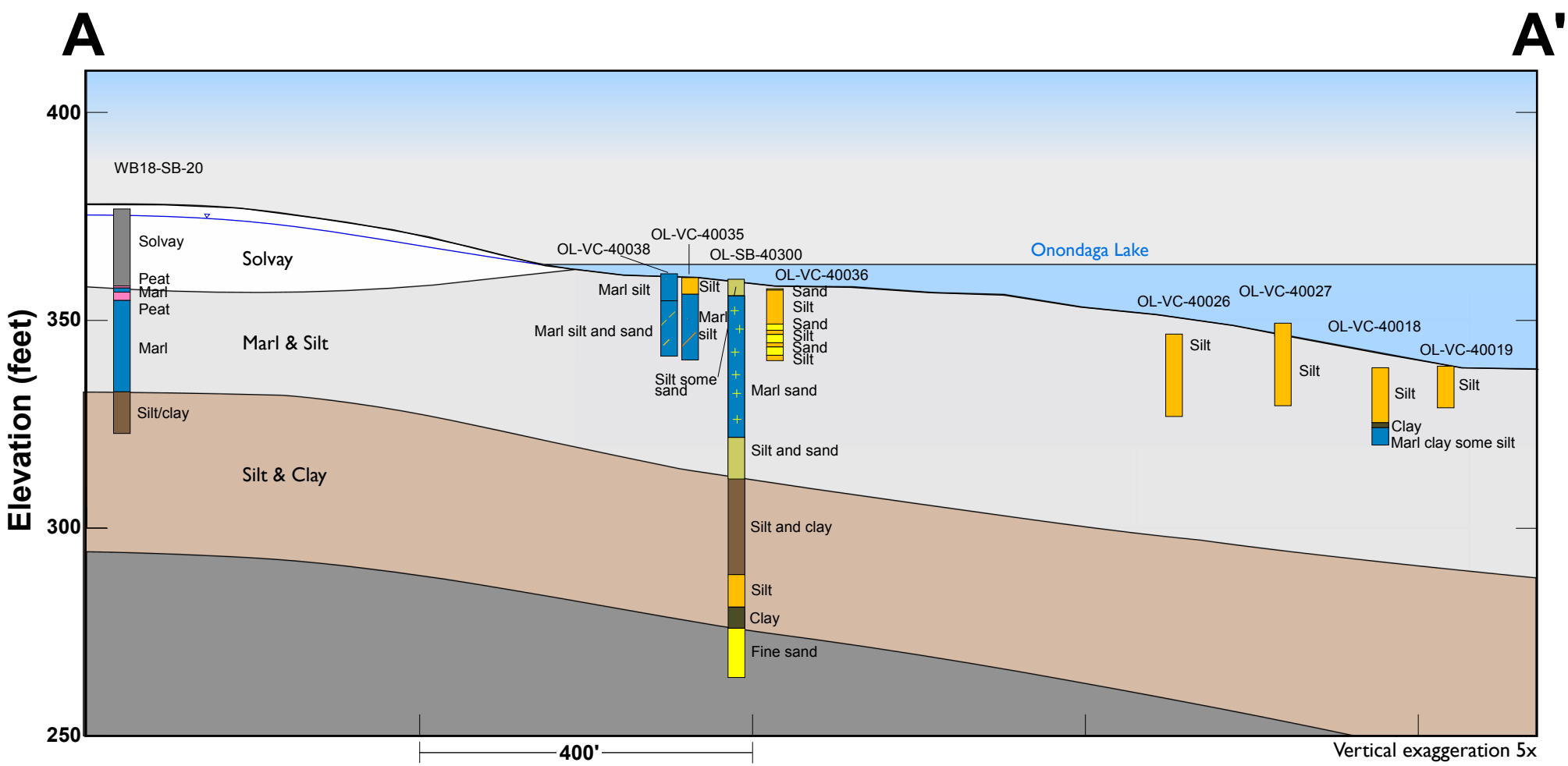


Figure I-2 Remediation Area A - Hydrogeologic Cross Section A-A'

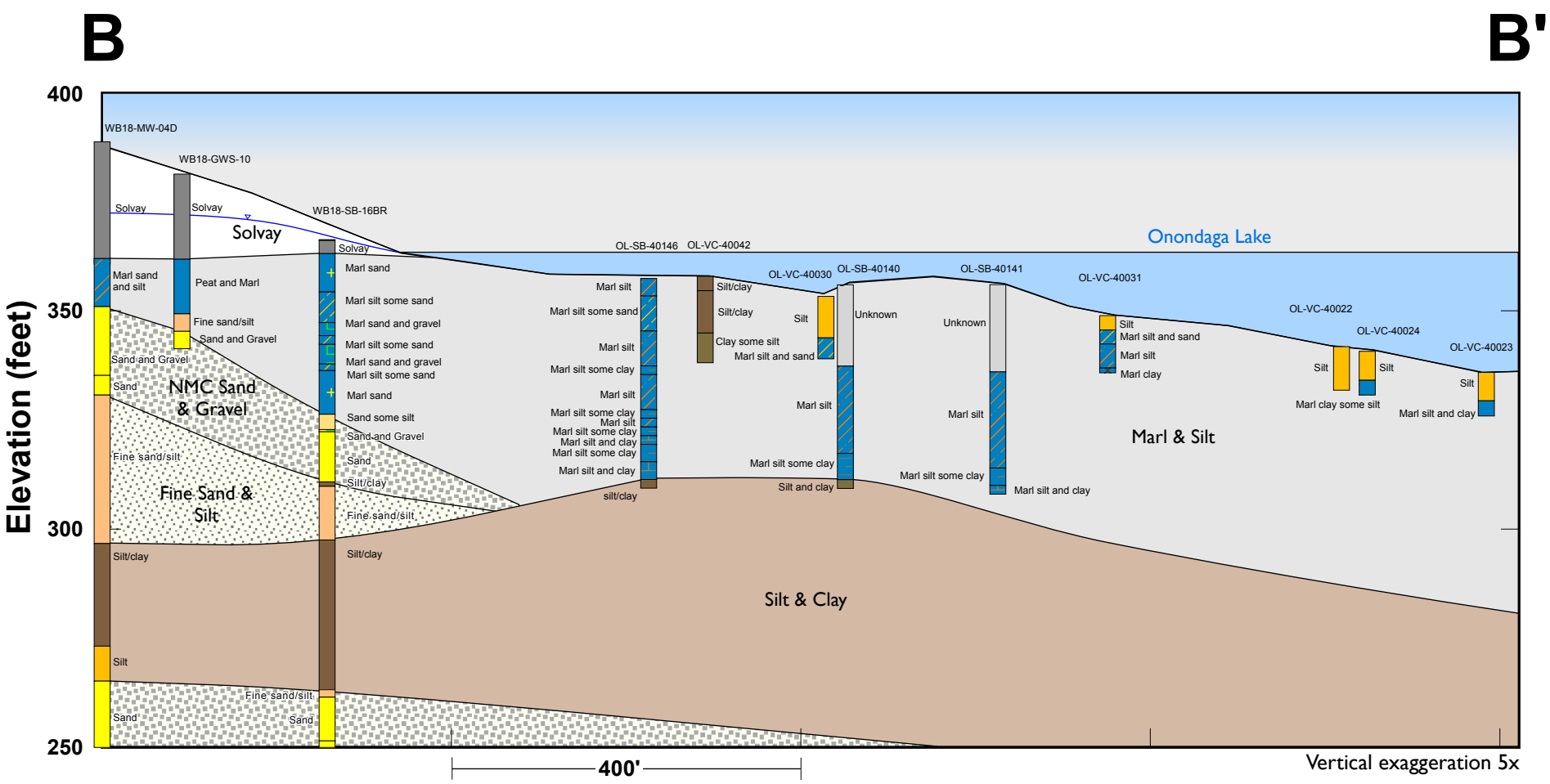


Figure I-3 Remediation Area A - Hydrogeologic Cross Section B-B'

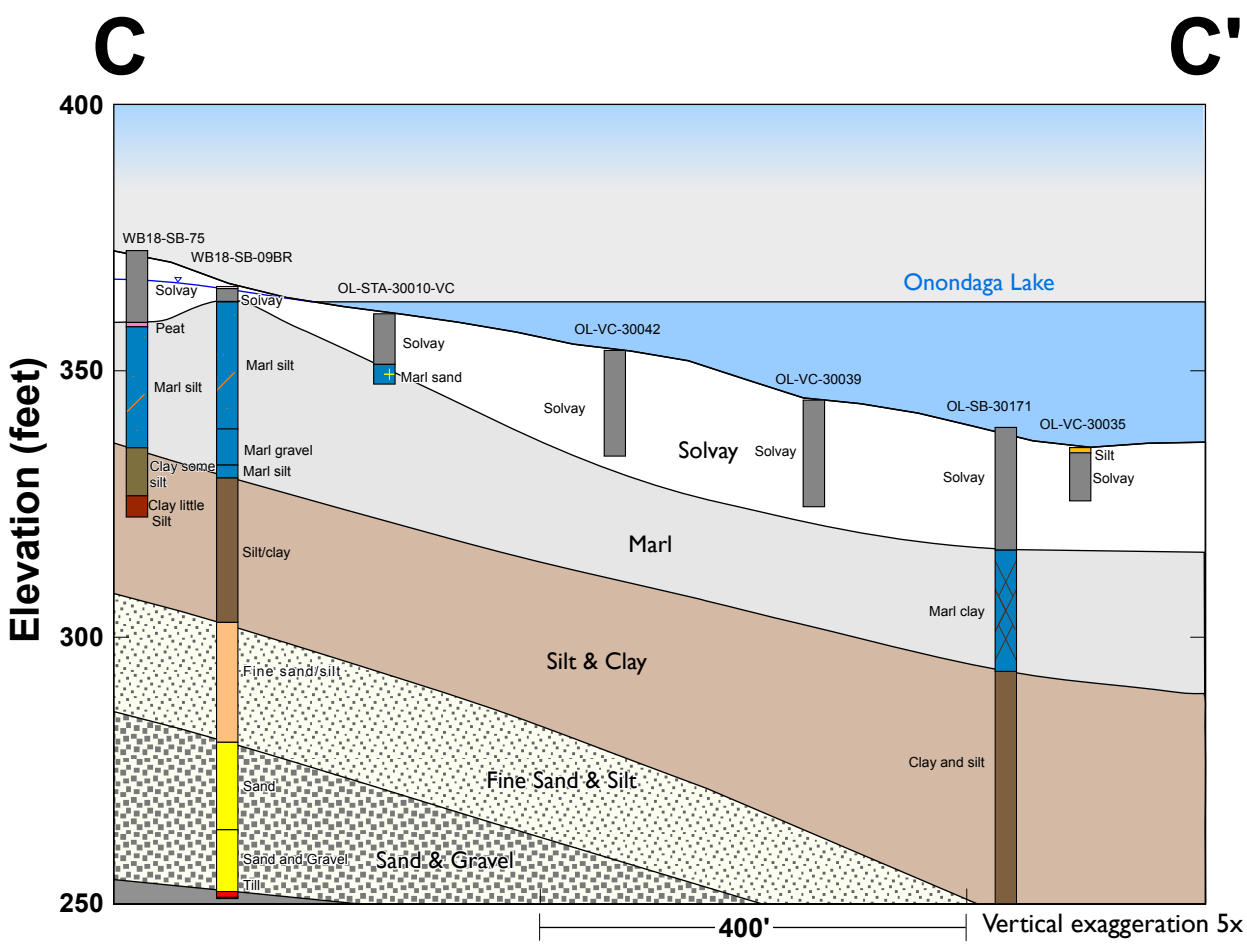


Figure I-4 Remediation Area B - Hydrogeologic Cross Section C-C'

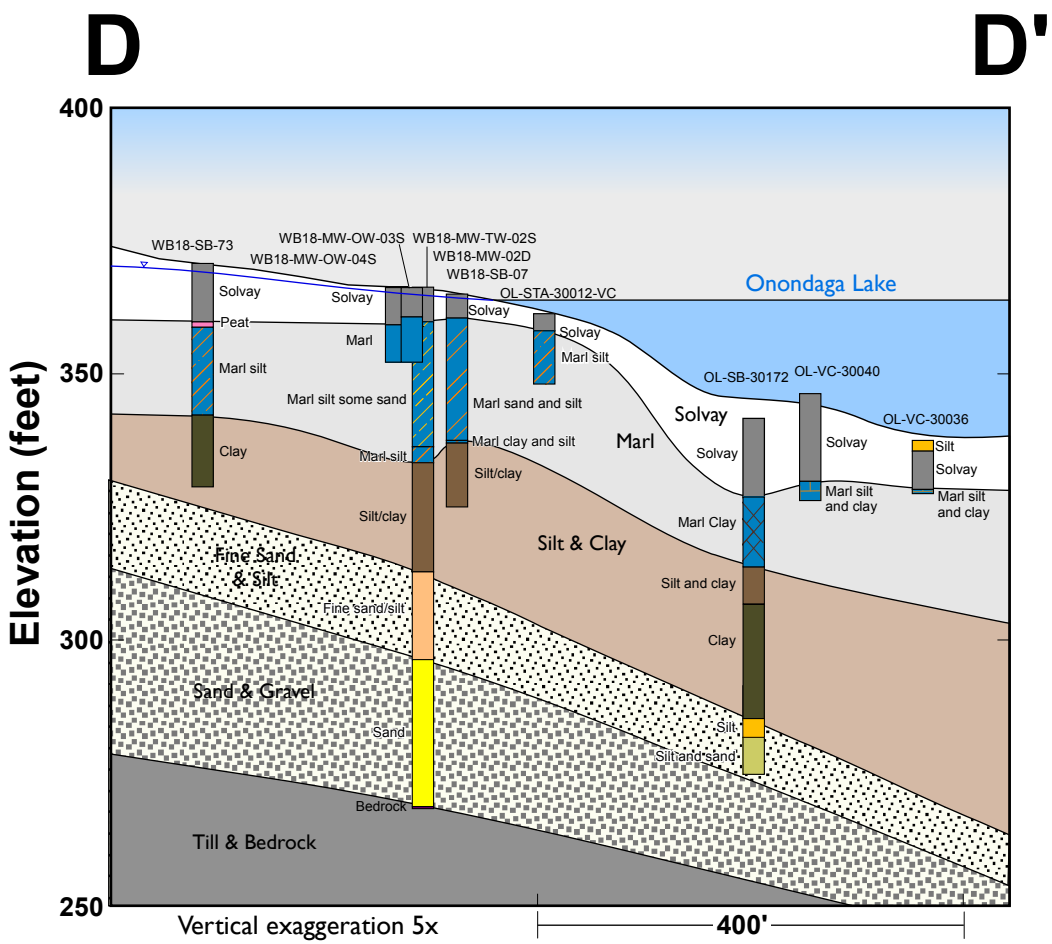


Figure I-5 Remediation Area B - Hydrogeologic Cross Section D-D'

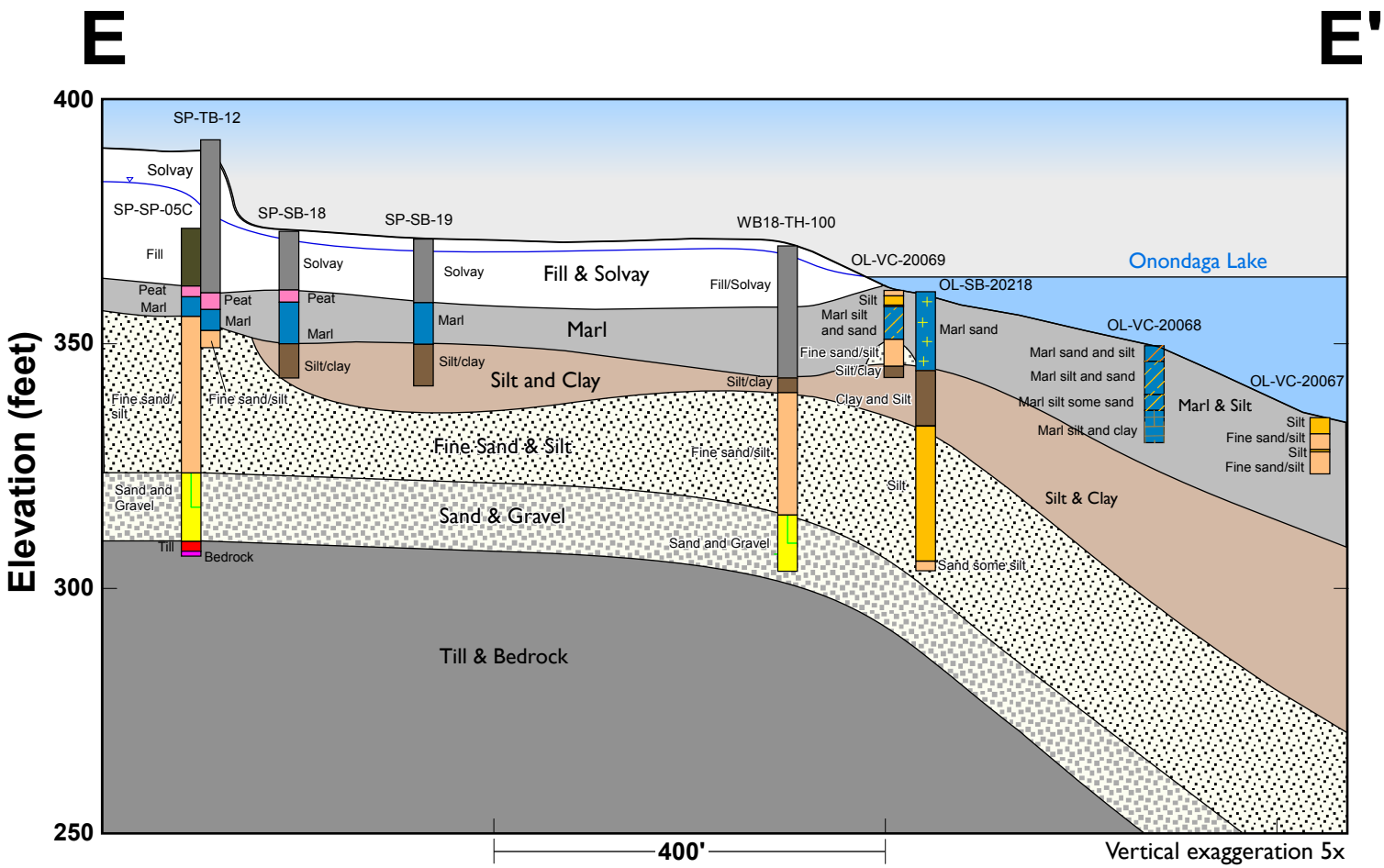


Figure I-6 Remediation Area C - Hydrogeologic Cross Section E-E'

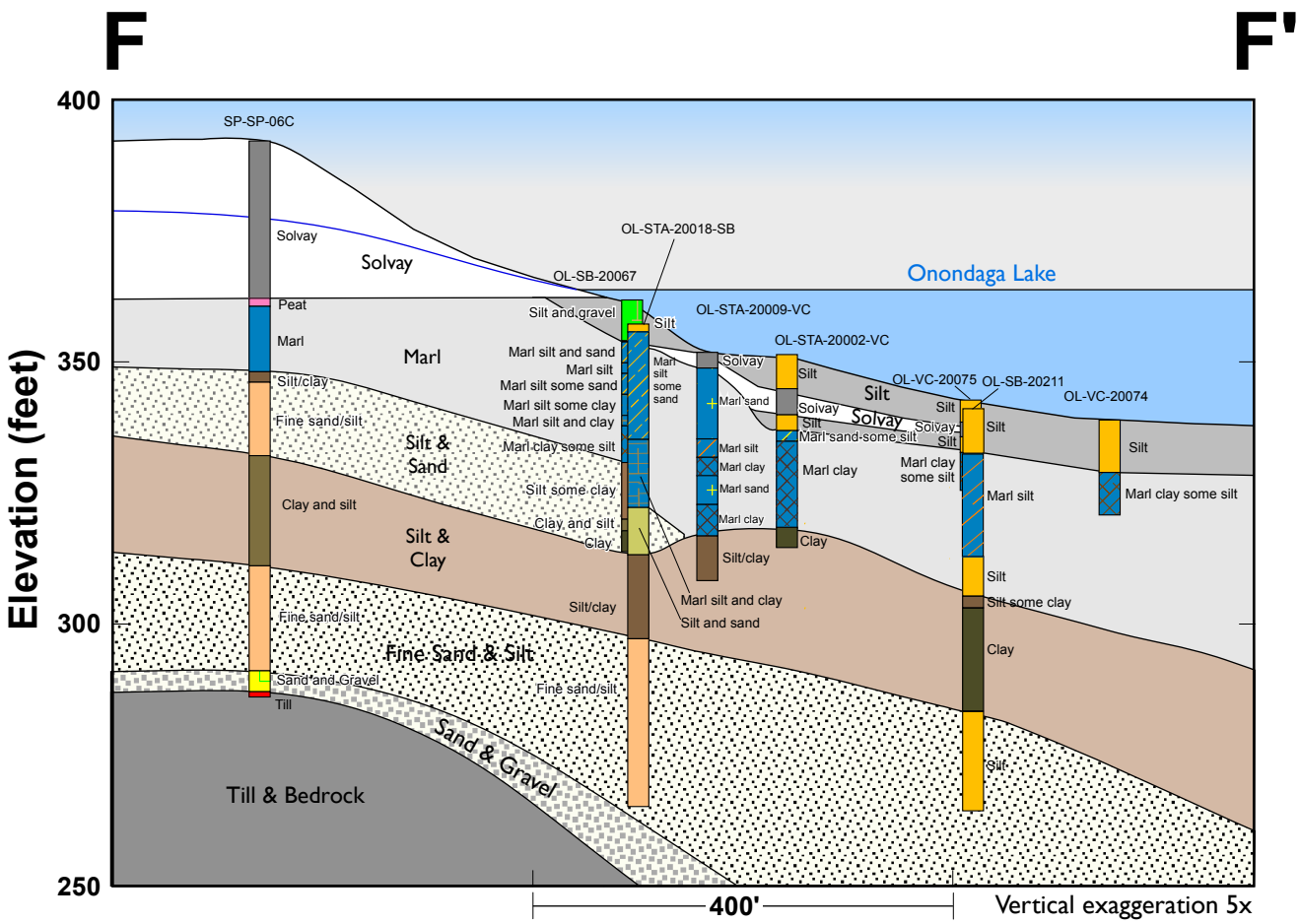


Figure I-7 Remediation Area C - Hydrogeologic Cross Section F-F'

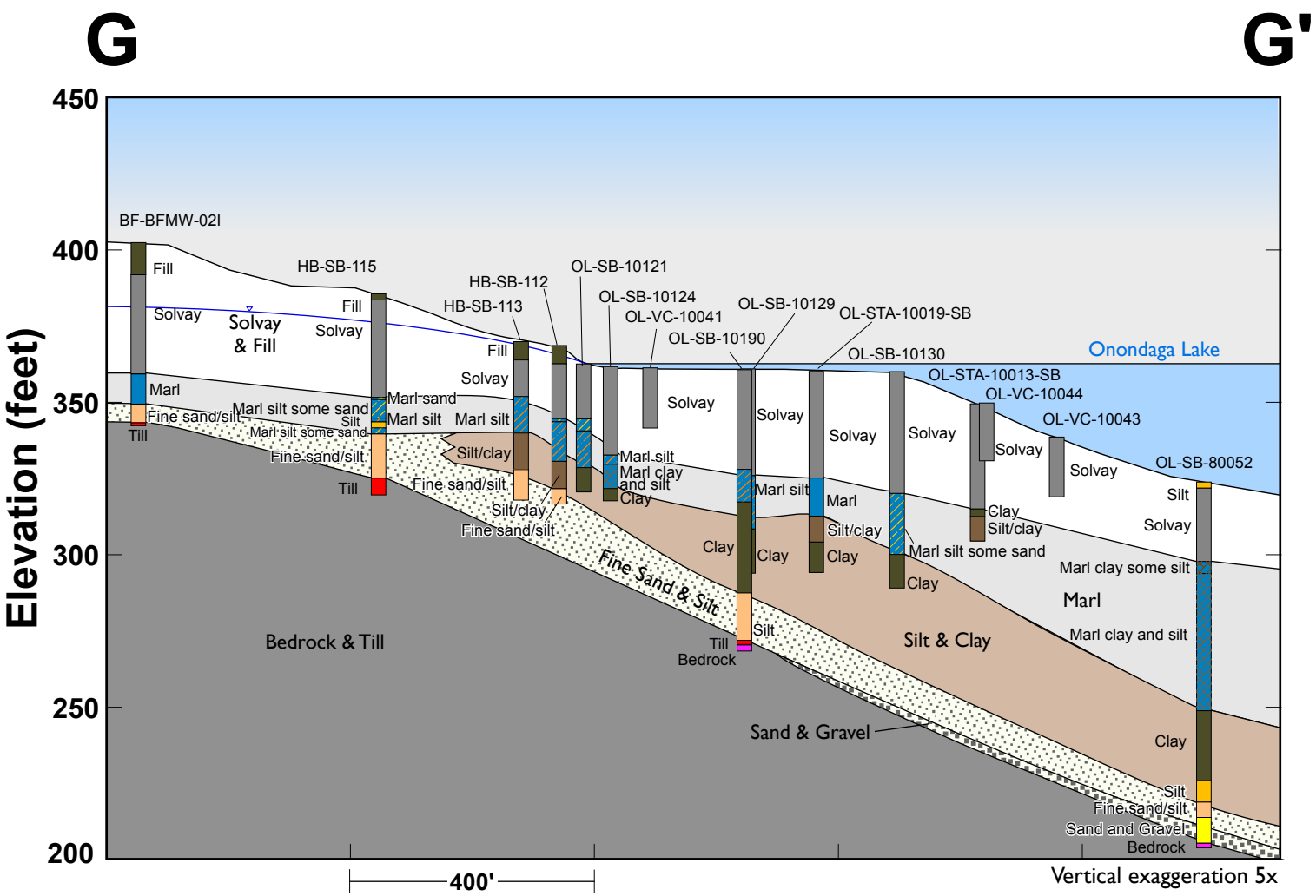


Figure I-8 Remediation Area D - Hyrdogeologic Cross Section G-G'

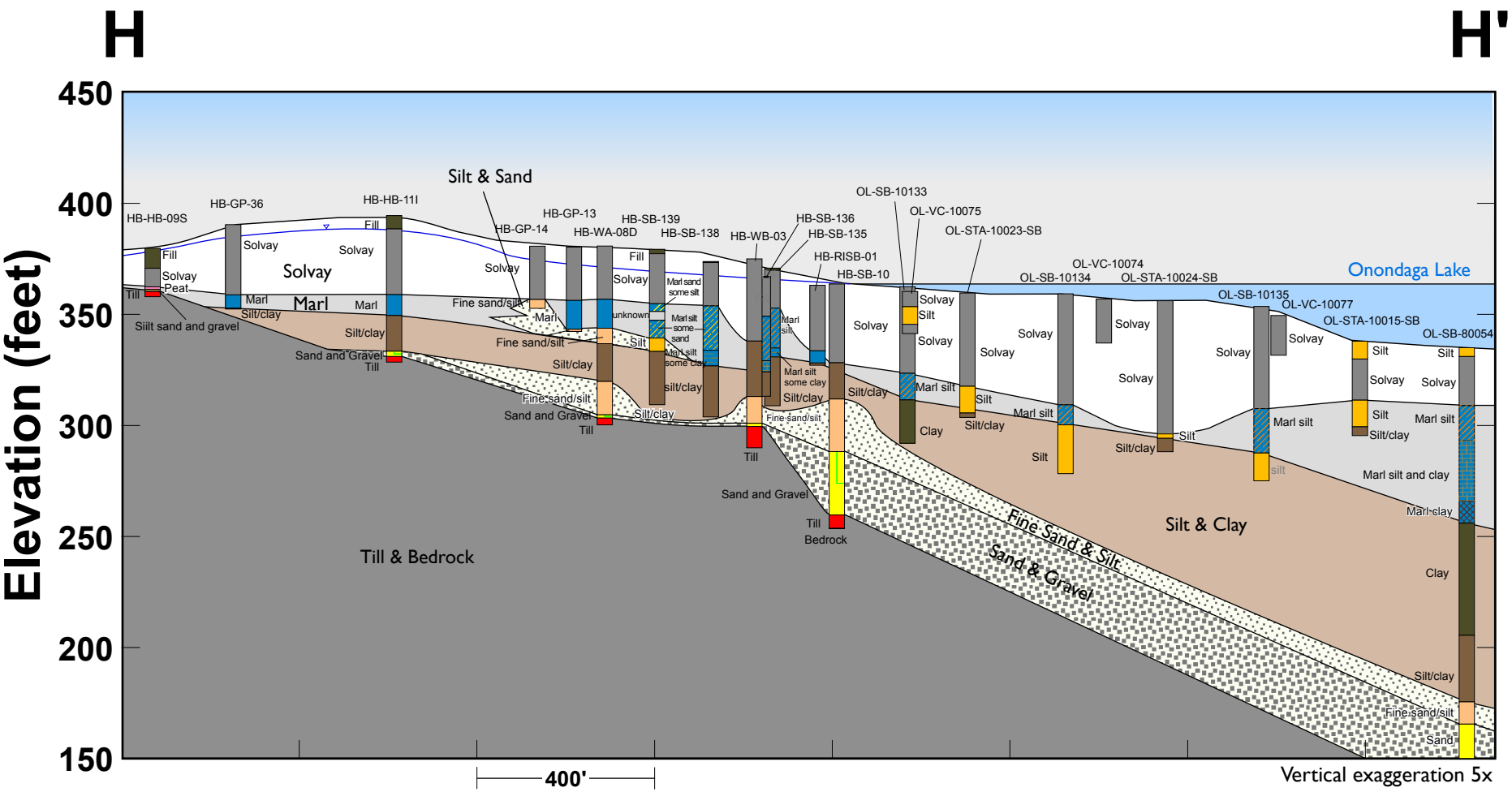
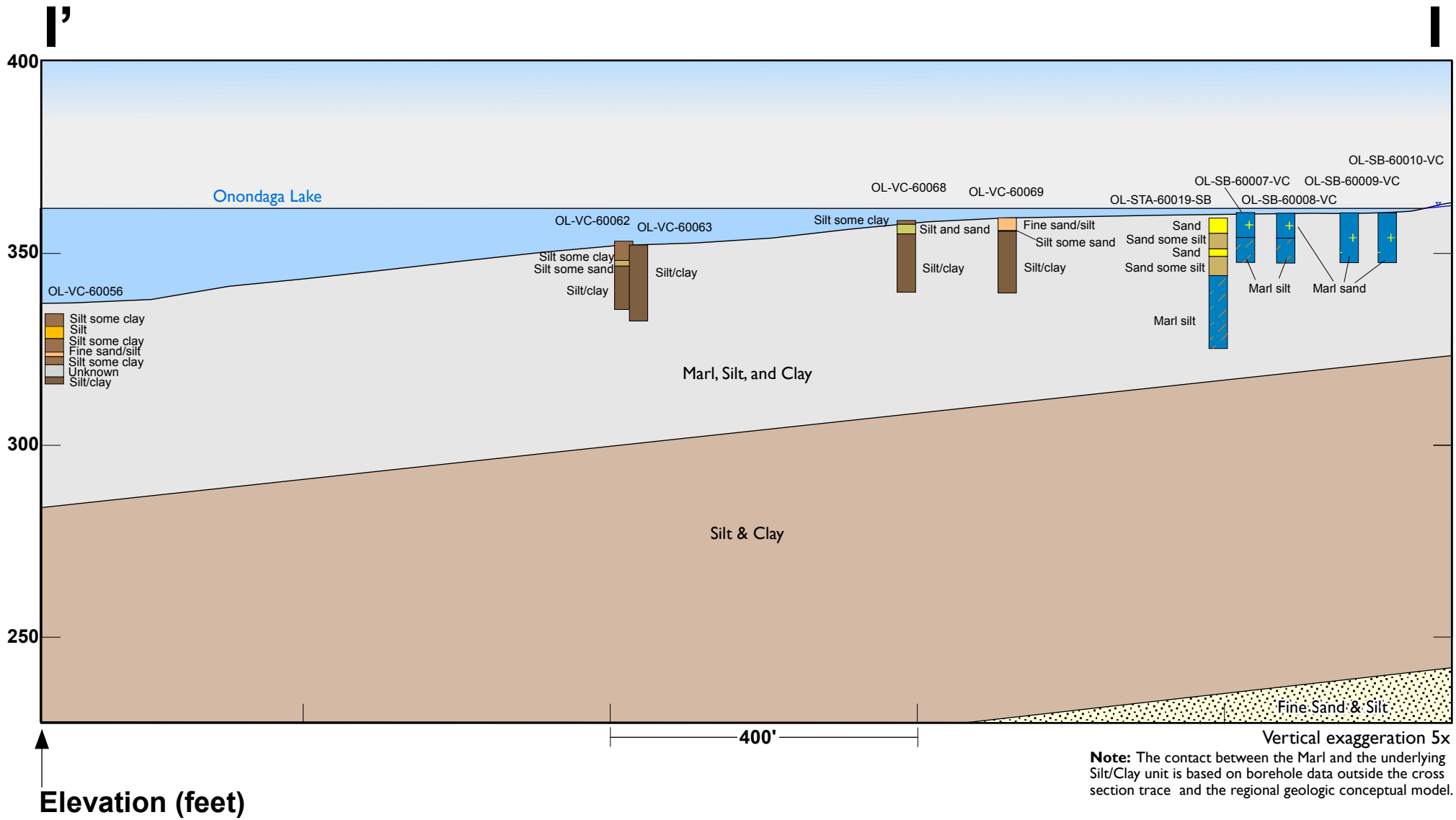


Figure I-9 Remediation Area D - Hydrogeologic Cross Section H-H'



Note: The contact between the Marl and the underlying Silt/Clay unit is based on borehole data outside the cross section trace and the regional geologic conceptual model.

Figure I-10 Remediation Area E - Hydrogeologic Cross Section I-I'

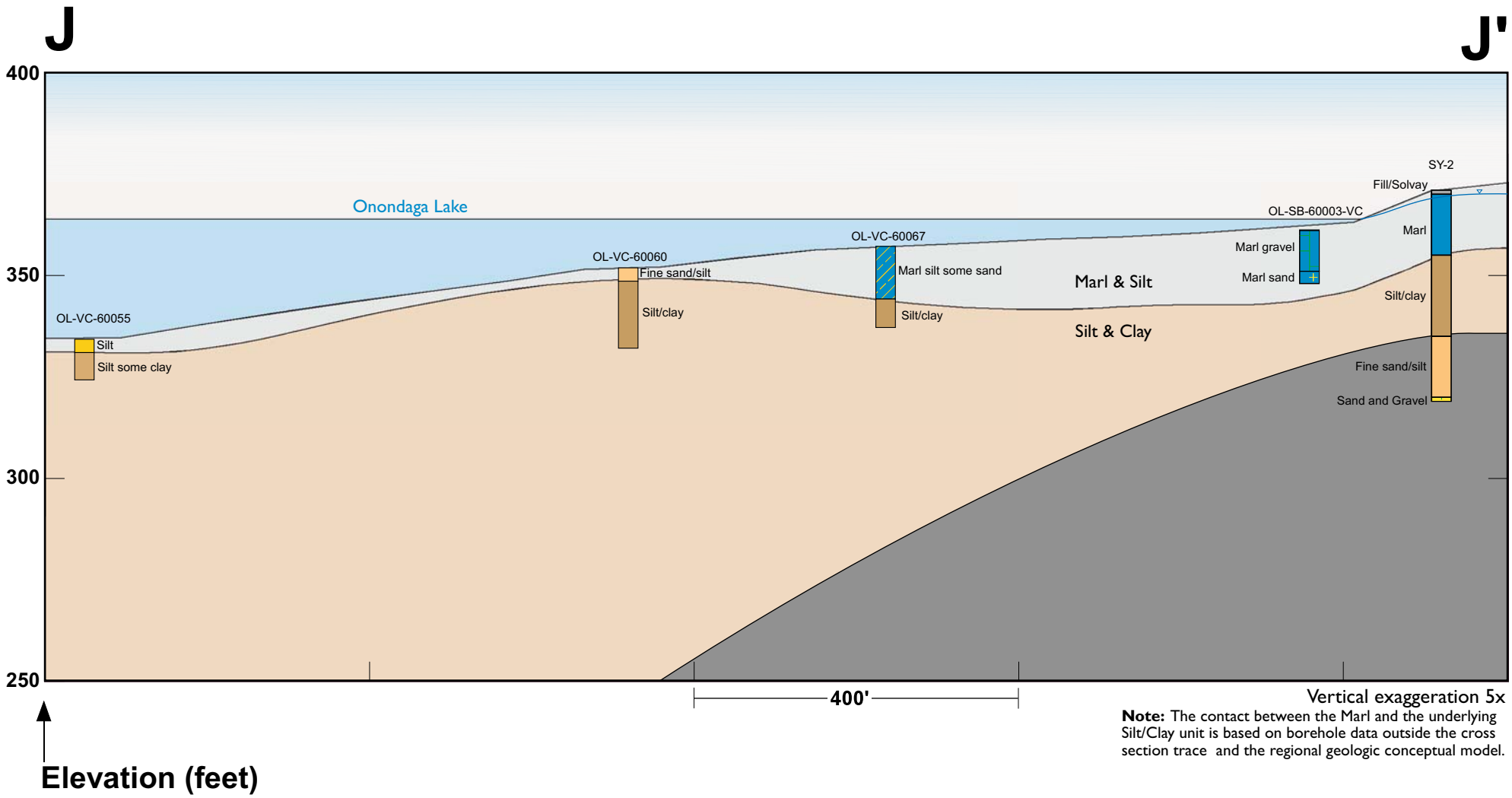


Figure I-11 Remediation Area E - Hydrogeologic Cross Section J-J'

Attachment II

Conductivity-Temperature Investigation Results

Attachment II
Conductivity-Temperature Investigation Results

The results of a comprehensive temperature and conductivity survey conducted from April 24 to 26, 2007, in Remediation Areas A and E are contained in this Attachment. For these surveys, a YSI 6600 series multi-parameter Sonde was used to measure water temperature, specific conductance, salinity, dissolved oxygen, turbidity, and sensor depth. The sensor was mounted in a custom built steel cage and towed with a 15-foot Jon boat as close to the bottom as possible. As an initial calibration step, the unit was tested on a known brine spring in Onondaga Creek to ensure it would identify a large anomaly in the groundwater discharging through the sediments. This screening step was successful in identifying the location of a large spring in lower Onondaga Creek. The survey was conducted by running transects approximately 25 feet apart along the shoreline from water depths of about two feet to six feet.

The following figures showing the results of the conductivity-temperature survey are contained in this Attachment:

Figure 1 Conductivity in SMU 4

Figure 2 Temperature in SMU 4

Figure 3 Conductivity in SMU 7

Figure 4 Temperature in SMU 7

Figure 5 Conductivity in Lower Onondaga Creek

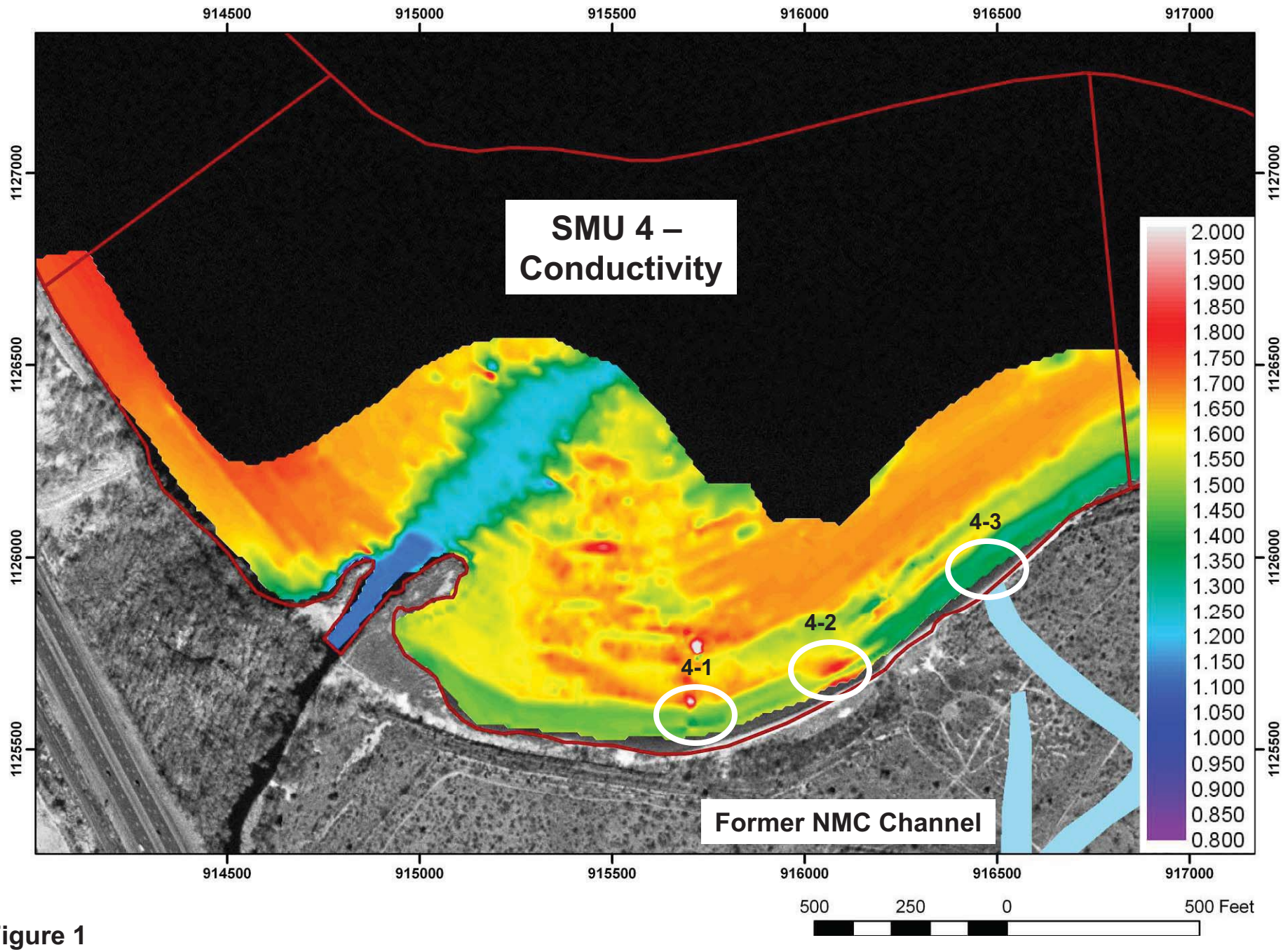

SMU 4 –
Conductivity
914500
915000
915500
916000
916500
917000
1127000
1126500
1126000
1125500
4-1
4-2
4-3
Former NMC Channel
2.000
1.950
1.900
1.850
1.800
1.750
1.700
1.650
1.600
1.550
1.500
1.450
1.400
1.350
1.300
1.250
1.200
1.150
1.100
1.050
1.000
0.950
0.900
0.850
0.800
500
250
0
500 Feet

Figure 1

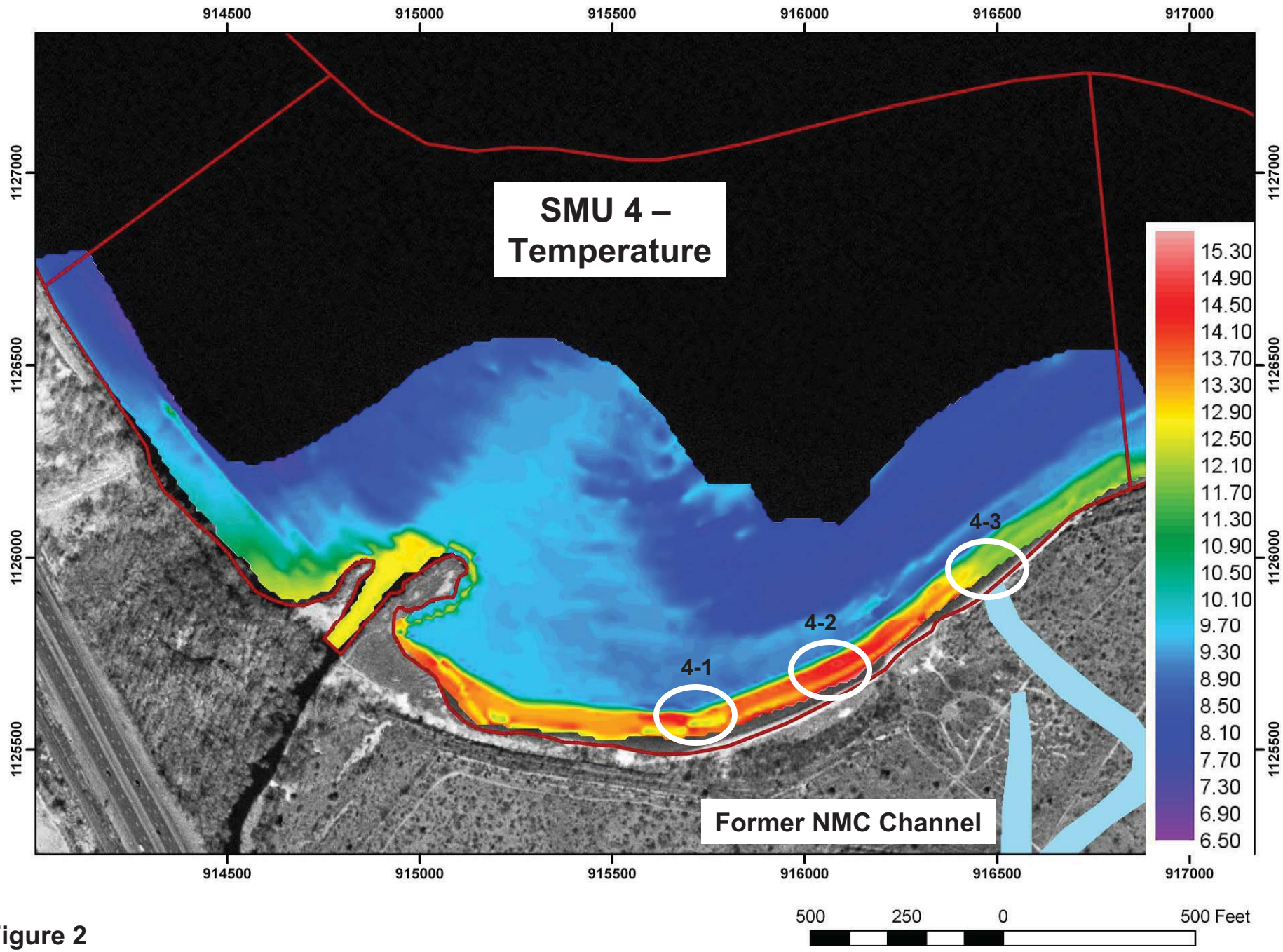

SMU 4 –
Temperature
914500
915000
915500
916000
916500
917000
1127000
1126500
1126000
1125500
4-1
4-2
4-3
Former NMC Channel
15.30
14.90
14.50
14.10
13.70
13.30
12.90
12.50
12.10
11.70
11.30
10.90
10.50
10.10
9.70
9.30
8.90
8.50
8.10
7.70
7.30
6.90
6.50
500
250
0
500 Feet

Figure 2

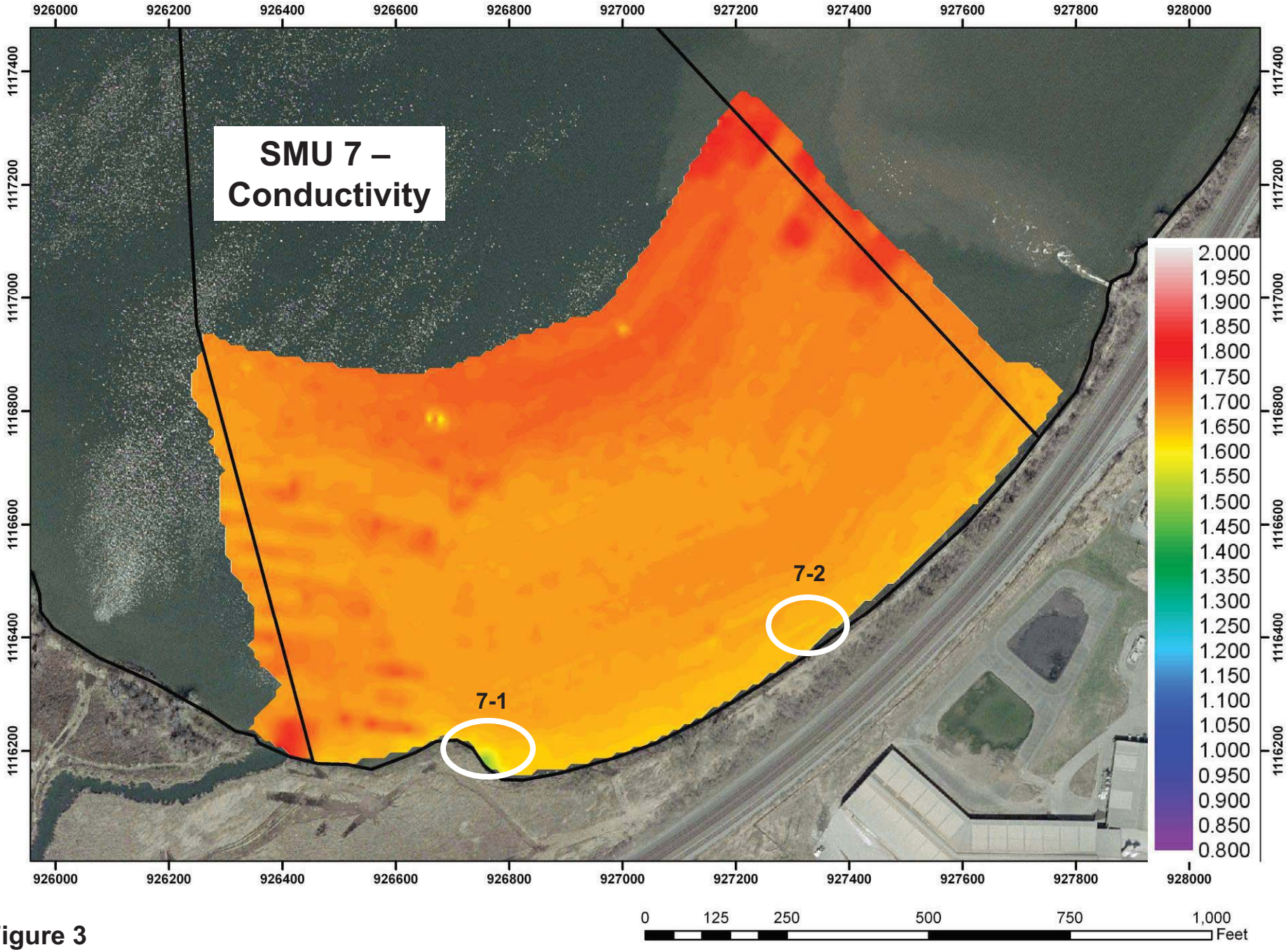

SMU 7 –
Conductivity
7-1
7-2
926000
926200
926400
926600
926800
927000
927200
927400
927600
927800
928000
1117400
1117200
1117000
1116800
1116600
1116400
1116200
2.000
1.950
1.900
1.850
1.800
1.750
1.700
1.650
1.600
1.550
1.500
1.450
1.400
1.350
1.300
1.250
1.200
1.150
1.100
1.050
1.000
0.950
0.900
0.850
0.800
0
125
250
500
750
1,000
Feet

Figure 3

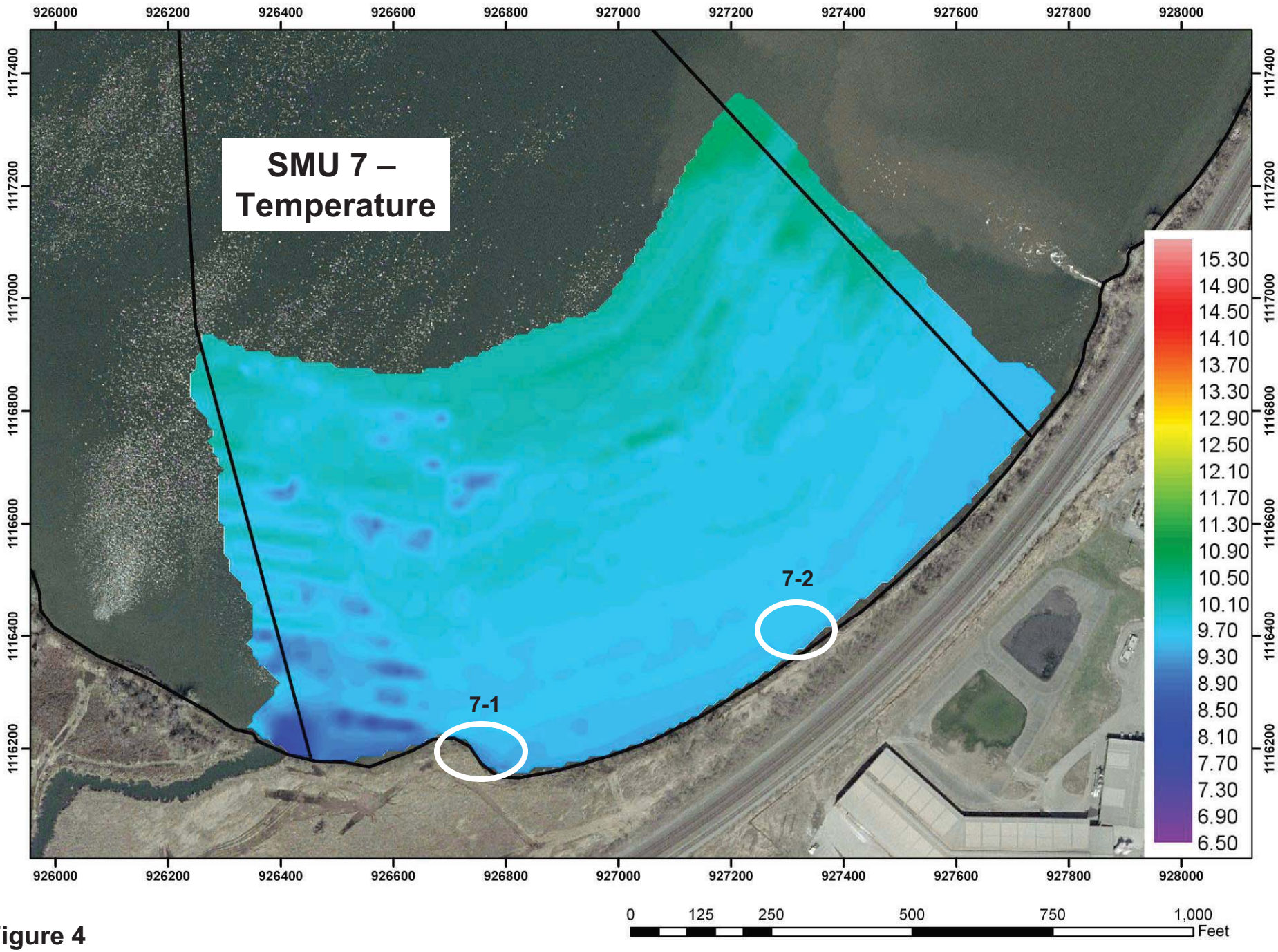

SMU 7 –
Temperature
7-1
7-2
926000
926200
926400
926600
926800
927000
927200
927400
927600
927800
928000
1117400
1117200
1117000
1116800
1116600
1116400
1116200
15.30
14.90
14.50
14.10
13.70
13.30
12.90
12.50
12.10
11.70
11.30
10.90
10.50
10.10
9.70
9.30
8.90
8.50
8.10
7.70
7.30
6.90
6.50
0
125
250
500
750
1,000
Feet

Figure 4

S.S. Papadopulos & Associates, Inc.

Onondaga Creek – Conductivity

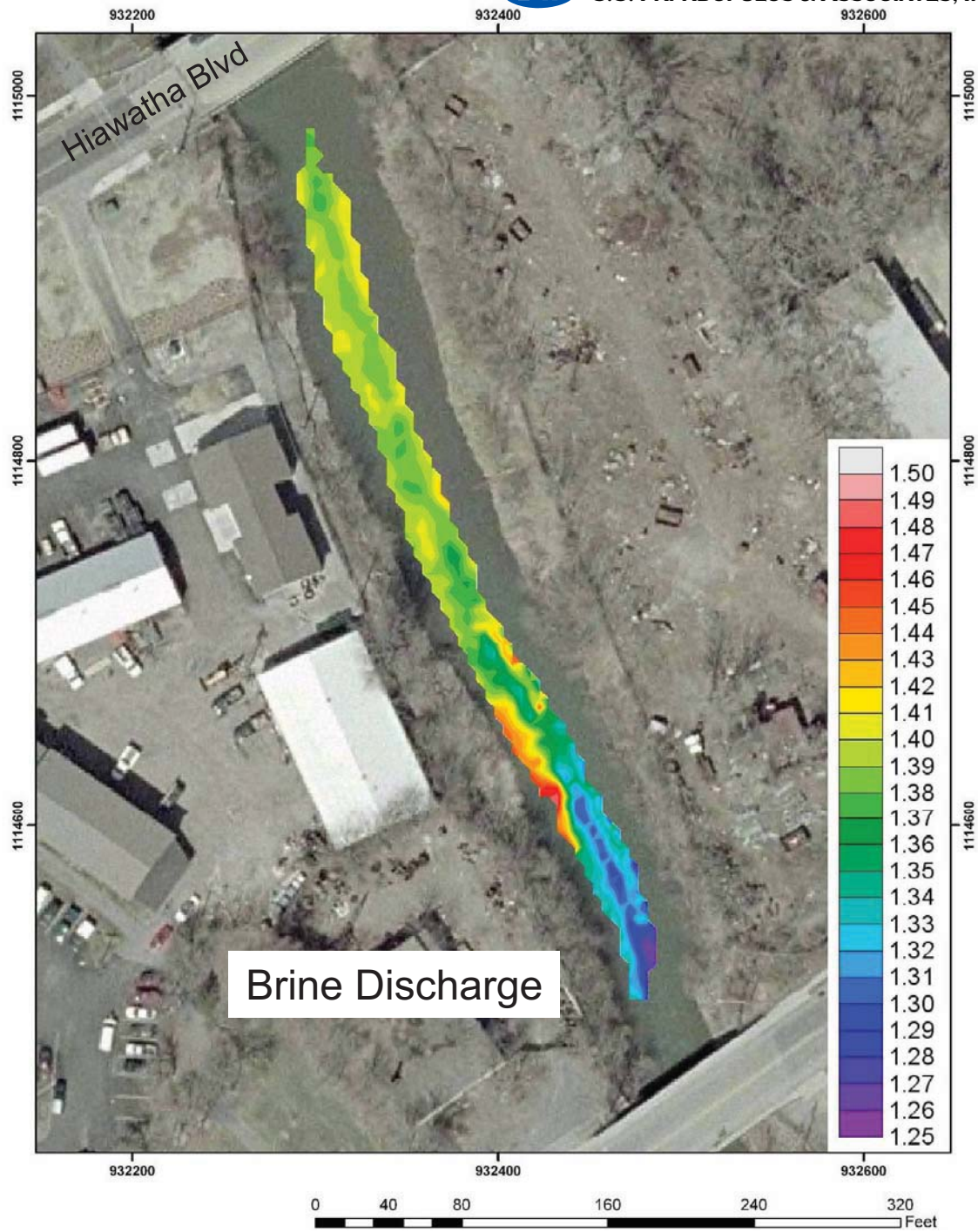


Figure 5

Attachment III

Upwelling Investigation Results – Transect TR01

Attachment III
Upwelling Investigation Results – Transect TR01

This Attachment contains a table summarizing the characteristics of the piezometers in transect TR01 in the Upwelling Investigation described in Parsons (2003). In addition, the table contains a summary of average hydraulic gradients measured along the transect from December 27, 2002 through August 1, 2003.

Table 1 S.S. Papadopulos & Associates, Inc.

Characteristics of Piezometers in Transect TR01 and Average Gradients

Piezometer ID	Transect	Distance from shore (feet)	Piezometer Depth (feet below top of sediment)	Piezometer Elevation (NAD 83 feet)	Northing	Easting	Install Date
TR01A-A	TR01	35	4.50	357.69	1125578.85	915232.61	11/14/02
TR01A-B	TR01	35	14.50	347.69	1125578.85	915232.61	10/14/02
TR01B-A	TR01	538	4.50	355.42	1126088.21	915289.50	11/12/02
TR01B-B	TR01	538	14.50	345.42	1126088.21	915289.50	11/12/02
TR01C-A	TR01	1011	4.50	353.55	1126558.91	915343.33	11/09/02
TR01C-B	TR01	1011	14.50	343.55	1126558.91	915343.33	11/09/02

AVERAGE GRADIENTS			
Dates	TR01A (B-A)	TR01B (B-A)	TR01C (B-A)
12/27/2002 to 3/14/2003	0.027	0.017	0.022
12/27/2003 to 8/1/2003	0.027	0.010	0.020

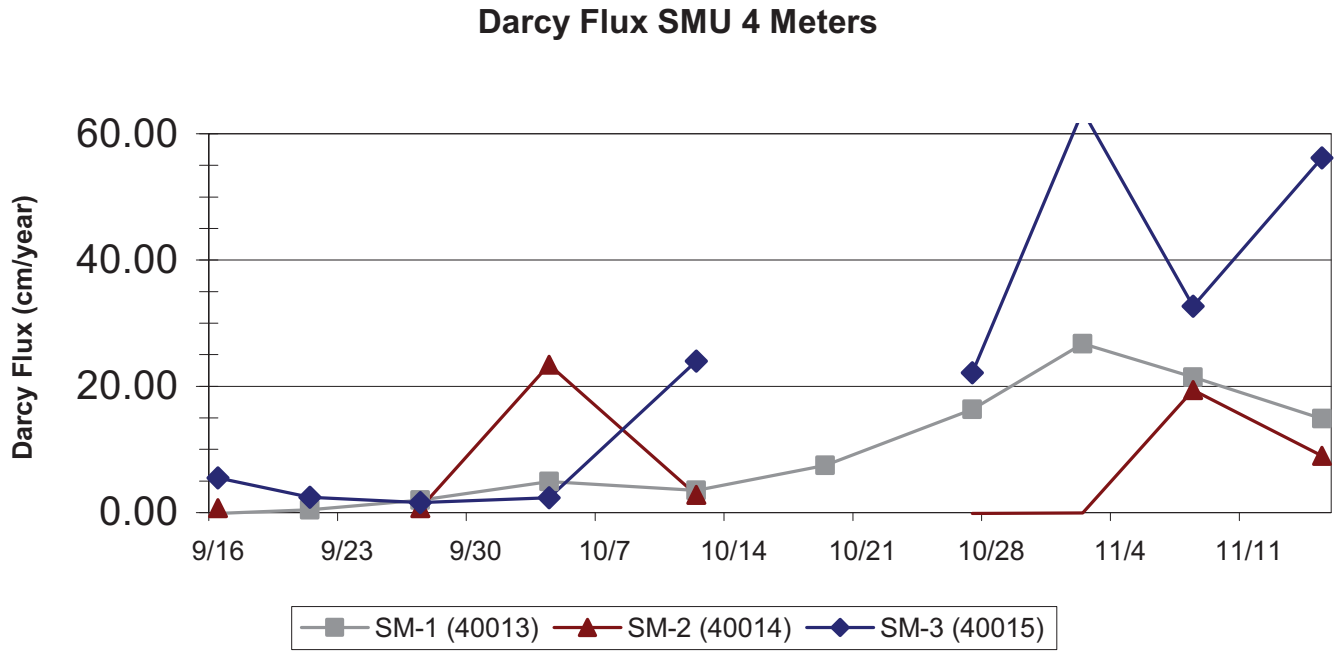
Attachment IV

Seepage Meter Investigation Results

Attachment IV
Seepage Meter Investigation Results

This Attachment contains plots of the measured upwelling velocities at the seepage meters installed in Phase I in 2005 and in Phase III in 2007. This Attachment contains the following figures:

Figure 1	Phase I Seepage Meter Results – Upwelling Velocities (cm/year)
Figure 2	Phase III Seepage Meter Results for Remediation Area A – Upwelling Velocities (cm/year)
Figure 3	Phase III Seepage Meter Results for Remediation Area E – Upwelling Velocities (cm/year)
Figure 4	Redesigned Seepage Meter used in Phase III



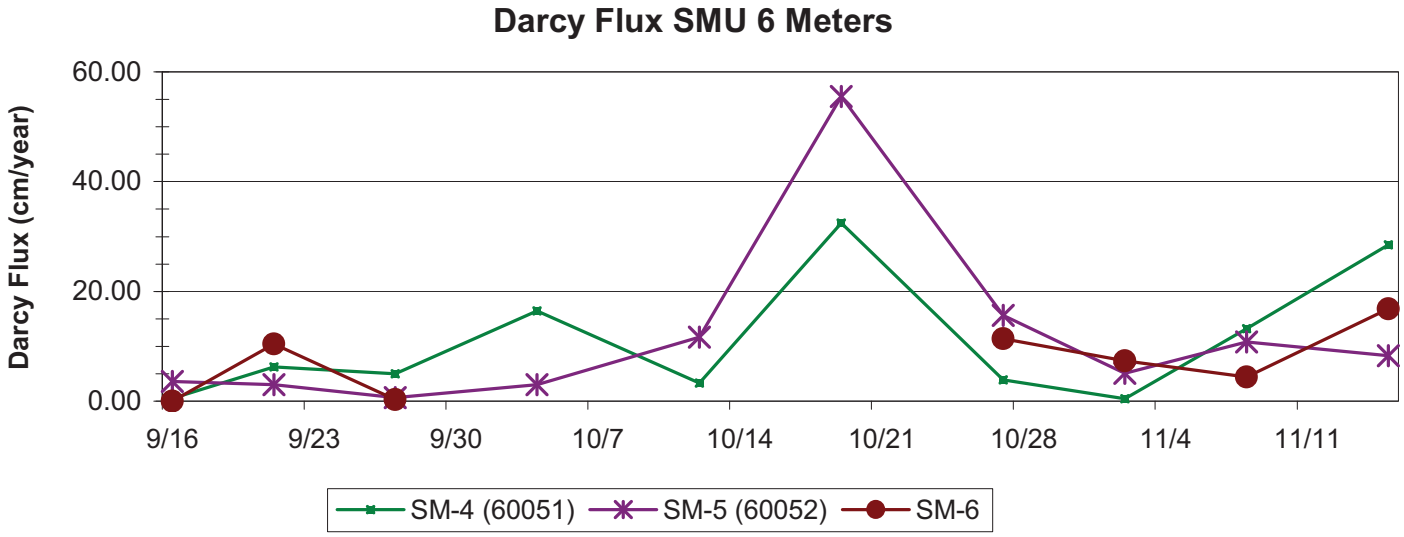
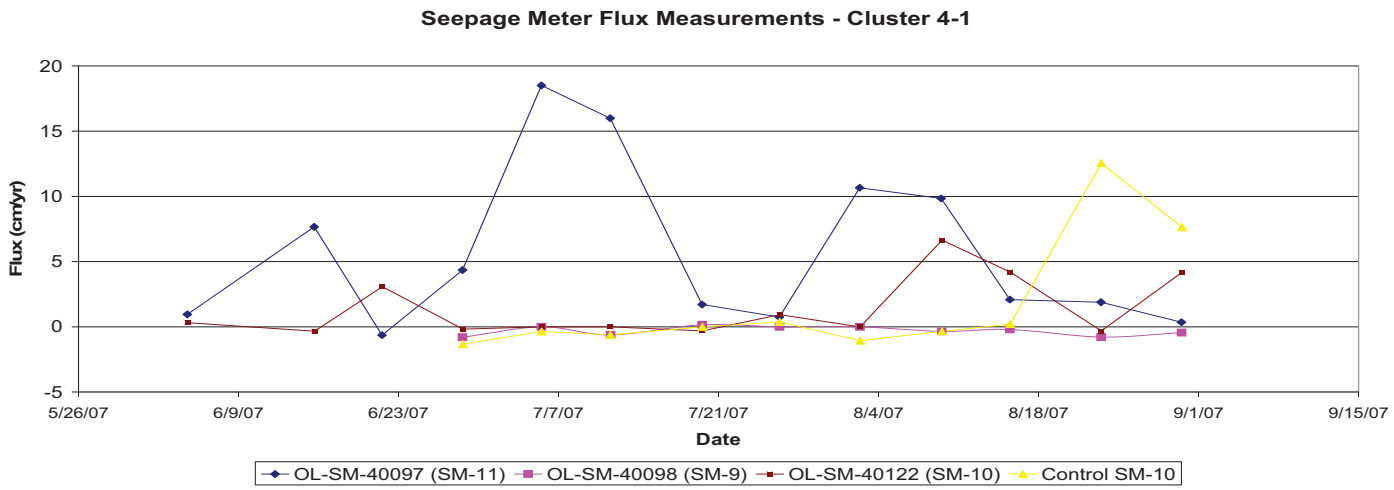
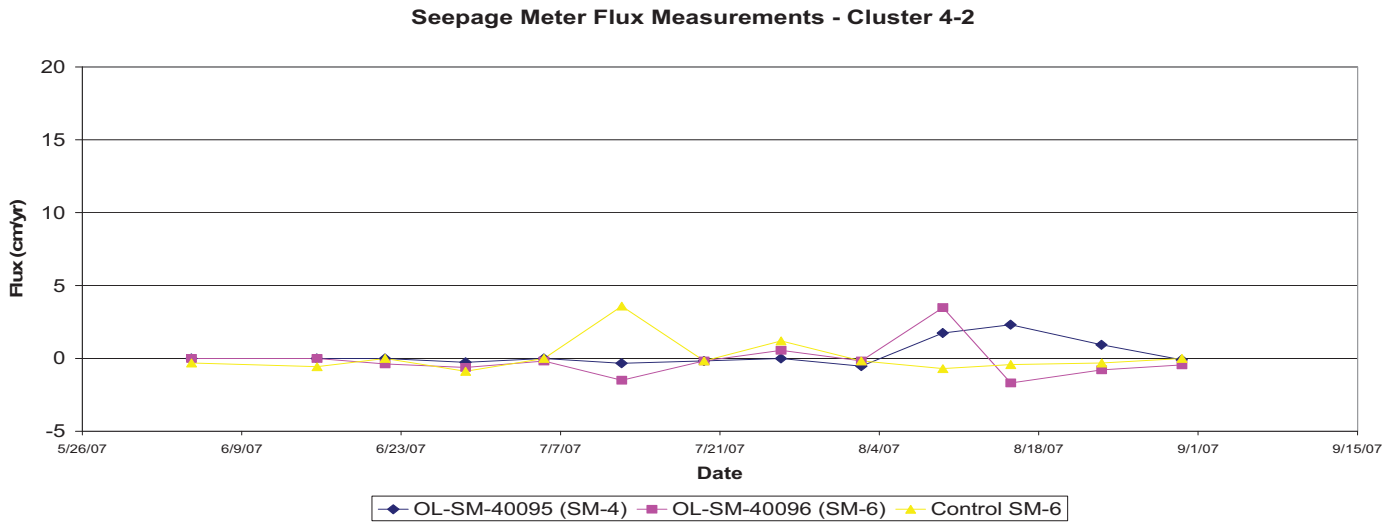


Figure 1 Phase I Seepage Meter Results – Upwelling Velocities (cm/year)





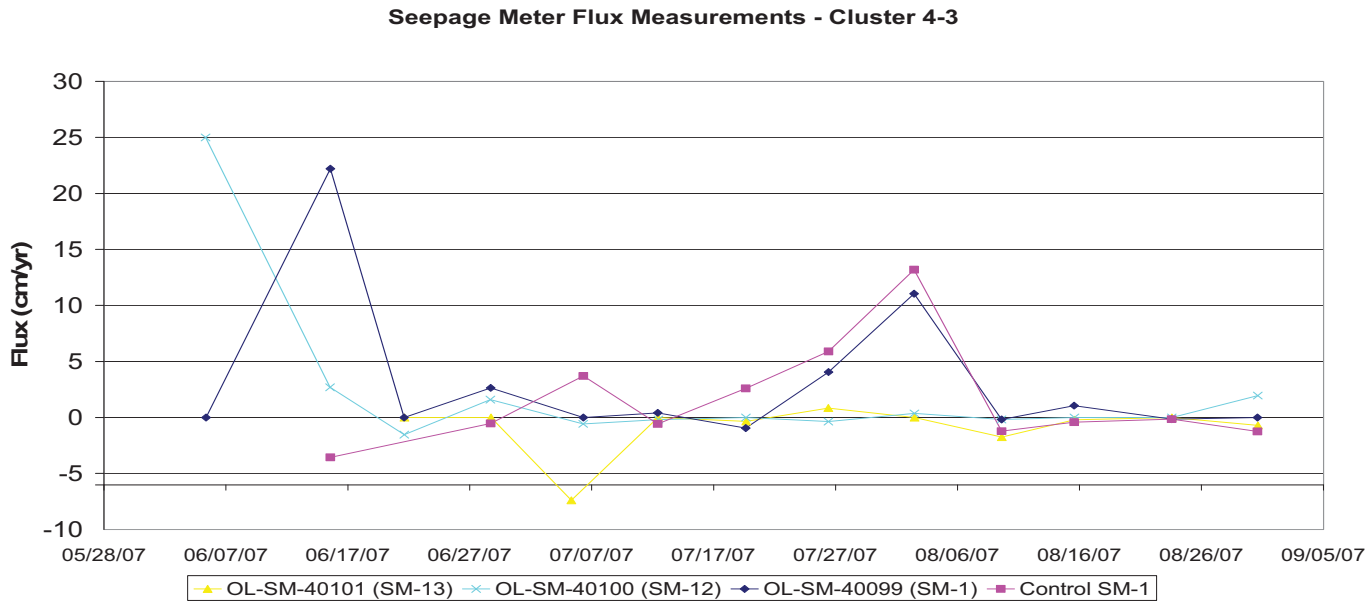
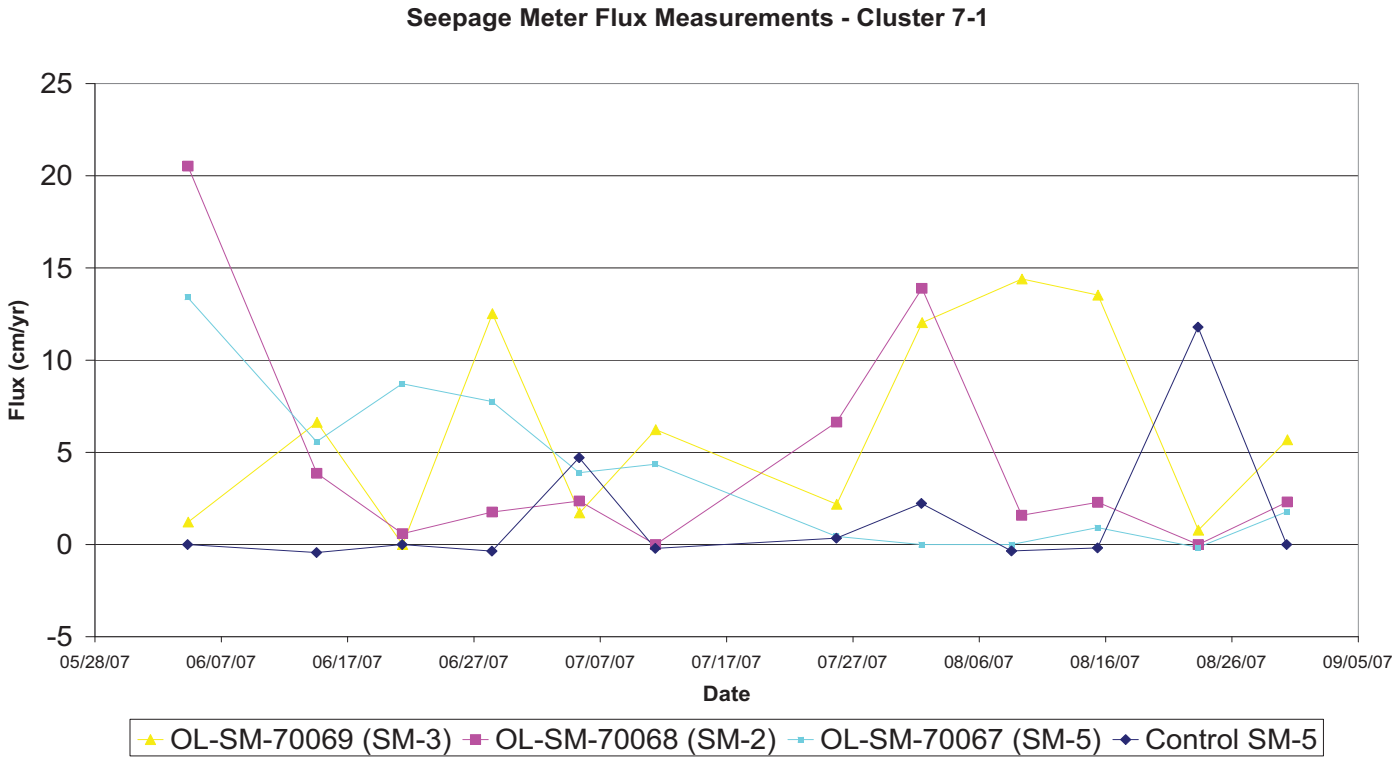


Figure 2 Phase III Seepage Meter Results for Remediation Area A Upwelling Velocities (cm/year)



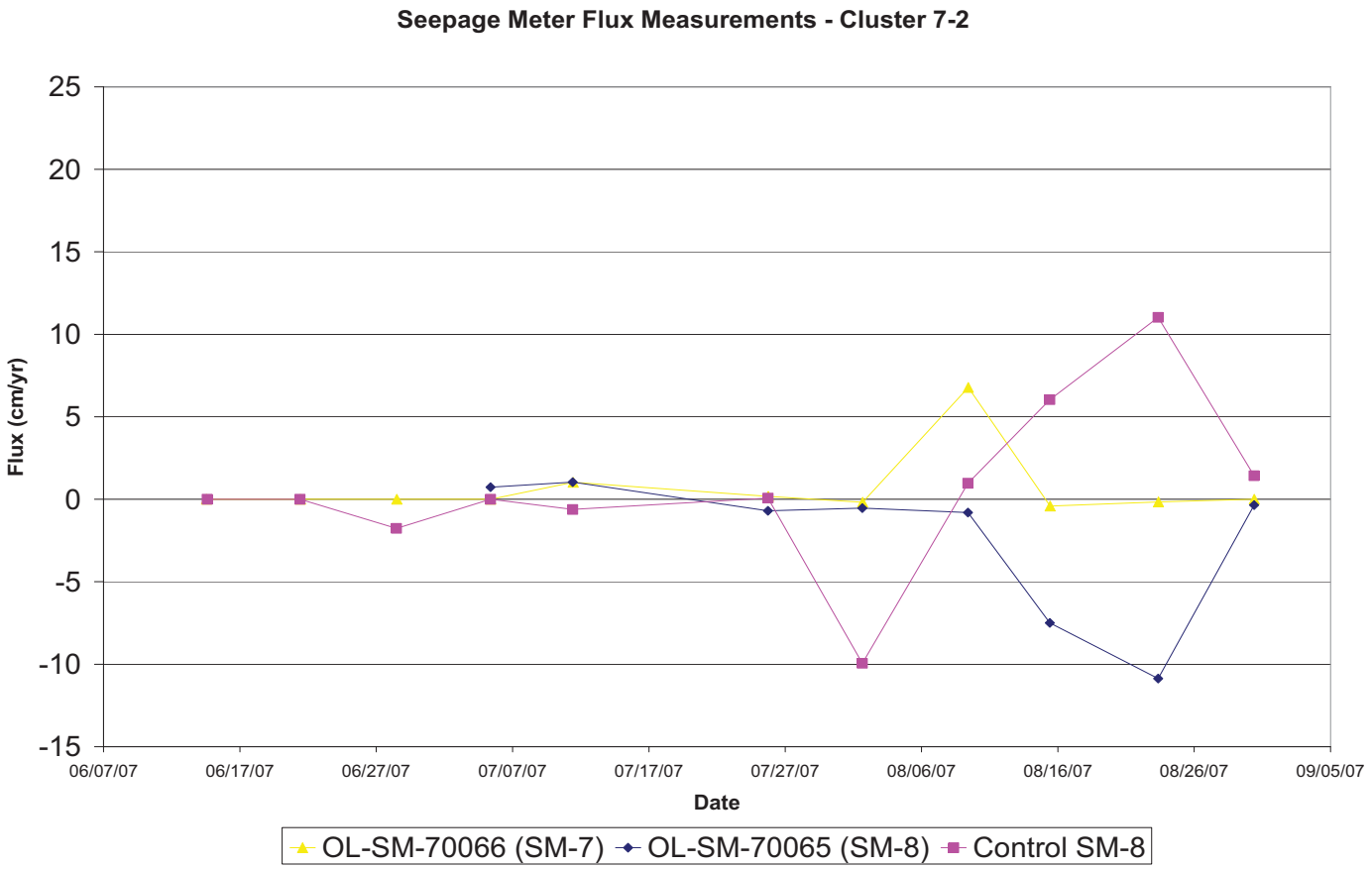


Figure 3 Phase III Seepage Meter Results for Remediation Area E Upwelling Velocities (cm/year)

Figure 4 Redesigned Seepage Meter Used in Phase III

Attachment V

Vibracore Water Quality and Porosity Data

Attachment V
Vibracore Water Quality and Porosity Data

This Attachment contains the following tables and figures:

1. Table V-1 is a list of general chemistry data for pore water obtained from centrifuging core samples collected with a Vibracore as well as the calculated cation-anion balance. Data obtained in the Phase II, Phase III, Phase III Addendum 5, and Phase V and VI PDI investigations are contained on this table.

2. Plots of porosity versus depth for all vibracore locations where core samples were analyzed for porosity. A total of thirty porosity-depth plots are included.

3. Plots of chloride versus depth, sodium versus depth, and the sodium-calcium ratio versus depth for Vibracore locations where pore water was analyzed for chloride, calcium, and sodium. The results from the Phase V Vibracore analyses are included at the end of the sequence of plots.

General Chemistry Data Anion-Cation Balances

Table V-1

General Chemistry Data from Vibracore and Cation-Anion Balance

Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-STA-20042	38-39 Ft	1500	81400	317	232	36500	3450	215000	-16.6	0.38
OL-STA-20042	39-40 Ft	1660	88600	343	252	39100	3680	224000	-17.2	0.40
OL-STA-20042	40-41 Ft	1520	92600	319	220	37900	3820	239000	-21.0	0.39
OL-STA-20042	41-42 Ft	1540	96700	323	240	37800	3850	244000	-23.1	0.40
OL-STA-20042	42-43 Ft	1570	94600	326	293	41100	3750	239000	-18.2	0.40
OL-STA-20042	43-44 Ft	1350	93600	283	228	35700	3660	271000	-24.4	0.35
OL-STA-20042	44-45 Ft	1560	66000	327	284	39500	2530	223000	-2.2	0.30
OL-STA-20042	45-46 Ft	1500	90700	319	259	38500	3560	251000	-19.3	0.36
OL-STA-20053	34.5-35.5 Ft	1520	69900	270	164	28700	3180	186000	-20.3	0.38
OL-STA-20053	35.5-36.5 Ft	1610	75100	288	181	32100	3420	199000	-18.5	0.38
OL-STA-20053	36.5-37.5 Ft	1660	79800	314	225	34900	3460	205000	-17.5	0.39
OL-STA-20053	37.5-38.5 Ft	1350	94500	288	208	34300	3800	238000	-26.7	0.40
OL-STA-20053	38.5-39.5 Ft	1150	95100	248	187	29600	3740	238000	-33.7	0.40
OL-STA-20053	39.5-40.5 Ft	1050	95300	226	163	24800	3750	242000	-41.1	0.39
OL-STA-20053	40.5-41.5 Ft	1240	98300	265	201	32700	3810	241000	-30.7	0.41
OL-STA-20053	41.5-42.5 Ft	1370	99300	294	213	35600	3810	253000	-27.3	0.39
OL-STA-20058	37-38 Ft	1580	84100	323	209	35000	3800	229000	-20.0	0.37
OL-STA-20058	38-39 Ft	1400	80000	290	190	31900	3630	212000	-22.2	0.38
OL-STA-20058	39-40 Ft	1550	84500	317	216	35500	3790	221000	-19.7	0.38
OL-STA-20058	40-41 Ft	1470	81200	300	204	33100	3630	212000	-21.1	0.38
OL-STA-20058	41-42 Ft	1450	83100	295	197	33500	3670	215000	-21.7	0.39
OL-STA-20058	42-43 Ft	1590	95200	332	247	39400	3870	244000	-20.4	0.39
OL-STA-20058	43-44 Ft	1360	89200	288	237	34800	3620	230000	-23.3	0.39
OL-STA-20058	44-45 Ft	1120	88600	235	189	30400	3530	223000	-29.4	0.40
OL-STA-20087	0.00-1.00 Ft	855	7430	112	28.8E	4600	951	25900	4.8	0.29
OL-STA-20087	1.00-2.00 Ft	1730	31800	257	122370	15600	2800	68600	-9.5	0.46
OL-STA-20087	2.00-3.00 Ft	1800	26800	241	103370	12700	2580	62500	-9.8	0.43
OL-STA-20087	3.00-4.00 Ft	1370	18300	192	64.4E	10000	2000	48700	-3.4	0.38
OL-STA-20087	4.00-5.00 Ft	1720	35200	281	146370	17500	2900	74100	-9.3	0.48
OL-STA-20087	5.00-6.00 Ft	1650	37400	292	174370	19900	2950	79000	-6.7	0.47
OL-STA-20087	6.00-7.00 Ft	1540	40600	283	179370	18900	3010	82400	-13.2	0.49
OL-STA-20087	7.00-8.00 Ft	1630	41900	301	197370	22000	3020	84600	-7.6	0.50
OL-STA-20087	8.00-9.00 Ft	1680	43000	301	193370	20200	3050	86400	-12.5	0.50
OL-STA-20087	9.00-10.00 Ft	1640	45300	295	192370	21000	3130	88200	-13.5	0.51
OL-STA-40002-PW	0.50-1.50 Ft	11500J	55000	90.6J	209370	7080	46.1J	104600	-26.9	0.53
OL-STA-40002-PW	2.50-3.50 Ft	20100J	86200	126J	455370	14500	10.0J	174600	-19.0	0.49
OL-STA-40002-PW	4.50-5.50 Ft	21300J	95300	128J	502370	16500	43.2J	187000	-19.7	0.51
OL-STA-40003-PW	0.50-1.50 Ft	7560J	38000	155J	140370	8640	41.1J	85200	-16.5	0.45
OL-STA-40003-PW	2.50-3.50 Ft	10100J	63800	97.8J	232370	14300	100U	132400	-22.5	0.48
OL-STA-40003-PW	4.50-5.50 Ft	11500J	80000	97.4J	293370	16700	100U	160000	-26.4	0.50
OL-STA-40055	0.00-1.00 Ft	4560	31700	169	133370	11600	69.4B	69200	-8.9	0.46
OL-STA-40055	1.00-2.00 Ft	6120	50400	236	267370	19100	103B	93800	-10.1	0.54
OL-STA-40055	2.00-3.00 Ft	6300	57100	252	313370	21300	153B	101200	-11.9	0.56
OL-STA-40055	3.00-4.00 Ft	5920	60800	273	343370	29400	192B	108000	-3.4	0.56
OL-STA-40055	4.00-5.00 Ft	5590	63300	285	353370	24900	230B	109900	-12.4	0.58
OL-STA-40055	5.00-6.00 Ft	5210	62300	296	361370	24400	215B	111700	-13.1	0.56
OL-STA-40055	6.00-7.00 Ft	5140	66500	290	367370	27100	217B	113200	-12.3	0.59
OL-STA-40055	7.00-8.00 Ft	4920	66800	278	366370	27100	206B	115100	-12.9	0.58
OL-STA-40055	8.00-9.00 Ft	5310	68700	282	376370	27300	173B	116200	-13.3	0.59
OL-STA-40055	9.00-10.00 Ft	5640	65400	247	353370	24700	149B		-14.3	
OL-STA-40056	0.00-1.00 Ft	771	5740	116	26.2E	897	79.1	9150	-30.2	0.63
OL-STA-40056	1.00-2.00 Ft	1040	3810	164	47.8E	1490	500U	13800	5.4	0.28
OL-STA-40056	2.00-3.00 Ft	1470	5700	166	79.7E	2190	57.9B	18800	6.4	0.30
OL-STA-40056	3.00-4.00 Ft	1770	7160	108	97.4E	2790	60.2B	23700	4.2	0.30
OL-STA-40056	4.00-5.00 Ft	1980	8770	49.1	109370	3480	500UG	27400	-0.2	0.32
OL-STA-40056	5.00-6.00 Ft	2580	10700	12.4B	127370	3950	500UG	31400	-1.2	0.34
OL-STA-40056	6.00-7.00 Ft	2840	12100	7.2B	121370	4420	63.8B	34900	-0.7	0.35
OL-STA-40056	7.00-8.00 Ft	3640	13800	28.7	128370	4770	105B	37800	0.4	0.37
OL-STA-40056	8.00-9.00 Ft	4310	15500	52.6	136370	6050	162B	43800	4.9	0.35
OL-STA-40056	9.00-10.00 Ft	3320	15700	16.1B	96.0E	5600	191B		-3.9	
OL-STA-40057	0.00-1.00 Ft	227	1610	479	17.8B	440	25.4B	7190	21.0	0.22
OL-STA-40057	1.00-2.00 Ft	228	1050	271	11.7B	309	35.8B	5310	21.9	0.20
OL-STA-40057	2.00-3.00 Ft	172	1920	506	19.3B	478	19.2B	7950	13.4	0.24
OL-STA-40057	3.00-4.00 Ft	208	2090	517	22.6B	536	29.6B	8570	12.6	0.24
OL-STA-40057	4.00-5.00 Ft	330	2220	527	25.4	585	21.5B	8920	15.3	0.25
OL-STA-40057	5.00-6.00 Ft	257	2310	506	24.1B	566	89.8	9160	8.6	0.25
OL-STA-40057	6.00-7.00 Ft	284	2440	522	25.9	595	40.1B	9590	9.1	0.25
OL-STA-40057	7.00-8.00 Ft	300	2550	523	26.8	600	37.1B	9820	7.7	0.26
OL-STA-40057	8.00-9.00 Ft	306	2520	529	27.7	605	22.5B	10100	9.1	0.25

Table V-1

General Chemistry Data from Vibracore and Cation-Anion Balance

Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-STA-60016-PW	0.50-1.50 Ft	428J	4510	47.6J	50.3J	2110	22.0J	17100	-3.8	0.26
OL-STA-60016-PW	2.50-3.50 Ft	510J	6410	65.8J	86.3J	3210	100U	19300	-2.9	0.33
OL-STA-60016-PW	4.50-5.50 Ft	488J	6350	68.8J	88.2J	2990	16.9J	18700	-5.0	0.34
OL-STA-60017-PW	0.50-1.50 Ft	734	5600	125J	63.6J	2070	21.3J	17300	-6.7	0.32
OL-STA-60017-PW	2.50-3.50 Ft	2400	19200	385J	283370	7540	38.2J	63400	-5.4	0.30
OL-STA-60017-PW	4.50-5.50 Ft	3710	36900	585J	474370	10500	122	89400	-19.5	0.41
OL-STA-60018-PW	0.50-1.50 Ft	508	1910	106J	26.0J	2250	36.4J	16000	41.6	0.12
OL-STA-60018-PW	2.50-3.50 Ft	335	662	43.2J	27.9J	359	22.8J	4080	31.3	0.16
OL-STA-60018-PW	4.50-5.50 Ft	402	1470	46.3J	40.6J	908	27.3J	6640	21.0	0.22
OL-STA-60019-PW	0.50-1.50 Ft	273	479	48.8J	17.2J	320	100U	3970	34.5	0.12
OL-STA-60019-PW	2.50-3.50 Ft	341	758	74.8J	40.2J	577	100U	6650	35.5	0.11
OL-STA-60019-PW	4.50-5.50 Ft	419	1430	102J	69.1J	772	100U	9210	20.8	0.16
OL-STA-60072	0.00-1.00 Ft	271	2180	19.4B	25.5	1240	125	8070	4.2	0.27
OL-STA-60072	1.00-2.00 Ft	328	3840	23.0B	35.1	2300	250UG	13500	2.4	0.28
OL-STA-60072	2.00-3.00 Ft	465	11000	37.4	48.5	6250	250UG	30700	-2.6	0.36
OL-STA-60072	3.00-4.00 Ft	580	17700	61.2	57.3	9390	250UG	43000	-6.4	0.41
OL-STA-60072	4.00-5.00 Ft	678	21200	82.7	62.3	11700	500UG	50200	-4.9	0.42
OL-STA-60072	5.00-6.00 Ft	801	26700	115	68.2	14900	500UG	57800	-4.4	0.46
OL-STA-60072	6.00-7.00 Ft	942	31100	159	72.4	17800	500UG	64200	-3.0	0.48
OL-STA-60072	7.00-8.00 Ft	1010	36900	199	75.8	18800	53.9B	73200	-8.1	0.50
OL-STA-60072	8.00-8.50 Ft	1040	39900	230	76.2	21300	500UG	76300	-6.4	0.52
OL-STA-60078	0.00-1.00 Ft	556	4390	113	35.3	2220	162B	16200	2.8	0.27
OL-STA-60078	1.00-2.00 Ft	1170	12800	267	146370	6510	158B	36100	0.4	0.35
OL-STA-60078	2.00-3.00 Ft	1290	14600	297	174370	7310	179B	38600	-0.5	0.38
OL-STA-60078	3.00-4.00 Ft	1340	15700	312	183370	7790	208B	40800	-1.3	0.38
OL-STA-60078	4.00-5.00 Ft	1450	17100	339	194370	7840	206B	44100	-4.3	0.39
OL-STA-60078	5.00-6.00 Ft	1670	19000	398	225370	8900	250B	46700	-3.1	0.41
OL-STA-60078	6.00-7.00 Ft	2030	22000	488	267370	9960	357B	51200	-3.8	0.43
OL-STA-60078	7.00-8.00 Ft	2340	25600	582	312370	11100	398B	58000	-5.4	0.44
OL-STA-60078	8.00-8.50 Ft	2390	28000	607	313370	10900	529	59000	-10.3	0.47
OL-STA-60081	0.00-1.00 Ft	370	3270	56.0	13.3BE	705	395	6490	-30.0	0.50
OL-STA-60081	1.00-2.00 Ft	623	3010	81.7	26.4E	1480	75.9B	12400	8.7	0.24
OL-STA-60081	2.00-3.00 Ft	911	4650	114	44.9E	2380	87.4B	17700	9.1	0.26
OL-STA-60081	3.00-4.00 Ft	1300	10000	200	94.7E	4740	86.2B	30700	1.1	0.33
OL-STA-60081	4.00-5.00 Ft	1760	15300	328	155370	7510	500U	40800	0.4	0.38
OL-STA-60081	5.00-6.00 Ft	2200	22600	488	227370	9450	500UG	52000	-6.7	0.43
OL-STA-60081	6.00-7.00 Ft	3370	37400	837	377370	15500	207B	72300	-7.0	0.52
OL-STA-60081	7.00-8.00 Ft	2530	29700	629	276370	11700	500UG	62800	-10.0	0.47
OL-STA-60081	8.00-9.00 Ft	3810	42800	997	449370	17300	473B	80600	-8.0	0.53
OL-STA-60081	9.00-9.50 Ft	1920	44400	524	204370	8910	500	82000	-40.7	0.54
OL-STA-60087	0.00-1.00 Ft	352	3020	55.1	10.8B	1550	320	10400	-1.1	0.29
OL-STA-60087	1.00-2.00 Ft	433	6220	92.2	11.0B	3530	124B	19600	1.4	0.32
OL-STA-60087	2.00-3.00 Ft	587	9460	128	12.0B	5210	41.3B	27600	-0.2	0.34
OL-STA-60087	3.00-4.00 Ft	641	11500	145	12.8B	6160	250UG	31300	-2.7	0.37
OL-STA-60087	4.00-5.00 Ft	685	13300	163	13.9B	6970	250UG	35100	-4.0	0.38
OL-STA-60087	5.00-6.00 Ft	719	15000	178	14.8B	8050	250UG	38100	-3.3	0.39
OL-STA-60087	6.00-7.00 Ft	733	16700	194	15.8B	8630	250UG	41700	-5.3	0.40
OL-STA-60087	7.00-8.00 Ft	764	18300	214	16.9B	9530	250UG	44600	-5.1	0.41
OL-STA-60087	8.00-9.00 Ft	791	20000	230	17.8B	10400	250UG	47500	-5.4	0.42
OL-STA-60087	9.00-9.50 Ft	793	20500	241	19.1B	11100	500UG	49200	-4.1	0.42
OL-STA-60090	1.00-2.00 Ft	482	1000	70.9	16.8B	409	26.0B	5820	25.2	0.17
OL-STA-60090	2.00-3.00 Ft	594	1330	93.9	22.2B	523	11.1B	7240	23.3	0.18
OL-STA-60090	0.00-1.00 Ft	266	529	41.1	8.9B	254	36.7	3250	28.1	0.16
OL-STA-60090	3.00-4.00 Ft	714	1670	109	27.1	598	5.6B	8450	20.3	0.20
OL-STA-60090	4.00-5.00 Ft	718	2110	129	31.5	746	10.9B	9880	14.3	0.21
OL-STA-60090	5.00-6.00 Ft	853	2310	153	33.2	879	100UG	11300	16.7	0.20
OL-STA-60090	6.00-7.00 Ft	806	2640	176	35.7	1060	100UG	12500	14.1	0.21
OL-STA-60090	7.00-8.00 Ft	718	3190	188	37.8	1260	100UG	13400	7.5	0.24
OL-STA-60090	8.00-8.50 Ft	340	3600	133	34.9	1300	31.9B	13300	-9.0	0.27
OL-STA-60096	0.00-1.00 Ft	257	856	34.4	9.3B	327	81.1B	4080	7.7	0.21
OL-STA-60096	1.00-2.00 Ft	657	1870	74.6	23.0B	834	500UG	10100	9.1	0.19
OL-STA-60096	2.00-3.00 Ft	790	1470	101	29.2	1150	105B	13100	38.6	0.11
OL-STA-60096	3.00-4.00 Ft	890	3550	132	32.7	1520	500UG	16200	5.0	0.22
OL-STA-60096	4.00-5.00 Ft	1060	4320	176	38.1	2040	500UG	19600	8.6	0.22
OL-STA-60096	5.00-6.00 Ft	1180	33300	208	40.7	2690	317B	21300	-66.0	1.56
OL-STA-60096	6.00-7.00 Ft	1280	8670	235	45.4	3100	500UG	23800	-7.5	0.36
OL-STA-60096	7.00-8.00 Ft	1650	8520	295	55.8	3910	500U	27400	5.2	0.31
OL-STA-70005-PW	0.50-1.50 Ft	1120	10100	41.7J	79.4J	4750	23.0J	33600	-3.1	0.30
OL-STA-70005-PW	2.50-3.50 Ft	1330	13000	39.0J	101370	6660	19.5J	8680	-0.7	1.50

Table V-1

General Chemistry Data from Vibracore and Cation-Anion Balance

Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-STA-70005-PW	4.50-5.50 Ft	816J	16900	146J	90.8J	10100	18.2J	56200	1.8	0.30
OL-STA-70006-PW	0.50-1.50 Ft	1080	6980	69.0J	39.0J	2360	17.4J	22100	-9.4	0.32
OL-STA-70006-PW	2.50-3.50 Ft	2020	12700	69.0J	90.4J	5300	100U	41100	-3.0	0.31
OL-STA-70006-PW	3.50-4.50 Ft	2170	15300	51.8J	109370	5080	19.8J	48000	-12.5	0.32
OL-STA-70007-PW	0.50-1.50 Ft	2400	30700	86.0J	114370	11300	65.8J	79800	-16.5	0.38
OL-STA-70007-PW	2.50-3.50 Ft	2960	55200	121J	136370	17100	34.4J	113400	-26.5	0.49
OL-STA-70007-PW	3.50-4.50 Ft	2660	61700	167J	140370	20000	148	134000	-26.2	0.46
OL-STA-70008-PW	0.50-1.50 Ft	584	12800	124J	27.9J	5550	40.1J	36500	-12.5	0.35
OL-STA-70008-PW	2.50-3.50 Ft	905	26800	184J	31.5J	10400	100U	68800	-19.2	0.39
OL-STA-70008-PW	4.50-5.50 Ft	1000	35300	208J	37.0J	16100	100U	90600	-13.0	0.39
OL-STA-70040	0.00-1.00 Ft	1590	13100	83.3	56.4E	6900	111B	34200	2.1	0.38
OL-STA-70040	1.00-2.00 Ft	2750	37200	153	129370	17000	75.4B	66900	-8.1	0.56
OL-STA-70040	2.00-3.00 Ft	2900	40400	214	96.6E	20300	500UG	71400	-4.6	0.57
OL-STA-70040	3.00-4.00 Ft	2790	43600	239	115370	21300	500UG	74500	-6.5	0.59
OL-STA-70040	4.00-5.00 Ft	2280	46100	293	87.7E	25500	500UG	77100	-2.4	0.60
OL-STA-70040	5.00-6.00 Ft	1900	47300	332	77.4E	26400	500UG	79100	-2.8	0.60
OL-STA-70040	6.00-7.00 Ft	1460	48400	355	68.1E	27400	500UG	80400	-3.0	0.60
OL-STA-70040	7.00-7.50 Ft	1260	49700	353	60.0E	26900	500UG	81500	-5.6	0.61
OL-STA-70042	0.00-1.00 Ft	238	495	63.9	10.0E	273	64.2	3400	31.3	0.15
OL-STA-70042	1.00-2.00 Ft	351	756	114	15.3E	403	27.3B	5300	34.4	0.14
OL-STA-70042	2.00-3.00 Ft	455	1220	187	22.7E	576	50.0U	7310	28.5	0.17
OL-STA-70042	3.00-4.00 Ft	510	1680	292	29.4E	709	50.0UG	9220	25.2	0.18
OL-STA-70042	4.00-5.00 Ft	500	2000	380	34.3E	855	100UG	10600	23.4	0.19
OL-STA-70042	5.00-6.00 Ft	566	2440	428	38.4E	1030	100UG	11400	21.3	0.21
OL-STA-70042	6.00-7.00 Ft	621	2880	436	40.2E	1210	100UG	12900	18.3	0.22
OL-STA-70042	7.00-8.00 Ft	663	3430	430	41.5E	1450	100UG	14000	14.6	0.25
OL-STA-70042	8.00-9.00 Ft	573	3890	381	38.6E	1530	100UG	14500	6.6	0.27
OL-STA-70043	0.00-1.00 Ft	275	2290	84.8	9.6B	290	385	4180	-36.8	0.55
OL-STA-70043	1.00-2.00 Ft	386	894	185	14.2B	452	165	6550	31.1	0.14
OL-STA-70043	2.00-3.00 Ft	374	1410	367	20.6B	657	58.0	9340	31.1	0.15
OL-STA-70043	3.00-4.00 Ft	267	2290	727	29.3	914	100UG	12700	26.1	0.18
OL-STA-70043	4.00-5.00 Ft	347	2010	653	27.4	854	100U	11900	29.9	0.17
OL-STA-70043	5.00-6.00 Ft	391	2780	778	33.0	1060	13.8B	13500	24.8	0.21
OL-STA-70043	6.00-7.00 Ft	438	2960	629	33.3	1110	33.6B	13600	18.6	0.22
OL-STA-70043	7.00-8.00 Ft	596	3390	496	33.4	1250	100UG	14300	12.6	0.24
OL-STA-70043	8.00-9.00 Ft	616	3790	424	34.8	1440	17.0B	15000	9.3	0.25
OL-VC-20111	0.00-0.30 Ft		2550					9690		0.26
OL-VC-20111	0.30-0.50 Ft		2980					9010		0.33
OL-VC-20111	0.50-0.80 Ft		4710					15500		0.30
OL-VC-20111	0.80-1.00 Ft		6720					20600		0.33
OL-VC-20111	1.00-1.30 Ft		12800					35100		0.36
OL-VC-20111	1.30-1.50 Ft		14800					41500		0.36
OL-VC-20111	1.50-1.80 Ft		17000					47400		0.36
OL-VC-20111	2.00-2.50 Ft	719J	19000	63.3	319370	10400	20.8B	60600	-3.3	0.31
OL-VC-20111	3.00-3.50 Ft	784J	22900	67.6	367370	11600	201	82000	-7.6	0.28
OL-VC-20111	4.00-4.50 Ft	801J	27300	71.4	415370	14000	191	92500	-7.5	0.30
OL-VC-20111	5.00-5.50 Ft	680J	30700	57.6	365370	14400	218	101000	-12.7	0.30
OL-VC-20113	0.00-0.30 Ft		8110					26900		0.30
OL-VC-20113	0.30-0.50 Ft		8010					28100		0.29
OL-VC-20113	0.50-0.80 Ft		13400					39400		0.34
OL-VC-20113	0.80-1.00 Ft		17400					46100		0.38
OL-VC-20113	1.00-1.30 Ft		1920					67800		0.03
OL-VC-20113	1.30-1.50 Ft		1930					67100		0.03
OL-VC-20113	1.50-1.80 Ft		2030					75000		0.03
OL-VC-20113	2.00-2.50 Ft	1350J	33400	174	111370	14000	2690	132000	-18.0	0.25
OL-VC-20113	3.00-3.50 Ft	1610J	36800	218	141370	17800	2990	137000	-11.3	0.27
OL-VC-20113	4.00-4.50 Ft	1570J	40100	241	156370	19200	3980	141000	-12.9	0.28
OL-VC-20113	5.00-5.50 Ft	1080J	44800	174	110370	14000	2930	154000	-32.2	0.29
OL-VC-20113	6.00-6.50 Ft	1430J	47600	234	163370	19200	3460	182000	-20.7	0.26
OL-VC-20113	7.50-8.00 Ft	1450J	45800	243	167370	19800	3360	190000	-17.4	0.24
OL-VC-20113	9.00-9.50 Ft	1380J	49000	229	157370	19400	3510	195000	-21.7	0.25
OL-VC-20118	0.00-0.30 Ft		1480					6350		0.23
OL-VC-20118	0.30-0.50 Ft		2080					8840		0.24
OL-VC-20118	0.50-0.80 Ft		2790					12000		0.23
OL-VC-20118	0.80-1.00 Ft		3500					14200		0.25
OL-VC-20118	1.00-1.30 Ft		5930					20600		0.29
OL-VC-20118	1.30-1.50 Ft		6610					21800		0.30
OL-VC-20118	1.50-1.80 Ft		7350					22700		0.32
OL-VC-20118	2.00-2.50 Ft	175J	9350	450J	32.5B	5590	118	39600	4.2	0.24

Table V-1

General Chemistry Data from Vibracore and Cation-Anion Balance

Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-VC-20118	3.00-3.50 Ft	29.4BJ	12400	519J	34.3B	6380	106	55900	-4.4	0.22
OL-VC-20118	4.00-4.50 Ft	111J	15400	428J	42.3B	8610	27.1B	68400	-2.2	0.23
OL-VC-20118	5.00-5.50 Ft	237J	19300	295J	42.6B	9410	108	88300	-10.1	0.22
OL-VC-20118	6.00-6.50 Ft	317J	23500	135J	40.8B	8580	86.7	101000	-24.7	0.23
OL-VC-20119	0.00-0.30 Ft		1230					5920		0.21
OL-VC-20119	0.30-0.50 Ft		1330					5500		0.24
OL-VC-20119	1.00-1.30 Ft		4250					17000		0.25
OL-VC-20119	1.30-1.50 Ft		5950					22200		0.27
OL-VC-20119	1.50-1.80 Ft		6710					25200		0.27
OL-VC-20119	2.00-2.50 Ft	621J	13900	7.0B	50.4	7020	29.8BJ	43200	-7.5	0.32
OL-VC-20119	3.00-3.50 Ft	766J	20000	2.4B	59.6	9600	29.0BJ	59700	-10.5	0.34
OL-VC-20119	4.00-4.50 Ft	428J	22100	74.9	70.1	12800	12.5BJ	69300	-3.1	0.32
OL-VC-20119	5.00-5.50 Ft	294J	25400	149	69.4	13100	61.5J	79900	-9.1	0.32
OL-VC-20119	6.00-6.50 Ft	345J	31800	237	73.3	14700	184J	96500	-14.1	0.33
OL-VC-20119	7.50-8.00 Ft	362J	40300	117	42.9B	9440	1010J	136000	-45.0	0.30
OL-VC-20133	0.00-0.30 Ft		31000					89400		0.35
OL-VC-20133	0.30-0.50 Ft		32400					81200		0.40
OL-VC-20133	1.00-1.30 Ft		40400					98600		0.41
OL-VC-20133	1.30-1.50 Ft		40300					105000		0.38
OL-VC-20133	1.50-1.80 Ft		42700					94200		0.45
OL-VC-20133	2.00-2.50 Ft	458J	43600	130	56.7	10700	2010J	167000	-43.5	0.26
OL-VC-20133	3.00-3.50 Ft	671J	46900	176	85.8	15400	2360J	190000	-31.2	0.25
OL-VC-20133	4.00-4.50 Ft	1170J	54200	284	169370	26300	2820J	203000	-12.7	0.27
OL-VC-20133	5.00-5.50 Ft	1400J	56400	326	218370	31500	2960J	216000	-5.8	0.26
OL-VC-20133	6.00-6.50 Ft	1600J	61400	362	252370	36500	3180J	230000	-2.7	0.27
OL-VC-20133	7.50-8.00 Ft	1530J	78000	338	248370	35200	3380J	249000	-16.1	0.31
OL-VC-20187	0.00-0.25 Ft		980					3690		0.27
OL-VC-20187	0.25-0.50 Ft		1250					4430		0.28
OL-VC-20187	0.50-0.75 Ft		1630					5500		0.30
OL-VC-20187	0.75-1.00 Ft		1860					6270		0.30
OL-VC-20187	1.00-1.25 Ft		2400					7360		0.33
OL-VC-20187	1.25-1.50 Ft		2650					8280		0.32
OL-VC-20187	1.50-1.75 Ft		3090					9150		0.34
OL-VC-20187	2.00-2.50 Ft	660	4640J		42.8	960	160	13200		0.35
OL-VC-20187	3.00-3.50 Ft	1380	6980J		66.5	1520	165	18300		0.38
OL-VC-20187	4.00-4.50 Ft	1820	8590J		82.6	1920	158	22100		0.39
OL-VC-20187	5.00-5.50 Ft	1500	9100J		95.0	2070	138	23000		0.40
OL-VC-20187	6.00-6.50 Ft	761	8200J		111370	2060	247	22700		0.36
OL-VC-20187	7.50-8.00 Ft	214	7900J		114370	2100	144	23600		0.33
OL-VC-20187	9.00-9.50 Ft	321	9080J		137370	2870	29.0	26500		0.34
OL-VC-20188	0-0.25 Ft		5970					16900		0.35
OL-VC-20188	0.25-0.5 Ft		11400					30100		0.38
OL-VC-20188	0.5-0.75 Ft		13100					33600		0.39
OL-VC-20188	0.75-1 Ft		13900					34900		0.40
OL-VC-20188	1-1.25 Ft		15500					38900		0.40
OL-VC-20188	1.25-1.5 Ft		15900					40300		0.39
OL-VC-20188	1.5-1.75 Ft		16600					41600		0.40
OL-VC-20188	2-2.5 Ft	2830	18300		95.7	8240	910	44700		0.41
OL-VC-20188	3-3.5 Ft	3370	20400		98.2	7950	1150	48500		0.42
OL-VC-20188	4-4.5 Ft	4100	22300		97.2	7710	1260	53100		0.42
OL-VC-20188	5-5.5 Ft	3370	22500		72.4	5450	1380	54200		0.42
OL-VC-20188	6-6.5 Ft	4160	21300		92.9	8130	1690	51300		0.42
OL-VC-20188	7.5-8 Ft	4670	22300		105370	6640	1640	53500		0.42
OL-VC-20188	9-9.5 Ft	5090	23300		106370	8350	1590	56100		0.42
OL-VC-20189	0-0.25 Ft		6000					17400		0.34
OL-VC-20189	0.25-0.5 Ft		8530					24600		0.35
OL-VC-20189	0.5-0.75 Ft		9280					26500		0.35
OL-VC-20189	0.75-1 Ft		9920					28600		0.35
OL-VC-20189	1-1.25 Ft		11400					32600		0.35
OL-VC-20189	1.25-1.5 Ft		12400					34800		0.36
OL-VC-20189	1.5-1.75 Ft		13000					36200		0.36
OL-VC-20189	2-2.5 Ft	599	17000J		71.6	6140	1320	46400		0.37
OL-VC-20189	3-3.5 Ft	845	22400J		92.7	7430	2020	59100		0.38
OL-VC-20189	4-4.5 Ft	1030	27600J		112370	10300	2680	73200		0.38
OL-VC-20189	5-5.5 Ft	1250	33200J		135370	12500	3430	86400		0.38
OL-VC-20189	6-6.5 Ft	1360	37600J		148370	16500	3740	94300		0.40
OL-VC-20189	7.5-8 Ft	1380	40100J		164370	16300	3780	99200		0.40
OL-VC-20189	9-9.5 Ft	1370	40500J		163370	15500	3820	100000		0.41
OL-VC-20190	0.00-0.25 Ft		2380					6810		0.35

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General Chemistry Data from Vibracore and Cation-Anion Balance

Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-VC-20190	0.25-0.50 Ft		2870					8120		0.35
OL-VC-20190	0.50-0.75 Ft		3530					9590		0.37
OL-VC-20190	0.75-1.00 Ft		3640					10100		0.36
OL-VC-20190	1.00-1.25 Ft		4010					11000		0.36
OL-VC-20190	1.25-1.50 Ft		3500					11400		0.31
OL-VC-20190	1.50-1.75 Ft		4190					11700		0.36
OL-VC-20190	2.00-2.50 Ft	1460	5180J		68.9	1860	90.5	14800		0.35
OL-VC-20190	3.00-3.50 Ft	2100	7980J		90.1	2660	97.2	22200		0.36
OL-VC-20190	4.00-4.50 Ft	3880	15500J		150370	5740	157	41000		0.38
OL-VC-20190	5.00-5.50 Ft	5230	22200J		199370	7930	186	54100		0.41
OL-VC-20190	6.00-6.50 Ft	5820	27700J		220370	9150	194	64200		0.43
OL-VC-20190	7.50-8.00 Ft	6570	31100J		243370	11000	185	72600		0.43
OL-VC-20190	9.00-9.50 Ft	6240	31700J		234370	11900	179	74300		0.43
OL-VC-20201	0.00-0.25 Ft		2030					7220		0.28
OL-VC-20202	0.00-0.25 Ft		1130					4250		0.27
OL-VC-20202	0.50-0.75 Ft		1420					5040		0.28
OL-VC-20202	0.75-1.00 Ft		1640					5450		0.30
OL-VC-20202	1.00-1.25 Ft		1740					5810		0.30
OL-VC-20202	1.25-1.50 Ft		1860					6010		0.31
OL-VC-20202	1.50-1.75 Ft		1710					5630		0.30
OL-VC-20202	2.00-2.50 Ft		1740				135	5860		0.30
OL-VC-20202	2.00-2.50 Ft		1760				120	5980		0.29
OL-VC-20202	3.00-3.50 Ft		1840				67.6	5570		0.33
OL-VC-20202	4.00-4.50 Ft		1970				72.3	2850		0.69
OL-VC-20202	5.00-5.50 Ft		1910				98.1	6230		0.31
OL-VC-20202	6.00-6.50 Ft		2440				249	9320		0.26
OL-VC-20202	7.50-8.00 Ft		3170				271	10600		0.30
OL-VC-20203	0.00-0.25 Ft		3280					10200		0.32
OL-VC-20203	0.25-0.50 Ft		3310					10400		0.32
OL-VC-20203	0.50-0.75 Ft		3040					9520		0.32
OL-VC-20203	1.50-1.75 Ft		12000					3370		3.56
OL-VC-20203	2.00-2.50 Ft	650	15100	67.2	118370	5380	1740	42600	-25.4	0.35
OL-VC-20203	3.00-3.50 Ft	887	16300	142	135370	9450	2140	46300	-3.5	0.35
OL-VC-20203	4.00-4.50 Ft	1130	16300	144	140370	9900	2120	45900	-0.1	0.36
OL-VC-20203	0.00-4.50 Ft									
OL-VC-20204	0.00-0.25 Ft		2140					7220		0.30
OL-VC-20204	0.25-0.50 Ft		4270					12900		0.33
OL-VC-20204	0.50-0.75 Ft		6540					19000		0.34
OL-VC-20204	0.75-1.00 Ft		8590					25400		0.34
OL-VC-20204	1.00-1.25 Ft		11700					31800		0.37
OL-VC-20204	1.25-1.50 Ft		14100					38900		0.36
OL-VC-20204	1.50-1.75 Ft		16000					43900		0.36
OL-VC-20204	2.00-2.50 Ft	452	21400	484	86.7	12000	22.4	55400	-1.5	0.39
OL-VC-20204	3.00-3.50 Ft	427	30600	463	54.5	12300	86.2	70000	-18.4	0.44
OL-VC-20204	4.00-4.50 Ft	597	36100	532	79.0	19100	547	81100	-6.4	0.45
OL-VC-20204	5.00-5.50 Ft	627	39300	349	75.0	15800	967	90000	-20.2	0.44
OL-VC-20204	6.00-6.50 Ft	642	45100	248	104370	11100	1780	101000	-41.8	0.45
OL-VC-20204	7.50-8.00 Ft	865	52500	211	111370	10800	2970	115000	-48.6	0.46
OL-VC-20204	9.00-9.50 Ft	904	61500	202	123370	11600	3860	130000	-52.2	0.47
OL-VC-20204A	0.00-0.25 Ft		2560					8640		0.30
OL-VC-20204A	0.25-0.50 Ft		4330					13400		0.32
OL-VC-20204A	0.50-0.75 Ft		6340					19400		0.33
OL-VC-20204A	0.75-1.00 Ft		8780					24400		0.36
OL-VC-20204A	1.00-1.25 Ft		11800					32200		0.37
OL-VC-20204A	1.25-1.50 Ft		14800					38900		0.38
OL-VC-20204A	1.50-1.75 Ft		17700					45100		0.39
OL-VC-20204A	2.00-2.50 Ft	468	20900	423	84.6	11600	55.2	55200	-2.2	0.38
OL-VC-20204A	2.00-2.50 Ft	452	21100	413	81.8	11000	53.9	54200	-5.2	0.39
OL-VC-20204A	3.00-3.50 Ft	486	29200	500	70.8	15500	174	73100	-5.5	0.40
OL-VC-20204A	4.00-4.50 Ft	509	35300	332	101370	12300	546	81500	-26.1	0.43
OL-VC-20204A	5.00-5.50 Ft	569	39700	257	97.5	10900	1270	88500	-37.1	0.45
OL-VC-20204A	6.00-6.50 Ft	707	44900	227	106370	10800	2090	99900	-42.7	0.45
OL-VC-20204A	7.50-8.00 Ft	872	54900	214	121370	11800	3200	117000	-47.3	0.47
OL-VC-20204A	9.00-9.50 Ft	784	64100	174	99.4	8560	4160	130000	-63.1	0.49
OL-VC-20205	0.00-0.25 Ft		2480					8120		0.31
OL-VC-20205	0.25-0.50 Ft		5200					15600		0.33
OL-VC-20205	0.50-0.75 Ft		8750					25400		0.34
OL-VC-20205	0.75-1.00 Ft		11600					32200		0.36
OL-VC-20205	1.00-1.25 Ft		16100					42200		0.38

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Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-VC-20205	1.25-1.50 Ft		18400					46200		0.40
OL-VC-20205	1.50-1.75 Ft		20600					52200		0.39
OL-VC-20205	2.00-2.50 Ft	579	26100	300	94.9	14100	157	67100	-5.0	0.39
OL-VC-20205	3.00-3.50 Ft	747	34300	328	134370	21400	683	83300	0.9	0.41
OL-VC-20205	4.00-4.50 Ft	1100	41900	316	169370	25500	1430	96800	-0.7	0.43
OL-VC-20205	5.00-5.50 Ft	1220	48900	285	201370	27400	2270	114000	-5.4	0.43
OL-VC-20205	6.00-6.50 Ft	1360	53700	268	171370	28800	2860	120000	-7.8	0.45
OL-VC-20205	6.00-6.50 Ft	1400	55400	281	196370	23300	3000	123000	-18.8	0.45
OL-VC-20205	7.50-8.00 Ft	1570	63100	293	233370	27900	3610	136000	-16.8	0.46
OL-VC-20205	9.00-9.50 Ft	1790	71100	315	275370	32200	4030	147000	-15.7	0.48
OL-VC-30129	0.00-0.25 Ft		2010					6640		0.30
OL-VC-30129	0.25-0.50 Ft		3250					10600		0.31
OL-VC-30129	0.50-0.75 Ft		2610					8580		0.30
OL-VC-30129	0.75-1.00 Ft		4040					12700		0.32
OL-VC-30129	1.00-1.25 Ft		4600					14300		0.32
OL-VC-30129	1.25-1.50 Ft		4930					14800		0.33
OL-VC-30129	1.50-1.75 Ft		5410					16200		0.33
OL-VC-30129	2.00-2.50 Ft	485	6350J	66.9	14.5	2630	102	19800	-11.3	0.32
OL-VC-30129	3.00-3.50 Ft	450	7870J	66.9	16.1	3100	113	24100	-15.8	0.33
OL-VC-30129	4.00-4.50 Ft	481	9230J	72.7	17.8	4150	84.9	27800	-10.8	0.33
OL-VC-30129	5.00-5.50 Ft	395	10300J	63.4	15.6	3800	82.8	30900	-21.0	0.33
OL-VC-30129	6.00-6.50 Ft	438	11700J	68.1	17.3	4260	103	34000	-21.8	0.34
OL-VC-30129	7.50-8.00 Ft	514	13800J	92.8	22.9	7360	48.2	38500	-4.9	0.36
OL-VC-30129	9.00-9.50 Ft	531	15500J	86.9	26.0	7840	116	44000	-7.9	0.35
OL-VC-30130	0.00-0.25 Ft		521					2490		0.21
OL-VC-30130	0.25-0.50 Ft		579					2810		0.21
OL-VC-30130	0.50-0.75 Ft		681					2990		0.23
OL-VC-30130	0.75-1.00 Ft		785					3310		0.24
OL-VC-30130	1.00-1.25 Ft		999					4010		0.25
OL-VC-30130	1.25-1.50 Ft		1220					4330		0.28
OL-VC-30130	1.50-1.75 Ft		1840					5830		0.32
OL-VC-30130	2.00-2.50 Ft	589	2340J	1.2J	38.7	620	120	8020	-8.8	0.29
OL-VC-30130	3.00-3.50 Ft	715	2640J	0.7J	50.4	894	137	7360	-0.9	0.36
OL-VC-30130	4.00-4.50 Ft	942	2830J	17.4	51.9	1040	136	10000	7.0	0.28
OL-VC-30130	5.00-5.50 Ft	789	3300J	1.2J	50.1	1080	155	12400	-4.7	0.27
OL-VC-30130	6.00-6.50 Ft	862	4200J	2.2J	61.4	1510	162	15000	-4.9	0.28
OL-VC-30130	7.50-8.00 Ft	1000	5120J	0.8J	67.0	1990	230	19400	-3.8	0.26
OL-VC-30130	9.00-9.50 Ft	948	7050J	4.6J	65.6	3140	305	24700	-4.9	0.29
OL-VC-30131	0-0.25 Ft		1150					4030		0.29
OL-VC-30131	0.25-0.5 Ft		1490					5340		0.28
OL-VC-30131	0.5-0.75 Ft		1960					6980		0.28
OL-VC-30131	0.75-1 Ft		2410					8030		0.30
OL-VC-30131	1-1.25 Ft		2480					9330		0.27
OL-VC-30131	1.25-1.5 Ft		2700					9830		0.27
OL-VC-30131	1.5-1.75 Ft		2970					10700		0.28
OL-VC-30131	2-2.5 Ft	1250	3360J	3.6J	68.6	615	102	12400	-3.0	0.27
OL-VC-30131	3-3.5 Ft	1500	4040J	2.0J	113370	719	118	15100	-3.2	0.27
OL-VC-30131	4-4.5 Ft	1470	4330J	1.2J	126370	707	135	15900	-7.5	0.27
OL-VC-30131	5-5.5 Ft	1480	4400J	2.6J	146370	735	153	17000	-7.4	0.26
OL-VC-30131	6-6.5 Ft	1570	4450J	2.2J	175370	1140	164	16700	1.4	0.27
OL-VC-30131	7.5-8 Ft	1530	4370J	2.6J	211370	1210	166	17300	3.0	0.25
OL-VC-30131	9-9.5 Ft	1550	4250J	1.4J	248370	1270	153	17400	6.1	0.24
OL-VC-30132	0.00-0.25 Ft		650					2160		0.30
OL-VC-30132	0.25-0.50 Ft		739					2590		0.29
OL-VC-30132	0.50-0.75 Ft		893					3170		0.28
OL-VC-30132	0.75-1.00 Ft		1010					3640		0.28
OL-VC-30132	1.00-1.25 Ft		1140					4120		0.28
OL-VC-30132	1.25-1.50 Ft		1670					4730		0.35
OL-VC-30132	1.50-1.75 Ft		2080					8240		0.25
OL-VC-30132	2.00-2.50 Ft	471	2200J	0.2J	156370	867	66.5	9370	1.4	0.23
OL-VC-30132	3.00-3.50 Ft	489	2360J	1.0J	188370	922	65.3	9670	1.1	0.24
OL-VC-30132	4.00-4.50 Ft	908	2640J	15.4	207370	960	74.2	12300	10.4	0.21
OL-VC-30132	5.00-5.50 Ft	911	2800J	0.2J	235370	988	62.5	14000	8.1	0.20
OL-VC-30132	6.00-6.50 Ft	879	2700J	3.2J	241370	976	51.3	13700	9.1	0.20
OL-VC-30132	7.50-8.00 Ft	940	2770J	8.2	269370	1050	47.4	13400	11.7	0.21
OL-VC-30132	9.00-9.50 Ft	793	2610J	3.6J	254370	1020	69.7	14200	9.4	0.18
OL-VC-30133	0.00-0.25 Ft		977					3610		0.27
OL-VC-30133	0.25-0.50 Ft		1420					4830		0.29
OL-VC-30133	0.50-0.75 Ft		2060					6530		0.32

Table V-1

General Chemistry Data from Vibracore and Cation-Anion Balance

Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-VC-30133	0.75-1.00 Ft		2570					7780		0.33
OL-VC-30133	1.00-1.25 Ft		2980					8700		0.34
OL-VC-30133	1.25-1.50 Ft		3210					9780		0.33
OL-VC-30133	1.50-1.75 Ft		3590					10900		0.33
OL-VC-30133	2.00-2.50 Ft	907	5410J	4.9J	27.7	1980	180	17000	-8.3	0.32
OL-VC-30133	3.00-3.50 Ft	1050	6910J	2.2J	36.9	2650	232	23100	-8.4	0.30
OL-VC-30133	4.00-4.50 Ft	1000	9540J	1.8J	45.3	3670	275	29200	-13.2	0.33
OL-VC-30133	6.00-6.50 Ft	812	13200J	4.2J	51.1	6760	306	38000	-5.9	0.35
OL-VC-30133	5.00-5.50 Ft	916	10800J	3.8J	49.4	5710	275	33300	-2.4	0.32
OL-VC-30133	7.50-8.00 Ft	608	16200J	3.4J	51.9	9320	272	45400	-2.8	0.36
OL-VC-30133	9.00-9.50 Ft	97.5	21700J	1.4J	54.3	11700	98.4	58500	-8.8	0.37
OL-VC-30176	0.00-0.25 Ft		2100					11100		0.19
OL-VC-30176	0.25-0.50 Ft		3390					11200		0.30
OL-VC-30176	0.50-0.75 Ft		3720					12100		0.31
OL-VC-30176	0.75-1.00 Ft		3760					13300		0.28
OL-VC-30176	1.00-1.25 Ft		3800					13200		0.29
OL-VC-30176	1.25-1.50 Ft		3760					13200		0.28
OL-VC-30176	1.50-1.75 Ft		3910					14400		0.27
OL-VC-30176	2.00-2.50 Ft	1190	4200	23.0	111370	1450	191	15400	1.9	0.27
OL-VC-30176	3.00-3.50 Ft	1180	4500	64.6	96.4	1430	191	15900	-0.8	0.28
OL-VC-30176	4.00-4.50 Ft	1230	5320	25.9	130370	1980	192	19500	-0.4	0.27
OL-VC-30176	5.00-5.50 Ft	1240	6240	18.1	141370	2800	186	23000	2.4	0.27
OL-VC-30176	6.00-6.50 Ft	676	6800	13.6	80.3	2020	217	22300	-22.3	0.30
OL-VC-30176	7.50-8.00 Ft	1100	10300	24.8	133370	4190	235	28200	-9.8	0.37
OL-VC-30176	9.00-9.50 Ft	654	12200	6.6	67.1	3340	218	36900	-31.9	0.33
OL-VC-30177	0.00-0.25 Ft		5460					17000		0.32
OL-VC-30177	0.25-0.50 Ft		7080					20600		0.34
OL-VC-30177	0.50-0.75 Ft		8550					24100		0.35
OL-VC-30177	0.75-1.00 Ft		9590					28000		0.34
OL-VC-30177	1.00-1.25 Ft		11300					31800		0.36
OL-VC-30177	1.25-1.50 Ft		11900					31900		0.37
OL-VC-30177	1.50-1.75 Ft		13100					36000		0.36
OL-VC-30177	2.00-2.50 Ft	770	16800	3.1	61.7	5990	305	38800	-23.0	0.43
OL-VC-30177	2.00-2.50 Ft	689	17600	3.9	51.3	5550	293	46200	-28.9	0.38
OL-VC-30177	3.00-3.50 Ft	868	20700	20.5	66.6	7130	335	52300	-24.7	0.40
OL-VC-30177	4.00-4.50 Ft	1560	26500	39.2	141370	12700	390	63600	-8.5	0.42
OL-VC-30177	5.00-5.50 Ft	982	28100	6.0	95.2	9040	600	71600	-28.8	0.39
OL-VC-30177	6.00-6.50 Ft	914	32200	8.3	99.0	10200	708	78500	-30.4	0.41
OL-VC-30177	7.50-8.00 Ft	677	39600	9.1	91.1	8940	1340	97200	-45.8	0.41
OL-VC-30177	9.00-9.50 Ft	558	54800	5.6	107370	10900	2140	119000	-51.8	0.46
OL-VC-30178	0.00-0.25 Ft		1080					4190		0.26
OL-VC-30178	0.25-0.50 Ft		1330					5010		0.27
OL-VC-30178	0.50-0.75 Ft		1560					5570		0.28
OL-VC-30178	0.75-1.00 Ft		7080					63400		0.11
OL-VC-30178	1.00-1.25 Ft		1960					6960		0.28
OL-VC-30178	1.25-1.50 Ft		2240					7630		0.29
OL-VC-30178	1.50-1.75 Ft		2360					8300		0.28
OL-VC-30178	2.00-2.50 Ft	182	3360	28.7	50.8	1750	66.3	9700	-3.9	0.35
OL-VC-30178	3.00-3.50 Ft	650	4560	1.6	57.0	2230	56.6	1360	0.5	3.35
OL-VC-30178	4.00-4.50 Ft	1120	6430	9.3	61.8	2970	182	18700	0.6	0.34
OL-VC-30178	5.00-5.50 Ft	1300	8630	4.5J	74.2	4160	253	25000	-0.1	0.35
OL-VC-30178	6.00-6.50 Ft	1320	9880	3.8	78.8	5150	266	28700	1.4	0.34
OL-VC-30178	7.50-8.00 Ft	1350	13900	25.0	81.8	6820	304	37800	-3.9	0.37
OL-VC-30178	9.00-9.50 Ft	1160	17800	18.8	91.9	9250	249	45800	-4.4	0.39
OL-VC-30179	0.00-0.25 Ft		6640					19200		0.35
OL-VC-30179	0.25-0.50 Ft		10700					28100		0.38
OL-VC-30179	0.50-0.75 Ft		15200					38600		0.39
OL-VC-30179	0.75-1.00 Ft		17800					41700		0.43
OL-VC-30179	1.00-1.25 Ft		20800					52600		0.40
OL-VC-30179	1.25-1.50 Ft		25100					60600		0.41
OL-VC-30179	1.50-1.75 Ft		26500					64100		0.41
OL-VC-30179	2.00-2.50 Ft	595	30000	2.9	94.6	13600	305	71600	-15.5	0.42
OL-VC-30179	2.00-2.50 Ft	606	31500	2.4	93.4	13700	351	72200	-17.5	0.44
OL-VC-30179	3.00-3.50 Ft	1220	37400	4.8	142370	19500	967	83400	-8.1	0.45
OL-VC-30179	4.00-4.50 Ft	1400	39800	9.7	160370	21500	1190	9010	-6.4	4.42
OL-VC-30179	5.00-5.50 Ft	1410	46200	12.1	174370	27300	1510	104000	-2.7	0.44
OL-VC-30179	6.00-6.50 Ft	1130	58800	12.5	139370	26900	2310	12300	-16.2	4.78
OL-VC-30179	7.50-8.00 Ft	1240	66300	3.5	160370	30600	3000	136000	-16.1	0.49
OL-VC-30179	9.00-9.50 Ft	195	71600	24.5	27.3	20300	3330	139000	-40.0	0.52

Table V-1

General Chemistry Data from Vibracore and Cation-Anion Balance

Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-VC-30180	0.00-0.25 Ft		1960					6550		0.30
OL-VC-30180	0.25-0.50 Ft		2960					8760		0.34
OL-VC-30180	0.50-0.75 Ft		4350					12600		0.35
OL-VC-30180	0.75-1.00 Ft		5430					16100		0.34
OL-VC-30180	1.00-1.25 Ft		6990					19200		0.36
OL-VC-30180	1.25-1.50 Ft		9220					24200		0.38
OL-VC-30180	1.50-1.75 Ft		11400					29100		0.39
OL-VC-30180	2.00-2.50 Ft	1110	13200	17.5	69.7	6920	183	32800	-2.2	0.40
OL-VC-30180	2.00-2.50 Ft	1010	13300	11.8	65.8	6650	168	31700	-5.0	0.42
OL-VC-30180	3.00-3.50 Ft	1110	15200	1.7	79.9	8050	238	36300	-3.1	0.42
OL-VC-30180	4.00-4.50 Ft	1020	17600	0.9J	85.8	9080	237	41900	-5.6	0.42
OL-VC-30180	5.00-5.50 Ft	906	22300	2.3	98.2	11800	310	52600	-6.2	0.42
OL-VC-30180	6.00-6.50 Ft	755	27000	3.7	70.4	14000	295	64600	-8.4	0.42
OL-VC-30180	7.50-8.00 Ft	493	32500	29.0	81.9	16600	467	61600	-10.4	0.53
OL-VC-30180	9.00-9.50 Ft	520	40000	121	98.7	10800	1260	74300	-38.9	0.54
OL-VC-40083	0.50-1.00 Ft	14100	48200	81.8	383370	9350	8.4J	131000	-9.4	0.37
OL-VC-40083	1.00-1.50 Ft	15700	49300	82.8	386370	10700	9.4J	136000	-4.7	0.36
OL-VC-40083	1.50-2.00 Ft	14800	51000	84.0	398370	10100	7.7J	136000	-9.3	0.38
OL-VC-40083	2.00-2.50 Ft	16300	50200	85.7	385370	11100	5.4J	142000	-3.8	0.35
OL-VC-40083	2.50-3.00 Ft	16600	50900	87.2	400370	11300	50.0U	142000	-3.6	0.36
OL-VC-40083	3.50-4.00 Ft	15500	54200	87.5	411370	10600	4.7J	140000	-9.9	0.39
OL-VC-40083	4.50-5.00 Ft	17800	55600	108	410370	12900	50.0U	154000	-3.3	0.36
OL-VC-40083	6.00-6.50 Ft	17700	80800	168	427370	14300	5.6J	171000	-19.7	0.47
OL-VC-40083	7.50-8.00 Ft	18100	66500	120	429370	13600	50.0U	154000	-10.6	0.43
OL-VC-40084	0.50-1.00 Ft	14100	43700	78.0	373370	8510	12.4J	119000	-6.2	0.37
OL-VC-40084	1.00-1.50 Ft	14300	44400	74.2	393370	8970	9.4J	118000	-5.6	0.38
OL-VC-40084	1.50-2.00 Ft	13600	43300	69.8	379370	8340	7.4J	121000	-7.2	0.36
OL-VC-40084	2.00-2.50 Ft	14400	44500	70.9	368370	8950	6.2J	118000	-5.6	0.38
OL-VC-40084	2.50-3.00 Ft	12800	42000	55.4	322370	8120	6.1J	118000	-8.2	0.36
OL-VC-40084	3.50-4.00 Ft	13500	42200	54.3	350370	8570	50.0U	123000	-5.8	0.34
OL-VC-40084	4.50-5.00 Ft	13200	46600	54.0	336370	8600	50.0U	121000	-11.4	0.39
OL-VC-40084	6.00-6.50 Ft	14900	52900	77.1	365370	11500	4.4J	135000	-8.5	0.39
OL-VC-40084	7.50-8.00 Ft	19600	51000	118	376370	14900	50.0U	159000	6.7	0.32
OL-VC-40085	0.50-1.00 Ft	4230	34700	199	141370	15000	53.3	96800	-5.2	0.36
OL-VC-40085	1.00-1.50 Ft	4620	40700	203	176370	17000	46.2J	112000	-7.4	0.36
OL-VC-40085	1.50-2.00 Ft	4850	45200	222J	121370	18500	44.5J	122000	-8.9	0.37
OL-VC-40085	2.00-2.50 Ft	5720	52000	222	264370	21300	43.2J	136000	-8.5	0.38
OL-VC-40085	2.50-3.00 Ft	5820	52400	223	268370	21300	41.2J	140000	-8.7	0.37
OL-VC-40085	3.50-4.00 Ft	8010	58300	201	291370	22200	23.4J	148000	-8.4	0.39
OL-VC-40085	4.50-5.00 Ft	9000	59300	201	326370	22300	21.1J	150000	-7.3	0.40
OL-VC-40085	6.00-6.50 Ft	9920	63400	187	348370	22000	18.5J	154000	-9.6	0.41
OL-VC-40085	7.50-8.00 Ft	10200	58700	177	332370	20100	25.5J	153000	-8.2	0.38
OL-VC-40087	0.50-1.00 Ft	15900	45400	12.8J	371370	8560	8.3J	123000	-4.2	0.37
OL-VC-40087	1.00-1.50 Ft	16500	45900	12.4J	375370	8760	5.2J	128000	-3.2	0.36
OL-VC-40087	1.50-2.00 Ft	15200	45800	11.9J	370370	8070	50.0U	130000	-7.2	0.35
OL-VC-40087	2.00-2.50 Ft	15100	46400	11.2J	347370	8070	50.0U	132000	-8.1	0.35
OL-VC-40087	2.50-3.00 Ft	15300	46200	12.3J	381370	8550	50.0U	128000	-6.4	0.36
OL-VC-40087	3.50-4.00 Ft	15700	45500	12.2J	374370	8480	50.0U	128000	-5.0	0.36
OL-VC-40087	4.50-5.00 Ft	14200	46000	11.4J	347370	7670	2.9J	127000	-10.4	0.36
OL-VC-40087	6.00-6.50 Ft	14200	457000	11.2J	342370	7660	50.0U	126000	-84.9	3.63
OL-VC-40087	7.50-8.00 Ft	15600	45000	11.8J	352370	8440	50.0U	126000	-4.7	0.36
OL-VC-40088	0.50-1.00 Ft	15300	43600	14.3J	373370	8350	11.4J	122000	-3.9	0.36
OL-VC-40088	1.00-1.50 Ft	14800	44900	13.5J	386370	7970	7.5J	126000	-7.2	0.36
OL-VC-40088	1.50-2.00 Ft	13500	44500	12.2J	341370	7300	4.8J	130000	-11.3	0.34
OL-VC-40088	2.00-2.50 Ft	13300	45100	10.8J	313370	7290	50.0U	126000	-12.5	0.36
OL-VC-40088	2.50-3.00 Ft	13300	46400	11.0J	320370	7300	50.0U	126000	-13.9	0.37
OL-VC-40088	3.50-4.00 Ft	14800	44900	11.4J	346370	8160	50.0U	126000	-6.9	0.36
OL-VC-40088	4.50-5.00 Ft	15400	45200	11.3J	361370	8570	50.0U	125000	-5.1	0.36
OL-VC-40088	6.00-6.50 Ft	14600	45000	11.0J	335370	7890	50.0U	126000	-8.0	0.36
OL-VC-40088	7.50-8.00 Ft	12300	43800	10.4J	321370	6640	5.8J	127000	-15.1	0.34
OL-VC-40089	0.50-1.00 Ft	16300	45400	13.9J	383370	8900	8.0J	120000	-2.8	0.38
OL-VC-40089	1.00-1.50 Ft	15600	46700	13.5J	382370	8500	7.3J	126000	-6.4	0.37
OL-VC-40089	1.50-2.00 Ft	15900	48100	12.8J	373370	8800	6.7J	126000	-6.7	0.38
OL-VC-40089	2.00-2.50 Ft	16500	46100	12.3J	377370	9190	4.7J	126000	-2.6	0.37
OL-VC-40089	2.50-3.00 Ft	14200	46500	11.9J	388370	8450	4.5J	126000	-9.4	0.37
OL-VC-40089	3.50-4.00 Ft	15600	46000	11.9J	373370	8540	50.0U	127000	-5.6	0.36
OL-VC-40089	4.50-5.00 Ft	14400	47100	11.8J	402370	7840	50.0U	128000	-10.8	0.37
OL-VC-40089	6.00-6.50 Ft	15200	54900	11.4J	384370	8380	50.0U	127000	-15.5	0.43
OL-VC-40089	7.50-8.00 Ft	15300	60400	11.8J	373370	8580	3.4J	126000	-19.5	0.48

Table V-1

General Chemistry Data from Vibracore and Cation-Anion Balance

Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-VC-40091	0.50-1.00 Ft	6340	35300	105	113370	9950	16.6J	82100	-13.4	0.43
OL-VC-40091	1.00-1.50 Ft	7250	42300	124	155370	11700	10.5J	96200	-14.8	0.44
OL-VC-40091	1.50-2.00 Ft	8580	45700	130	184370	14100	9.1J	110000	-9.9	0.42
OL-VC-40091	2.00-2.50 Ft	9530	46300	133	219370	15700	50.0U	122000	-5.3	0.38
OL-VC-40091	2.50-3.00 Ft	9790	50200	134	237370	15900	6.1J	128000	-8.4	0.39
OL-VC-40091	3.50-4.00 Ft	10300	52600	131	274370	16900	50.0U	136000	-7.9	0.39
OL-VC-40091	4.50-5.00 Ft	10300	56900	141	293370	17500	50.0U	144000	-10.7	0.40
OL-VC-40091	6.00-6.50 Ft	10000	56000	151	275370	19300	50.0U	144000	-7.6	0.39
OL-VC-40091	7.50-8.00 Ft	7460	53900	184	276370	19400	1.8J	136000	-10.2	0.40
OL-VC-40092	0.50-1.00 Ft	6230	30600	115	117370	10600	15.1J	83600	-4.8	0.37
OL-VC-40092	1.00-1.50 Ft	6740	38200	131	171370	12900	50.0U	10500	-8.3	3.64
OL-VC-40092	1.50-2.00 Ft	8120	43200	138	204370	15400	7.3J	118000	-5.5	0.37
OL-VC-40092	2.00-2.50 Ft	8990	44600	145	238370	17400	50.0U	128000	-1.4	0.35
OL-VC-40092	2.50-3.00 Ft	9430	44000	147	242370	17300	50.0U	130000	0.0	0.34
OL-VC-40092	3.50-4.00 Ft	10000	50900	154	259370	18900	3.3J	128000	-3.4	0.40
OL-VC-40092	4.50-5.00 Ft	9400	54300	162	276370	19100	3.6J	141000	-7.4	0.39
OL-VC-40092	6.00-6.50 Ft	10800	54800	146	282370	19900	50.0U	146000	-4.1	0.38
OL-VC-40092	7.50-8.00 Ft	9890	57500	147	272370	19300	5.4J	148000	-9.1	0.39
OL-VC-40093	0.50-1.00 Ft	6890	41100	153	166370	14700	14.3J	108000	-7.4	0.38
OL-VC-40093	1.00-1.50 Ft	7470	40900	164	202370	16600	7.5J	122000	-1.8	0.34
OL-VC-40093	1.50-2.00 Ft	8090	44700	167	224370	18000	6.6J	127000	-2.2	0.35
OL-VC-40093	2.00-2.50 Ft	8220	54100	172	253370	19200	4.4J	140000	-9.3	0.39
OL-VC-40093	2.50-3.00 Ft	8500	49700	181	267370	19700	3.8J	137000	-3.7	0.36
OL-VC-40093	3.50-4.00 Ft	8050	50400	179	278370	20100	4.5J	138000	-4.6	0.37
OL-VC-40093	4.50-5.00 Ft	7850	54400	190	289370	20900	50.0U	144000	-7.4	0.38
OL-VC-40093	6.00-6.50 Ft	7810	53200	197	289370	22000	50.0U	146000	-4.6	0.36
OL-VC-40093	7.50-8.00 Ft	7820	54600	193	295370	21700	50.0U	147000	-6.3	0.37
OL-VC-40126	0.50-1.00 Ft	4060	37100	109	73.5J	9280	500U	91400	-26.3	0.41
OL-VC-40126	1.00-1.50 Ft	4900	42800	128	105370	11900	500U	112000	-22.2	0.38
OL-VC-40126	1.50-2.00 Ft	5950	48900	155	149370	15700	500U	121000	-16.5	0.40
OL-VC-40126	2.00-2.50 Ft	5910	52500	153	155370	16200	500U	130000	-18.9	0.40
OL-VC-40126	2.50-3.00 Ft	7410	58000	186	202370	19900	500U	134000	-13.5	0.43
OL-VC-40126	3.50-4.00 Ft	6760	54000	182	204370	19600	500U	140000	-11.8	0.39
OL-VC-40126	4.50-5.00 Ft	4870	50500	153	153370	16400	500U	142000	-19.2	0.36
OL-VC-40126	6.00-6.50 Ft	5420	56600	200	203370	21000	500U	146000	-14.3	0.39
OL-VC-40126	7.50-8.00 Ft	5360	57800	225	225370	23300	500U	146000	-11.4	0.40
OL-VC-40127	0.50-1.00 Ft	4820	41000	126	103370	11900	500U	106000	-20.4	0.39
OL-VC-40127	1.00-1.50 Ft	5440	57400	141	135370	14400	500U	122000	-28.2	0.47
OL-VC-40127	1.50-2.00 Ft	6610	49900	163	173370	16900	500U	129000	-13.4	0.39
OL-VC-40127	2.00-2.50 Ft	6450	53100	162	184370	17600	500U	140000	-15.4	0.38
OL-VC-40127	2.50-3.00 Ft	6940	56400	174	202370	19500	500U	141000	-13.8	0.40
OL-VC-40127	3.50-4.00 Ft	6310	53800	171	192370	18600	500U	142000	-14.4	0.38
OL-VC-40127	4.50-5.00 Ft	6990	56700	206	234370	22300	500U	144000	-9.1	0.39
OL-VC-40127	6.00-6.50 Ft	4520	53900	159	160370	17200	500U	145000	-21.4	0.37
OL-VC-40127	7.50-8.00 Ft	4890	51800	200	199370	20900	500U	145000	-11.2	0.36
OL-VC-40128	0.50-1.00 Ft	4680	39500	126	103370	11600	500U	102000	-19.9	0.39
OL-VC-40128	1.00-1.50 Ft	6400	52400	162	161370	16400	500U	121000	-17.3	0.43
OL-VC-40128	1.50-2.00 Ft	6290	52600	158	172370	16500	500U	128000	-17.5	0.41
OL-VC-40128	2.00-2.50 Ft	5700	54900	148	166370	16400	500U	137000	-21.2	0.40
OL-VC-40128	2.50-3.00 Ft	6430	82900	164	188370	17800	500U	140000	-35.7	0.59
OL-VC-40128	3.50-4.00 Ft	6210	58400	171	193370	18300	500U	142000	-19.1	0.41
OL-VC-40128	4.50-5.00 Ft	5560	60600	161	178370	17900	500U	144000	-23.1	0.42
OL-VC-40128	6.00-6.50 Ft	5880	58400	189	210370	20400	500U	143000	-15.9	0.41
OL-VC-40128	7.50-8.00 Ft	6320	60300	215	230370	22700	500U	144000	-12.7	0.42
OL-VC-40129	0.50-1.00 Ft	17300	59700	187	295370	12400	500U	147000	-8.6	0.41
OL-VC-40129	1.00-1.50 Ft	18800	63900	208	338370	13400	500U	154000	-7.9	0.41
OL-VC-40129	1.50-2.00 Ft	16800	78300	199	293370	12000	500U	156000	-23.2	0.50
OL-VC-40129	2.00-2.50 Ft	21800	70900	266	418370	16000	500U	164000	-5.1	0.43
OL-VC-40129	2.50-3.00 Ft	3590	70400	250	378370	2590	500U	166000	-72.2	0.42
OL-VC-40129	3.00-3.50 Ft	17800	69600	222	337370	13100	500U	168000	-14.1	0.41
OL-VC-40129	3.50-4.00 Ft	16500	72500	215	309370	12300	500U	169000	-19.5	0.43
OL-VC-40129	4.50-5.00 Ft	23100	71500	301	433370	17300	500U	172000	-2.2	0.42
OL-VC-40129	6.00-6.50 Ft	21700	77300	298	427370	16500	500U	172000	-8.8	0.45
OL-VC-40129	7.50-8.00 Ft	21600	75200	295	405370	16600	500U	172000	-7.5	0.44
OL-VC-40130	0.50-1.00 Ft	18100	63500	183	330370	13700	500U	154000	-8.4	0.41
OL-VC-40130	1.00-1.50 Ft	19100	61100	184	344370	13500	500U	148000	-5.1	0.41
OL-VC-40130	1.50-2.00 Ft	17300	54300	160	286370	12700	500U	135000	-3.6	0.40
OL-VC-40130	2.00-2.50 Ft	17700	68200	197	316370	13600	500U	165000	-12.7	0.41
OL-VC-40130	2.50-3.00 Ft	21200	69800	243	403370	15300	500U	166000	-6.0	0.42

Table V-1

General Chemistry Data from Vibracore and Cation-Anion Balance

Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-VC-40130	3.00-3.50 Ft	20000	129000	238	372370	14800	500U	168000	-37.2	0.77
OL-VC-40130	3.50-4.00 Ft	19900	71700	250	392370	14700	500U	169000	-10.0	0.42
OL-VC-40130	4.50-5.00 Ft	18000	80200	233	320370	13000	500U	170000	-20.8	0.47
OL-VC-40130	6.00-6.50 Ft	19300	74300	263	344370	14300	500U	175000	-13.2	0.42
OL-VC-40130	7.50-8.00 Ft	19700	73200	273	384370	15300	500U	176000	-10.5	0.42
OL-VC-40131	0.50-1.00 Ft	14500	63500	151	214370	10100	500U	144000	-20.8	0.44
OL-VC-40131	1.00-1.50 Ft	15400	65700	168	239370	10900	500U	152000	-19.2	0.43
OL-VC-40131	1.50-2.00 Ft	14200	66400	161	222370	10200	500U	156000	-23.3	0.43
OL-VC-40131	2.00-2.50 Ft	17600	66600	210	302370	13000	500U	166000	-12.5	0.40
OL-VC-40131	2.50-3.00 Ft	20900	68100	247	378370	15200	500U	167000	-5.4	0.41
OL-VC-40131	3.00-3.50 Ft	19800	68100	239	346370	14700	500U	170000	-7.7	0.40
OL-VC-40131	3.50-4.00 Ft	22800	72600	281	421370	17000	500U	170000	-3.7	0.43
OL-VC-40131	4.50-5.00 Ft	18000	82400	235	315370	13800	500U	174000	-20.9	0.47
OL-VC-40131	6.00-6.50 Ft	19500	76000	254	351370	15700	500U	175000	-12.2	0.43
OL-VC-40131	7.50-8.00 Ft	19800	76300	246	334370	16800	500U	174000	-10.6	0.44
OL-VC-40149	0.00-0.30 Ft		659					6090		0.11
OL-VC-40149	0.30-0.50 Ft		644					4740		0.14
OL-VC-40149	0.50-0.80 Ft		653					4100		0.16
OL-VC-40149	0.80-1.00 Ft		653					4010		0.16
OL-VC-40149	1.00-1.30 Ft		2500					13700		0.18
OL-VC-40149	1.30-1.50 Ft		3080					16700		0.18
OL-VC-40149	1.50-1.80 Ft		3630					19600		0.19
OL-VC-40149	2.00-2.50 Ft	45.4B	4090	796	24.4B	1990	187	24800	13.0	0.16
OL-VC-40149	3.00-3.50 Ft	63.8	5470	863	30.7B	3120	167	34000	14.4	0.16
OL-VC-40149	4.00-4.50 Ft	219	7570	705	36.2B	4310	330	41700	7.7	0.18
OL-VC-40149	5.00-5.50 Ft	369	9520	528	37.6B	5510	376	50400	4.5	0.19
OL-VC-40149	6.00-6.50 Ft	391	11400	337	31.7B	5340	329	61000	-7.9	0.19
OL-VC-40151	0.00-0.30 Ft		541					3340		0.16
OL-VC-40151	0.30-0.50 Ft		641					3950		0.16
OL-VC-40151	0.50-0.80 Ft		934					5520		0.17
OL-VC-40151	0.80-1.00 Ft		1120					6660		0.17
OL-VC-40151	1.00-1.30 Ft		1700					10000		0.17
OL-VC-40151	1.30-1.50 Ft		1760					10200		0.17
OL-VC-40151	1.50-1.80 Ft		1800					10200		0.18
OL-VC-40151	2.00-2.50 Ft	153	1870	604	27.0B	773	232	12200	22.8	0.15
OL-VC-40151	3.00-3.50 Ft	96.7J	2170	328	15.3B	450	169	11600	-11.1	0.19
OL-VC-40151	4.00-4.50 Ft	171	2600	735	35.8B	1030	203	15300	19.3	0.17
OL-VC-40151	5.00-5.50 Ft	93.3J	2970	596	27.1B	850	216	17800	1.7	0.17
OL-VC-40151	6.00-6.50 Ft	68.8J	3450	944	40.8B	1430	155	25100	17.9	0.14
OL-VC-40151	7.50-8.00 Ft	44.1BJ	4260	1410	60.4	2500	155	26100	29.9	0.16
OL-VC-40151	9.00-9.50 Ft	19.5BJ	5560	881	37.2B	2170	202	32500	2.4	0.17
OL-VC-40154	0.00-0.30 Ft		527					3140		0.17
OL-VC-40154	0.30-0.50 Ft		546					3130		0.17
OL-VC-40154	0.50-0.80 Ft		567					3520		0.16
OL-VC-40154	0.80-1.00 Ft		687					3860		0.18
OL-VC-40154	1.00-1.30 Ft		2170					9940		0.22
OL-VC-40154	1.30-1.50 Ft		2480					10600		0.23
OL-VC-40154	1.50-1.80 Ft		2870					12700		0.23
OL-VC-40154	2.00-2.50 Ft	359	4270	459	17.4B	1300	487	18800	-7.4	0.23
OL-VC-40154	3.00-3.50 Ft	410	5570	550	20.8B	1900	583	20600	-6.4	0.27
OL-VC-40154	4.00-4.50 Ft	480	7270	531	23.9B	2860	400	33300	-5.1	0.22
OL-VC-40154	5.00-5.50 Ft	661	9300	470	26.6B	3990	428	33500	-4.9	0.28
OL-VC-40154	6.00-6.50 Ft	829	11000	300	25.0B	4530	601	34100	-10.1	0.32
OL-VC-40154	7.50-8.00 Ft	694	13700	138	20.2B	4600	680	44900	-23.8	0.31
OL-VC-40154	9.00-9.50 Ft	667	18000	107	22.2B	6010	786	66700	-26.6	0.27
OL-VC-40157	0.00-0.30 Ft		1970					6880		0.29
OL-VC-40157	0.30-0.50 Ft		2330					8410		0.28
OL-VC-40157	0.50-0.80 Ft		3320					10400		0.32
OL-VC-40157	0.80-1.00 Ft		2760					8980		0.31
OL-VC-40157	1.00-1.30 Ft		3230					11000		0.29
OL-VC-40157	1.30-1.50 Ft		3580					11400		0.31
OL-VC-40157	1.50-1.80 Ft		3850					11700		0.33
OL-VC-40157	2.00-2.50 Ft	25.4B	4960	528	37.5B	1350	99.2	17900	-15.3	0.28
OL-VC-40157	3.00-3.50 Ft	30.1B	6050	650	40.2B	1830	245	20600	-12.9	0.29
OL-VC-40157	4.00-4.50 Ft	40.4B	7110	786	46.2B	2520	260	23100	-7.4	0.31
OL-VC-40157	5.00-5.50 Ft	125	8670	827	41.5B	3030	1020	33200	-12.4	0.26
OL-VC-40157	6.00-6.50 Ft	114	10900	726	39.2B	3990	428	38800	-13.7	0.28
OL-VC-40157	7.50-8.00 Ft	254	13400	689	45.0B	5550	456	39800	-10.8	0.34
OL-VC-40157	9.00-9.50 Ft	424	18500	424	45.0B	7190	540	64500	-18.1	0.29

Table V-1

General Chemistry Data from Vibracore and Cation-Anion Balance

Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-VC-40165	0.00-0.30 Ft		3500					14500		0.24
OL-VC-40165	0.30-0.50 Ft		5560					20500		0.27
OL-VC-40165	0.50-0.80 Ft		8340					30800		0.27
OL-VC-40165	0.80-1.00 Ft		10900					35000		0.31
OL-VC-40165	1.00-1.30 Ft		14700					45100		0.33
OL-VC-40165	1.30-1.50 Ft		14500					47200		0.31
OL-VC-40165	1.50-1.80 Ft		15500					47100		0.33
OL-VC-40165	2.00-2.50 Ft	920	20100	180	77.3	11500	2420	97500	-4.6	0.21
OL-VC-40165	3.00-3.50 Ft	1100	24700	204	100	14100	2260	107000	-3.9	0.23
OL-VC-40165	4.00-4.50 Ft	1310	30200	248	134	17700	2340	135000	-2.4	0.22
OL-VC-40165	5.00-5.50 Ft	1440	32400	280	167	19900	2370	140000	0.1	0.23
OL-VC-40165	6.00-6.50 Ft	1290	35500	247	156	19000	2500	151000	-7.0	0.24
OL-VC-40165	7.50-8.00 Ft	1530	38700	294	201	22400	2540	161000	-2.9	0.24
OL-VC-40165	9.00-9.50 Ft	1180	40800	228	154	18000	2550	167000	-16.4	0.24
OL-VC-40168	0.00-0.30 Ft		840					4380		0.19
OL-VC-40168	0.30-0.50 Ft		1190					5100		0.23
OL-VC-40168	0.50-0.80 Ft		1910					7090		0.27
OL-VC-40168	0.80-1.00 Ft		3080					9540		0.32
OL-VC-40168	1.00-1.30 Ft		3310					13900		0.24
OL-VC-40168	1.30-1.50 Ft		3330					13600		0.24
OL-VC-40168	1.50-1.80 Ft		3390					13800		0.25
OL-VC-40168	2.00-2.50 Ft	640	3950	46.7B	97.0	904	26.4B	13300	-18.1	0.30
OL-VC-40168	3.00-3.50 Ft	906	4130	11.0B	99.4	900	34.9B	14600	-14.3	0.28
OL-VC-40168	4.00-4.50 Ft	1040	4240	1.3B	95.6	852	72.7	15400	-13.9	0.28
OL-VC-40168	5.00-5.40 Ft	1150	4380	1.2B	110	928	100	15600	-11.0	0.28
OL-VC-40172	0.00-0.30 Ft		1410					6300		0.22
OL-VC-40172	0.30-0.50 Ft		1430					6010		0.24
OL-VC-40172	0.50-0.80 Ft		1840					7440		0.25
OL-VC-40172	0.80-1.00 Ft		2660					8950		0.30
OL-VC-40172	1.00-1.30 Ft		2590					9720		0.27
OL-VC-40172	1.30-1.50 Ft		2960					10400		0.28
OL-VC-40172	1.50-1.80 Ft		3150					11300		0.28
OL-VC-40172	2.00-2.50 Ft	1280	3720	66.1	13.4B	1830	2480	20700	-2.4	0.18
OL-VC-40172	3.00-3.50 Ft	473	5260	32.0B	8.9B	1210	1310	22400	-37.9	0.23
OL-VC-40172	4.00-4.50 Ft	537	6880	52.0	14.7B	2350	494	26100	-20.9	0.26
OL-VC-40172	5.00-5.50 Ft	455	8180	50.0	13.3B	2380	269	31700	-28.8	0.26
OL-VC-40172	6.00-6.50 Ft	570	9980	69.1	19.1B	3540	443	32800	-21.3	0.30
OL-VC-40172	7.50-8.00 Ft	539	12000	72.1	20.3B	4020	112	38100	-24.2	0.31
OL-VC-40179	0.00-0.30 Ft		1160					7090		0.16
OL-VC-40179	0.30-0.50 Ft		1480					7880		0.19
OL-VC-40179	0.50-0.80 Ft		2250					10800		0.21
OL-VC-40179	0.80-1.00 Ft		2490					13200		0.19
OL-VC-40179	1.00-1.30 Ft		5340					23900		0.22
OL-VC-40179	1.30-1.50 Ft		5780					25000		0.23
OL-VC-40179	1.50-1.80 Ft		6030					26200		0.23
OL-VC-40179	2.00-2.50 Ft	618	8360	435	34.3B	2070	117	26500	-20.4	0.32
OL-VC-40179	3.00-3.50 Ft	1310	9600	535	62.9	3840	111	32700	0.9	0.29
OL-VC-40179	4.00-4.50 Ft	1350	12300	232	49.3B	3450	101	44800	-19.0	0.27
OL-VC-40179	5.00-5.50 Ft	1800	15200	108	61.2	4460	84.9	60800	-18.8	0.25
OL-VC-40179	6.00-6.50 Ft	2380	17800	33.4B	90.1	6380	120	71200	-11.4	0.25
OL-VC-40179	7.50-8.00 Ft	3470	22100	0.3B	125	9760	51.4	90300	-1.9	0.24
OL-VC-40184	0.00-0.30 Ft		19500					70600		0.28
OL-VC-40184	0.30-0.50 Ft		19100					67900		0.28
OL-VC-40184	0.50-0.80 Ft		18400					65400		0.28
OL-VC-40184	0.80-1.00 Ft		18000					64400		0.28
OL-VC-40184	1.00-1.30 Ft		7850					32500		0.24
OL-VC-40184	1.30-1.50 Ft		10600					42100		0.25
OL-VC-40184	1.50-1.80 Ft		16100					59200		0.27
OL-VC-40184	2.00-2.50 Ft	1660	42400	289	171	21900	1090	196000	-6.8	0.22
OL-VC-40184	3.00-3.50 Ft	1150	40900	316	192	24400	1130	181000	-1.2	0.23
OL-VC-40184	4.00-4.50 Ft	1100	46000	319	198	25100	1100	183000	-5.7	0.25
OL-VC-40184	5.00-5.50 Ft	914	45900	269	161	21700	1100	183000	-12.9	0.25
OL-VC-40238	0.00-0.25 Ft		2450					9090		0.27
OL-VC-40238	0.25-0.50 Ft		4900					16200		0.30
OL-VC-40238	0.50-0.75 Ft		8310					24600		0.34
OL-VC-40238	0.75-1.00 Ft		12100					34700		0.35
OL-VC-40238	1.00-1.25 Ft		15600					42600		0.37
OL-VC-40238	1.25-1.50 Ft		18300					48400		0.38
OL-VC-40238	1.50-1.75 Ft		22100					52400		0.42

Table V-1

General Chemistry Data from Vibracore and Cation-Anion Balance

Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-VC-40238	2.00-2.50 Ft	1040	22800J	178	117	15000	2470	61800	1.9	0.37
OL-VC-40238	3.00-3.50 Ft	1260	30100J	209	144	18800	2950	77300	-0.5	0.39
OL-VC-40238	4.00-4.50 Ft	1460	36600J	251	171	22800	3200	91800	-0.4	0.40
OL-VC-40238	5.00-5.50 Ft	1540	38300J	262	181	23200	3190	96600	-1.5	0.40
OL-VC-40238	6.00-6.50 Ft	1550	38200J	258	187	23500	3110	99700	-0.7	0.38
OL-VC-40238	7.50-8.00 Ft	1580	40400J	257J	195	24200	3190	97000	-2.0	0.42
OL-VC-40238	9.00-9.50 Ft	1520	39200J	247	190	24000	3090	96700	-1.1	0.41
OL-VC-40239	0.00-0.25 Ft		2160					7680		0.28
OL-VC-40239	0.25-0.50 Ft		3450					11200		0.31
OL-VC-40239	0.50-0.75 Ft		5780					16800		0.34
OL-VC-40239	0.75-1.00 Ft		7880					22600		0.35
OL-VC-40239	1.00-1.25 Ft		9970					30100		0.33
OL-VC-40239	1.25-1.50 Ft		11700					34900		0.34
OL-VC-40239	1.50-1.75 Ft		12700					35200		0.36
OL-VC-40239	2.00-2.50 Ft	695	17700J	160	60.2	9600	1230	50000	-5.8	0.35
OL-VC-40239	3.00-3.50 Ft	841	23800J	203	80.6	12400	1620	63700	-8.0	0.37
OL-VC-40239	4.00-4.50 Ft	910	27800J	239	93.6	14000	1820	75200	-9.7	0.37
OL-VC-40239	5.00-5.50 Ft	915	31200J	245	104	14700	1970	81100	-13.1	0.38
OL-VC-40239	6.00-6.50 Ft	966	34100J	278	123	17900	2010	86400	-8.1	0.39
OL-VC-40239	7.50-8.00 Ft	1010	37700J	291	134	19000	2090	96600	-10.1	0.39
OL-VC-40239	9.00-9.50 Ft	1080	40600J	321	150	22900	2160	99700	-4.8	0.41
OL-VC-40240	0.00-0.25 Ft		1620					5660		0.29
OL-VC-40240	0.25-0.50 Ft		1950					6140		0.32
OL-VC-40240	0.50-0.75 Ft		2080					6600		0.32
OL-VC-40240	0.75-1.00 Ft		2190					7010		0.31
OL-VC-40240	1.00-1.25 Ft		2690					7950		0.34
OL-VC-40240	1.25-1.50 Ft		2900					8850		0.33
OL-VC-40240	1.50-1.75 Ft		3270					9810		0.33
OL-VC-40240	2.00-2.50 Ft	105	3870J	236	33.7	1820	61.3	12600	-2.7	0.31
OL-VC-40240	3.00-3.50 Ft	184	5660J	223	36.2	2410	131	16600	-9.8	0.34
OL-VC-40240	4.00-4.50 Ft	205	7190J	192	55.3	4340	59.3	21100	2.9	0.34
OL-VC-40240	5.00-5.50 Ft	277	9220J	152	57.8	5630	92.8	26400	2.0	0.35
OL-VC-40240	6.00-6.50 Ft	307	10900J	124	59.7	6410	168	30600	-0.8	0.36
OL-VC-40240	7.50-8.00 Ft	368	13600J	125	66.1	7370	334	38500	-5.3	0.35
OL-VC-40240	9.00-9.50 Ft	411	16800J	137J	73.9	9600	480	45600	-3.5	0.37
OL-VC-40241	0.00-0.25 Ft		854					3250		0.26
OL-VC-40241	0.25-0.50 Ft		1320					4520		0.29
OL-VC-40241	0.50-0.75 Ft		1650					5210		0.32
OL-VC-40241	0.75-1.00 Ft		1860					5800		0.32
OL-VC-40241	1.00-1.25 Ft		2260					6890		0.33
OL-VC-40241	1.25-1.50 Ft		2740					7800		0.35
OL-VC-40241	1.50-1.75 Ft		2780					8230		0.34
OL-VC-40241	2.00-2.50 Ft	608	3300J	255	66.6	717	30.0	10200	-5.3	0.32
OL-VC-40241	3.00-3.50 Ft	570	3790J	242	83.8	854	28.9	11300	-10.2	0.34
OL-VC-40241	4.00-4.50 Ft	781	3920J	187	111	1010	98.5	12400	-5.4	0.32
OL-VC-40241	5.00-5.50 Ft	966	4470J	104	122	1110	75.0	13600	-8.3	0.33
OL-VC-40241	6.00-6.50 Ft	992	4740J	58.0	125	1130	18.7	14300	-11.4	0.33
OL-VC-40241	7.50-8.00 Ft	1120	5160J	38.3	146	1660	19.7	15200	-3.9	0.34
OL-VC-40241	8.00-8.50 Ft	1190	5680J	31.0	153	1800	8.0U	16000	-5.3	0.36
OL-VC-40242	0.00-0.25 Ft		2360					7590		0.31
OL-VC-40242	0.25-0.50 Ft		3050					9350		0.33
OL-VC-40242	0.50-0.75 Ft		3530					10600		0.33
OL-VC-40242	0.75-1.00 Ft		4000					12200		0.33
OL-VC-40242	1.00-1.25 Ft		4750					14100		0.34
OL-VC-40242	1.25-1.50 Ft		5310					15500		0.34
OL-VC-40242	1.50-1.75 Ft		5860					16900		0.35
OL-VC-40242	2.00-2.50 Ft	349	6930J	83.2	22.3	4420	452U	19900	2.9	0.35
OL-VC-40242	3.00-3.50 Ft	392	8470J	92.8	25.8	5430	542	24900	2.7	0.34
OL-VC-40242	4.00-4.50 Ft	358	9980J	83.3	23.8	5590	663J	29100	-4.8	0.34
OL-VC-40242	5.00-5.50 Ft	406	11700J	104J	29.4	6720	685J	32300	-3.4	0.36
OL-VC-40242	6.00-6.50 Ft	434	12800J	119	35.0	8240	726J	35600	1.9	0.36
OL-VC-40242	7.50-8.00 Ft	511	14300J	166	46.0	9360	745J	41600	3.3	0.34
OL-VC-40242	9.00-9.50 Ft	433	18500J	133	37.4	7550	894J	47900	-19.8	0.39
OL-VC-40243	0.00-0.25 Ft		664					3160		0.21
OL-VC-40243	0.25-0.50 Ft		665					2980		0.22
OL-VC-40243	0.50-0.75 Ft		1050					4000		0.26
OL-VC-40243	0.75-1.00 Ft		1350					5490		0.25
OL-VC-40243	1.00-1.25 Ft		3020					9120		0.33
OL-VC-40243	1.25-1.50 Ft		3500					10400		0.34

Table V-1

General Chemistry Data from Vibracore and Cation-Anion Balance

Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-VC-40243	1.50-1.75 Ft		4490					12800		0.35
OL-VC-40243	2.00-2.50 Ft	377	5750J	477J	26.2	2050	73.5	19300	-5.1	0.30
OL-VC-40243	3.00-3.50 Ft	1140	8680J	550J	37.9	3660	104U	26500	3.0	0.33
OL-VC-40243	4.00-4.50 Ft	999	9790J	575J	41.8	5080	20.0U	29700	7.2	0.33
OL-VC-40243	5.00-5.50 Ft	1510	11400J	441J	43.3	4940	29.0	33800	0.8	0.34
OL-VC-40243	6.00-6.50 Ft	2040	14300J	365J	41.6	6750	126U	40400	2.5	0.35
OL-VC-40243	7.50-8.00 Ft	4070	16100J	348J	49.4	8200	232J	46900	12.5	0.34
OL-VC-40243	9.00-9.50 Ft	5210	17100J	336J	54.0	9780	312J	52900	18.7	0.32
OL-VC-40244	0.00-0.25 Ft		38700					87000		0.44
OL-VC-40244	0.25-0.50 Ft		51500					109000		0.47
OL-VC-40244	0.50-0.75 Ft		56000					117000		0.48
OL-VC-40244	0.75-1.00 Ft		56800					120000		0.47
OL-VC-40244	1.00-1.25 Ft		57600					120000		0.48
OL-VC-40244	1.25-1.50 Ft		57100					119000		0.48
OL-VC-40244	1.50-1.75 Ft		57100					120000		0.48
OL-VC-40244	2.00-2.50 Ft	25100	62100J	41.5	318	12100	60.0U	120000	1.1	0.52
OL-VC-40244	3.00-3.50 Ft	24000	62200J	38.3	328	12600	60.0U	121000	0.0	0.51
OL-VC-40244	4.00-4.50 Ft	23100	60900J	35.0	330J	11700	60.0U	120000	-1.4	0.51
OL-VC-40244	5.00-5.50 Ft	22600	61200J	34.7	331J	11800	60.0U	119000	-2.2	0.51
OL-VC-40244	6.00-6.50 Ft	24600	61100J	35.2	349J	12200	60.0U	118000	1.3	0.52
OL-VC-40244	7.50-8.00 Ft	20400	53800J	34.2	316J	10900	60.0U	101000	-0.5	0.53
OL-VC-40244	9.00-9.50 Ft	20800	54600J	35.2	327J	11300	70.0U	116000	0.0	0.47
OL-VC-40245	0.00-0.25 Ft		711					3030		0.23
OL-VC-40245	0.25-0.50 Ft		1060					3970		0.27
OL-VC-40245	0.50-0.75 Ft		1580					5250		0.30
OL-VC-40245	0.75-1.00 Ft		1880					6110		0.31
OL-VC-40245	1.00-1.25 Ft		2210					6980		0.32
OL-VC-40245	1.25-1.50 Ft		2520					7790		0.32
OL-VC-40245	1.50-1.75 Ft		2690					8480		0.32
OL-VC-40245	2.00-2.50 Ft	719	3140J	169	128J	1030	6.0U	9670	4.9	0.32
OL-VC-40245	3.00-3.50 Ft	802	3310J	87.2	155J	1100	8.0U	10100	2.8	0.33
OL-VC-40245	4.00-4.50 Ft	737	3340J	44.8	149J	1010	8.0U	10800	-3.4	0.31
OL-VC-40245	5.00-5.50 Ft	460	3430J	6.9	95.1	575	14.2	11300	-31.1	0.30
OL-VC-40245	6.00-6.50 Ft	703	3840J	2.4J	100J	661	99.2	12300	-24.7	0.31
OL-VC-40245	7.50-8.00 Ft	1080	3870J	2.1J	152J	875	86.3	12200	-7.2	0.32
OL-VC-40245	9.00-9.50 Ft	1030	4250J	13.8J	131J	780	91.1	13100	-15.1	0.32
OL-VC-40246	0.00-0.25 Ft		1090					3990		0.27
OL-VC-40246	0.25-0.50 Ft		1330					4780		0.28
OL-VC-40246	0.50-0.75 Ft		1530					5460		0.28
OL-VC-40246	0.75-1.00 Ft		1920					6240		0.31
OL-VC-40246	1.00-1.25 Ft		2020					7200		0.28
OL-VC-40246	1.25-1.50 Ft		2380					7400		0.32
OL-VC-40246	1.50-1.75 Ft		2710					8140		0.33
OL-VC-40246	2.00-2.50 Ft	946	2800J	9.7J	79.5	792	46.8	9320	2.8	0.30
OL-VC-40246	3.00-3.50 Ft	1210	3090J	6.9J	87.6	842	137J	10500	5.2	0.29
OL-VC-40246	4.00-4.50 Ft	1380	3250J	8.3J	93.6	870	142J	10900	7.4	0.30
OL-VC-40246	5.00-5.50 Ft	1190	3120J	5.7J	100J	944	106J	11200	6.8	0.28
OL-VC-40246	6.00-6.50 Ft	1160	3510J	74.6	93.6	888	32.2	11000	2.6	0.32
OL-VC-40246	7.50-8.00 Ft	725	3440J	158	101J	931	13.4	10700	-2.7	0.32
OL-VC-40246	9.00-9.50 Ft	455	2770J	162	97.6	905	35.7	10800	-0.6	0.26
OL-VC-40247	0.00-0.25 Ft		503					2590		0.19
OL-VC-40247	0.25-0.50 Ft		715					3210		0.22
OL-VC-40247	0.50-0.75 Ft		950					3830		0.25
OL-VC-40247	0.75-1.00 Ft		1360					4790		0.28
OL-VC-40247	1.00-1.25 Ft		1650					5740		0.29
OL-VC-40247	1.25-1.50 Ft		1880					6430		0.29
OL-VC-40247	1.50-1.75 Ft		1980					6910		0.29
OL-VC-40247	2.00-2.50 Ft	124	2260J	341	81.6	708	70.4	7770	1.5	0.29
OL-VC-40247	3.00-3.50 Ft	99.9	2550J	347	112J	840	31.5	8430	0.2	0.30
OL-VC-40247	4.00-4.50 Ft	222	2640J	266	123J	918	21.9	8800	0.7	0.30
OL-VC-40247	5.00-5.50 Ft	487	2930J	91.6	149J	965	28.8	9420	-3.5	0.31
OL-VC-40247	6.00-6.50 Ft	758	2960J	19.9	147J	900	59.0	10200	-1.4	0.29
OL-VC-40247	7.50-8.00 Ft	947	3020J	3.6J	144J	925	155U	10300	1.7	0.29
OL-VC-40247	9.00-9.50 Ft	970	3030J	7.9	153J	1000	89.7	10000	5.0	0.30
OL-VC-40248	0.00-0.25 Ft		1130					4010		0.28
OL-VC-40248	0.25-0.50 Ft		841					3300		0.25
OL-VC-40248	0.50-0.75 Ft		932					3510		0.27
OL-VC-40248	0.75-1.00 Ft		1210					4310		0.28
OL-VC-40248	1.00-1.25 Ft		1910					6650		0.29

Table V-1

General Chemistry Data from Vibracore and Cation-Anion Balance

Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-VC-40248	1.25-1.50 Ft		1800					6660		0.27
OL-VC-40248	1.50-1.75 Ft		2050					7530		0.27
OL-VC-40248	2.00-2.50 Ft	655	2750J	142	95.3	728	15.9	8730	0.4	0.32
OL-VC-40248	3.00-3.50 Ft	574	3100J	125	118J	841	20.8	9520	-5.6	0.33
OL-VC-40248	4.00-4.50 Ft	602	3130J	120	147J	1120	12.7	10200	2.1	0.31
OL-VC-40248	5.00-5.50 Ft	650	3080J	120	152J	1110	40.9	10300	3.7	0.30
OL-VC-40248	6.00-6.50 Ft	550	3020J	97.1	140J	1000	61.6	10500	-2.3	0.29
OL-VC-40248	7.50-8.00 Ft	608	2970J	86.1	153J	1040	124U	11100	0.1	0.27
OL-VC-40248	8.00-8.50 Ft	1020	3380J	84.9	171J	1230	80.3	11900	8.8	0.28
OL-VC-40249	0.00-0.25 Ft		662					3180		0.21
OL-VC-40249	0.25-0.50 Ft		741					3570		0.21
OL-VC-40249	0.50-0.75 Ft		1030					4250		0.24
OL-VC-40249	0.75-1.00 Ft		1450					6690		0.22
OL-VC-40249	1.00-1.25 Ft		2170					7320		0.30
OL-VC-40249	1.25-1.50 Ft		2960					8470		0.35
OL-VC-40249	1.50-1.75 Ft		3050					8650		0.35
OL-VC-40249	2.00-2.50 Ft	1140	2870J	7.9J	84.0	800	43.9	9920	7.2	0.29
OL-VC-40249	3.00-3.50 Ft	1330	3340J	21.5	84.2	902	71.3	11600	6.7	0.29
OL-VC-40249	4.00-4.50 Ft	1240	3860J	25.1	103J	983	45.9	12800	-0.2	0.30
OL-VC-40249	5.00-5.50 Ft	1230	4260J	33.2	115J	1200	6.0U	13500	-0.4	0.32
OL-VC-40249	6.00-6.50 Ft	1080	4540J	24.6	111J	1150	11.7	13900	-8.2	0.33
OL-VC-40249	7.50-8.00 Ft	1530	3840J	31.2	128J	1220	17.4	13900	10.9	0.28
OL-VC-40249	8.00-8.50 Ft	1420	3290J	30.7	126J	1130	13.4	13900	14.9	0.24
OL-VC-40250	0.00-0.25 Ft		1150					4190		0.27
OL-VC-40250	0.25-0.50 Ft		1110					4000		0.28
OL-VC-40250	0.50-0.75 Ft		921					3560		0.26
OL-VC-40250	0.75-1.00 Ft		1100					4130		0.27
OL-VC-40250	1.00-1.25 Ft		1520					5380		0.28
OL-VC-40250	1.25-1.50 Ft		1700					5780		0.29
OL-VC-40250	1.50-1.75 Ft		1780					6170		0.29
OL-VC-40250	2.00-2.50 Ft	346	1890J	242	39.0	529	69.1	6790	5.6	0.28
OL-VC-40250	3.00-3.50 Ft	341	2540J	249	60.4	668	123U	8540	-4.3	0.30
OL-VC-40250	4.00-4.50 Ft	566	3010J	247	82.6	927	42.3	10000	3.0	0.30
OL-VC-40250	5.00-5.50 Ft	478	3210J	185	89.1	926	40.0	10300	-5.6	0.31
OL-VC-40250	6.00-6.50 Ft	502	3180J	104	108J	1010	36.7	10800	-5.9	0.29
OL-VC-40250	7.50-8.00 Ft	972	3510J	34.6	121J	1140	6.0U	11200	2.4	0.31
OL-VC-40250	9.00-9.50 Ft	1100	3720J	18.9	132J	1180	95.1	11700	1.9	0.32
OL-VC-40287	0.00-0.25 Ft		759					3400		0.22
OL-VC-40287	0.25-0.50 Ft		1240					4690		0.26
OL-VC-40287	0.50-0.75 Ft		1570					5380		0.29
OL-VC-40287	0.75-1.00 Ft		1800					6160		0.29
OL-VC-40287	1.00-1.25 Ft		2420					8140		0.30
OL-VC-40287	1.25-1.50 Ft		3280					10400		0.32
OL-VC-40287	1.50-1.75 Ft		4940					15600		0.32
OL-VC-40287	2.00-2.50 Ft	439	7250	73.2	23.5	4870	588	20000	5.2	0.36
OL-VC-40287	2.00-2.50 Ft	467	6910	70.4	22.5	3360	569	20600	-8.1	0.34
OL-VC-40287	3.00-3.50 Ft	466B	8330	82.1	27.4	5110	738	23600	0.5	0.35
OL-VC-40287	4.00-4.50 Ft	686	9550	97.4	31.1	5970	847	27700	2.7	0.34
OL-VC-40287	5.00-5.50 Ft	614	11800	118J	35.6	7430	957	34000	1.6	0.35
OL-VC-40287	6.00-6.50 Ft	745	14400	137J	40.5	8850	1180	38500	0.4	0.37
OL-VC-40287	7.50-8.00 Ft	592	17400	144J	45.9	9750	1450	46200	-5.5	0.38
OL-VC-40287	9.00-9.50 Ft	789	20800	178	55.3	11700	1540	55900	-4.6	0.37
OL-VC-40288	0.00-0.25 Ft		1420					5040		0.28
OL-VC-40288	0.25-0.50 Ft		1770					6100		0.29
OL-VC-40288	0.50-0.75 Ft		2020					6860		0.29
OL-VC-40288	0.75-1.00 Ft		2180					7480		0.29
OL-VC-40288	1.00-1.25 Ft		2730					9120		0.30
OL-VC-40288	1.25-1.50 Ft		3010					9970		0.30
OL-VC-40288	1.50-1.75 Ft		13200					10900		1.21
OL-VC-40288	2.00-2.50 Ft	325J	4260	31.1	10.4	1590	299	13200	-17.8	0.32
OL-VC-40288	2.00-2.50 Ft	391J	3950	34.3	11.1	1710	285	12500	-9.5	0.32
OL-VC-40288	3.00-3.50 Ft	299J	5520	38.9	13.2	2120	453	16800	-19.7	0.33
OL-VC-40288	4.00-4.50 Ft	443J	6530	61.6	18.7	3300	509	19600	-6.4	0.33
OL-VC-40288	5.00-5.50 Ft	376BJ	7710	60.5	19.5	3320	651	22000	-15.6	0.35
OL-VC-40288	6.00-6.50 Ft	323BJ	9010	56.3	18.4	3250	694	25400	-24.6	0.35
OL-VC-40288	7.50-8.00 Ft	396	11300	78.0	24.4	5110	805	32600	-14.8	0.35
OL-VC-40288	9.00-9.50 Ft	512	14800	121	39.7	8190	1020	40100	-5.5	0.37
OL-VC-40289	0.00-0.25 Ft		664					3550		0.19
OL-VC-40289	0.25-0.50 Ft		605					3550		0.17

Table V-1

General Chemistry Data from Vibracore and Cation-Anion Balance

Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-VC-40289	0.50-0.75 Ft		811					42100		0.02
OL-VC-40289	0.75-1.00 Ft		818					3690		0.22
OL-VC-40289	1.00-1.25 Ft		1310					4850		0.27
OL-VC-40289	1.25-1.50 Ft		1450					2370		0.61
OL-VC-40289	1.50-1.75 Ft		1860					6350		0.29
OL-VC-40289	2.00-2.50 Ft		3270				275	9660		0.34
OL-VC-40289	2.00-2.50 Ft		1530				125	9210		0.17
OL-VC-40289	3.00-3.50 Ft	433	4150	59.4	16.5	2010	346	13000	-4.2	0.32
OL-VC-40289	4.00-4.50 Ft	578	5620	67.5	17.4	2500	497	16400	-8.1	0.34
OL-VC-40289	5.00-5.50 Ft	569	6390	79.1	20.1	3150	627	19100	-5.7	0.33
OL-VC-40289	6.00-6.50 Ft	541	7040	83.0	25.4	4410	681	21700	3.1	0.32
OL-VC-40289	7.50-8.00 Ft	549	9580	101	29.1	5680	779	26100	-0.5	0.37
OL-VC-40289	9.00-9.30 Ft	510	11300	108	31.1	6440	903	32100	-3.4	0.35
OL-VC-40289A	0.00-0.25 Ft		1060					4080		0.26
OL-VC-40289A	0.25-0.50 Ft		1420					4990		0.28
OL-VC-40289A	0.50-0.75 Ft		1590					5650		0.28
OL-VC-40289A	0.75-1.00 Ft		1740					6530		0.27
OL-VC-40289A	1.00-1.25 Ft		2210					7660		0.29
OL-VC-40289A	1.25-1.50 Ft		2550					8670		0.29
OL-VC-40289A	1.50-1.75 Ft		2950					9600		0.31
OL-VC-40289A	2.00-2.50 Ft		3940				284	12100		0.33
OL-VC-40289A	2.00-2.50 Ft	324	3890	40.1	16.0	1410	264	12100	-17.3	0.32
OL-VC-40289A	3.00-3.50 Ft	595	5240	71.3	29.3	2870	462	163000	1.2	0.03
OL-VC-40289A	4.00-4.50 Ft	378	6370	50.4	21.0	2200	557	18700	-23.2	0.34
OL-VC-40289A	5.00-5.50 Ft	444	7380	59.6	28.3	2830	695	21700	-19.2	0.34
OL-VC-40290	0.00-0.25 Ft		4240					13000		0.33
OL-VC-40290	0.25-0.50 Ft		4720					15000		0.31
OL-VC-40290	0.50-0.75 Ft		5160					16000		0.32
OL-VC-40290	0.75-1.00 Ft		5680					17200		0.33
OL-VC-40290	1.00-1.25 Ft		5710					18100		0.32
OL-VC-40290	1.25-1.50 Ft		6340					19100		0.33
OL-VC-40290	1.50-1.75 Ft		6750					20100		0.34
OL-VC-40290	2.00-2.50 Ft	1410	8110	176	42.9	2760	58.1	21500	-5.5	0.38
OL-VC-40290	2.00-2.50 Ft	1490	8240	188	44.9	2870	39.6	22500	-3.9	0.37
OL-VC-40290	3.00-3.50 Ft	1460	9930	130	37.2	2520	104	26200	-18.5	0.38
OL-VC-40290	4.00-4.50 Ft	1720	12300	129	41.0	2950	131	31400	-21.5	0.39
OL-VC-40290	5.00-5.50 Ft	2690	14500	200	65.1	5460	229	37300	-3.0	0.39
OL-VC-40290	7.50-8.00 Ft	2960	19500	229	82.2	8050	562	48800	-4.0	0.40
OL-VC-40290	6.00-6.50 Ft	2930	13700	215	73.0	6760	349	36000	7.7	0.38
OL-VC-40290	9.00-9.50 Ft	2270	21600	211	87.6	9230	711	54200	-7.7	0.40
OL-VC-40291	0.00-0.25 Ft		4060					12700		0.32
OL-VC-40291	0.25-0.50 Ft		4090					12700		0.32
OL-VC-40291	0.50-0.75 Ft		14300					16600		0.86
OL-VC-40291	0.75-1.00 Ft		7230					21000		0.34
OL-VC-40291	1.00-1.25 Ft		8410					23600		0.36
OL-VC-40291	1.25-1.50 Ft		9590					27000		0.36
OL-VC-40291	1.50-1.75 Ft		10900					29800		0.37
OL-VC-40291	2.00-2.50 Ft	3500J	13800	260B	83.3	3990	62.0	34400	-2.5	0.40
OL-VC-40291	3.00-3.50 Ft	4490J	18700	242B	99.2	5480	106	44800	-4.4	0.42
OL-VC-40291	4.00-4.50 Ft	5490	21900	244	110	6780	183	50700	-2.5	0.43
OL-VC-40291	5.00-5.50 Ft	6200	25400	249	116	7480	210	58500	-4.5	0.43
OL-VC-40291	6.00-6.50 Ft	5600	27200	208	98.3	6840	269	51600	-12.9	0.53
OL-VC-40292	0.00-0.25 Ft		1700					5550		0.31
OL-VC-40292	0.25-0.50 Ft		3100					8900		0.35
OL-VC-40292	0.50-0.75 Ft		3100					9090		0.34
OL-VC-40292	0.75-1.00 Ft		1330					5350		0.25
OL-VC-40292	1.00-1.25 Ft		1470					5610		0.26
OL-VC-40292	1.25-1.50 Ft		3240					11100		0.29
OL-VC-40292	1.50-1.75 Ft		4500					14500		0.31
OL-VC-40292	2.00-2.50 Ft	445J	5200	1420	37.0J	1160	24.8	15700	12.8	0.33
OL-VC-40292	2.00-2.50 Ft									
OL-VC-40292	3.00-3.50 Ft	131J	5370	1440	56.4	1260	72.8	14800	8.5	0.36
OL-VC-40292	4.00-4.50 Ft	189	4410	1270	68.8	1260	43.5	13700	15.3	0.32
OL-VC-40292	5.00-5.50 Ft	354	3730	872	75.2	1150	39.4	10500	14.3	0.36
OL-VC-40292	6.00-6.50 Ft	110	2960	626	80.9	1010	42.3	9520	9.9	0.31
OL-VC-40292	7.50-8.00 Ft	443	2700	528	87.4	927	24.6	8860	17.0	0.30
OL-VC-40293	0.00-0.25 Ft		3390					10900		0.31
OL-VC-40293	0.25-0.50 Ft		3540					12000		0.30
OL-VC-40293	0.50-0.75 Ft		3910					12500		0.31

Table V-1

General Chemistry Data from Vibracore and Cation-Anion Balance

Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-VC-40293	0.75-1.00 Ft		4420					14000		0.32
OL-VC-40293	1.00-1.25 Ft		5310					16100		0.33
OL-VC-40293	1.25-1.50 Ft		5750					17000		0.34
OL-VC-40293	1.50-1.75 Ft		5380					15900		0.34
OL-VC-40293	2.00-2.50 Ft	480	6980	945B	67.4	1930	23.7	18900	-2.6	0.37
OL-VC-40293	2.00-2.50 Ft	472	7030	931B	70.4	2100	27.0	18700	-1.4	0.38
OL-VC-40293	3.00-3.50 Ft	799	8320	908	84.4	2530	65.1	22500	-2.0	0.37
OL-VC-40293	4.00-4.50 Ft	1070	10500	764	94.1	3390	42.0	27800	-5.5	0.38
OL-VC-40293	5.00-5.50 Ft	1640	13700	812	119	5250	47.0	34700	-1.0	0.39
OL-VC-40293	6.00-6.50 Ft	2140	18800	806	135	7640	10.0J	47100	-2.1	0.40
OL-VC-40294	0.00-0.25 Ft		819					3270		0.25
OL-VC-40294	0.25-0.50 Ft		1310					4620		0.28
OL-VC-40294	0.50-0.75 Ft		1630					5000		0.33
OL-VC-40294	0.75-1.00 Ft		2390					6940		0.34
OL-VC-40294	1.00-1.25 Ft		1890					5600		0.34
OL-VC-40294	2.00-2.50 Ft		2410				14.1	7240		0.33
OL-VC-40294	2.00-2.50 Ft	451	2560	184	58.2	661	16.3	6690	-3.3	0.38
OL-VC-40294	1.25-1.50 Ft		2030					4960		0.41
OL-VC-40294	1.50-1.75 Ft		2090					2970		0.70
OL-VC-40294	3.00-3.50 Ft	556	2680	164	62.9	699	16.7	8170	-1.8	0.33
OL-VC-40294	4.00-4.50 Ft	473	2840	141	69.1	719	10.7	7210	-8.1	0.39
OL-VC-40294	5.00-5.50 Ft	585	2960	125	77.5	763	12.5	8640	-5.7	0.34
OL-VC-40294	6.00-6.50 Ft	527	3030	130	86.2	824	3.8J	8830	-6.5	0.34
OL-VC-40295	0.00-0.25 Ft		535					2710		0.20
OL-VC-40295	0.25-0.50 Ft		630					3230		0.20
OL-VC-40295	0.50-0.75 Ft		782					3810		0.21
OL-VC-40295	0.75-1.00 Ft		900					4070		0.22
OL-VC-40295	1.00-1.25 Ft		1110					4620		0.24
OL-VC-40295	1.25-1.50 Ft		1220					5120		0.24
OL-VC-40295	1.50-1.75 Ft		1330					5440		0.24
OL-VC-40295	2.00-2.50 Ft	468	1870	404	20.1	516	19.2	6850	19.9	0.27
OL-VC-40295	3.00-3.50 Ft	184	2030	437	21.2	541	7.1J	7220	9.3	0.28
OL-VC-40295	3.00-3.50 Ft	164	2010	442	21.8	561	66.2J	7200	9.0	0.28
OL-VC-40295	4.00-4.50 Ft	527	2310	495	25.6	646	17.0	7070	18.8	0.33
OL-VC-40295	5.00-5.50 Ft	284	2520	547	28.9	698	22.0J	7040	11.6	0.36
OL-VC-40295	6.00-6.50 Ft	278	2670	547	33.1	729	6.7	9660	9.6	0.28
OL-VC-40295	7.50-8.00 Ft	229	2860	619	37.2	773	10.6	9590	9.0	0.30
OL-VC-40295	9.00-9.50 Ft	128	2910	609	38.0	747	10.7	9600	4.4	0.30
OL-VC-40296	0.00-0.25 Ft		690					3110		0.22
OL-VC-40296	0.25-0.50 Ft		839					3610		0.23
OL-VC-40296	0.50-0.75 Ft		955					4060		0.24
OL-VC-40296	0.75-1.00 Ft		1100					4640		0.24
OL-VC-40296	1.00-1.25 Ft		1280					5210		0.25
OL-VC-40296	1.25-1.50 Ft		1360					5350		0.25
OL-VC-40296	1.50-1.75 Ft		1440					5580		0.26
OL-VC-40296	2.00-2.50 Ft	121	1660	401	20.0	458	20.1	6190	11.5	0.27
OL-VC-40296	2.00-2.50 Ft	150	1660	394	20.4	470	18.6	6200	12.6	0.27
OL-VC-40296	3.00-3.50 Ft	142	1830	435	22.7	544	17.3	7090	12.7	0.26
OL-VC-40296	4.00-4.50 Ft	199	2180	434	23.1	547	16.1	7840	6.2	0.28
OL-VC-40296	5.00-5.50 Ft	263	2300	412	28.4	574	11.5	8460	5.5	0.27
OL-VC-40296	6.00-6.50 Ft	256	2560	495	34.6	678	14.4	9120	7.3	0.28
OL-VC-40296	7.50-8.00 Ft	207	2680	534	40.6	724	14.0	9600	6.7	0.28
OL-VC-40296	9.00-9.50 Ft	609	2990	559	41.5	732	32.6J	9590	12.5	0.31
OL-VC-40296A	0.00-0.25 Ft		66.4					3140		0.02
OL-VC-40296A	0.25-0.50 Ft		774					3490		0.22
OL-VC-40296A	0.50-0.75 Ft		885					4160		0.21
OL-VC-40296A	0.75-1.00 Ft		1000					4660		0.21
OL-VC-40296A	1.00-1.25 Ft		1180					5140		0.23
OL-VC-40296A	1.25-1.50 Ft		1250					5710		0.22
OL-VC-40296A	1.50-1.75 Ft		1390					6150		0.23
OL-VC-40296A	2.00-2.50 Ft	101	1530	492	18.4	438	17.0J	6360	19.8	0.24
OL-VC-40296A	2.00-2.50 Ft	182	1480	475	18.4J	435	32.4J	6510	22.9	0.23
OL-VC-40296A	3.00-3.50 Ft	136	1840	463	22.7	542	23.4	7180	13.7	0.26
OL-VC-40296A	4.00-4.50 Ft	230	2110	469	25.5	604	8.0	8110	12.7	0.26
OL-VC-40296A	5.00-5.50 Ft	269	2380	481	30.1	661	8.1	9220	10.2	0.26
OL-VC-40296A	6.00-6.50 Ft	271	2580	507	34.6	707	7.5	9620	8.7	0.27
OL-VC-40296A	7.50-8.00 Ft	352	2760	543	39.2	734	13.6	9950	9.8	0.28
OL-VC-40296A	9.00-9.50 Ft	283	2880	584	43.2	763	4.1J	10300	8.5	0.28
OL-VC-40297	0.00-0.25 Ft		798					3120		0.26

Table V-1

General Chemistry Data from Vibracore and Cation-Anion Balance

Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-VC-40297	0.25-0.50 Ft		1270					4170		0.30
OL-VC-40297	0.50-0.75 Ft		1440					4760		0.30
OL-VC-40297	0.75-1.00 Ft		1750					5050		0.35
OL-VC-40297	1.00-1.25 Ft		1870					5580		0.34
OL-VC-40297	1.25-1.50 Ft		1930					5770		0.33
OL-VC-40297	1.50-1.75 Ft		2010					6140		0.33
OL-VC-40297	2.00-2.50 Ft		2430				17.1	7290		0.33
OL-VC-40297	2.00-2.50 Ft		2390				11.6	7160		0.33
OL-VC-40297	3.00-3.50 Ft	302	2940	296	54.4	826	31.4	8870	-4.3	0.33
OL-VC-40297	4.00-4.50 Ft		2930				191	9170		0.32
OL-VC-40297	5.00-5.50 Ft	199	3110	369	54.9	862	19.0	9620	-5.3	0.32
OL-VC-40297	6.00-6.50 Ft	233	3120	344	55.0	831	14.7	9760	-6.5	0.32
OL-VC-40297	7.50-8.00 Ft	366	3030	358	66.0	896	13.9	9550	1.5	0.32
OL-VC-40297	9.00-9.50 Ft	241	3140	310	61.6	797	11.4	9720	-9.2	0.32
OL-VC-40297A	0.00-0.25 Ft		670					3750		0.18
OL-VC-40297A	0.25-0.50 Ft		926					3270		0.28
OL-VC-40297A	0.50-0.75 Ft		1020					3710		0.27
OL-VC-40297A	0.75-1.00 Ft		1330					4490		0.30
OL-VC-40297A	1.00-1.25 Ft		1530					4850		0.32
OL-VC-40297A	1.25-1.50 Ft		1590					5070		0.31
OL-VC-40297A	1.50-1.75 Ft		1710					5300		0.32
OL-VC-40297A	2.00-2.50 Ft	449	1940	143	39.4	512	6.4	5810	2.3	0.33
OL-VC-40297A	4.00-4.50 Ft	545	3070	390	58.6	893	14.5	9770	6.8	0.31
OL-VC-40297A	5.00-5.50 Ft	341	3110	368	59.4	899	7.6	9470	0.0	0.33
OL-VC-40297A	6.00-6.50 Ft	268	3100	347	62.0	891	11.0	9840	-3.2	0.32
OL-VC-40297A	7.50-8.00 Ft	423	3230	334	69.4	885	19.0J	9580	-1.5	0.34
OL-VC-40297A	9.00-9.50 Ft	252	3180	334	65.3	864	22.8	9250	-6.4	0.34
OL-VC-40298	0.00-0.25 Ft		2850					9780		0.29
OL-VC-40298	0.25-0.50 Ft		4530					14600		0.31
OL-VC-40298	0.50-0.75 Ft		5570					17900		0.31
OL-VC-40298	0.75-1.00 Ft		6380					20100		0.32
OL-VC-40298	1.00-1.25 Ft		8330					24100		0.35
OL-VC-40298	1.25-1.50 Ft		9220					27400		0.34
OL-VC-40298	1.50-1.75 Ft		10500					30300		0.35
OL-VC-40298	2.00-2.50 Ft	1180	14100	120	59.1	7090	149	38300	-2.8	0.37
OL-VC-40298	3.00-3.50 Ft	1290	17300	138	74.9	9070	75.9	45500	-1.8	0.38
OL-VC-40298	4.00-4.50 Ft	1320		160	56.8	9230				
OL-VC-40298	4.00-4.50 Ft	1230		155	57.7	9710				
OL-VC-40298	5.00-5.50 Ft	1050	19700	155	61.4	10300	124	48400	-4.1	0.41
OL-VC-40298	6.00-6.50 Ft	881	22700	179	69.2	10800	142U	55900	-9.6	0.41
OL-VC-40298	7.50-8.00 Ft	738	23600	182	67.6	11400	66.8	58800	-9.7	0.40
OL-VC-40298	9.00-9.50 Ft	720	25100	205	76.6	13600	61.7	60000	-4.6	0.42
OL-VC-40299	0.00-0.25 Ft		922					3670		0.25
OL-VC-40299	0.25-0.50 Ft		1600					5580		0.29
OL-VC-40299	0.50-0.75 Ft		1920					6400		0.30
OL-VC-40299	0.75-1.00 Ft		2090					7260		0.29
OL-VC-40299	1.00-1.25 Ft		3610					11000		0.33
OL-VC-40299	1.25-1.50 Ft		4170					12800		0.33
OL-VC-40299	1.50-1.75 Ft		4720					15100		0.31
OL-VC-40299	2.00-2.50 Ft	694	7070	64.0	17.1	2240	157	20300	-19.1	0.35
OL-VC-40299	2.00-2.50 Ft	858	6900	81.9	21.4	2940	107	19400	-5.0	0.36
OL-VC-40299	3.00-3.50 Ft	823	9170	86.0	32.0	5110	123	24600	1.9	0.37
OL-VC-40299	4.00-4.50 Ft	874	12100	105	34.9	6170	48.2	31300	-3.1	0.39
OL-VC-40299	5.00-5.50 Ft	909	14000	132	43.7	7800	43.5	35000	0.1	0.40
OL-VC-40299	6.00-6.50 Ft	802	16400	145	48.4	9290	31.2	42400	-0.6	0.39
OL-VC-40299	7.50-8.00 Ft	746	18100	153	51.3	10200	23.2	45000	-1.6	0.40
OL-VC-40299	9.00-9.50 Ft	773	21900	186	59.6	12000	33.0	54500	-3.4	0.40
OL-VC-40301	0.00-0.25 Ft		612					2710		0.23
OL-VC-40301	0.25-0.50 Ft		745					3240		0.23
OL-VC-40301	0.50-0.75 Ft		855					3750		0.23
OL-VC-40301	0.75-1.00 Ft		1060					4890		0.22
OL-VC-40301	1.00-1.25 Ft		1090					4800		0.23
OL-VC-40301	1.25-1.50 Ft		1150					4930		0.23
OL-VC-40301	1.50-1.75 Ft		1250					5490		0.23
OL-VC-40301	2.00-2.50 Ft	273	1660	245	14.4	390	18.7	6940	4.0	0.24
OL-VC-40301	3.00-3.50 Ft	432	2330	391	23.1	752	74.8	8810	12.8	0.26
OL-VC-40301	4.00-4.50 Ft	651	3050	350	25.9	962	6.0J	10800	9.3	0.28
OL-VC-40301	5.00-5.50 Ft		3900				931	11900		0.33
OL-VC-40301	5.00-5.50 Ft		3870				684	11700		0.33

Table V-1

General Chemistry Data from Vibracore and Cation-Anion Balance

Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-VC-40301	6.00-6.50 Ft	1510	4710	149J	24.0	1070	636	13700	-4.0	0.34
OL-VC-40301	7.50-8.00 Ft	1040	5010	87.8	25.4	1240	966	14800	-17.3	0.34
OL-VC-40301	9.00-9.30 Ft	1070	6580	118	39.9	2650	595	18000	-4.9	0.37
OL-VC-40302	0.00-0.25 Ft		9590					27400		0.35
OL-VC-40302	0.50-0.75 Ft		19600					66100		0.30
OL-VC-40302	0.25-0.50 Ft		26500					51500		0.51
OL-VC-40302	0.75-1.00 Ft		29200					72100		0.40
OL-VC-40302	1.00-1.25 Ft		29800					72600		0.41
OL-VC-40302	1.25-1.50 Ft		28000					69500		0.40
OL-VC-40302	1.50-1.75 Ft		25800					64100		0.40
OL-VC-40302	2.00-2.50 Ft	5470	33200	337	160	11100	144	74900	-8.8	0.44
OL-VC-40302	2.00-2.50 Ft	5470	33700	375	169	12300	230	75900	-6.2	0.44
OL-VC-40302	3.00-3.50 Ft	3820	35800	294	128	9500	549	69500	-23.6	0.52
OL-VC-40302	4.00-4.50 Ft	6200	35500	425	173	12700	377	80300	-5.7	0.44
OL-VC-40302	5.00-5.50 Ft	7330	36600	430	170	13300	1100	75500	-3.5	0.48
OL-VC-40302	6.00-6.50 Ft	7670	38500	410	167	12000	353	84300	-7.4	0.46
OL-VC-40302	7.50-8.00 Ft	8600	38900	397	169	12800	373	87000	-3.9	0.45
OL-VC-40302	9.00-9.50 Ft	6020	39500	361J	168	14600	807	57800	-7.7	0.68
OL-VC-40305	0.00-0.25 Ft		8110					23100		0.35
OL-VC-40305	0.25-0.50 Ft		13100					34600		0.38
OL-VC-40305	0.50-0.75 Ft		18300					47300		0.39
OL-VC-40305	0.75-1.00 Ft		23300					53600		0.43
OL-VC-40305	1.00-1.25 Ft		30100					73200		0.41
OL-VC-40305	1.25-1.50 Ft		34100					80800		0.42
OL-VC-40305	1.50-1.75 Ft		37800					86800		0.44
OL-VC-40305	2.00-2.50 Ft		58800				83.7	110000		0.53
OL-VC-40305	2.00-2.50 Ft	14000	62900	95.7	220	11800	71.2J	117000	-18.3	0.54
OL-VC-40305	3.00-3.50 Ft	18500	69500	91.2	283	16700	52.2J	133000	-8.2	0.52
OL-VC-40305	4.00-4.50 Ft	21600	80100	98.0	357	19800	72.2J	122000	-7.2	0.66
OL-VC-40305	5.00-5.50 Ft	22600	74400	91.7	370	19500	46.5J	141000	-2.6	0.53
OL-VC-40305	6.00-6.50 Ft	22000	76500	87.7	368	19300	69.1J	143000	-5.0	0.53
OL-VC-40305	7.50-8.00 Ft	23200	77900	83.8	386	19800	79.5J	142000	-3.9	0.55
OL-VC-40305	9.00-9.50 Ft	24200	77600	88.2	399	20400	52.2J	142000	-1.8	0.55
OL-VC-40306	0.00-0.25 Ft		995					4250		0.23
OL-VC-40306	0.25-0.50 Ft		1420					5410		0.26
OL-VC-40306	0.50-0.75 Ft		1950					7190		0.27
OL-VC-40306	0.75-1.00 Ft		2480					8690		0.29
OL-VC-40306	1.00-1.25 Ft		3760					12100		0.31
OL-VC-40306	1.25-1.50 Ft		3240					10900		0.30
OL-VC-40306	1.50-1.75 Ft		4420					14000		0.32
OL-VC-40306	2.00-2.50 Ft	989	6310	635J	45.6	2020	21.2	189000	3.3	0.03
OL-VC-40306	3.00-3.50 Ft	971	8620	804	61.3	2780	92.8	24100	-1.7	0.36
OL-VC-40306	4.00-4.50 Ft	1210	10300	828	70.6	3330	27.6	28200	-2.8	0.37
OL-VC-40306	5.00-5.50 Ft	1570	12400	819	83.8	4110	25.5	33300	-3.5	0.37
OL-VC-40306	6.00-6.50 Ft	931	14600	323	44.4	2390	29.9	38100	-39.7	0.38
OL-VC-40306	7.50-8.00 Ft	2580	17600	442	107	6620	52.1	44700	-4.4	0.39
OL-VC-40306	9.00-9.50 Ft	3570	21400	189	98.5	8530	35.3	52300	-3.2	0.41
OL-VC-40307	0.00-0.25 Ft		3830					11600		0.33
OL-VC-40307	0.25-0.50 Ft		3100					9700		0.32
OL-VC-40307	0.50-0.75 Ft		3980					12800		0.31
OL-VC-40307	0.75-1.00 Ft		7560					21400		0.35
OL-VC-40307	1.00-1.25 Ft		1070					2730		0.39
OL-VC-40307	1.25-1.50 Ft		11100					27700		0.40
OL-VC-40307	1.50-1.75 Ft		10700					29000		0.37
OL-VC-40307	2.00-2.50 Ft		14300				311	36400		0.39
OL-VC-40307	6.00-6.50 Ft	3680		175	83.0	11800				
OL-VC-40307	7.50-8.00 Ft	2570	33800	166	77.6	12000	42.0	74500	-17.8	0.45
OL-VC-40307	9.00-9.50 Ft	1100	34500	185	72.2	2600	15.7J	84300	-68.1	0.41
OL-VC-50071	0.00-0.25 Ft		5290					17300		0.31
OL-VC-50071	0.25-0.50 Ft		8310					25800		0.32
OL-VC-50071	0.50-0.75 Ft		10900					31900		0.34
OL-VC-50071	0.75-1.00 Ft		11400					32400		0.35
OL-VC-50071	1.00-1.25 Ft		12600					35400		0.36
OL-VC-50071	1.25-1.50 Ft		13500					37600		0.36
OL-VC-50071	1.50-1.75 Ft		13500					38500		0.35
OL-VC-50071	2.00-2.50 Ft	745	14300J	195	52.0	8070	1560	42900	-3.6	0.33
OL-VC-50071	3.00-3.50 Ft	843	14000J	221	63.0	9310	1450	43500	4.7	0.32
OL-VC-50071	4.00-4.50 Ft	830	17900J	215	66.8	9550	1660	45800	-6.2	0.39
OL-VC-50071	5.00-5.50 Ft	755	18900J	199	65.4	9130	1570	48400	-11.1	0.39

Table V-1

General Chemistry Data from Vibracore and Cation-Anion Balance

Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-VC-50071	6.00-6.50 Ft	835	20300J	227	76.8	10300	1520	51100	-8.4	0.40
OL-VC-50071	7.50-8.00 Ft	937	23100J	269	94.1	11700	1560	56500	-8.2	0.41
OL-VC-50071	9.00-9.50 Ft	921	26700J	289	107	13400	1580	65000	-9.1	0.41
OL-VC-50087	0.00-0.25 Ft		611					3190		0.19
OL-VC-50087	0.25-0.50 Ft		680					3590		0.19
OL-VC-50087	0.50-0.75 Ft		1070					4630		0.23
OL-VC-50087	0.75-1.00 Ft		2140					7280		0.29
OL-VC-50087	1.00-1.25 Ft		3260					9910		0.33
OL-VC-50087	1.25-1.50 Ft		4640					14100		0.33
OL-VC-50087	1.50-1.75 Ft		6040					13700		0.44
OL-VC-50087	2.00-2.50 Ft		8900				462	17300	-100.0	0.51
OL-VC-50087	2.00-2.50 Ft		9090				421	24600	-100.0	0.37
OL-VC-50087	3.00-3.50 Ft		13700				593	35600	-100.0	0.38
OL-VC-50087	4.00-4.50 Ft		17400				870	45900	-100.0	0.38
OL-VC-50087	5.00-5.50 Ft	1390	22200	315	187	12100	893	56000	-1.4	0.40
OL-VC-50087	6.00-6.50 Ft	1490	26900	343	205	13200	1140	64500	-6.9	0.42
OL-VC-50087	7.50-8.00 Ft	1250	32200	284	169	11500	1580	76000	-22.9	0.42
OL-VC-50087	9.00-9.50 Ft	1940	38500	450	268	17900	1860	87400	-10.0	0.44
OL-VC-50088	0.00-0.25 Ft		1090					4220		0.26
OL-VC-50088	0.25-0.50 Ft		1970					7050		0.28
OL-VC-50088	0.50-0.75 Ft		2850					9800		0.29
OL-VC-50088	0.75-1.00 Ft		5180					16200		0.32
OL-VC-50088	1.00-1.25 Ft		6460					19600		0.33
OL-VC-50088	1.25-1.50 Ft		5390					17000		0.32
OL-VC-50088	1.50-1.75 Ft		4500					14500		0.31
OL-VC-50088	2.00-2.50 Ft	813	8050	152	62.3	3550	9.1J	24200	-4.2	0.33
OL-VC-50088	3.00-3.50 Ft	1170	11900	213	86.0	5030	13.6J	32800	-6.2	0.36
OL-VC-50088	4.00-4.50 Ft	1300	15900	270	108	6200	8.6J	43700	-11.0	0.36
OL-VC-50088	5.00-5.50 Ft	1520	19700	351	146	8250	20.0UJ	51300	-8.7	0.38
OL-VC-50088	6.00-6.50 Ft	2020	23900	476	207	11500	120	60300	-2.4	0.40
OL-VC-50088	7.50-8.00 Ft	2290	29100	567	261	13800	10.2J	67800	-3.3	0.43
OL-VC-50088	9.00-9.50 Ft	1750	36700	450	216	11100	40.0U	84000	-25.7	0.44
OL-VC-50088A	0.00-0.25 Ft		1710					6180		0.28
OL-VC-50088A	0.25-0.50 Ft		2750					9040		0.30
OL-VC-50088A	0.50-0.75 Ft		3500					11600		0.30
OL-VC-50088A	0.75-1.00 Ft		4800					15000		0.32
OL-VC-50088A	1.00-1.25 Ft		6000					18100		0.33
OL-VC-50088A	1.25-1.50 Ft		6970					20400		0.34
OL-VC-50088A	1.50-1.75 Ft		7610					19000		0.40
OL-VC-50088A	2.00-2.50 Ft	695	9170	129	43.4	3160	17.2	22300	-17.0	0.41
OL-VC-50088A	2.00-2.50 Ft	792	9190	147	50.7	3770	14.4	24700	-8.9	0.37
OL-VC-50088A	3.00-3.50 Ft	944	13200	208	71.0	4910	12.3J	35600	-14.3	0.37
OL-VC-50088A	4.00-4.50 Ft	1090	17400	266	88.7	6390	6.5J	44400	-15.9	0.39
OL-VC-50088A	5.00-5.50 Ft	1540	21500	416	142	9280	6.4J	48900	-7.8	0.44
OL-VC-50088A	6.00-6.50 Ft	1770	25500	493	191	11500	6.6J	58800	-6.3	0.43
OL-VC-50088A	7.50-8.00 Ft	1980	33100	587	243	14600	30.0U	73000	-8.5	0.45
OL-VC-50088A	9.00-9.50 Ft	2990	38800	765	339	18700	18.3J	82700	-2.8	0.47
OL-VC-50089	0.00-0.25 Ft		964					3830		0.25
OL-VC-50089	0.25-0.50 Ft		1600					5530		0.29
OL-VC-50089	0.50-0.75 Ft		2410					7760		0.31
OL-VC-50089	0.75-1.00 Ft		2950					9790		0.30
OL-VC-50089	1.00-1.25 Ft		4430					13300		0.33
OL-VC-50089	1.25-1.50 Ft		4960					14400		0.34
OL-VC-50089	1.50-1.75 Ft		5480					14500		0.38
OL-VC-50089	2.00-2.50 Ft	983	7020	173	60.5	2890	12.2J	20200	-2.0	0.35
OL-VC-50089	2.00-2.50 Ft	833	7500	169	70.9	2980	22.9J	20700	-6.3	0.36
OL-VC-50089	3.00-3.50 Ft	1230	9860	270	104	4150	70.2	27400	-2.3	0.36
OL-VC-50089	4.00-4.50 Ft	1950	18500	548	214	8200	20.0U	46400	-1.7	0.40
OL-VC-50089	5.00-5.50 Ft	1540	13400	371	138	5880	65.4	34300	-1.7	0.39
OL-VC-50089	6.00-6.50 Ft	2440	20000	656	259	9620	18.5J	46800	3.1	0.43
OL-VC-50089	7.50-8.00 Ft	2590	22800	703	290	10500	69.3	55800	0.5	0.41
OL-VC-50089	9.00-9.50 Ft	3340	29900	1000	360	13800	85.5	70700	0.8	0.42
OL-VC-60125	0.00-0.30 Ft		591					3860		0.15
OL-VC-60125	0.30-0.50 Ft		667					4110		0.16
OL-VC-60125	0.50-0.80 Ft		830					5040		0.16
OL-VC-60125	0.80-1.00 Ft		848					5110		0.17
OL-VC-60125	1.00-1.30 Ft		1650					9770		0.17
OL-VC-60125	1.30-1.50 Ft		1700					9820		0.17
OL-VC-60125	1.50-1.80 Ft		1830					9780		0.19

Table V-1

General Chemistry Data from Vibracore and Cation-Anion Balance

Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-VC-60125	2.00-2.50 Ft	746	3140	74.6	24.9B	1560	83.5	13200	10.7	0.24
OL-VC-60125	3.00-3.50 Ft	762	4050	89.7	25.5B	1880	77.5	16200	4.9	0.25
OL-VC-60125	4.00-4.50 Ft	771	4270	119	27.3B	2360	75.0	19000	10.8	0.22
OL-VC-60125	5.00-5.50 Ft	709	5310	143	25.1B	2540	77.2	21800	2.2	0.24
OL-VC-60125	6.00-6.50 Ft	713	6750	187	25.0B	3050	77.3J	22200	-2.1	0.30
OL-VC-60125	7.50-8.00 Ft	851	9440	265	30.5B	4440	21.7BJ	27300	-1.6	0.35
OL-VC-60125	9.00-9.50 Ft	915	11200	285	29.6B	5110	9.6B	35500	-3.9	0.32
OL-VC-60127	0.00-0.30 Ft		1190					7070		0.17
OL-VC-60127	0.30-0.50 Ft		1660					8420		0.20
OL-VC-60127	1.00-1.30 Ft		2360					13300		0.18
OL-VC-60127	1.30-1.50 Ft		2620					14300		0.18
OL-VC-60127	1.50-1.80 Ft		2850					15000		0.19
OL-VC-60127	2.00-2.50 Ft	784	3720	130	28.7B	1690	100	10300	7.4	0.36
OL-VC-60127	3.00-3.50 Ft	744	4630	134	26.2B	1860	84.5	10900	-1.0	0.42
OL-VC-60127	4.00-4.50 Ft	885	5580	178	31.4B	2620	87.7	8420	4.3	0.66
OL-VC-60127	5.00-5.50 Ft	906	6520	195	34.0B	3140	201	9000	2.7	0.72
OL-VC-60127	6.00-6.50 Ft	885	7830	188	31.1B	3150	648	17500	-8.5	0.45
OL-VC-60127	7.50-8.00 Ft	1060	10100	244	40.6B	4300	51.3	9420	-4.6	1.07
OL-VC-60129	0.00-0.30 Ft		796					3860		0.21
OL-VC-60129	0.30-0.50 Ft		860					4340		0.20
OL-VC-60129	0.50-0.80 Ft		1170					5490		0.21
OL-VC-60129	0.80-1.00 Ft		1250					5740		0.22
OL-VC-60129	1.00-1.30 Ft		3160					15800		0.20
OL-VC-60129	1.30-1.50 Ft		4130					18400		0.22
OL-VC-60129	1.50-1.80 Ft		5990					23200		0.26
OL-VC-60129	2.00-2.50 Ft	1070	8630	252	79.2	7250	55.5	33000	23.1	0.26
OL-VC-60129	3.00-3.50 Ft	1210	18100	322	93.7	8920	220	39300	-3.8	0.46
OL-VC-60129	4.00-4.50 Ft	1300	19100	416	124	10900	112	59900	3.2	0.32
OL-VC-60129	5.00-5.50 Ft	1400	24300	482	143	12500	104	56300	-2.3	0.43
OL-VC-60129	6.00-6.50 Ft	1730	30100	622	197	16100	76.2J	64900	-0.5	0.46
OL-VC-60129	7.50-8.00 Ft	1640	33300	580	180	15400	9.3BJ	69500	-7.8	0.48
OL-VC-60129	9.00-9.10 Ft	1890	36200	668	220	18200	9.4BJ	80000	-3.8	0.45
OL-VC-60150	0.00-0.30 Ft		564					3760		0.15
OL-VC-60150	0.30-0.50 Ft		644					3790		0.17
OL-VC-60150	0.50-0.80 Ft		750					5000		0.15
OL-VC-60150	0.80-1.00 Ft		756					5310		0.14
OL-VC-60150	1.00-1.30 Ft		1260					7720		0.16
OL-VC-60150	1.30-1.50 Ft		1400					8270		0.17
OL-VC-60150	1.50-1.80 Ft		1560					9090		0.17
OL-VC-60150	2.00-2.50 Ft	580	2160	74.1	25.0B	968	103	11000	10.4	0.20
OL-VC-60150	3.00-3.50 Ft	654	3040	85.0	26.9B	1310	53.2	13300	5.7	0.23
OL-VC-60150	4.00-4.50 Ft	668	3870	96.3	27.8B	1640	118	15300	0.8	0.25
OL-VC-60150	5.00-5.50 Ft	727	4980	109	25.1B	1930	61.1	17800	-4.4	0.28
OL-VC-60150	6.00-6.50 Ft	839	4750	134	27.6B	2600	49.8B	20200	10.5	0.24
OL-VC-60150	7.50-8.00 Ft	897	6720	155	24.9B	3510	10.8B	25200	5.3	0.27
OL-VC-60150	9.00-9.50 Ft	672	8500	130	19.0B	3750	25.5B	29700	-7.2	0.29
OL-VC-60152	0.00-0.30 Ft		247					4460		0.06
OL-VC-60152	0.30-0.50 Ft		825					5090		0.16
OL-VC-60152	0.50-0.80 Ft		1280					7600		0.17
OL-VC-60152	0.80-1.00 Ft		1310					8340		0.16
OL-VC-60152	1.00-1.30 Ft		1510					9080		0.17
OL-VC-60152	1.30-1.50 Ft		1590					9420		0.17
OL-VC-60152	1.50-1.80 Ft		1660					9730		0.17
OL-VC-60152	2.00-2.50 Ft	663	2070	107	24.7B	935	437	11000	10.4	0.19
OL-VC-60152	3.00-3.50 Ft	673	2560	118	24.0B	1110	380	12800	7.0	0.20
OL-VC-60152	4.00-4.50 Ft	611	3000	115	23.5B	1270	160J	13400	4.3	0.22
OL-VC-60152	5.00-5.50 Ft	609	3530	124	24.3B	1570	312J	14800	1.6	0.24
OL-VC-60152	6.00-6.50 Ft	604	3430	120	20.4B	1740	450	14000	4.5	0.25
OL-VC-60152	7.50-8.00 Ft	588	4560	117	20.0B	2290	67.3	17700	3.4	0.26
OL-VC-60154	0.00-0.30 Ft		1140					8200		0.14
OL-VC-60154	0.30-0.50 Ft		1270					7860		0.16
OL-VC-60154	0.50-0.80 Ft		1880					7940		0.24
OL-VC-60154	0.80-1.00 Ft		2690					11100		0.24
OL-VC-60154	1.00-1.30 Ft		3530					14700		0.24
OL-VC-60154	1.30-1.50 Ft		4190					17200		0.24
OL-VC-60154	1.50-1.80 Ft		4770					18700		0.26
OL-VC-60154	2.00-2.50 Ft	678	6420	113	16.6B	2740	261	10200	-6.8	0.63
OL-VC-60154	3.00-3.50 Ft	849	8270	159	16.9B	3620	152	8500	-5.1	0.97
OL-VC-60154	4.00-4.50 Ft	920	9750	190	18.4B	4040	367	4600	-8.6	2.12

Table V-1

General Chemistry Data from Vibracore and Cation-Anion Balance

Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-VC-60154	5.00-5.50 Ft	977	10800	218	17.3B	4550	332	9600	-8.1	1.13
OL-VC-60154	6.00-6.50 Ft	994	11300	232	17.3B	5090	256	28900	-5.5	0.39
OL-VC-60154	7.50-8.00 Ft	952	13200	230	15.3B	5190	34.1	15200	-12.1	0.87
OL-VC-60154	9.00-9.50 Ft	1050	15200	258	18.3B	6200	200	11900	-11.5	1.28
OL-VC-60162	0.00-0.30 Ft		498					3850		0.13
OL-VC-60162	0.30-0.50 Ft		611					4580		0.13
OL-VC-60162	0.50-0.80 Ft		716					5780		0.12
OL-VC-60162	0.80-1.00 Ft		751					5840		0.13
OL-VC-60162	1.00-1.30 Ft		1080					7740		0.14
OL-VC-60162	1.30-1.50 Ft		1080					8400		0.13
OL-VC-60162	1.50-1.80 Ft		1200					8910		0.13
OL-VC-60162	2.00-2.50 Ft	439	1970	76.2	22.4B	705	99.7J	10300	1.5	0.19
OL-VC-60162	3.00-3.50 Ft	529	2850	104	24.8B	998	79.2J	12300	-1.9	0.23
OL-VC-60162	4.00-4.50 Ft	560	3860	122	25.5B	1350	58.0J	14700	-6.1	0.26
OL-VC-60162	5.00-5.50 Ft	615	4590	138	25.6B	1680	86.9J	16200	-6.3	0.28
OL-VC-60162	6.00-6.50 Ft	586	4430	138	22.8B	1840	56.1J	17100	-2.0	0.26
OL-VC-60162	7.50-8.00 Ft	819	6060	196	28.7B	3160	8.3BJ	19800	6.6	0.31
OL-VC-60162	9.00-9.20 Ft	862	7750	214	28.5B	4010	10.3BJ	25000	3.7	0.31
OL-VC-60168	0.00-0.30 Ft		475					3670		0.13
OL-VC-60168	0.30-0.50 Ft		501					4080		0.12
OL-VC-60168	0.50-0.80 Ft		559					4560		0.12
OL-VC-60168	0.80-1.00 Ft		597					5160		0.12
OL-VC-60168	1.00-1.30 Ft		864					7020		0.12
OL-VC-60168	1.30-1.50 Ft		884					7800		0.11
OL-VC-60168	1.50-1.80 Ft		1020					7590		0.13
OL-VC-60168	2.00-2.50 Ft	478	1420	91.7	24.6B	733	165	9760	19.0	0.15
OL-VC-60168	3.00-3.50 Ft	560	2010	122	24.2B	882	977	12600	0.0	0.16
OL-VC-60168	4.00-4.50 Ft	522	3070	150	25.6B	1310	318	15300	1.5	0.20
OL-VC-60168	5.00-5.50 Ft	558	3720	175	26.9B	1680	171	17100	3.4	0.22
OL-VC-60168	6.00-6.50 Ft	675	4390	198	29.4B	2180	569	18400	3.5	0.24
OL-VC-60168	7.50-8.00 Ft	744	5630	210	27.8B	2780	80.9	22000	4.6	0.26
OL-VC-60168	9.00-9.20 Ft	779	7040	219	28.2B	3590	24.7	24000	3.6	0.29
OL-VC-60171	0.00-0.30 Ft		500					3470		0.14
OL-VC-60171	0.30-0.50 Ft		597					3610		0.17
OL-VC-60171	0.50-0.80 Ft		654					3900		0.17
OL-VC-60171	0.80-1.00 Ft		688					4050		0.17
OL-VC-60171	1.00-1.30 Ft		1390					7480		0.19
OL-VC-60171	1.30-1.50 Ft		1560					8290		0.19
OL-VC-60171	1.50-1.80 Ft		1620					8320		0.19
OL-VC-60171	2.00-2.50 Ft	488	2670	67.4	19.6B	1250	192	12100	3.3	0.22
OL-VC-60171	3.00-3.50 Ft	551	4090	82.1	18.0B	1710	470	14200	-6.9	0.29
OL-VC-60171	4.00-4.50 Ft	597	4350	97.3	20.4B	2660	304	16900	8.8	0.26
OL-VC-60171	5.00-5.50 Ft	531	5210	92.1	17.1B	2850	73.9J	16900	3.3	0.31
OL-VC-60171	6.00-6.50 Ft	472	6010	89.2	14.2B	2970	66.7	20400	-3.2	0.29
OL-VC-60171	7.50-8.00 Ft	615	7610	120	14.9B	4220	29.8BJ	21600	2.1	0.35
OL-VC-60171	9.00-9.50 Ft	570	9300	111	12.3B	4490	76.1J	27300	-6.2	0.34
OL-VC-60179	0.00-0.30 Ft		1260					7790		0.16
OL-VC-60179	0.30-0.50 Ft		1200					7230		0.17
OL-VC-60179	0.50-0.80 Ft		1140					6850		0.17
OL-VC-60179	0.80-1.00 Ft		1040					7000		0.15
OL-VC-60179	1.00-1.30 Ft		1770					8920		0.20
OL-VC-60179	1.30-1.50 Ft		2530					8940		0.28
OL-VC-60179	1.50-1.80 Ft		3380					4180		0.81
OL-VC-60179	2.00-2.50 Ft	474	5810	121	44.5B	3080	325	10000	-0.6	0.58
OL-VC-60179	3.00-3.50 Ft	499	7280	131	48.1B	3960	184	8560	0.0	0.85
OL-VC-60179	4.00-4.50 Ft	464	10100	135	46.8B	5260	138	10200	-4.3	0.99
OL-VC-60179	5.00-5.50 Ft	468	13800	143	41.9B	6390	188	17600	-11.2	0.78
OL-VC-60179	6.00-6.50 Ft	416	21000	179	35.5B	9780	128	22800	-12.6	0.92
OL-VC-60181	0.00-0.30 Ft		552					3830		0.14
OL-VC-60181	0.30-0.50 Ft		780					4060		0.19
OL-VC-60181	0.50-0.80 Ft		976					4950		0.20
OL-VC-60181	0.80-1.00 Ft		1030					5230		0.20
OL-VC-60181	1.00-1.30 Ft		1540					6800		0.23
OL-VC-60181	1.30-1.50 Ft		1640					7900		0.21
OL-VC-60181	1.50-1.80 Ft		1900					8800		0.22
OL-VC-60181	2.00-2.50 Ft	451	2400	90.0	17.3B	1360	105	11600	12.3	0.21
OL-VC-60181	3.00-3.50 Ft	543	3340	113	20.3B	1930	660	13800	5.6	0.24
OL-VC-60181	4.00-4.50 Ft	473	4270	102	19.7B	2260	460	16000	0.3	0.27
OL-VC-60181	5.00-5.50 Ft	466	5100	96.0	17.8B	2520	395	19200	-3.7	0.27

Table V-1

General Chemistry Data from Vibracore and Cation-Anion Balance

Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-VC-60181	6.00-6.50 Ft	427	5840	91.4	17.8B	2840	186	19100	-4.9	0.31
OL-VC-60181	7.50-8.00 Ft	490	7070	110	17.9B	3860	35.4	23500	0.4	0.30
OL-VC-60181	9.00-9.50 Ft	520	8670	115	17.3B	4870	42.0	28000	0.5	0.31
OL-VC-60191	0.00-0.30 Ft		4580					17100		0.27
OL-VC-60191	0.30-0.50 Ft		3710					13900		0.27
OL-VC-60191	0.50-0.80 Ft		3940					12600		0.31
OL-VC-60191	0.80-1.00 Ft		5030					16500		0.30
OL-VC-60191	1.00-1.30 Ft		14700					38700		0.38
OL-VC-60191	1.30-1.50 Ft		19000					54300		0.35
OL-VC-60191	2.00-2.50 Ft	1450	25700	208	26.8B	12700	144	111000	-6.2	0.23
OL-VC-60191	3.00-3.50 Ft	1300	28800	213	26.0B	12900	113	121000	-11.7	0.24
OL-VC-60191	4.00-4.50 Ft	1270	31200	244	28.8B	15300	50.8J	130000	-8.1	0.24
OL-VC-60191	5.00-5.50 Ft	1300	33500	286	34.9B	18100	45.6J	131000	-3.8	0.26
OL-VC-60191	6.00-6.50 Ft	1060	34700	275	33.1B	17500	26.2J	143000	-7.8	0.24
OL-VC-60191	7.50-8.00 Ft	960	36300	295	33.6B	18500	24.8BJ	157000	-7.7	0.23
OL-VC-60274	0.25-0.50 Ft		1110					88300		0.01
OL-VC-60274	1.50-1.75 Ft		2580					4260		0.61
OL-VC-60274	2.00-2.50 Ft		10900				455	27900		0.39
OL-VC-60274	2.00-2.50 Ft		11100				536	27400		0.41
OL-VC-60274	3.00-3.50 Ft	1390	16500	35.6	97.1	8120	285	38100	-4.8	0.43
OL-VC-60274	4.00-4.50 Ft		17000				231	40400		0.42
OL-VC-60274	5.00-5.50 Ft		23500				286J	54300		0.43
OL-VC-60274	6.00-6.50 Ft	3180	27600	108	81.5	10300	212	60700	-11.8	0.45
OL-VC-60274	7.50-8.00 Ft	1740	31700	116	69.2	12900	215	72800	-15.4	0.44
OL-VC-60274	9.00-9.50 Ft	372	38000	42.4	12.7	19500	126	82600	-10.5	0.46
OL-VC-60275	0.25-0.50 Ft		1610					5720		0.28
OL-VC-60275	0.50-0.75 Ft		1460					5670		0.26
OL-VC-60275	0.75-1.00 Ft		1550					5640		0.27
OL-VC-60275	1.00-1.25 Ft							5770		
OL-VC-60275	1.25-1.50 Ft							6170		
OL-VC-60275	1.50-1.75 Ft		1820					6030		0.30
OL-VC-60275	2.00-2.50 Ft	219	1970	12.9	16.5	653	242	6300	-19.5	0.31
OL-VC-60275	2.00-2.50 Ft	165	1930	13.2	11.7	449	183	6260	-33.3	0.31
OL-VC-60275	3.00-3.50 Ft	286	2620	11.9	31.0	1280	57.8	7920	-2.3	0.33
OL-VC-60275	4.00-4.50 Ft	275	3090	12.7	36.6	1400	45.9	9460	-7.0	0.33
OL-VC-60275	5.00-5.50 Ft	167	3890	8.4	26.7	1040	39.2	10800	-33.6	0.36
OL-VC-60275	6.00-6.50 Ft	279	7550	16.0	28.5	1930	41.1	19700	-36.3	0.38
OL-VC-60275	7.50-8.00 Ft	737	16800	47.9	42.2	4680	11.8	42300	-31.8	0.40
OL-VC-60275	9.00-9.50 Ft	1160	27500	115	57.2	8250	61.9	65700	-29.0	0.42
OL-VC-60276	0.00-0.25 Ft		6670					19100		0.35
OL-VC-60276	0.25-0.50 Ft		6640					19900		0.33
OL-VC-60276	0.50-0.75 Ft		7610					21300		0.36
OL-VC-60276	0.75-1.00 Ft		7390					20800		0.36
OL-VC-60276	1.00-1.25 Ft		7760					22000		0.35
OL-VC-60276	1.25-1.50 Ft		7120					16900		0.42
OL-VC-60276	1.50-1.75 Ft		8130					21800		0.37
OL-VC-60276	2.00-2.50 Ft		9430				130	26000		0.36
OL-VC-60276	2.00-2.50 Ft		9850				147	26500		0.37
OL-VC-60276	3.00-3.50 Ft	652	14800	62.7	30.0	4940	129	38400	-24.8	0.39
OL-VC-60276	4.00-4.50 Ft	532	17200	66.8	30.7	5900	165	43900	-25.6	0.39
OL-VC-60276	5.00-5.50 Ft	1180	19700	79.8	23.2	5150	150J	50000	-31.7	0.39
OL-VC-60276	6.00-6.50 Ft		22600				151J	56400		0.40
OL-VC-60276	7.50-8.00 Ft	860	27500	115	37.7	10200	155J	66100	-22.1	0.42
OL-VC-60276	9.00-9.50 Ft	1000	33100	142	41.4	11700	96.2	78900	-24.2	0.42
OL-VC-60276	0.00-6.00 Ft									
OL-VC-60277	0.00-0.25 Ft		369					2070		0.18
OL-VC-60277	1.00-1.25 Ft		269					1540		0.17
OL-VC-60277	1.25-1.50 Ft		291					1430		0.20
OL-VC-60277	1.50-1.75 Ft		342					1420		0.24
OL-VC-60277	2.00-2.50 Ft	383	383	31.5	13.3	142	48.1	1530	41.0	0.25
OL-VC-60277	2.00-2.50 Ft		367				74.9	1530		0.24
OL-VC-60277	3.00-3.50 Ft	390	378	24.5	19.7	210	134	1570	39.6	0.24
OL-VC-60277	4.00-4.50 Ft	422	400	35.8	18.0	210	98.1	1520	43.2	0.26
OL-VC-60277	5.00-5.50 Ft		510				182	2010		0.25
OL-VC-60277	6.00-6.50 Ft		1150				74.6	3800		0.30
OL-VC-60277	7.50-8.00 Ft		5150				178	15200		0.34
OL-VC-60277	9.00-9.50 Ft		8050				140	22400		0.36
OL-VC-60278	0.00-0.25 Ft		625					2580		0.24

Table V-1

General Chemistry Data from Vibracore and Cation-Anion Balance

Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-VC-60278	0.25-0.50 Ft		686					2560		0.27
OL-VC-60278	0.50-0.75 Ft		652					2760		0.24
OL-VC-60278	0.75-1.00 Ft		646					2360		0.27
OL-VC-60278	3.00-3.50 Ft		1620				345	5610		0.29
OL-VC-60278	4.00-4.50 Ft		6760				141	19100		0.35
OL-VC-60278	5.00-5.50 Ft		11700				42.5	31600		0.37
OL-VC-60278	6.00-6.50 Ft		15700				27.7	39200		0.40
OL-VC-60278	7.50-8.00 Ft		24300				74.6	58200		0.42
OL-VC-60278	9.00-9.50 Ft	1270	32700	173	65.1	16300	163	75900	-8.0	0.43
OL-VC-60278	0.00-6.00 Ft									
OL-VC-60278A	2.00-2.50 Ft		3310				255	8980		0.37
OL-VC-60278A	3.00-3.50 Ft	447	8860	25.4	25.2	2740	51.7	23900	-27.0	0.37
OL-VC-60278A	4.00-4.50 Ft	508	12900	51.5	21.8	4400	14.3	34100	-24.4	0.38
OL-VC-60278A	5.00-5.50 Ft		15400				71.4	37800		0.41
OL-VC-60278A	6.00-6.50 Ft		19500				20.5	47200		0.41
OL-VC-60278A	7.50-8.00 Ft	392	29300	18.8	11.5J	1910	120	65100	-77.6	0.45
OL-VC-60278A	9.00-9.50 Ft		34100				194	75600		0.45
OL-VC-60278A	0.00-6.00 Ft									
OL-VC-60279	0.75-1.00 Ft		1770					7250		0.24
OL-VC-60279	1.00-1.25 Ft		2020					7190		0.28
OL-VC-60279	1.25-1.50 Ft		1860					6640		0.28
OL-VC-60279	1.50-1.75 Ft		944					6590		0.14
OL-VC-60279	3.00-3.50 Ft		458				476	2620		0.17
OL-VC-60279	4.00-4.50 Ft		617				376	3000		0.21
OL-VC-60279	5.00-5.50 Ft		2750				402	8920		0.31
OL-VC-60279	6.00-6.50 Ft		6100				254	17700		0.34
OL-VC-60279	7.50-8.00 Ft		10900				283	27900		0.39
OL-VC-60279	9.00-9.50 Ft		25200				40.3	61800		0.41
OL-VC-60281	3.00-3.50 Ft		2520				43.3	7850		0.32
OL-VC-60281	4.00-4.50 Ft		3790				100	11100		0.34
OL-VC-60281A	2.00-2.50 Ft		1050				1180	5440		0.19
OL-VC-60281A	2.00-2.50 Ft		984				2840	6700		0.15
OL-VC-60281A	3.00-3.50 Ft	417	1200	36.1	39.1	430	704	5130	-5.5	0.23
OL-VC-60281A	4.00-4.50 Ft	309	1500	29.1	26.9	484	10.6	5620	-3.6	0.27
OL-VC-60281A	5.00-5.50 Ft		1680				404	5880		0.29
OL-VC-60281A	6.00-6.50 Ft		1570				153	5680		0.28
OL-VC-60281A	7.50-8.00 Ft		1680				200	5950		0.28
OL-VC-60281A	9.00-9.50 Ft		2230				498	8060		0.28
OL-VC-60282	0.00-0.25 Ft		1740					5790		0.30
OL-VC-60282	0.25-0.50 Ft		2240					6990		0.32
OL-VC-60282	3.00-3.50 Ft	841	16400	140	25.5	3320	28.8J	41100	-40.0	0.40
OL-VC-60282	5.00-5.50 Ft		19900				132	49700		0.40
OL-VC-60283	0.75-1.00 Ft		2300					7950		0.29
OL-VC-60283	1.25-1.50 Ft		2410					7900		0.31
OL-VC-60283	1.50-1.75 Ft		2680					8890		0.30
OL-VC-60283	2.00-2.50 Ft		2710				183	8810		0.31
OL-VC-60283	2.00-2.50 Ft		2810				269	9350		0.30
OL-VC-60283	4.00-4.50 Ft		13600				91.8J	37000		0.37
OL-VC-60283	5.00-5.50 Ft		17800				46.3J	46000		0.39
OL-VC-60283	6.00-6.50 Ft		19600				81.7J	51700		0.38
OL-VC-60284	1.00-1.25 Ft		4070					12100		0.34
OL-VC-60284	1.50-1.75 Ft		4870					14300		0.34
OL-VC-60284	2.00-2.50 Ft		6400				137J	18300		0.35
OL-VC-60284	3.00-3.50 Ft	597	7670	223	45.3	3410	10.5	21100	-4.6	0.36
OL-VC-60284	4.00-4.50 Ft	532	8290	205	46.8	3840	17.3	22500	-5.1	0.37
OL-VC-60284	4.00-4.50 Ft	517	8260	190	45.0	3640	22.2	22900	-7.5	0.36
OL-VC-60284	5.00-5.50 Ft	518	8890	93.7	35.4	3200	56.7	24300	-18.4	0.37
OL-VC-60284	6.00-6.50 Ft	790	10600	139	54.4	5860	67.6	28600	1.1	0.37
OL-VC-60284	7.50-8.00 Ft	516	14300	118	34.0	4960	16.7	38100	-23.1	0.38
OL-VC-60284	9.00-9.50 Ft		18900				118	47400		0.40
OL-VC-60285	0.25-0.50 Ft		2870					9440		0.30
OL-VC-60285	0.50-0.75 Ft		3360					10800		0.31
OL-VC-60285	0.75-1.00 Ft		3670					11500		0.32
OL-VC-60285	1.00-1.25 Ft		3400					10900		0.31
OL-VC-60285	1.25-1.50 Ft		4650					14100		0.33
OL-VC-60285	1.50-1.75 Ft		4300					12900		0.33
OL-VC-60285	2.00-2.50 Ft	1780	6040	125	28.4	2630	131J	16700	10.6	0.36
OL-VC-60285	3.00-3.50 Ft		7960				98.7	22300		0.36
OL-VC-60285	3.00-3.50 Ft		7940				134J	22300		0.36

Table V-1

General Chemistry Data from Vibracore and Cation-Anion Balance

Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-VC-60285	6.00-6.50 Ft		16500				70.8	43800		0.38
OL-VC-60285	7.50-8.00 Ft	1610	20200	465	131	9200	55.6	52200	-4.5	0.39
OL-VC-60286	0.75-1.00 Ft		4970					14700		0.34
OL-VC-60286	1.00-1.25 Ft		5860					17400		0.34
OL-VC-60286	1.25-1.50 Ft		7970					1400		5.69
OL-VC-60286	1.50-1.75 Ft		6910							
OL-VC-60286	2.00-2.50 Ft		12900				269	33200		0.39
OL-VC-60286	4.00-4.50 Ft	3070	28200	662	236	10600	18.3J	61300	-8.2	0.46
OL-VC-60286	5.00-5.50 Ft	3560	31500	890	306	12800	14.7J	70600	-4.3	0.45
OL-VC-60286	6.00-6.50 Ft	3890	33900	1030	322	14200	16.4J	74700	-2.8	0.45
OL-VC-60286	7.50-8.00 Ft	4060	37100	1110	363	15600	25.3J	82500	-3.2	0.45
OL-VC-60287	0.75-1.00 Ft		2780					9130		0.30
OL-VC-60287	1.00-1.25 Ft		3170					10300		0.31
OL-VC-60287	1.25-1.50 Ft		4130					12900		0.32
OL-VC-60287	1.50-1.75 Ft		5220					15400		0.34
OL-VC-60287	2.00-2.50 Ft	711	9400	69.8	83.2	4330	19.0	24900	-6.8	0.38
OL-VC-60287	3.00-3.50 Ft		16600				33.2	42400		0.39
OL-VC-60287	4.00-4.50 Ft	2790	20600	366	248	8130	13.2J	51900	-4.7	0.40
OL-VC-60287	5.00-5.50 Ft	4350	26600	698	373	10200	16.9J	62000	-1.5	0.43
OL-VC-60287	6.00-6.50 Ft		29900				44.3	67900		0.44
OL-VC-60288	1.50-1.75 Ft		6180					13900		0.44
OL-VC-60288	2.00-2.50 Ft		9710				36.7	26500		0.37
OL-VC-60288	2.00-2.50 Ft		10100				39.0	27600		0.37
OL-VC-60288	3.00-3.50 Ft		13500				30.9	34900		0.39
OL-VC-60288	4.00-4.50 Ft		19000				14.7J	47900		0.40
OL-VC-60288	5.00-5.50 Ft	865	26800	123	72.6	10300	11.4J	65000	-20.1	0.41
OL-VC-60288	6.00-6.50 Ft		33000				26.8J	77000		0.43
OL-VC-60288	7.50-8.00 Ft	1560	40500	209	90.8	16100	36.7	92400	-17.8	0.44
OL-VC-60288	9.00-9.50 Ft	1960	44700	258	97.8	18600	12.6J	102000	-15.1	0.44
OL-VC-60289	0.25-0.50 Ft		981					4220		0.23
OL-VC-60289	0.00-0.25 Ft		1020					4610		0.22
OL-VC-60289	0.50-0.75 Ft		1030					4250		0.24
OL-VC-60289	0.75-1.00 Ft		1130					4550		0.25
OL-VC-60289	1.00-1.25 Ft		1160					4790		0.24
OL-VC-60289	2.00-2.50 Ft		3310				653	11200		0.30
OL-VC-60289	3.00-3.50 Ft		7680				91.2	22800		0.34
OL-VC-60289	4.00-4.50 Ft	841	16200	150	33.2	5800	40.0	121000	-19.6	0.13
OL-VC-60289	5.00-5.50 Ft	823	28600	186	44.4	11700	27.2	93800	-17.5	0.30
OL-VC-60289	6.00-6.40 Ft	1410	33400	201	43.5	12000	90.6	79600	-21.5	0.42
OL-VC-60290	0.00-0.25 Ft		616					3080		0.20
OL-VC-60290	0.25-0.50 Ft		649					3250		0.20
OL-VC-60290	0.50-0.75 Ft		700					3690		0.19
OL-VC-60290	0.75-1.00 Ft		791					4030		0.20
OL-VC-60290	1.00-1.25 Ft		965					5040		0.19
OL-VC-60290	1.25-1.50 Ft		1060					5680		0.19
OL-VC-60290	1.50-1.75 Ft		1210					6250		0.19
OL-VC-60290	2.00-2.50 Ft		1570				44.0J	7650		0.21
OL-VC-60290	2.00-2.50 Ft	307	1660	84.0	32.7	536	17.9J	8340	-0.9	0.20
OL-VC-60290	3.00-3.50 Ft	564	2280	114	49.9	830	28.1	10700	7.2	0.21
OL-VC-60290	4.00-4.50 Ft	855	2840	112	52.0	1040	39.6	12500	9.8	0.23
OL-VC-60290	5.00-5.50 Ft	254	3660	84.5	56.0	1510	13.8	15000	-8.8	0.24
OL-VC-60290	6.00-6.50 Ft	388	5810	97.3	70.4	2770	11.4	20500	-4.6	0.28
OL-VC-60290	7.50-8.00 Ft	253	7470	89.2	66.9	3590	67.6	24000	-8.8	0.31
OL-VC-60290	9.00-9.50 Ft	364	11100	128	72.0	5870	21.4	32900	-4.6	0.34
OL-VC-60290A	0.00-0.25 Ft		670					3870		0.17
OL-VC-60290A	0.50-0.75 Ft		877					4250		0.21
OL-VC-60290A	0.75-1.00 Ft		1030					5010		0.21
OL-VC-60290A	1.00-1.25 Ft		1380					6820		0.20
OL-VC-60290A	1.25-1.50 Ft		1480					7330		0.20
OL-VC-60290A	1.50-1.75 Ft		1700					8400		0.20
OL-VC-60290A	2.00-2.50 Ft	370	2230	101	43.2	775	31.2J	10500	-1.6	0.21
OL-VC-60290A	2.00-2.50 Ft	289	2210	94.9	46.1	797	15.1J	10700	-3.8	0.21
OL-VC-60290A	3.00-3.50 Ft	74.4	2820	37.8	38.9	722	70.4	10900	-34.8	0.26
OL-VC-60290A	4.00-4.50 Ft	298	3470	115	63.1	1450	8.0	15500	-4.8	0.22
OL-VC-60290A	5.00-5.50 Ft	347		88.0	52.6	1480		42300	100.0	
OL-VC-60290A	6.00-6.50 Ft	414	6120	118	70.8	2630	14.8	21500	-8.2	0.28
OL-VC-60290A	7.50-8.00 Ft	398	9130	112	80.1	4060	7.7J	28200	-10.7	0.32
OL-VC-60290A	9.00-9.50 Ft		14100				8.6J	39600		0.36
OL-VC-60291	3.00-3.50 Ft		14900				171B	36400		0.41

Table V-1

General Chemistry Data from Vibracore and Cation-Anion Balance

Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-VC-60291	4.00-4.50 Ft		17000				111B	43000		0.40
OL-VC-60291	5.00-5.50 Ft		18900				22.7	49200		0.38
OL-VC-60291	6.00-6.50 Ft		20000				24.9	50800		0.39
OL-VC-60291	7.50-8.00 Ft		22000				24.5	55200		0.40
OL-VC-60292	2.00-2.50 Ft		10800				60.0	29000		0.37
OL-VC-60292	3.00-3.50 Ft		12000				107	31800		0.38
OL-VC-60292	4.00-4.50 Ft	1170	14400	264	42.5	7280	41.8	37900	-1.1	0.38
OL-VC-60292	5.00-5.50 Ft	1230	15700	284	47.4	8120	56.4	40700	-0.5	0.39
OL-VC-60292	6.00-6.50 Ft		16400				91.2	42500		0.39
OL-VC-60292	7.50-8.00 Ft	1250	17200	303	54.8	10200	129	44000	4.4	0.39
OL-VC-60292	9.00-9.40 Ft	1170	18200	280	54.4	9880	157	47600	-0.4	0.38
OL-VC-60293	0.75-1.00 Ft		1000					4030		0.25
OL-VC-60293	1.00-1.25 Ft		1420					5320		0.27
OL-VC-60293	1.25-1.50 Ft		1730					5920		0.29
OL-VC-60293	3.00-3.50 Ft		5310				10.5	16100	-100.0	0.33
OL-VC-60293	4.00-4.50 Ft		6160				19.6	17900	-100.0	0.34
OL-VC-60293	5.00-5.50 Ft	1100	7490	122	29.3	3600	10.7	21900	2.5	0.34
OL-VC-60293	6.00-6.50 Ft	710	8450	116	21.5	4010	14.7	24200	-4.1	0.35
OL-VC-60293	7.50-8.00 Ft	840	10100	142	19.8	5330	13.1	28400	0.1	0.36
OL-VC-60293	9.00-9.50 Ft	792	11500	147	26.2	6160	18.5	31900	-0.7	0.36
OL-VC-60294	0.00-0.25 Ft		824					3140		0.26
OL-VC-60294	0.25-0.50 Ft		1320					4630		0.29
OL-VC-60294	2.00-2.50 Ft		5360				4.7J	15300		0.35
OL-VC-60294	3.00-3.50 Ft		6150				4.4J	18200		0.34
OL-VC-60294	4.00-4.50 Ft	768	6920	122	27.7	3470	6.7J	20200	1.2	0.34
OL-VC-60294	5.00-5.50 Ft	741	7810	121	27.3	3600	17.1	22300	-3.9	0.35
OL-VC-60294	6.00-6.50 Ft	497	8450	95.9	20.2	2560	26.3	25000	-24.6	0.34
OL-VC-60294	7.50-8.00 Ft	890	10100	148	19.8	5310	96.2	28000	0.2	0.36
OL-VC-60294	9.00-9.50 Ft	789	11700	170	26.1	5600	90.3	31700	-5.4	0.37
OL-VC-60294A	0.00-0.25 Ft		579					2620		0.22
OL-VC-60294A	0.25-0.50 Ft									
OL-VC-60294A	0.50-0.75 Ft		823					3490		0.24
OL-VC-60294A	3.00-3.50 Ft	600	6580	91.8	21.0	2350	15.9	19700	-14.0	0.33
OL-VC-60294A	4.00-4.50 Ft	764	7280	117	24.9	2850	26.9	20800	-8.9	0.35
OL-VC-60294A	5.00-5.50 Ft		8070				34.3J	23000		0.35
OL-VC-60294A	5.00-5.50 Ft		8010				46.3J	23100		0.35
OL-VC-60294A	6.00-6.50 Ft	491	8590	77.6	9.4J	2520	37.3J	25300	-26.7	0.34
OL-VC-60294A	7.50-8.00 Ft	541	10000	86.0	9.3J	2680	27.1	29200	-30.4	0.34
OL-VC-60294A	9.00-9.50 Ft	521	14100	78.8	9.7J	2970	30.4	32500	-42.2	0.43
OL-VC-60295	0.00-0.25 Ft		5940					18000		0.33
OL-VC-60295	0.25-0.50 Ft		6640					20000		0.33
OL-VC-60295	5.00-5.50 Ft	427	11600	49.1	13.5	1300	2360BJ	32000	-64.1	0.36
OL-VC-60295	6.00-6.50 Ft	1600	13300	223	55.8	6540	96.4	3750	0.9	3.55
OL-VC-60295	7.50-8.00 Ft	1150		238	56.6	8280				
OL-VC-60295	9.00-9.50 Ft	1490		220	55.2	6680				
OL-VC-60296	0.00-0.25 Ft		807					3400		0.24
OL-VC-60296	0.25-0.50 Ft		1170					4430		0.26
OL-VC-60296	0.50-0.75 Ft		1950					6710		0.29
OL-VC-60296	0.75-1.00 Ft		2270					7730		0.29
OL-VC-60296	2.00-2.50 Ft		4390				88.5	13100		0.34
OL-VC-60296	3.00-3.50 Ft		8970				79.0	24800		0.36
OL-VC-60296	4.00-4.50 Ft	893	10600	191	30.0	3100	44.1	29100	-21.0	0.36
OL-VC-60296	5.00-5.50 Ft	822	11700	210	30.6	3600	42.2	31600	-21.1	0.37
OL-VC-60296	6.00-6.50 Ft	1320	12800	304	35.2	5540	53.1	34200	-4.2	0.37
OL-VC-60296	7.50-8.00 Ft	1270	14200	306	42.8	5640	98.3	37800	-9.2	0.38
OL-VC-60296	9.00-9.50 Ft	1710	16000	436	48.1	7100	25.7	42300	-2.3	0.38
OL-VC-60297	0.00-0.25 Ft		1960					6290		0.31
OL-VC-60297	0.25-0.50 Ft		3070					9550		0.32
OL-VC-60297	0.50-0.75 Ft		4070					11200		0.36
OL-VC-60297	0.75-1.00 Ft		5110					14800		0.35
OL-VC-60297	1.00-1.25 Ft		6130					17600		0.35
OL-VC-60297	1.25-1.50 Ft		7240					20500		0.35
OL-VC-60297	1.50-1.75 Ft		8480					24400		0.35
OL-VC-60297	2.00-2.50 Ft	508	11800	202	55.3	5520	28.0	32500	-8.1	0.36
OL-VC-60297	3.00-3.50 Ft	1010	15900	268	74.9	7050	19.1	42100	-8.2	0.38
OL-VC-60297	4.00-4.50 Ft	803	20200	317	94.4	8690	31.5	52800	-12.2	0.38
OL-VC-60297	5.00-5.50 Ft	869	24200	359	105B	12600	8.2J	58700	-4.5	0.41
OL-VC-60297	6.00-6.50 Ft	1210	27200	390	122B	11700	7.8J	65600	-11.9	0.41

Table V-1

General Chemistry Data from Vibracore and Cation-Anion Balance

Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-VC-60297	7.50-8.00 Ft	1270	32400	454	156B	14800	7.1J	75200	-10.0	0.43
OL-VC-60297	9.00-9.50 Ft	1250	37600	420	149B	13900	9.9J	86500	-20.1	0.43
OL-VC-60302	0.75-1.00 Ft		21800					58200		0.37
OL-VC-60302	1.00-1.25 Ft		24000					62000		0.39
OL-VC-60302	1.25-1.50 Ft		25700					67000		0.38
OL-VC-60302	1.50-1.75 Ft		25200					63300		0.40
OL-VC-60302	2.00-2.50 Ft		33100				38.1J	80100		0.41
OL-VC-60302	2.00-2.50 Ft		32900				47.0	78300		0.42
OL-VC-60302	3.00-3.50 Ft		36900				80.5	87500		0.42
OL-VC-60302	4.00-4.50 Ft	1040	41100	92.2	34.8	7060	51.4	95200	-51.9	0.43
OL-VC-60302	5.00-5.50 Ft	677	42200	129	44.3	9610	33.6J	99000	-44.0	0.43
OL-VC-60302	6.00-6.50 Ft	757	46100	117	38.3	7860	34.9J	103000	-53.8	0.45
OL-VC-60302	7.50-8.00 Ft	745	46200	162	51.3	11400	34.2J	103000	-40.8	0.45
OL-VC-60302	9.00-9.50 Ft	613	47200	130	41.5	9530	35.2J	106000	-48.9	0.45
OL-VC-60303	0.00-0.25 Ft		885					3500		0.25
OL-VC-60303	1.25-1.50 Ft		5920					17800		0.33
OL-VC-60303	1.50-1.75 Ft		6600					19300		0.34
OL-VC-60303	2.00-2.50 Ft		8570				113	24400		0.35
OL-VC-60303	2.00-2.50 Ft	370	9400	80.0	8.3	3250	71.9	25900	-23.1	0.36
OL-VC-60303	3.00-3.50 Ft		9320				33.9	26200		0.36
OL-VC-60303	4.00-4.50 Ft		10700				168	27000		0.40
OL-VC-60303	5.00-5.50 Ft	538	12600	92.8	7.5J	3190	33.1	35100	-34.5	0.36
OL-VC-60303	6.00-6.50 Ft		13300				48.6	35400		0.38
OL-VC-60303	7.50-8.00 Ft	535	15200	106	9.6J	4820	106	40300	-27.4	0.38
OL-VC-60303	9.00-9.50 Ft	596	17300	113	9.9J	4360	69.2	45400	-36.3	0.38
OL-VC-60304	1.50-1.75 Ft		10200					22900		0.45
OL-VC-60304	2.00-2.50 Ft		12500				141	32400		0.39
OL-VC-60304	2.00-2.50 Ft		12900				193	31700		0.41
OL-VC-60304	3.00-3.50 Ft							38300		
OL-VC-60304	4.00-4.50 Ft		16800				114	41700		0.40
OL-VC-60304	5.00-5.50 Ft		17700				122	43700		0.41
OL-VC-60304	6.00-6.50 Ft		18900				68.8	49000		0.39
OL-VC-60304	7.50-8.00 Ft		20200				114	51500		0.39
OL-VC-60304	9.00-9.50 Ft	169	21900	36.8	3.0	7050	118	53300	-32.2	0.41
OL-VC-70057	0.50-1.00 Ft	1080	7600	63.0	30.0	2910	39.7J	23200	-7.2	0.33
OL-VC-70057	1.00-1.50 Ft	1710	9940	58.8	55.7	4900	39.5J	35000	4.0	0.28
OL-VC-70057	1.50-2.00 Ft	1700	11700	45.8	64.0	5530	47.3J	38300	0.0	0.31
OL-VC-70057	2.00-2.50 Ft	2060	15000	50.5	82.2	6640	21.5J	47000	-3.1	0.32
OL-VC-70057	2.50-3.00 Ft	2050	14100	51.4	82.0	6920	15.0J	47000	1.4	0.30
OL-VC-70057	3.50-4.00 Ft	1940	13400	80.0	80.4	7370	6.4J	49500	6.0	0.27
OL-VC-70057	4.50-5.00 Ft	1750	15500	106	74.6	8280	3.0J	51400	2.3	0.30
OL-VC-70057	6.00-6.50 Ft	1390	17400	140	67.2	9070	3.1J	54400	-1.4	0.32
OL-VC-70057	7.50-8.00 Ft	1140	16900	165	62.8	9510	3.6J	56400	0.9	0.30
OL-VC-70058	0.50-1.00 Ft	1480	9480	58.1	43.4	3940	43.9	29600	-3.3	0.32
OL-VC-70058	1.00-1.50 Ft	1820	11500	46.8	60.2	5160	64.8	38400	-0.8	0.30
OL-VC-70058	1.50-2.00 Ft	1950	13400	46.2	67.9	5310	50.9	40800	-6.3	0.33
OL-VC-70058	2.00-2.50 Ft	1980	14500	59.5	73.6	6750	15.2J	48200	-1.3	0.30
OL-VC-70058	2.50-3.00 Ft	2010	15100	72.4	77.0	7200	11.3J	49400	-0.6	0.31
OL-VC-70058	3.50-4.00 Ft	1750	15700	97.4	73.0	7840	8.9J	50400	-0.5	0.31
OL-VC-70058	4.50-5.00 Ft	1380	14700	135	68.0	8410	3.4J	52600	3.8	0.28
OL-VC-70058	6.00-6.50 Ft	991	19500	165	62.0	9380	2.3J	55200	-7.6	0.35
OL-VC-70058	7.50-8.00 Ft	821	16300	174	57.4	9800	1.2J	56300	2.5	0.29
OL-VC-70059	0.50-1.00 Ft	1930	12600	49.0	64.0	5190	21.3J	39800	-4.1	0.32
OL-VC-70059	1.00-1.50 Ft	2030	15300	44.2	70.3	5640	27.7	41900	-10.2	0.37
OL-VC-70059	1.50-2.00 Ft	2120	14900	47.8	77.0	6330	21.6J	45000	-4.2	0.33
OL-VC-70059	2.00-2.50 Ft	2080	17900	67.2	81.3	7350	5.2J	49800	-7.9	0.36
OL-VC-70059	2.50-3.00 Ft	2030	16400	75.3	80.1	7610	3.3J	50200	-2.4	0.33
OL-VC-70059	3.50-4.00 Ft	1520	16100	96.9	65.5	6980	2.7J	51200	-7.7	0.31
OL-VC-70059	4.50-5.00 Ft	1410	16900	139	72.0	9050	25.0U	53200	0.0	0.32
OL-VC-70059	6.00-6.50 Ft	979	17500	159	61.6	9100	2.6J	55200	-3.6	0.32
OL-VC-70059	7.50-8.00 Ft	803	18200	174	58.3	10300	2.2J	57800	-0.9	0.31
OL-VC-70061	0.50-1.00 Ft	388	9320	127	14.4J	5480	49.1	31400	0.9	0.30
OL-VC-70061	1.00-1.50 Ft	507	14500	185	16.2J	8310	35.9	49000	-0.9	0.30
OL-VC-70061	1.50-2.00 Ft	632	20200	236	17.9J	11400	15.6J	60600	-2.0	0.33
OL-VC-70061	2.00-2.50 Ft	782	24900	279	20.7J	13900	50.0U	76700	-2.6	0.32
OL-VC-70061	2.50-3.00 Ft	761	25600	275	20.3J	14400	50.0U	77800	-2.5	0.33
OL-VC-70061	3.50-4.00 Ft	790	26700	282	21.0J	14300	50.0U	83000	-4.8	0.32
OL-VC-70061	4.50-5.00 Ft	911	36200	321	24.8J	18400	50.0U	95600	-7.9	0.38
OL-VC-70061	6.00-6.50 Ft	947	38500	341	26.6	17900	50.0U	97400	-12.0	0.40

Table V-1

General Chemistry Data from Vibracore and Cation-Anion Balance

Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-VC-70061	7.50-8.00 Ft	960	43800	350	26.1	19300	50.0U	10300	-14.8	4.25
OL-VC-70062	0.50-1.00 Ft	429	9580	129	12.4J	4650	33.2	27800	-7.2	0.34
OL-VC-70062	1.00-1.50 Ft	562	15200	188	15.0J	8180	27.1	44200	-3.6	0.34
OL-VC-70062	1.50-2.00 Ft		12900	229	15.6J	10100	11.0J	56300	11.5	0.23
OL-VC-70062	2.00-2.50 Ft	811	27900	279	19.7J	13700	50.0U	74000	-8.9	0.38
OL-VC-70062	2.50-3.00 Ft	844	37900	291	20.6J	14200	50.0U	77000	-22.0	0.49
OL-VC-70062	3.50-4.00 Ft	901	29800	303	21.5J	15400	50.0U	83000	-6.4	0.36
OL-VC-70062	4.50-5.00 Ft	964	34200	319	24.1J	16900	50.0U	94000	-8.8	0.36
OL-VC-70062	6.00-6.50 Ft	990	34900	340	26.1	18600	50.0U	99800	-5.3	0.35
OL-VC-70062	7.50-8.00 Ft	991	37600	368	29.8	20100	50.0U	102000	-5.3	0.37
OL-VC-70063	0.50-1.00 Ft	478	10900	135	15.0J	5620	36.6	31200	-4.8	0.35
OL-VC-70063	1.00-1.50 Ft	624	15200	184	15.0J	8060	28.0	47200	-3.9	0.32
OL-VC-70063	1.50-2.00 Ft	771	20000	233	17.5J	10800	16.9J	60000	-3.4	0.33
OL-VC-70063	2.00-2.50 Ft	985	27000	290	22.2J	14300	50.0U	81200	-4.6	0.33
OL-VC-70063	2.50-3.00 Ft	986	30400	294	23.6J	15600	50.0U	84800	-6.6	0.36
OL-VC-70063	3.50-4.00 Ft	1060	31800	308	24.0J	15700	50.0U	89800	-8.2	0.35
OL-VC-70063	4.50-5.00 Ft	1120	34100	318	26.9	18300	50.0U	104000	-4.6	0.33
OL-VC-70063	6.00-6.50 Ft	1060	36800	339	29.0	18200	50.0U	108000	-8.7	0.34
OL-VC-70063	7.50-8.00 Ft	1010	39000	350	27.4	19800	3.2J	108000	-7.8	0.36
OL-VC-70089	0.00-0.30 Ft		492					4380		0.11
OL-VC-70089	0.30-0.50 Ft		546					5210		0.10
OL-VC-70089	0.50-0.80 Ft		673					6290		0.11
OL-VC-70089	0.80-1.00 Ft		744					6290		0.12
OL-VC-70089	1.00-1.30 Ft		944					9510		0.10
OL-VC-70089	1.30-1.50 Ft		1100					10800		0.10
OL-VC-70089	1.50-1.80 Ft		1310					12400		0.11
OL-VC-70089	2.00-2.50 Ft	275	2220	526	27.1B	850	122	19300	18.5	0.12
OL-VC-70089	3.00-3.50 Ft	175	2990	957	33.2B	1200	119	22800	23.6	0.13
OL-VC-70089	4.00-4.50 Ft	107	3640	794	30.3B	1210	80.0	23400	8.6	0.16
OL-VC-70089	5.00-5.50 Ft	204	3920	760	38.0B	1640	93.4	20300	12.6	0.19
OL-VC-70089	6.00-6.50 Ft	314	4230	390	29.0B	1530	703	27000	-7.6	0.16
OL-VC-70089	7.50-8.00 Ft	397	3960	250	28.5B	1890	88.3	27900	4.1	0.14
OL-VC-70089	9.00-9.50 Ft	524	4950	204	30.1B	2800	56.5	28200	8.1	0.18
OL-VC-70093	0.00-0.30 Ft		448					3750		0.12
OL-VC-70093	0.30-0.50 Ft		429					3840		0.11
OL-VC-70093	1.00-1.30 Ft		787					5430		0.14
OL-VC-70093	1.30-1.50 Ft		819					6380		0.13
OL-VC-70093	1.50-1.80 Ft		879					7460		0.12
OL-VC-70093	2.00-2.50 Ft	256	2050	242	19.0B	687	149	10400	1.7	0.20
OL-VC-70093	3.00-3.50 Ft	186	2560	303	18.3B	680	213	13600	-8.8	0.19
OL-VC-70093	4.00-4.50 Ft	179	2840	267	15.6B	641	387	12600	-19.7	0.23
OL-VC-70093	5.00-5.50 Ft	326	3400	426	26.6B	1210	664	15500	-2.4	0.22
OL-VC-70093	6.00-6.50 Ft	340	3860	388	25.4B	1340	608	20400	-6.0	0.19
OL-VC-70093	7.50-8.00 Ft	407	4820	348	23.8B	1600	724	20200	-11.8	0.24
OL-VC-70093	9.00-9.30 Ft	315	6230	250	19.8B	1750	821	28400	-26.1	0.22
OL-VC-70100	0.00-0.30 Ft		719					4290		0.17
OL-VC-70100	0.30-0.50 Ft		675					3960		0.17
OL-VC-70100	0.50-0.80 Ft		1100					6230		0.18
OL-VC-70100	0.80-1.00 Ft		1200					6880		0.17
OL-VC-70100	1.00-1.30 Ft		2110					10500		0.20
OL-VC-70100	1.30-1.50 Ft		2140					10500		0.20
OL-VC-70100	1.50-1.80 Ft		2040					11200		0.18
OL-VC-70100	2.00-2.50 Ft	343	3670	233	19.7B	1600	313	20400	-1.7	0.18
OL-VC-70100	3.00-3.50 Ft	395	4780	255	21.1B	2020	307	26300	-4.5	0.18
OL-VC-70100	4.00-4.50 Ft	508	4300	252	22.0B	2470	548	28100	7.5	0.15
OL-VC-70100	5.00-5.50 Ft	502	5240	206	21.3B	2920	381	33100	4.3	0.16
OL-VC-70100	6.00-6.50 Ft	510	6200	190	23.6B	3750	227	39900	6.6	0.16
OL-VC-70100	7.50-8.00 Ft	407	7710	135	19.8B	3720	176	41400	-6.6	0.19
OL-VC-70100	9.00-9.50 Ft	524	9360	181	28.3B	5730	54.3	47900	4.7	0.20
OL-VC-70102	0.00-0.30 Ft		1410					9200		0.15
OL-VC-70102	0.30-0.50 Ft		2390					9980		0.24
OL-VC-70102	0.50-0.80 Ft		3500					13300		0.26
OL-VC-70102	0.80-1.00 Ft		7160					21400		0.33
OL-VC-70102	1.00-1.30 Ft		11400					42700		0.27
OL-VC-70102	1.30-1.50 Ft		14800					520		28.46
OL-VC-70102	1.50-1.80 Ft		17700					60800		0.29
OL-VC-70102	2.00-2.50 Ft	500	24500	203	13.0B	9190	246	94600	-22.4	0.26
OL-VC-70102	3.00-3.50 Ft	496	26300	214	14.1B	10000	100	102000	-21.8	0.26
OL-VC-70102	4.00-4.50 Ft	349	28200	148	10.1B	7090	137	89900	-40.5	0.31

Table V-1

General Chemistry Data from Vibracore and Cation-Anion Balance

Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-VC-70102	5.00-5.50 Ft	433	30600	183	13.0B	9180	106	117000	-33.0	0.26
OL-VC-70102	6.00-6.50 Ft	606	31400	256	17.9B	12900	93.4BG	117000	-18.3	0.27
OL-VC-70102	7.50-8.00 Ft	657	34200	280	19.0B	14200	25.3BG	126000	-17.8	0.27
OL-VC-70144	0.00-0.25 Ft		9880					26700		0.37
OL-VC-70144	0.25-0.50 Ft		12300					32800		0.38
OL-VC-70144	0.50-0.75 Ft		12500					33200		0.38
OL-VC-70144	0.75-1.00 Ft		12900					34200		0.38
OL-VC-70144	1.00-1.25 Ft		12500					33500		0.37
OL-VC-70144	1.25-1.50 Ft		12400					33100		0.37
OL-VC-70144	1.50-1.75 Ft		12700					33700		0.38
OL-VC-70144	3.00-3.50 Ft		15100				35.0	39300		0.38
OL-VC-70144	4.00-4.50 Ft	812	18300	142	55.9	10400	17.3J	101000	-1.0	0.18
OL-VC-70144	5.00-5.50 Ft	665	19500	154	53.1	10400	9.9J	51500	-4.8	0.38
OL-VC-70144	6.00-6.50 Ft	705	20900	173	52.5	12400	8.1J	54300	0.0	0.38
OL-VC-70144	7.50-8.00 Ft	1090	22200	185	45.5	11300	13.3J	123000	-5.4	0.18
OL-VC-70144	9.00-9.50 Ft	711	24700	185	42.7	11900	9.5J	62300	-10.1	0.40
OL-VC-70145	0.00-0.25 Ft		8590					24800		0.35
OL-VC-70145	0.25-0.50 Ft		15000					6840		2.19
OL-VC-70145	0.50-0.75 Ft		19800					49300		0.40
OL-VC-70145	2.00-2.50 Ft		40000				19.7J	88800		0.45
OL-VC-70145	3.00-3.50 Ft	1510	44100	165	67.6	9340	14.2J	97400	-42.9	0.45
OL-VC-70145	4.00-4.50 Ft	1310	46400	181	67.6	9900	13.1J	100000	-43.7	0.46
OL-VC-70145	5.00-5.50 Ft		47300				21.7J	106000		0.45
OL-VC-70145	5.00-5.50 Ft		47500				24.7J	104000		0.46
OL-VC-70145	6.00-6.50 Ft	1620	48200	249	57.5	20600	18.1J	107000	-15.3	0.45
OL-VC-70145	7.50-8.00 Ft	961	50000	229	39.9	15800	13.3J	109000	-30.3	0.46
OL-VC-70145	9.00-9.50 Ft	959	50900	236	36.7	15300	13.8J	110000	-32.4	0.46
OL-VC-70146	2.00-2.50 Ft		39700				15.9J	95500		0.42
OL-VC-70146	2.00-2.50 Ft	3270	40000	214	103	19900	13.3J	95800	-3.7	0.42
OL-VC-70146	3.00-3.50 Ft	3080	44000	257	113	23800	15.5J	101000	-1.2	0.44
OL-VC-70146	4.00-4.50 Ft		45500				18.7J	106000		0.43
OL-VC-70146	5.00-5.50 Ft	2260	47100	364	60.1J	26700	15.6J	109000	-0.9	0.43
OL-VC-70146	0.00-6.00 Ft									
OL-VC-70146	6.00-6.50 Ft	1770	46700	317	81.0	26600	11.1J	104000	-1.7	0.45
OL-VC-70146	7.50-8.00 Ft	1560	49900	326	73.9	27500	15.6J	104000	-3.9	0.48
OL-VC-70146	9.00-9.50 Ft	1570	50000	355	70.6	28600	12.1J	102000	-2.1	0.49
OL-VC-70147	3.00-3.50 Ft	2580	12900	139	15.6	7520	10.7J	34500	12.5	0.37
OL-VC-70147	4.00-4.50 Ft	940	14300	142	15.7	7950	10.6J	38000	0.2	0.38
OL-VC-70147	5.00-5.50 Ft	1790	16000	160	16.2	8800	11.6J	41800	3.6	0.38
OL-VC-70147	6.00-6.50 Ft	1380	17000	166	17.1	9570	16.0U	44800	2.0	0.38
OL-VC-70147	7.50-8.00 Ft	2010	19200	193	21.1	12200	10.4J	47900	8.9	0.40
OL-VC-70148	0.00-0.25 Ft		590					2770		0.21
OL-VC-70148	0.25-0.50 Ft		708					3650		0.19
OL-VC-70148	0.50-0.75 Ft		792					4200		0.19
OL-VC-70148	0.75-1.00 Ft		880					4590		0.19
OL-VC-70148	0.75-1.00 Ft		907					4730		0.19
OL-VC-70148	1.00-1.25 Ft		1050					5230		0.20
OL-VC-70148	1.25-1.50 Ft		1070					5820		0.18
OL-VC-70148	1.50-1.75 Ft		1250					6580		0.19
OL-VC-70148	2.00-2.50 Ft	246	1520	189	37.3	717	5.8	8280	16.5	0.18
OL-VC-70148	3.00-3.50 Ft		1860				21.6	8980		0.21
OL-VC-70148	3.00-3.50 Ft	193	1950	232	46.3	857	14.1	9260	9.7	0.21
OL-VC-70148	4.00-4.50 Ft	186	2190	220	47.1	818	12.7	10200	1.7	0.21
OL-VC-70148	5.00-5.50 Ft	181	2660	261	59.6	939	7.4	10900	-1.6	0.24
OL-VC-70148	6.00-6.50 Ft	167	2570	255	64.2	987	8.7	10900	0.8	0.24
OL-VC-70148	7.50-8.00 Ft	120	2810	260	63.8	940	8.7	10800	-6.4	0.26
OL-VC-70148	9.00-9.50 Ft	37.6	3130	264	39.8	655	6.2	11700	-24.9	0.27
OL-VC-70148A	0.00-0.25 Ft		584					3590		0.16
OL-VC-70148A	0.25-0.50 Ft		722					4060		0.18
OL-VC-70148A	0.50-0.75 Ft		832					4800		0.17
OL-VC-70148A	0.75-1.00 Ft		933					5050		0.18
OL-VC-70148A	1.00-1.25 Ft		1150					6310		0.18
OL-VC-70148A	1.25-1.50 Ft		1270					7280		0.17
OL-VC-70148A	1.50-1.75 Ft		1370					7800		0.18
OL-VC-70148A	2.00-2.50 Ft	205	1650	220	37.2	599	30.1	8980	8.0	0.18
OL-VC-70148A	2.00-2.50 Ft	230	1620	185	31.5	557	18.6	8940	5.8	0.18
OL-VC-70148A	3.00-3.50 Ft		2020				15.2	11500		0.18
OL-VC-70148A	4.00-4.50 Ft	179	2160	239	43.2	703	10.0	11000	-0.7	0.20
OL-VC-70148A	5.00-5.50 Ft	176	2390	246	53.4	808	8.6	11600	-1.5	0.21

Table V-1

General Chemistry Data from Vibracore and Cation-Anion Balance

Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-VC-70148A	6.00-6.50 Ft	142	2560	222	53.6	724	5.2	11300	-10.8	0.23
OL-VC-70148A	7.50-8.00 Ft	132	2760	211	58.1	852	4.3	11600	-11.0	0.24
OL-VC-70148A	9.00-9.50 Ft	52.0	3080	284	63.4	839	4.4	11900	-15.2	0.26
OL-VC-70149	0.00-0.25 Ft		453					2450		0.18
OL-VC-70149	0.25-0.50 Ft		532					3120		0.17
OL-VC-70149	0.50-0.75 Ft		725					3950		0.18
OL-VC-70149	0.75-1.00 Ft		897					4780		0.19
OL-VC-70149	1.00-1.25 Ft		1530					7580		0.20
OL-VC-70149	1.25-1.50 Ft		1430					7190		0.20
OL-VC-70149	1.50-1.75 Ft		1250					6280		0.20
OL-VC-70149	2.00-2.50 Ft	136	1690	67.2	43.7	735	34.8	8310	-3.2	0.20
OL-VC-70149	2.00-2.50 Ft	117	1840	73.2	53.0	820	26.6	8460	-3.5	0.22
OL-VC-70149	3.00-3.50 Ft	79.9	2220	63.7	51.2	791	15.1	9900	-16.7	0.22
OL-VC-70149	4.00-4.50 Ft	67.9	2570	70.7	63.1	927	3.1	10500	-17.3	0.24
OL-VC-70149	5.00-5.50 Ft	22.3	2760	65.2	67.0	981	2.6	10700	-21.0	0.26
OL-VC-70149	6.00-6.50 Ft	203	3310	41.2	79.7	1220	479	11600	-20.2	0.29
OL-VC-70149	7.50-8.00 Ft	1280	4220	22.0	73.5	1210	226J	12100	-1.5	0.35
OL-VC-70149	9.00-9.50 Ft	1280	4210	7.8	65.7	1220	260J	12600	-2.0	0.33
OL-VC-70150	0.00-0.25 Ft		570					3270		0.17
OL-VC-70150	0.25-0.50 Ft		708					4090		0.17
OL-VC-70150	0.50-0.75 Ft		835					4830		0.17
OL-VC-70150	0.75-1.00 Ft		972					5400		0.18
OL-VC-70150	1.00-1.25 Ft		1130					6320		0.18
OL-VC-70150	1.25-1.50 Ft		1240					7320		0.17
OL-VC-70150	1.50-1.75 Ft		1360					7730		0.18
OL-VC-70150	2.00-2.50 Ft	331	1370	123	44.3	723	29.2	9280	20.3	0.15
OL-VC-70150	2.00-2.50 Ft	327	1730	132	45.5	743	26.7	9490	10.3	0.18
OL-VC-70150	3.00-3.50 Ft	117	2100	124	24.3	384	35.8	11200	-28.5	0.19
OL-VC-70150	4.00-4.50 Ft	229	2430	613	60.0	865	12.6	13900	19.0	0.17
OL-VC-70150	5.00-5.50 Ft	91.5	2770	1340	69.6	1020	3.4J	16300	34.6	0.17
OL-VC-70150	6.00-6.50 Ft	25.6	3440	1740	59.7	1050	6.0U	18000	32.7	0.19
OL-VC-70150	7.50-8.00 Ft	116	4270	1030	62.6	1380	12.7J	17800	11.5	0.24
OL-VC-70150	9.00-9.50 Ft	263	4590	340	56.0	1730	13.1	8850	-4.8	0.52
OL-VC-70151	0.00-0.25 Ft		2660					8540		0.31
OL-VC-70151	0.25-0.50 Ft		3430					10600		0.32
OL-VC-70151	0.50-0.75 Ft		3500					10900		0.32
OL-VC-70151	0.75-1.00 Ft		3460					7540		0.46
OL-VC-70151	1.00-1.25 Ft		3510					11300		0.31
OL-VC-70151	1.25-1.50 Ft		3480					11100		0.31
OL-VC-70151	1.50-1.75 Ft		4720					14200		0.33
OL-VC-70151	2.00-2.50 Ft		13600				10.6	28300		0.48
OL-VC-70151	3.00-3.50 Ft	2070	10700	3.5J	90.0	5910	85.6	33500	8.9	0.32
OL-VC-70151	4.00-4.50 Ft	1940		9.2	62.4	5150		39100		
OL-VC-70151	5.00-5.50 Ft		16500				11.8J	39500		0.42
OL-VC-70151	6.00-6.50 Ft		19700				8.9J	45200		0.44
OL-VC-70151	6.00-6.50 Ft		19000				19.8J	44800		0.42
OL-VC-70151	7.50-8.00 Ft	3470	27500	109	140	12600	11.9J	60600	-2.8	0.45
OL-VC-70152	1.50-1.75 Ft		12400					1630		7.61
OL-VC-70152	2.00-2.50 Ft	2560	24300	25.8	117	10500	42.6	51900	-7.6	0.47
OL-VC-70152	3.00-3.50 Ft	1380	33600	64.1	57.2	6670	15.5J	77000	-44.3	0.44
OL-VC-70152	4.00-4.50 Ft	1930	41700	152	80.8	9670	12.8J	90800	-37.8	0.46
OL-VC-70152	5.00-5.50 Ft	3400	44800	255	85.7	23200	40.0U	97500	-2.5	0.46
OL-VC-70152	6.00-6.50 Ft	1920	55000	227	49.9	15500	50.0U	105000	-32.5	0.52
OL-VC-70153	0.25-0.50 Ft		12700							
OL-VC-70153	0.75-1.00 Ft		10200					29000		0.35
OL-VC-70153	1.50-1.75 Ft		17200							
OL-VC-70153	2.00-2.50 Ft		26200				215	60200		0.44
OL-VC-70153	2.00-2.50 Ft		22400				254	55500		0.40
OL-VC-70153	3.00-3.50 Ft	2330	35300	52.8	65.6	11100	208	79200	-24.6	0.45
OL-VC-70153	4.00-4.50 Ft	2700	38000	120	73.2	13900	126J	95500	-17.7	0.40
OL-VC-70153	5.00-5.50 Ft	2850	46600	153	80.3	15700	209J	99900	-22.2	0.47
OL-VC-70153	6.00-6.50 Ft	3100	49000	187	75.6	17900	326J	103000	-18.7	0.48
OL-VC-70153	7.50-8.00 Ft	3920	46400	226	106J	21900	283	101000	-5.8	0.46
OL-VC-70154	2.00-2.50 Ft		6800				329	20100		0.34
OL-VC-70154	2.00-2.50 Ft		6620				262	19400		0.34
OL-VC-70154	3.00-3.50 Ft	785	10700	10.5J	37.8	3080	237	28900	-27.4	0.37
OL-VC-70154	4.00-4.50 Ft	2020	29700	121	54.5	9240	91.2	69200	-24.0	0.43
OL-VC-70154	5.00-5.50 Ft		34400				140	80200		0.43
OL-VC-70154	6.00-6.50 Ft	2010	38600	137	65.7	10200	192	88900	-32.5	0.43

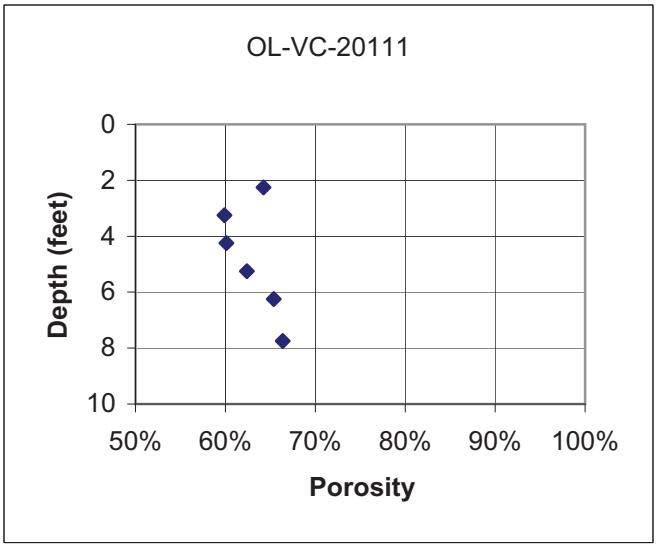
Table V-1

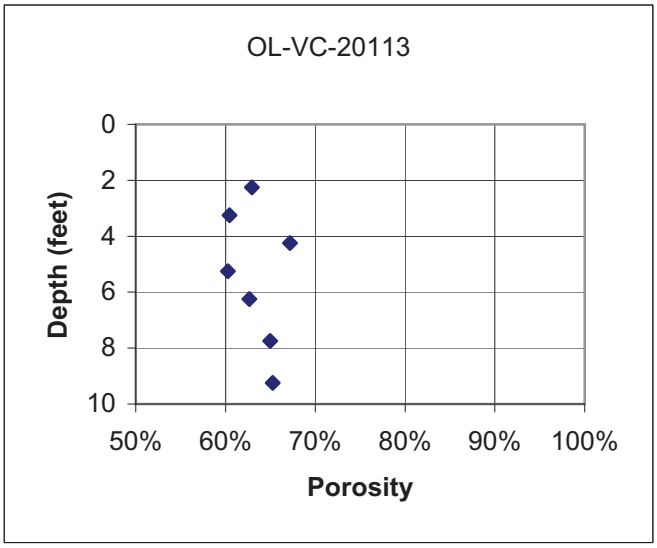
General Chemistry Data from Vibracore and Cation-Anion Balance

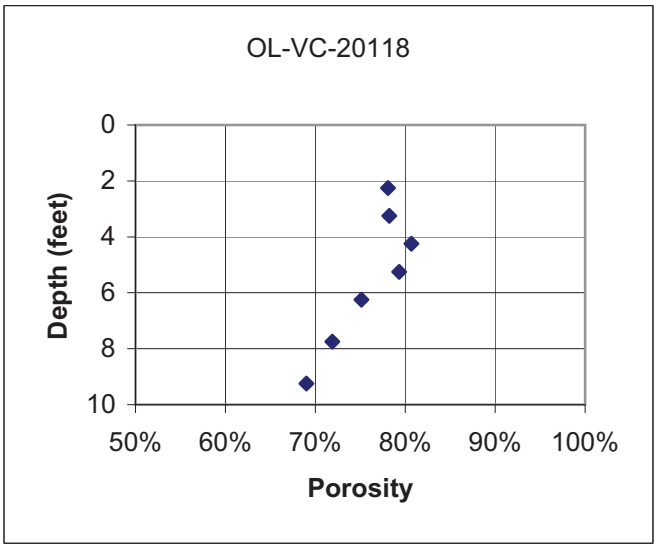
Location ID	Sample Depth (feet)	Calcium mg/L	Chloride mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Conductance uS/cm	Balance %	Chloride/ Conductivity
OL-VC-70154	7.50-8.00 Ft	1900	42800	122	57.6	10000	263	97600	-38.3	0.44
OL-VC-70154	9.00-9.50 Ft	2400	44500	137	65.6	12400	305	98500	-30.5	0.45
OL-VC-70155	1.00-1.25 Ft									
OL-VC-70155	1.25-1.50 Ft		21400					56900		0.38
OL-VC-70155	1.50-1.75 Ft		23600					62500		0.38
OL-VC-70155	2.00-2.50 Ft	1570	26900	159	41.0	7830	23.6	67300	-27.4	0.40
OL-VC-70155	2.00-2.50 Ft		26600				54.2	65700		0.40
OL-VC-70155	3.00-3.50 Ft	1750	28500	314	25.8	15900	33.2	69100	0.1	0.41
OL-VC-70155	4.00-4.50 Ft	1040	32200	250	21.4	12200	16.1J	76800	-20.2	0.42
OL-VC-70155	5.00-5.50 Ft	1780	33800	342	30.4	18500	11.2J	82800	-1.7	0.41
OL-VC-70155	6.00-6.50 Ft		35400				67.0	85100		0.42
OL-VC-70155	7.50-8.00 Ft	2970	36200	359	32.2	19200	23.7J	87000	-0.4	0.42
OL-VC-70155	9.00-9.50 Ft	1480	36800	370	31.3	19400	11.8J	88600	-4.5	0.42

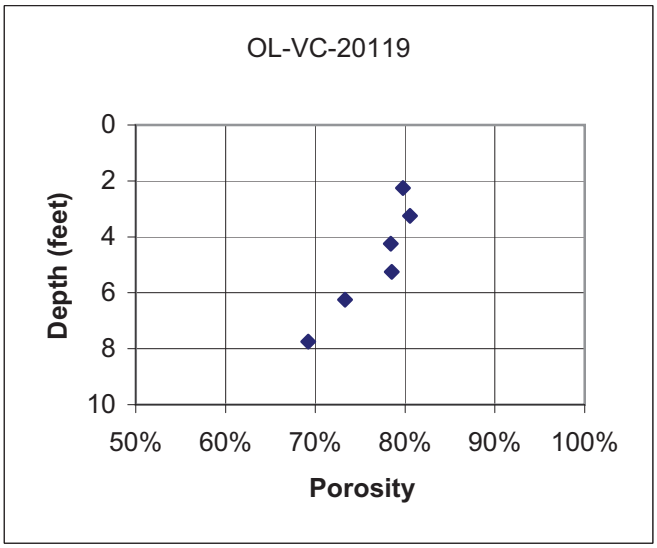
Plots of Porosity Data

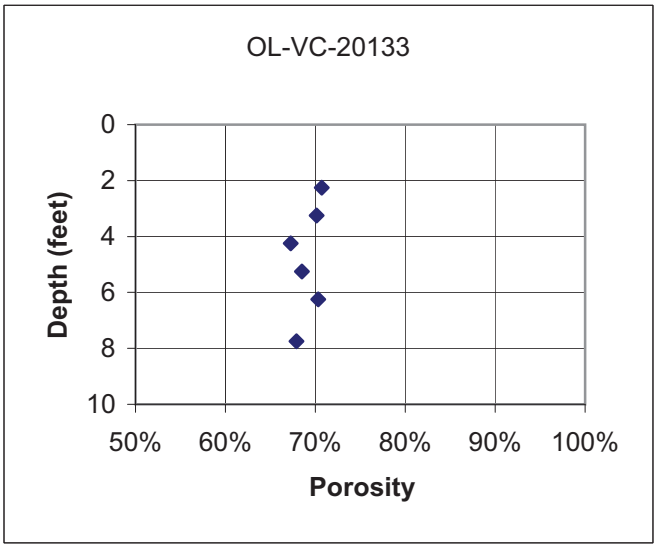
Porosity Depth Profiles from Addendum V Vibracores

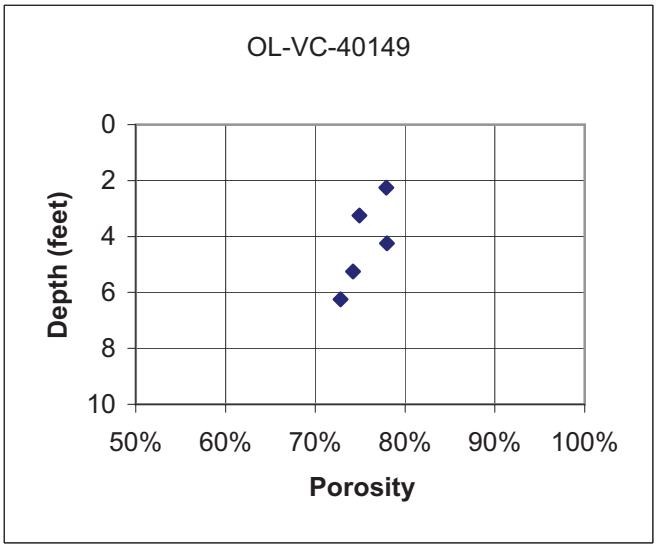




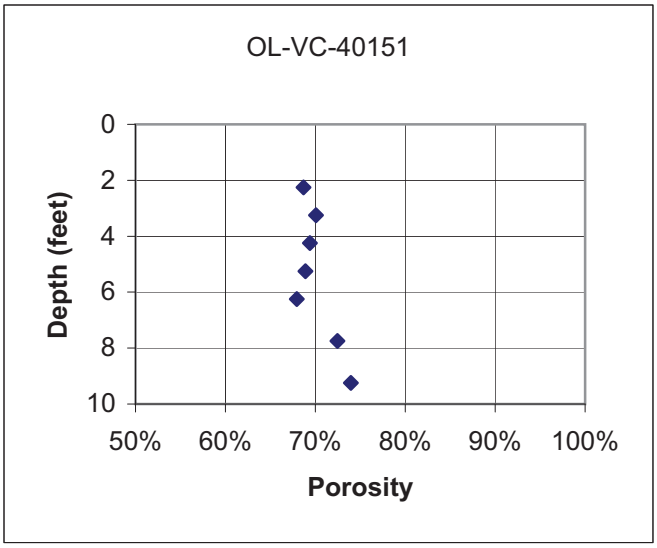


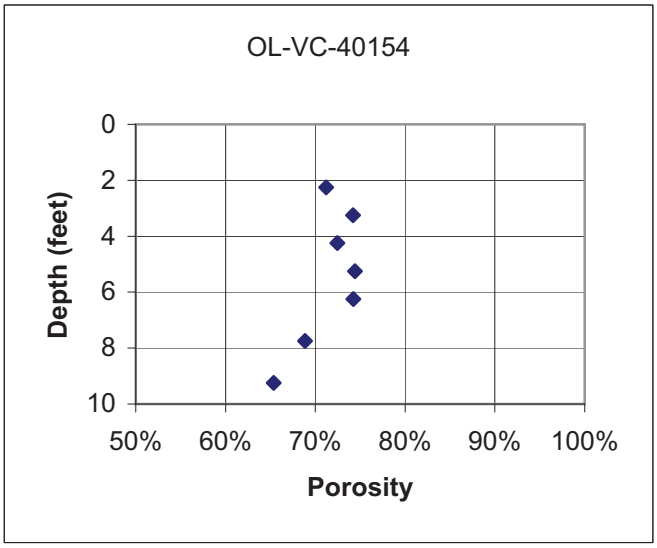


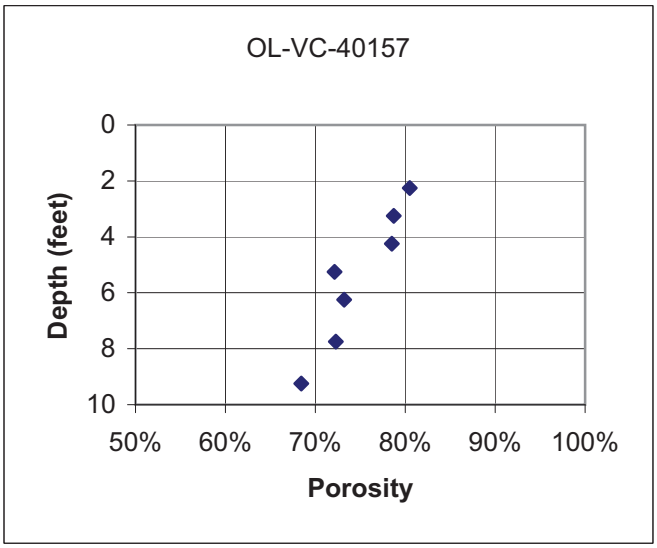


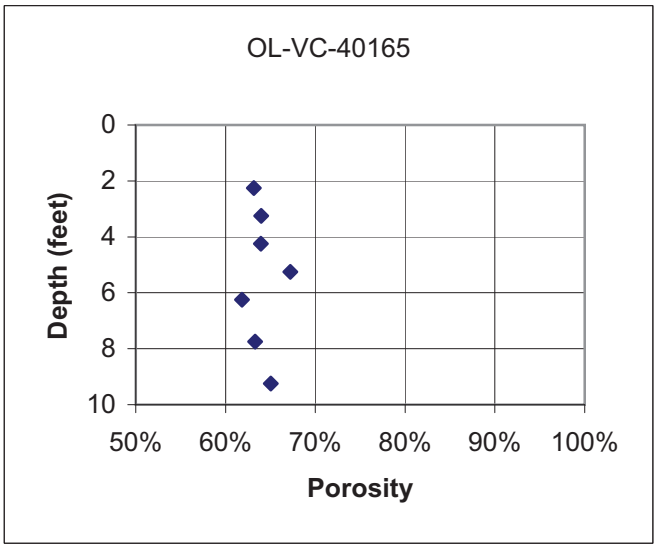


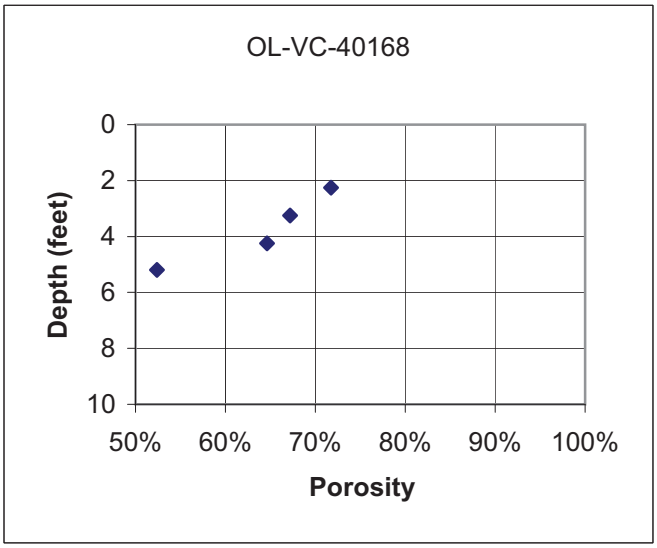
Porosity Depth Profiles from Addendum V Vibracores

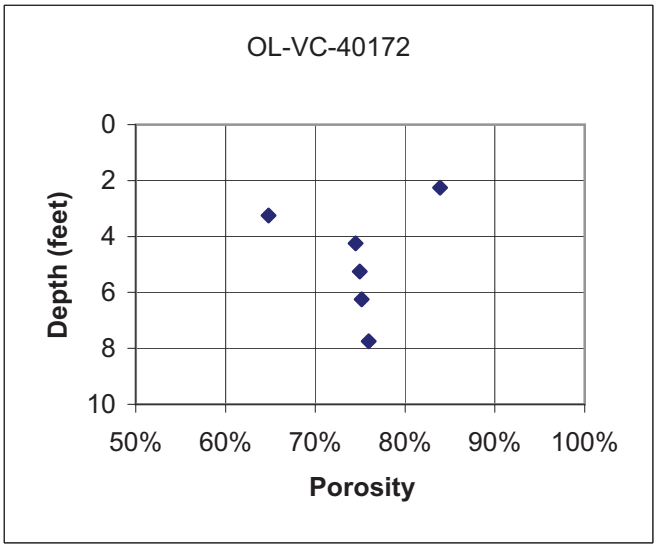




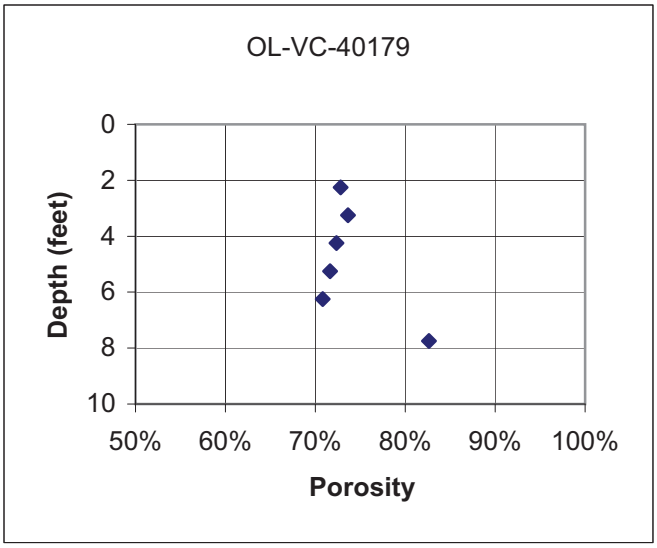


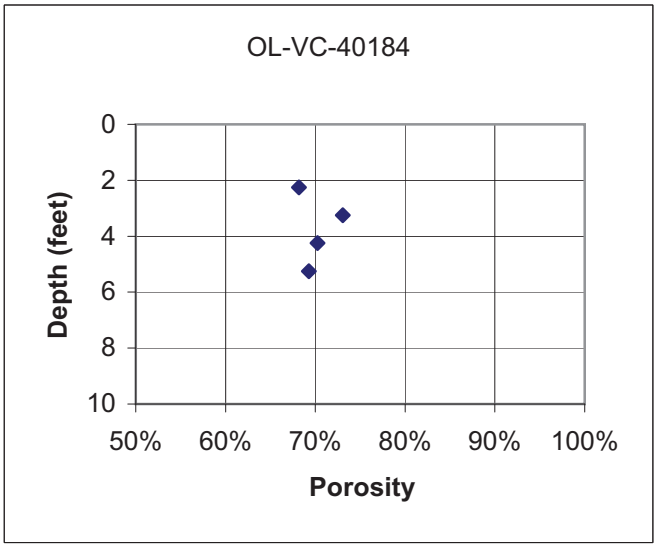


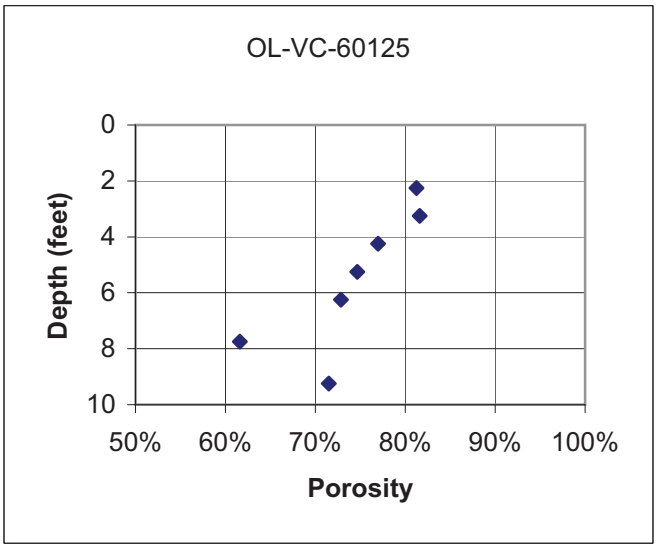


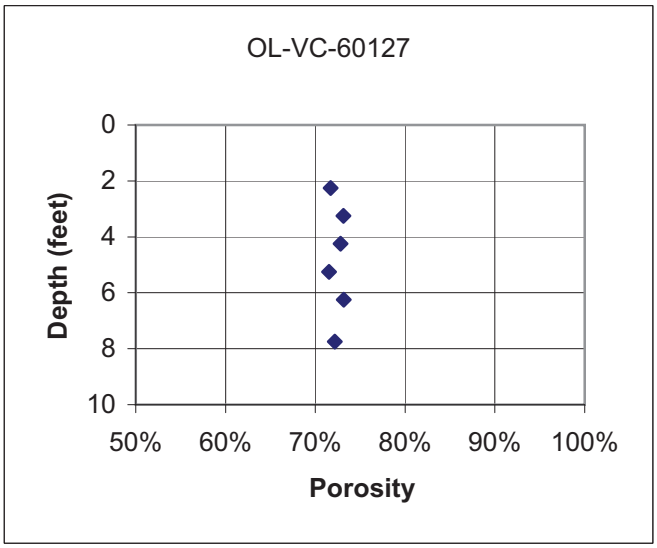


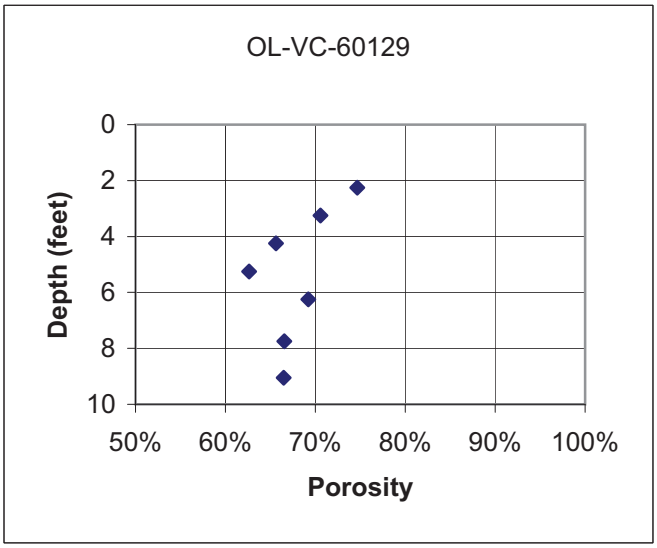
Porosity Depth Profiles from Addendum V Vibracores

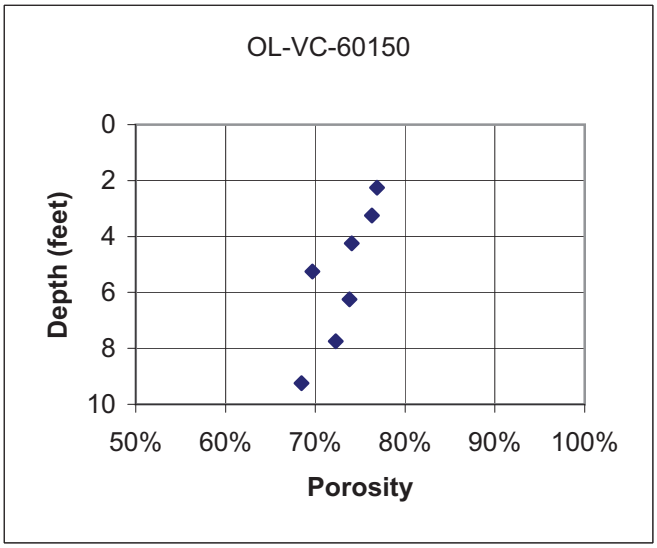




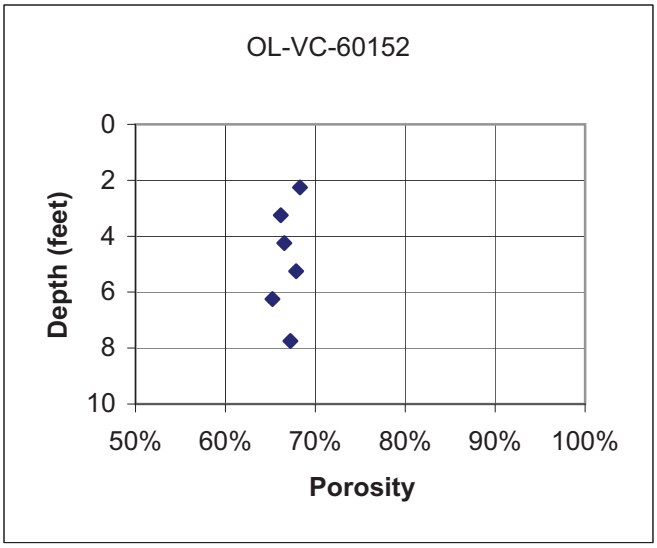


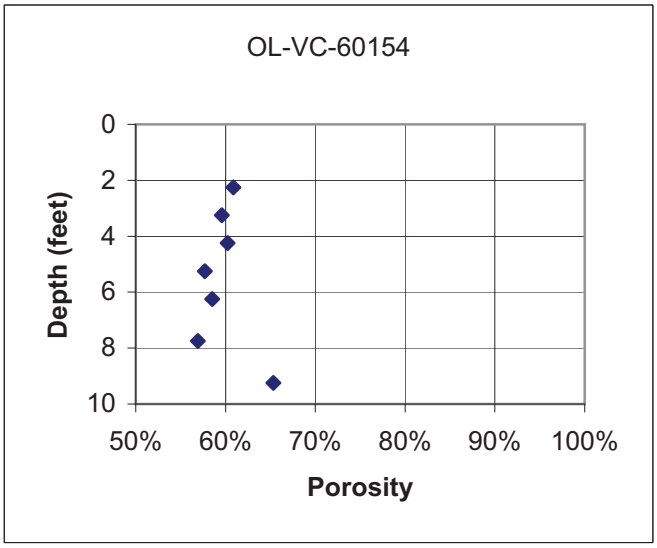


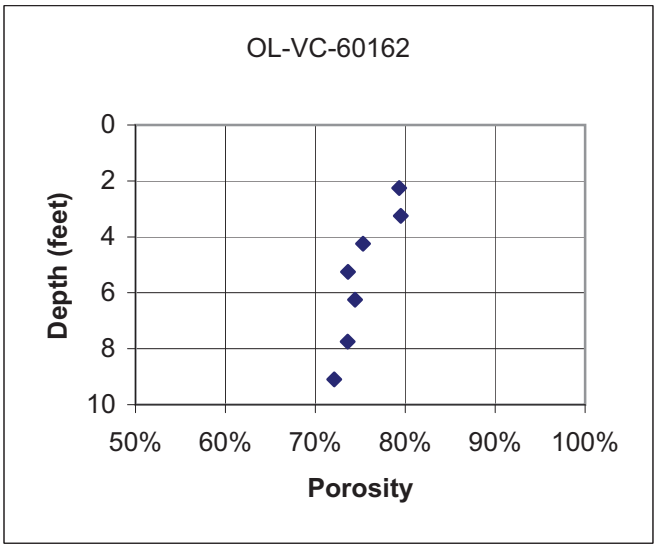


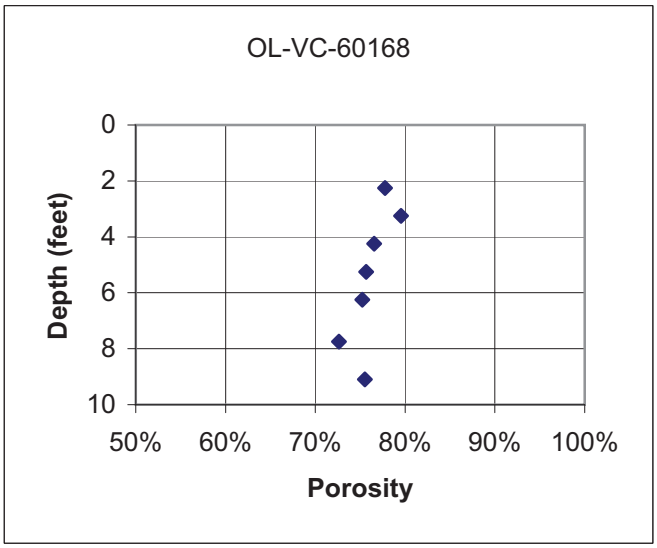


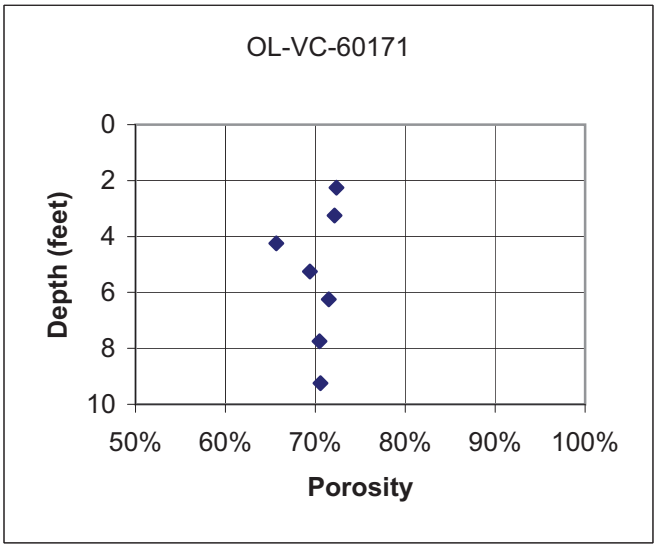
Porosity Depth Profiles from Addendum V Vibracores

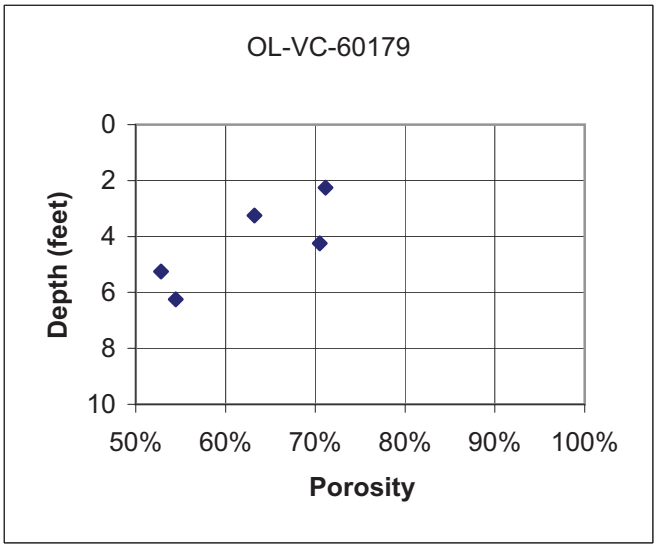




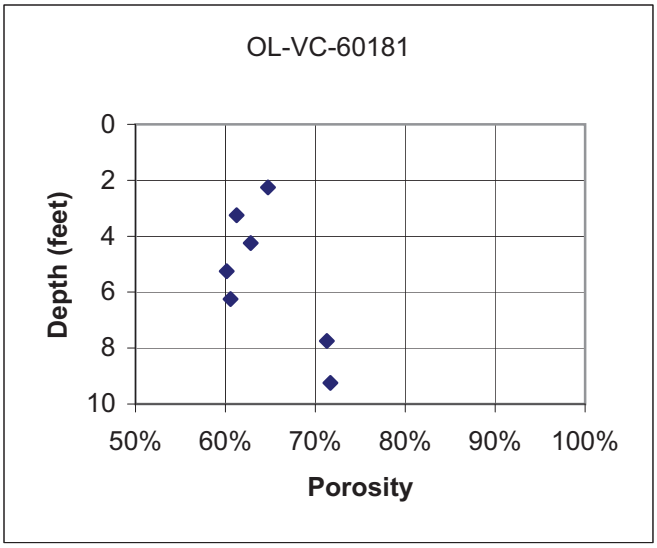


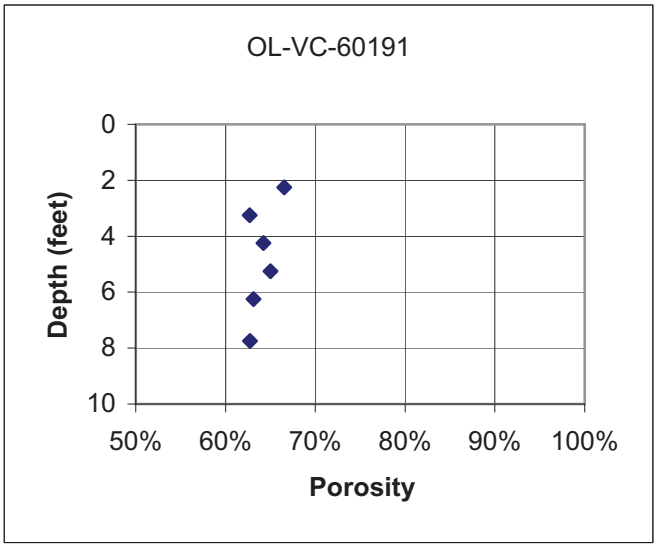


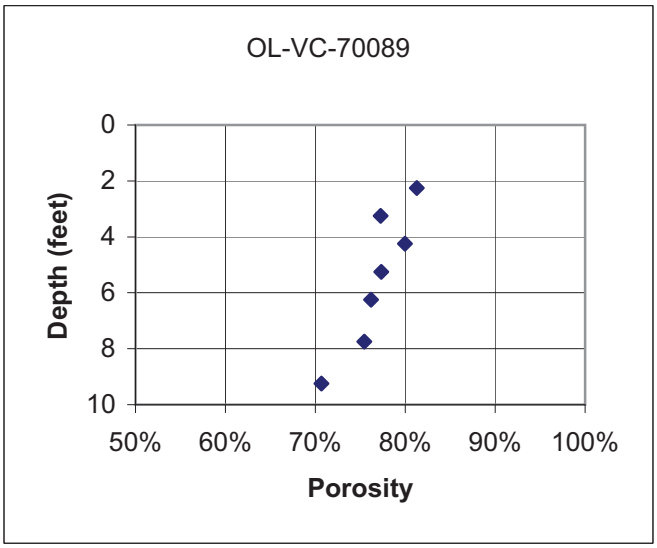


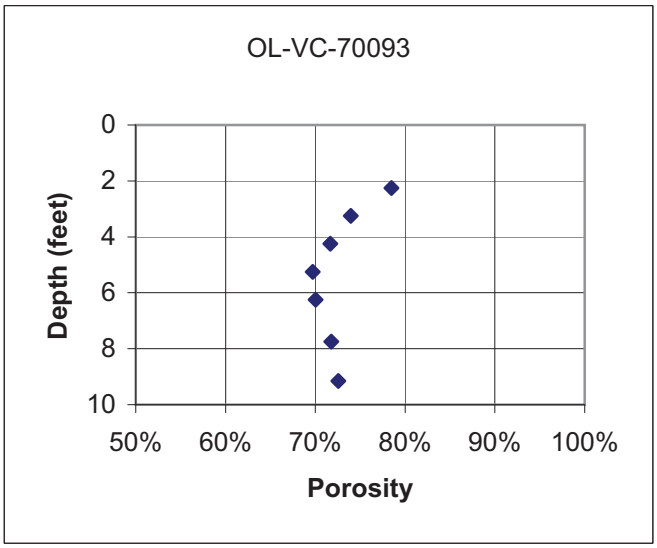


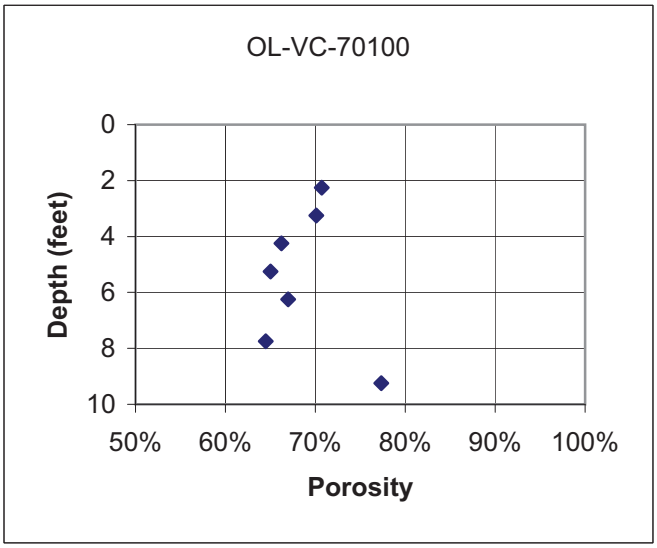
Porosity Depth Profiles from Addendum V Vibracores

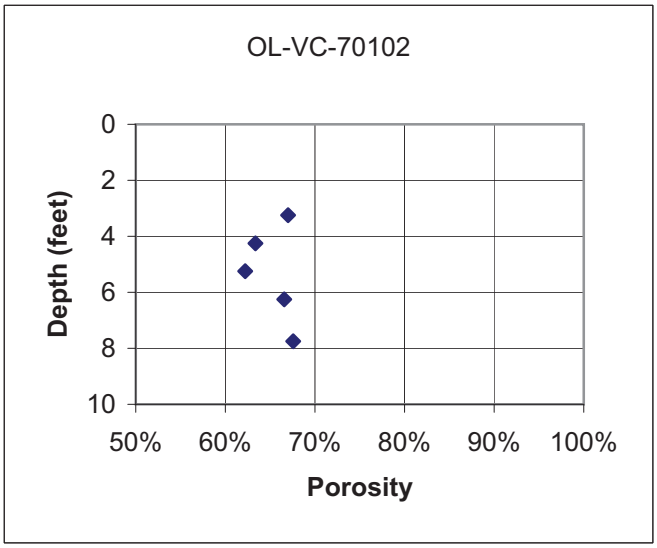




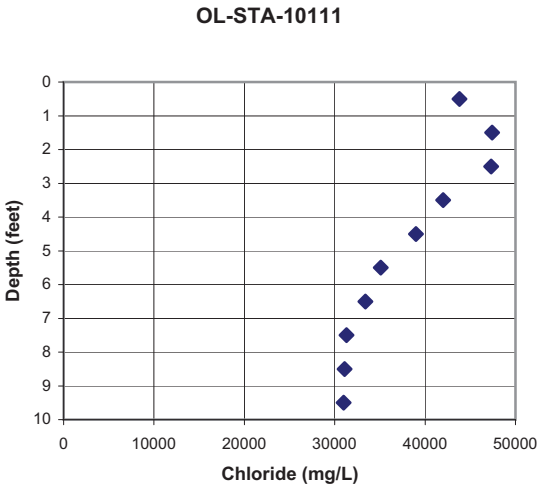


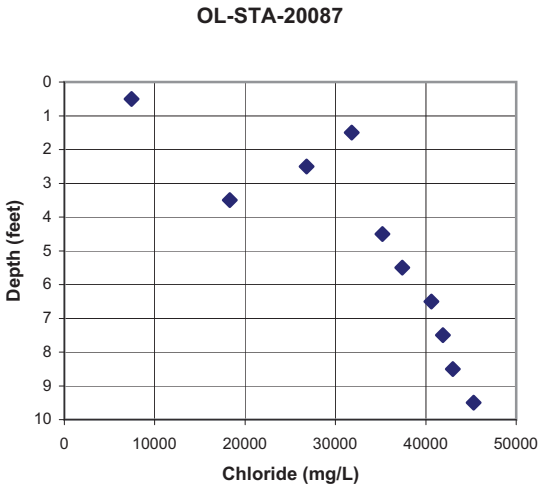


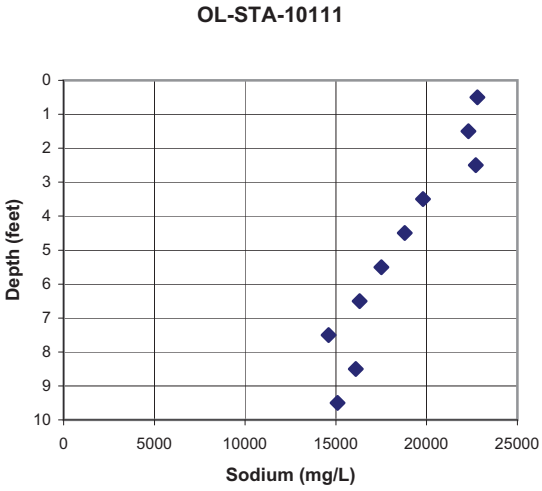


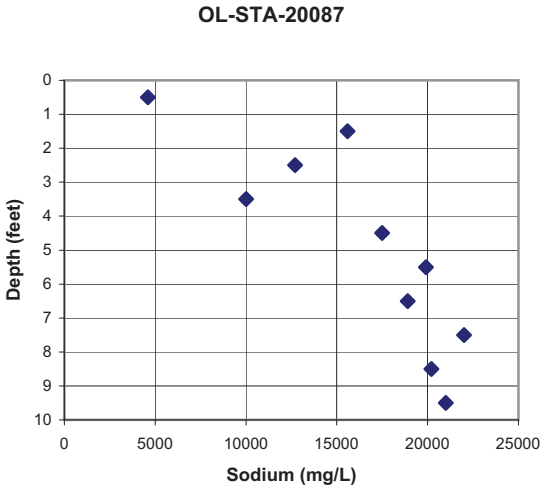


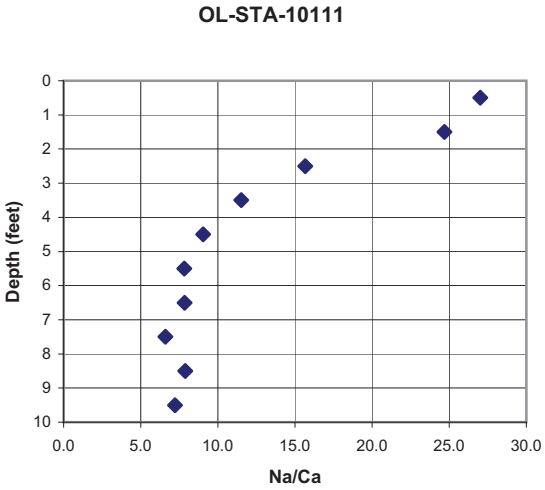
Plots of Chloride, Sodium, and Sodium/Calcium Ratio with Depth

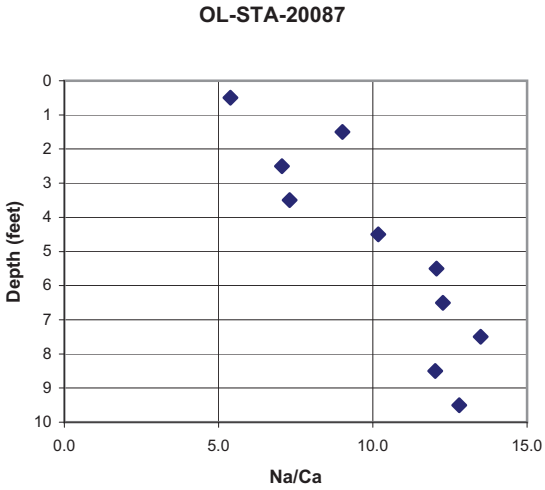

OL-STA-10111
Depth (feet)
Chloride (mg/L)
0
10000
20000
30000
40000
50000

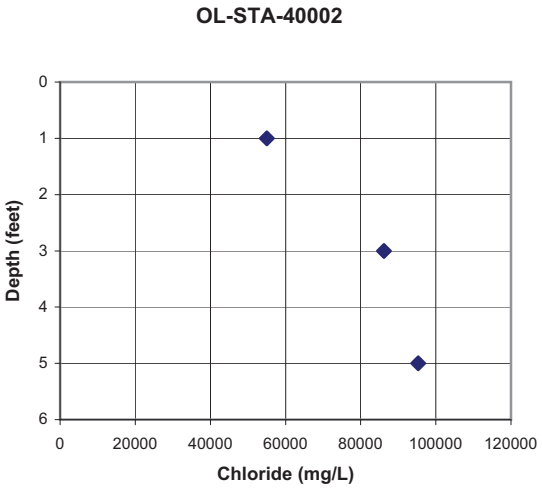

OL-STA-20087
Depth (feet)
Chloride (mg/L)
0
10000
20000
30000
40000
50000

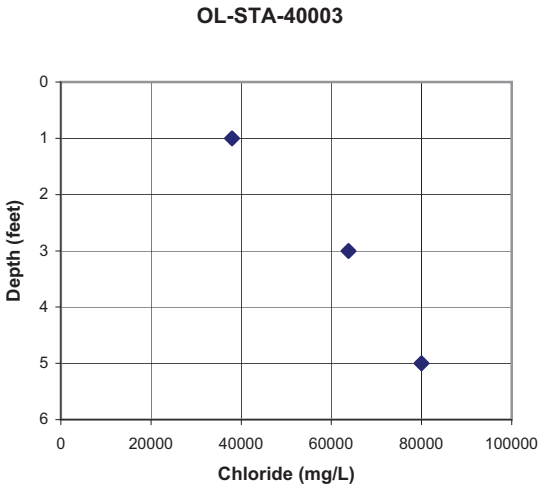

OL-STA-10111
Depth (feet)
Sodium (mg/L)
0
5000
10000
15000
20000
25000

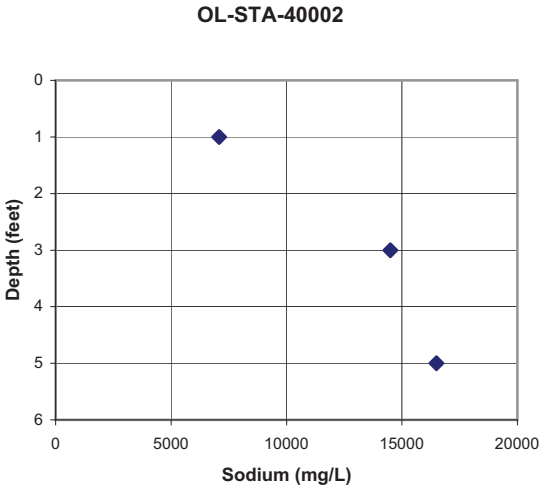

OL-STA-20087
Depth (feet)
Sodium (mg/L)
0
5000
10000
15000
20000
25000

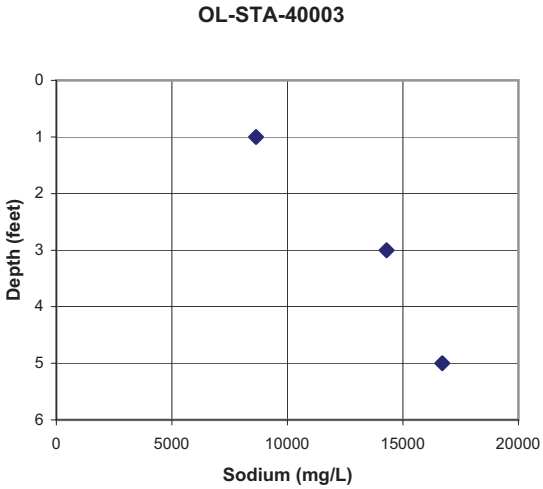

OL-STA-10111
Depth (feet)
Na/Ca
0.0
5.0
10.0
15.0
20.0
25.0
30.0

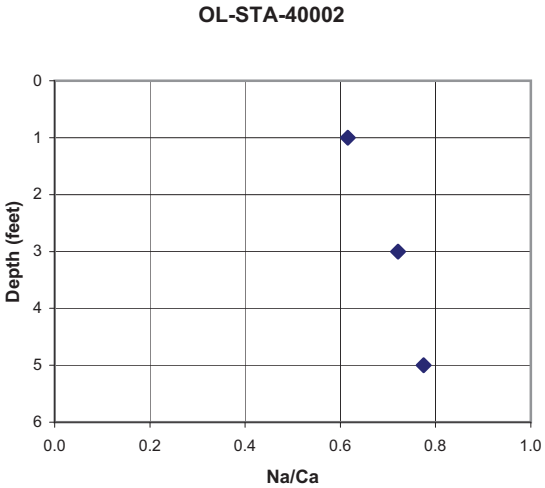

OL-STA-20087
Depth (feet)
Na/Ca
0.0
5.0
10.0
15.0

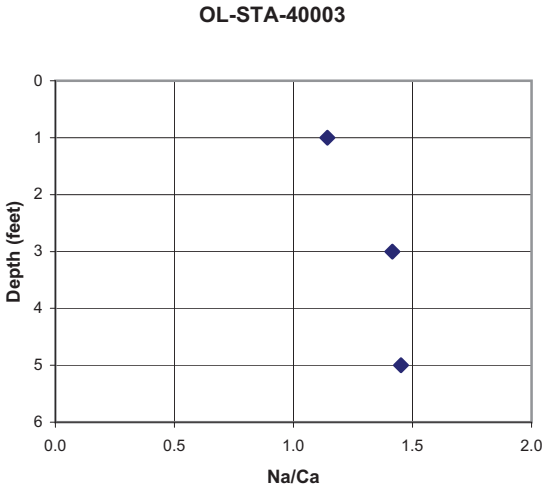

OL-STA-40002
Depth (feet)
0
1
2
3
4
5
6
0
20000
40000
60000
80000
100000
120000
Chloride (mg/L)

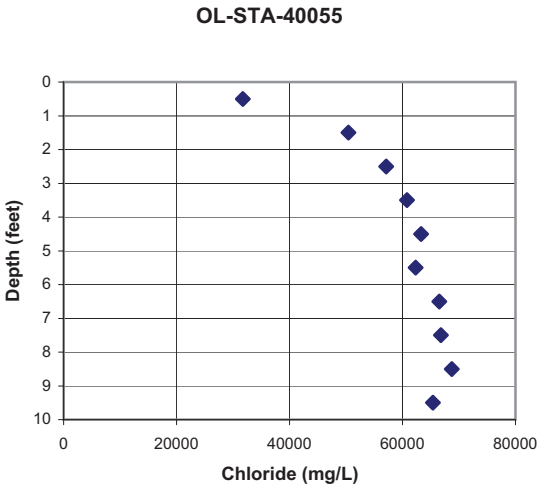

OL-STA-40003
Depth (feet)
0
1
2
3
4
5
6
0
20000
40000
60000
80000
100000
Chloride (mg/L)

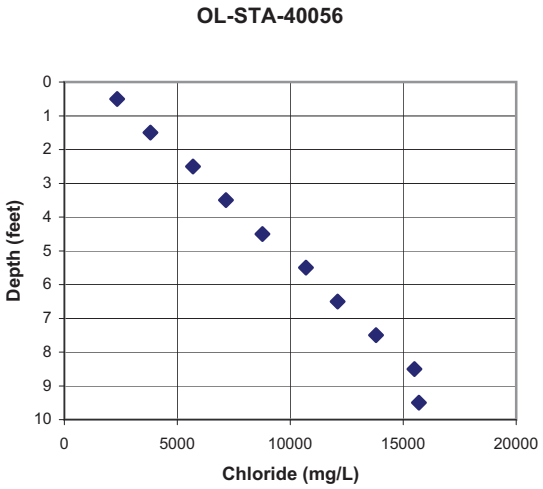

OL-STA-40002
Depth (feet)
0
1
2
3
4
5
6
0
5000
10000
15000
20000
Sodium (mg/L)

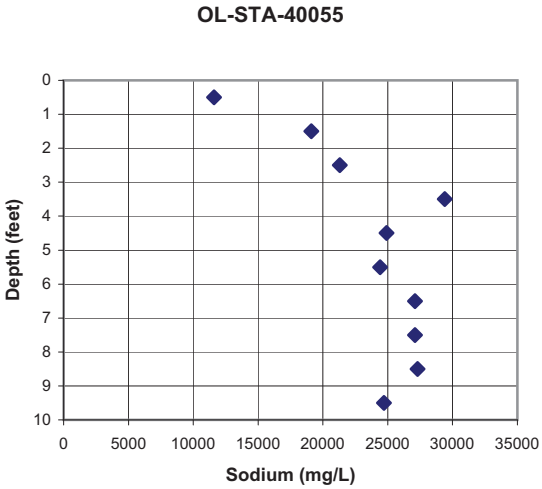

OL-STA-40003
Depth (feet)
0
1
2
3
4
5
6
0
5000
10000
15000
20000
Sodium (mg/L)

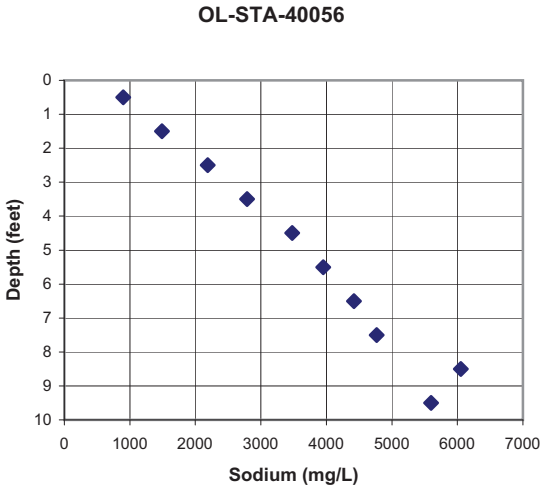

OL-STA-40002
Depth (feet)
0
1
2
3
4
5
6
0.0
0.2
0.4
0.6
0.8
1.0
Na/Ca

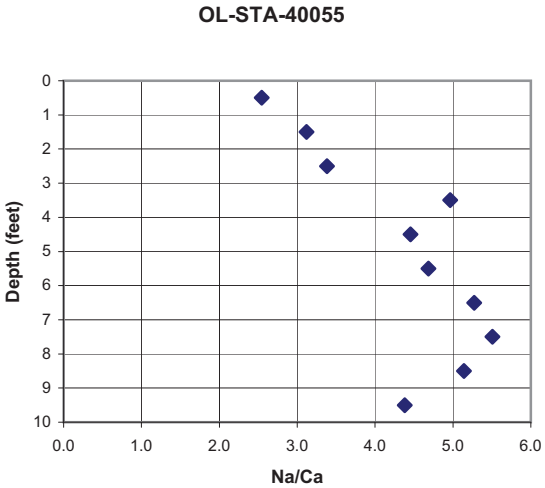

OL-STA-40003
Depth (feet)
0
1
2
3
4
5
6
0.0
0.5
1.0
1.5
2.0
Na/Ca

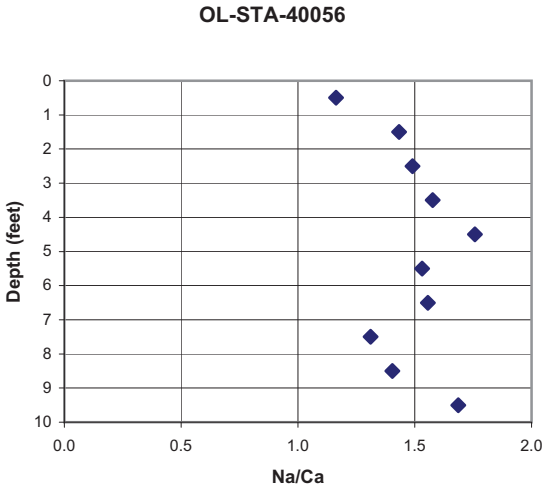

OL-STA-40055
Depth (feet)
Chloride (mg/L)
0
20000
40000
60000
80000


OL-STA-40056
Depth (feet)
Chloride (mg/L)
0
5000
10000
15000
20000

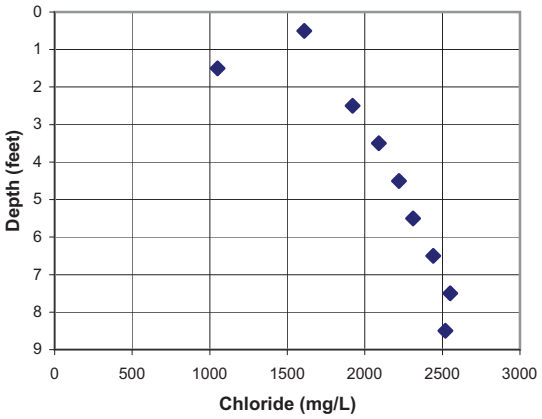

OL-STA-40055
Depth (feet)
Sodium (mg/L)
0
5000
10000
15000
20000
25000
30000
35000


OL-STA-40056
Depth (feet)
Sodium (mg/L)
0
1000
2000
3000
4000
5000
6000
7000

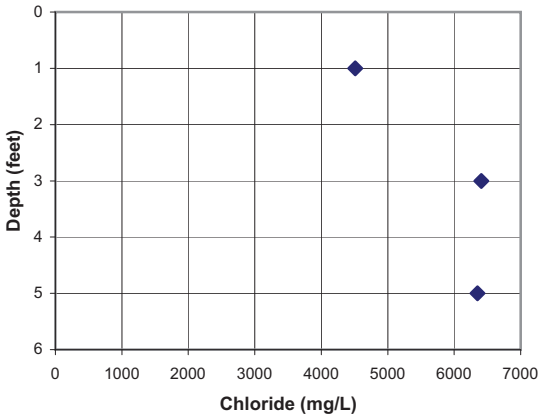

OL-STA-40055
Depth (feet)
Na/Ca
0.0
1.0
2.0
3.0
4.0
5.0
6.0


OL-STA-40056
Depth (feet)
Na/Ca
0.0
0.5
1.0
1.5
2.0

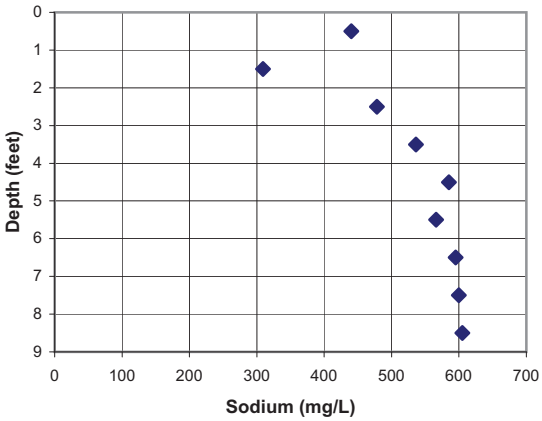
OL-STA-40057



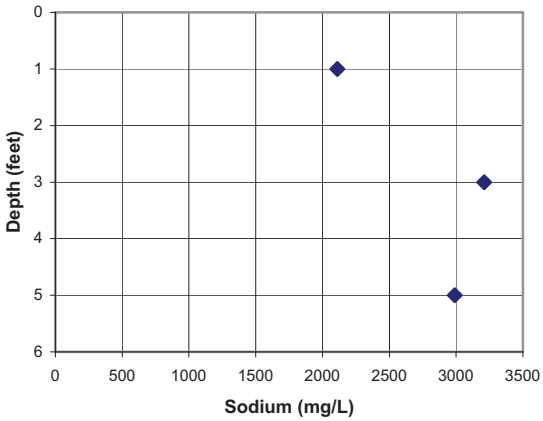
OL-STA-60016



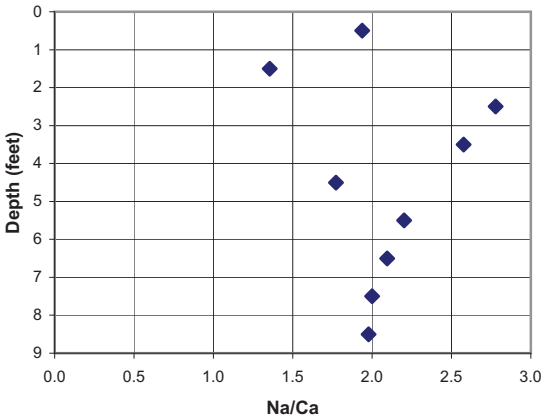
OL-STA-40057



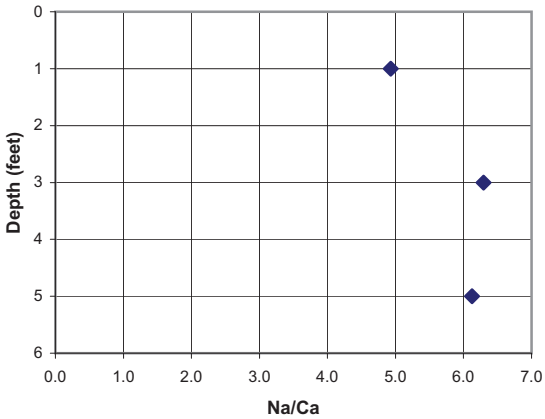
OL-STA-60016

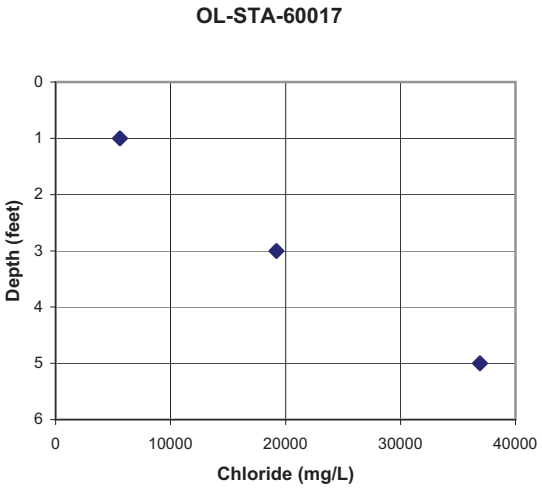


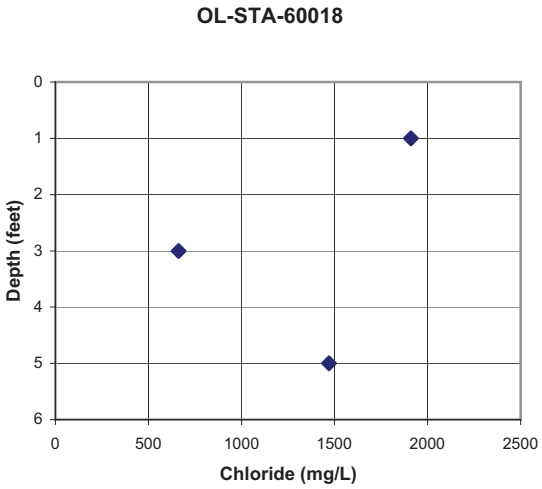
OL-STA-40057

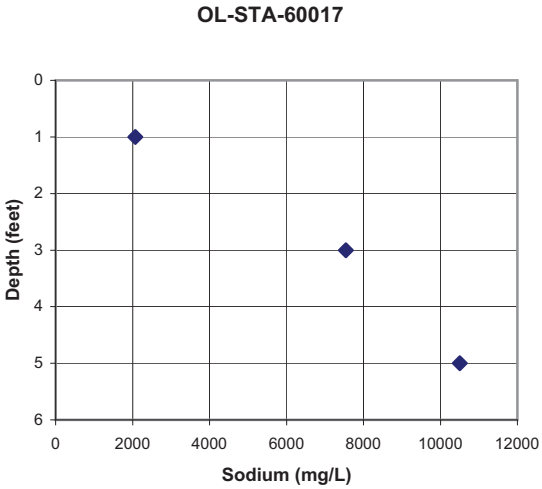


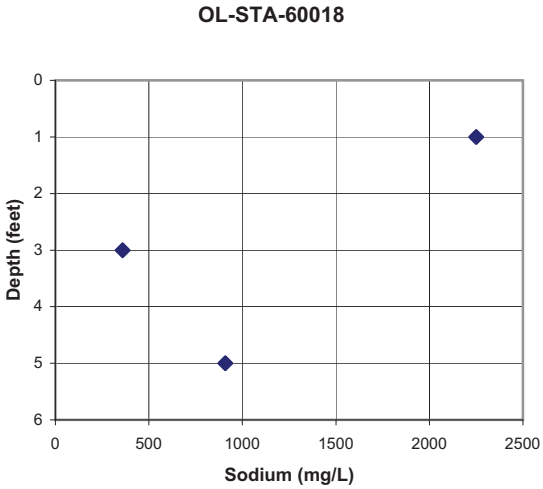
OL-STA-60016

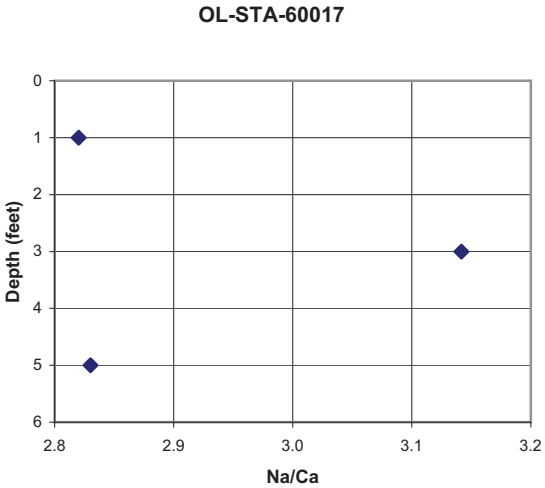


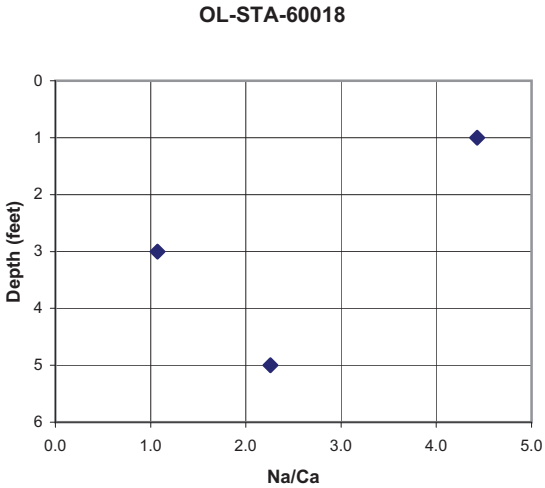

OL-STA-60017
Depth (feet)
0
1
2
3
4
5
6
0
10000
20000
30000
40000
Chloride (mg/L)


OL-STA-60018
Depth (feet)
0
1
2
3
4
5
6
0
500
1000
1500
2000
2500
Chloride (mg/L)

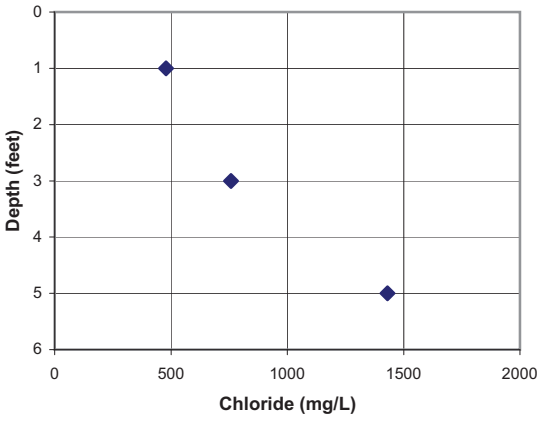

OL-STA-60017
Depth (feet)
0
1
2
3
4
5
6
0
2000
4000
6000
8000
10000
12000
Sodium (mg/L)


OL-STA-60018
Depth (feet)
0
1
2
3
4
5
6
0
500
1000
1500
2000
2500
Sodium (mg/L)

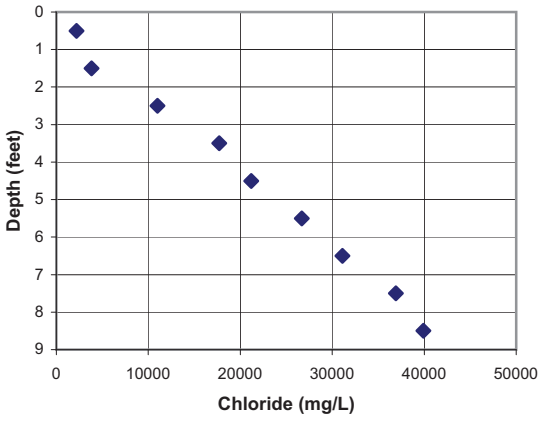

OL-STA-60017
Depth (feet)
0
1
2
3
4
5
6
2.8
2.9
3.0
3.1
3.2
Na/Ca


OL-STA-60018
Depth (feet)
0
1
2
3
4
5
6
0.0
1.0
2.0
3.0
4.0
5.0
Na/Ca

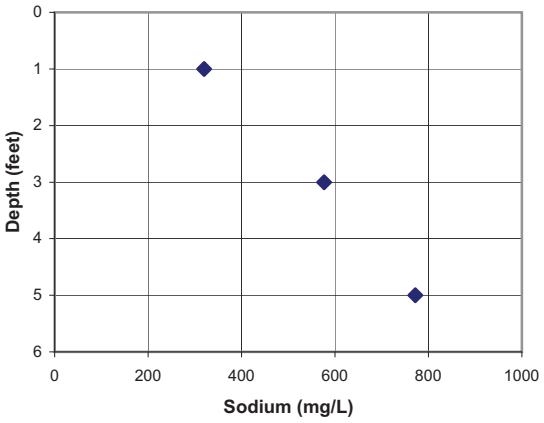
OL-STA-60019



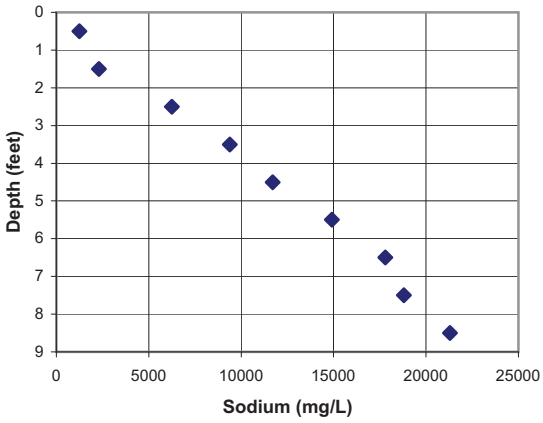
OL-STA-60072



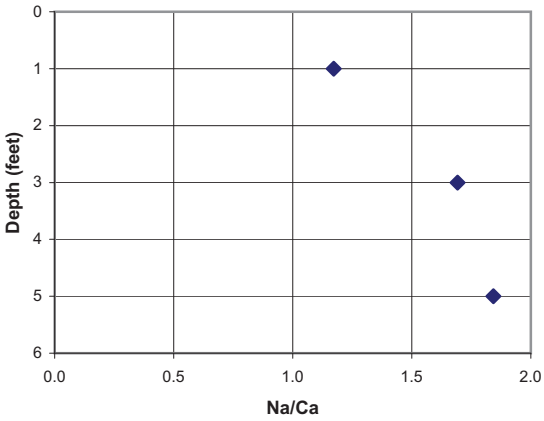
OL-STA-60019



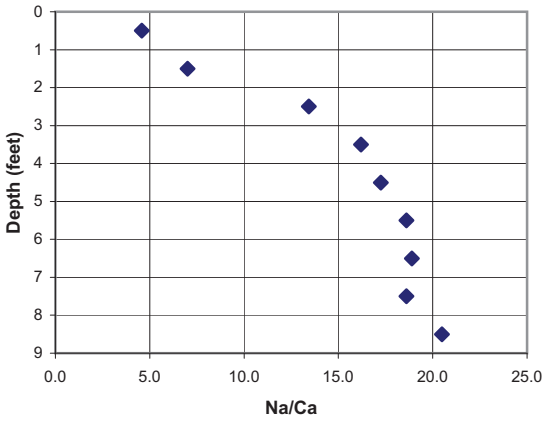
OL-STA-60072



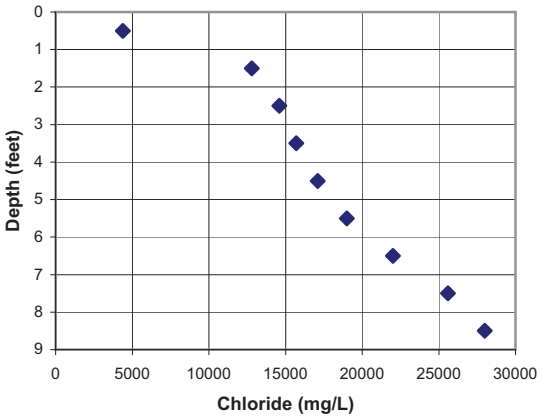
OL-STA-60019



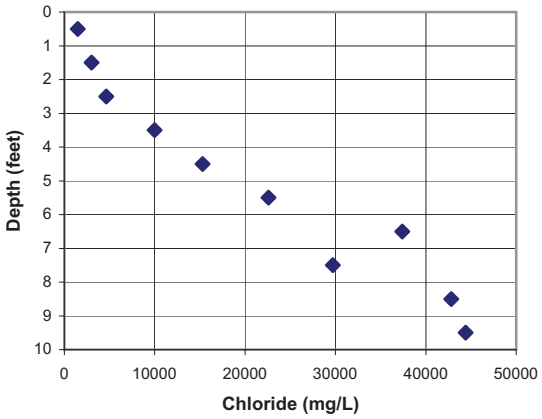
OL-STA-60072



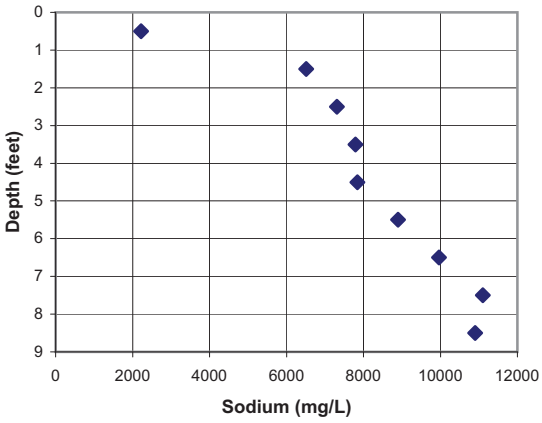
OL-STA-60078



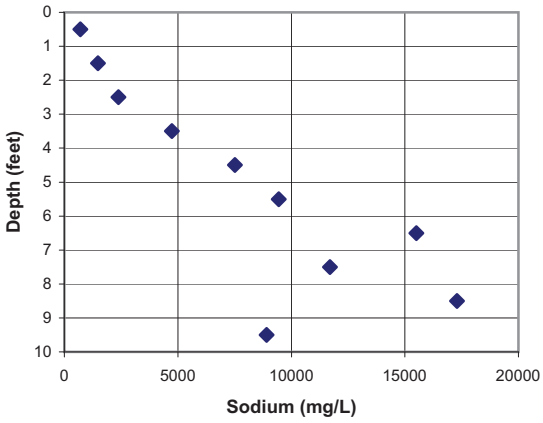
OL-STA-60081



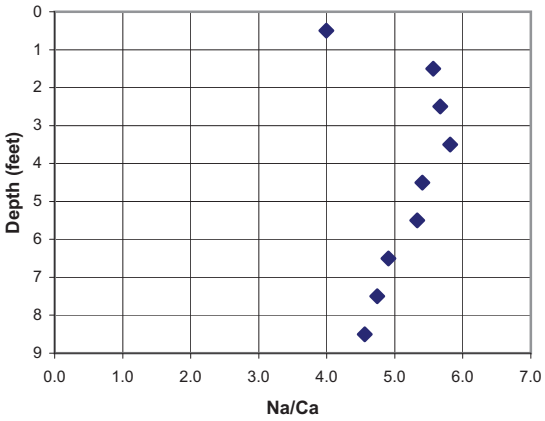
OL-STA-60078



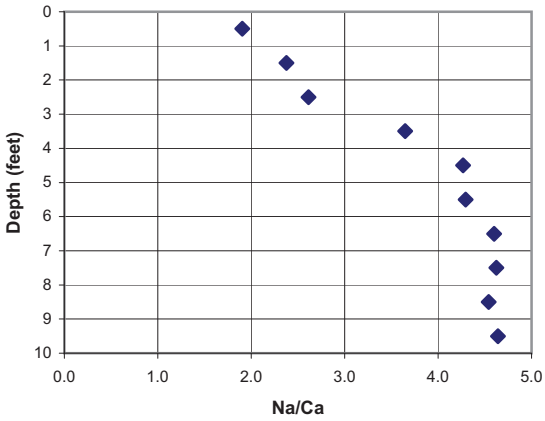
OL-STA-60081

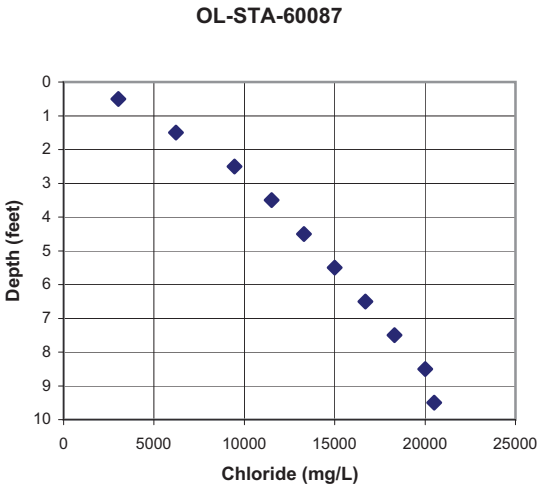


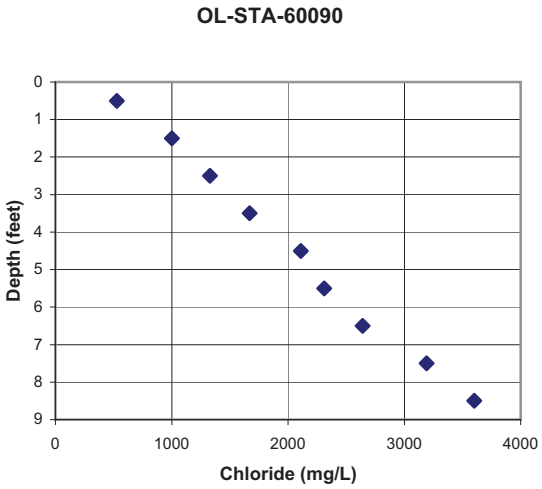
OL-STA-60078

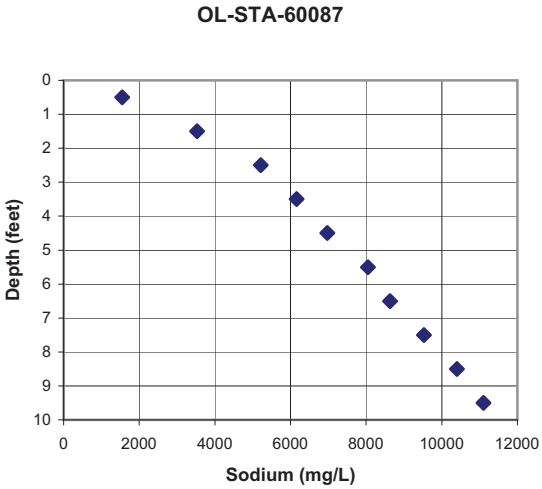


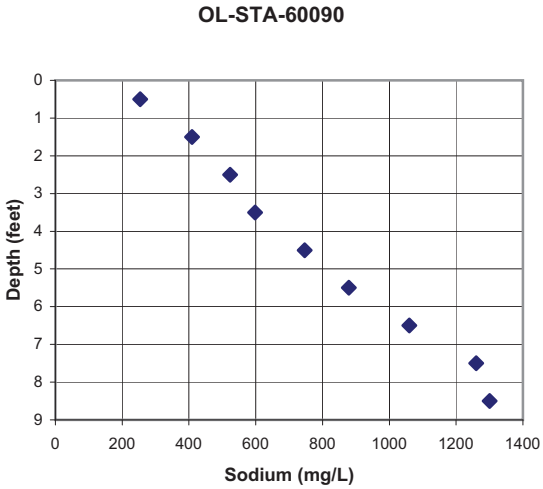
OL-STA-60081

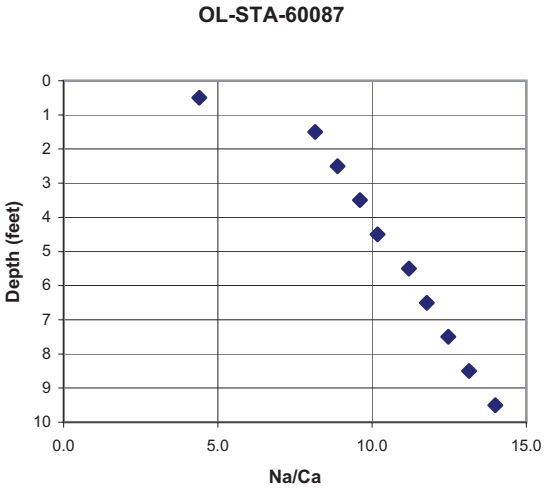


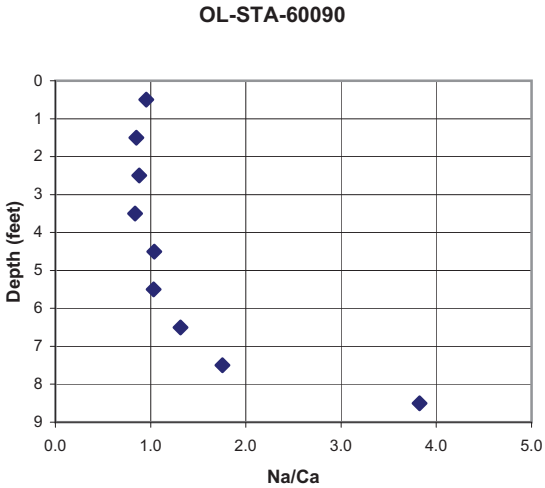

OL-STA-60087
Depth (feet)
0
1
2
3
4
5
6
7
8
9
10
0
5000
10000
15000
20000
25000
Chloride (mg/L)

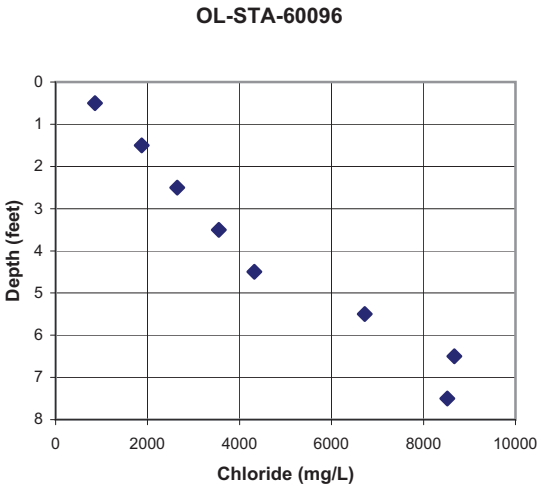

OL-STA-60090
Depth (feet)
0
1
2
3
4
5
6
7
8
9
0
1000
2000
3000
4000
Chloride (mg/L)

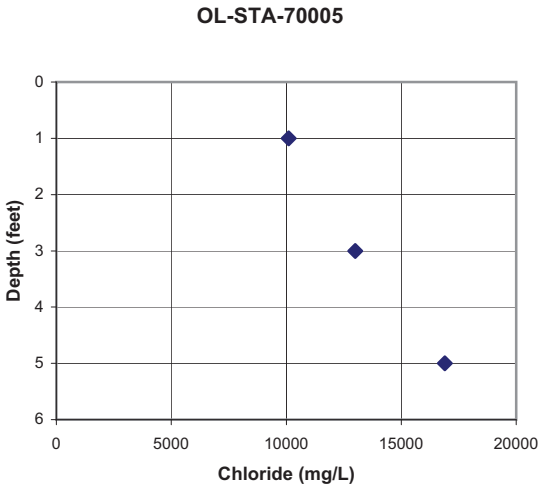

OL-STA-60087
Depth (feet)
0
1
2
3
4
5
6
7
8
9
10
0
2000
4000
6000
8000
10000
12000
Sodium (mg/L)

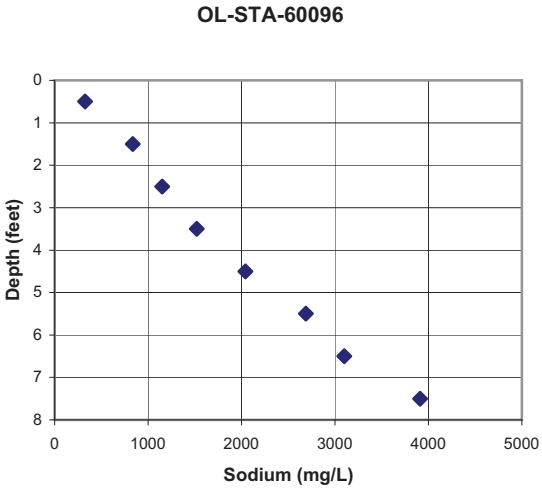

OL-STA-60090
Depth (feet)
0
1
2
3
4
5
6
7
8
9
0
200
400
600
800
1000
1200
1400
Sodium (mg/L)

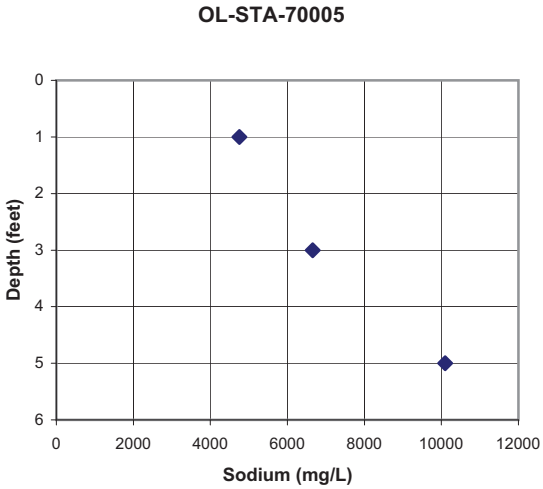

OL-STA-60087
Depth (feet)
0
1
2
3
4
5
6
7
8
9
10
0.0
5.0
10.0
15.0
Na/Ca

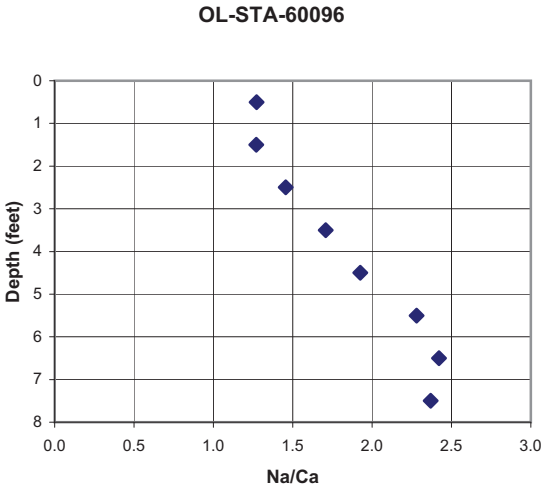

OL-STA-60090
Depth (feet)
0
1
2
3
4
5
6
7
8
9
0.0
1.0
2.0
3.0
4.0
5.0
Na/Ca

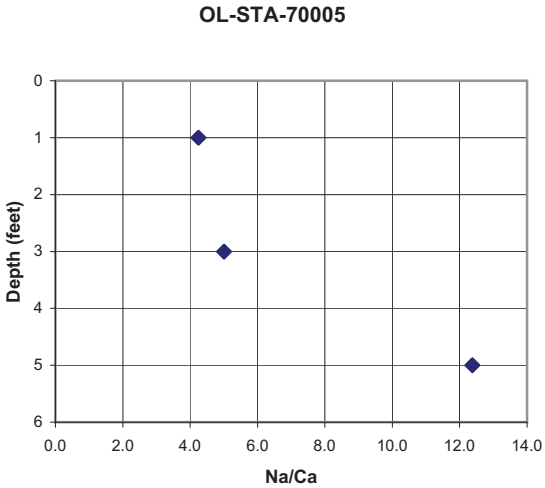

OL-STA-60096
Depth (feet)
0
1
2
3
4
5
6
7
8
0
2000
4000
6000
8000
10000
Chloride (mg/L)

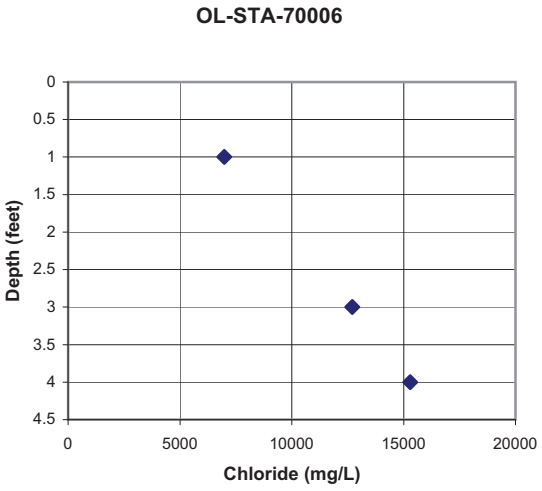

OL-STA-70005
Depth (feet)
0
1
2
3
4
5
6
0
5000
10000
15000
20000
Chloride (mg/L)

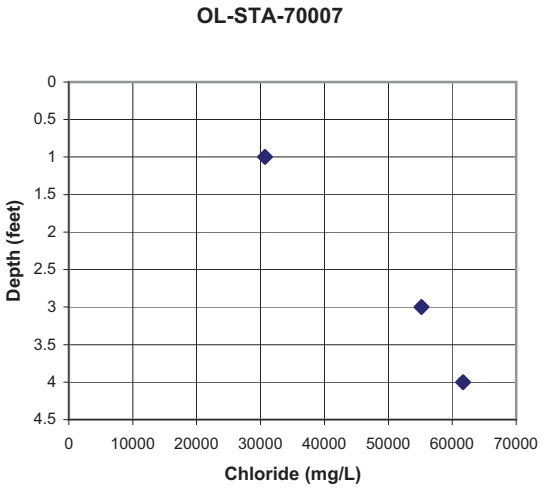

OL-STA-60096
Depth (feet)
0
1
2
3
4
5
6
7
8
0
1000
2000
3000
4000
5000
Sodium (mg/L)

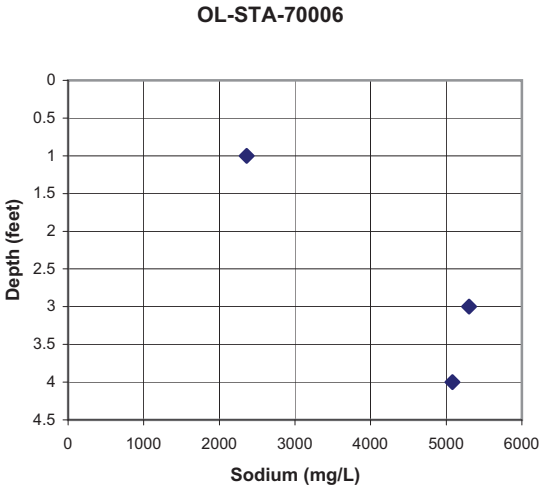

OL-STA-70005
Depth (feet)
0
1
2
3
4
5
6
0
2000
4000
6000
8000
10000
12000
Sodium (mg/L)

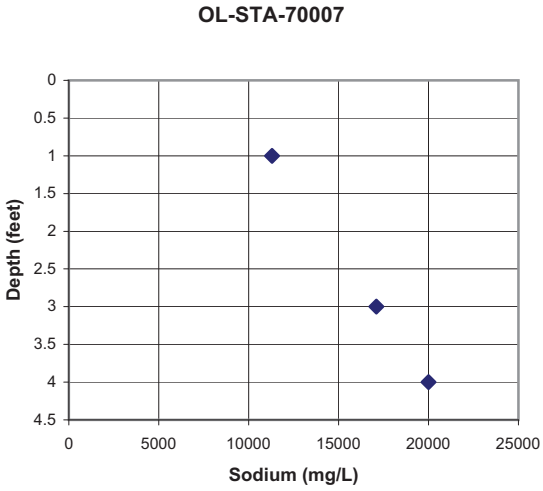

OL-STA-60096
Depth (feet)
0
1
2
3
4
5
6
7
8
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Na/Ca

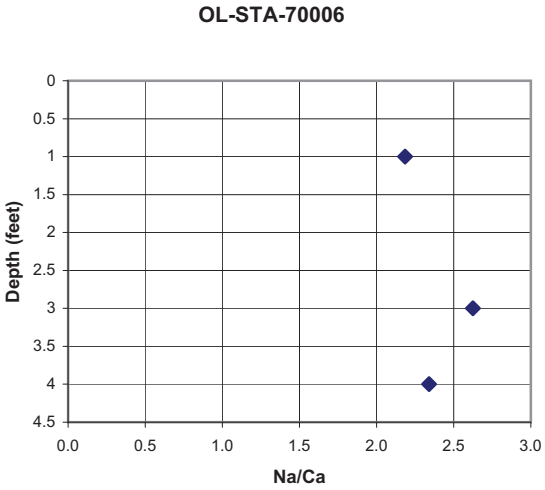

OL-STA-70005
Depth (feet)
0
1
2
3
4
5
6
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
Na/Ca

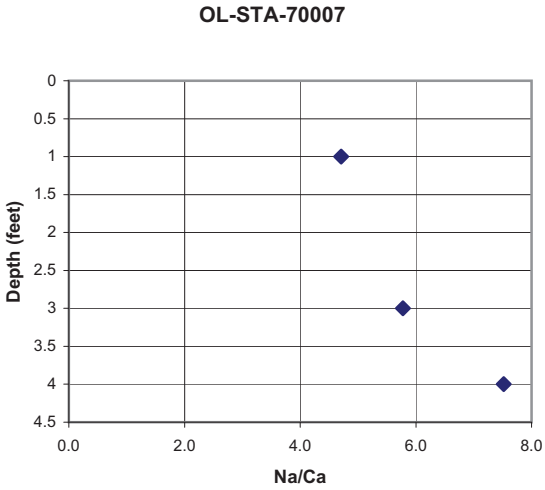

OL-STA-70006
Depth (feet)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
0
5000
10000
15000
20000
Chloride (mg/L)


OL-STA-70007
Depth (feet)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
0
10000
20000
30000
40000
50000
60000
70000
Chloride (mg/L)

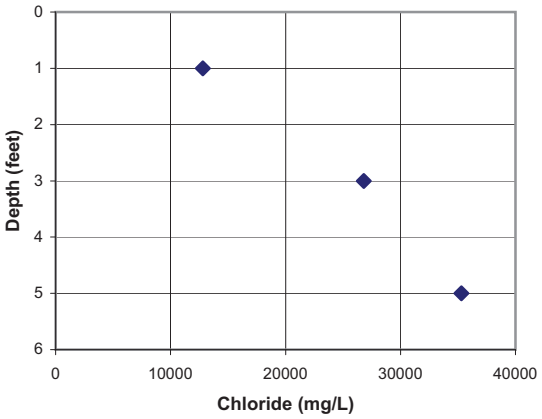

OL-STA-70006
Depth (feet)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
0
1000
2000
3000
4000
5000
6000
Sodium (mg/L)


OL-STA-70007
Depth (feet)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
0
5000
10000
15000
20000
25000
Sodium (mg/L)

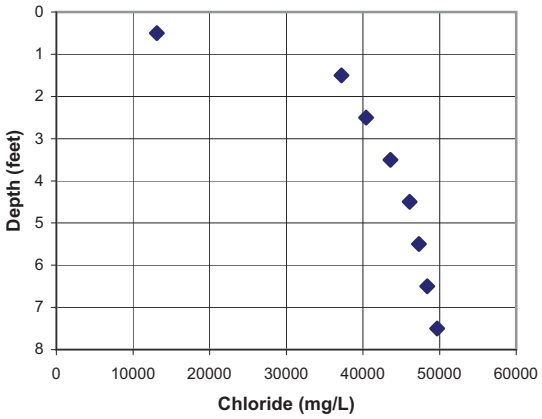

OL-STA-70006
Depth (feet)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Na/Ca


OL-STA-70007
Depth (feet)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
0.0
2.0
4.0
6.0
8.0
Na/Ca

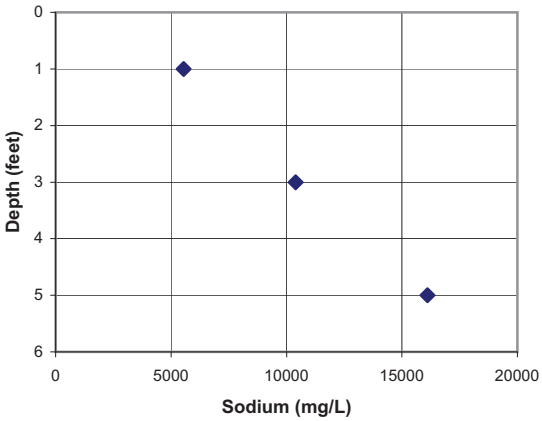
OL-STA-70008



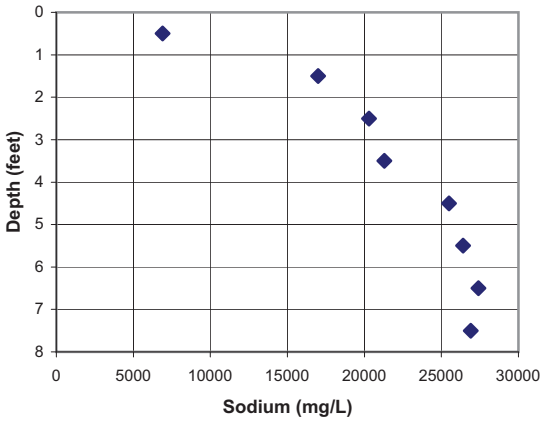
OL-STA-70040



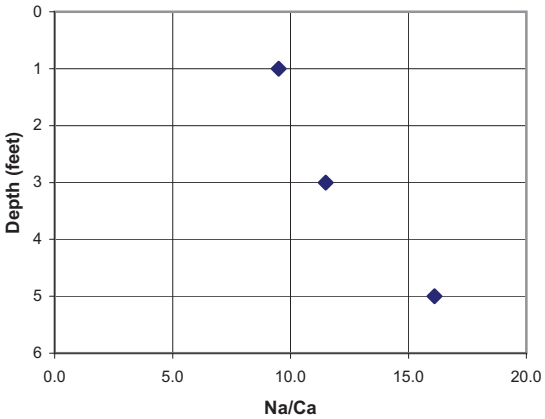
OL-STA-70008



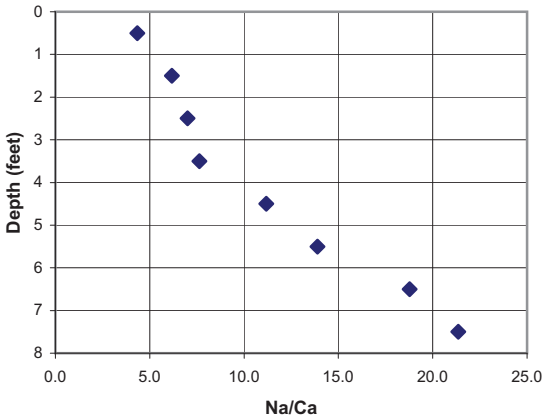
OL-STA-70040

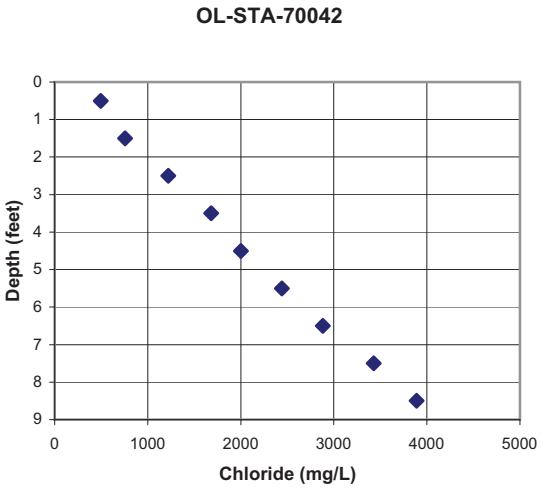


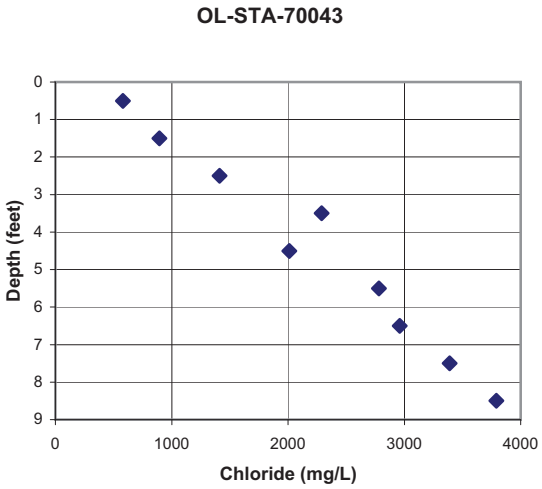
OL-STA-70008

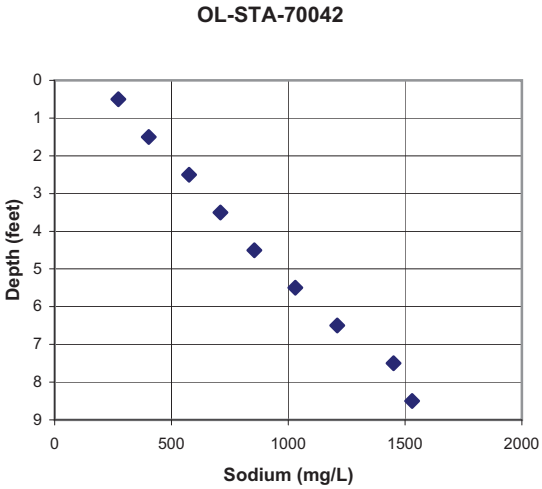


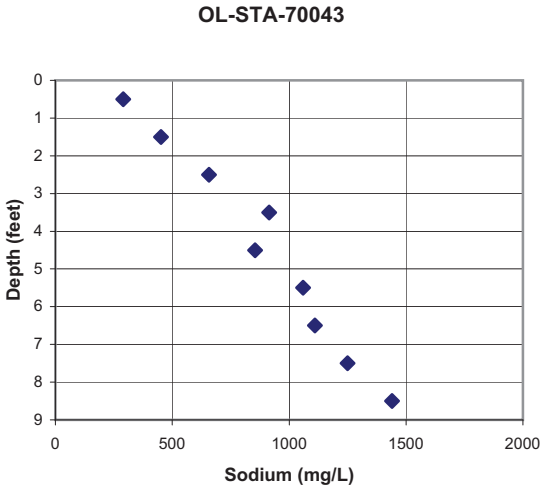
OL-STA-70040

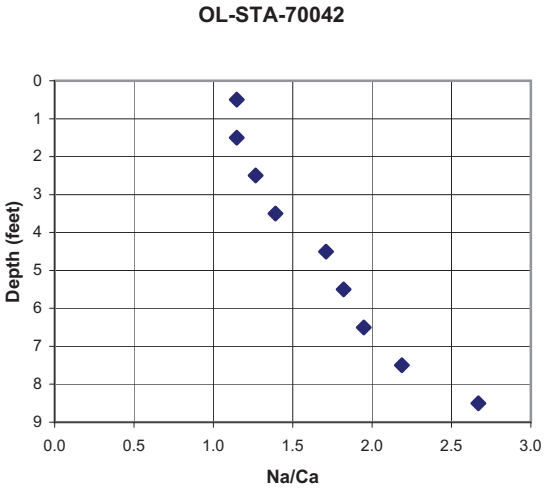


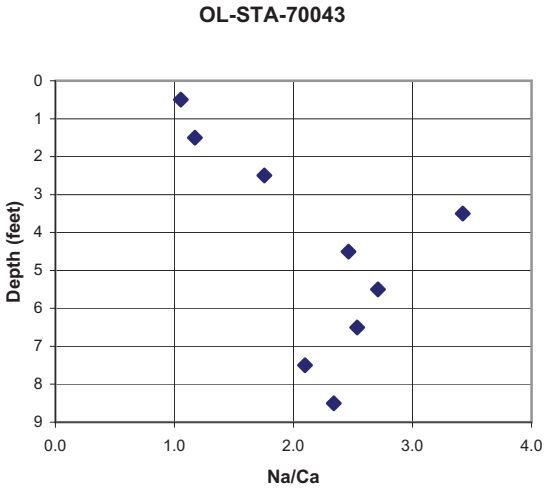

OL-STA-70042
Depth (feet)
Chloride (mg/L)
0
1000
2000
3000
4000
5000

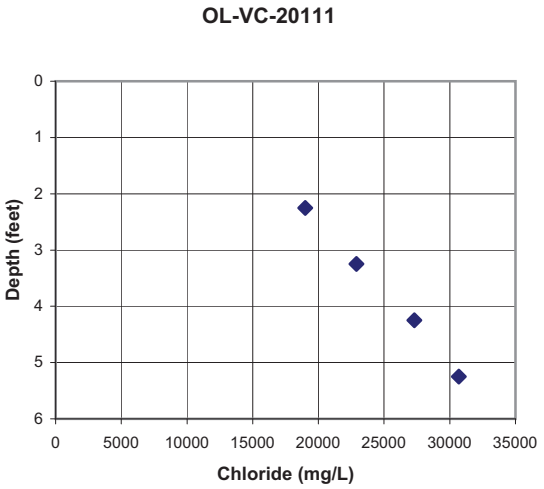

OL-STA-70043
Depth (feet)
Chloride (mg/L)
0
1000
2000
3000
4000

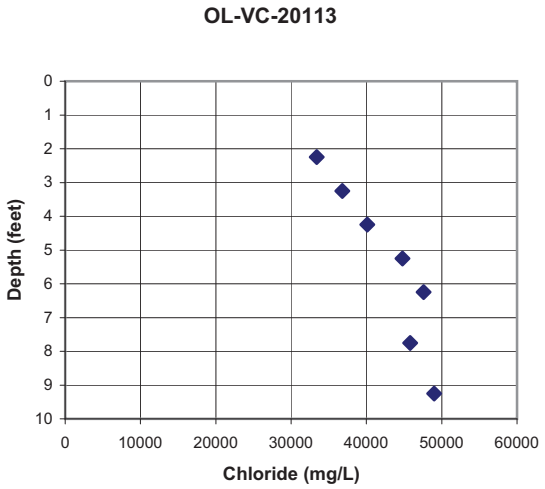

OL-STA-70042
Depth (feet)
Sodium (mg/L)
0
500
1000
1500
2000

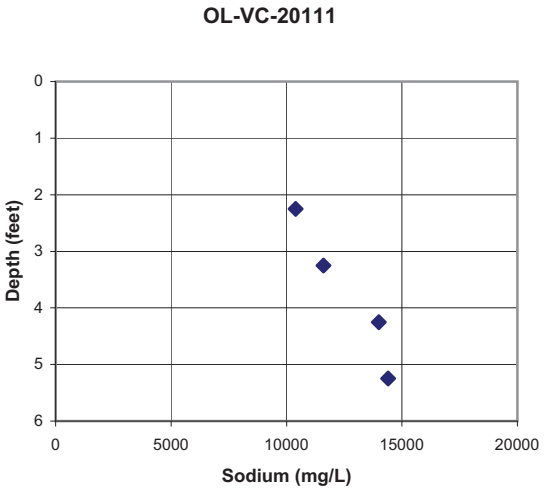

OL-STA-70043
Depth (feet)
Sodium (mg/L)
0
500
1000
1500
2000

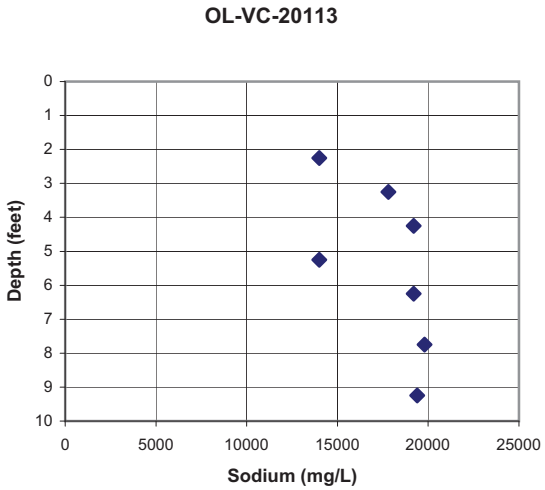

OL-STA-70042
Depth (feet)
Na/Ca
0.0
0.5
1.0
1.5
2.0
2.5
3.0

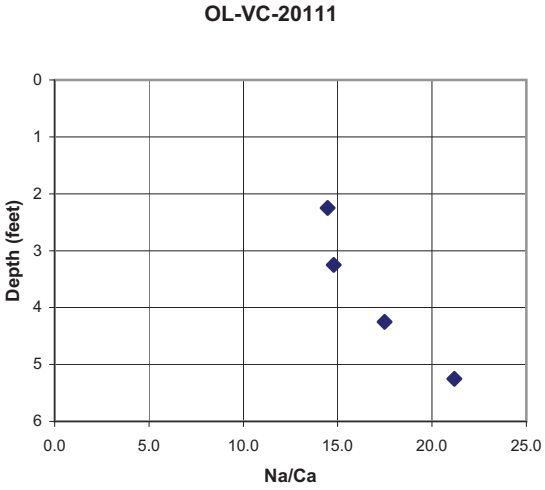

OL-STA-70043
Depth (feet)
Na/Ca
0.0
1.0
2.0
3.0
4.0

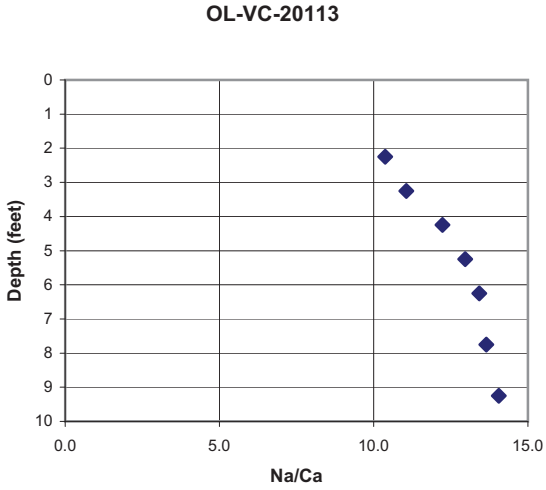

OL-VC-20111
Depth (feet)
0
1
2
3
4
5
6
0
5000
10000
15000
20000
25000
30000
35000
Chloride (mg/L)


OL-VC-20113
Depth (feet)
0
1
2
3
4
5
6
7
8
9
10
0
10000
20000
30000
40000
50000
60000
Chloride (mg/L)

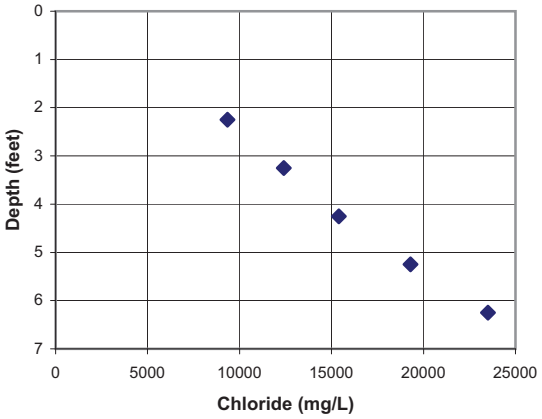

OL-VC-20111
Depth (feet)
0
1
2
3
4
5
6
0
5000
10000
15000
20000
Sodium (mg/L)


OL-VC-20113
Depth (feet)
0
1
2
3
4
5
6
7
8
9
10
0
5000
10000
15000
20000
25000
Sodium (mg/L)

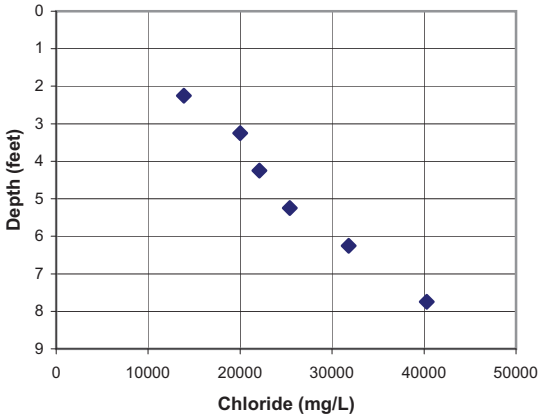

OL-VC-20111
Depth (feet)
0
1
2
3
4
5
6
0.0
5.0
10.0
15.0
20.0
25.0
Na/Ca


OL-VC-20113
Depth (feet)
0
1
2
3
4
5
6
7
8
9
10
0.0
5.0
10.0
15.0
Na/Ca

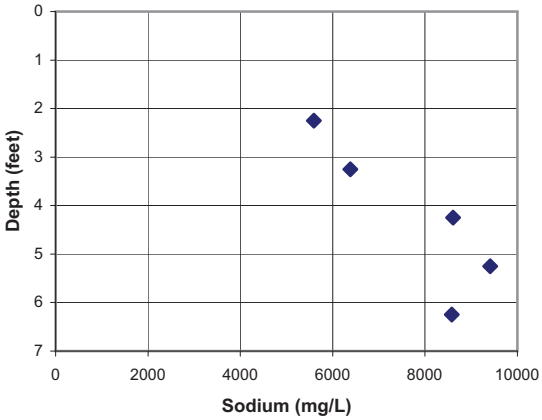
OL-VC-20118



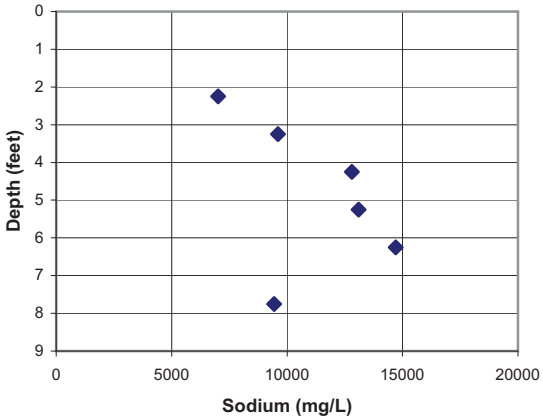
OL-VC-20119



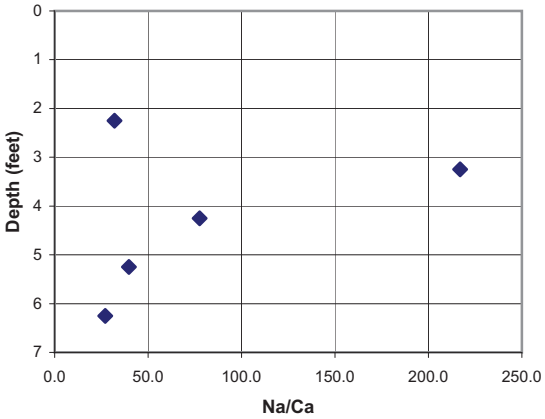
OL-VC-20118



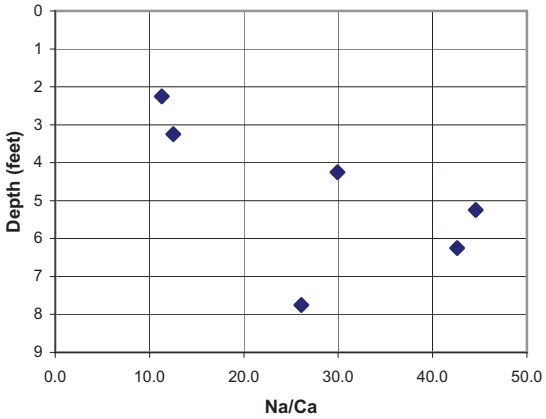
OL-VC-20119

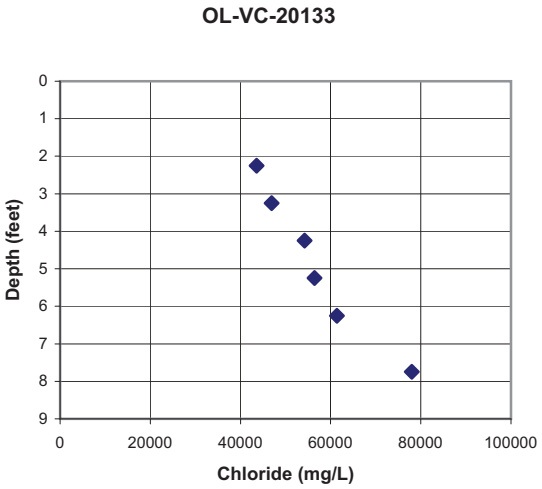


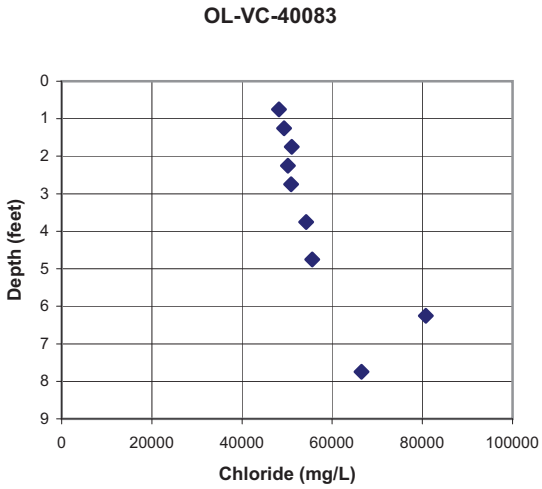
OL-VC-20118

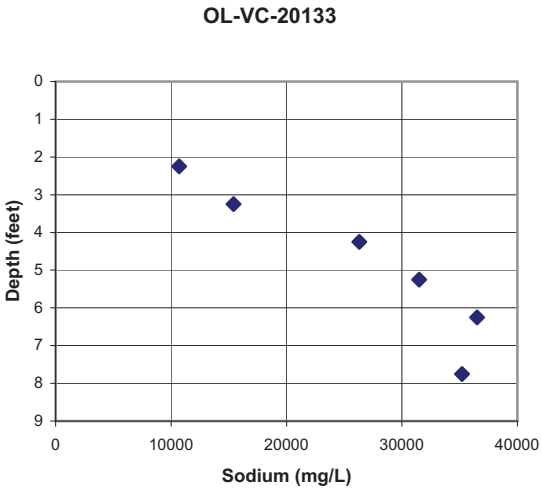


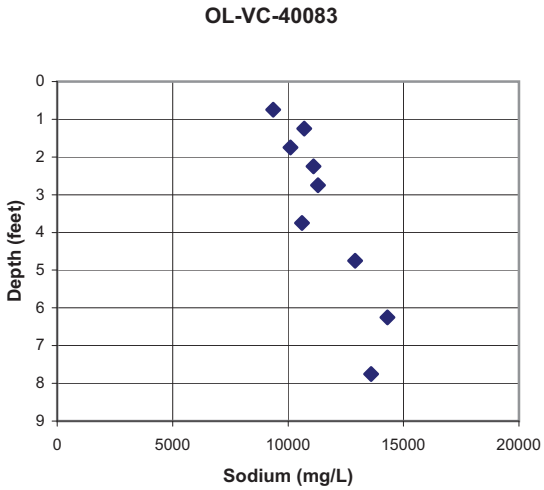
OL-VC-20119

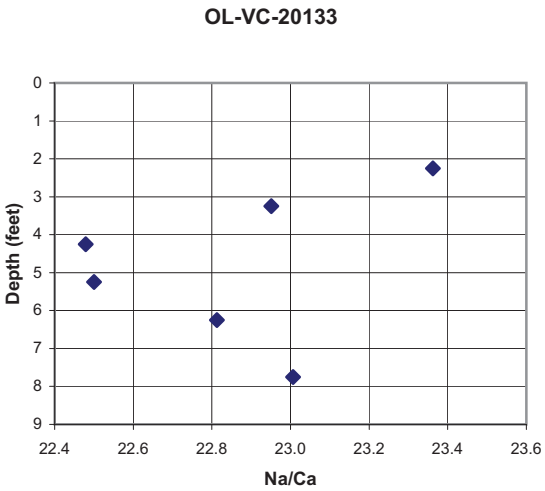


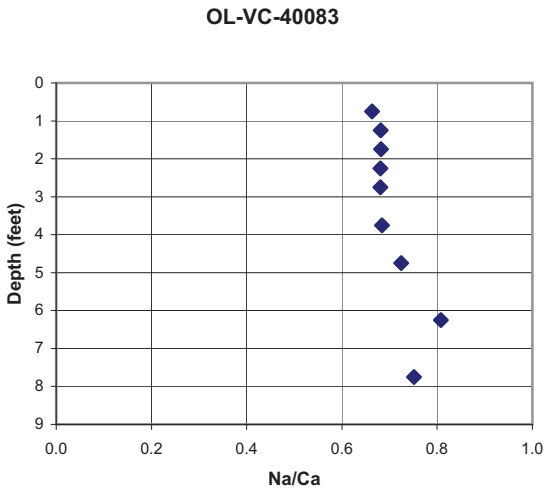

OL-VC-20133
Depth (feet)
Chloride (mg/L)
0
1
2
3
4
5
6
7
8
9
0
20000
40000
60000
80000
100000

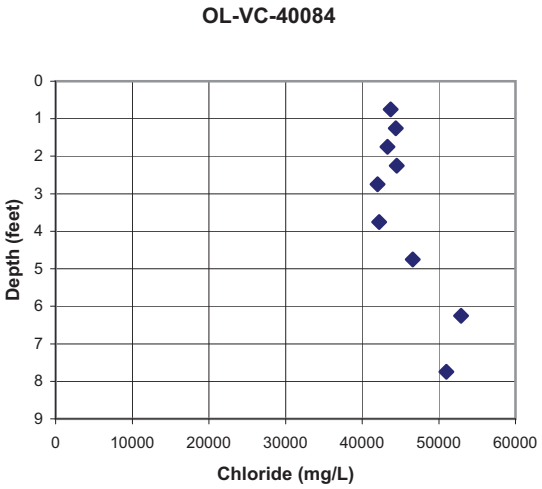

OL-VC-40083
Depth (feet)
Chloride (mg/L)
0
1
2
3
4
5
6
7
8
9
0
20000
40000
60000
80000
100000

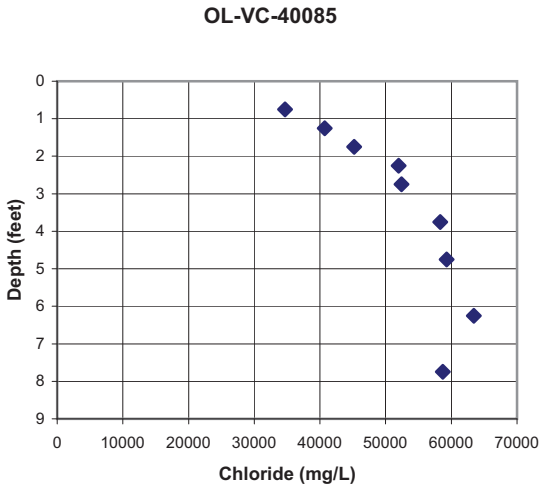

OL-VC-20133
Depth (feet)
Sodium (mg/L)
0
1
2
3
4
5
6
7
8
9
0
10000
20000
30000
40000

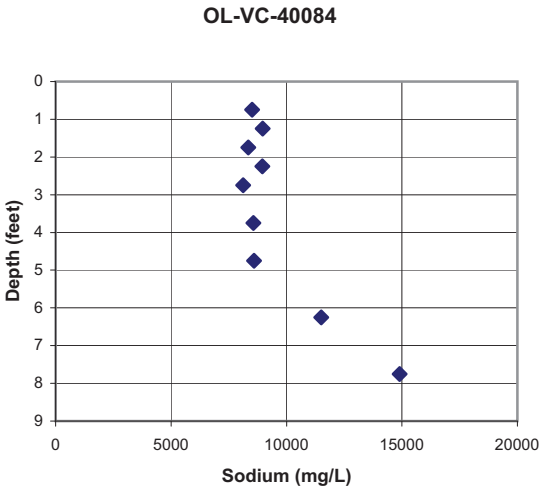

OL-VC-40083
Depth (feet)
Sodium (mg/L)
0
1
2
3
4
5
6
7
8
9
0
5000
10000
15000
20000

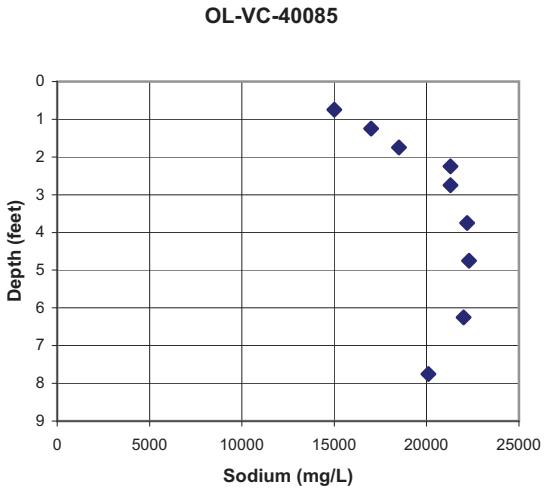

OL-VC-20133
Depth (feet)
Na/Ca
0
1
2
3
4
5
6
7
8
9
22.4
22.6
22.8
23.0
23.2
23.4
23.6

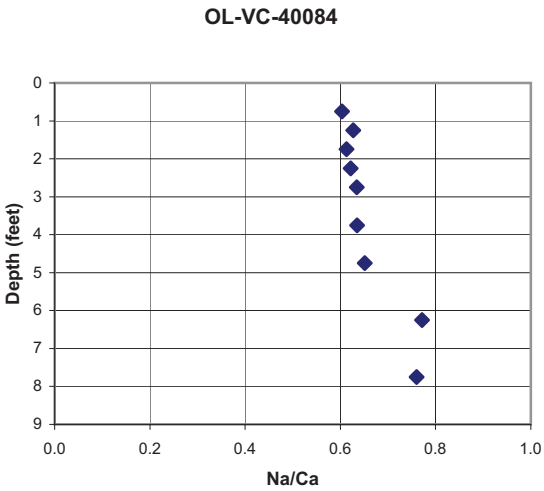

OL-VC-40083
Depth (feet)
Na/Ca
0
1
2
3
4
5
6
7
8
9
0.0
0.2
0.4
0.6
0.8
1.0

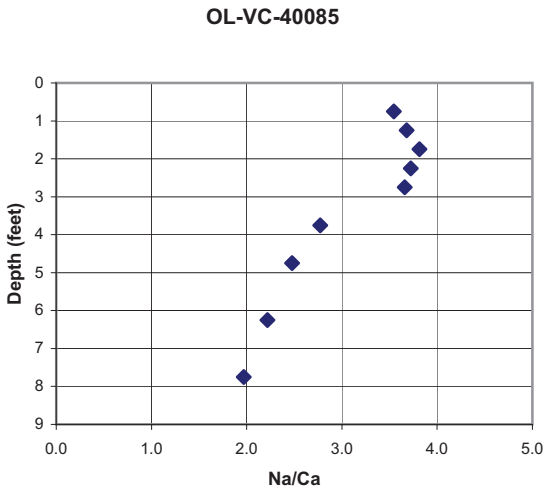

OL-VC-40084
Depth (feet)
Chloride (mg/L)
0
1
2
3
4
5
6
7
8
9
0
10000
20000
30000
40000
50000
60000

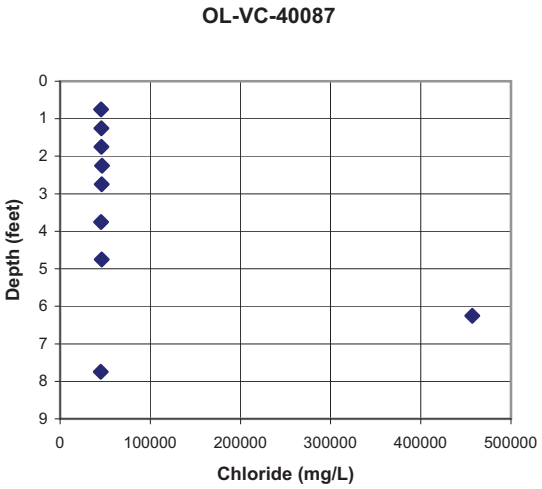

OL-VC-40085
Depth (feet)
Chloride (mg/L)
0
1
2
3
4
5
6
7
8
9
0
10000
20000
30000
40000
50000
60000
70000

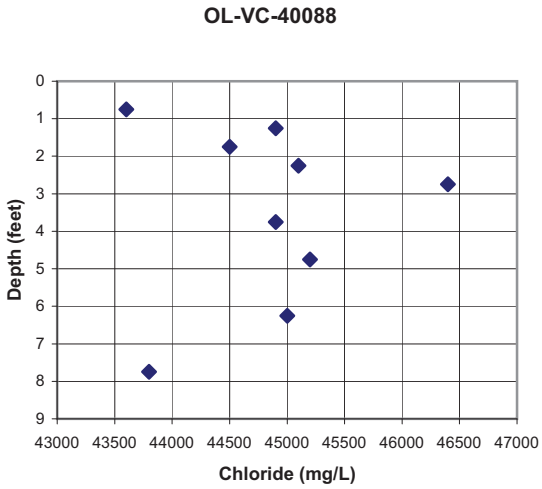

OL-VC-40084
Depth (feet)
Sodium (mg/L)
0
1
2
3
4
5
6
7
8
9
0
5000
10000
15000
20000

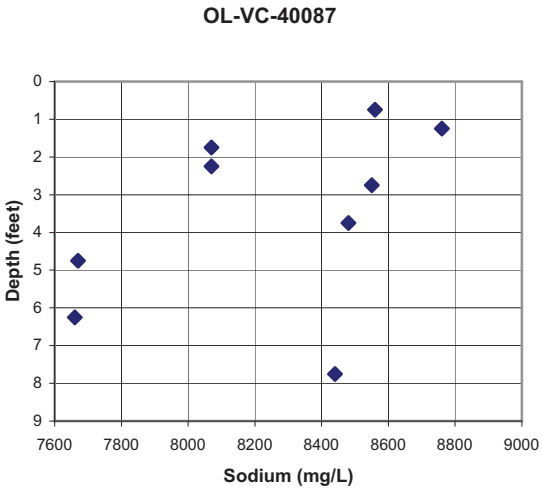

OL-VC-40085
Depth (feet)
Sodium (mg/L)
0
1
2
3
4
5
6
7
8
9
0
5000
10000
15000
20000
25000

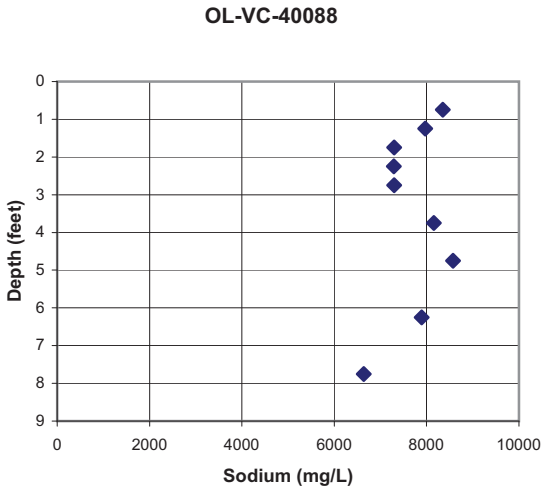

OL-VC-40084
Depth (feet)
Na/Ca
0
1
2
3
4
5
6
7
8
9
0.0
0.2
0.4
0.6
0.8
1.0

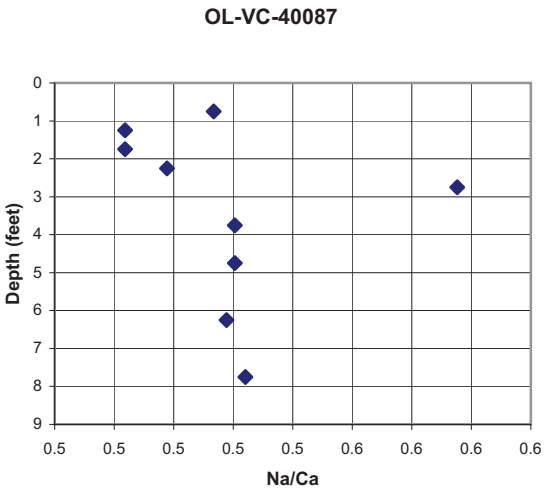

OL-VC-40085
Depth (feet)
Na/Ca
0
1
2
3
4
5
6
7
8
9
0.0
1.0
2.0
3.0
4.0
5.0

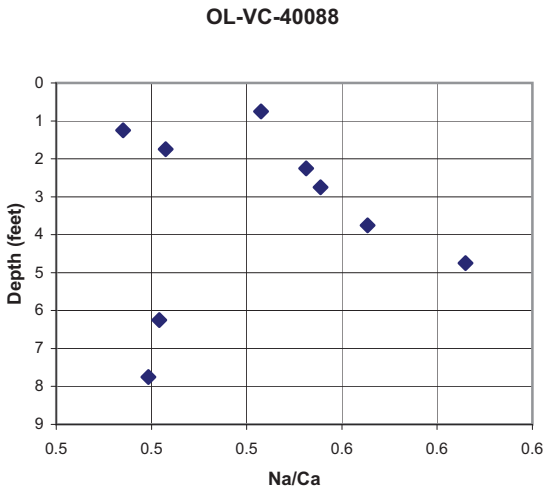

OL-VC-40087
Depth (feet)
0
1
2
3
4
5
6
7
8
9
0
100000
200000
300000
400000
500000
Chloride (mg/L)

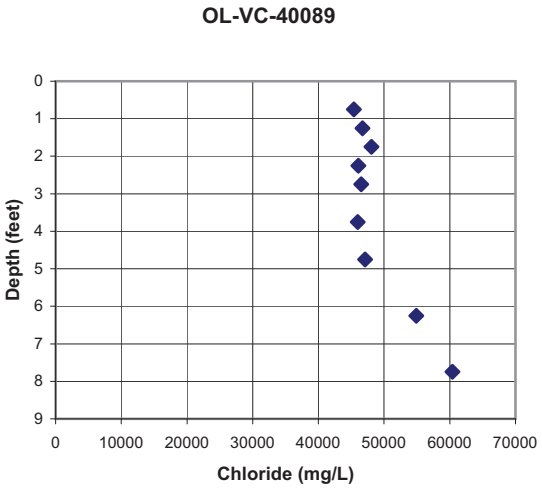

OL-VC-40088
Depth (feet)
0
1
2
3
4
5
6
7
8
9
43000
43500
44000
44500
45000
45500
46000
46500
47000
Chloride (mg/L)

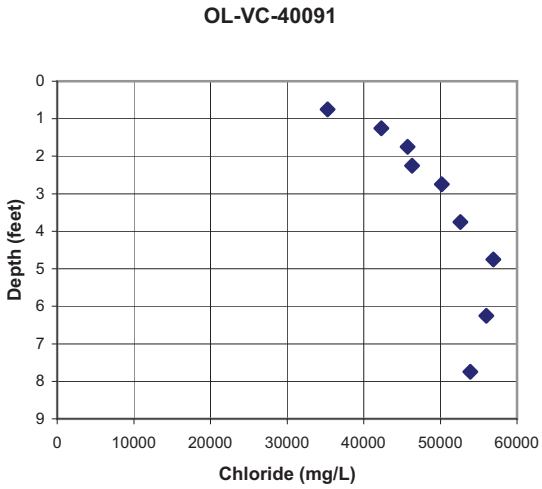

OL-VC-40087
Depth (feet)
0
1
2
3
4
5
6
7
8
9
7600
7800
8000
8200
8400
8600
8800
9000
Sodium (mg/L)

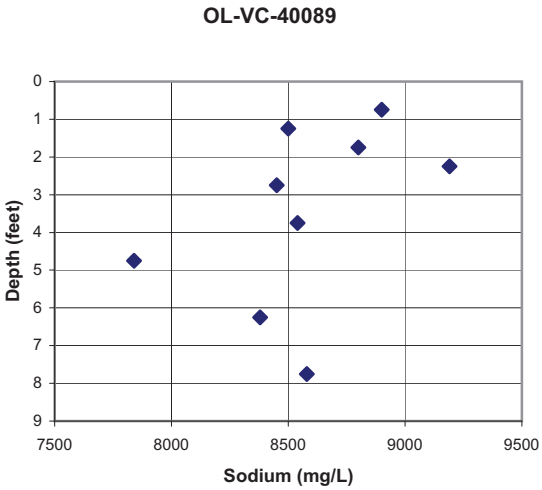

OL-VC-40088
Depth (feet)
0
1
2
3
4
5
6
7
8
9
0
2000
4000
6000
8000
10000
Sodium (mg/L)

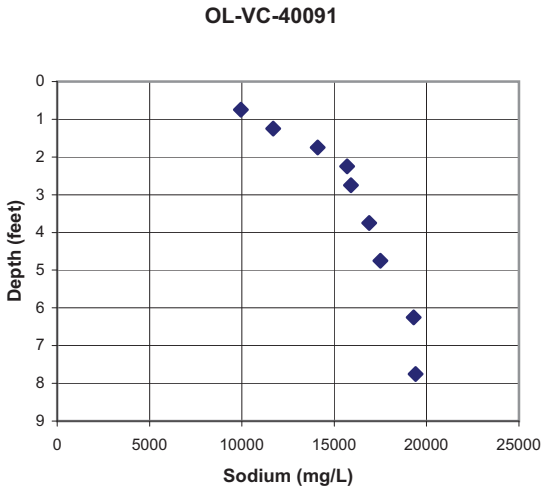

OL-VC-40087
Depth (feet)
0
1
2
3
4
5
6
7
8
9
0.5
0.5
0.5
0.5
0.5
0.6
0.6
0.6
0.6
Na/Ca

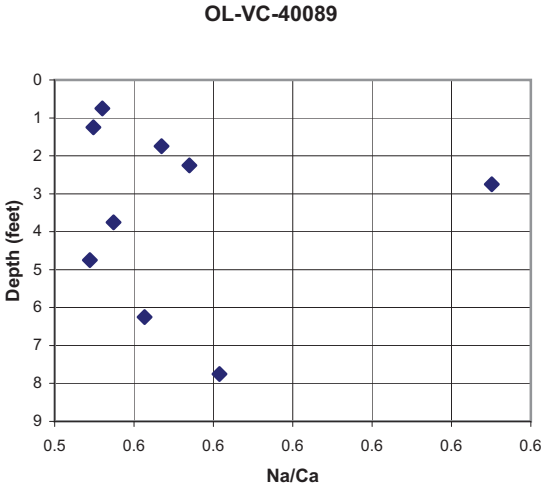

OL-VC-40088
Depth (feet)
0
1
2
3
4
5
6
7
8
9
0.5
0.5
0.5
0.6
0.6
0.6
Na/Ca

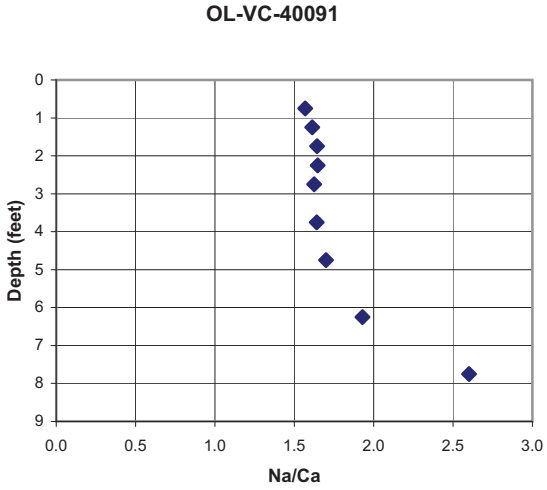

OL-VC-40089
Depth (feet)
Chloride (mg/L)
0
1
2
3
4
5
6
7
8
9
0
10000
20000
30000
40000
50000
60000
70000

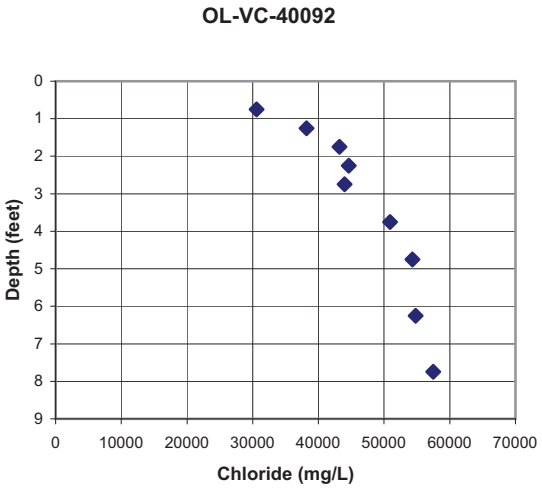

OL-VC-40091
Depth (feet)
Chloride (mg/L)
0
1
2
3
4
5
6
7
8
9
0
10000
20000
30000
40000
50000
60000

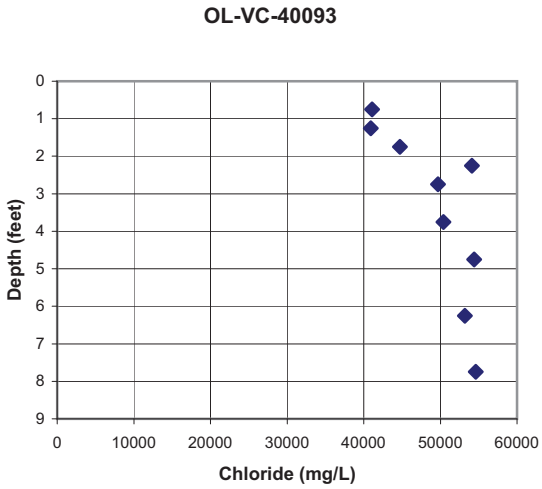

OL-VC-40089
Depth (feet)
Sodium (mg/L)
0
1
2
3
4
5
6
7
8
9
7500
8000
8500
9000
9500

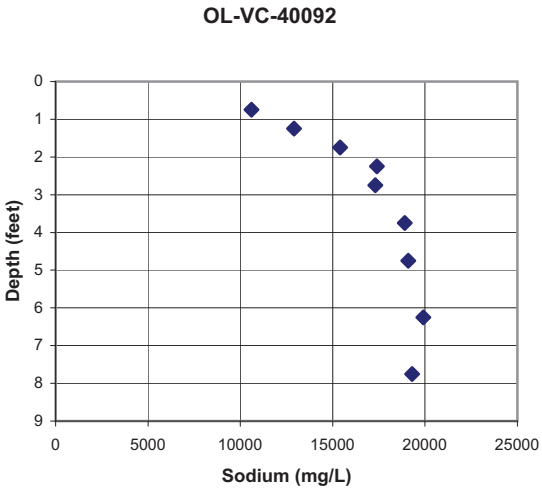

OL-VC-40091
Depth (feet)
Sodium (mg/L)
0
1
2
3
4
5
6
7
8
9
0
5000
10000
15000
20000
25000

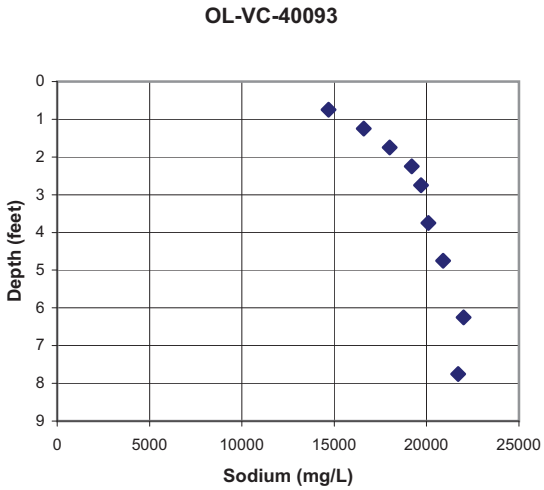

OL-VC-40089
Depth (feet)
Na/Ca
0
1
2
3
4
5
6
7
8
9
0.5
0.6
0.6
0.6
0.6
0.6

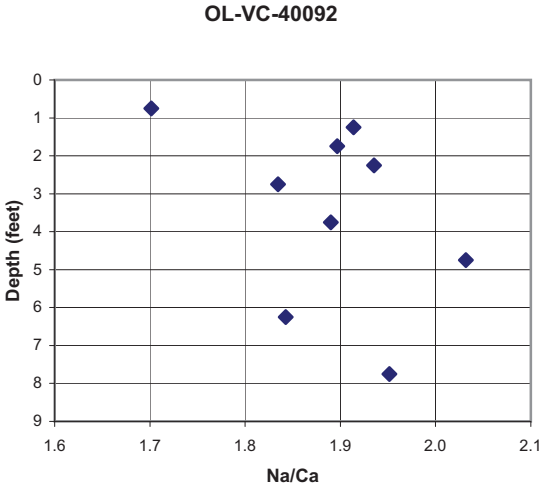

OL-VC-40091
Depth (feet)
Na/Ca
0
1
2
3
4
5
6
7
8
9
0.0
0.5
1.0
1.5
2.0
2.5
3.0

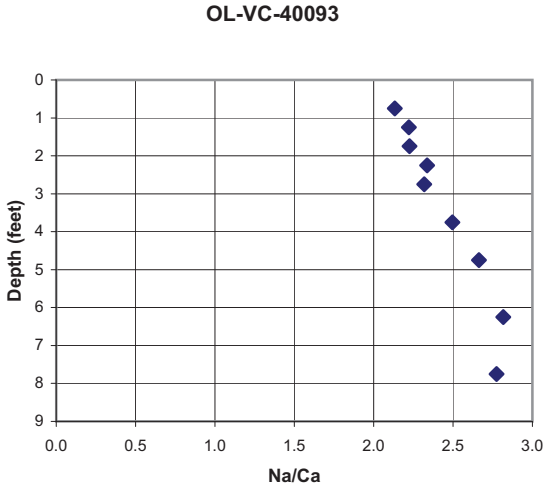

OL-VC-40092
Depth (feet)
Chloride (mg/L)
0
1
2
3
4
5
6
7
8
9
0
10000
20000
30000
40000
50000
60000
70000

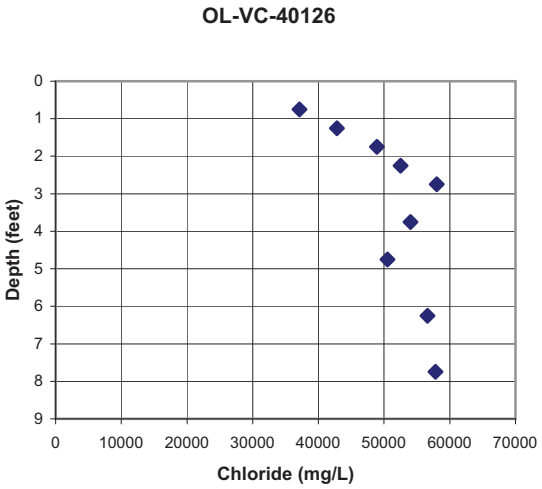

OL-VC-40093
Depth (feet)
Chloride (mg/L)
0
1
2
3
4
5
6
7
8
9
0
10000
20000
30000
40000
50000
60000

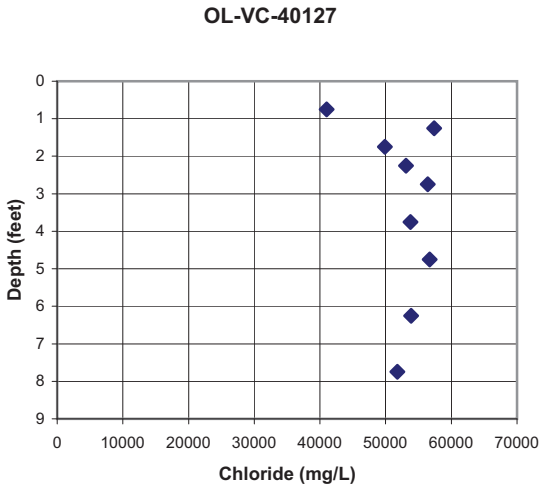

OL-VC-40092
Depth (feet)
Sodium (mg/L)
0
1
2
3
4
5
6
7
8
9
0
5000
10000
15000
20000
25000

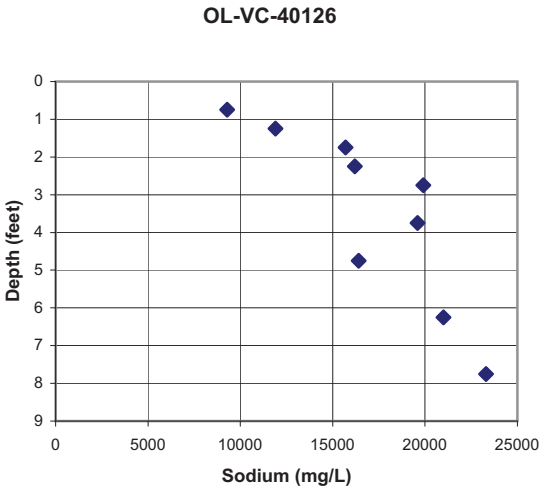

OL-VC-40093
Depth (feet)
Sodium (mg/L)
0
1
2
3
4
5
6
7
8
9
0
5000
10000
15000
20000
25000

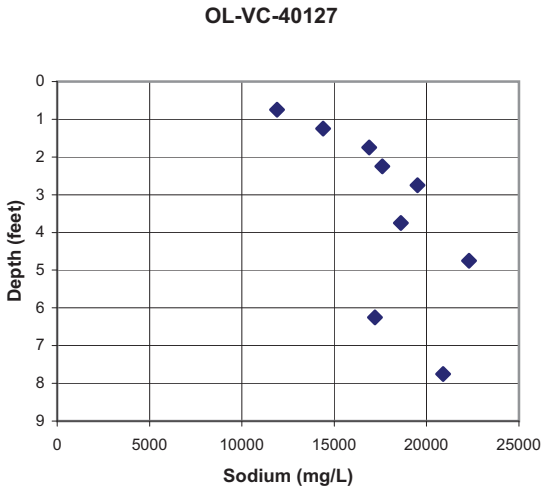

OL-VC-40092
Depth (feet)
Na/Ca
0
1
2
3
4
5
6
7
8
9
1.6
1.7
1.8
1.9
2.0
2.1

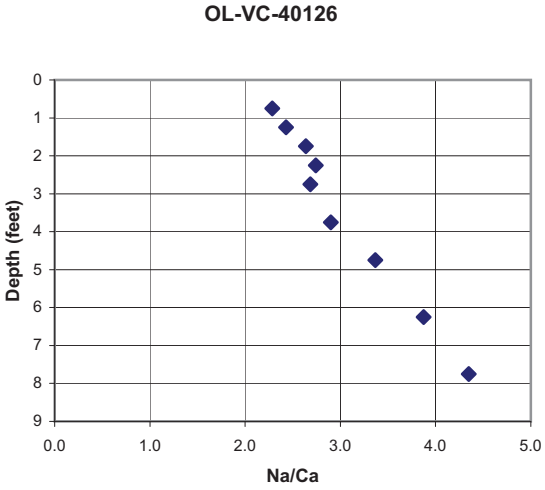

OL-VC-40093
Depth (feet)
Na/Ca
0
1
2
3
4
5
6
7
8
9
0.0
0.5
1.0
1.5
2.0
2.5
3.0

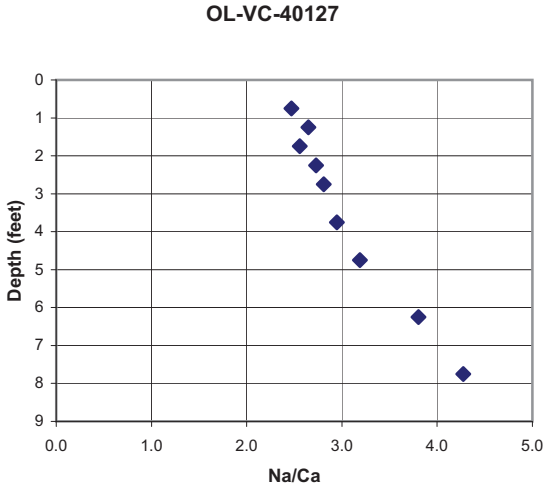

OL-VC-40126
Depth (feet)
0
1
2
3
4
5
6
7
8
9
0
10000
20000
30000
40000
50000
60000
70000
Chloride (mg/L)

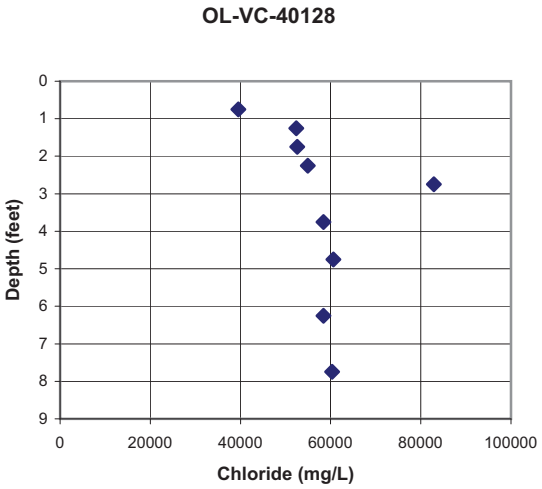

OL-VC-40127
Depth (feet)
0
1
2
3
4
5
6
7
8
9
0
10000
20000
30000
40000
50000
60000
70000
Chloride (mg/L)

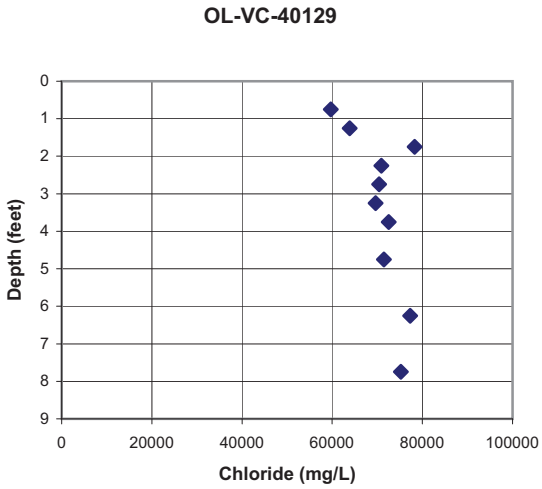

OL-VC-40126
Depth (feet)
0
1
2
3
4
5
6
7
8
9
0
5000
10000
15000
20000
25000
Sodium (mg/L)

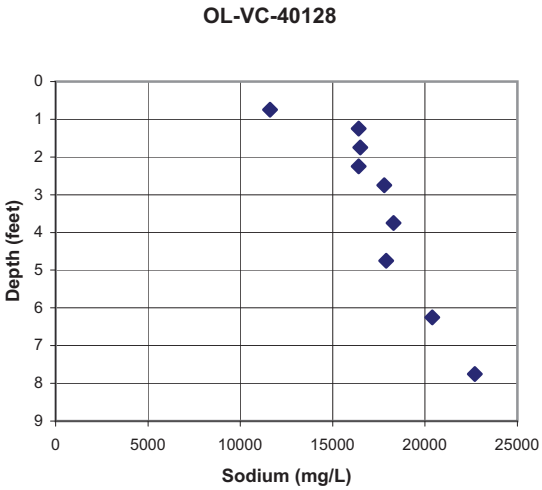

OL-VC-40127
Depth (feet)
0
1
2
3
4
5
6
7
8
9
0
5000
10000
15000
20000
25000
Sodium (mg/L)

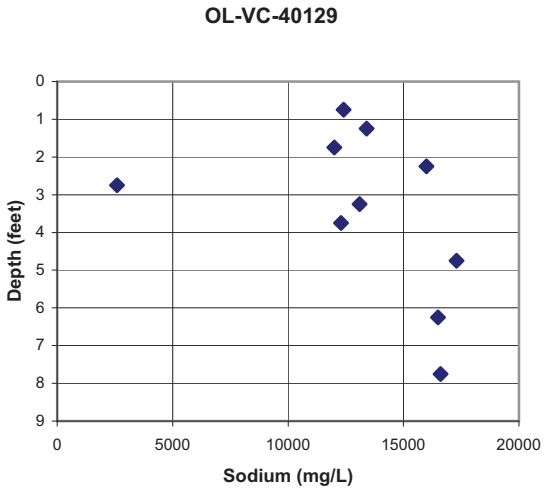

OL-VC-40126
Depth (feet)
0
1
2
3
4
5
6
7
8
9
0.0
1.0
2.0
3.0
4.0
5.0
Na/Ca

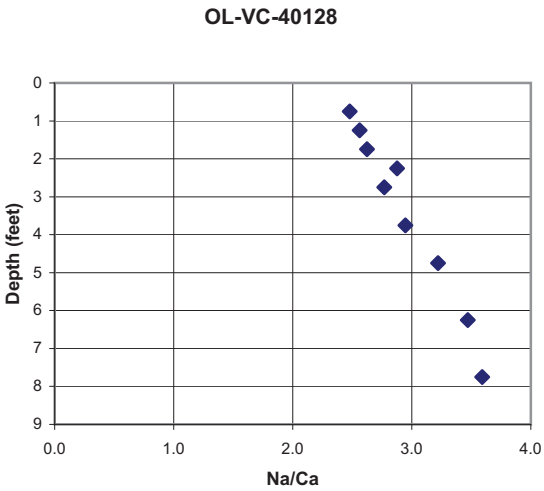

OL-VC-40127
Depth (feet)
0
1
2
3
4
5
6
7
8
9
0.0
1.0
2.0
3.0
4.0
5.0
Na/Ca

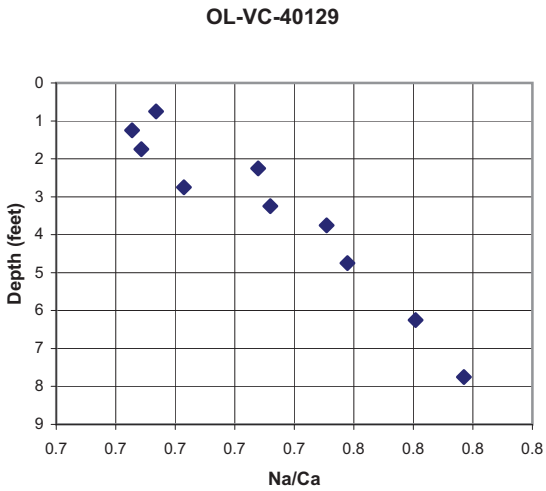

OL-VC-40128
Depth (feet)
Chloride (mg/L)
0
1
2
3
4
5
6
7
8
9
0
20000
40000
60000
80000
100000

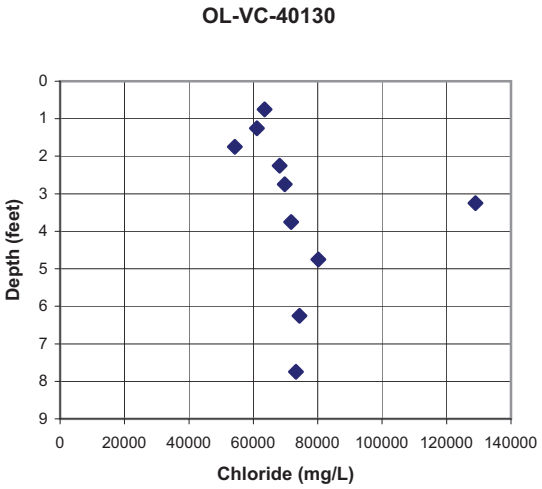

OL-VC-40129
Depth (feet)
Chloride (mg/L)
0
1
2
3
4
5
6
7
8
9
0
20000
40000
60000
80000
100000

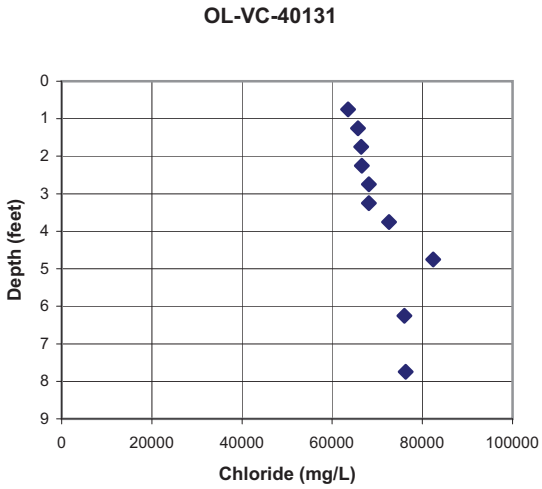

OL-VC-40128
Depth (feet)
Sodium (mg/L)
0
1
2
3
4
5
6
7
8
9
0
5000
10000
15000
20000
25000

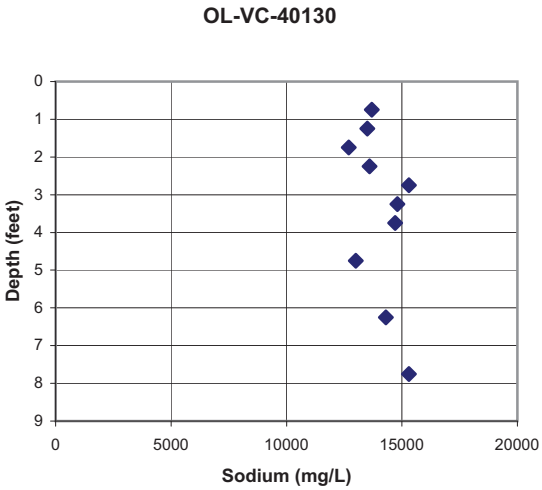

OL-VC-40129
Depth (feet)
Sodium (mg/L)
0
1
2
3
4
5
6
7
8
9
0
5000
10000
15000
20000

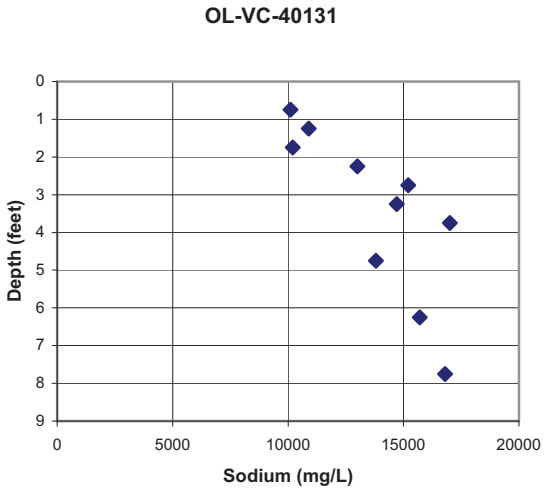

OL-VC-40128
Depth (feet)
Na/Ca
0
1
2
3
4
5
6
7
8
9
0.0
1.0
2.0
3.0
4.0

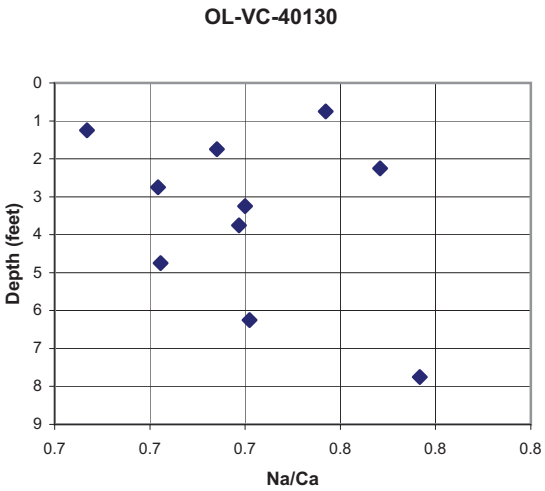

OL-VC-40129
Depth (feet)
Na/Ca
0
1
2
3
4
5
6
7
8
9
0.7
0.7
0.7
0.7
0.7
0.8
0.8
0.8
0.8

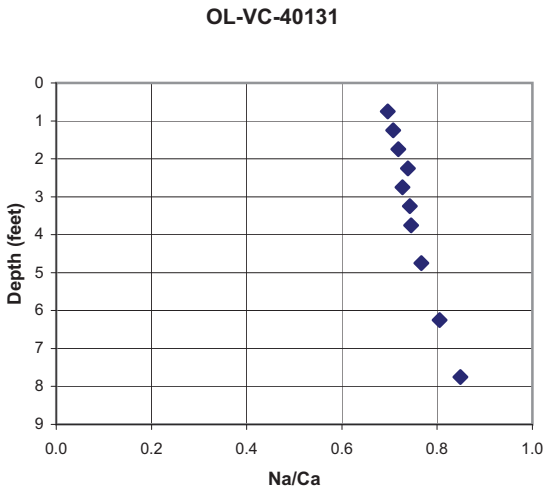

OL-VC-40130
Depth (feet)
Chloride (mg/L)
0
1
2
3
4
5
6
7
8
9
0
20000
40000
60000
80000
100000
120000
140000

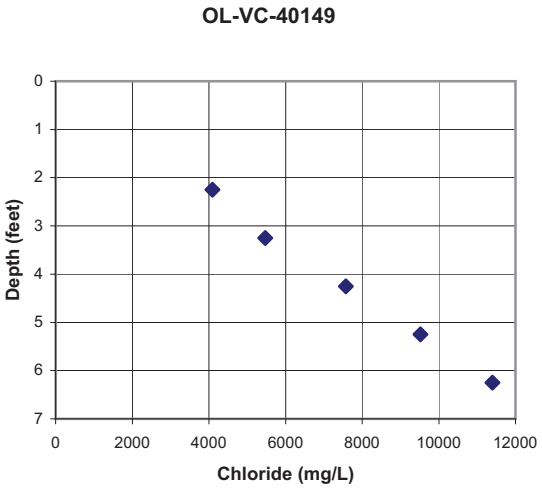

OL-VC-40131
Depth (feet)
Chloride (mg/L)
0
1
2
3
4
5
6
7
8
9
0
20000
40000
60000
80000
100000

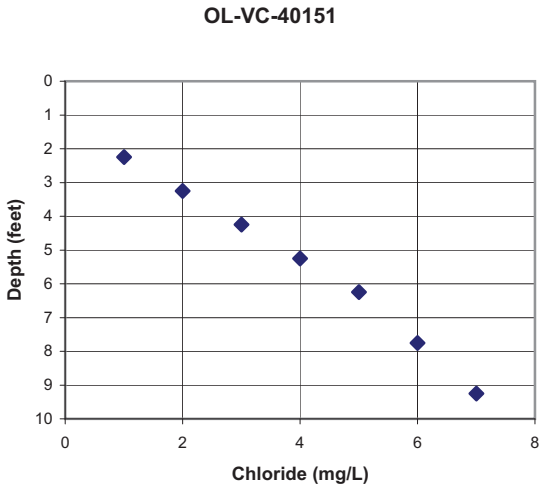

OL-VC-40130
Depth (feet)
Sodium (mg/L)
0
1
2
3
4
5
6
7
8
9
0
5000
10000
15000
20000

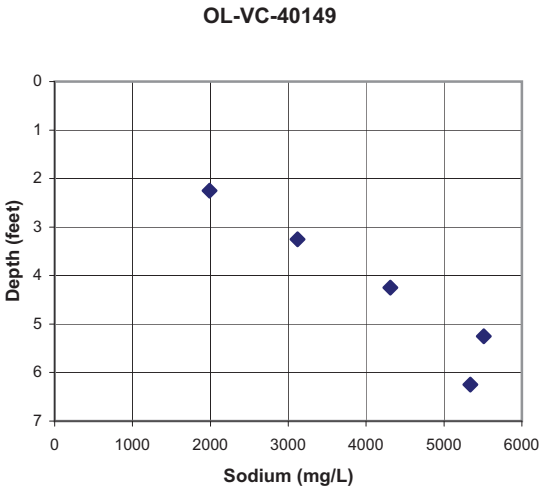

OL-VC-40131
Depth (feet)
Sodium (mg/L)
0
1
2
3
4
5
6
7
8
9
0
5000
10000
15000
20000

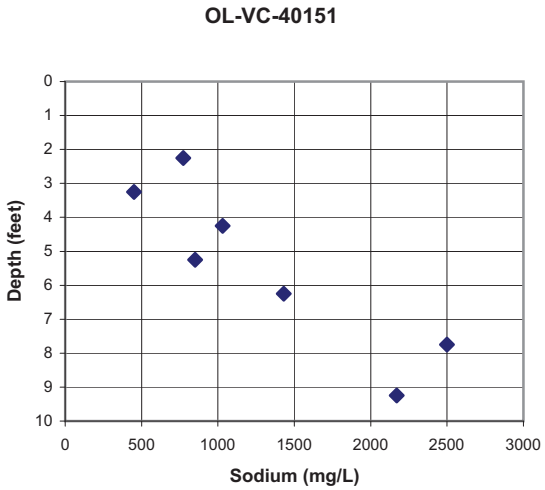

OL-VC-40130
Depth (feet)
Na/Ca
0
1
2
3
4
5
6
7
8
9
0.7
0.7
0.7
0.8
0.8
0.8

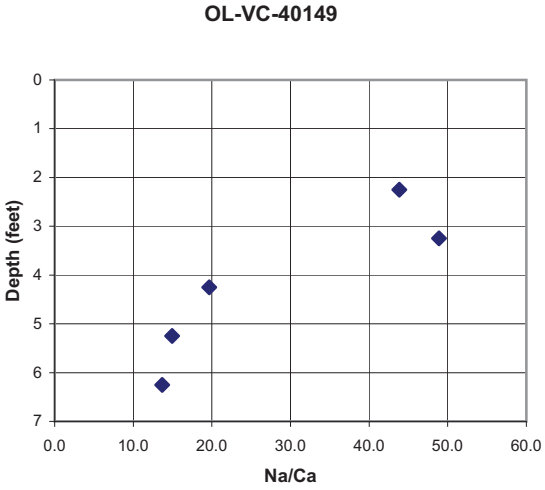

OL-VC-40131
Depth (feet)
Na/Ca
0
1
2
3
4
5
6
7
8
9
0.0
0.2
0.4
0.6
0.8
1.0

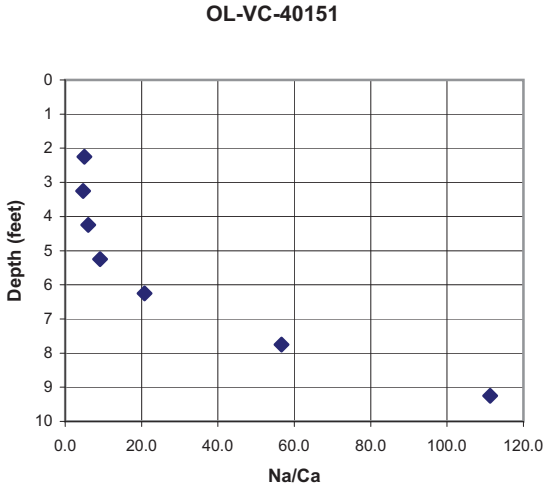

OL-VC-40149
Depth (feet)
Chloride (mg/L)

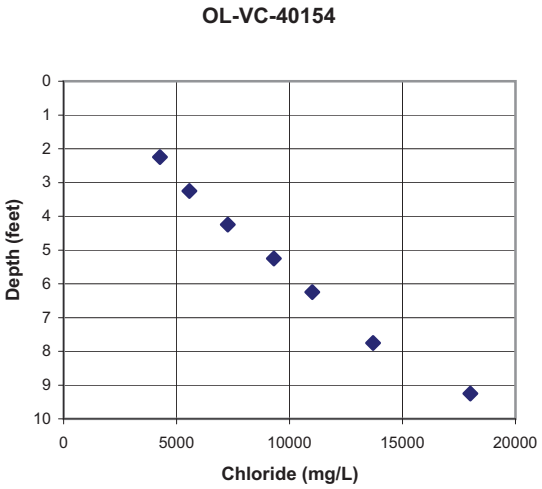

OL-VC-40151
Depth (feet)
Chloride (mg/L)

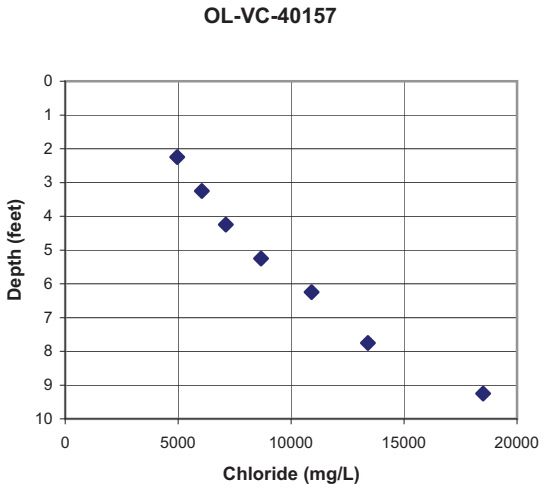

OL-VC-40149
Depth (feet)
Sodium (mg/L)

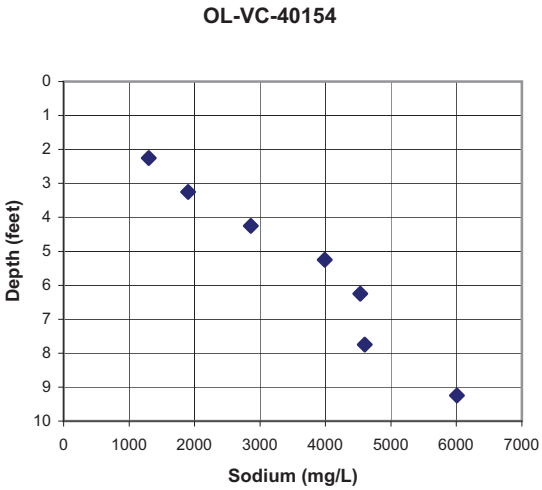

OL-VC-40151
Depth (feet)
Sodium (mg/L)

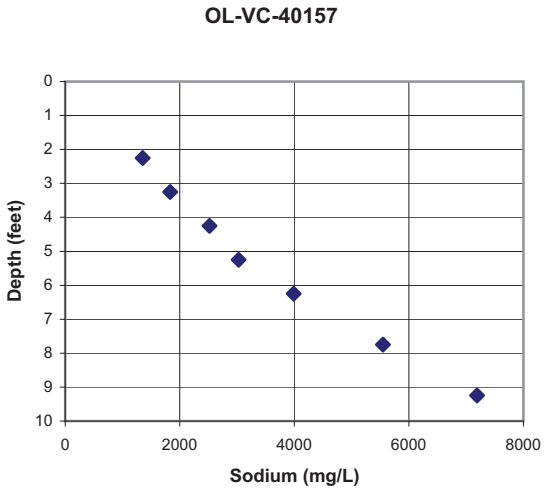

OL-VC-40149
Depth (feet)
Na/Ca

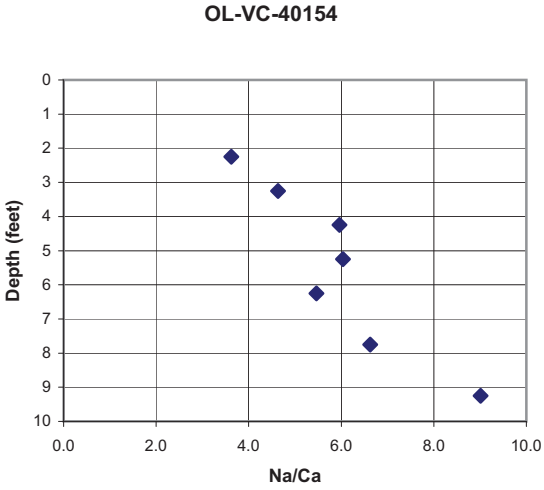

OL-VC-40151
Depth (feet)
Na/Ca

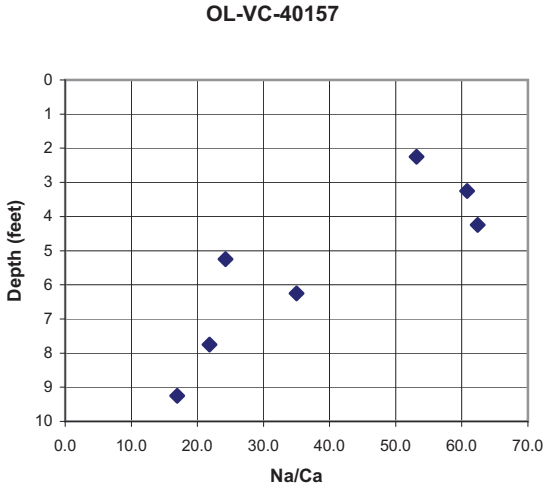

OL-VC-40154
Depth (feet)
Chloride (mg/L)
0
1
2
3
4
5
6
7
8
9
10
0
5000
10000
15000
20000

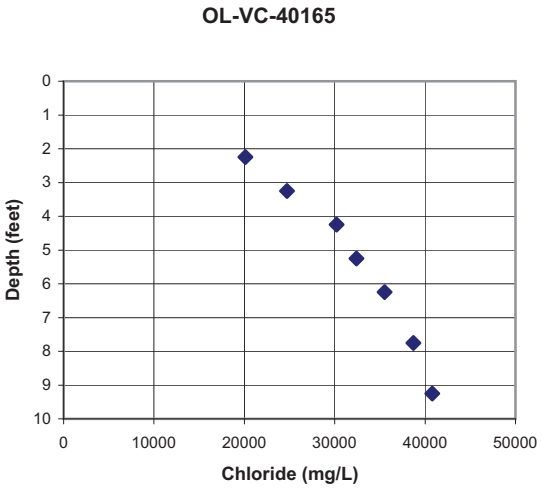

OL-VC-40157
Depth (feet)
Chloride (mg/L)
0
1
2
3
4
5
6
7
8
9
10
0
5000
10000
15000
20000

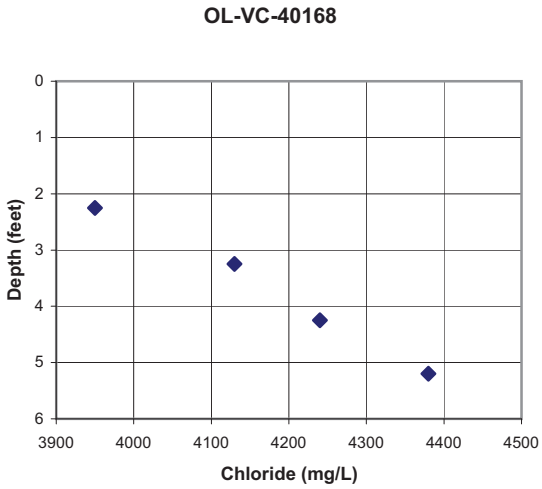

OL-VC-40154
Depth (feet)
Sodium (mg/L)
0
1
2
3
4
5
6
7
8
9
10
0
1000
2000
3000
4000
5000
6000
7000

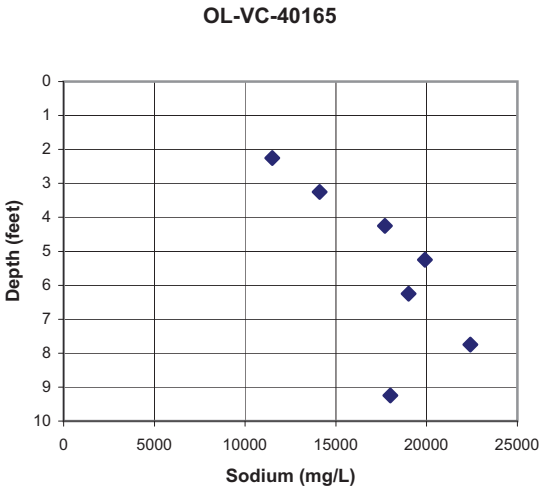

OL-VC-40157
Depth (feet)
Sodium (mg/L)
0
1
2
3
4
5
6
7
8
9
10
0
2000
4000
6000
8000

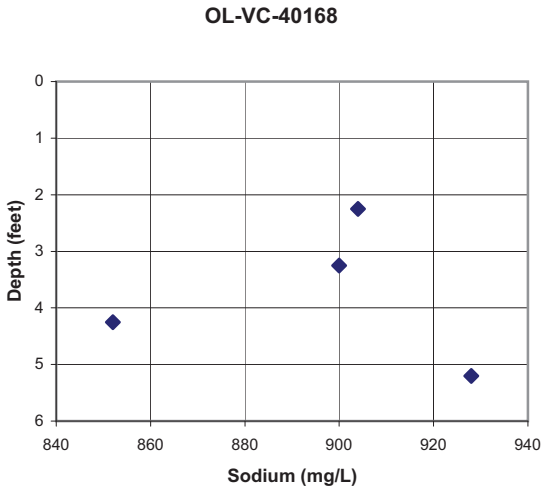

OL-VC-40154
Depth (feet)
Na/Ca
0
1
2
3
4
5
6
7
8
9
10
0.0
2.0
4.0
6.0
8.0
10.0

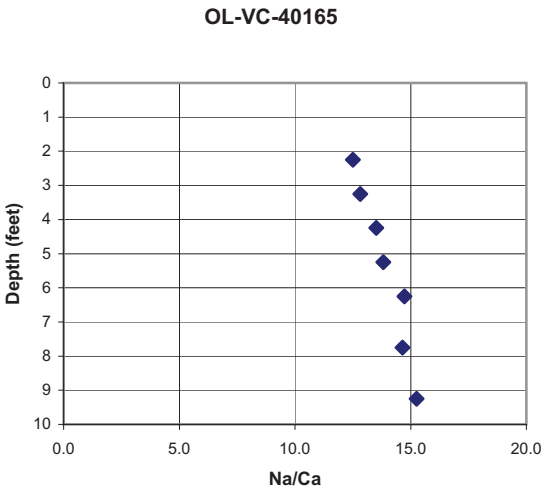

OL-VC-40157
Depth (feet)
Na/Ca
0
1
2
3
4
5
6
7
8
9
10
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0

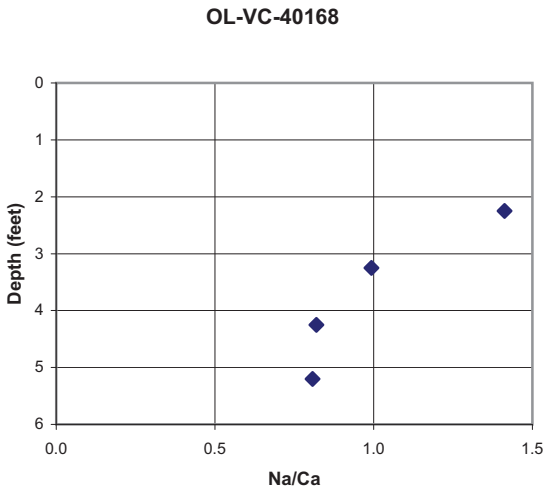

OL-VC-40165
Depth (feet)
0
1
2
3
4
5
6
7
8
9
10
0
10000
20000
30000
40000
50000
Chloride (mg/L)

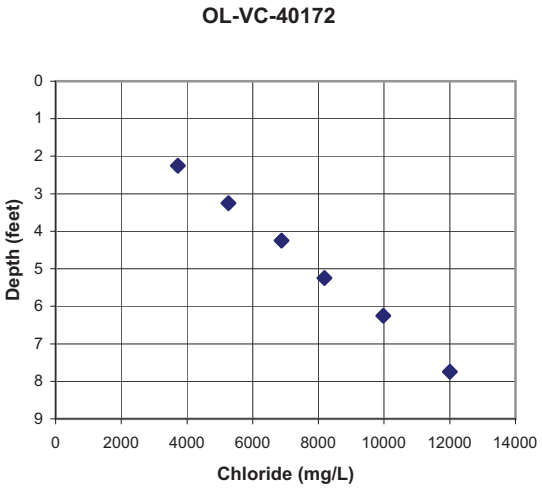

OL-VC-40168
Depth (feet)
0
1
2
3
4
5
6
3900
4000
4100
4200
4300
4400
4500
Chloride (mg/L)

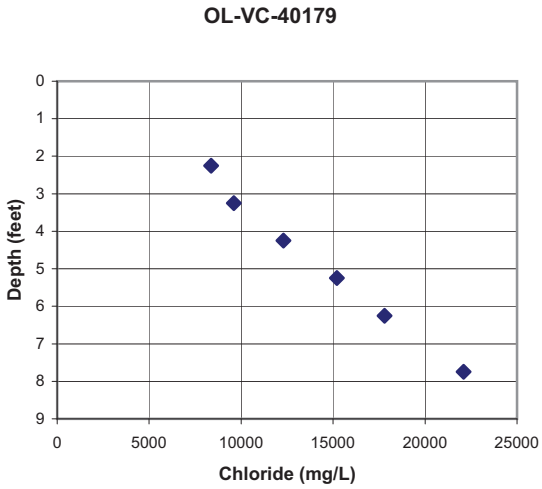

OL-VC-40165
Depth (feet)
0
1
2
3
4
5
6
7
8
9
10
0
5000
10000
15000
20000
25000
Sodium (mg/L)

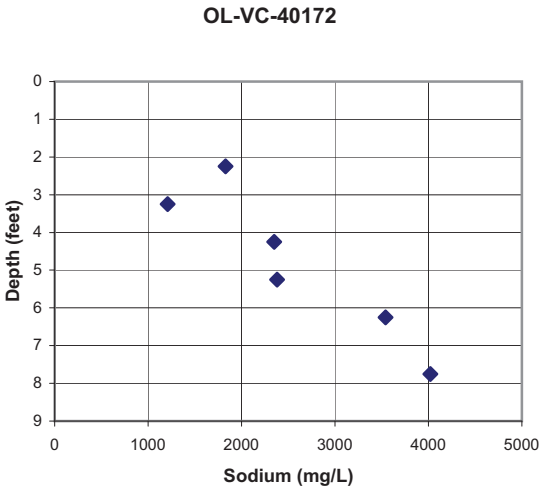

OL-VC-40168
Depth (feet)
0
1
2
3
4
5
6
840
860
880
900
920
940
Sodium (mg/L)

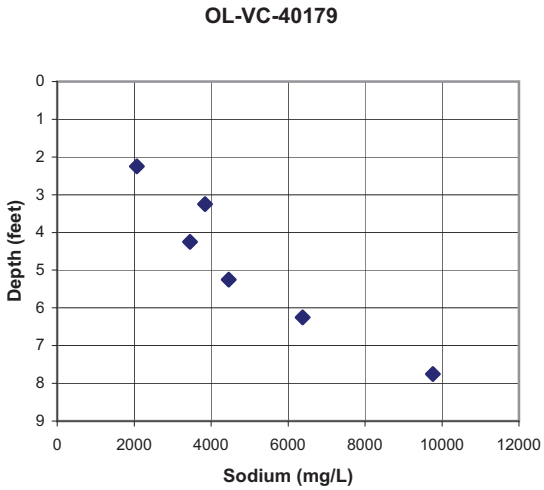

OL-VC-40165
Depth (feet)
0
1
2
3
4
5
6
7
8
9
10
0.0
5.0
10.0
15.0
20.0
Na/Ca

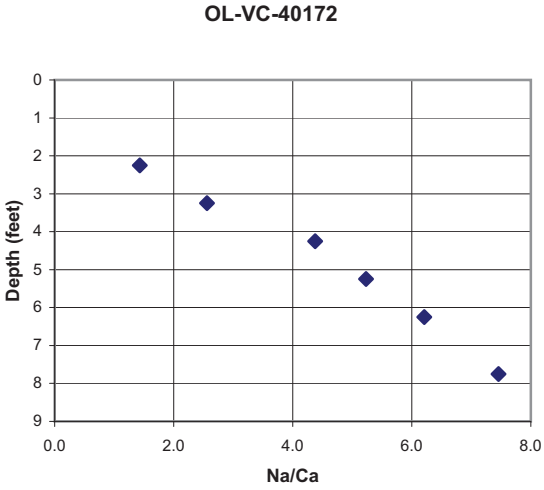

OL-VC-40168
Depth (feet)
0
1
2
3
4
5
6
0.0
0.5
1.0
1.5
Na/Ca

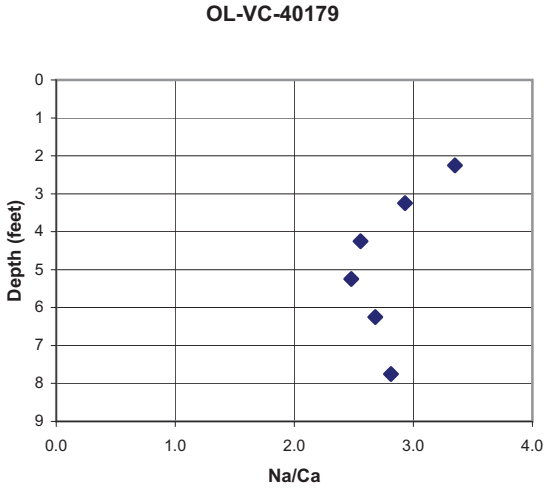

OL-VC-40172
Depth (feet)
0
1
2
3
4
5
6
7
8
9
0
2000
4000
6000
8000
10000
12000
14000
Chloride (mg/L)

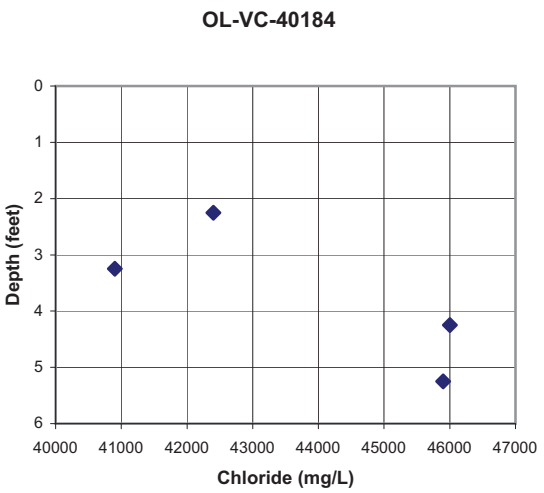

OL-VC-40179
Depth (feet)
0
1
2
3
4
5
6
7
8
9
0
5000
10000
15000
20000
25000
Chloride (mg/L)

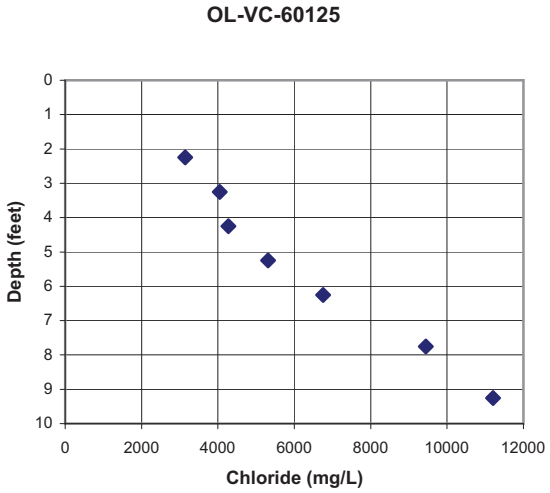

OL-VC-40172
Depth (feet)
0
1
2
3
4
5
6
7
8
9
0
1000
2000
3000
4000
5000
Sodium (mg/L)

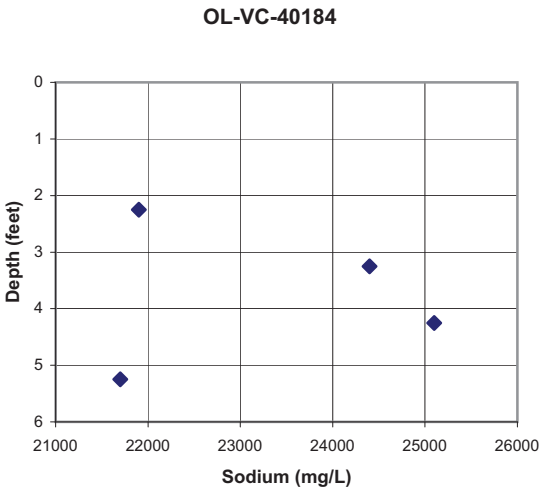

OL-VC-40179
Depth (feet)
0
1
2
3
4
5
6
7
8
9
0
2000
4000
6000
8000
10000
12000
Sodium (mg/L)

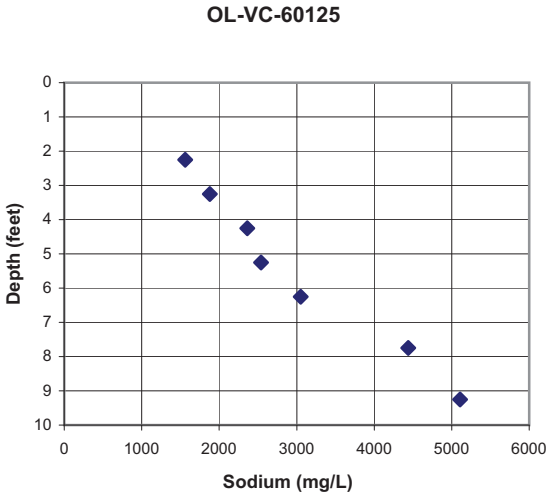

OL-VC-40172
Depth (feet)
0
1
2
3
4
5
6
7
8
9
0.0
2.0
4.0
6.0
8.0
Na/Ca

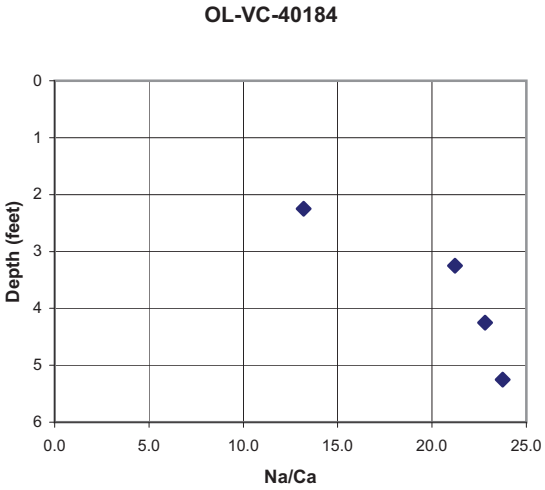

OL-VC-40179
Depth (feet)
0
1
2
3
4
5
6
7
8
9
0.0
1.0
2.0
3.0
4.0
Na/Ca

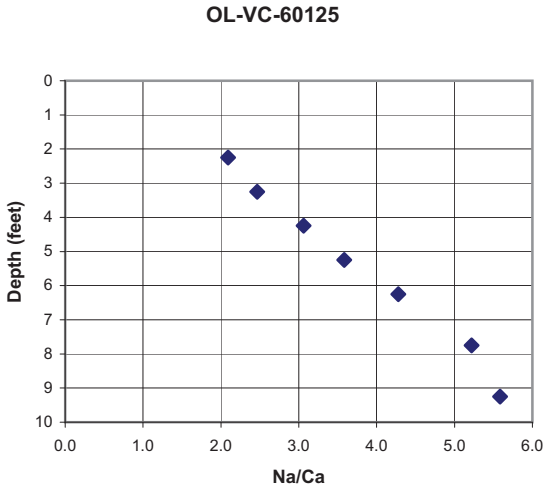

OL-VC-40184
Depth (feet)
0
1
2
3
4
5
6
40000
41000
42000
43000
44000
45000
46000
47000
Chloride (mg/L)


OL-VC-60125
Depth (feet)
0
1
2
3
4
5
6
7
8
9
10
0
2000
4000
6000
8000
10000
12000
Chloride (mg/L)

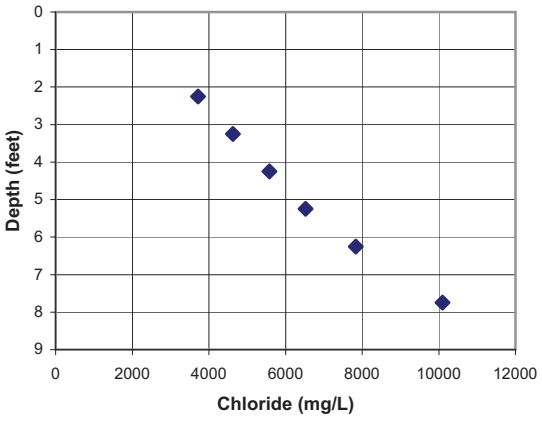

OL-VC-40184
Depth (feet)
0
1
2
3
4
5
6
21000
22000
23000
24000
25000
26000
Sodium (mg/L)


OL-VC-60125
Depth (feet)
0
1
2
3
4
5
6
7
8
9
10
0
1000
2000
3000
4000
5000
6000
Sodium (mg/L)

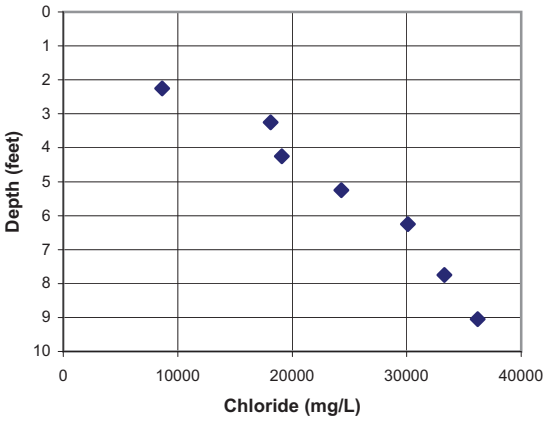

OL-VC-40184
Depth (feet)
0
1
2
3
4
5
6
0.0
5.0
10.0
15.0
20.0
25.0
Na/Ca


OL-VC-60125
Depth (feet)
0
1
2
3
4
5
6
7
8
9
10
0.0
1.0
2.0
3.0
4.0
5.0
6.0
Na/Ca

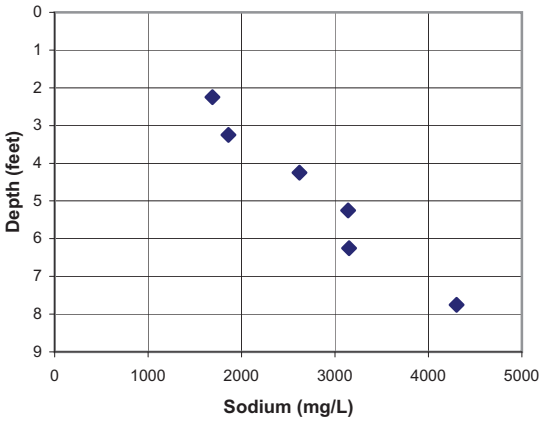
OL-VC-60127



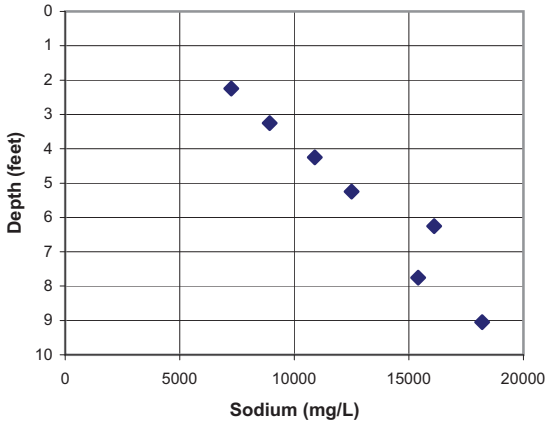
OL-VC-60129



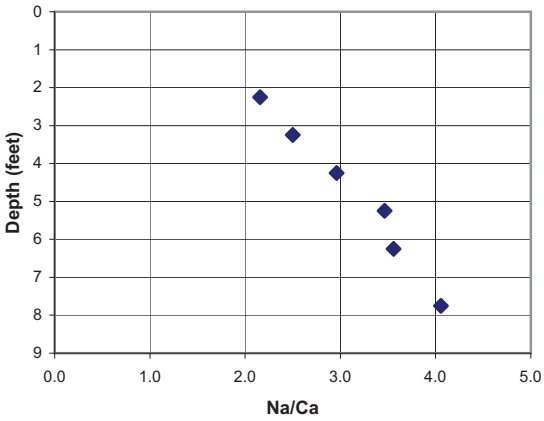
OL-VC-60127



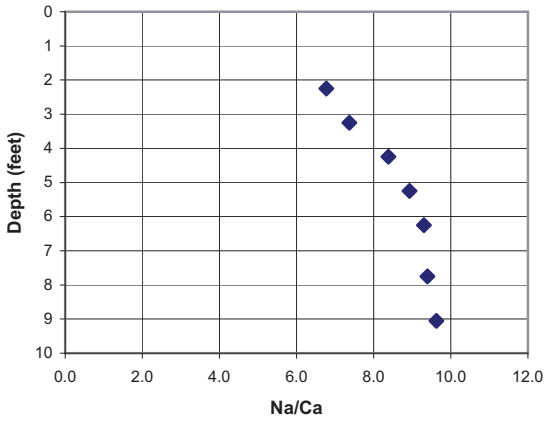
OL-VC-60129

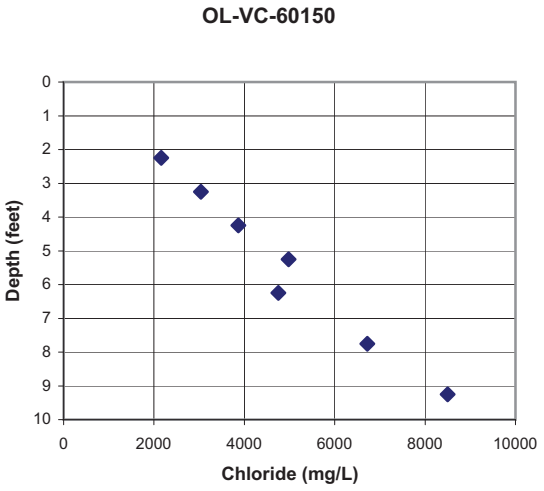


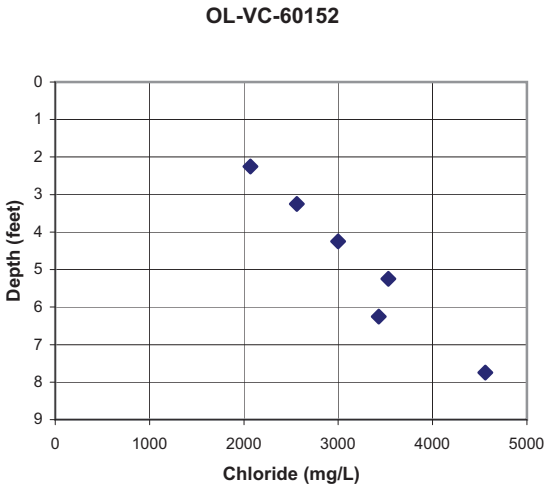
OL-VC-60127

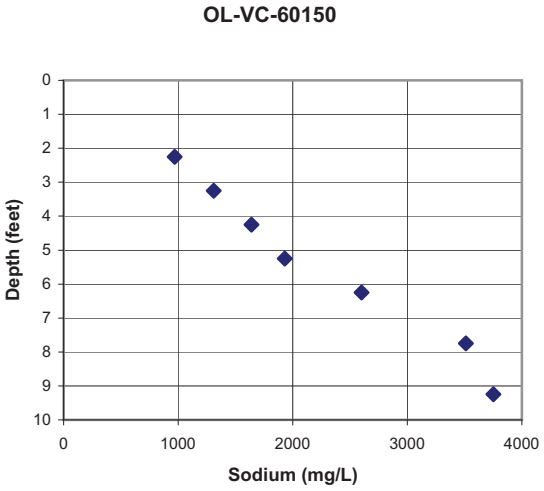


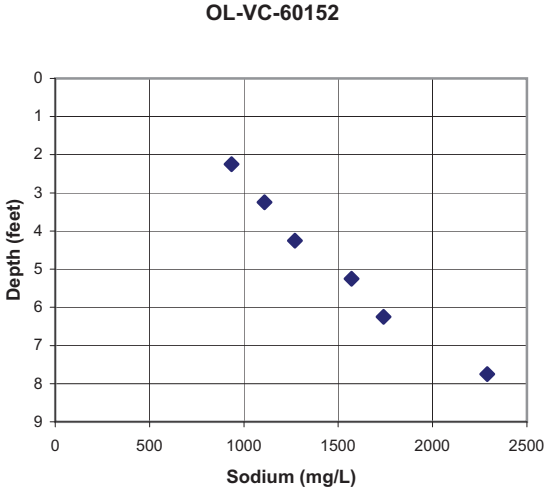
OL-VC-60129

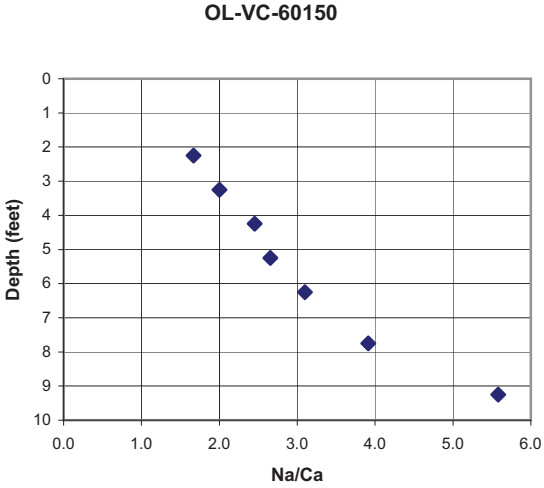


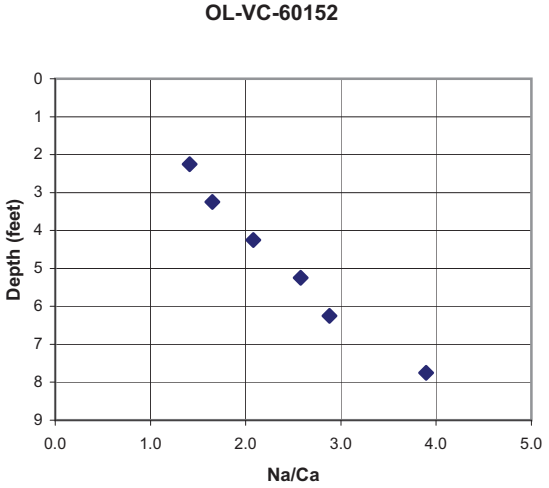

OL-VC-60150
Depth (feet)
Chloride (mg/L)

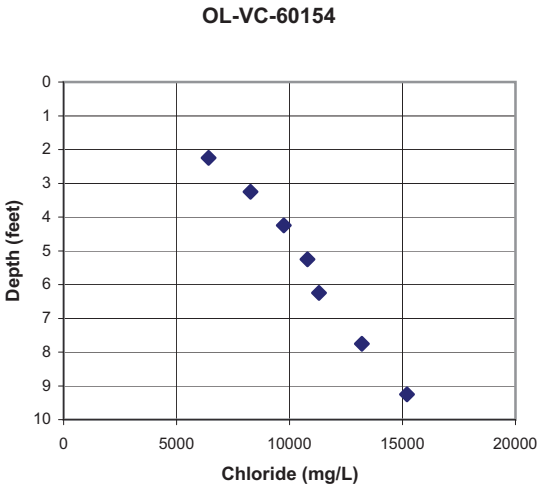

OL-VC-60152
Depth (feet)
Chloride (mg/L)

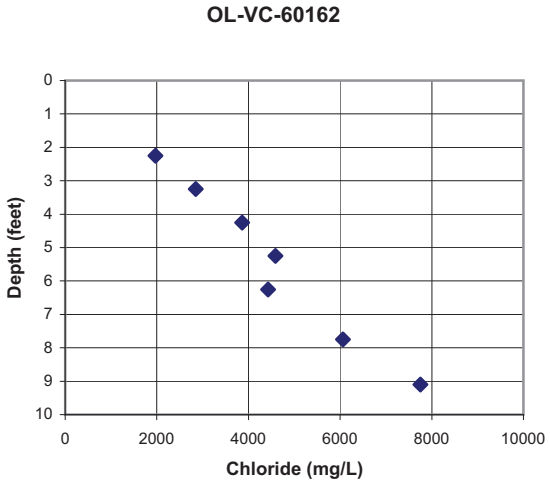

OL-VC-60150
Depth (feet)
Sodium (mg/L)

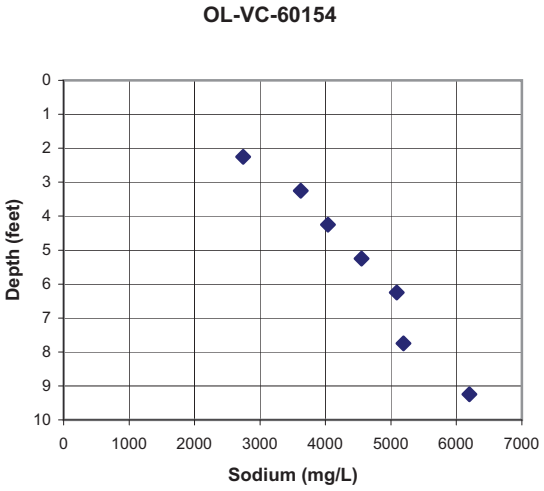

OL-VC-60152
Depth (feet)
Sodium (mg/L)

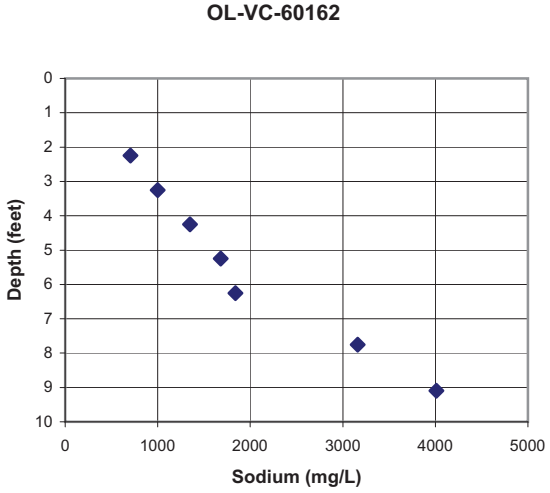

OL-VC-60150
Depth (feet)
Na/Ca

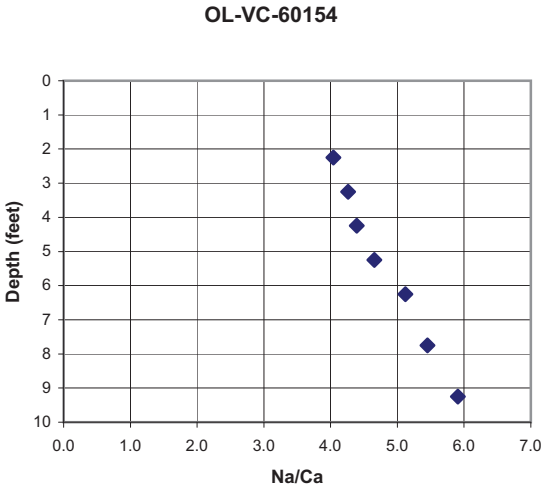

OL-VC-60152
Depth (feet)
Na/Ca

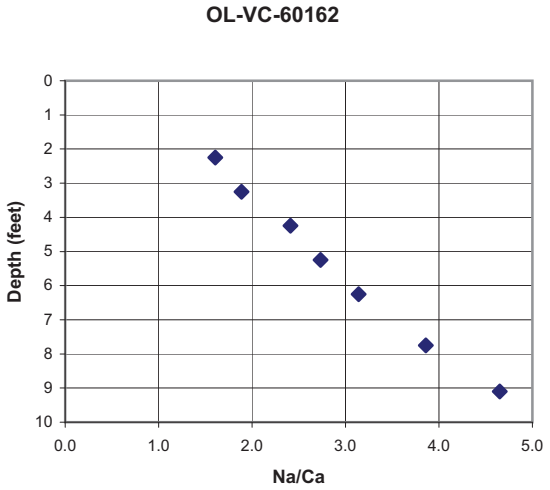

OL-VC-60154
Depth (feet)
Chloride (mg/L)
0
1
2
3
4
5
6
7
8
9
10
0
5000
10000
15000
20000

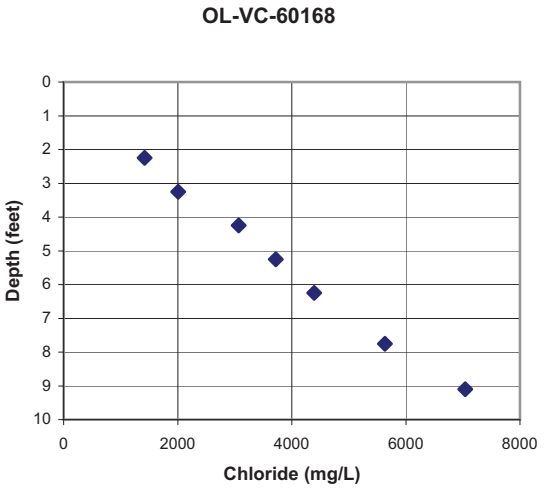

OL-VC-60162
Depth (feet)
Chloride (mg/L)
0
1
2
3
4
5
6
7
8
9
10
0
2000
4000
6000
8000
10000

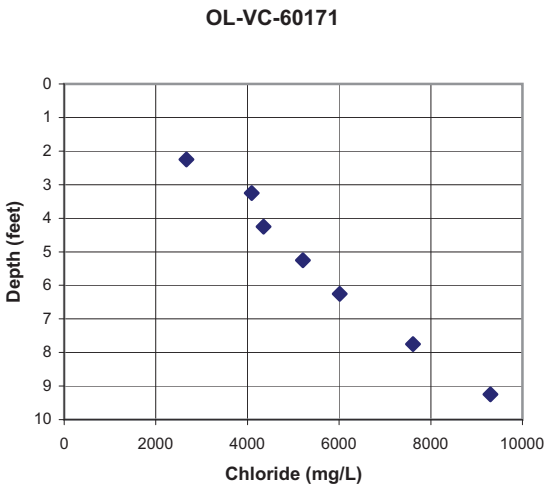

OL-VC-60154
Depth (feet)
Sodium (mg/L)
0
1
2
3
4
5
6
7
8
9
10
0
1000
2000
3000
4000
5000
6000
7000

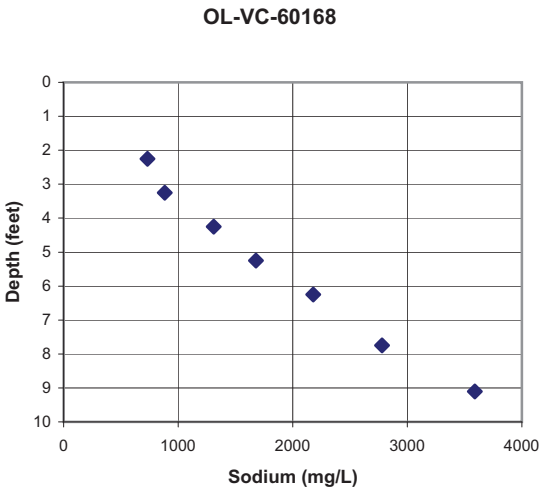

OL-VC-60162
Depth (feet)
Sodium (mg/L)
0
1
2
3
4
5
6
7
8
9
10
0
1000
2000
3000
4000
5000

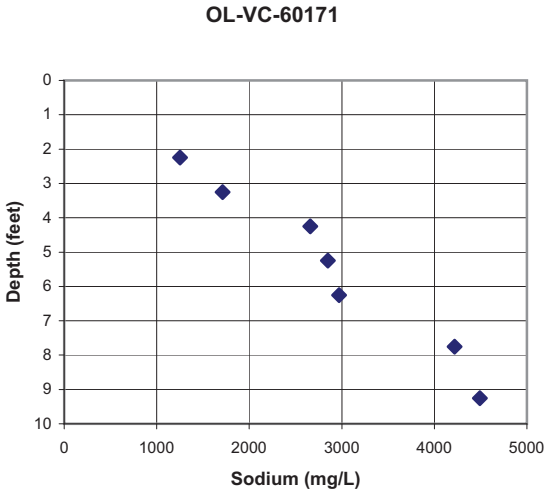

OL-VC-60154
Depth (feet)
Na/Ca
0
1
2
3
4
5
6
7
8
9
10
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0

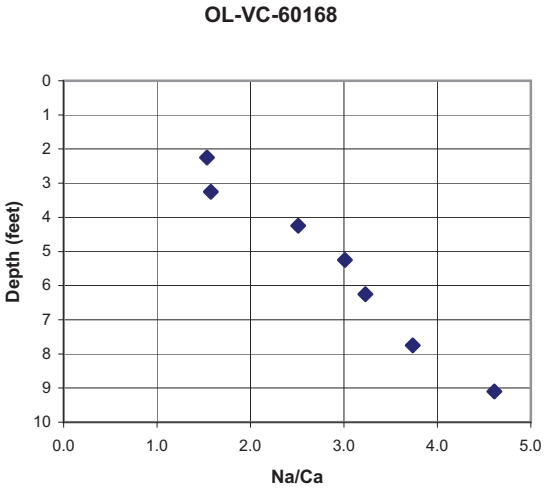

OL-VC-60162
Depth (feet)
Na/Ca
0
1
2
3
4
5
6
7
8
9
10
0.0
1.0
2.0
3.0
4.0
5.0

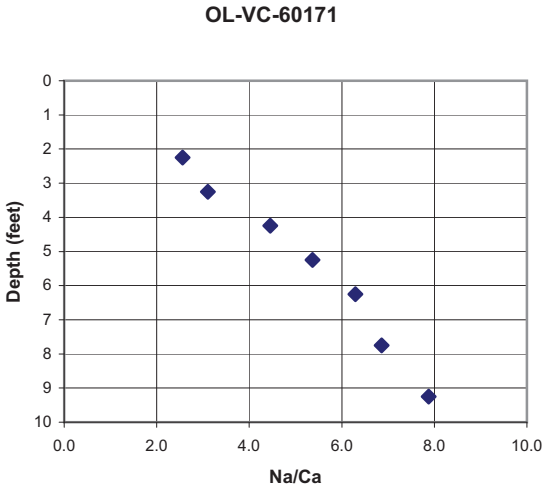

OL-VC-60168
Depth (feet)
Chloride (mg/L)


OL-VC-60171
Depth (feet)
Chloride (mg/L)

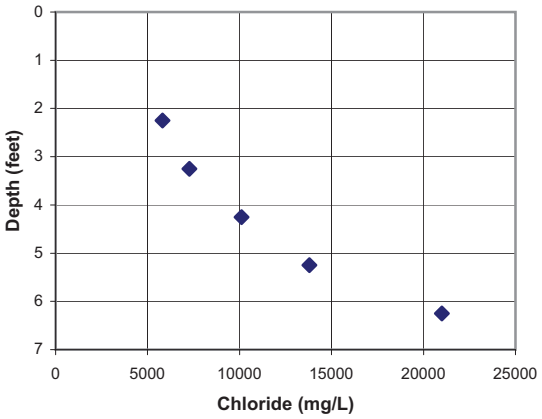

OL-VC-60168
Depth (feet)
Sodium (mg/L)


OL-VC-60171
Depth (feet)
Sodium (mg/L)

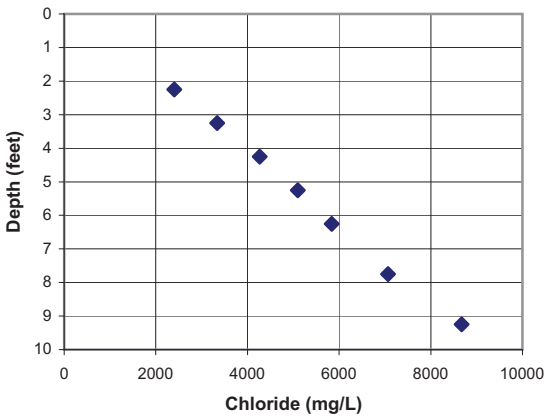

OL-VC-60168
Depth (feet)
Na/Ca


OL-VC-60171
Depth (feet)
Na/Ca

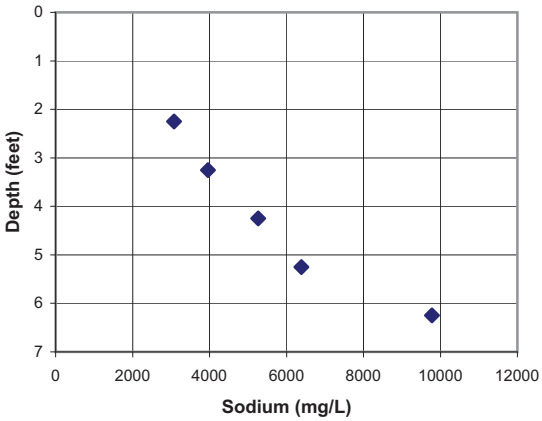
OL-VC-60179



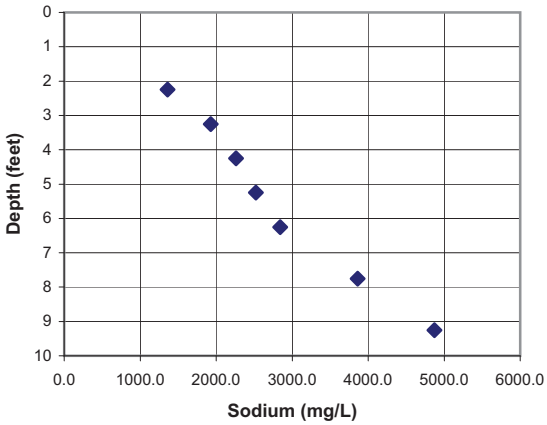
OL-VC-60181



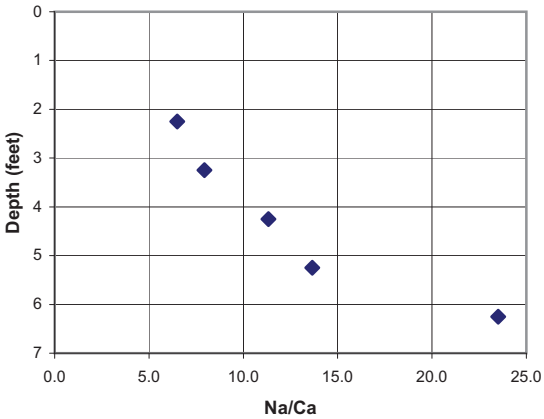
OL-VC-60179



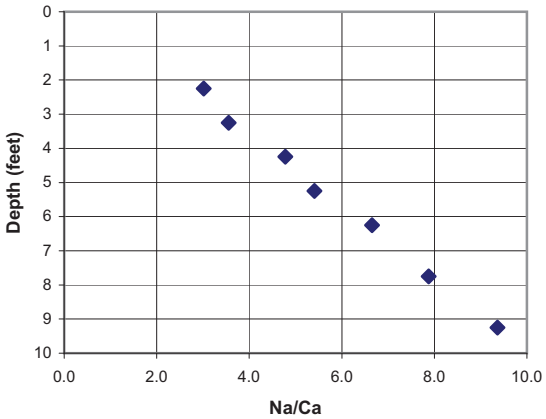
OL-VC-60181

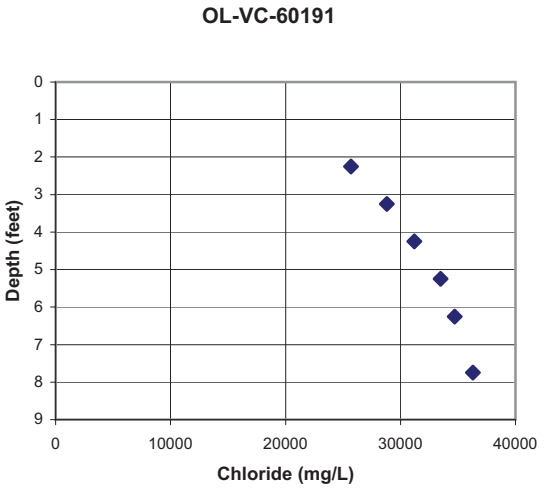


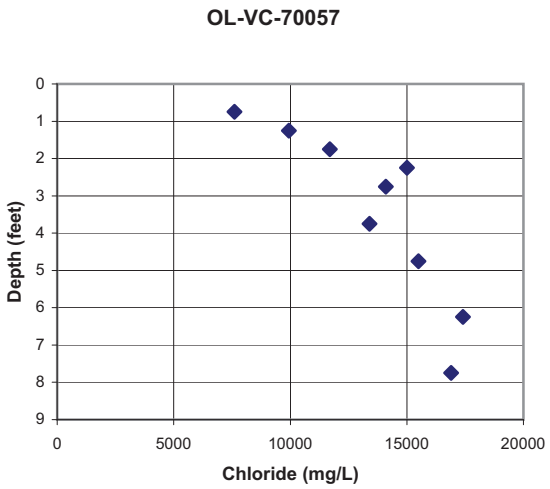
OL-VC-60179

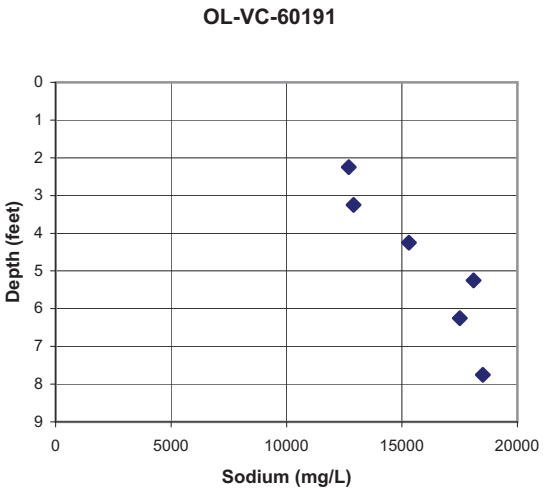


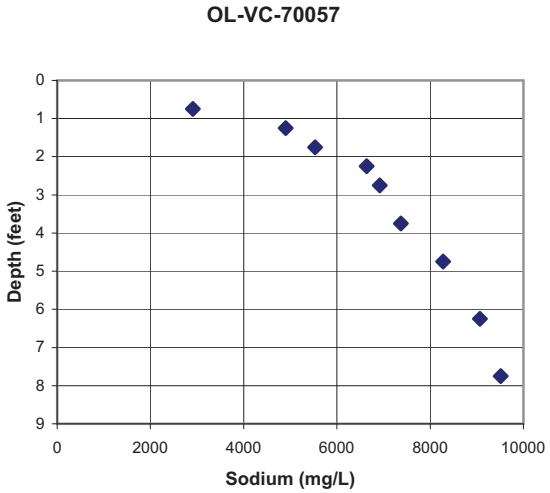
OL-VC-60181

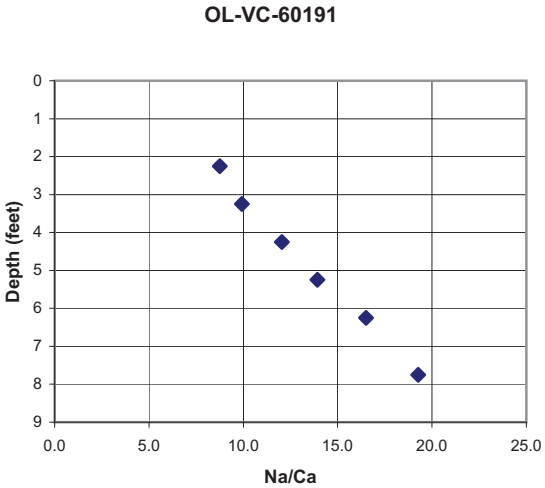


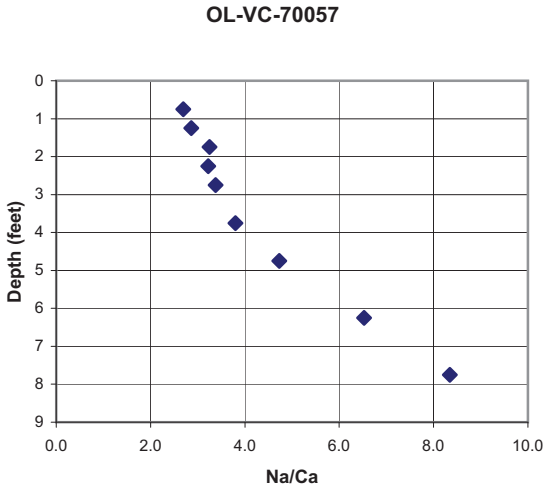

OL-VC-60191
Depth (feet)
Chloride (mg/L)
0
1
2
3
4
5
6
7
8
9
0
10000
20000
30000
40000

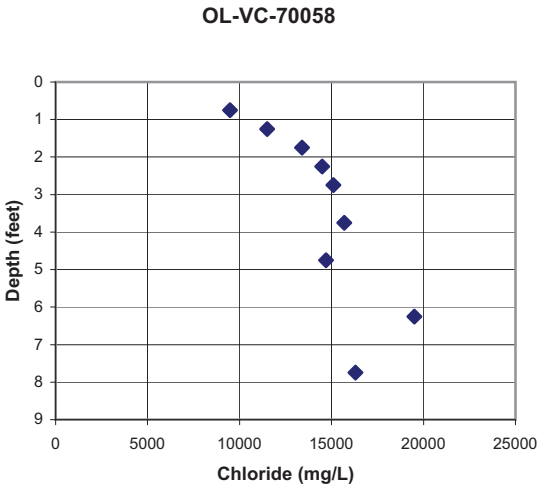

OL-VC-70057
Depth (feet)
Chloride (mg/L)
0
1
2
3
4
5
6
7
8
9
0
5000
10000
15000
20000

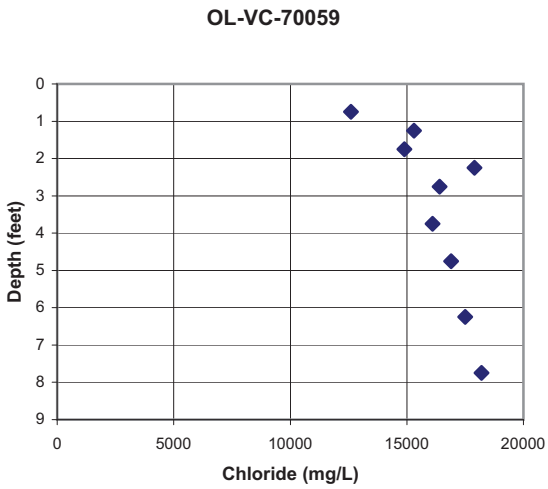

OL-VC-60191
Depth (feet)
Sodium (mg/L)
0
1
2
3
4
5
6
7
8
9
0
5000
10000
15000
20000

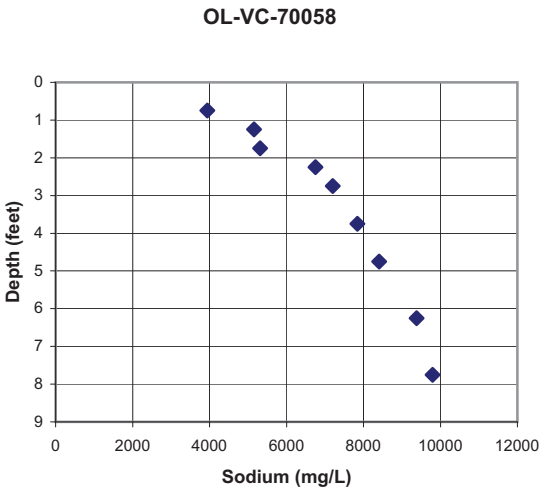

OL-VC-70057
Depth (feet)
Sodium (mg/L)
0
1
2
3
4
5
6
7
8
9
0
2000
4000
6000
8000
10000

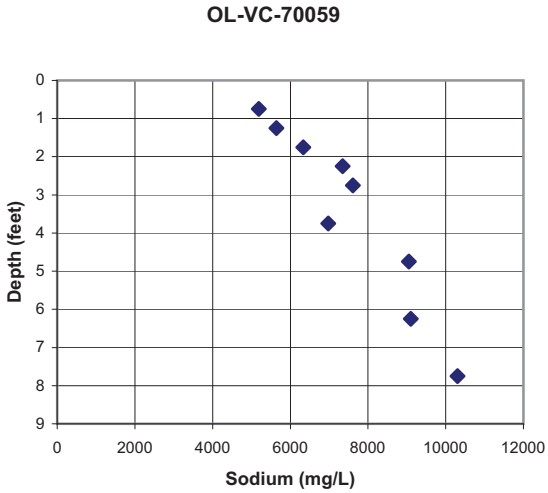

OL-VC-60191
Depth (feet)
Na/Ca
0
1
2
3
4
5
6
7
8
9
0.0
5.0
10.0
15.0
20.0
25.0

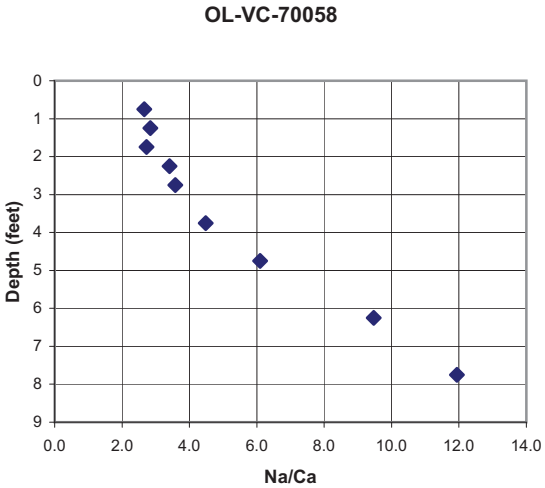

OL-VC-70057
Depth (feet)
Na/Ca
0
1
2
3
4
5
6
7
8
9
0.0
2.0
4.0
6.0
8.0
10.0

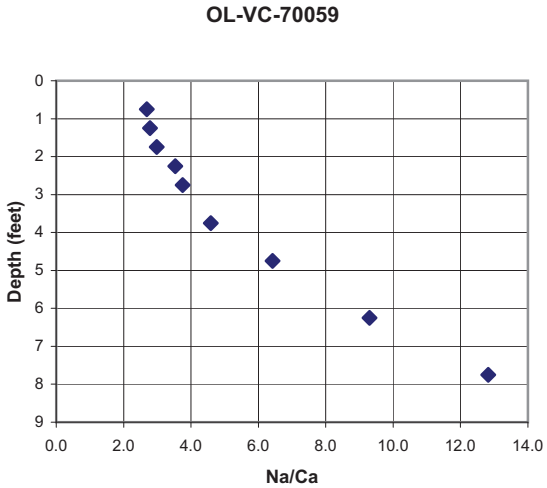

OL-VC-70058
Depth (feet)
Chloride (mg/L)
0
1
2
3
4
5
6
7
8
9
0
5000
10000
15000
20000
25000

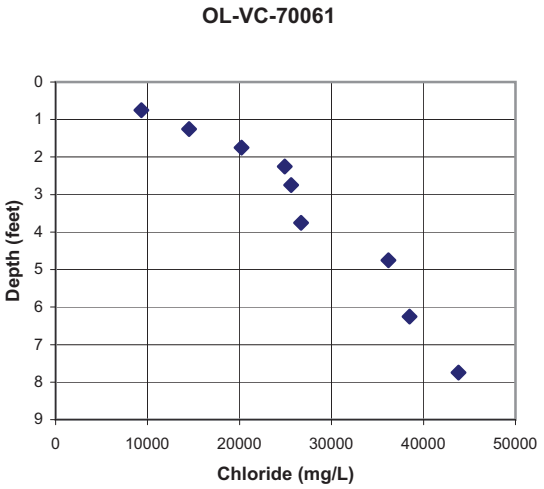

OL-VC-70059
Depth (feet)
Chloride (mg/L)
0
1
2
3
4
5
6
7
8
9
0
5000
10000
15000
20000

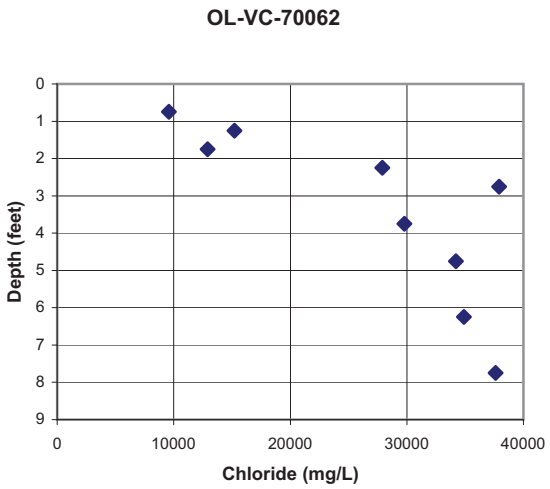

OL-VC-70058
Depth (feet)
Sodium (mg/L)
0
1
2
3
4
5
6
7
8
9
0
2000
4000
6000
8000
10000
12000

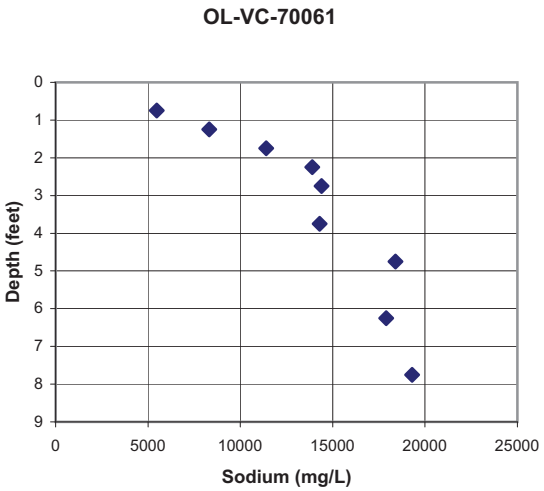

OL-VC-70059
Depth (feet)
Sodium (mg/L)
0
1
2
3
4
5
6
7
8
9
0
2000
4000
6000
8000
10000
12000

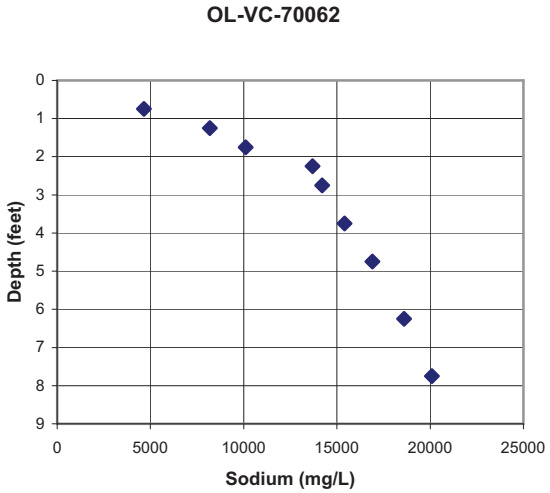

OL-VC-70058
Depth (feet)
Na/Ca
0
1
2
3
4
5
6
7
8
9
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0

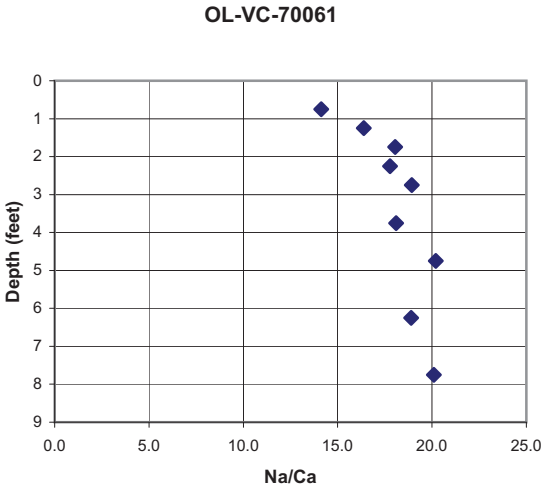

OL-VC-70059
Depth (feet)
Na/Ca
0
1
2
3
4
5
6
7
8
9
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0

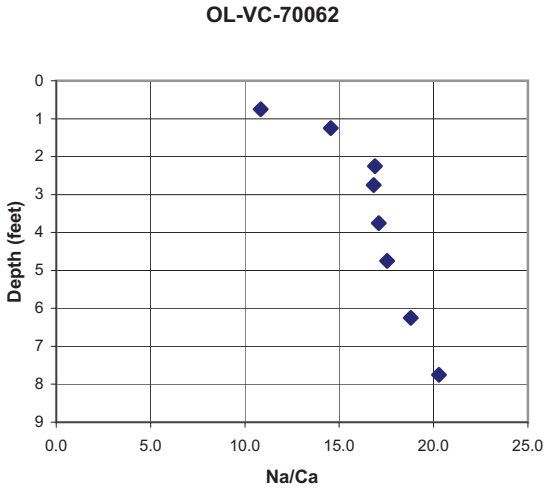

OL-VC-70061
Depth (feet)
Chloride (mg/L)
0
1
2
3
4
5
6
7
8
9
0
10000
20000
30000
40000
50000

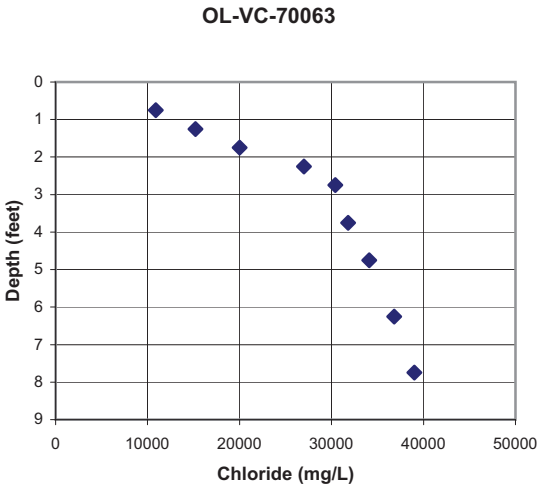

OL-VC-70062
Depth (feet)
Chloride (mg/L)
0
1
2
3
4
5
6
7
8
9
0
10000
20000
30000
40000

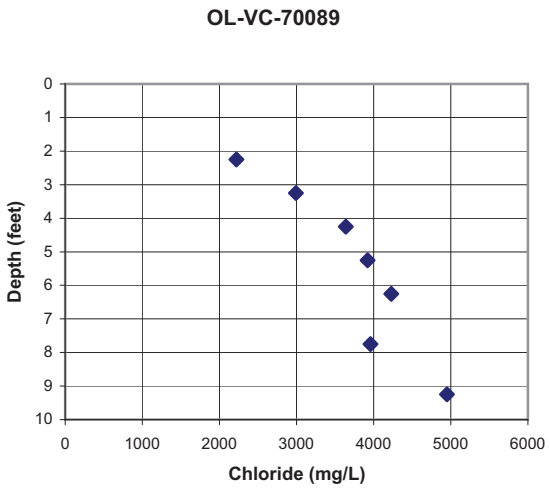

OL-VC-70061
Depth (feet)
Sodium (mg/L)
0
1
2
3
4
5
6
7
8
9
0
5000
10000
15000
20000
25000

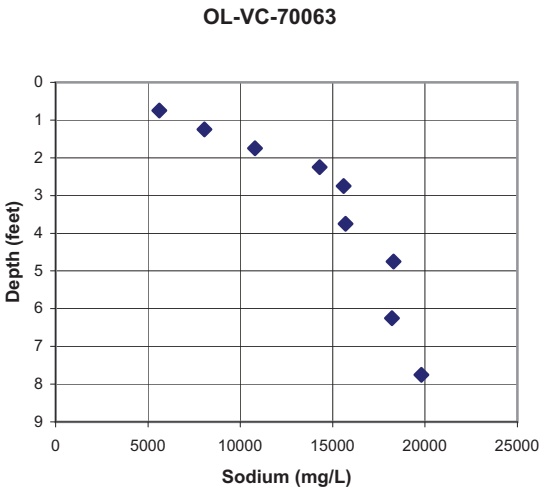

OL-VC-70062
Depth (feet)
Sodium (mg/L)
0
1
2
3
4
5
6
7
8
9
0
5000
10000
15000
20000
25000

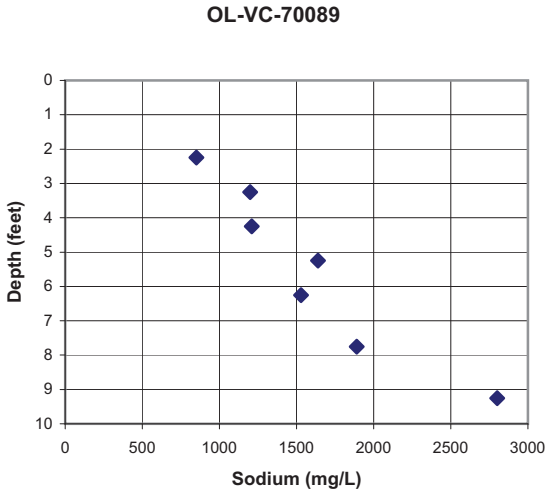

OL-VC-70061
Depth (feet)
Na/Ca
0
1
2
3
4
5
6
7
8
9
0.0
5.0
10.0
15.0
20.0
25.0

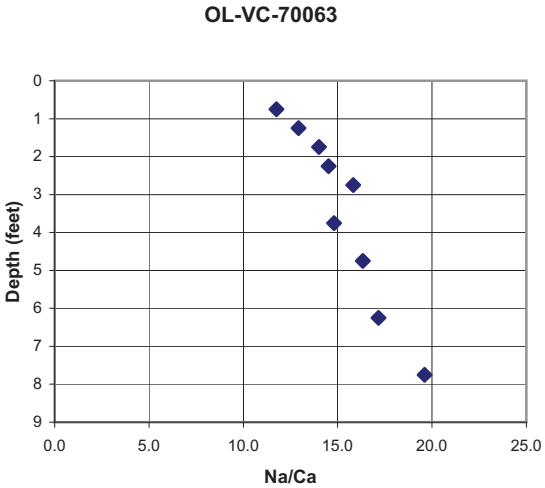

OL-VC-70062
Depth (feet)
Na/Ca
0
1
2
3
4
5
6
7
8
9
0.0
5.0
10.0
15.0
20.0
25.0

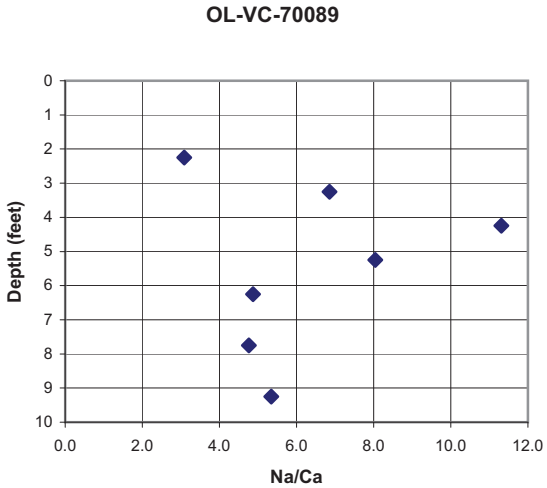

OL-VC-70063
Depth (feet)
0
1
2
3
4
5
6
7
8
9
0
10000
20000
30000
40000
50000
Chloride (mg/L)

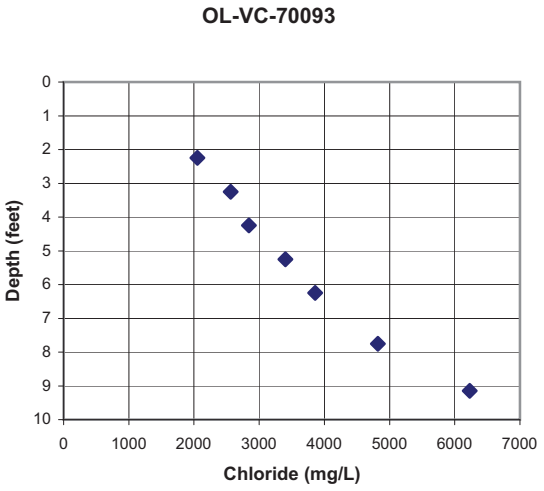

OL-VC-70089
Depth (feet)
0
1
2
3
4
5
6
7
8
9
10
0
1000
2000
3000
4000
5000
6000
Chloride (mg/L)

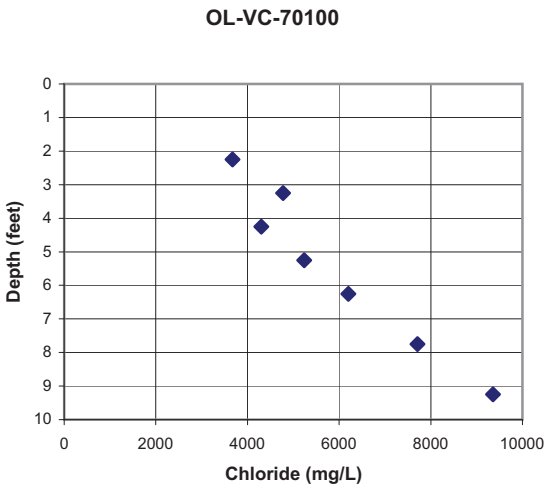

OL-VC-70063
Depth (feet)
0
1
2
3
4
5
6
7
8
9
0
5000
10000
15000
20000
25000
Sodium (mg/L)

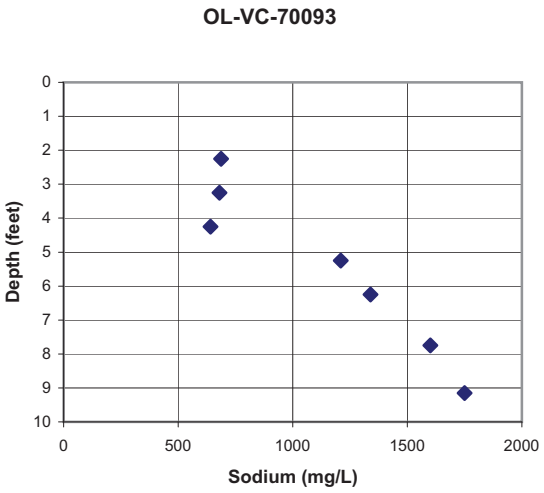

OL-VC-70089
Depth (feet)
0
1
2
3
4
5
6
7
8
9
10
0
500
1000
1500
2000
2500
3000
Sodium (mg/L)

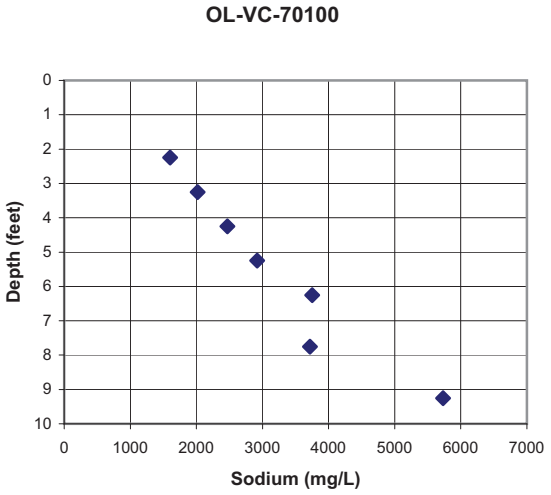

OL-VC-70063
Depth (feet)
0
1
2
3
4
5
6
7
8
9
0.0
5.0
10.0
15.0
20.0
25.0
Na/Ca

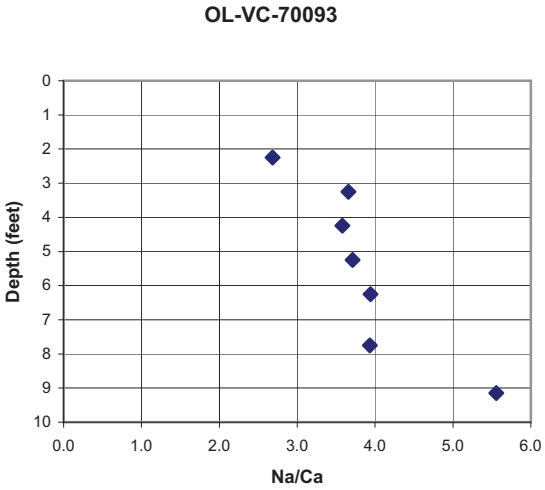

OL-VC-70089
Depth (feet)
0
1
2
3
4
5
6
7
8
9
10
0.0
2.0
4.0
6.0
8.0
10.0
12.0
Na/Ca

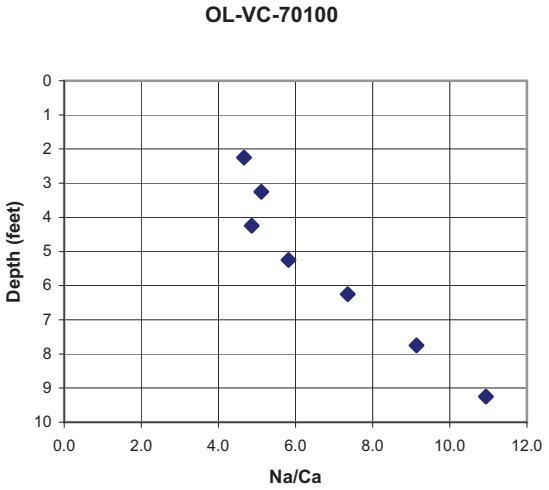

OL-VC-70093
Depth (feet)
Chloride (mg/L)

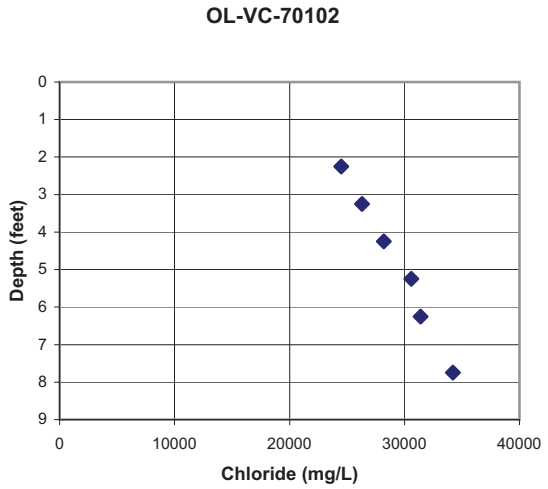

OL-VC-70100
Depth (feet)
Chloride (mg/L)


OL-VC-70093
Depth (feet)
Sodium (mg/L)


OL-VC-70100
Depth (feet)
Sodium (mg/L)


OL-VC-70093
Depth (feet)
Na/Ca


OL-VC-70100
Depth (feet)
Na/Ca


OL-VC-70102
Depth (feet)
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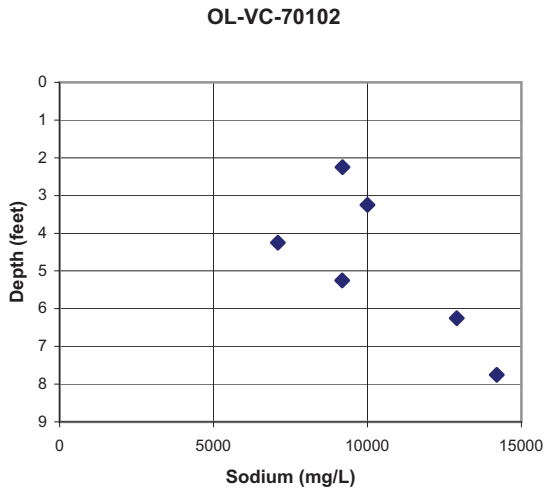
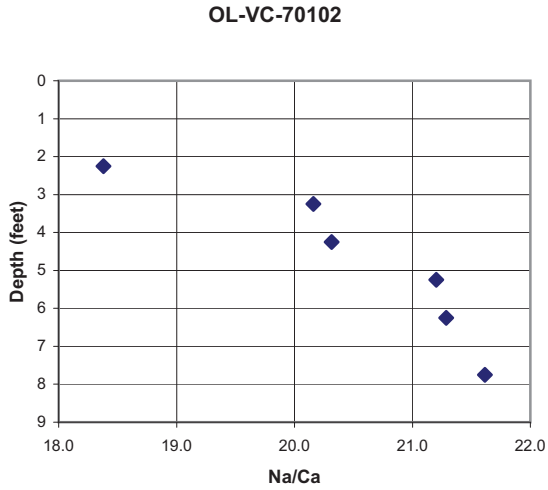
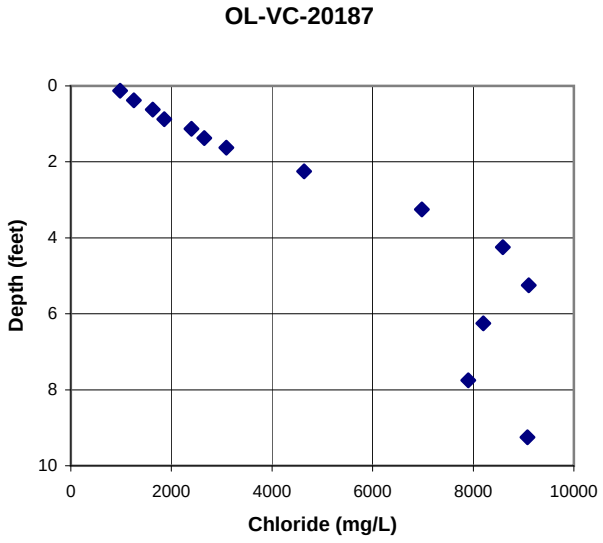
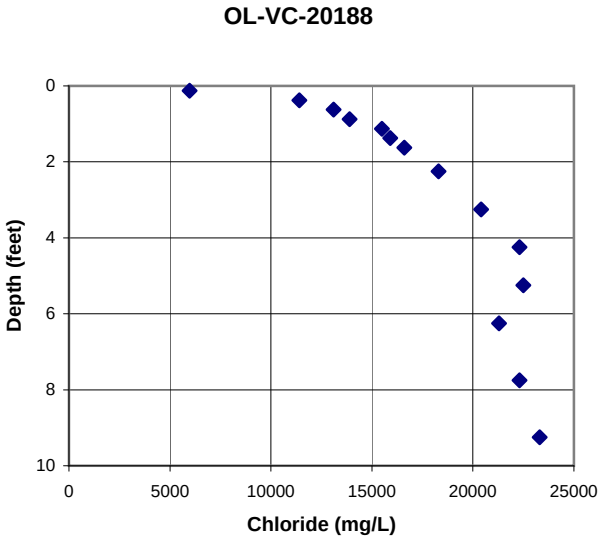
1
2
3
4
5
6
7
8
9
0
10000
20000
30000
40000
Chloride (mg/L)

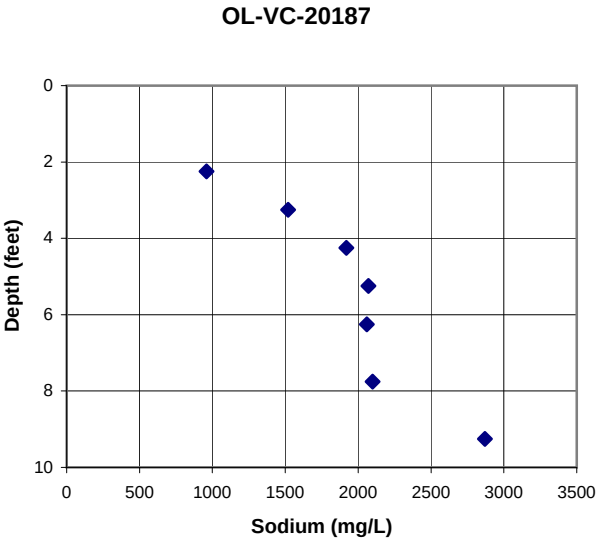

OL-VC-70102
Depth (feet)
0
1
2
3
4
5
6
7
8
9
0
5000
10000
15000
Sodium (mg/L)

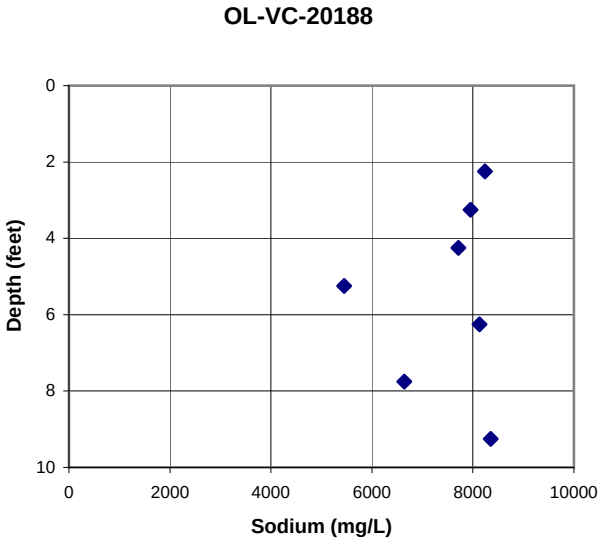

OL-VC-70102
Depth (feet)
0
1
2
3
4
5
6
7
8
9
18.0
19.0
20.0
21.0
22.0
Na/Ca

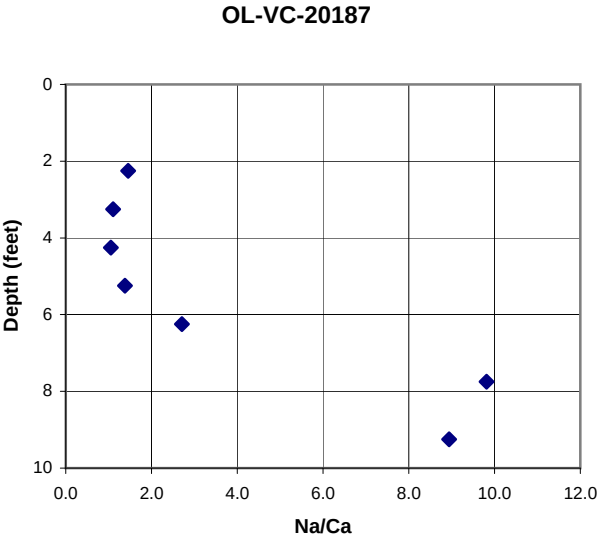
Phase V Data

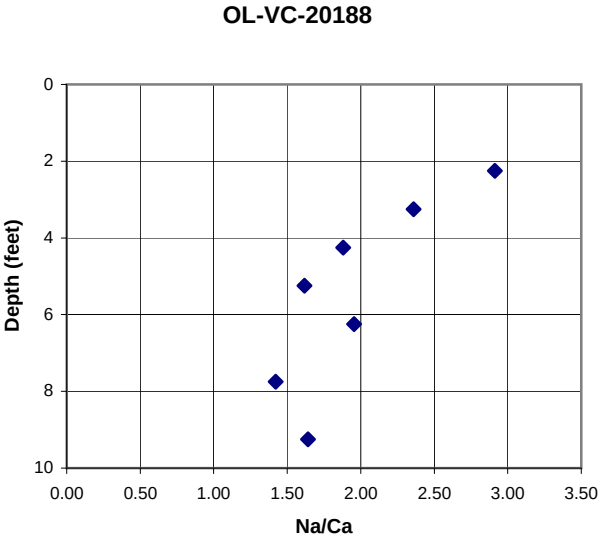

OL-VC-20187
Depth (feet)
Chloride (mg/L)
0
2
4
6
8
10
0
2000
4000
6000
8000
10000

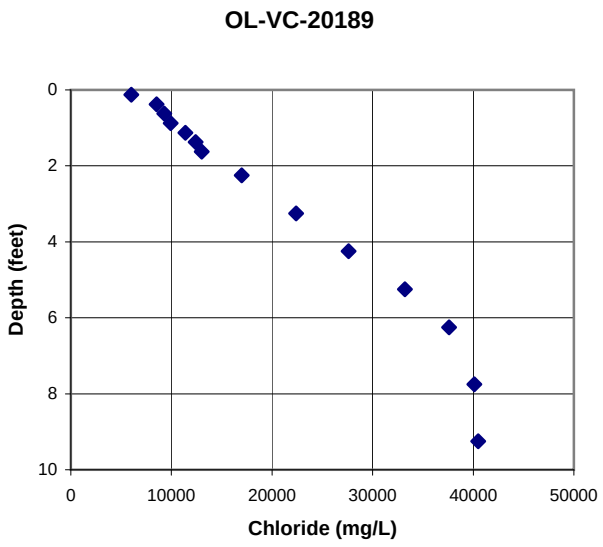

OL-VC-20188
Depth (feet)
Chloride (mg/L)
0
2
4
6
8
10
0
5000
10000
15000
20000
25000

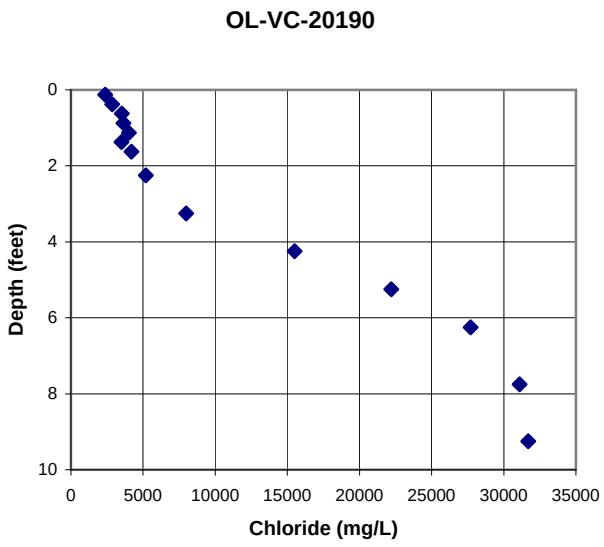

OL-VC-20187
Depth (feet)
Sodium (mg/L)
0
2
4
6
8
10
0
500
1000
1500
2000
2500
3000
3500

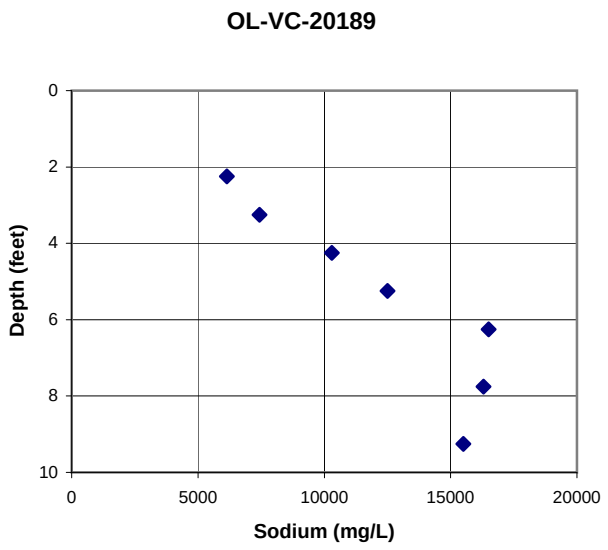

OL-VC-20188
Depth (feet)
Sodium (mg/L)
0
2
4
6
8
10
0
2000
4000
6000
8000
10000

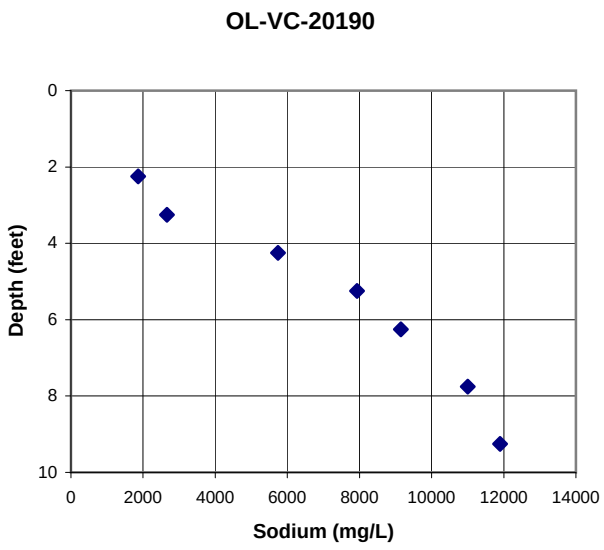

OL-VC-20187
Depth (feet)
Na/Ca
0
2
4
6
8
10
0.0
2.0
4.0
6.0
8.0
10.0
12.0

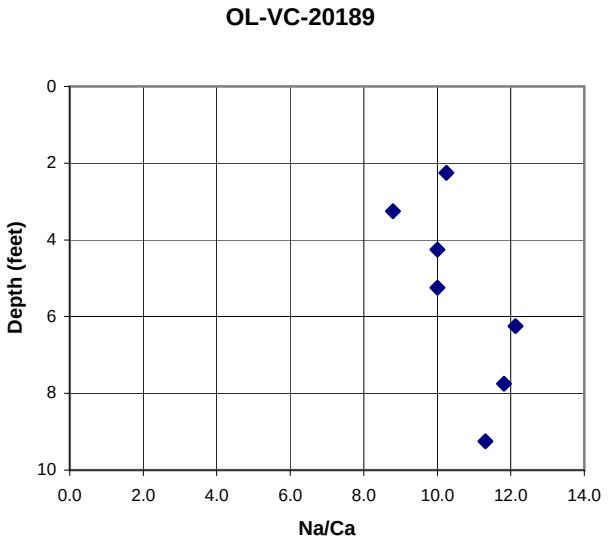

OL-VC-20188
Depth (feet)
Na/Ca
0
2
4
6
8
10
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50

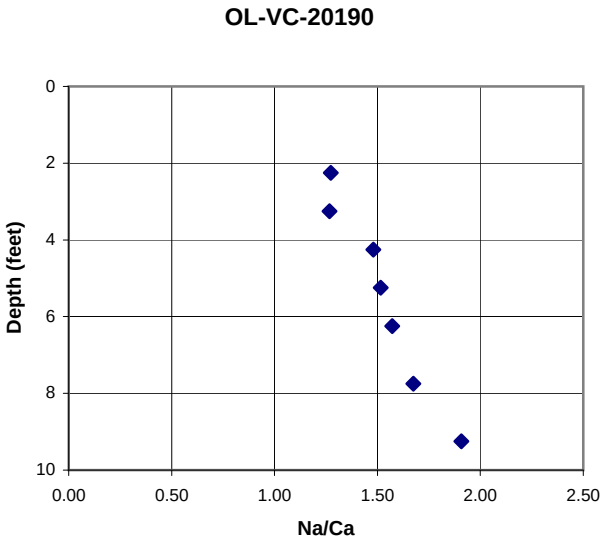

OL-VC-20189
Depth (feet)
Chloride (mg/L)
0
2
4
6
8
10
0
10000
20000
30000
40000
50000

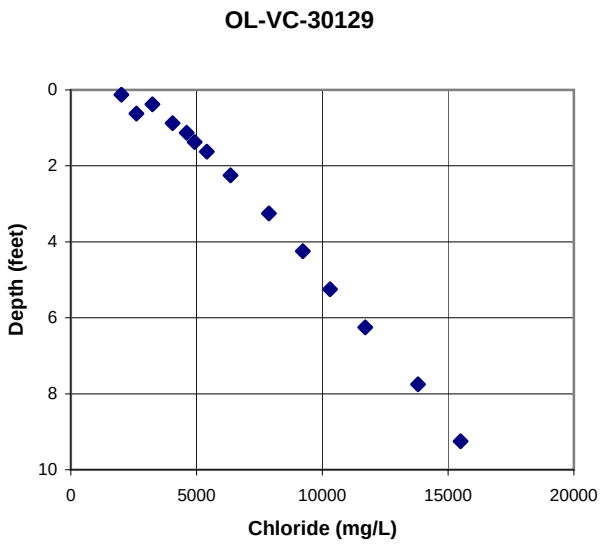

OL-VC-20190
Depth (feet)
Chloride (mg/L)
0
2
4
6
8
10
0
5000
10000
15000
20000
25000
30000
35000

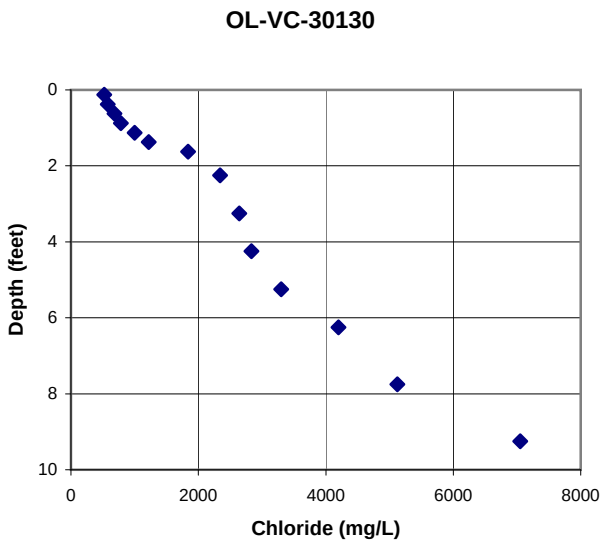

OL-VC-20189
Depth (feet)
Sodium (mg/L)
0
2
4
6
8
10
0
5000
10000
15000
20000

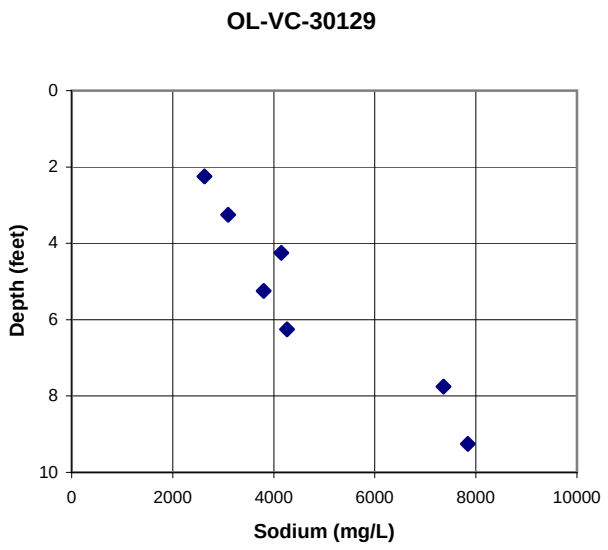

OL-VC-20190
Depth (feet)
Sodium (mg/L)
0
2
4
6
8
10
0
2000
4000
6000
8000
10000
12000
14000

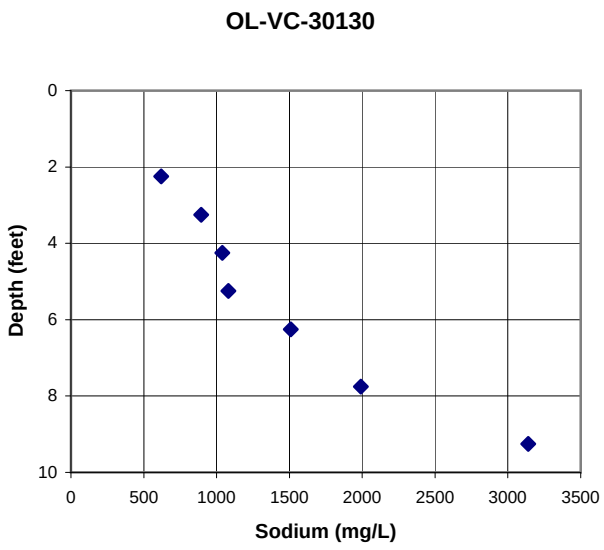

OL-VC-20189
Depth (feet)
Na/Ca
0
2
4
6
8
10
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0

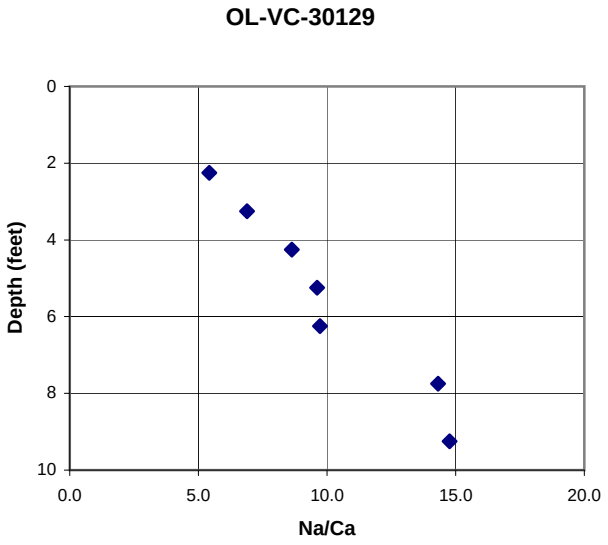

OL-VC-20190
Depth (feet)
Na/Ca
0
2
4
6
8
10
0.00
0.50
1.00
1.50
2.00
2.50

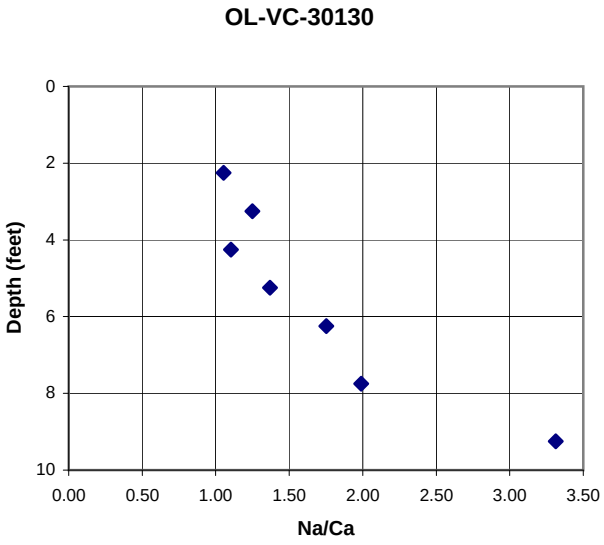

OL-VC-30129
Depth (feet)
Chloride (mg/L)
0
2
4
6
8
10
0
5000
10000
15000
20000

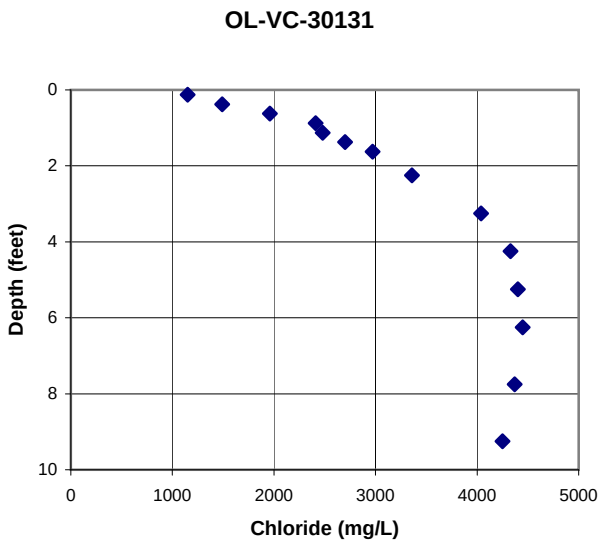

OL-VC-30130
Depth (feet)
Chloride (mg/L)
0
2
4
6
8
10
0
2000
4000
6000
8000

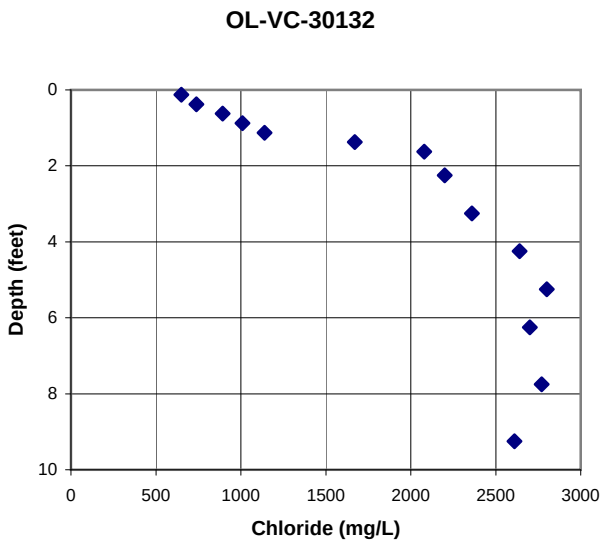

OL-VC-30129
Depth (feet)
Sodium (mg/L)
0
2
4
6
8
10
0
2000
4000
6000
8000
10000

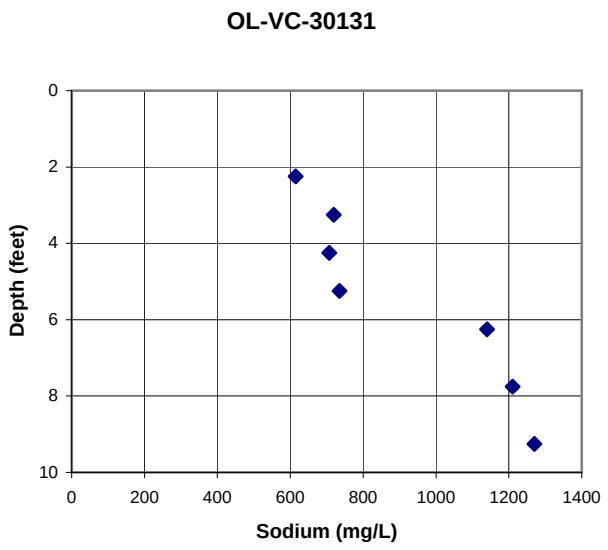

OL-VC-30130
Depth (feet)
Sodium (mg/L)
0
2
4
6
8
10
0
500
1000
1500
2000
2500
3000
3500

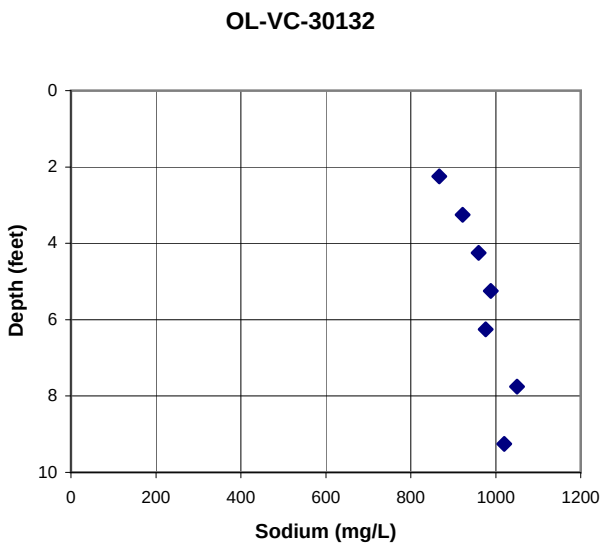

OL-VC-30129
Depth (feet)
Na/Ca
0
2
4
6
8
10
0.0
5.0
10.0
15.0
20.0

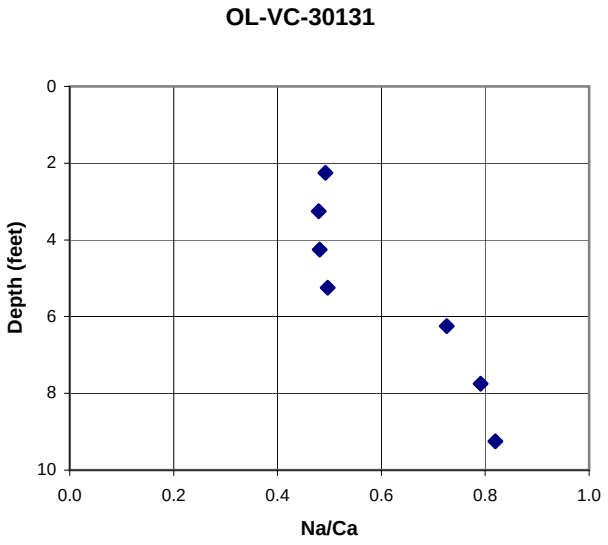

OL-VC-30130
Depth (feet)
Na/Ca
0
2
4
6
8
10
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50

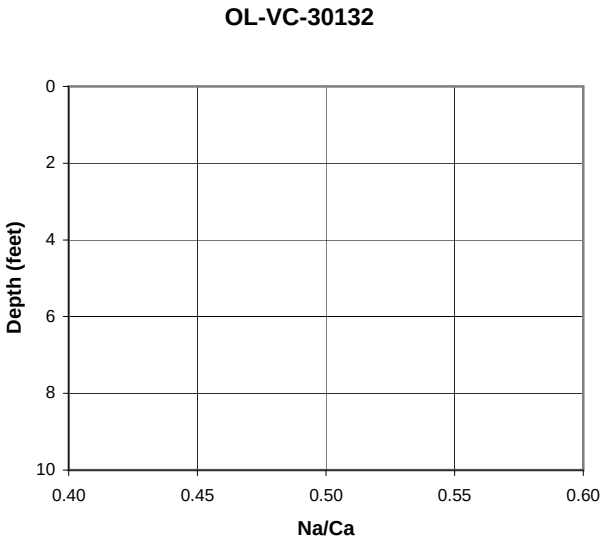

OL-VC-30131
Depth (feet)
Chloride (mg/L)
0
2
4
6
8
10
0
1000
2000
3000
4000
5000

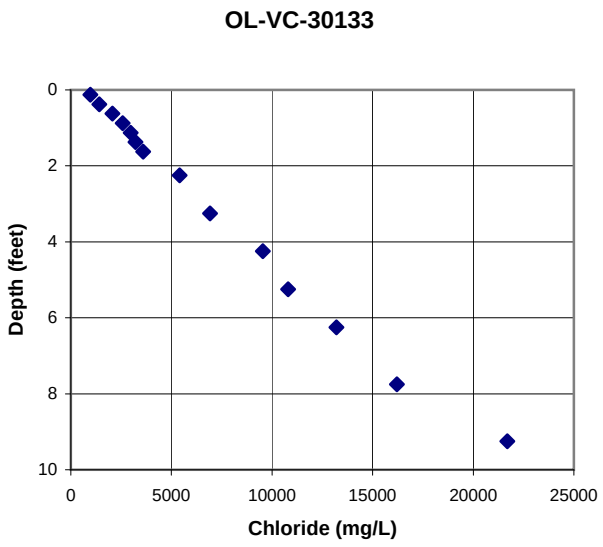

OL-VC-30132
Depth (feet)
Chloride (mg/L)
0
2
4
6
8
10
0
500
1000
1500
2000
2500
3000

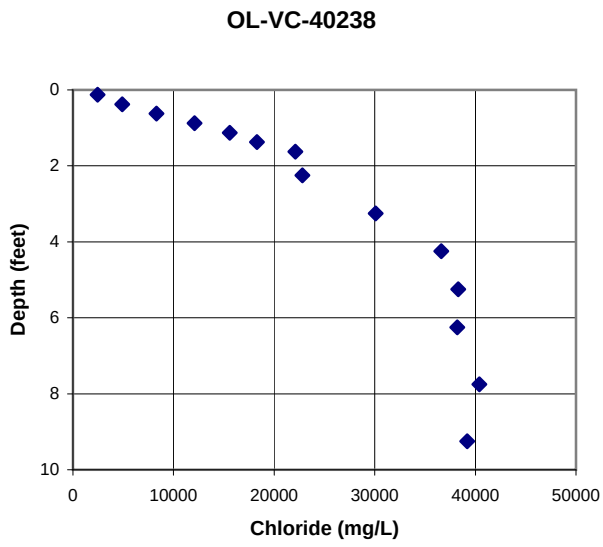

OL-VC-30131
Depth (feet)
Sodium (mg/L)
0
2
4
6
8
10
0
200
400
600
800
1000
1200
1400

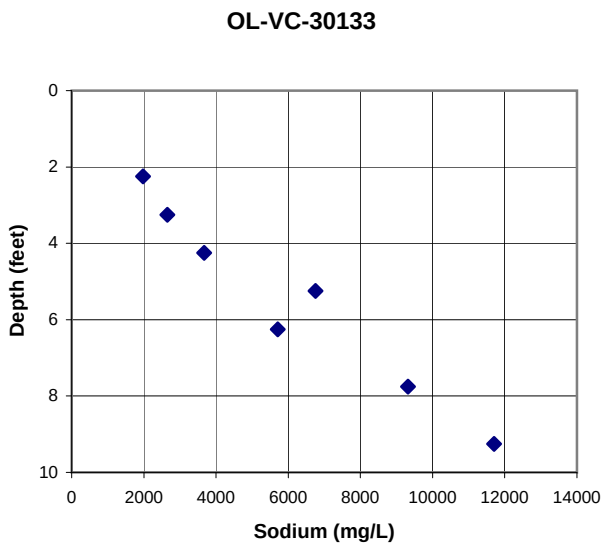

OL-VC-30132
Depth (feet)
Sodium (mg/L)
0
2
4
6
8
10
0
200
400
600
800
1000
1200

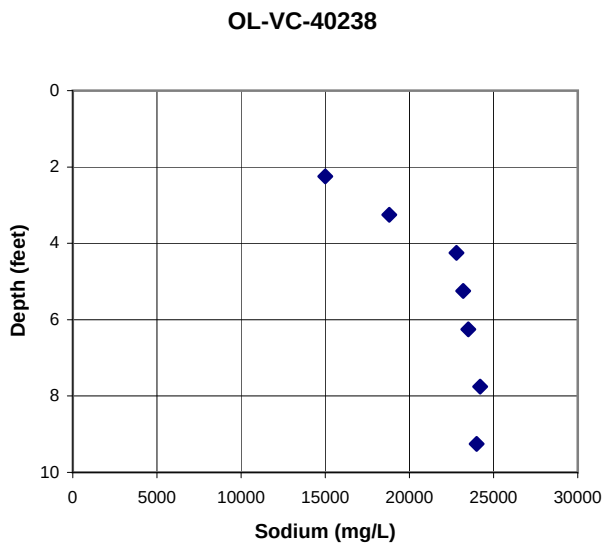

OL-VC-30131
Depth (feet)
Na/Ca
0
2
4
6
8
10
0.0
0.2
0.4
0.6
0.8
1.0

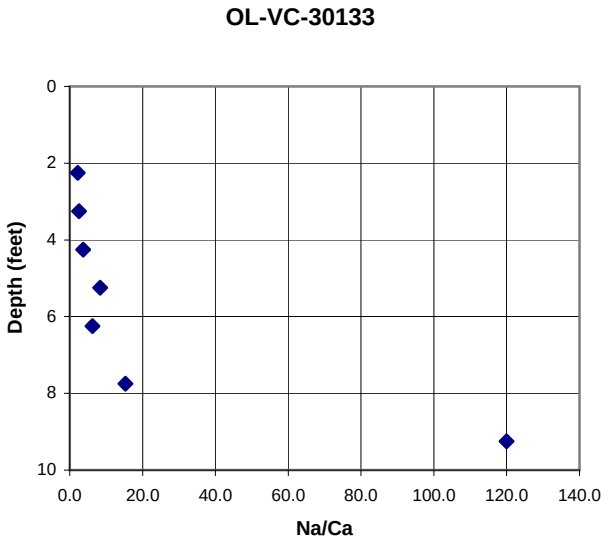

OL-VC-30132
Depth (feet)
Na/Ca
0
2
4
6
8
10
0.40
0.45
0.50
0.55
0.60

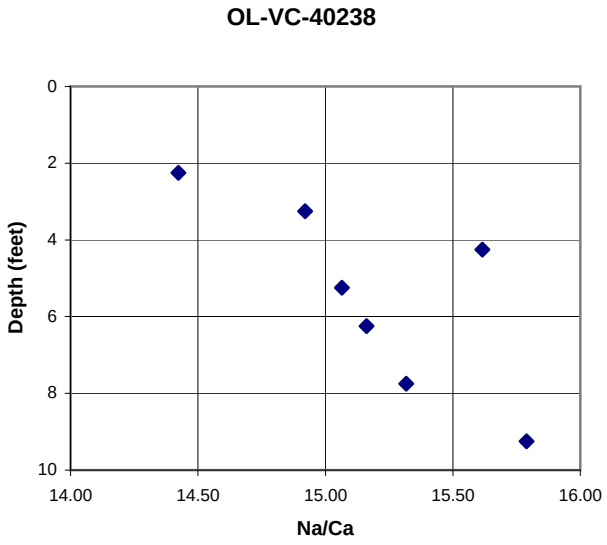

OL-VC-30133
Depth (feet)
Chloride (mg/L)
0
2
4
6
8
10
0
5000
10000
15000
20000
25000

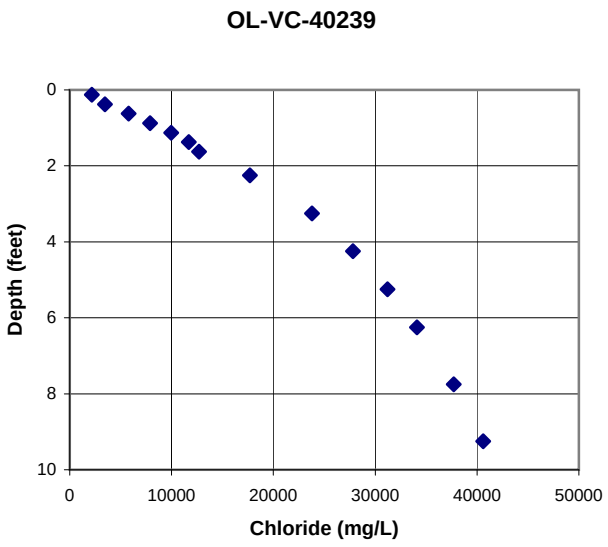

OL-VC-40238
Depth (feet)
Chloride (mg/L)
0
2
4
6
8
10
0
10000
20000
30000
40000
50000

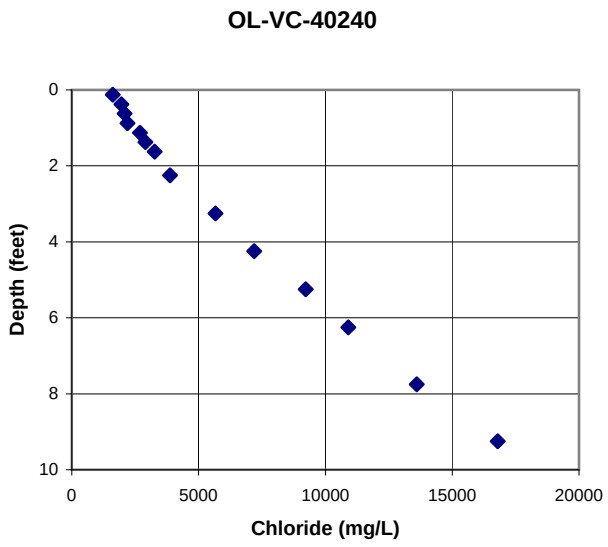

OL-VC-30133
Depth (feet)
Sodium (mg/L)
0
2
4
6
8
10
0
2000
4000
6000
8000
10000
12000
14000


OL-VC-40238
Depth (feet)
Sodium (mg/L)
0
2
4
6
8
10
0
5000
10000
15000
20000
25000
30000


OL-VC-30133
Depth (feet)
Na/Ca
0
2
4
6
8
10
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0


OL-VC-40238
Depth (feet)
Na/Ca
0
2
4
6
8
10
14.00
14.50
15.00
15.50
16.00


OL-VC-40239
Depth (feet)
0
2
4
6
8
10
0
10000
20000
30000
40000
50000
Chloride (mg/L)


OL-VC-40240
Depth (feet)
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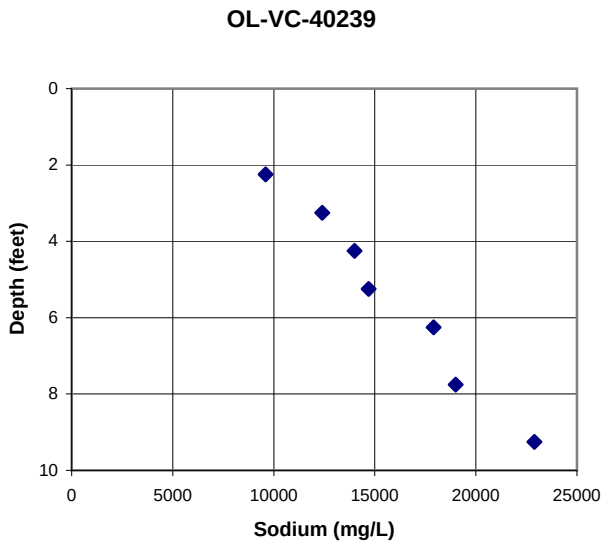
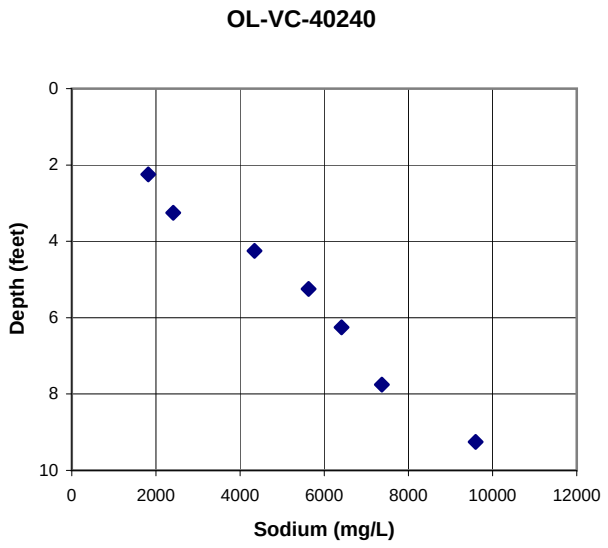
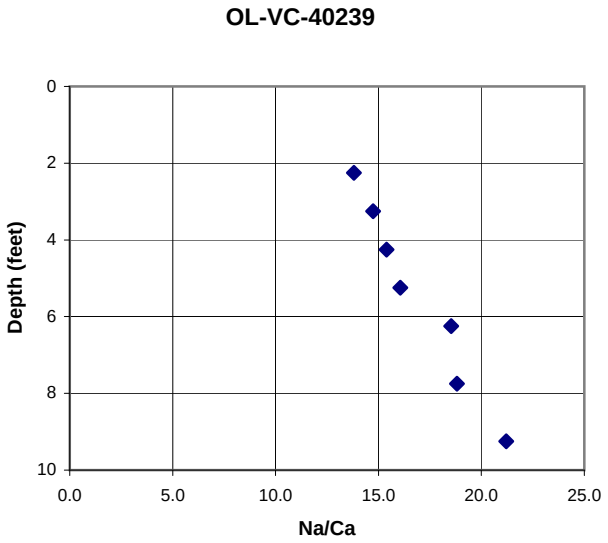
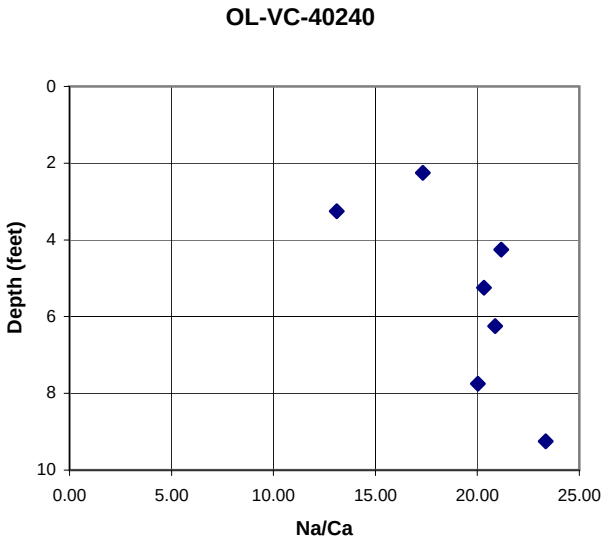
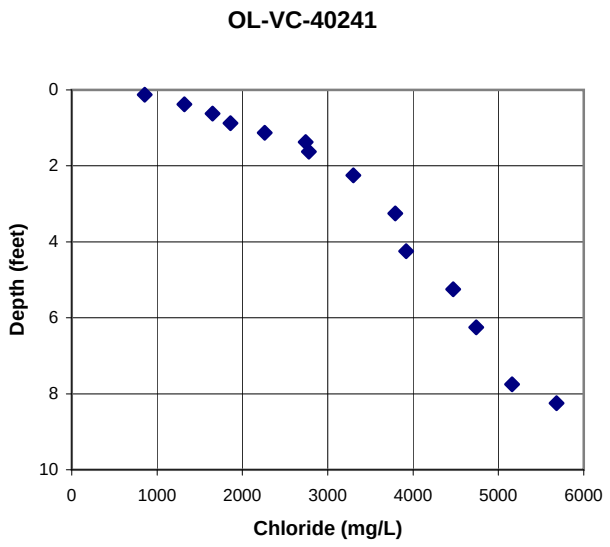
2
4
6
8
10
0
5000
10000
15000
20000
Chloride (mg/L)

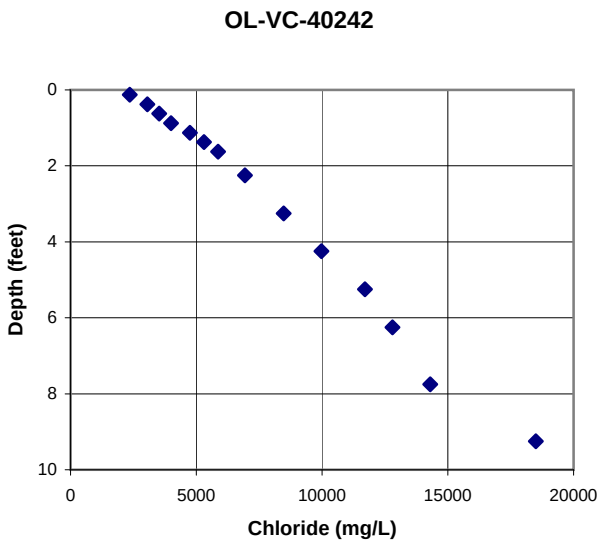

OL-VC-40239
Depth (feet)
0
2
4
6
8
10
0
5000
10000
15000
20000
25000
Sodium (mg/L)

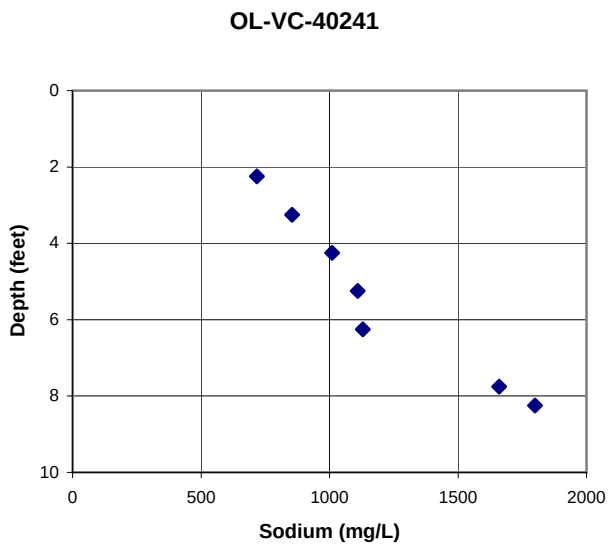

OL-VC-40240
Depth (feet)
0
2
4
6
8
10
0
2000
4000
6000
8000
10000
12000
Sodium (mg/L)

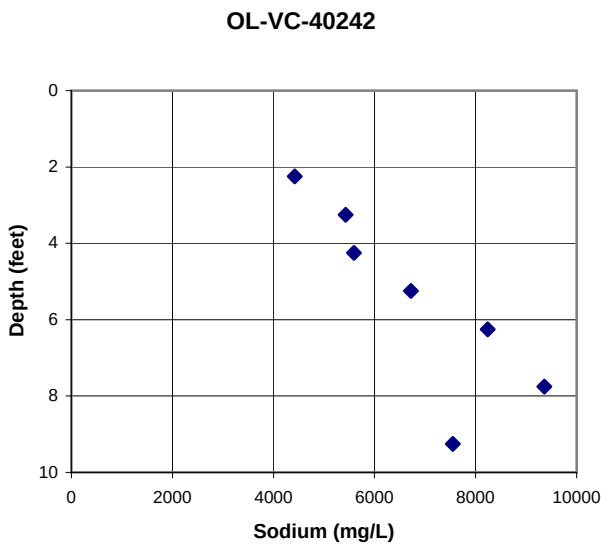

OL-VC-40239
Depth (feet)
0
2
4
6
8
10
0.0
5.0
10.0
15.0
20.0
25.0
Na/Ca

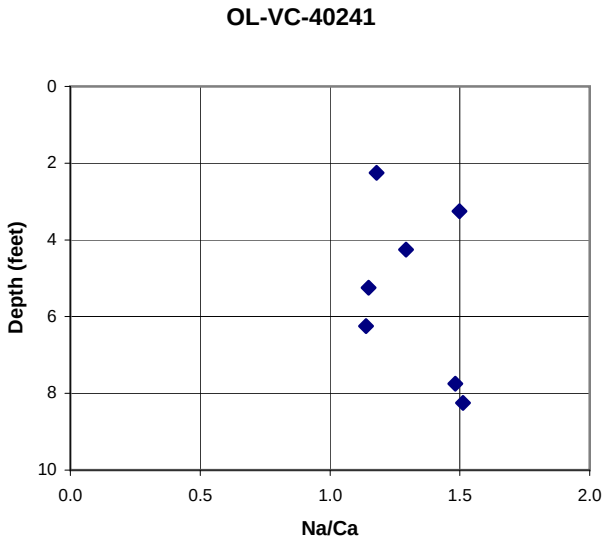

OL-VC-40240
Depth (feet)
0
2
4
6
8
10
0.00
5.00
10.00
15.00
20.00
25.00
Na/Ca

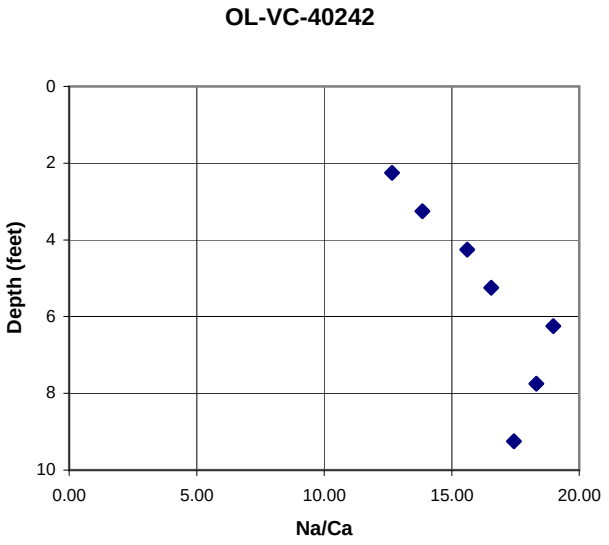

OL-VC-40241
Depth (feet)
0
2
4
6
8
10
0
1000
2000
3000
4000
5000
6000
Chloride (mg/L)

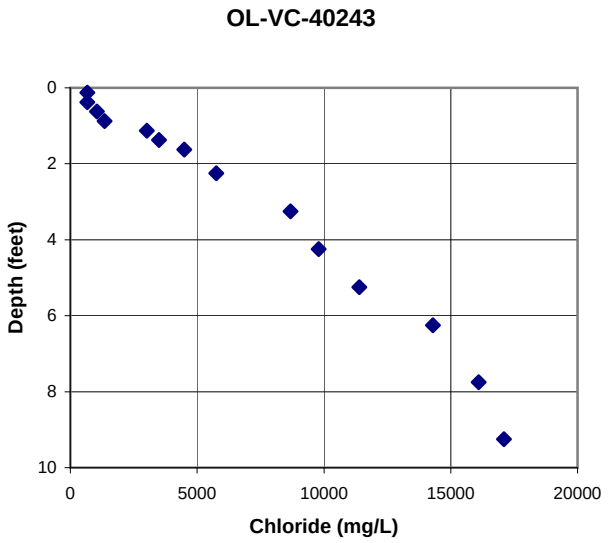

OL-VC-40242
Depth (feet)
0
2
4
6
8
10
0
5000
10000
15000
20000
Chloride (mg/L)

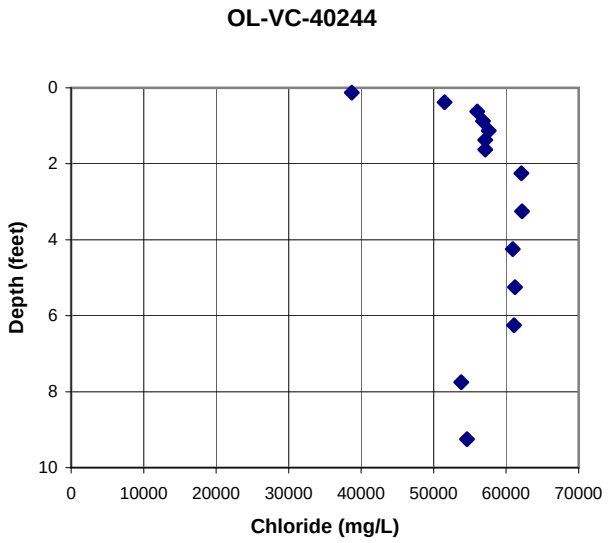

OL-VC-40241
Depth (feet)
0
2
4
6
8
10
0
500
1000
1500
2000
Sodium (mg/L)

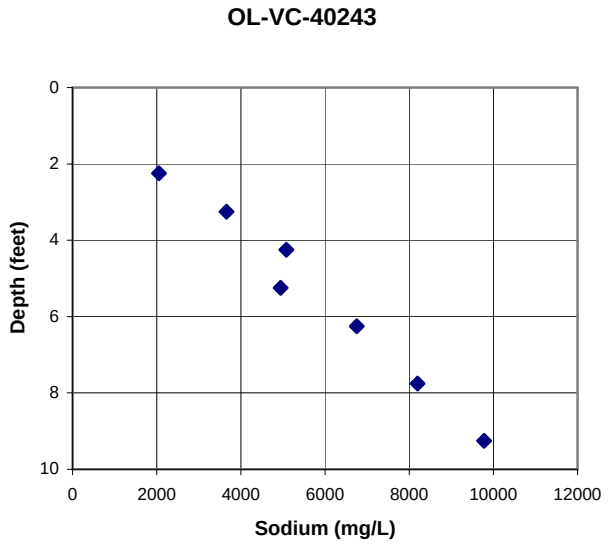

OL-VC-40242
Depth (feet)
0
2
4
6
8
10
0
2000
4000
6000
8000
10000
Sodium (mg/L)

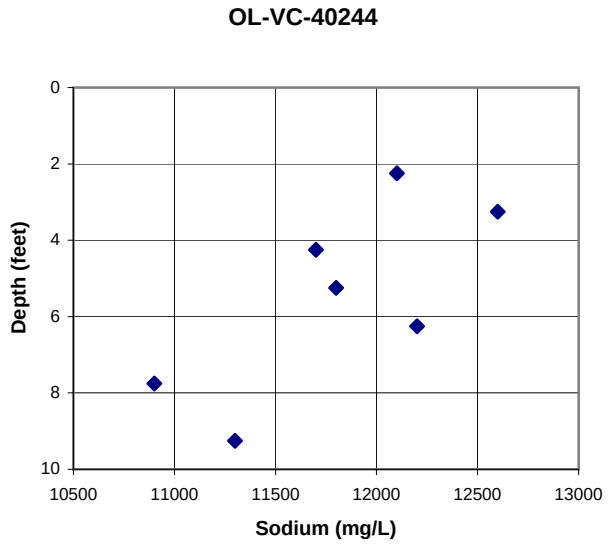

OL-VC-40241
Depth (feet)
0
2
4
6
8
10
0.0
0.5
1.0
1.5
2.0
Na/Ca

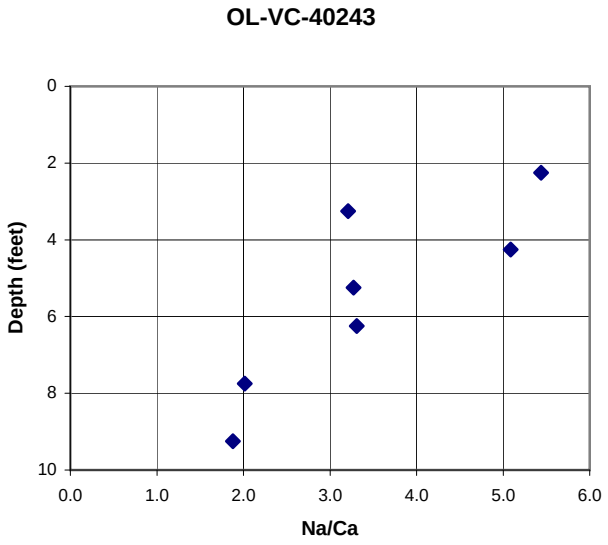

OL-VC-40242
Depth (feet)
0
2
4
6
8
10
0.00
5.00
10.00
15.00
20.00
Na/Ca

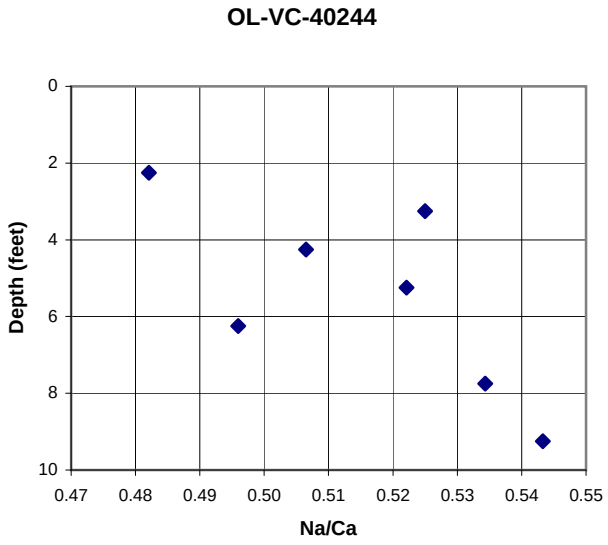

OL-VC-40243
Depth (feet)
Chloride (mg/L)
0
2
4
6
8
10
0
5000
10000
15000
20000

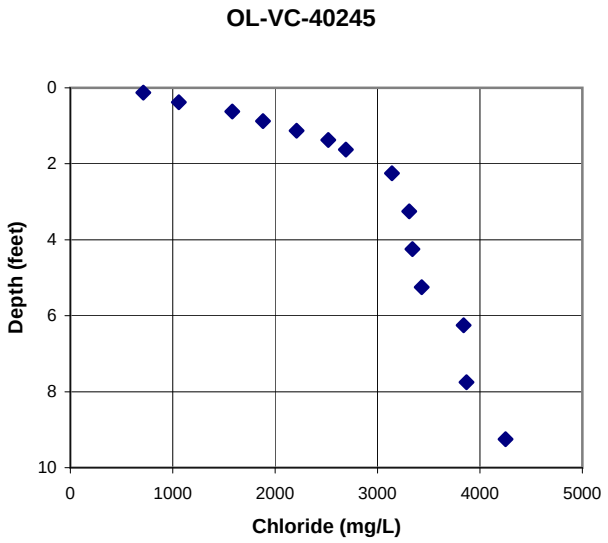

OL-VC-40244
Depth (feet)
Chloride (mg/L)
0
2
4
6
8
10
0
10000
20000
30000
40000
50000
60000
70000

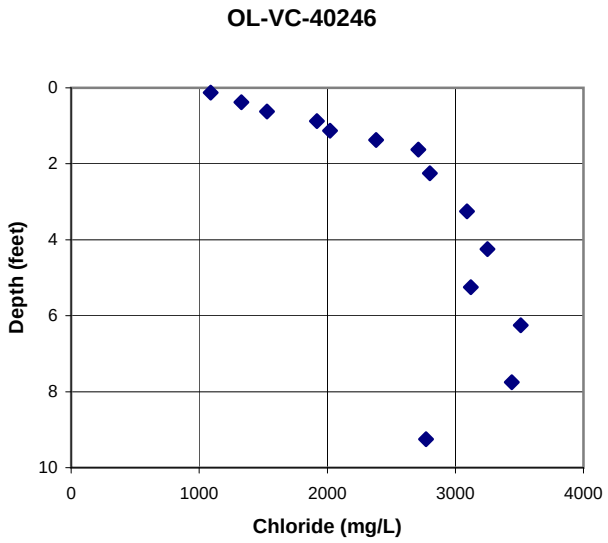

OL-VC-40243
Depth (feet)
Sodium (mg/L)
0
2
4
6
8
10
0
2000
4000
6000
8000
10000
12000

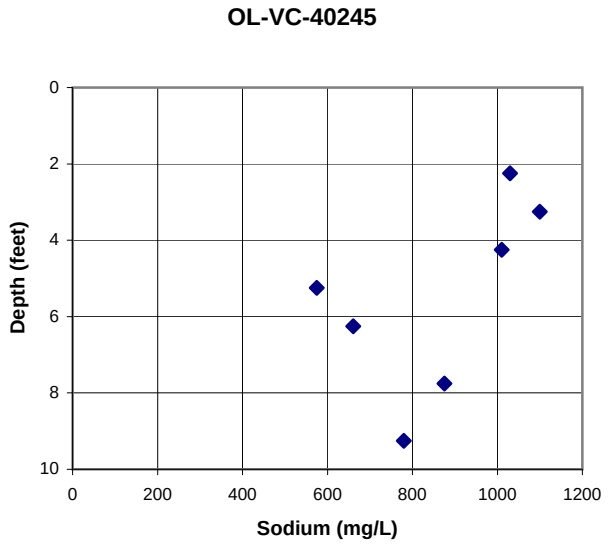

OL-VC-40244
Depth (feet)
Sodium (mg/L)
0
2
4
6
8
10
10500
11000
11500
12000
12500
13000

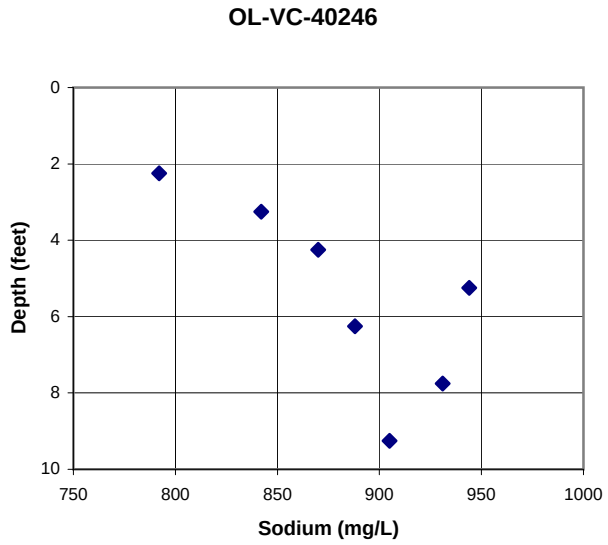

OL-VC-40243
Depth (feet)
Na/Ca
0
2
4
6
8
10
0.0
1.0
2.0
3.0
4.0
5.0
6.0

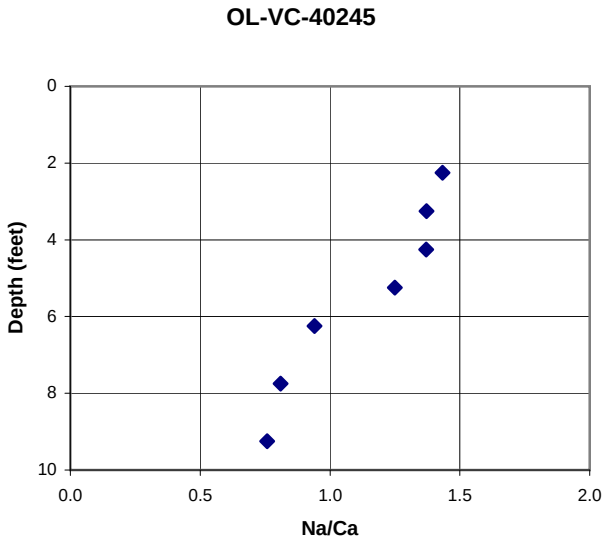

OL-VC-40244
Depth (feet)
Na/Ca
0
2
4
6
8
10
0.47
0.48
0.49
0.50
0.51
0.52
0.53
0.54
0.55

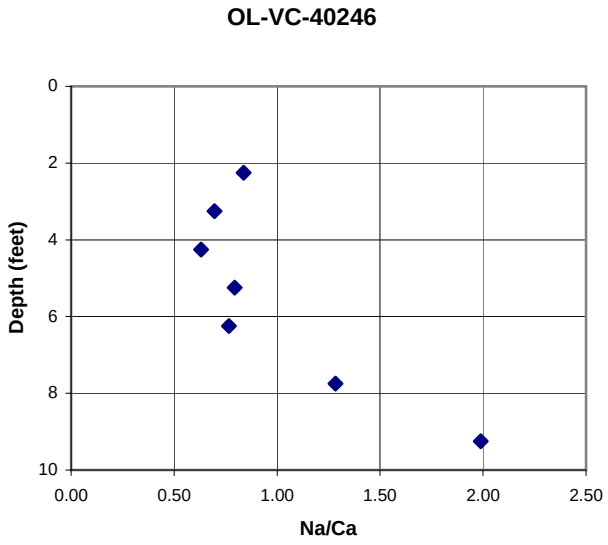

OL-VC-40245
Depth (feet)
0
2
4
6
8
10
0
1000
2000
3000
4000
5000
Chloride (mg/L)

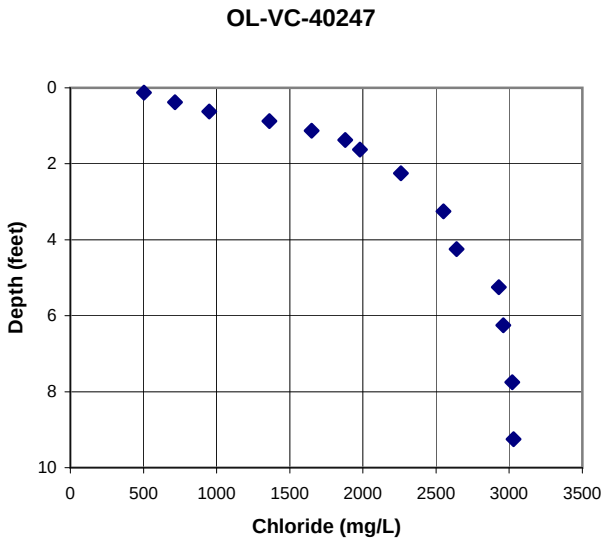

OL-VC-40246
Depth (feet)
0
2
4
6
8
10
0
1000
2000
3000
4000
Chloride (mg/L)


OL-VC-40245
Depth (feet)
0
2
4
6
8
10
0
200
400
600
800
1000
1200
Sodium (mg/L)


OL-VC-40246
Depth (feet)
0
2
4
6
8
10
750
800
850
900
950
1000
Sodium (mg/L)


OL-VC-40245
Depth (feet)
0
2
4
6
8
10
0.0
0.5
1.0
1.5
2.0
Na/Ca


OL-VC-40246
Depth (feet)
0
2
4
6
8
10
0.00
0.50
1.00
1.50
2.00
2.50
Na/Ca


OL-VC-40247
Depth (feet)
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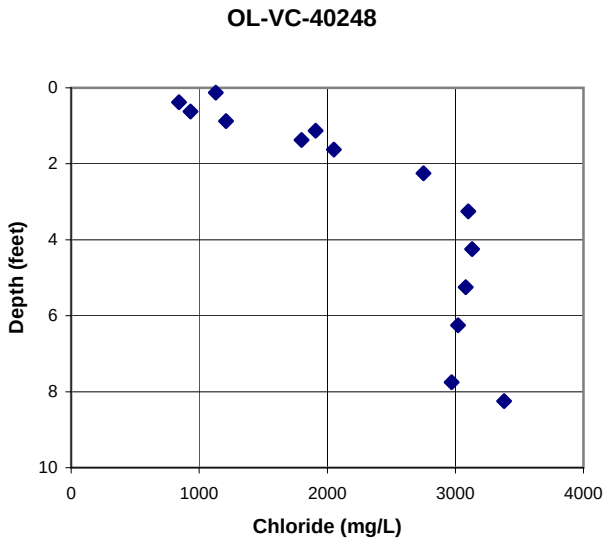
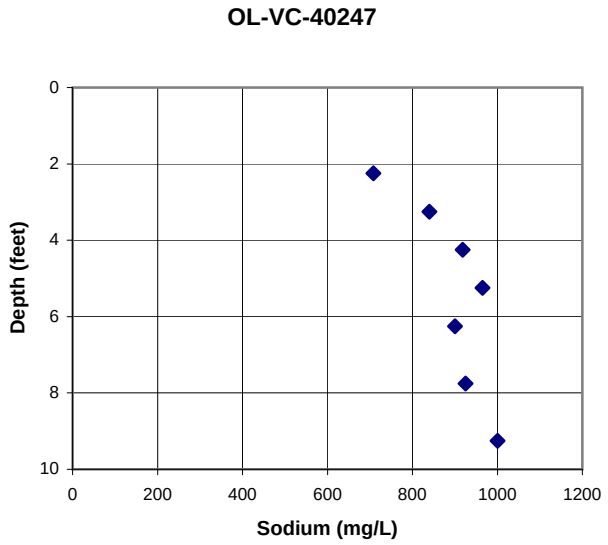
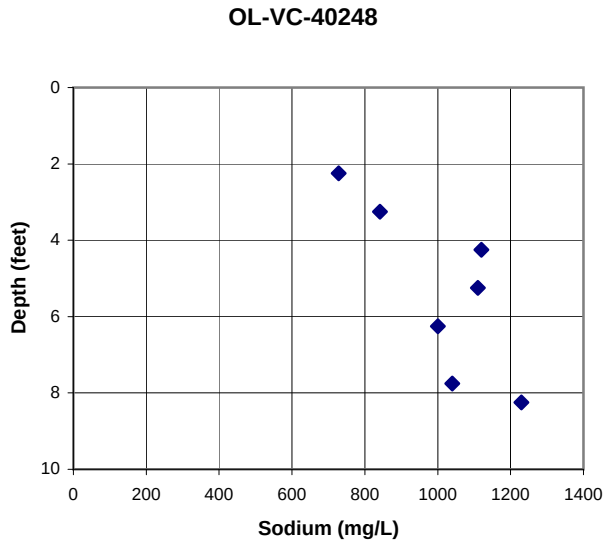
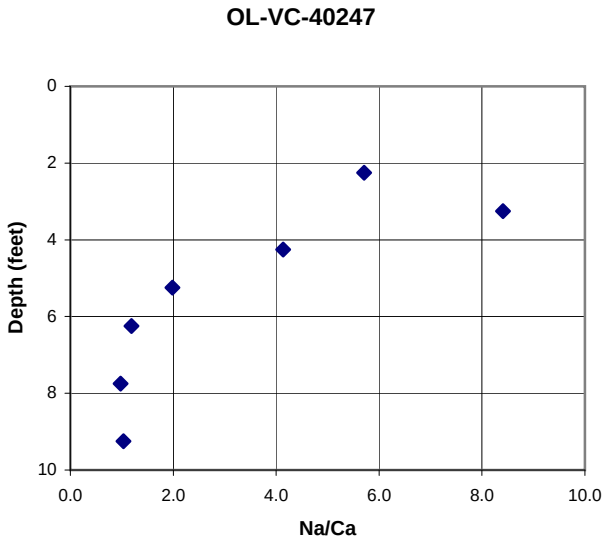
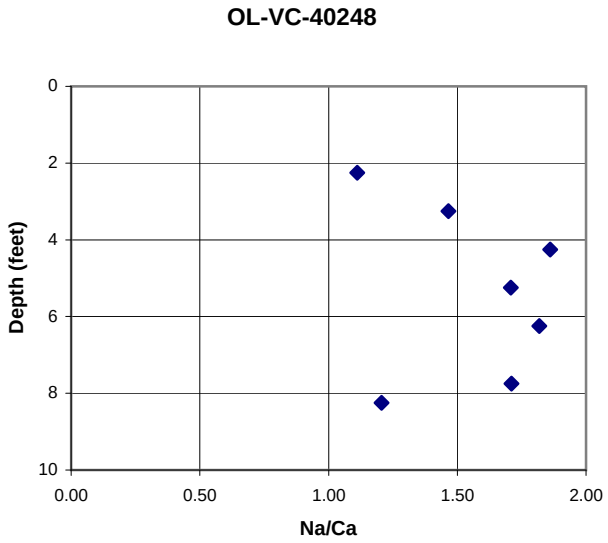
2
4
6
8
10
0
500
1000
1500
2000
2500
3000
3500
Chloride (mg/L)

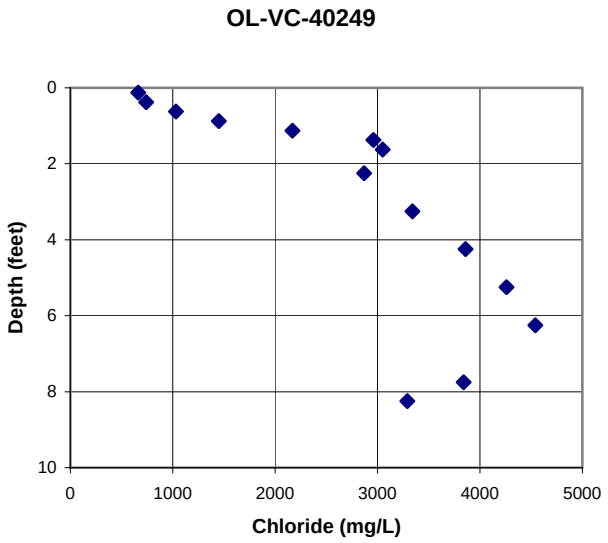

OL-VC-40248
Depth (feet)
0
2
4
6
8
10
0
1000
2000
3000
4000
Chloride (mg/L)

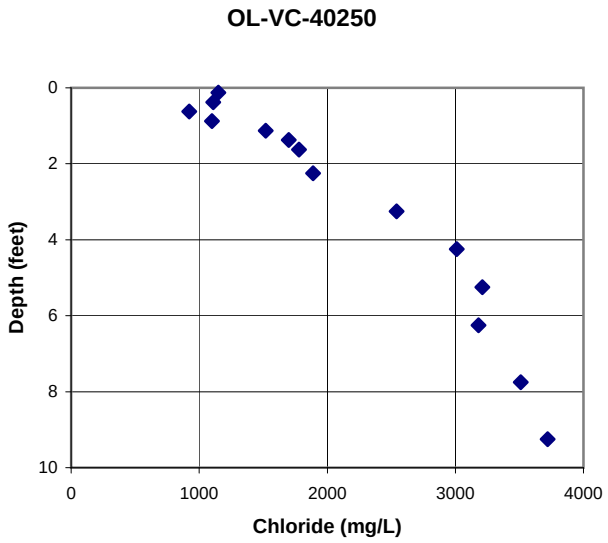

OL-VC-40247
Depth (feet)
0
2
4
6
8
10
0
200
400
600
800
1000
1200
Sodium (mg/L)

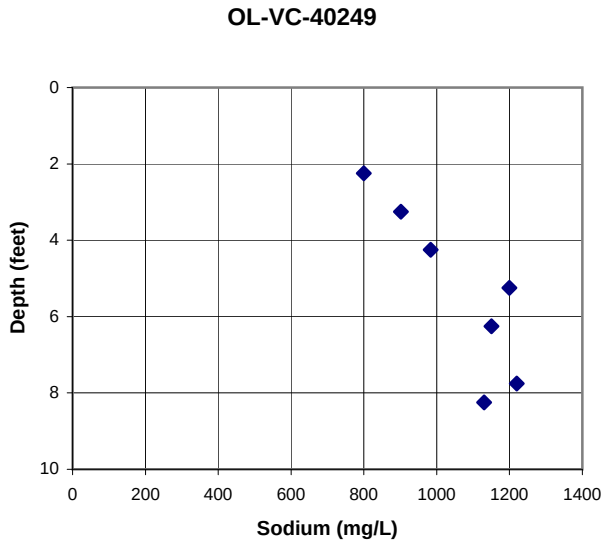

OL-VC-40248
Depth (feet)
0
2
4
6
8
10
0
200
400
600
800
1000
1200
1400
Sodium (mg/L)

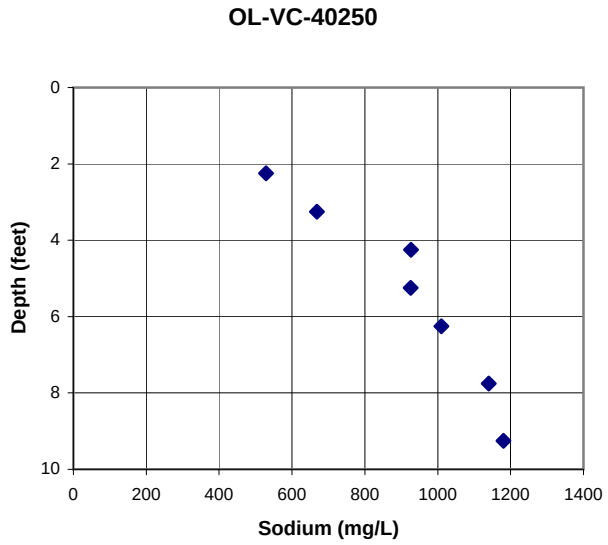

OL-VC-40247
Depth (feet)
0
2
4
6
8
10
0.0
2.0
4.0
6.0
8.0
10.0
Na/Ca

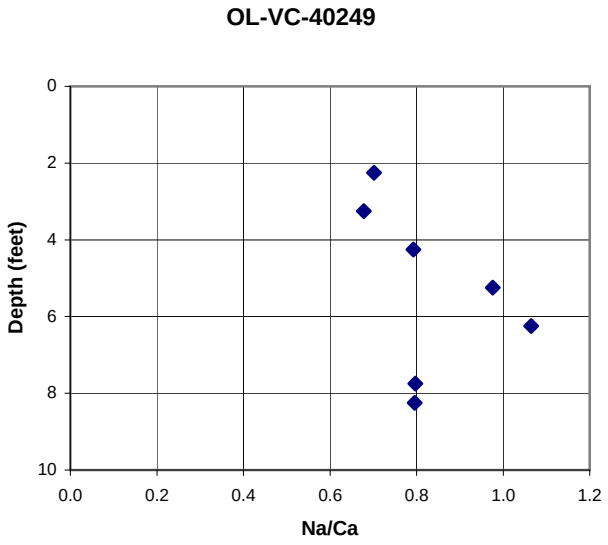

OL-VC-40248
Depth (feet)
0
2
4
6
8
10
0.00
0.50
1.00
1.50
2.00
Na/Ca

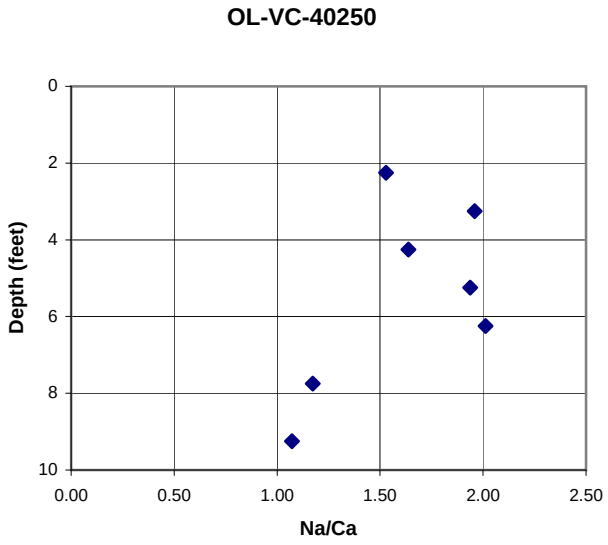

OL-VC-40249
Depth (feet)
Chloride (mg/L)
0
2
4
6
8
10
0
1000
2000
3000
4000
5000

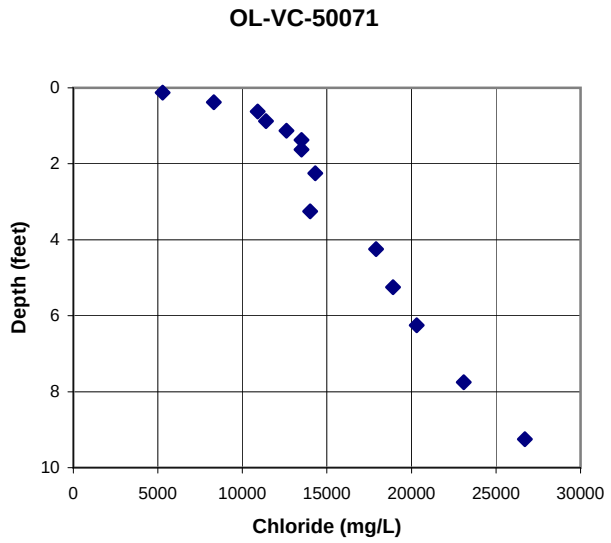

OL-VC-40250
Depth (feet)
Chloride (mg/L)
0
2
4
6
8
10
0
1000
2000
3000
4000

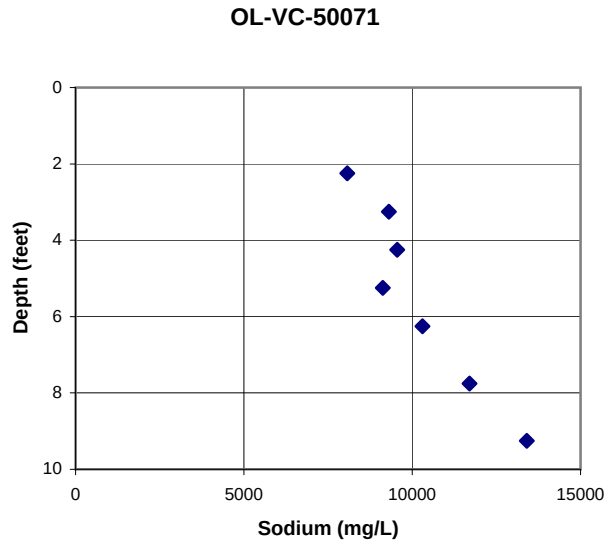

OL-VC-40249
Depth (feet)
Sodium (mg/L)
0
2
4
6
8
10
0
200
400
600
800
1000
1200
1400

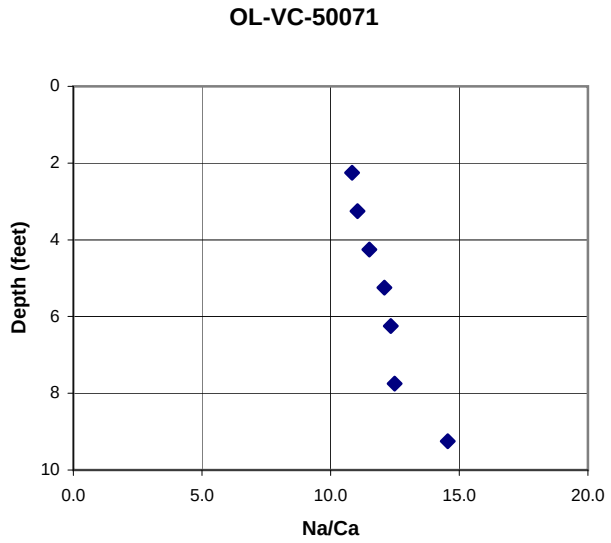

OL-VC-40250
Depth (feet)
Sodium (mg/L)
0
2
4
6
8
10
0
200
400
600
800
1000
1200
1400


OL-VC-40249
Depth (feet)
Na/Ca
0
2
4
6
8
10
0.0
0.2
0.4
0.6
0.8
1.0
1.2


OL-VC-40250
Depth (feet)
Na/Ca
0
2
4
6
8
10
0.00
0.50
1.00
1.50
2.00
2.50


OL-VC-50071
Depth (feet)
0
2
4
6
8
10
0
5000
10000
15000
20000
25000
30000
Chloride (mg/L)


OL-VC-50071
Depth (feet)
0
2
4
6
8
10
0
5000
10000
15000
Sodium (mg/L)


OL-VC-50071
Depth (feet)
0
2
4
6
8
10
0.0
5.0
10.0
15.0
20.0
Na/Ca

Attachment VI

Sediment Conductivity and Pore Water Correlations

Attachment VI
Sediment Conductivity and Pore Water Correlations

This attachment contains plots of chloride versus depth and sediment conductivity versus depth for the 31 locations where Vibracores were co-located with sediment conductivity borings as part of the Phase III Appendix 5 and the Phase IV PDI investigations in 2007 and 2008. For each location with a co-located data, a plot is shown with chloride concentrations from pore water versus depth, sediment conductivity versus depth, and adjusted chloride concentration versus depth from sediment conductivity data. The adjusted chloride concentration was calculated from the sediment conductivity data by a factor that minimizes the difference between the adjusted chloride concentrations and the pore water chloride concentrations. The calculated adjustment factor, which was calculated with the Excel solver routine, is listed on each of the plots.

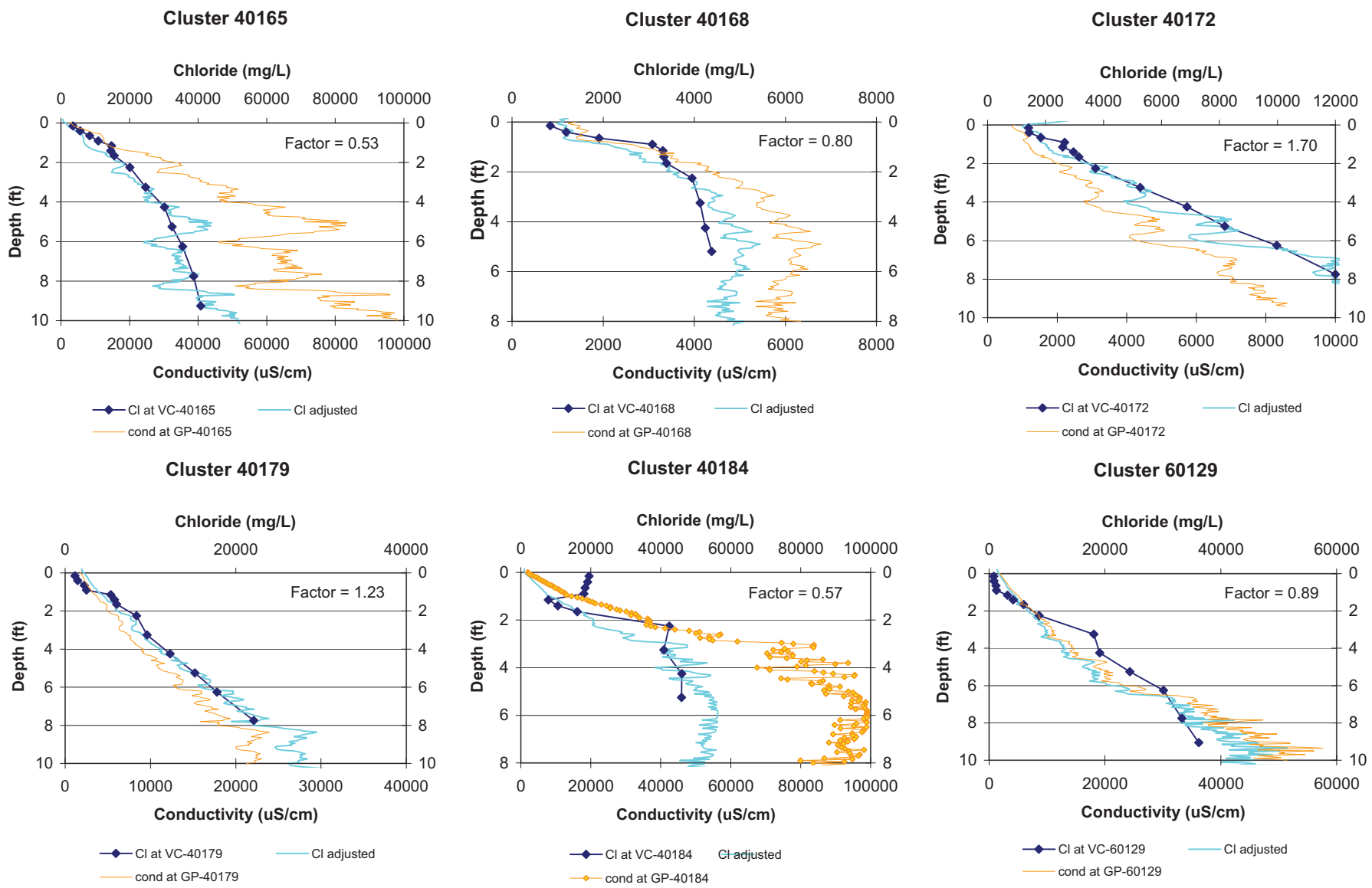


Figure 1 Pore Water Chloride and Sediment Conductivity Relationship -- 2007 Sediment Data

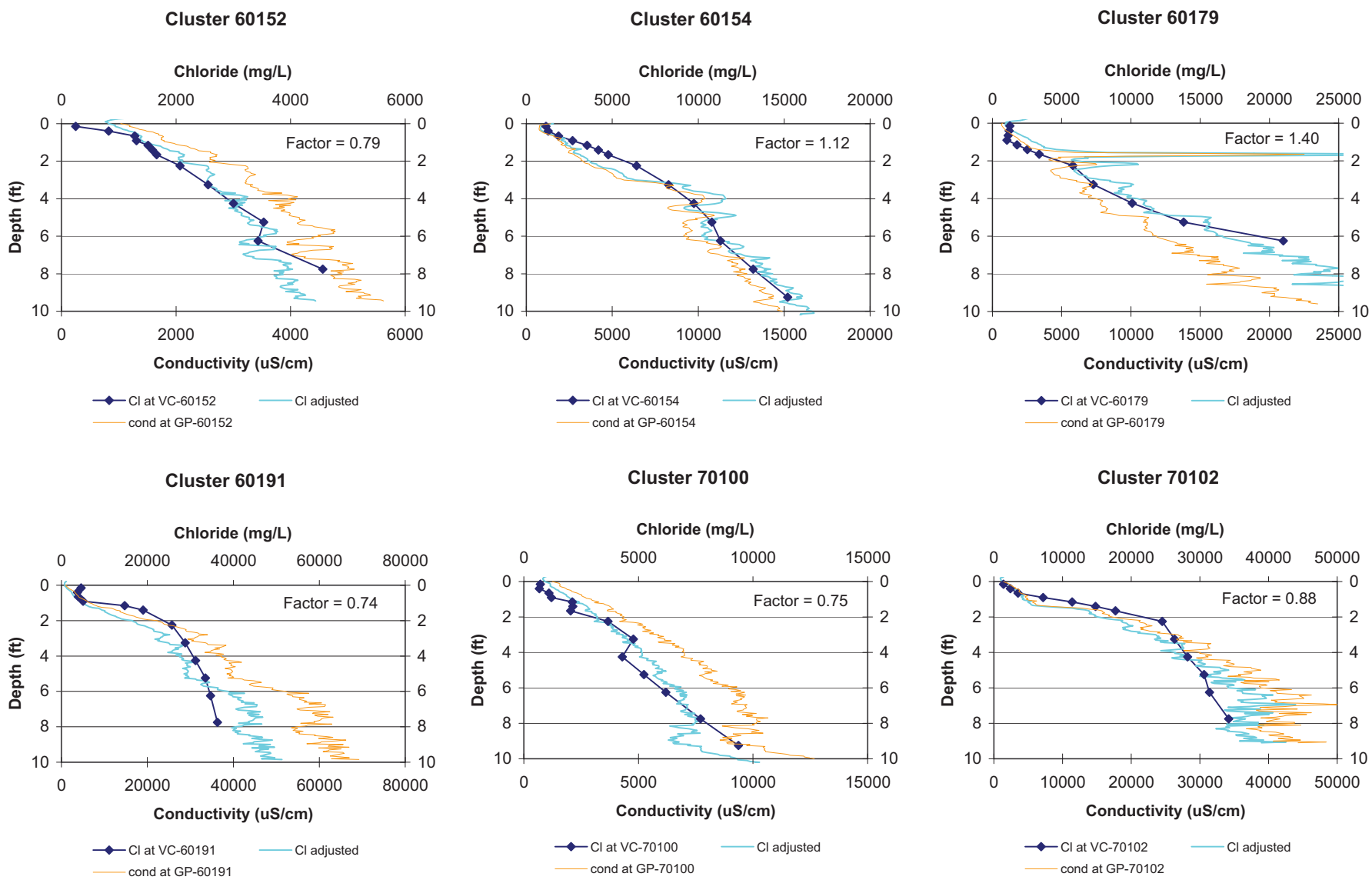


Figure 1 Pore Water Chloride and Sediment Conductivity Relationship -- 2007 Sediment Data

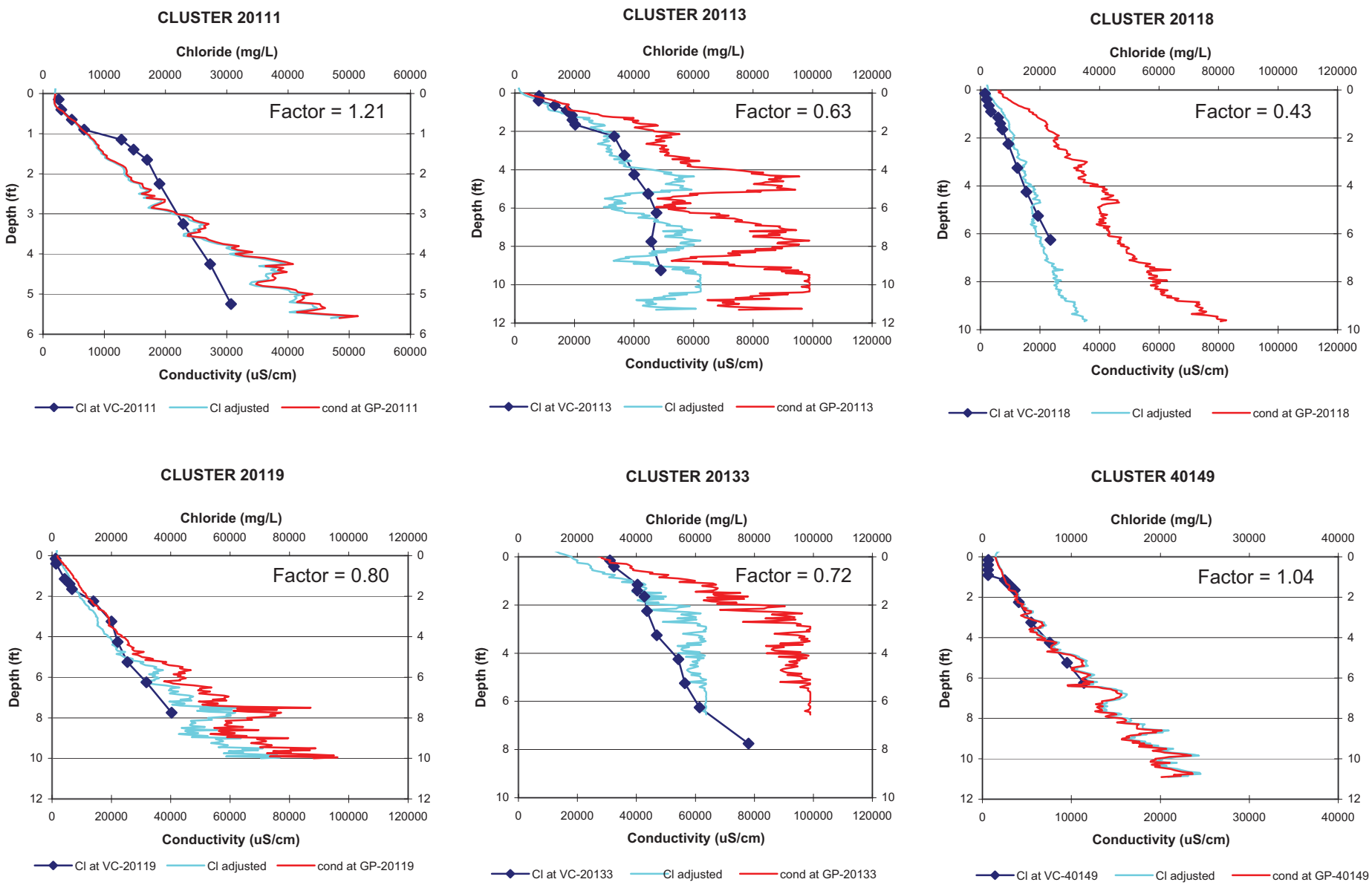


Figure 2 Pore Water Chloride and Sediment Conductivity Relationship - 2008 Sediment Data

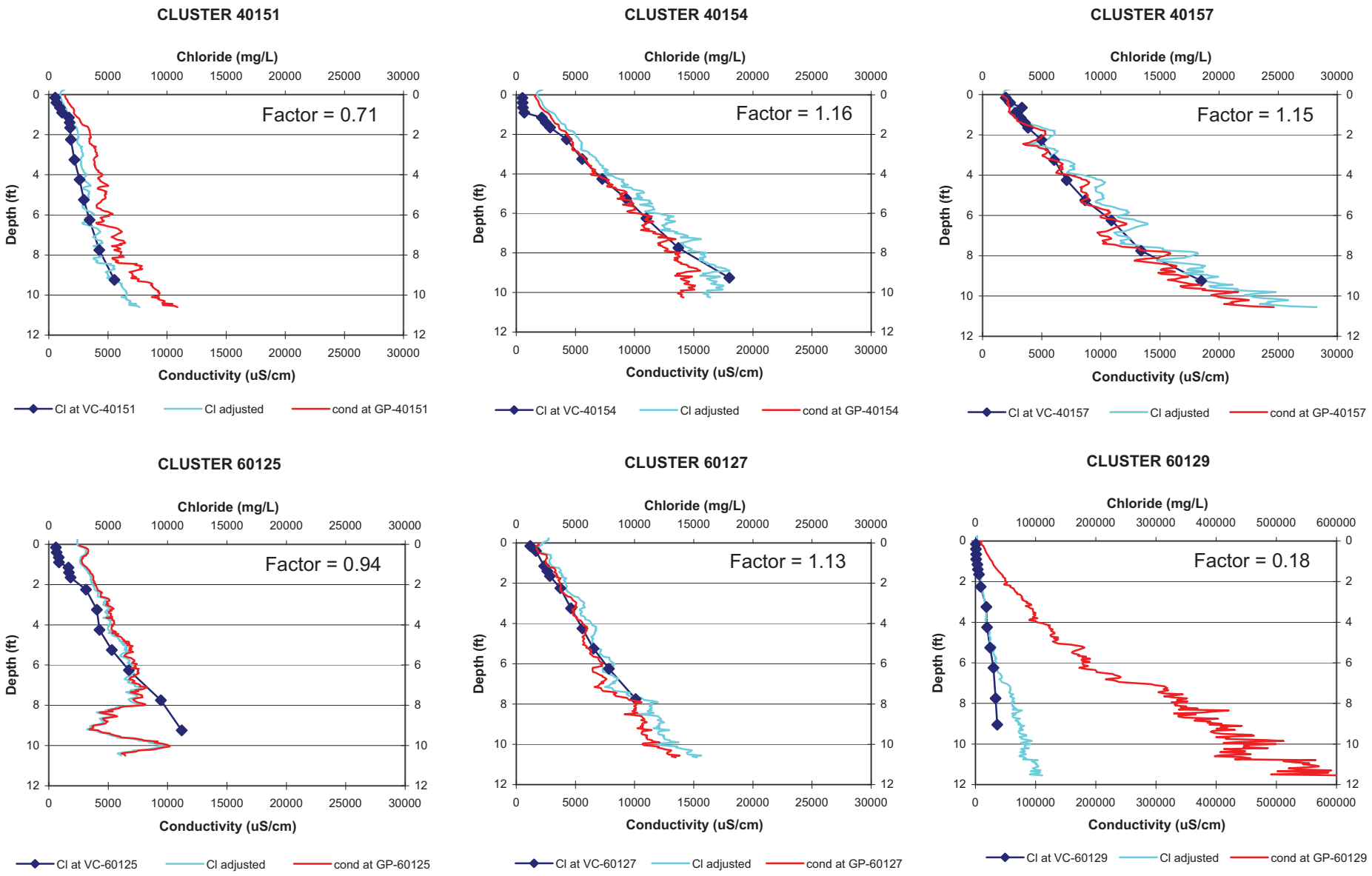


Figure 2 Pore Water Chloride and Sediment Conductivity Relationship - 2008 Sediment Data

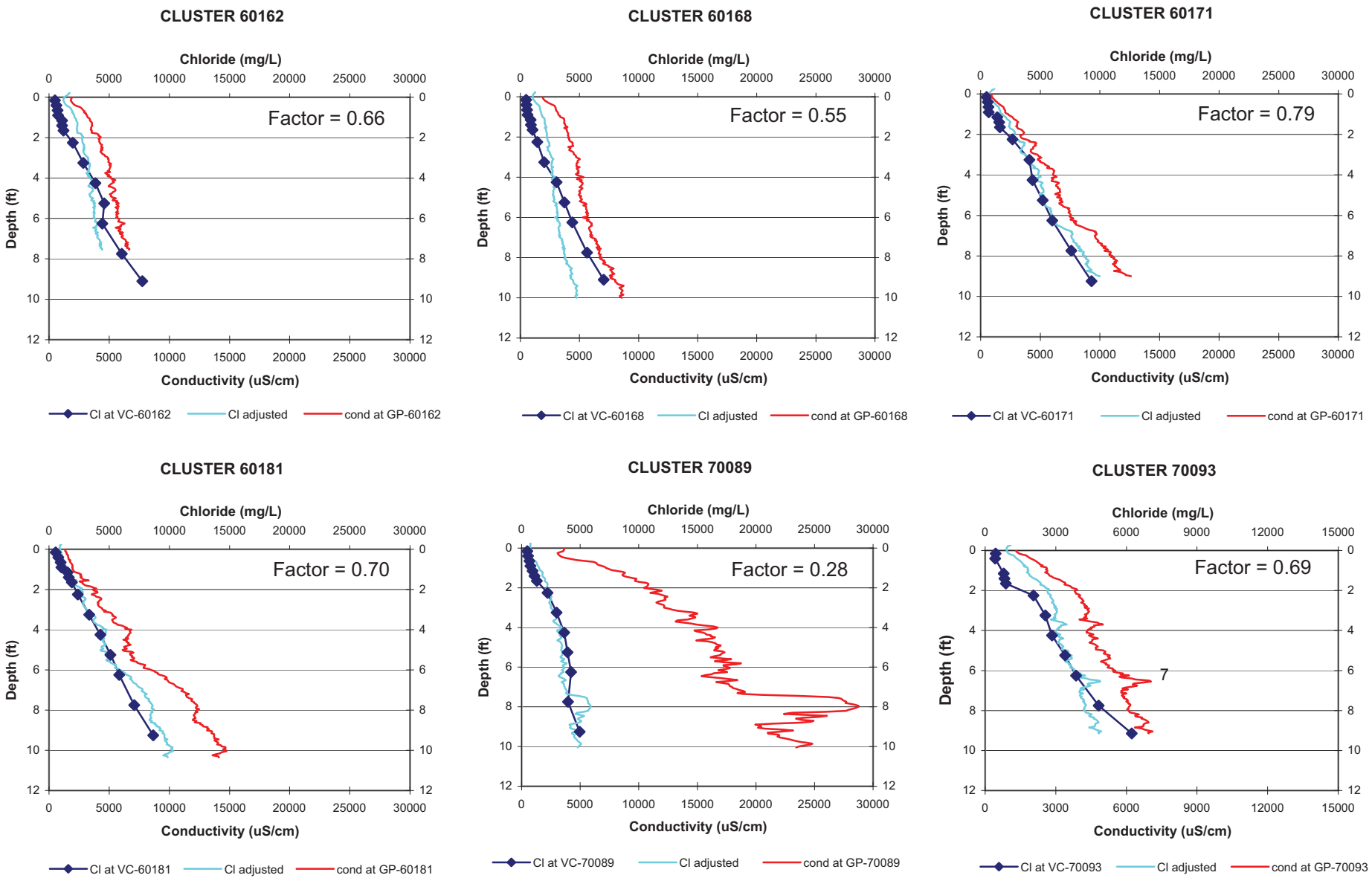


Figure 2 Pore Water Chloride and Sediment Conductivity Relationship - 2008 Sediment Data

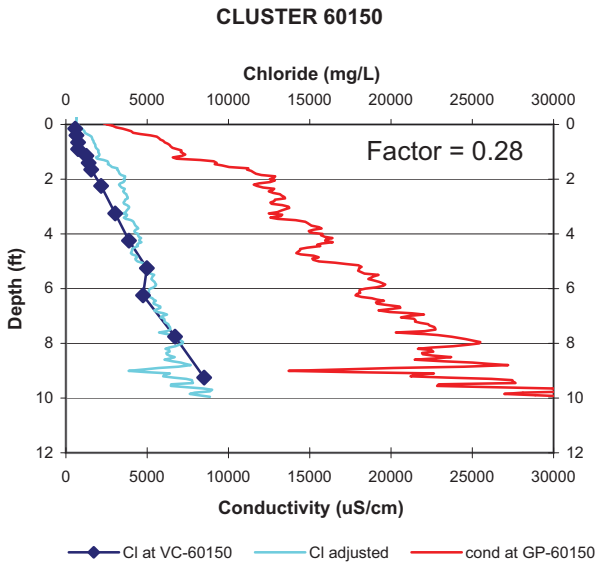


Figure 2 Pore Water Chloride and Sediment Conductivity Relationship - 2008 Sediment Data

Attachment VII

Chloride-Depth Profile Analyses

Attachment VII
Chloride-Depth Profile Analyses

This Attachment contains the results of evaluating upwelling velocities from chloride-depth profiles developed from pore water data collected at 156 locations and sediment conductivity data collected at 245 locations in the littoral zone in and around the vicinity of the Remediation Areas using the procedures described in Section 3. In total, as a result of duplicate and triplicate data collected at some locations, 474 chloride-depth profiles were developed. The analysis consisted of iteratively solving Equation 1, described in Section 3, using various values of the upwelling velocity, and in some cases the lower boundary concentration, until a "best fit" between the calculated and the measured chloride depth profile was obtained.

Table VII-1 provides a summary of all of the chloride-depth profiles that were conducted. Listed on the table are the upper and lower boundary conditions used in both the 10-foot and the 5-foot analyses, the calculated upwelling velocities for the 10-foot and 5-foot analyses, the depth below the sediment-water interface of the deepest measured data, and comments regarding the analyses. The comments include notes indicating the quality of the upwelling analysis, which is a qualitative assessment of how well the measured data matched the chloride-depth profile calculated using Equation 1. The quality of the upwelling analysis for about 65 percent of the chloride-depth profiles based on pore water data and for about 54 percent of the chloride-depth profiles based on sediment-conductivity data are judged to be "good". For these chloride-depth profiles the chloride concentrations generally increase monotonically with depth with little scatter and there is a good correspondence between the observed and calculated chloride-depth profiles. For these analyses, there is a high degree of confidence in the calculated upwelling velocities. On the other hand, the quality of the upwelling analysis for about 8 percent of the chloride-depth profiles based on pore water data and about 14 percent of the chloride-depth profiles based on sediment conductivity data are described as "poor". In general, these analyses are judged to be "poor" because the observed chloride concentrations do not increase monotonically with depth or there is significant scatter in the measured data.

The chloride-depth profiles developed from sediment conductivity data are presented first, followed by chloride-depth profiles developed from sediment pore-water chloride data.

Table VII-1

Summary of Upwelling Velocity and Associated Data

Location ID	Type[1]	Remediat-ion Area	Boundary Concentrations (mg/L)[2]			Upwelling Velocity (cm/yr)			90% Confidence Interval(+/-) (cm/year)	Depth[3] (feet)	Reported Depth[4] (feet)	Comments
			Upper	Lower 10' Analysis	Lower 5' Analysis	10' Analysis	5' Analysis	Upwelling Velocity				
OL-STA-10111	VC	SMU1	359	39000	39000	<-32.5	<-32.5	<-32	52.82	9.5	9.5	poor
OL-STA-20087	VC	SMU2	359	88200	74100	-2.9	-5.5	-2.9	4.17	9.5	9.5	fair for 10-foot analysis, poor for 5-foot analysis
OL-GP-20109	GP	C2	1953	27000	21500	-1.4	-1.5	-1.5	0.05	7.4	10.15	good
OL-GP-20110	GP	C2	1980	11500	10584		-3.3	-3.3	0.52	4.55	5.7	fair
OL-GP-20111	GP	C2	1638	38718	32313	~0	~0	0.0	0.18	5.3	6.75	good
OL-GP-20111.DAT	GP	C2	4339	44500	30700	-1.3	-2.6	-2.6	0.38	9.65	10.95	fair
OL-VC-20111	VC	C2	359	29500	29500	-1.4	-1.6	**-1.6**	0.54	5.25	5.25	fair
OL-GP-20112	GP	C2	2947	66000	47000	-2.6	-2.6	-2.6	0.26	11.55	11.85	fair
OL-GP-20113	GP	C2	3050	79200	75000	-1.0	-1.0	-1.0	0.07	11.3	12.15	fair
OL-GP-20113.DAT	GP	C2	1664	55000	40492	-5.2	-7.3	-7.3	1.88	9.5	11.5	poor
OL-VC-20113	VC	C2	359	49000	42000	-2.4	-2.4	**-2.4**	0.56	9.25	9.25	good
OL-GP-20115	GP	C2	1872	85000	73000	-1.0	~0	-1.0	0.02	11.2	11.85	good
OL-GP-20115.DAT	GP	C2	2019	53000	53000	-8.5	-8.5	-8.5	2.70	10.45	12.1	poor
OL-GP-20116	GP	C3	1852	45000	19100	~0	-0.8	-0.8	0.05	10.25	12.25	good
OL-GP-20116.DAT	GP	C3	1580	32500	16000	~0	~0	0.0	0.03	9.2	10.85	good
OL-GP-20117	GP	C3	1718	37834	18100	~0	-0.1	-0.1	0.01	11.25	12.25	good
OL-GP-20117.DAT	GP	C3	1565	29597	16000	~0	~0	0.0	0.02	10.35	12	good
OL-GP-20118	GP	C3	4635	53565	32044	-0.7	-1.6	-1.6	0.10	9.65	11.65	good
OL-GP-20118.DAT	GP	C3	1185	31000	22000	-0.5	~0	-0.5	0.08	8.4	12.4	fair
OL-VC-20118	VC	C3	359	30000	17208	-0.5	-0.7	-0.7	0.20	6.25	6.25	good
OL-GP-20119	GP	C3	1509	60000	22500	~0	~0	0.0	0.01	10	10.6	good
OL-VC-20119	VC	C3	359	50000	26403	~0	~0	0.0	0.32	7.75	7.75	good
OL-GP-20120	GP	C3	1463	39669	13985	~0	-0.4	-0.4	0.01	11.95	12.1	good
OL-GP-20121	GP	C3	1724	43000	18051	~0	~0	0.0	0.02	11.05	11.85	good
OL-GP-20121.DAT	GP	C3	1898	31135	14200	~0	~0	0.0	0.01	10.95	12.45	good
OL-GP-20122	GP	C3	1188	72000	42500	-0.4	-1.1	-1.1	0.05	11.45	12.1	good
OL-GP-20122.DAT	GP	C3	1187	50000	39500	-0.9	~0	-0.9	0.01	11.5	12.35	good
OL-GP-20123	GP	C3	1266	52759	22730	~0	~0	0.0	0.08	10.05	12.2	poor
OL-GP-20123.DAT	GP	C3	2375	37931	23290	-0.2	~0	-0.2	0.02	10.75	11.25	good
OL-GP-20124	GP	C3	1404	30396	13200	~0	-0.1	-0.1	0.01	11.4	12.05	good
OL-GP-20125	GP	C3	1461	29000	14100	-0.2	-0.8	-0.8	0.04	9.6	11.35	good
OL-GP-20126	GP	C2	1488	8800	4700	~0	~0	0.0	0.01	11.85	11.85	good

Table VII-1

Summary of Upwelling Velocity and Associated Data

Location ID	Type[1]	Remediat-ion Area	Boundary Concentrations (mg/L)[2]			Upwelling Velocity (cm/yr)			90% Confidence Interval(+/-) (cm/year)	Depth[3] (feet)	Reported Depth[4] (feet)	Comments
			Upper	Lower 10' Analysis	Lower 5' Analysis	10' Analysis	5' Analysis	Upwelling Velocity				
OL-GP-20127	GP	C2	1640	23000	23000	-1.3	-0.2	-1.3	0.04	9.95	12.6	fair
OL-GP-20128	GP	C3	1514	76000	42400	-0.1	-0.1	-0.1	0.03	10.85	11.6	good
OL-GP-20128.DAT	GP	C3	4436	62425	34104	~0	-0.5	-0.5	0.03	10.6	10.9	good
OL-GP-20129	GP	C3	2327	77348	43000	-0.5	-0.7	-0.7	0.09	9.95	10.65	good
OL-GP-20129-A	GP	C3	2345	70632	42000	-0.3	-0.3	-0.3	0.01	11.65	12	good
OL-GP-20130	GP	C3	1539	79200	35000	~0	-0.1	-0.1	0.02	10.6	11.85	good
OL-GP-20130.DAT	GP	C3	2473	52219	26821	~0	~0	0.0	0.01	10.5	12.05	good
OL-GP-20131	GP	SMU2	2578	73000	53000	-0.3	~0	-0.3	0.01	10.95	11.95	good
OL-GP-20132	GP	C3	1792	83000	72000	-1.1	-0.1	-1.1	0.03	10.05	12.05	good
OL-GP-20132.DAT	GP	C3	9536	70000	61500	-14.2	-14.4	-14.4	4.17	7.8	10.5	poor
OL-GP-20133	GP	C3	3437	120000	83000	-1.0	-0.9	-1.0	0.09	8.65	12.1	fair
OL-VC-20133	VC	C3	359	64000	55000	-4.8	-8.5	-8.5	6.73	7.75	7.75	poor
OL-GP-20134	GP	SMU2	7288	43000	42000	-3.7	-3.3	-3.3	0.35	7.75	11.95	good for 5-foot analysis, poor for 10-foot analysis
OL-VC-20187	VC	C2	359	9200	10000	-1.7	-0.1	**-1.7**	0.58	9.25	9.25	good
OL-VC-20188	VC	C2	359	22500	19726	-8.3	-9.7	-9.7	2.81	9.25	9.25	good
OL-VC-20189	VC	C2	359	41000	29500	-1.3	-1.6	**-1.6**	0.54	9.25	9.25	good
OL-VC-20190	VC	C2	359	33000	15000	-0.2	-0.1	**-0.6**	0.39	9.25	9.25	good, adjusted based on confidence interval, best-fit value is 0.2 cm/yr
OL-VC-20201	VC	SMU2	359	2030	2030	NA	NA	NA		0.13	0.13	not analyzable due to insufficient data
OL-VC-20202	VC	C2	1000	3170	2000	~0	-5.3	-5.3	1.65	7.75	7.75	fair at 5 foot, poor at 10 foot analysis
OL-VC-20203	VC	C2	359	18095	18095	-3.1	-3.1	-3.1	1.36	4.25	4.25	fair
OL-VC-20204	VC	C3	359	61500	52500	NA	NA	NA		9.25	9.25	not analyzable due to insufficient data
OL-VC-20204A	VC	C3	359	64876	39487	-0.5	-0.8	-0.8	0.07	9.25	9.25	good
OL-VC-20205	VC	C3	359	71972	45634	-0.7	-1.1	-1.1	0.06	9.25	9.25	good
OL-GP-30059	GP	A1	1302	24073	13500	-0.1	-0.2	**-0.2**	0.03	10.8	12.1	good
OL-GP-30060	GP	A1	1435	26000	16675	-0.3	~0	**-0.3**	0.05	10.15	12.05	good
OL-GP-30061	GP	SMU3	1692	24000	24000	-4.6	-4.6	-4.6	0.50	7.8	8.95	fair but poor fit to data
OL-GP-30061-A	GP	SMU3	1351	24000	24000	-4.2	-4.2	-4.2	0.43	7	7.8	fair
OL-GP-30062	GP	SMU3	2083	25000	14730	-0.2	-0.1	-0.1	0.05	10.2	13.2	poor
OL-GP-30063	GP	A1	1485	17880	11800	-0.4	-0.9	**-0.9**	0.05	10.85	12	fair

Table VII-1

Summary of Upwelling Velocity and Associated Data

Location ID	Type[1]	Remediat-ion Area	Boundary Concentrations (mg/L)[2]			Upwelling Velocity (cm/yr)			90% Confidence Interval(+/-) (cm/year)	Depth[3] (feet)	Reported Depth[4] (feet)	Comments
			Upper	Lower 10' Analysis	Lower 5' Analysis	10' Analysis	5' Analysis	Upwelling Velocity				
OL-GP-30064	GP	A1	2687	34587	16500	~0	-1.5	**-1.5**	0.11	9.6	12.4	fair
OL-GP-30065	GP	A1	1738	30716	18129	-0.1	~0	**-0.1**	0.02	10.65	13.05	fair
OL-GP-30066	GP	SMU3	2443	29500	26900	-16.4	-16.1	-16.1	1.59	9.75	12.2	fair for 5-foot analysis, poor for 10-foot analysis
OL-GP-30067	GP	SMU3	6901	38000	22190	~0	~0	0.0	0.06	9.15	11.85	good
OL-GP-30068	GP	A1	2196	27408	14444	~0	~0	**0.0**	0.04	10.25	12.25	fair
OL-GP-30069	GP	SMU3	3317	43000	39135	-2.3	-1.7	-2.3	0.06	10.65	12.1	good
OL-GP-30070	GP	A1	3280	19438	11700	-0.3	-0.9	**-0.9**	0.04	10.65	13.05	good
OL-GP-30071-1	GP	C2	3762	10000	5880	<-32.5	<-32.5	<-32	22.43	12	13.8	poor
OL-GP-30071-2	GP	C2	4820	35010	20000	-0.9	-0.1	-0.9	0.09	9.75	11.95	poor
OL-GP-30072-1	GP	C2	2297	24632	24500	-24.1	-12.7	-24.1	1.69	13.3	16.05	poor
OL-GP-30072-2	GP	C2	7360	79200	40000	-0.6	-1.2	-1.2	0.25	10.15	12.7	poor
OL-GP-30073-1	GP	C2	1832	8000	7892	-4.8	-4.8	-4.8	1.27	6.25	8.25	poor
OL-GP-30073-2	GP	C2	1086	23256	9700	-0.5	-5.0	-5.0	1.02	10.7	12	poor
OL-GP-30074	GP	C2	2042	60000	16000	~0	-2.0	-2.0	0.36	10.95	12.85	poor
OL-GP-30075-1	GP	C2	1980	1827	1827		NA	NA	-	1.1	1.1	analysis not possible
OL-GP-30075-2	GP	C2	1268	10608	10000	-18.9	-18.9	-18.9	14.04	10.5	13.75	poor
OL-GP-30075-3	GP	C2	1373	11000	11000	-7.7	-5.7	-7.7	206.14	7.95	9.1	poor
OL-GP-30075-4	GP	C2	5120	9400	9400		-13.0	-13.0	4.15	2.35	2.35	poor
OL-GP-30075-5	GP	C2	359	6900	6900		<-32.5	<-32	26.43	3.85	3.85	poor
OL-GP-30075-6	GP	C2	2609	16060	11945	NA	NA	NA	-	10	14.7	analysis not meaningful
OL-GP-30075-7	GP	C2	1709	1680	1680		NA	NA	-	1.3	1.7	analysis not meaningful
OL-GP-30076-1	GP	C2	1500	8200	6500		-1.3	-1.3	0.25	2.7	6.7	poor
OL-GP-30076-2	GP	C2	1870	3000	3000		NA	NA	-	3.5	6.05	analysis not meaningful as lots of scatter in data
OL-GP-30076-3	GP	C2	1900	2200	2200		<-32.5	<-32	14.99	1.35	1.35	poor
OL-GP-30076-4	GP	C2	2343	7600	6650	-0.5	~0	-0.5	0.11	9.35	13	poor
OL-GP-30077	GP	SMU3	2446	20000	9000	~0	-7.5	-7.5	2.28	10.85	11.85	5-foot analysis fair, 10-foot analysis poor
OL-VC-30129	VC	A1	359	15500	9250	-0.9	-2.7	**-2.7**	0.64	9.25	9.25	good
OL-VC-30130	VC	B2	359	7300	3326	-0.1	-0.8	-0.8	0.32	9.25	9.25	good
OL-VC-30131	VC	SMU3	359	4245	4400	-4.7	-3.7	-4.7	0.48	9.25	9.25	good
OL-VC-30132	VC	B2	359	2807	2813	-3.2	-2.3	-3.2	0.74	9.25	9.25	good
OL-VC-30133	VC	B1/C1	359	21000	11000	-0.1	-0.1	-0.1	0.07	9.25	9.25	good

Table VII-1

Summary of Upwelling Velocity and Associated Data

Location ID	Type[1]	Remediat-ion Area	Boundary Concentrations (mg/L)[2]			Upwelling Velocity (cm/yr)			90% Confidence Interval(+/-) (cm/year)	Depth[3] (feet)	Reported Depth[4] (feet)	Comments
			Upper	Lower 10' Analysis	Lower 5' Analysis	10' Analysis	5' Analysis	Upwelling Velocity				
OL-VC-30176	VC	C2	1200	11676	5320	-0.2	-3.9	**-3.9**	1.86	9.25	9.25	fair
OL-VC-30177	VC	C2	2000	55000	26700	~0	-1.5	-1.5	0.32	9.25	9.25	good
OL-VC-30178	VC	C2	1000	20000	5366	~0	-0.8	**-0.8**	0.39	9.25	9.25	good
OL-VC-30179	VC	C2	2000	70217	38000	-1.1	-3.8	-3.8	0.43	9.25	9.25	good
OL-VC-30180	VC	C2	359	41111	19500	-0.3	-1.8	-1.8	0.22	9.25	9.25	good
OL-STA-40055	VC	SMU4	359	65400	61140	-10.8	-10.6	-10.8	1.43	9.5	9.5	good
OL-STA-40056	VC	A1	359	16500	9145	-0.6	-1.4	**-1.4**	0.18	9.5	9.5	good
OL-STA-40057	VC	A1	359	2520	2124	-3.9	-6.0	**6.2**	2.25	8.5	8.5	10-foot anlysis fair, 5-foot analysis poor, used 10' analysis, adusted based on confidence interval, best-fit value is 3.9 cm/yr
OL-GP-40074	GP	SMU4	3124	79200	79200	<-37.5	<-37.5	<-37	11.29	11.05	11.65	fair
OL-GP-40074A	GP	SMU4	6717	52000	52000	<-37.5	<-37.5	<-37	10.93	15.75	16.75	poor
OL-GP-40075	GP	SMU4	3539	38000	35050	<-37.5	-29.6	-29.6	3.09	17.2	17.8	5-foot analysis fair, 10-foot analysis poor
OL-GP-40076	GP	SMU4	2071	33000	29800	-33.0	-33.5	-33.5	6.11	15.75	16.75	poor
OL-GP-40076A	GP	SMU4	4329	79200	79200	<-37.5	<-37.5	NA	3.21	15.2	16.75	poor
OL-GP-40077	GP	A1	2400	40000	40000	<-37.5	<-37.5	<-37	16.81	10.8	10.8	high upwelling velocity
OL-GP-40078	GP	A1	1700	42000	41332	<-37.5	<-37.5	<-37	16.57	10.85	11.55	high upwelling velocity
OL-GP-40079	GP	A1	359	41000	40812	<-37.5	<-37.5	<-37	17.09	10.05	10.05	high upwelling velocity
OL-GP-40079A	GP	A1	3633	42000	42000	<-37.5	<-37.5	<-37	13.41	10.2	11.55	high upwelling velocity
OL-GP-40080	GP	SUM4	1572	50000	42800	-5.3	-6.3	-6.3	0.41	9.4	10.25	fair
OL-GP-40081	GP	SUM4	2885	43000	41700	-7.6	-7.5	-7.5	0.41	14.65	15.4	good
OL-GP-40082	GP	SUM4	1587	45000	40600	-6.5	-8.0	-8.0	0.36	16.05	16.75	good
OL-VC-40083	VC	SUM4	359	66500	55600	-9.1	-20.2	<-20	8.89	7.75	7.75	poor, minimum estimate of velocity
OL-VC-40084	VC	SMU4	359	51000	44378	-30.6	<-37.5	<-37	22.73	7.75	7.75	poor
OL-VC-40085	VC	SMU4	359	61500	59300	-8.1	-7.2	-8.1	1.11	7.75	7.75	good
OL-VC-40087	VC	A1	359	46000	46000	<-37.5	<-37.5	<-37	13.70	7.75	7.75	fair
OL-VC-40088	VC	A1	359	46000	45200	<-37.5	<-37.5	<-37	10.69	7.75	7.75	fair
OL-VC-40089	VC	A1	359	47100	47100	<-37.5	<-37.5	<-37	11.98	7.75	7.75	fair
OL-VC-40091	VC	SMU4	359	55000	52870	-9.5	-10.3	-10.3	2.11	7.75	7.75	good
OL-VC-40092	VC	SMU4	359	57500	54200	-6.9	-6.8	-6.9	1.49	7.75	7.75	good
OL-VC-40093	VC	SMU4	359	54600	51378	-16.0	-14.5	-16.0	5.26	7.75	7.75	good

Table VII-1

Summary of Upwelling Velocity and Associated Data

Location ID	Type[1]	Remediat-ion Area	Boundary Concentrations (mg/L)[2]			Upwelling Velocity (cm/yr)			90% Confidence Interval(+/-) (cm/year)	Depth[3] (feet)	Reported Depth[4] (feet)	Comments
			Upper	Lower 10' Analysis	Lower 5' Analysis	10' Analysis	5' Analysis	Upwelling Velocity				
OL-GP-40107	GP	A1	477	3600	2750	-1.4	-1.4	-1.4	0.01	15.9	16.75	good
OL-GP-40108	GP	A1	1129	6200	3343	~0	-1.4	-1.4	0.02	16.05	16.75	good
OL-GP-40109	GP	A1	1155	70000	38000	-0.6	-0.6	**-0.6**	0.01	15.75	16.75	fair
OL-GP-40110	GP	A1	10703	200000	191000	-3.5	-2.8	NA	0.74	10.55	11.8	poor
OL-GP-40110A	GP	A1	2499	84000	80000	-8.6	-8.7	**-8.7**	0.55	15	16.75	fair to good
OL-GP-40114	GP	SMU4	1108	62000	56950	-10.1	-10.6	-10.6	0.51	15.3	16.75	good
OL-GP-40115	GP	SMU4	1508	67000	63000	-8.3	-7.8	-8.3	0.44	16	16.75	good
OL-GP-40116	GP	SMU4	1514	70000	65000	-6.8	-6.7	-6.8	0.39	15.6	16.5	good
OL-GP-40117	GP	SMU4	1102	46000	46000	-11.1	-7.5	-11.1	0.66	12.05	13.25	fair
OL-GP-40118	GP	SMU4	1455	46000	45000	-5.7	-4.8	-5.7	0.43	11.5	12.2	good
OL-GP-40119	GP	SMU4	1974	47500	43800	-8.3	-8.2	-8.3	0.80	10.4	11.2	good
OL-GP-40123	GP	SMU4	72	74386	74386		NA	NA	-	2.1	3.2	no trend in data
OL-VC-40126	VC	SMU4	359	57800	54000	-12.8	-12.0	-12.8	2.78	7.75	7.75	good
OL-VC-40127	VC	SMU4	359	60000	56700	-19.6	-16.4	-19.6	5.94	7.75	7.75	poor
OL-VC-40128	VC	SMU4	359	60300	60000	-17.0	-11.7	-17.0	1.65	7.75	7.75	good
OL-VC-40129	VC	SMU4	359	78000	71500	-23.6	-22.2	-23.6	8.07	7.75	7.75	fair to poor
OL-VC-40130	VC	SMU4	359	76000	76000	-17.9	-11.9	-17.9	6.14	7.75	7.75	poor
OL-VC-40131	VC	SMU4	359	76300	72400	-27.4	-22.4	<-27	12.80	7.75	7.75	poor, minimum estimate of velocity
OL-GP-40143	GP	SMU4	4583	79200	70000	<-37.5	<-37.5	<-37	7.76	15.55	16.75	fair
OL-GP-40144	GP	SMU4	1000	100000	100000	<-37.5	<-37.5	<-37	21.18	14.75	16.75	poor
OL-GP-40145	GP	SMU4	5020	100000	100000	<-37.5	<-37.5	NA	13.91	14.95	16.75	off scale at 0.4 feet
OL-GP-40148	GP	A1	1288	15000	7500	-0.7	-1.5	**-1.5**	0.15	11.05	12	fair
OL-GP-40149	GP	A1	1180	14000	6500	~0	~0	0.0	0.03	10.9	12.3	good
OL-VC-40149	VC	A1	359	11400	11400		-1.5	**-3.1**	1.64	5.1	6.25	fair, adjusted based on confidence interval, best-fit value is 1.5 cm/yr
OL-GP-40150	GP	A1	1072	11259	4674	~0	-0.3	**-0.3**	0.03	10.85	11.95	good
OL-GP-40151	GP	A1	1107	6500	3779	~0	-2.0	-2.0	0.07	10.6	12	good
OL-VC-40151	VC	A1	359	5560	2680	-0.3	-3.4	**-3.4**	0.70	9.25	9.25	fair
OL-GP-40152	GP	A1	1108	6000	3488	~0	~0	**0.0**	0.02	10.25	11.6	good
OL-GP-40153	GP	A1	1153	10000	4893	~0	~0	**0.0**	0.02	11.15	11.9	good
OL-GP-40154	GP	A1	1239	12000	6800	-0.2	~0	-0.2	0.02	10.25	11.85	good
OL-VC-40154	VC	A1	359	18000	7270	~0	~0	**0.0**	0.16	9.25	9.25	good

Table VII-1

Summary of Upwelling Velocity and Associated Data

Location ID	Type[1]	Remediat-ion Area	Boundary Concentrations (mg/L)[2]			Upwelling Velocity (cm/yr)			90% Confidence Interval(+/-) (cm/year)	Depth[3] (feet)	Reported Depth[4] (feet)	Comments
			Upper	Lower 10' Analysis	Lower 5' Analysis	10' Analysis	5' Analysis	Upwelling Velocity				
OL-GP-40155	GP	A1	1267	18875	10000	~0	-0.3	**-0.3**	0.01	10.8	12.05	good
OL-GP-40156	GP	A1	2676	73000	55000	-1.8	-1.6	**-1.8**	0.10	10.75	11.75	good
OL-GP-40157	GP	A1	1285	14000	7140	~0	~0	0.0	0.03	10.55	11.75	good
OL-VC-40157	VC	A1	359	16000	7000	-0.2	-1.7	**-1.7**	0.34	9.25	9.25	good
OL-GP-40158	GP	A1	1213	7163	3800	~0	-2.2	**-2.2**	0.12	10.1	12	good
OL-GP-40159	GP	A2	1192	4773	3500	-1.1	-3.0	**-3.0**	0.23	10.4	12.05	fair
OL-GP-40160	GP	A2	881	3625	3474	-6.0	-5.8	**-6.0**	0.57	10.25	11.9	good
OL-GP-40161	GP	A1	986	3900	3512	-1.7	-1.2	**-1.7**	0.07	10.05	12.05	good
OL-GP-40162	GP	A1	1185	6000	3420	~0	-1.0	**-1.0**	0.06	9.9	12	good
OL-GP-40163	GP	A1	1432	6113	5700	-5.4	-5.4	**-5.4**	0.23	10.55	11.85	fair
OL-GP-40163-A	GP	A1	1449	6500	6000	-5.4	-5.4	-5.4	0.25	10.5	11.7	fair
OL-GP-40164.DAT	GP	A1	957	19799	11350	-0.3	-0.9	**-0.9**	0.03	9.95	10.3	good
OL-GP-40165.DAT	GP	SMU4	1034	78194	49500	-0.4	-0.5	-0.5	0.03	10.25	11.55	fair
OL-VC-40165	VC	SMU4	359	41000	31030	-2.1	-2.6	-2.6	0.30	9.25	9.25	good
OL-GP-40166	GP	A1	1065	9000	4835	~0	-1.3	**-1.3**	0.04	10.75	12.1	good
OL-GP-40167.DAT	GP	A2	1015	6000	5400	-2.3	-1.5	**-2.3**	0.06	10.7	11.3	fair
OL-GP-40168.DAT	GP	A2	1196	5000	5000	-7.2	-5.7	-7.2	0.25	8.95	10.95	good
OL-VC-40168	VC	A2	359	4380	4327		-7.5	**-7.5**	1.38	5.2	5.2	good
OL-GP-40169.DAT	GP	A2	786	4200	3770	-2.6	-1.7	**-2.6**	0.08	10.15	11.75	good
OL-GP-40170.DAT	GP	A1	1003	4400	3735	-1.0	~0	**-1.0**	0.02	9.9	11.8	fair
OL-GP-40171.DAT	GP	A1	1116	5445	3600	-0.2	-0.2	**-0.2**	0.02	11.05	11.8	good
OL-GP-40172.DAT	GP	A1	572	7100	3460	~0	~0	0.0	0.05	9.35	11	good
OL-VC-40172	VC	A1	359	15000	7233	-0.2	-1.3	**-1.3**	0.45	7.75	7.75	good
OL-GP-40173.DAT	GP	SMU4	759	27000	17431	-0.8	-0.7	-0.8	0.03	8.75	10.35	good
OL-GP-40174.DAT	GP	A2	1362	30461	15150	~0	-0.2	**-0.2**	0.02	11	11.75	good
OL-GP-40175.DAT	GP	A2	1074	6585	5370	-2.3	-2.2	**-2.3**	0.11	10.15	11.75	good
OL-GP-40176.DAT	GP	A2	1018	7200	6000	-2.3	-2.3	**-2.3**	0.57	9.7	11.7	fair based on upper 2 feet
OL-GP-40177.DAT	GP	A2	1108	3850	3590	-5.0	-5.5	**-5.5**	0.29	9.3	11	good
OL-GP-40178.DAT	GP	A1	1231	6200	4393	~0	~0	**0.0**	0.11	7.7	11.6	good
OL-GP-40179.DAT	GP	A1	1264	17782	8531	~0	~0	0.0	0.02	10.75	12.05	good
OL-VC-40179	VC	A1	359	27000	13484	-0.3	-1.3	**-1.3**	0.37	7.75	7.75	good
OL-GP-40180.DAT	GP	SMU4	2173	68000	66500	-3.6	-2.2	-3.6	0.10	10.3	11.8	good
OL-GP-40181.DAT	GP	SMU4	21702	72000	70000	-5.3	-5.1	-5.3	0.55	9.5	11.5	good

Table VII-1

Summary of Upwelling Velocity and Associated Data

Location ID	Type[1]	Remediat-ion Area	Boundary Concentrations (mg/L)[2]			Upwelling Velocity (cm/yr)			90% Confidence Interval(+/-) (cm/year)	Depth[3] (feet)	Reported Depth[4] (feet)	Comments
			Upper	Lower 10' Analysis	Lower 5' Analysis	10' Analysis	5' Analysis	Upwelling Velocity				
OL-GP-40182.DAT	GP	A2	2036	60000	47000	-9.8	-11.3	-11.3	2.67	9.05	11.1	poor
OL-GP-40183	GP	A2	6962	120000	120000	-5.3	-4.5	**-5.3**	0.75	10.85	12.05	poor
OL-GP-40183.DAT	GP	A2	1619	130000	120000	-2.3	-1.9	-2.3	0.22	10.1	11.5	poor
OL-GP-40184	GP	A1	5276	120000	120000	-4.5	-3.0	**-4.5**	0.33	11.75	12	poor as data off scale below 1.5 feet; good fit above 1.5 feet
OL-GP-40184.DAT	GP	A1	1604	80000	74286	-2.4	-0.4	-0.4	0.06	9.5	10.6	fair
OL-VC-40184	VC	A1	359	47000	47000		NA	NA	-	5.25	5.25	not analyzable due to data scatter
OL-GP-40185	GP	A1	10701	120000	120000	-22.5	-19.5	NA	7.55	11	11.65	off scale at 0.4 feet
OL-GP-40185.DAT	GP	A1	1713	150000	150000	-7.5	-6.0	NA	1.78	9.3	10.55	off scale at 0.95 feet
OL-GP-40186	GP	SMU4	3178	120000	120000	NA	NA	NA	1.56	11.05	11.35	off scale at 1 foot
OL-GP-40186.DAT	GP	SMU4	3672	120000	120000	-3.0	-2.3	-3.0	0.30	9.9	10.85	fair
OL-GP-40187.DAT	GP	SMU4	1403	100000	100000		NA	NA	0.79	0.8	1.4	insufficient data to analyze
OL-VC-40238	VC	SMU4	359	41163	38000	-3.2	-2.5	-3.2	0.29	9.25	9.25	good
OL-VC-40239	VC	A1	359	41000	30000	-1.6	-1.5	**-1.6**	0.11	9.25	9.25	good
OL-VC-40240	VC	A2	359	17000	7600	-0.1	-1.3	**-1.3**	0.39	9.25	9.25	good
OL-VC-40241	VC	A2	359	5000	4000	-3.7	-5.0	**-5.0**	0.42	8.25	8.25	good
OL-VC-40242	VC	A2	359	17000	10000	-1.3	-3.6	**-3.6**	0.70	9.25	9.25	good
OL-VC-40243	VC	A2	359	18700	12000	-0.6	-0.1	**-0.6**	0.18	9.25	9.25	good
OL-VC-40244	VC	A1	359	60000	60000	<-35.0	<-35.0	<-35	17.19	9.25	9.25	good
OL-VC-40245	VC	A2	359	4000	3485	-5.1	-6.1	**-6.1**	0.38	9.25	9.25	good
OL-VC-40246	VC	A2	359	3400	3100	-7.5	-7.8	**-7.8**	1.31	9.25	9.25	good
OL-VC-40247	VC	A2	359	3000	2785	-4.7	-4.3	**-4.7**	0.49	9.25	9.25	good
OL-VC-40248	VC	A2	359	3250	3300	-5.0	-3.6	**-5.0**	0.99	8.25	8.25	good
OL-VC-40249	VC	A2	359	4200	4000	-4.6	-3.9	**-4.6**	1.38	8.25	8.25	good
OL-VC-40250	VC	A2	359	3600	3049	-2.7	-2.6	**-2.7**	0.90	9.25	9.25	good
OL-VC-40287	VC	A2	359	22000	11436	-0.2	-0.2	-0.2	0.23	9.25	9.25	good
OL-VC-40288	VC	A2	600	14800	6851	-0.5	-1.7	**-1.7**	0.28	9.25	9.25	good
OL-VC-40289	VC	A2	359	12500	5620	~0	~0	0.0	0.31	9.15	9.15	good
OL-VC-40289A	VC	A2	359	7125	7125	-0.9	-0.9	**-0.9**	0.31	5.25	5.25	good
OL-VC-40290	VC	A2	359	22400	12800	-0.9	-3.2	**-3.2**	1.13	9.25	9.25	fair
OL-VC-40291	VC	A2	359	27200	23621	-1.5	-1.8	**-1.8**	0.44	6.25	6.25	good
OL-VC-40292	VC	SMU4	359	2700	3907	~0	-8.8	-8.8	11.02	7.75	7.75	poor, data scatter

Table VII-1

Summary of Upwelling Velocity and Associated Data

Location ID	Type[1]	Remediat-ion Area	Boundary Concentrations (mg/L)[2]			Upwelling Velocity (cm/yr)			90% Confidence Interval(+/-) (cm/year)	Depth[3] (feet)	Reported Depth[4] (feet)	Comments
			Upper	Lower 10' Analysis	Lower 5' Analysis	10' Analysis	5' Analysis	Upwelling Velocity				
OL-VC-40293	VC	A2	359	18800	10500	~0	-3.0	**-3.0**	1.15	6.25	6.25	fair
OL-VC-40294	VC	A2	359	3030	2900	-5.1	-5.5	**-5.5**	0.51	6.25	6.25	fair
OL-VC-40295	VC	A1	359	2950	2494	-2.3	-2.0	**-2.3**	0.25	9.25	9.25	good
OL-VC-40296	VC	A2	500	2990	2174	-1.8	-3.2	**-3.2**	0.33	9.25	9.25	good
OL-VC-40296A	VC	A2	359	2900	2200	-2.0	-2.7	-2.7	0.68	9.25	9.25	good
OL-VC-40297	VC	A2	400	3150	3000	-5.8	-5.2	**-5.8**	0.78	9.25	9.25	good
OL-VC-40297A	VC	A2	400	3200	3198	-3.5	-2.1	-3.5	0.52	9.25	9.25	good
OL-VC-40298	VC	A1	359	25300	21000	-2.4	-2.4	**-2.4**	0.27	9.25	9.25	good
OL-VC-40299	VC	A1	359	23000	14108	-0.4	~0	**-0.4**	0.01	9.25	9.25	good
OL-VC-40301	VC	A1	359	7000	3422	~0	~0	**0.0**	0.11	9.15	9.15	good
OL-VC-40302	VC	A2	359	39000	35400	-14.5	-15.3	**-15.3**	4.22	9.25	9.25	fair
OL-VC-40305	VC	A1	359	78250	87214	-4.3	-2.1	-4.3	0.78	9.25	9.25	good
OL-VC-40306	VC	A1	359	23000	12000	~0	~0	**0.0**	0.1	9.25	9.25	good
OL-VC-40307	VC	A1	359	35000	30134	-1.2	~0	-1.2	0.57	9.25	9.25	fair
OL-GP-50026	GP	A1	1000	22000	11250	-0.2	-0.3	**-0.3**	0.02	11	12.05	good
OL-GP-50027	GP	A1	1283	25000	11350	~0	-0.4	**-0.4**	0.04	9.4	12.1	good
OL-GP-50028	GP	SMU5	1491	41989	32500	-1.4	-1.5	-1.5	0.05	10.6	11.8	good
OL-GP-50036	GP	E1	2240	2258	2258		NA	NA	-	1.45	1.7	insufficient data to analyze
OL-GP-50037	GP	E1	1993	34729	11800	~0	-4.6	**-4.6**	0.88	10.55	12.7	fair
OL-GP-50038	GP	E1	1833	19918	10500	-0.1	-0.4	**-0.4**	0.02	10.3	12.25	good
OL-GP-50039	GP	E1	1835	28235	14350	~0	-0.6	**-0.6**	0.02	10.8	12.9	good
OL-GP-50040	GP	E1	3000	62289	38700	-0.5	-0.2	**-0.5**	0.02	10.45	12.65	good
OL-GP-50041	GP	E1	3500	35000	20000	-0.3	-0.4	**-0.4**	0.01	11.45	14.45	good
OL-GP-50042	GP	E1	3932	38000	19260	~0	-2.5	**-2.5**	0.09	11.3	12.2	fair
OL-GP-50043	GP	SMU5	1311	34000	17436	-0.3	-0.6	-0.6	0.02	11.25	12.25	good
OL-GP-50044	GP	A1	1346	32000	20000	-0.7	-0.5	**-0.7**	0.02	10.6	12.2	good
OL-GP-50045	GP	A1	1035	28000	18000	-0.5	-1.1	**-1.1**	0.05	10.2	11.2	good
OL-GP-50046	GP	A1	1277	37000	16658	~0	-0.2	**-0.2**	0.03	9.85	10.65	good
OL-GP-50047	GP	A1	1276	28000	15000	-0.1	~0	**-0.1**	0.02	10.7	11.85	good
OL-GP-50048	GP	A1	1072	50000	27000	~0	-0.4	**-0.4**	0.07	9.65	10.65	fair to poor
OL-GP-50049	GP	A1	1731	28000	15800	-0.6	-1.7	**-1.7**	0.12	8.4	10.4	good
OL-GP-50050	GP	A1	1359	19915	11342	-0.4	-0.4	**-0.4**	0.02	11.15	11.95	good
OL-GP-50051	GP	SMU5	3689	34888	28000	-6.0	-8.3	-8.3	0.76	10.75	12.05	fair to poor

Table VII-1

Summary of Upwelling Velocity and Associated Data

Location ID	Type[1]	Remediat-ion Area	Boundary Concentrations (mg/L)[2]			Upwelling Velocity (cm/yr)			90% Confidence Interval(+/-) (cm/year)	Depth[3] (feet)	Reported Depth[4] (feet)	Comments
			Upper	Lower 10' Analysis	Lower 5' Analysis	10' Analysis	5' Analysis	Upwelling Velocity				
OL-VC-50071	VC	A1	359	27000	15940	-2.6	-13.3	**-13.3**	3.42	9.25	9.25	good
OL-VC-50087	VC	A1	359	40572	19259	~0	~0	**0.0**	0.17	9.25	9.25	good
OL-VC-50088	VC	E1	359	40000	18500	~0	~0	0.0	0.17	9.25	9.25	good
OL-VC-50088A	VC	E1	359	41500	19067	~0	-0.7	**-0.7**	0.13	9.25	9.25	good
OL-VC-50089	VC	E1	359	30886	18500	~0	~0	**0.0**	0.21	9.25	9.25	good
OL-STA-60072	VC	E1	359	46000	23000	~0	~0	**0.0**	0.24	8.5	8.5	fair
OL-STA-60078	VC	SMU6	359	28000	17500	-1.3	-4.4	-4.4	0.89	8.5	8.5	good
OL-STA-60081	VC	E1	359	44400	15300	~0	~0	**0.0**	0.25	9.5	9.5	fair
OL-STA-60087	VC	E1	359	20500	13500	-1.1	-2.0	**-2.0**	0.15	9.5	9.5	good
OL-STA-60090	VC	E1	359	3800	2200	-0.2	-0.3	**-0.3**	0.08	8.5	8.5	good
OL-STA-60096	VC	E1	359	10000	4500	-0.3	-0.7	**-0.7**	0.13	7.5	7.5	good
OL-GP-60119	GP	E1	1647	19000	9500	~0	~0	**0.0**	0.03	10.45	12.05	good
OL-GP-60120	GP	E1	1461	20000	10017	~0	-0.5	**-0.5**	0.02	10.25	12.1	good
OL-GP-60121	GP	E1	1004	36000	18500	-0.2	~0	**-0.2**	0.02	9.6	11	good
OL-GP-60122	GP	E1	1515	13000	6988	~0	-0.6	**-0.6**	0.02	10.65	11.55	good
OL-GP-60123	GP	E1	1322	15000	7200	~0	-0.9	**-0.9**	0.03	10.35	12.05	good
OL-GP-60124	GP	E1	986	15000	9989	-0.8	-1.1	**-1.1**	0.05	10.35	11.35	good
OL-GP-60125	GP	E1	2000	28000	18500	-0.6	-0.3	-0.6	0.06	8.45	11.45	good
OL-GP-60125.DAT	GP	E1	1683	7000	5221	-0.8	-0.8	-0.8	0.06	9.05	10.05	good
OL-GP-60125-A	GP	E1	2497	8000	6400	-0.9	-0.4	-0.9	0.03	9.6	11.5	good to fair to 7 feet
OL-VC-60125	VC	E1	359	12000	4700	~0	-0.8	**-0.8**	0.34	9.25	9.25	good
OL-GP-60126	GP	E1	1440	6200	5570	-1.6	-0.8	**-1.6**	0.05	10.8	11.8	good
OL-GP-60127	GP	E1	1704	10000	5100	~0	-1.0	-1.0	0.05	10.65	12.05	fair
OL-VC-60127	VC	E1	359	12500	5895	-0.1	-1.7	**-1.7**	0.47	7.75	7.75	fair, first data points offset
OL-GP-60128	GP	E1	921	11000	6400	-0.2	~0	**-0.2**	0.02	9.95	11.4	good
OL-GP-60129	GP	E1	924	40000	13124	~0	~0	0.0	0.01	11.55	12.05	fair
OL-VC-60129	VC	E1	359	39000	25000	-0.3	~0	**-0.6**	0.30	9.05	9.05	fair, adjusted based on confidence interval, best-fit value is 0.3 cm/yr
OL-GP-60130	GP	E3	2500	26000	12400	~0	-1.5	**-1.5**	0.10	10	11.1	good
OL-GP-60130.DAT	GP	E3	1515	6000	4250	-0.3	-0.3	-0.3	0.03	11.3	12.3	good
OL-GP-60130-A	GP	E3	1569	7500	5000	-0.2	-0.5	-0.5	0.05	9.25	11.65	good
OL-GP-60131	GP	E3	2200	11629	6430	-0.5	-1.9	**-1.9**	0.08	11.45	11.95	fair to poor
OL-GP-60132	GP	E3	1045	5410	4135	-1.5	-2.4	**-2.4**	0.15	9.25	10.2	good

Table VII-1

Summary of Upwelling Velocity and Associated Data

Location ID	Type[1]	Remediat-ion Area	Boundary Concentrations (mg/L)[2]			Upwelling Velocity (cm/yr)			90% Confidence Interval(+/-) (cm/year)	Depth[3] (feet)	Reported Depth[4] (feet)	Comments
			Upper	Lower 10' Analysis	Lower 5' Analysis	10' Analysis	5' Analysis	Upwelling Velocity				
OL-GP-60133	GP	E3	962	5600	3500	-0.4	-1.0	**-1.0**	0.06	9.45	10.4	good
OL-GP-60134	GP	E3	1173	24520	16000	-0.4	~0	**-0.4**	0.04	9.45	10.45	good
OL-GP-60135	GP	E3	1280	42000	30158	-0.8	~0	**-0.8**	0.02	10.2	11	fair
OL-GP-60136	GP	E3	2000	16000	11021	-1.3	-1.8	-1.8	0.10	8.6	9.45	fair to good
OL-GP-60136.DAT	GP	E3	1748	4700	3900	-2.1	-2.1	-2.1	0.27	9	11	poor
OL-GP-60136-A	GP	E3	1559	7700	4303	~0	-2.0	**-2.0**	0.07	9.05	11.55	good
OL-GP-60136-B	GP	E3	2120	7700	4550	~0	-1.1	-1.1	0.10	8.8	11.9	good
OL-GP-60137	GP	E3	1640	8000	5900	-1.1	-1.4	**-1.4**	0.08	11.05	11.9	good
OL-GP-60138	GP	E3	919	5700	4597	-2.1	~0	-2.1	0.10	8.7	10.45	poor
OL-GP-60139	GP	E3	907	9700	4941	-0.2	-0.9	**-0.9**	0.10	9.55	10.5	fair
OL-GP-60140	GP	E3	1031	16000	11899	-0.7	-0.2	**-0.7**	0.04	9.7	10.9	fair
OL-GP-60141	GP	E3	1579	28000	14200	-0.3	-1.8	**-1.8**	0.27	10.15	10.85	fair to poor
OL-GP-60142	GP	E3	3360	21000	12000	~0	-1.3	-1.3	0.05	9.9	11.95	good
OL-GP-60142.DAT	GP	E3	1546	6900	4020	~0	-0.7	-0.7	0.08	8.5	9.9	good
OL-GP-60142-A	GP	E3	2000	8100	4600	~0	-1.4	-1.4	0.05	9.5	11.9	good
OL-GP-60143	GP	E3	2300	18000	11800	-1.4	-2.5	**-2.5**	0.12	10.05	11.9	good
OL-GP-60143.DAT	GP	E3	2000	8300	5278	~0	-0.4	-0.4	0.08	9.1	11.75	poor
OL-GP-60143-A	GP	E3	1800	9000	5050	-0.7	-2.5	-2.5	0.08	9.4	12.1	good
OL-GP-60144	GP	E3	1362	6800	4550	-0.4	-1.8	**-1.8**	0.09	11.25	12.25	good
OL-GP-60145	GP	E3	904	4000	3350	-2.2	-2.6	**-2.6**	0.18	8.55	8.95	good
OL-GP-60146	GP	E3	1060	12106	8400	-0.5	~0	**-0.5**	0.02	10.05	11.3	good
OL-GP-60147	GP	E3	690	15000	8000		~0	0.0	0.23	2.75	3.8	poor
OL-GP-60148	GP	E1	821	13854	8600	-1.1	-2.2	**-2.2**	0.22	10.05	10.85	fair
OL-GP-60149	GP	E3	3500	20000	12000	-1.1	-2.2	**-2.2**	0.12	9.2	11.8	good
OL-GP-60149.DAT	GP	E3	1524	5840	4278	-0.8	-2.2	-2.2	0.09	11.45	13.1	good
OL-GP-60149-A	GP	E3	2000	8000	4670	-0.7	-2.1	-2.1	0.10	9.55	11.9	good
OL-GP-60150	GP	E3	3000	25000	14600	-0.7	-2.4	-2.4	0.13	9.85	11.4	good to fair
OL-GP-60150.DAT	GP	E3	1693	7500	4525	-0.8	-1.9	-1.9	0.07	11.1	11.9	good to fair
OL-GP-60150-A	GP	E3	1550	7000	5100	-1.4	-2.1	-2.1	0.07	9.45	11.5	good
OL-VC-60150	VC	E3	359	9000	4300	~0	~0	**0.0**	0.10	9.25	9.25	good
OL-GP-60151	GP	E3	1520	5500	4400	-0.7	-0.8	**-0.8**	0.08	9.4	12.1	fair to good
OL-GP-60152	GP	E3	910	4920	3475	-0.9	-1.9	-1.9	0.09	9.65	10.7	good
OL-VC-60152	VC	E3	359	5000	3104	-0.9	-2.1	**-2.1**	0.47	7.75	7.75	good

Table VII-1

Summary of Upwelling Velocity and Associated Data

Location ID	Type[1]	Remediat-ion Area	Boundary Concentrations (mg/L)[2]			Upwelling Velocity (cm/yr)			90% Confidence Interval(+/-) (cm/year)	Depth[3] (feet)	Reported Depth[4] (feet)	Comments
			Upper	Lower 10' Analysis	Lower 5' Analysis	10' Analysis	5' Analysis	Upwelling Velocity				
OL-GP-60153	GP	E1	1070	1949	1949		NA	NA	-	1.05	2.3	insufficient data to analyze
OL-GP-60154	GP	E1	677	13350	8856	-0.4	-0.2	-0.4	0.04	11.05	11.15	fair
OL-VC-60154	VC	E1	359	15070	11068	-1.1	-0.9	**-1.1**	0.10	9.25	9.25	good
OL-GP-60155	GP	E1	982	7736	7000		-16.8	**-16.8**	3.55	5.05	5.55	fair to poor
OL-GP-60156	GP	E3	3049	18000	13000	-1.6	-3.4	-3.4	0.09	11.35	11.35	good
OL-GP-60156-A	GP	E3	1824	5700	4780	-2.8	-4.0	**-4.0**	0.20	7.15	14.7	good
OL-GP-60157	GP	E3	2673	7000	4300	~0	~0	**0.0**	0.11	11.45	11.85	fair at 10' analysis
OL-GP-60158	GP	E3	1300	5300	4100	-1.8	-2.5	**-2.5**	0.15	9.85	12.15	good
OL-GP-60159	GP	E3	1070	8872	4955	~0	-0.6	**-0.6**	0.05	9.45	10.75	good to fair
OL-GP-60160	GP	E1	617	2750	2750		-3.6	-3.6	0.96	2.6	3.85	poor
OL-GP-60161	GP	E3	4200	18000	11900	-1.4	-2.5	-2.5	0.09	11	11.55	good to fair
OL-GP-60161.DAT	GP	E3	1969	5000	3950	-1.2	-1.9	-1.9	0.05	10.55	12.25	good
OL-GP-60161-A	GP	E3	1700	5800	4500	-1.7	-3.1	**-3.1**	0.13	10.4	11.85	good
OL-GP-60162	GP	E3	3800	18000	12200	-1.1	-2.1	-2.1	0.07	11.35	12.1	good
OL-GP-60162.DAT	GP	E3	1656	5000	4000	-2.5	-3.8	-3.8	0.13	11.2	12.1	good to fair
OL-GP-60162-A	GP	E3	1645	5400	4750	-2.5	-2.6	-2.6	0.16	7.55	11.55	good
OL-VC-60162	VC	E3	359	7750	4912	~0	~0	**0.0**	0.23	9.1	9.1	fair
OL-GP-60163	GP	E3	2200	14000	10000	-2.5	-4.3	**-4.3**	0.22	9.65	11.85	good
OL-GP-60163-A	GP	E3	1400	4500	4120	-3.3	-3.3	-3.3	0.20	7.8	11.55	good
OL-GP-60164	GP	E3	1786	12500	8300	-1.2	-1.8	**-1.8**	0.21	7.7	11.3	fair
OL-GP-60165	GP	E1	783	11000	6600	-0.5	-0.3	**-0.5**	0.02	8.9	10.5	good
OL-GP-60166	GP	E1	742	13324	7400	-0.2	~0	**-0.2**	0.04	9.9	10.65	good
OL-GP-60167	GP	E3	3300	20000	13500	-0.8	-1.9	-1.9	0.05	11.85	11.85	good
OL-GP-60167.DAT	GP	E3	2073	6000	4470	-1.4	-2.1	**-2.1**	0.06	10.75	12.45	good
OL-GP-60167-A	GP	E3	1700	7000	5400	-1.3	-1.9	-1.9	0.10	9.4	11.3	good
OL-GP-60168	GP	E3	2700	20000	12000	-0.1	-3.2	-3.2	0.12	11.25	11.85	good
OL-GP-60168.DAT	GP	E3	1990	5800	4000	-0.5	-3.5	-3.5	0.12	10.6	12	good
OL-GP-60168-A	GP	E3	1800	6000	4680	-2.8	-3.5	-3.5	0.18	9.8	12	good to 5 feet
OL-VC-60168	VC	E3	359	7040	3016	~0	~0	**0.0**	0.23	9.1	9.1	good
OL-GP-60169	GP	E3	1833	5750	4200	-0.8	-2.3	**-2.3**	0.13	9	12	fair
OL-GP-60170	GP	E3	1330	5000	4000	-1.6	-2.2	-2.2	0.07	10.65	11.8	good
OL-GP-60170-200	GP	E3	2200	15000	10600	-1.4	-1.8	-1.8	0.06	10.35	11.8	good to 5 feet
OL-GP-60170-400	GP	E3	4900	16000	13850	-2.6	-2.8	**-2.8**	0.09	10.4	12.1	good

Table VII-1

Summary of Upwelling Velocity and Associated Data

Location ID	Type[1]	Remediation Area	Boundary Concentrations (mg/L)[2]			Upwelling Velocity (cm/yr)			90% Confidence Interval(+/-) (cm/year)	Depth[3] (feet)	Reported Depth[4] (feet)	Comments
			Upper	Lower 10' Analysis	Lower 5' Analysis	10' Analysis	5' Analysis	Upwelling Velocity				
OL-GP-60171	GP	E3	829	12000	5933	~0	-0.8	-0.8	0.04	9	10.75	good
OL-VC-60171	VC	E3	359	9600	5153	~0	~0	**0.0**	0.18	9.25	9.25	good
OL-GP-60172	GP	E1	1200	12000	6350	-0.2	-0.2	**-0.2**	0.02	9.2	13.3	good
OL-GP-60173	GP	E1	961	11000	5150	~0	-0.2	**-0.2**	0.04	9.45	10.65	good to five feet
OL-GP-60174	GP	E3	1784	6155	4125	-0.5	-3.7	**-3.7**	0.15	11.5	11.95	good
OL-GP-60175	GP	E3	1600	5000	4300	-1.7	-1.8	**-1.8**	0.11	10.1	11.7	good
OL-GP-60176	GP	E3	1007	5380	4220	-1.4	-1.4	**-1.4**	0.06	10	11	good
OL-GP-60177	GP	E3	704	16000	8500	-0.2	-0.2	**-0.2**	0.04	9.2	10.55	good
OL-GP-60178	GP	E1	928	23981	12830	-0.3	-2.0	**-2.0**	0.06	10.6	11.75	good
OL-GP-60179	GP	E1	480	18000	8000	~0	-0.6	-0.6	0.24	9.6	10.7	good
OL-VC-60179	VC	E1	359	23000	11000	-0.2	~0	**-0.8**	0.60	6.25	6.25	fair, adjusted based on confidence interval, best-fit value is 0.2 cm/yr
OL-GP-60180	GP	E3	1125	4150	3600	-2.0	-2.0	**-2.0**	0.06	9.75	10.2	good
OL-GP-60181	GP	E3	1181	13098	6000	~0	-0.2	-0.2	0.03	10.35	11.05	good
OL-VC-60181	VC	E3	359	8670	4910	~0	~0	**0.0**	0.04	9.25	9.25	good
OL-GP-60182	GP	E3	683	22000	12300	-0.2	-0.2	**-0.2**	0.05	8.7	10.55	good
OL-GP-60183	GP	E1	874	26249	18500	-1.1	-1.1	-1.1	0.06	9.9	10.75	good
OL-GP-60184	GP	E1	1404	60000	42000	-1.5	-1.6	**-1.6**	0.07	10.8	11.15	good to five feet
OL-GP-60185	GP	E3	866	18250	9553	-0.5	-1.5	**-1.5**	0.21	9.1	10.7	fair
OL-GP-60186	GP	E1	783	23500	15300	-0.7	-1.2	**-1.2**	0.11	9.5	10.65	fair
OL-GP-60187	GP	E1	1016	35555	27400	-1.4	-1.4	**-1.4**	0.07	10	10.9	fair
OL-GP-60188	GP	E1	738	45000	18000	NA	NA	NA	-	9.85	10.6	profile not analyzable
OL-GP-60189	GP	E1	1176	21000	14000	-0.5	~0	**-0.5**	0.04	8.85	10.5	fair
OL-GP-60190	GP	E1	631	14000	8800	-0.4	~0	**-0.4**	0.05	8.6	10.35	fair to 5 feet
OL-GP-60191	GP	E1	1227	60000	35700	-1.2	-2.1	-2.1	0.16	9.75	10.85	fair
OL-VC-60191	VC	E1	359	37500	35568	-2.7	-1.8	**-2.7**	0.84	7.75	7.75	fair
OL-GP-60192	GP	E1	2783	60000	42000	-1.0	-1.1	**-1.1**	0.04	10.7	11.8	good
OL-GP-60193	GP	E3	2000	5800	4220	-1.4	-2.2	**-2.2**	0.08	11.05	12.05	good
OL-GP-60194	GP	E3	1088	3400	3300	-3.1	-2.5	**-3.1**	0.30	8.55	9.55	5-foot analysis good, 10-foot analysis poor
OL-VC-60274	VC	E1	359	40924	21219	~0	~0	**0.0**	0.29	9.25	9.25	good
OL-VC-60275	VC	E1	359	40000	3600	~0	-0.1	**-0.3**	0.2	9.3	9.3	fair to poor, adjusted based on confidence interval, best-fit value is 0.1 cm/yr

Table VII-1

Summary of Upwelling Velocity and Associated Data

Location ID	Type[1]	Remediat-ion Area	Boundary Concentrations (mg/L)[2]			Upwelling Velocity (cm/yr)			90% Confidence Interval(+/-) (cm/year)	Depth[3] (feet)	Reported Depth[4] (feet)	Comments
			Upper	Lower 10' Analysis	Lower 5' Analysis	10' Analysis	5' Analysis	Upwelling Velocity				
OL-VC-60276	VC	E1	359	33275	18331	-0.5	-1.8	**-1.8**	0.9	9.25	9.25	fair
OL-VC-60277	VC	E1	359	15000	400	~0	NA	NA		9.25	9.25	poor
OL-VC-60278	VC	E1	359	40000	6760	~0	~0	0.0	0.56	9.25	9.25	poor
OL-VC-60278A	VC	E1	359	40000	15000	~0	~0	0.0	0.83	9.25	9.25	poor
OL-VC-60279	VC	E1	359	25200	620	~0	NA	NA	2000	9.25	9.25	poor
OL-VC-60281	VC	E1	359	3790	3169	NA	NA	NA	14.99	4.24	4.24	poor
OL-VC-60281A	VC	E1	359	2300	1700	-0.5	-0.2	**-0.5**	0.24	9.25	9.25	fair
OL-VC-60282	VC	E1	359	19900	23113	~0	-0.6	**-0.6**	0.29	5.25	5.25	fair to poor
OL-VC-60283	VC	E1	359	19600	16000	~0	~0	0.0	1.8	6.25	6.25	poor
OL-VC-60284	VC	E1	359	18900	8260	~0	-3.4	**-3.4**	0.49	9.25	9.25	good
OL-VC-60285	VC	E3	359	20200	9600	~0	-2.1	**-2.1**	0.63	7.75	7.75	good
OL-VC-60286	VC	E3	359	37100	33000	~0	~0	**0.0**	0.35	7.75	7.75	fair
OL-VC-60287	VC	E3	359	29900	22171	~0	~0	**0.0**	0.77	6.25	6.25	good
OL-VC-60288	VC	E1	359	48000	21216	~0	~0	**0.0**	0.08	9.25	9.25	good
OL-VC-60289	VC	SMU6	359	33400	20000	~0	~0	0.0	0.35	6.2	6.2	poor
OL-VC-60290	VC	E1	359	13000	2840	~0	-0.6	-0.6	0.15	9.25	9.25	good
OL-VC-60290A	VC	E1	359	16000	3470	~0	-1.3	**-1.3**	0.62	9.25	9.25	good
OL-VC-60291	VC	E1	359	22000	18172	-1.8	-2.1	**-2.1**	0.19	7.75	7.75	fair
OL-VC-60292	VC	E1	359	18250	15250	-2.2	-2.3	**-2.3**	0.35	9.2	9.2	fair
OL-VC-60293	VC	E1	359	12000	7118	-0.3	~0	**-0.3**	0.15	9.25	9.25	good
OL-VC-60294	VC	E1	359	11483	7263	-1.0	-2.7	**-2.7**	0.25	9.25	9.25	good
OL-VC-60294A	VC	E1	359	15000	8839	~0	~0	0.0	0.18	9.25	9.25	fair
OL-VC-60295	VC	E1	359	13500	6640	NA	NA	NA		6.25	6.25	poor
OL-VC-60296	VC	E3	359	16685	12199	-0.8	~0	**-0.8**	0.24	9.25	9.25	fair
OL-VC-60297	VC	E1	359	39307	22700	-0.4	-0.5	**-0.5**	0.07	9.25	9.25	good
OL-VC-60302	VC	E1	359	47200	41250	-3.8	-4.3	**-4.3**	0.53	9.25	9.25	good
OL-VC-60303	VC	E1	359	17700	11111	-1.3	-3.3	**-3.3**	0.58	9.25	9.25	good
OL-VC-60304	VC	E1	359	22250	17668	-2.1	-2.8	**-2.8**	0.1	9.25	9.25	good
OL-STA-70040	VC	E1	359	50000	46500	-5.4	-5.5	-5.5	1.27	7.5	7.5	good
OL-STA-70042	VC	E2	359	4400	2142	~0	~0	**0.0**	0.14	8.5	8.5	good

Table VII-1

Summary of Upwelling Velocity and Associated Data

Location ID	Type[1]	Remediat-ion Area	Boundary Concentrations (mg/L)[2]			Upwelling Velocity (cm/yr)			90% Confidence Interval(+/-) (cm/year)	Depth[3] (feet)	Reported Depth[4] (feet)	Comments
			Upper	Lower 10' Analysis	Lower 5' Analysis	10' Analysis	5' Analysis	Upwelling Velocity				
OL-STA-70043	VC	E2	359	4300	2383	-0.2	-0.6	**-1.1**	0.49	8.5	8.5	good, adjusted based on confidence interval, best-fit value is 0.6 cm/yr
OL-GP-70051	GP	E2	2305	28000	28000		-7.0	-7.0	2.25	3.35	4.35	poor
OL-GP-70051A	GP	E2	1200	33500	32000	-4.9	-4.9	-4.9	0.69	15.75	16.75	poor
OL-GP-70052	GP	E2	2316	74194	35600	~0	-7.0	-7.0	1.70	14.7	15.3	poor
OL-GP-70053	GP	E2	1357	60000	24100	~0	-9.8	-9.8	1.74	15.95	16.75	poor
OL-GP-70053-1	GP	E2	1537	17000	17000		-6.3	-6.3	1.69	3.6	4.7	poor
OL-GP-70053-2	GP	E2	359	9323	9323		NA	NA	-	3.1	3.1	data not analyzable
OL-GP-70054	GP	E1	2707	60000	60000	-4.6	-3.2	-4.6	0.31	9.65	11.05	poor
OL-GP-70054A	GP	E1	1000	120000	120000	-0.8	-0.8	-0.8	0.16	9.05	9.9	poor
OL-GP-70055	GP	E1	18893	86514	74000	-1.7	-1.2	-1.7	0.04	11.95	12.95	good
OL-GP-70056	GP	E1	1692	73000	49627	-1.5	-2.1	-2.1	0.07	16.35	16.75	fair
OL-VC-70057	VC	E2	359	16900	15500	-5.3	-5.5	-5.5	1.36	7.75	7.75	good
OL-VC-70058	VC	E2	359	17000	15350	-7.4	-8.2	-8.2	0.98	7.75	7.75	good
OL-VC-70059	VC	E2	359	18200	16696	-13.7	-13.8	-13.8	4.07	7.75	7.75	fair
OL-VC-70061	VC	E1	359	43800	34623	-2.0	-2.2	-2.2	0.62	7.75	7.75	good
OL-VC-70062	VC	E1	359	38500	34400	-3.1	-2.8	-3.1	2.00	7.75	7.75	fair, data scattered
OL-VC-70063	VC	E1	359	40000	35611	-2.9	-2.7	-2.9	0.53	7.75	7.75	good
OL-GP-70075	GP	E2	3463	18846	15800	-2.3	-3.5	-3.5	0.17	15.2	16.75	fair
OL-GP-70076	GP	E2	2725	20611	15800	-1.4	-3.2	-3.2	0.18	15.1	16.75	fair
OL-GP-70077	GP	E2	750	20304	14950	-3.9	-7.0	-7.0	0.71	15.65	16.75	fair to 3 feet
OL-GP-70078	GP	E1	1110	47000	36000	-1.4	-1.6	-1.6	0.04	15.65	16.75	poor
OL-GP-70079	GP	E1	993	56000	45500	-2.2	-2.2	-2.2	0.07	14.9	16.75	fair
OL-GP-70080	GP	E1	4806	4895	4717	NA	NA	NA	-	15.25	16.75	data not analyzable - may be very high upwelling velocity
OL-GP-70081	GP	E1	2112	97000	62000	-0.7	-0.7	-0.7	0.06	15.15	16.75	poor
OL-GP-70082	GP	E2	1840	51155	42701	-1.7	-1.6	-1.7	0.05	15.25	16.75	good
OL-GP-70083	GP	E2	2193	45000	39000	-3.2	-3.5	-3.5	0.28	15.35	16.75	fair
OL-GP-70088	GP	E2	5000	15000	14500	-2.8	-2.0	-2.8	0.08	10.75	11.85	good to 6 feet
OL-GP-70088.DAT	GP	E2	2400	5056	4870	-3.5	-3.5	-3.5	0.22	10.7	10.7	good to 6 feet
OL-GP-70088-A	GP	E2	1686	8750	5633	-0.9	-1.9	-1.9	0.06	11.55	12	good to 6.5 feet
OL-GP-70089-A	GP	E2	2977	7975	5700	-0.6	-2.5	-2.5	0.12	10.45	11.85	good
OL-VC-70089	VC	E2	359	5100	4000	-0.9	~0	**-0.9**	0.17	9.25	9.25	good

Table VII-1

Summary of Upwelling Velocity and Associated Data

Location ID	Type[1]	Remediat-ion Area	Boundary Concentrations (mg/L)[2]			Upwelling Velocity (cm/yr)			90% Confidence Interval(+/-) (cm/year)	Depth[3] (feet)	Reported Depth[4] (feet)	Comments
			Upper	Lower 10' Analysis	Lower 5' Analysis	10' Analysis	5' Analysis	Upwelling Velocity				
OL-GP-70090	GP	E2	1634	6771	5000	-1.6	-1.9	**-1.9**	0.08	10.65	11.95	good
OL-GP-70091	GP	E2	1460	4311	3650	-2.6	-3.5	**-3.5**	0.29	10.05	10.95	fair to 6.5 feet
OL-GP-70092	GP	E2	1437	4800	3780	-2.7	-4.2	-4.2	0.58	7.55	8.95	poor
OL-GP-70093	GP	E2	1175	6200	4280	-1.8	-3.2	-3.2	0.14	9.1	10.1	good
OL-VC-70093	VC	E2	359	6300	3280	~0	~0	**0.0**	0.27	9.15	9.15	good
OL-GP-70094	GP	E3	1100	12500	7718	-0.8	-0.7	**-0.7**	0.02	10.25	10.55	good
OL-GP-70095	GP	E2	838	4200	4200	-5.9	-5.9	-5.9	0.54	8.35	10.1	good to 4 feet
OL-GP-70096	GP	E2	1600	7400	5288	-1.1	-1.5	**-1.5**	0.06	10.9	10.9	good
OL-GP-70097	GP	E1	1303	20000	11000	-0.2	~0	**-0.2**	0.04	10.25	11.1	good
OL-GP-70098	GP	E1	609	6500	6500		-0.2	-0.2	0.23	2.45	3.25	poor
OL-GP-70099	GP	E2	1068	6000	4250	-1.5	-2.1	**-2.1**	0.14	10.05	11.05	good to fair
OL-GP-70100	GP	E2	1023	10907	7200	-0.4	-0.4	-0.4	0.01	11.2	11.65	good
OL-VC-70100	VC	E2	359	9360	5302	-0.4	-1.2	**-1.2**	0.45	9.25	9.25	good
OL-GP-70101	GP	E2	1112	24161	16000	-0.5	~0	**-0.5**	0.02	9.5	11	good
OL-GP-70102	GP	E1	1158	54000	32000	-0.4	-0.4	-0.4	0.05	9.15	10.95	good to 7 feet
OL-VC-70102	VC	E1	359	35500	32680	-2.4	-1.7	**-2.4**	0.63	7.75	7.75	good
OL-GP-70103	GP	E1	1786	88000	70000	-0.4	-1.0	**-1.0**	0.10	9.15	10.35	fair to 6 feet
OL-GP-70104	GP	E2	790	6200	5200	-2.0	-1.6	-2.0	0.04	10.85	11.9	good
OL-GP-70105	GP	E2	709	35000	24000	-1.0	-1.0	-1.0	0.09	10.05	11.05	good to 4 feet
OL-GP-70106	GP	E1	870	36000	30000	-1.6	~0	**-1.6**	0.02	10.65	12	fair to 4.5 feet
OL-GP-70107	GP	E1	5734	99000	99000	~0	~0	0.0	0.04	9.7	10.55	fair to poor
OL-GP-70107-1	GP	E1	2571	10362	10362		NA	NA	-	2.05	3.45	data limited and not analyzable
OL-GP-70107-2	GP	E1	4364	60000	52000	<-35	<-35	<-35	5.57	9.65	11.15	fair
OL-VC-70144	VC	E2	359	25500	19000	-1.5	-2.8	-2.8	2.99	9.25	9.25	fair to poor
OL-VC-70145	VC	E1	359	50900	45500	-5.4	-6.5	-6.5	0.92	9.25	9.25	good
OL-VC-70146	VC	E1	359	50000	46750	-5.0	-5.3	-5.3	0.19	9.25	9.25	fair
OL-VC-70147	VC	E1	359	20083	15011	-1.7	-2.8	**-2.8**	0.19	7.75	7.75	fair to poor
OL-VC-70148	VC	E2	359	3134	2353	-1.3	-1.4	-1.4	0.2	9.25	9.25	good
OL-VC-70148A	VC	E2	359	3150	2350	-1.4	-2.1	**-2.1**	0.21	9.25	9.25	good
OL-VC-70149	VC	E2	359	4444	2771	-0.7	-1.4	**-1.4**	0.38	9.25	9.25	good
OL-VC-70150	VC	E2	359	4800	2550	-0.4	-1.4	**-1.4**	0.29	9.25	9.25	good
OL-VC-70151	VC	E1	359	27500	16000	~0	~0	0.0	1.46	7.75	7.75	poor

Table VII-1

Summary of Upwelling Velocity and Associated Data

Location ID	Type[1]	Remediat-ion Area	Boundary Concentrations (mg/L)[2]			Upwelling Velocity (cm/yr)			90% Confidence Interval(+/-) (cm/year)	Depth[3] (feet)	Reported Depth[4] (feet)	Comments
			Upper	Lower 10' Analysis	Lower 5' Analysis	10' Analysis	5' Analysis	Upwelling Velocity				
OL-VC-70152	VC	E1	359	55000	49088	-0.4	~0	**-0.4**	0.2	6.25	6.25	fair
OL-VC-70153	VC	E1	359	53539	42531	-1.7	-1.4	**-1.7**	0.66	7.75	7.75	good
OL-VC-70154	VC	E1	359	46468	29700	-1.2	~0	**-1.2**	0.58	9.25	9.25	fair at 10 foot analysis, poor at 5 foot analysis
OL-VC-70155	VC	E1	359	37400	34250	-10.8	-11.0	-11	0.5	9.25	9.25	fair

Notes:

[1] The upwelling estimates are based on evaluations of chloride-depth profiles developed from pore water analyses obtained from Vibracore (VC) borings and from sediment conductivity data collected with a Geoprobe (GP) direct push conductivity probe.

[2] The chloride depth profiles were analyzed using Equation 1 which requires specification of chloride concentrations at the upper and lower boundaries of the domain of interest. The boundary concentrations are listed in these columns for evaluations of chloride depth profiles from the upper 5 feet of sediment and the upper 10 feet of sediment.

[3] This is the depth the boring was advanced below the sediment-water interface.

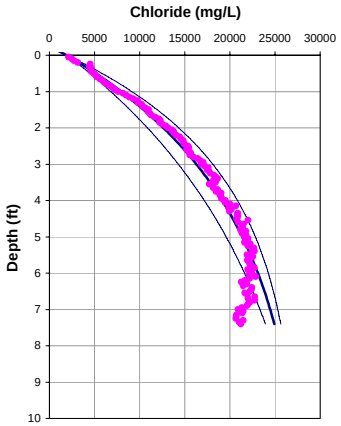
[4] This is the reported field depth of the boring, which for Geoprobe borings is generally greater than the depth the boring was advanced below the sediment-water interface. For the Geoprobe borings, recording of conductivity commenced at an arbitrary distance above the sediment water interface. The location of the interface was subsequently determined based on an abrupt change in conductivity.

Upwelling velocity values in bold typeface are the values shown in Table 1 of the main report.

"NA" - indicates the chloride depth profile does not have a form suitable for analysis.

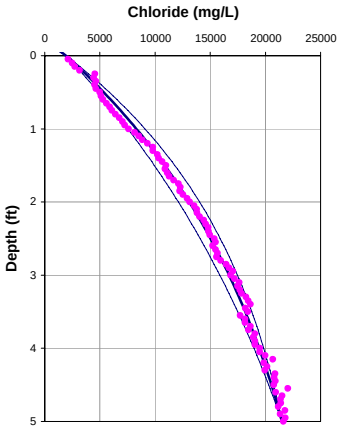
Upwelling Velocities from Sediment Conductivity Data

OL-GP-20109



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -1.4 cm/year

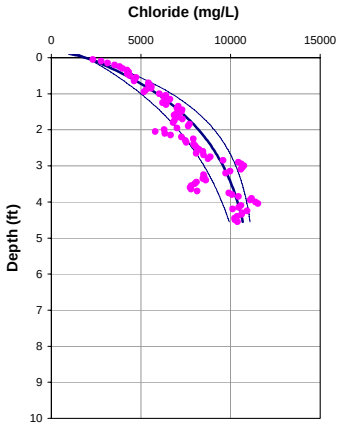
OL-GP-20109



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -1.5 cm/year

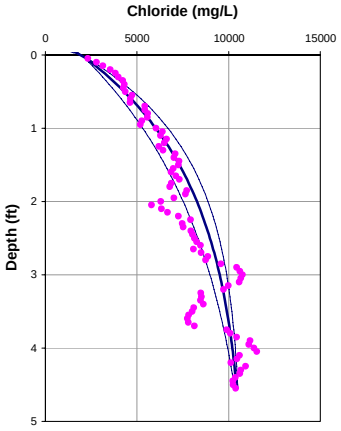
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1953	1953
Cl (mg/L)	27000	21500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********		
V(cm/yr)	-2.13	-2.30
q (cm/yr)	-1.38	-1.50
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.72	0.68
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2.75	

OL-GP-20110



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -3.3 cm/year

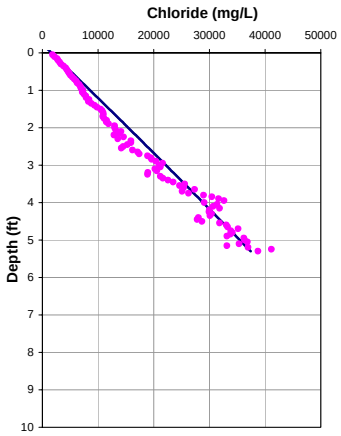
OL-GP-20110



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -3.3 cm/year

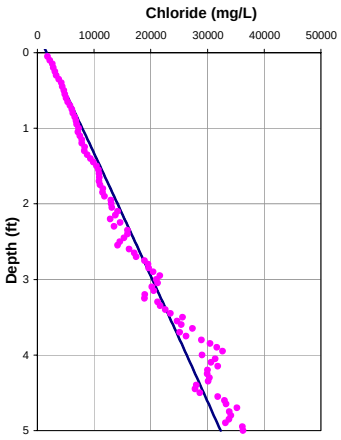
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1980	1980
Cl (mg/L)	11500	10584
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-5.00	-5.00
q (cm/yr)	-3.25	-3.25
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.79	0.71
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-20111



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

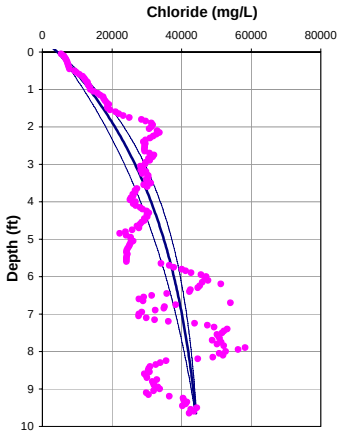
OL-GP-20111



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

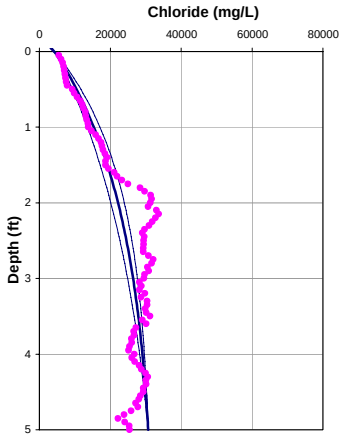
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1638	1638
Cl (mg/L)	38718	32313
L(ft)	6	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.07	-0.07
dispersion length (ft)	0.12	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.12	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.66	0.66
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.45	

OL-GP-20111.DAT



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -1.3 cm/year

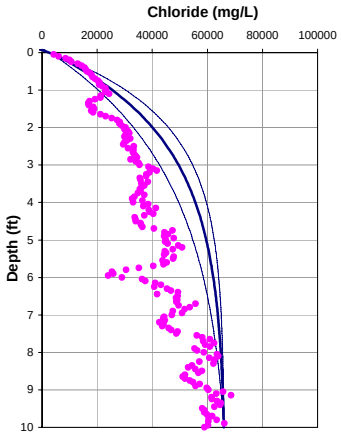
OL-GP-20111.DAT



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -2.6 cm/year

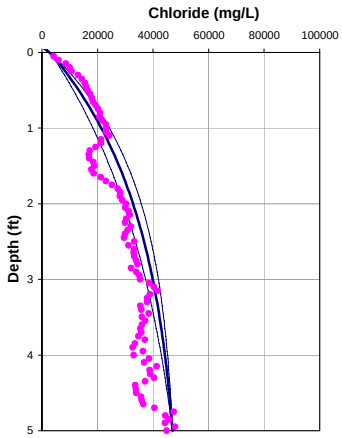
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	4339	4339
Cl (mg/L)	44500	30700
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********		
V(cm/yr)	-1.98	-4.00
q (cm/yr)	-1.28	-2.60
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.71	0.70
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.3	

OL-GP-20112



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -2.6 cm/year

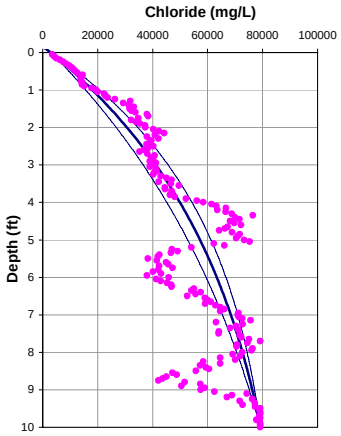
OL-GP-20112



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -2.6 cm/year

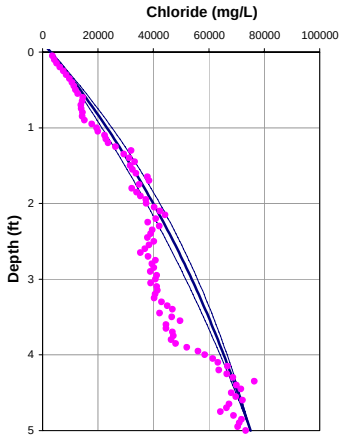
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2947	2947
Cl (mg/L)	66000	47000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-4.00	-4.00
q (cm/yr)	-2.60	-2.60
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.77	0.70
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-GP-20113



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -1.0 cm/year

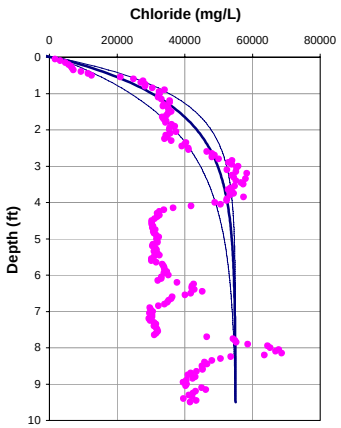
OL-GP-20113



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -1.0 cm/year

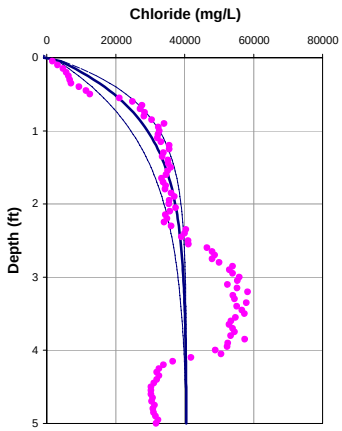
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	3050	3050
Cl (mg/L)	79200	75000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.52	-1.50
q (cm/yr)	-0.99	-0.98
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.70	0.68
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.85	

OL-GP-20113.DAT



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -5.2 cm/year

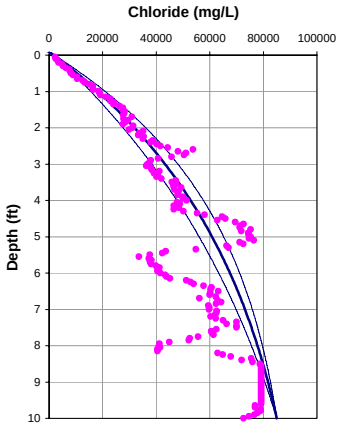
OL-GP-20113.DAT



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -7.3 cm/year

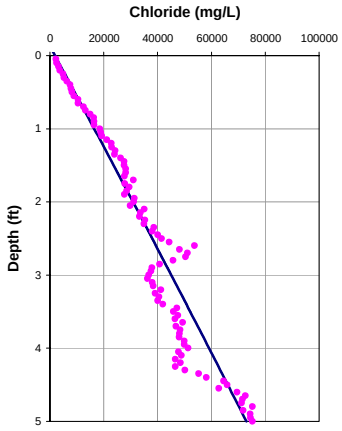
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1664	1664
Cl (mg/L)	55000	40492
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********		40491.81933
V(cm/yr)	-8.00	-11.26
q (cm/yr)	-5.20	-7.32
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.87	0.76
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-20115



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -1.0 cm/year

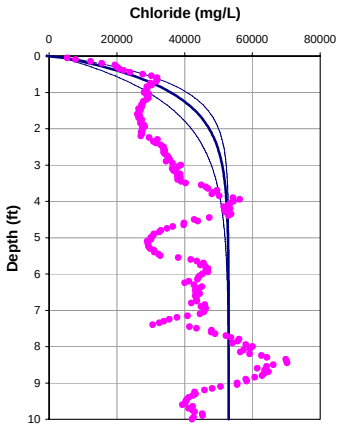
OL-GP-20115



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

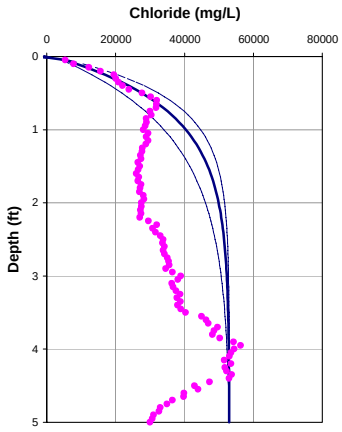
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1872	1872
Cl (mg/L)	85000	73000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.50	-0.10
q (cm/yr)	-0.98	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.70	0.66
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-20115.DAT



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -8.5 cm/year

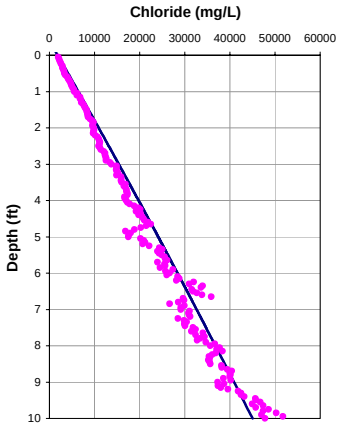
OL-GP-20115.DAT



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -8.5 cm/year

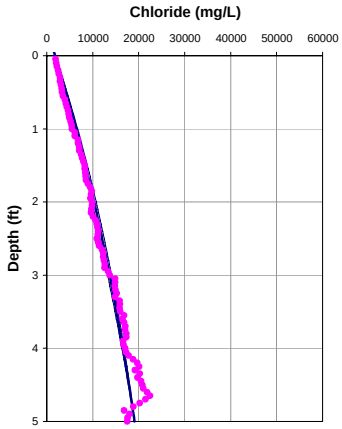
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2019	2019
Cl (mg/L)	53000	53000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-13.00	-13.00
q (cm/yr)	-8.45	-8.45
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	1.00	0.78
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.65	

OL-GP-20116



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

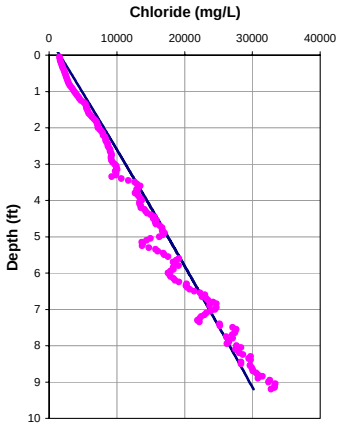
OL-GP-20116



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -0.8 cm/year

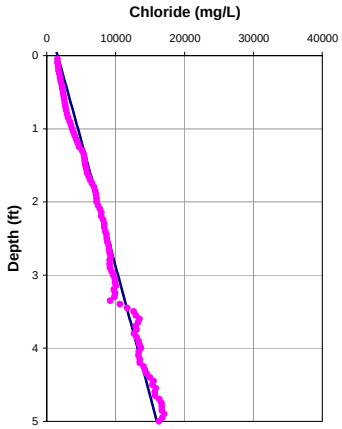
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1852	1852
Cl (mg/L)	45000	19100
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********		
V(cm/yr)	-0.10	-1.19
q (cm/yr)	-0.07	-0.77
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.67
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-20116.DAT



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

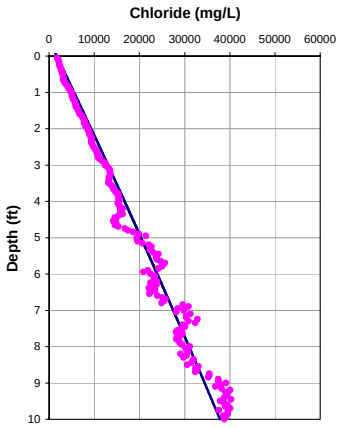
OL-GP-20116.DAT



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

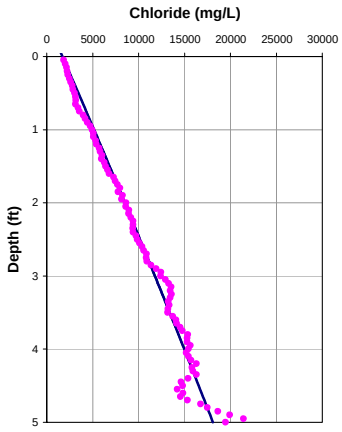
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1580	1580
Cl (mg/L)	32500	16000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.07	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.66
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-20117



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

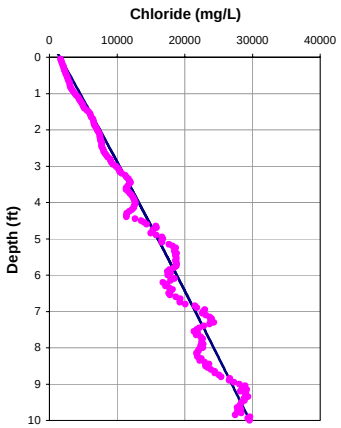
OL-GP-20117



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -0.1 cm/year

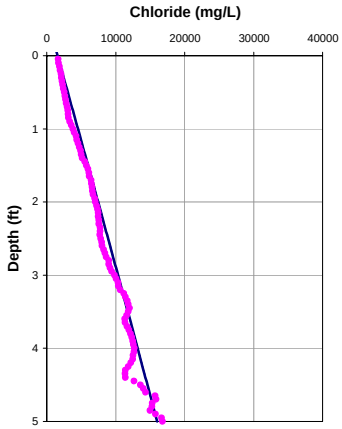
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1718	1718
Cl (mg/L)	37834	18100
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-0.19
q (cm/yr)	-0.07	-0.12
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.67
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-20117.DAT



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

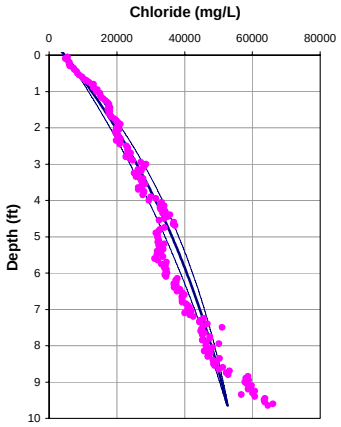
OL-GP-20117.DAT



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

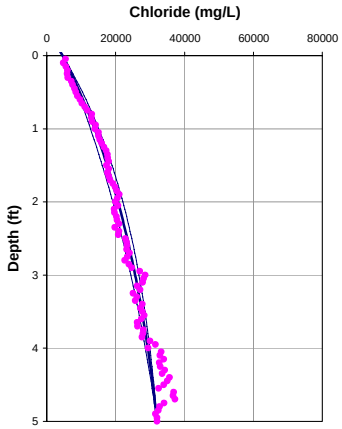
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1565	1565
Cl (mg/L)	29597	16000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********		
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.07	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.66
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.65	

OL-GP-20118



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.7 cm/year

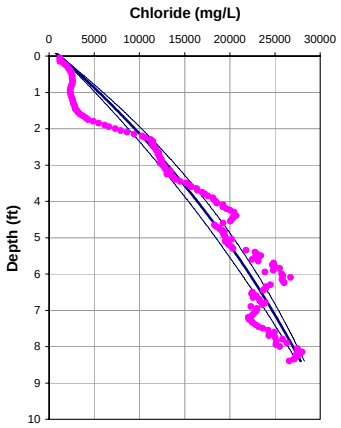
OL-GP-20118



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -1.6 cm/year

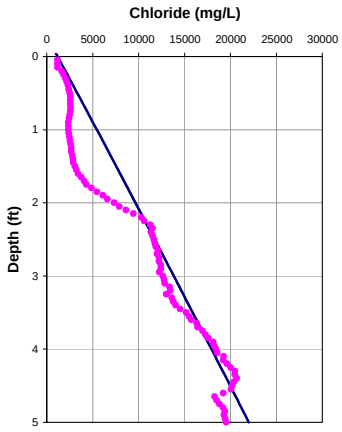
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	4635	4635
Cl (mg/L)	53565	32044
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.00	-2.53
q (cm/yr)	-0.65	-1.65
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.69	0.69
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-20118.DAT



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.5 cm/year

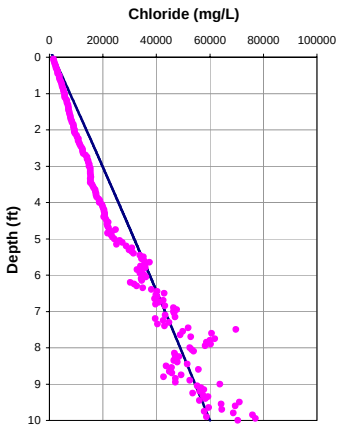
OL-GP-20118.DAT



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

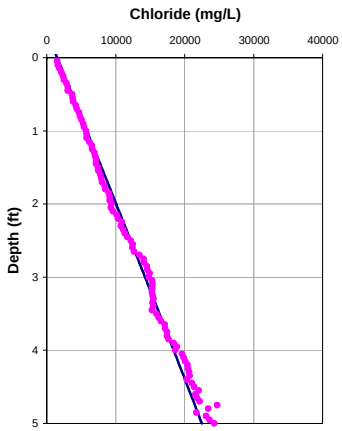
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1185	1185
Cl (mg/L)	31000	22000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.74	-0.10
q (cm/yr)	-0.48	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.68	0.66
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-4	

OL-GP-20119



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

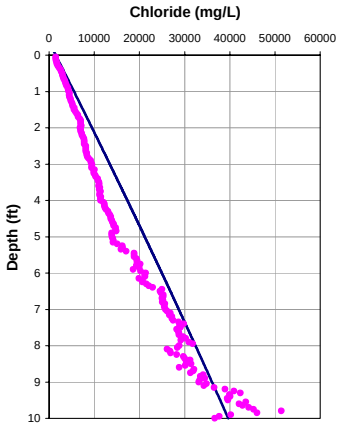
OL-GP-20119



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

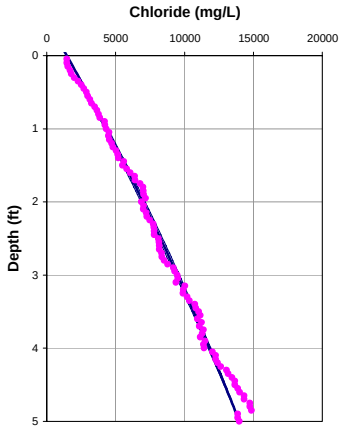
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1509	1509
Cl (mg/L)	60000	22500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********		
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.07	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.66
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.6	

OL-GP-20120



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

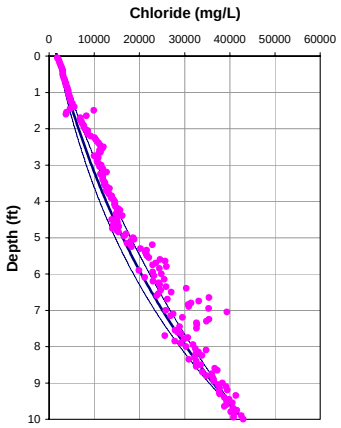
OL-GP-20120



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -0.4 cm/year

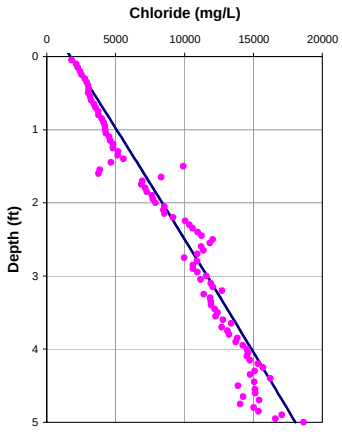
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1463	1463
Cl (mg/L)	39669	13985
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-0.55
q (cm/yr)	-0.07	-0.36
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.67
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-GP-20121



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

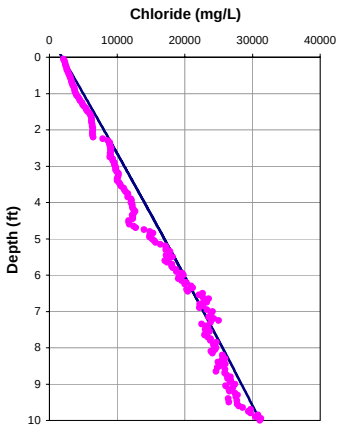
OL-GP-20121



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

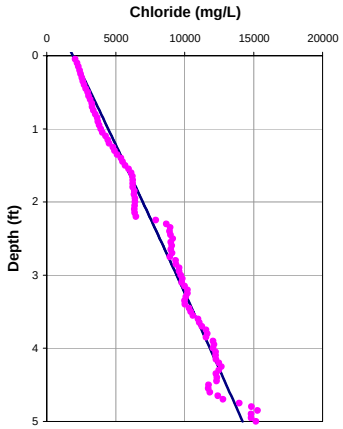
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1724	1724
Cl (mg/L)	43000	18051
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	1.00	-0.10
q (cm/yr)	0.65	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.69	0.66
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.8	

OL-GP-20121.DAT



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

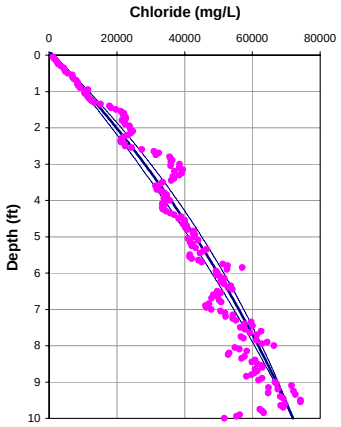
OL-GP-20121.DAT



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

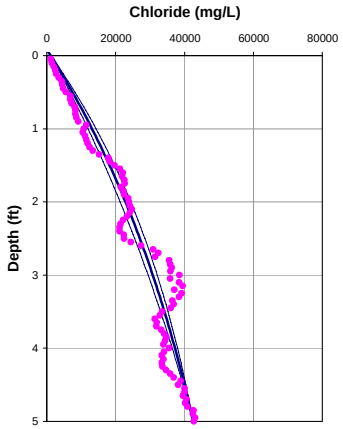
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		1898	1898
Cl (mg/L)		31135	14200
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.65	0.65
Calculated Values **********			
V(cm/yr)		-0.10	-0.15
q (cm/yr)		-0.07	-0.10
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.66	0.66
Diffusion + Dispersion (cm2/day)		0.67	0.67
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	-1.5		

OL-GP-20122



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.4 cm/year

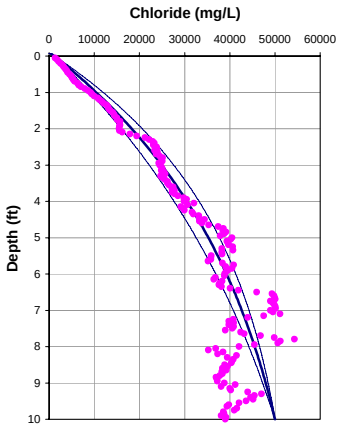
OL-GP-20122



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -1.1 cm/year

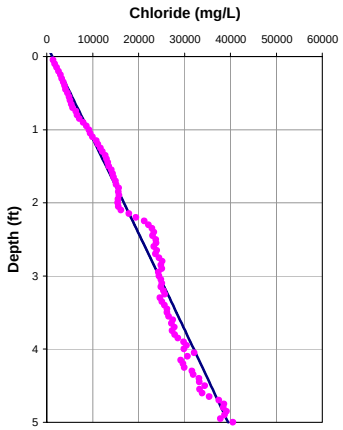
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		1188	1188
Cl (mg/L)		72000	42500
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.7	0.7
Calculated Values **********			
V(cm/yr)		-0.61	-1.67
q (cm/yr)		-0.40	-1.08
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.66	0.66
Diffusion + Dispersion (cm2/day)		0.68	0.68
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	-1		

OL-GP-20122.DAT



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.9 cm/year

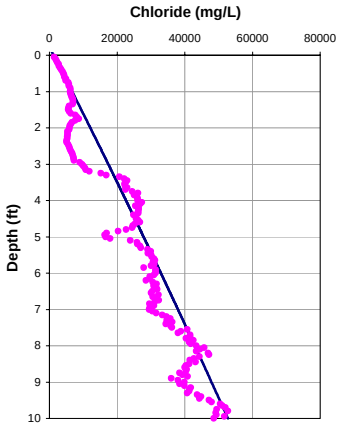
OL-GP-20122.DAT



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

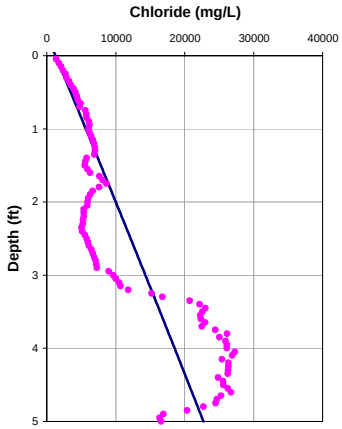
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		1187	1187
Cl (mg/L)		50000	39500
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.7	0.7
Calculated Values **********			
V(cm/yr)		-1.40	-0.10
q (cm/yr)		-0.91	-0.07
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.66	0.66
Diffusion + Dispersion (cm2/day)		0.70	0.66
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	-0.85		

OL-GP-20123



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

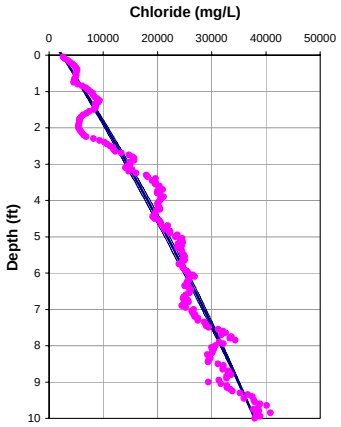
OL-GP-20123



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

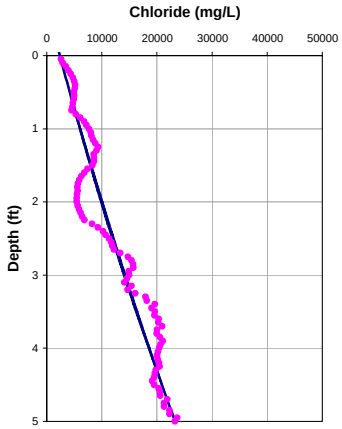
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1266	1266
Cl (mg/L)	52759	22730
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********		
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.07	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.66
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2.15	

OL-GP-20123.DAT



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.2 cm/year

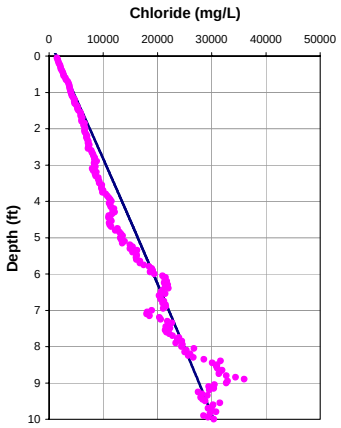
OL-GP-20123.DAT



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

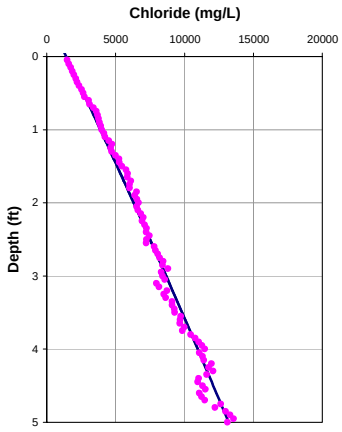
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2375	2375
Cl (mg/L)	37931	23290
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.29	0.50
q (cm/yr)	-0.19	0.33
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.67
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-20124



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

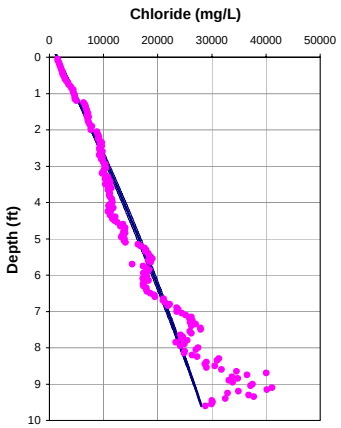
OL-GP-20124



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -0.1 cm/year

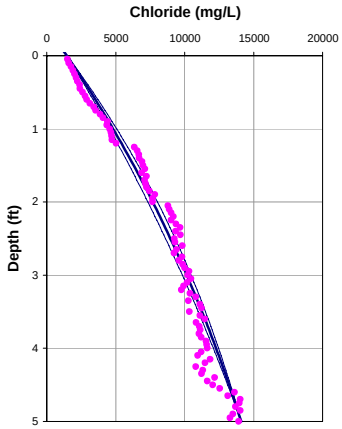
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1404	1404
Cl (mg/L)	30396	13200
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-0.21
q (cm/yr)	-0.07	-0.14
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.67
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.65	

OL-GP-20125



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.2 cm/year

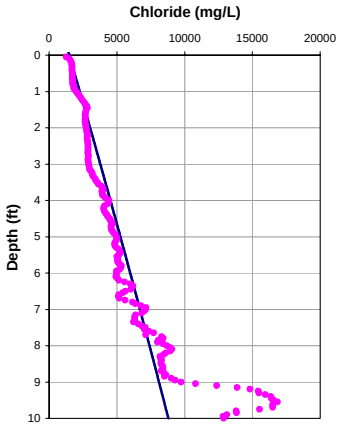
OL-GP-20125



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -0.8 cm/year

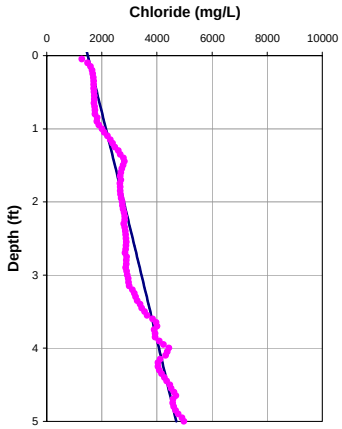
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1461	1461
Cl (mg/L)	29000	14100
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********		
V(cm/yr)	-0.31	-1.23
q (cm/yr)	-0.20	-0.80
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.67
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.75	

OL-GP-20126



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

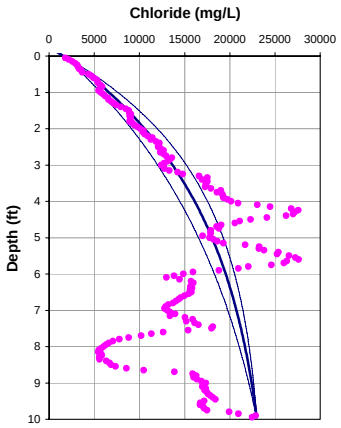
OL-GP-20126



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

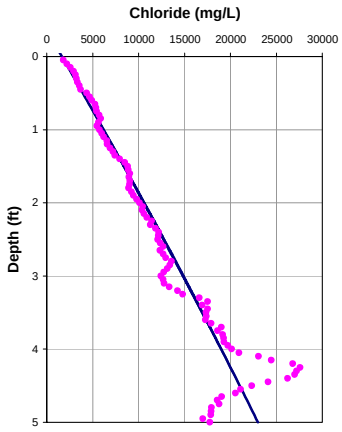
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1488	1488
Cl (mg/L)	8800	4700
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.07	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.66
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-GP-20127



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -1.3 cm/year

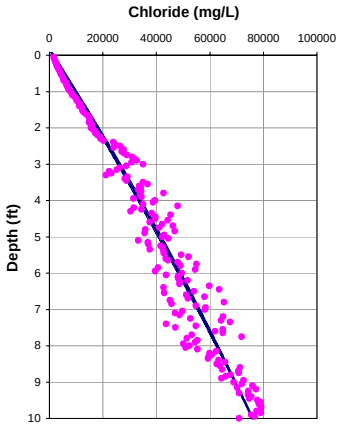
OL-GP-20127



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -0.2 cm/year

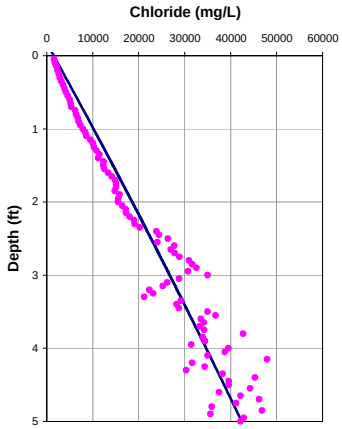
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1640	1640
Cl (mg/L)	23000	23000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-2.05	-0.25
q (cm/yr)	-1.33	-0.16
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.72	0.67
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2.65	

OL-GP-20128



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.1 cm/year

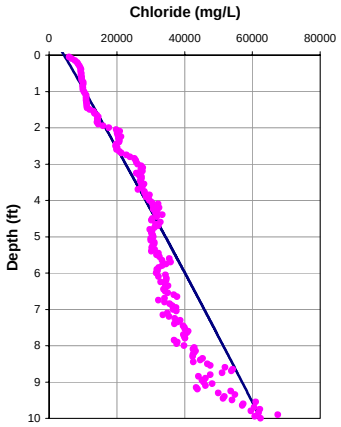
OL-GP-20128



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -0.1 cm/year

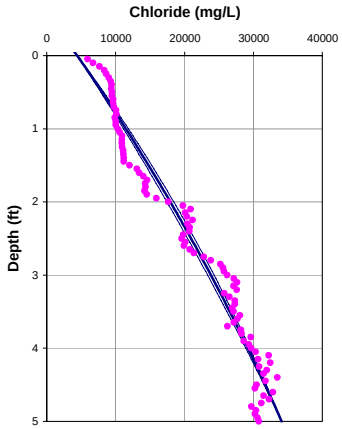
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1514	1514
Cl (mg/L)	76000	42400
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********		
V(cm/yr)	-0.22	-0.23
q (cm/yr)	-0.14	-0.15
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.67
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.75	

OL-GP-20128.DAT



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

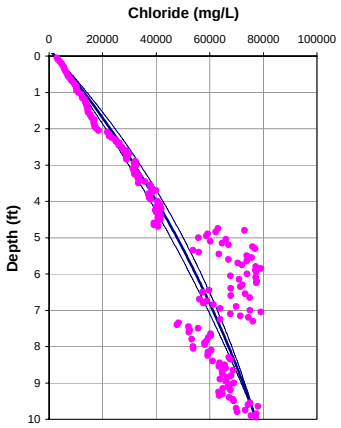
OL-GP-20128.DAT



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -0.5 cm/year

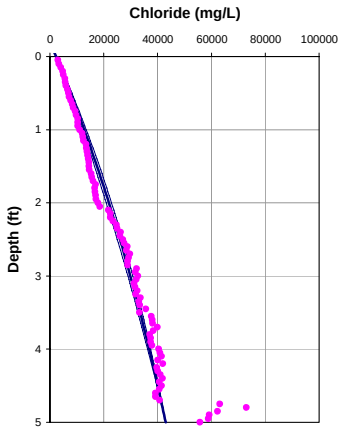
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	4436	4436
Cl (mg/L)	62425	34104
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		34103.6077
V(cm/yr)	-0.10	-0.73
q (cm/yr)	-0.07	-0.48
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.67
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-GP-20129



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.5 cm/year

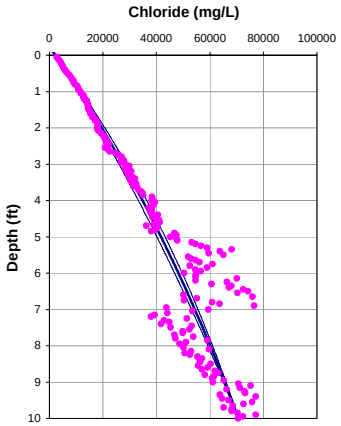
OL-GP-20129



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -0.7 cm/year

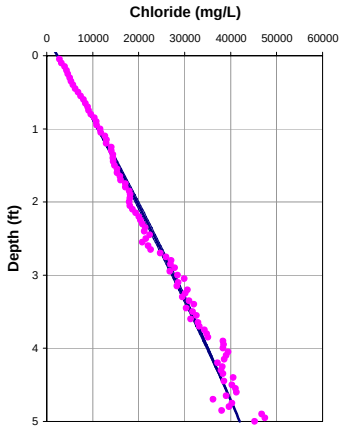
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2327	2327
Cl (mg/L)	77348	43000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.70	-1.08
q (cm/yr)	-0.46	-0.70
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.68	0.67
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.7	

OL-GP-20129-A



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.3 cm/year

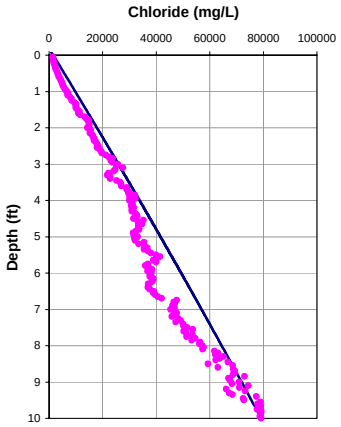
OL-GP-20129-A



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -0.3 cm/year

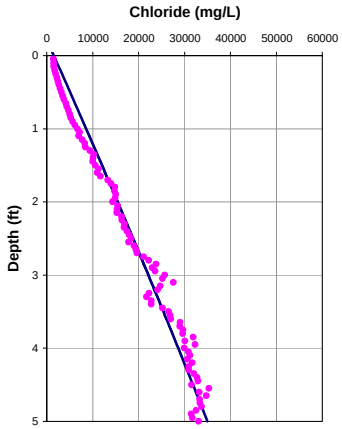
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2345	2345
Cl (mg/L)	70632	42000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********		
V(cm/yr)	-0.50	-0.47
q (cm/yr)	-0.33	-0.31
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.68	0.67
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.35	

OL-GP-20130



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

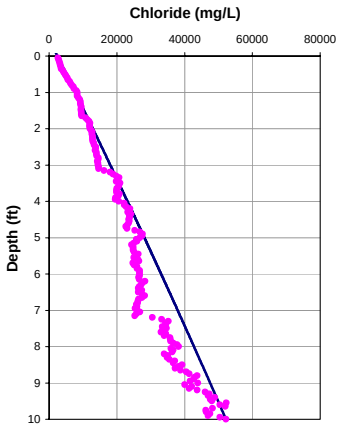
OL-GP-20130



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -0.1 cm/year

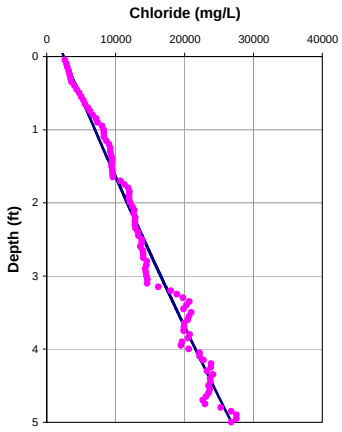
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1539	1539
Cl (mg/L)	79200	35000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-0.20
q (cm/yr)	-0.07	-0.13
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.67
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-20130.DAT



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

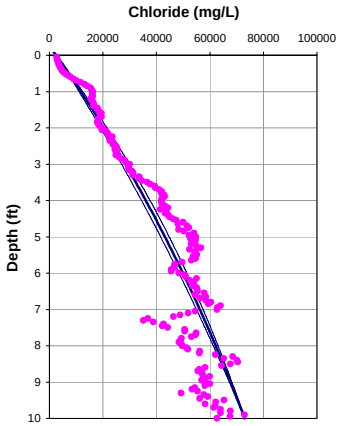
OL-GP-20130.DAT



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

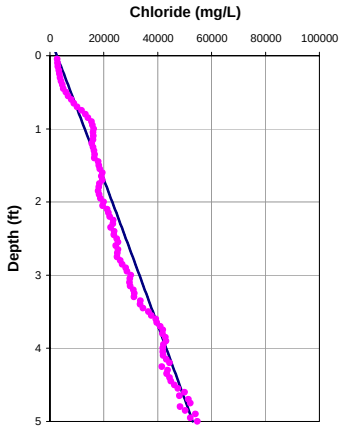
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2473	2473
Cl (mg/L)	52219	26821
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	0.29
q (cm/yr)	-0.07	0.19
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.67
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.55	

OL-GP-20131



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.3 cm/year

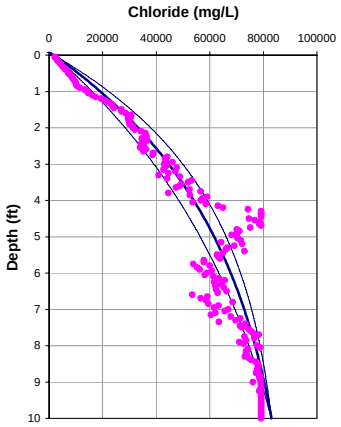
OL-GP-20131



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

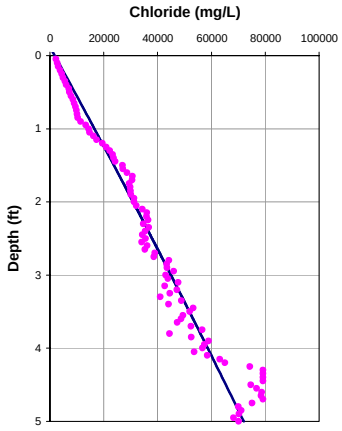
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2578	2578
Cl (mg/L)	73000	53000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********		
V(cm/yr)	-0.50	-0.10
q (cm/yr)	-0.33	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.68	0.66
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-20132



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -1.1 cm/year

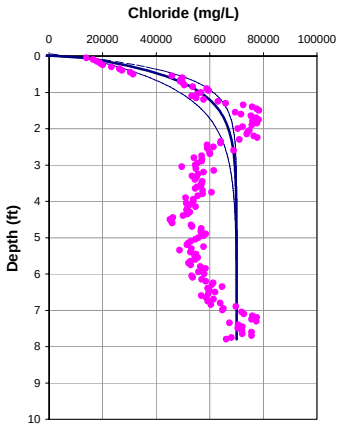
OL-GP-20132



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -0.1 cm/year

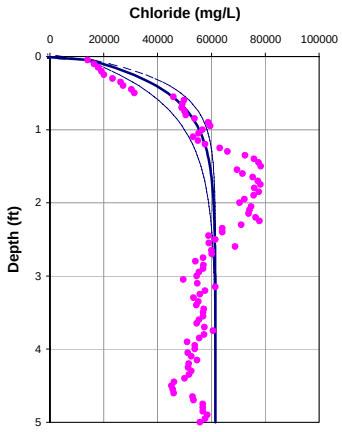
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1792	1792
Cl (mg/L)	83000	72000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.74	-0.20
q (cm/yr)	-1.13	-0.13
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.71	0.67
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-20132.DAT



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -14.2 cm/year

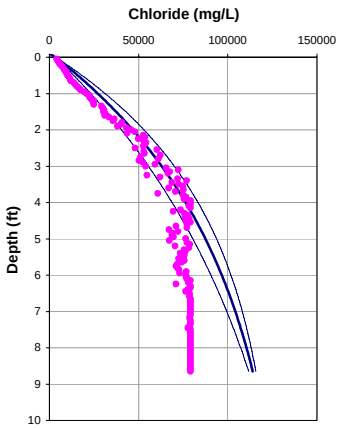
OL-GP-20132.DAT



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -14.4 cm/year

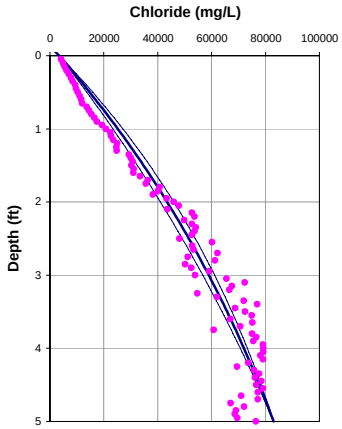
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	9536	9536
Cl (mg/L)	70000	61500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-21.79	-22.13
q (cm/yr)	-14.16	-14.39
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	1.22	0.86
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2.7	

OL-GP-20133



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -1.0 cm/year

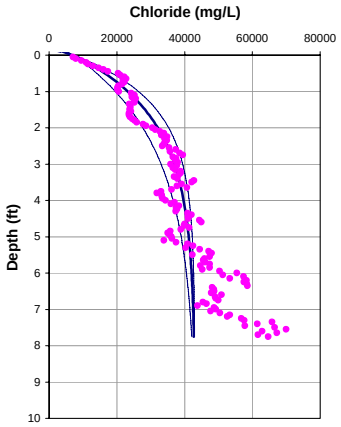
OL-GP-20133



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -0.9 cm/year

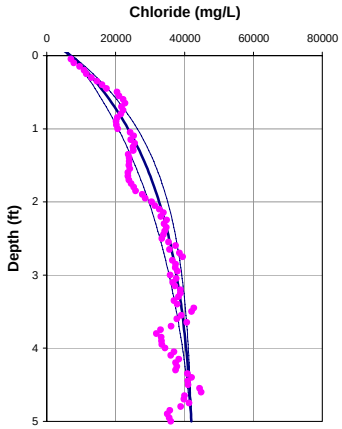
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	3437	3437
Cl (mg/L)	120000	83000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********		
V(cm/yr)	-1.60	-1.38
q (cm/yr)	-1.04	-0.90
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.70	0.68
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-3.45	

OL-GP-20134



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -3.7 cm/year

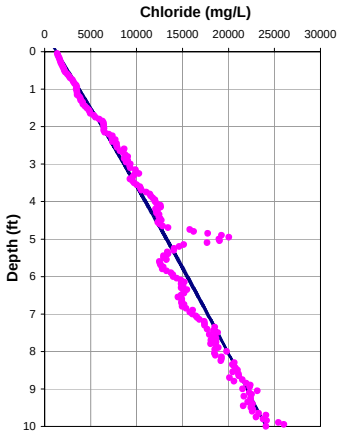
OL-GP-20134



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -3.3 cm/year

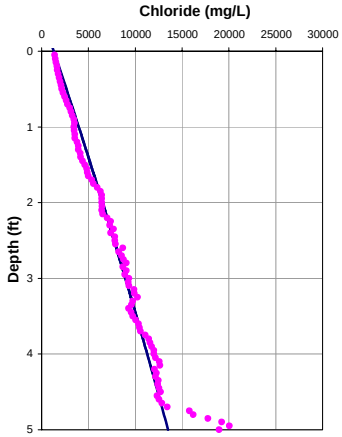
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	7288	7288
Cl (mg/L)	43000	42000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-5.71	-5.00
q (cm/yr)	-3.71	-3.25
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.81	0.71
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-4	

OL-GP-30059



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.1 cm/year

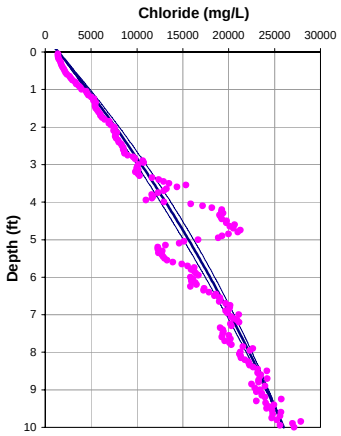
OL-GP-30059



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -0.2 cm/year

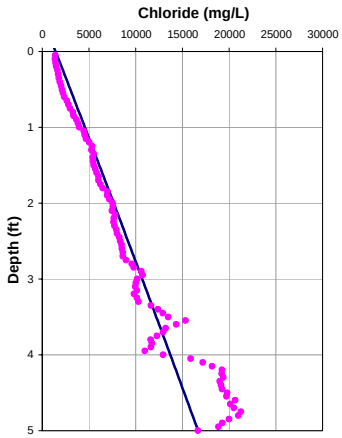
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1302	1302
Cl (mg/L)	24073	13500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********		
V(cm/yr)	-0.16	-0.36
q (cm/yr)	-0.11	-0.23
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.67
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.3	

OL-GP-30060



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.3 cm/year

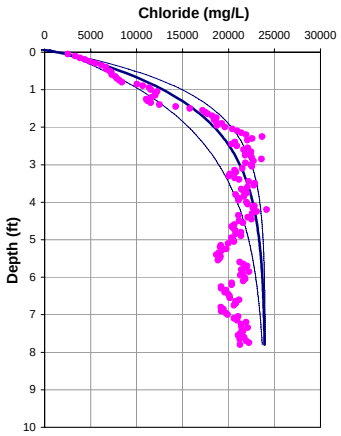
OL-GP-30060



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

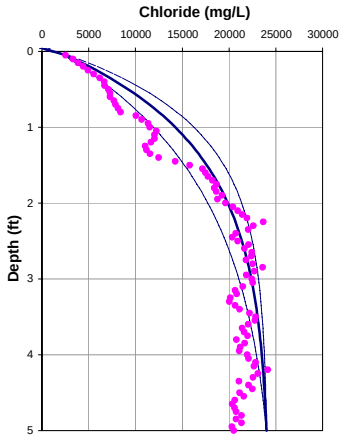
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1435	1435
Cl (mg/L)	26000	16675
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.51	-0.10
q (cm/yr)	-0.33	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.68	0.66
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-30061



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -4.6 cm/year

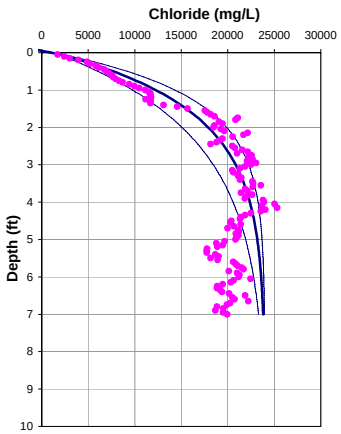
OL-GP-30061



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -4.6 cm/year

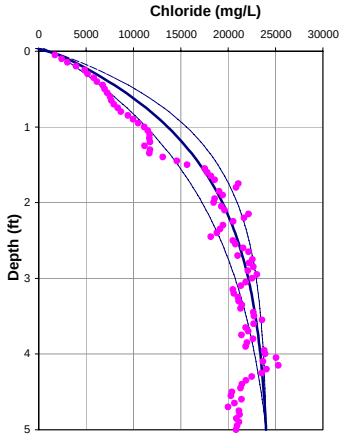
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1692	1692
Cl (mg/L)	24000	24000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		22943.2559
V(cm/yr)	-7.00	-7.00
q (cm/yr)	-4.55	-4.55
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.84	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.15	

OL-GP-30061-A



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -4.2 cm/year

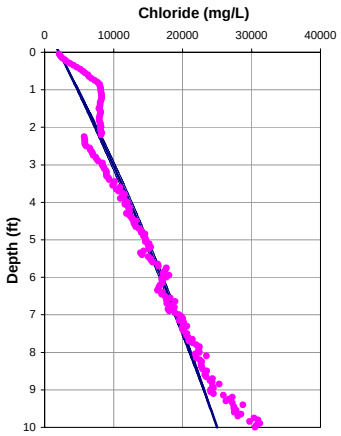
OL-GP-30061-A



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -4.2 cm/year

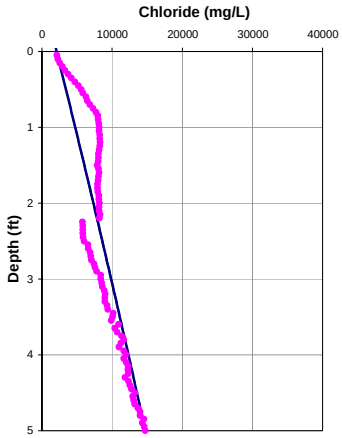
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1351	1351
Cl (mg/L)	24000	24000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********		
V(cm/yr)	-6.50	-6.50
q (cm/yr)	-4.23	-4.23
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.83	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.8	

OL-GP-30062



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.2 cm/year

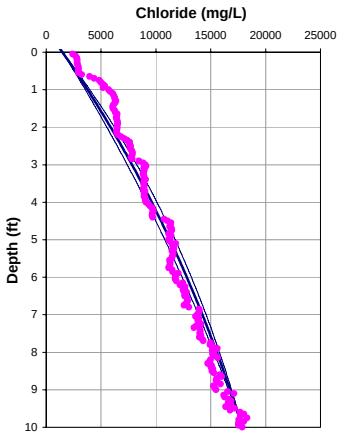
OL-GP-30062



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -0.1 cm/year

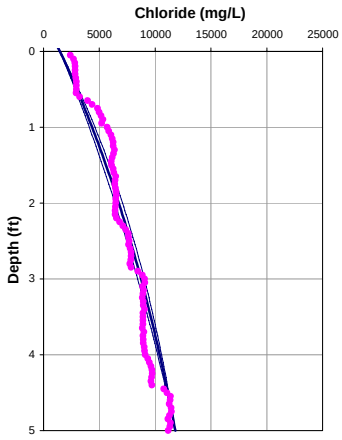
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2083	2083
Cl (mg/L)	25000	14730
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.32	-0.20
q (cm/yr)	-0.21	-0.13
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.67
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-3	

OL-GP-30063



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.4 cm/year

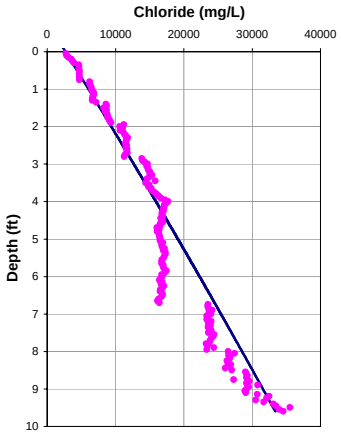
OL-GP-30063



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -0.9 cm/year

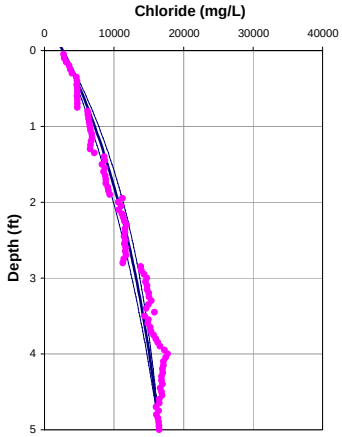
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1485	1485
Cl (mg/L)	17880	11800
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.64	-1.46
q (cm/yr)	-0.42	-0.95
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.68	0.68
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.15	

OL-GP-30064



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

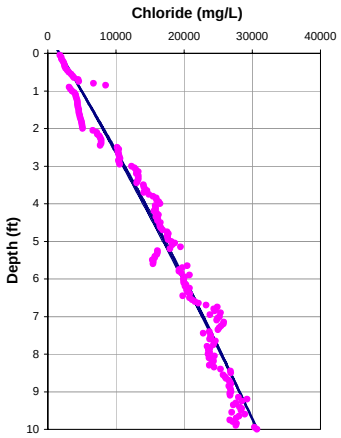
OL-GP-30064



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -1.5 cm/year

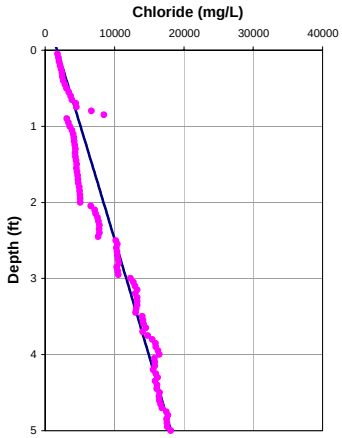
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2687	2687
Cl (mg/L)	34587	16500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********		
V(cm/yr)	-0.10	-2.38
q (cm/yr)	-0.07	-1.55
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.68
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2.8	

OL-GP-30065



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.1 cm/year

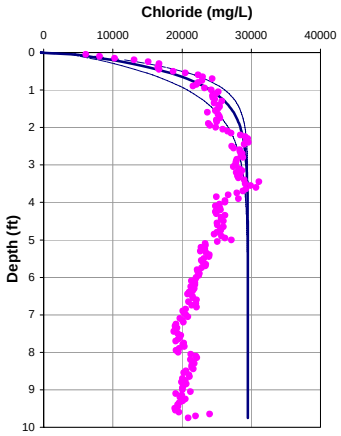
OL-GP-30065



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

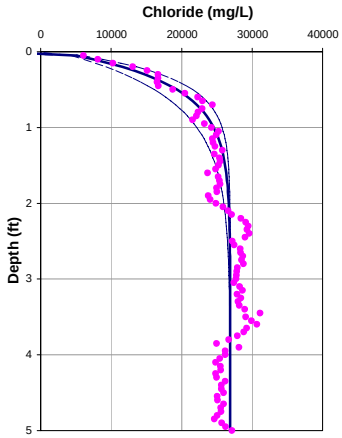
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1738	1738
Cl (mg/L)	30716	18129
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.19	-0.10
q (cm/yr)	-0.12	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.66
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-30066



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -16.4 cm/year

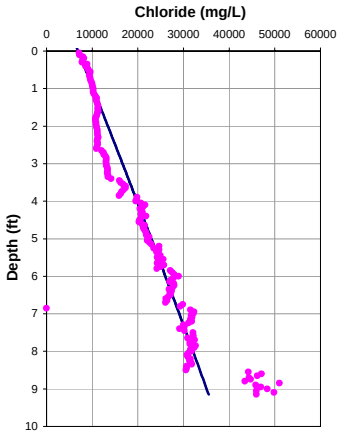
OL-GP-30066



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -16.1 cm/year

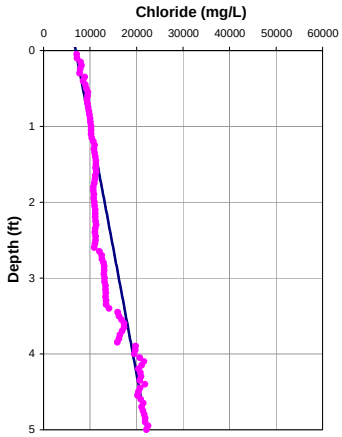
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2443	2443
Cl (mg/L)	29500	26900
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-25.20	-24.76
q (cm/yr)	-16.38	-16.09
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	1.31	0.88
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2.45	

OL-GP-30067



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

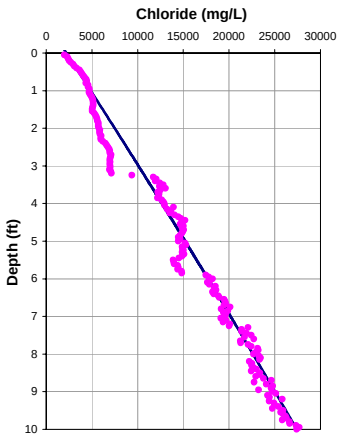
OL-GP-30067



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

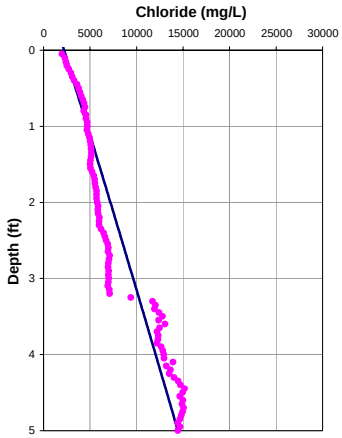
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	6901	6901
Cl (mg/L)	38000	22190
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********		
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.07	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.66
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2.7	

OL-GP-30068



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

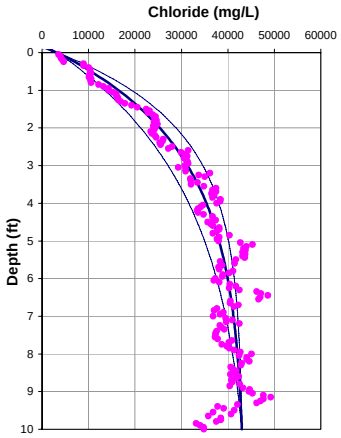
OL-GP-30068



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

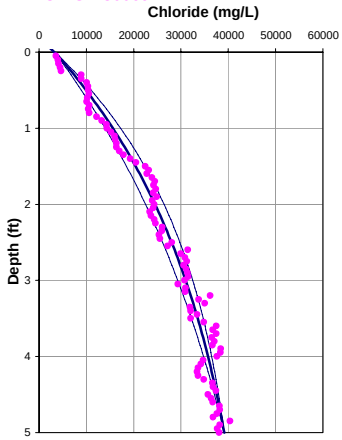
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2196	2196
Cl (mg/L)	27408	14444
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.07	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.66
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-30069



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -2.3 cm/year

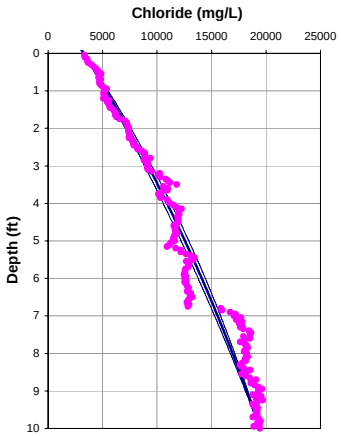
OL-GP-30069



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -1.7 cm/year

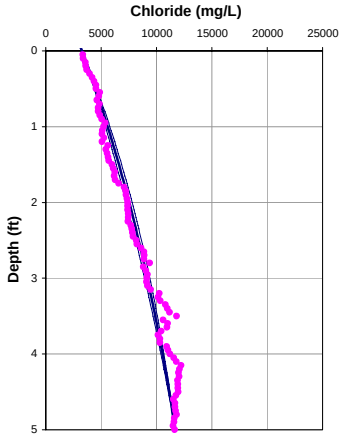
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	3317	3317
Cl (mg/L)	43000	39135
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		39134.7021
V(cm/yr)	-3.55	-2.63
q (cm/yr)	-2.30	-1.71
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.75	0.69
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.45	

OL-GP-30070



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.3 cm/year

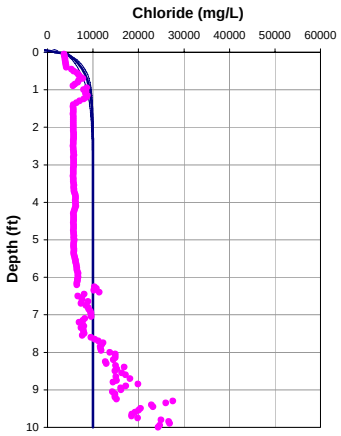
OL-GP-30070



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -0.9 cm/year

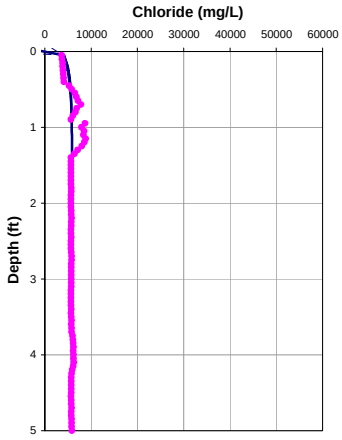
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	3280	3280
Cl (mg/L)	19438	11700
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********		
V(cm/yr)	-0.49	-1.40
q (cm/yr)	-0.32	-0.91
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.68	0.68
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2.4	

OL-GP-30071-1



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = <-32.5 cm/year

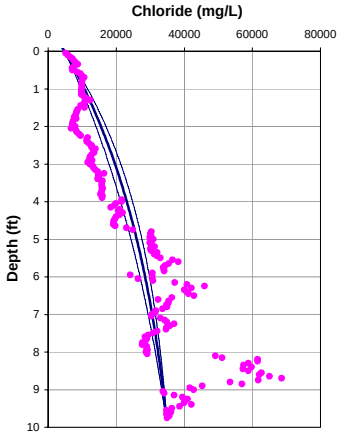
OL-GP-30071-1



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = <-32.5 cm/year

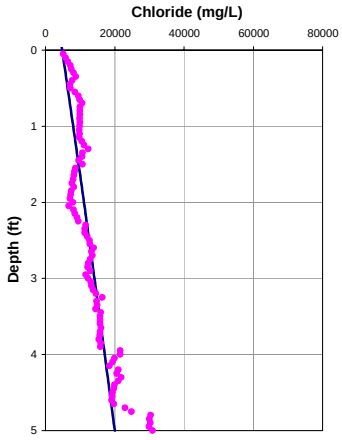
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	3762	3762
Cl (mg/L)	10000	5880
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-50.00	-50.00
q (cm/yr)	-32.50	-32.50
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	1.94	1.11
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-30071-2



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.9 cm/year

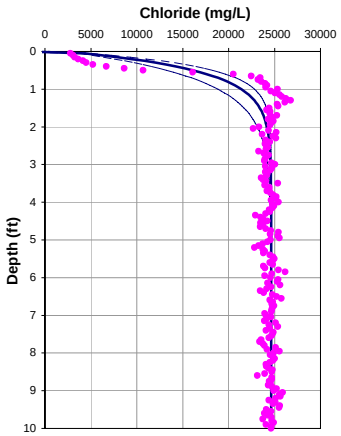
OL-GP-30071-2



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -0.1 cm/year

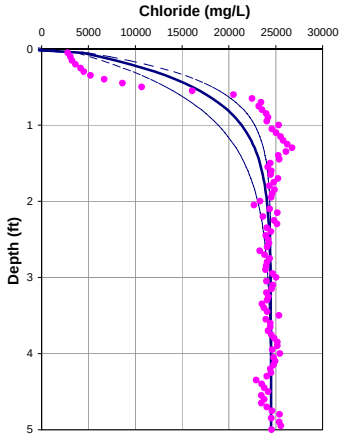
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	4820	4820
Cl (mg/L)	35010	20000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.44	-0.19
q (cm/yr)	-0.94	-0.12
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.70	0.67
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2.2	

OL-GP-30072-1



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -24.1 cm/year

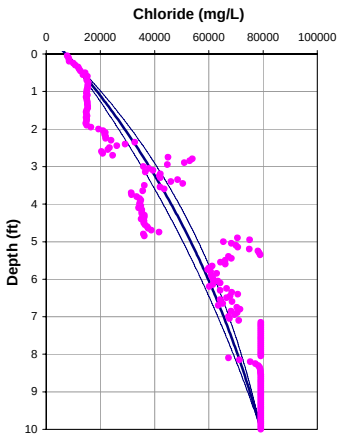
OL-GP-30072-1



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -12.7 cm/year

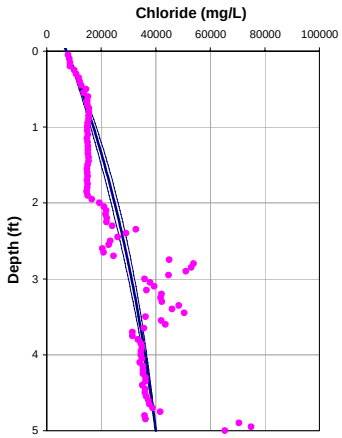
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2297	2297
Cl (mg/L)	24632	24500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********		
V(cm/yr)	-37.15	-19.54
q (cm/yr)	-24.15	-12.70
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	1.61	0.84
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2.75	

OL-GP-30072-2



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.6 cm/year

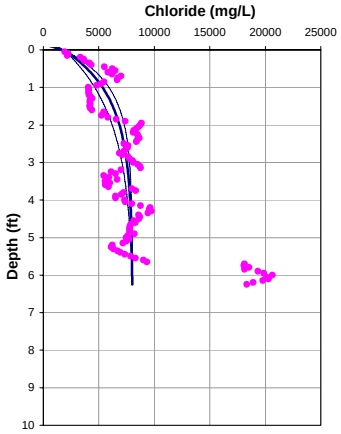
OL-GP-30072-2



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -1.2 cm/year

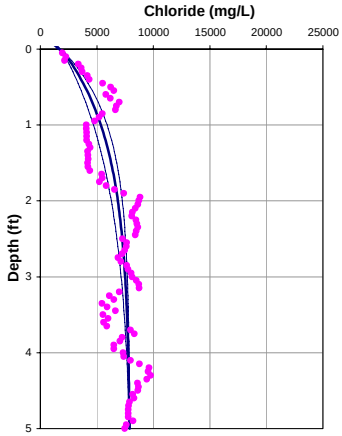
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	7360	7360
Cl (mg/L)	79200	40000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.95	-1.85
q (cm/yr)	-0.61	-1.20
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.69	0.68
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-3	

OL-GP-30073-1



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -4.8 cm/year

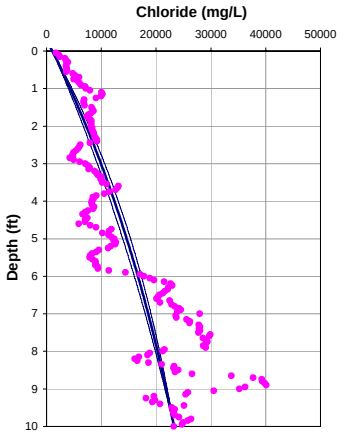
OL-GP-30073-1



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -4.8 cm/year

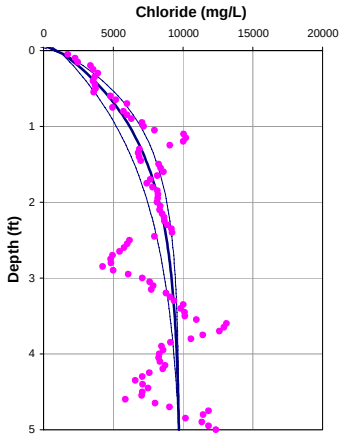
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1832	1832
Cl (mg/L)	8000	7892
L(ft)	6	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		7891.62402
V(cm/yr)	-7.46	-7.44
q (cm/yr)	-4.85	-4.83
dispersion length (ft)	0.14	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.14	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.75	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-30073-2



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.5 cm/year

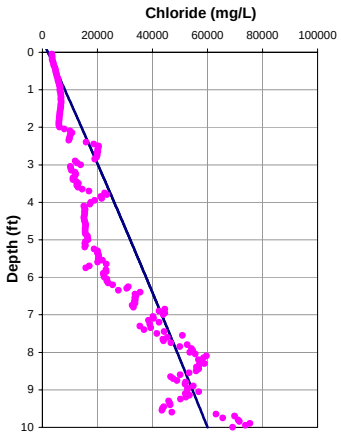
OL-GP-30073-2



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -5.0 cm/year

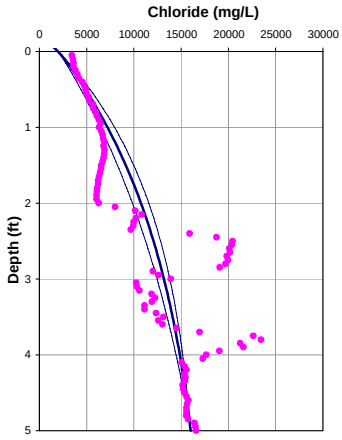
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1086	1086
Cl (mg/L)	23256	9700
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********		
V(cm/yr)	-0.74	-7.64
q (cm/yr)	-0.48	-4.97
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.68	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.3	

OL-GP-30074



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

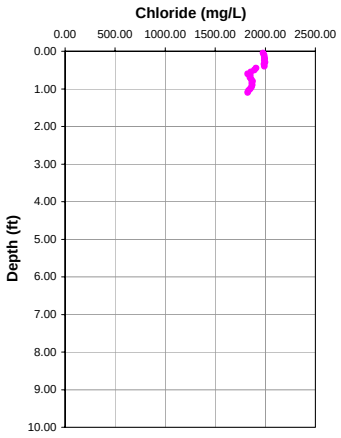
OL-GP-30074



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -2.0 cm/year

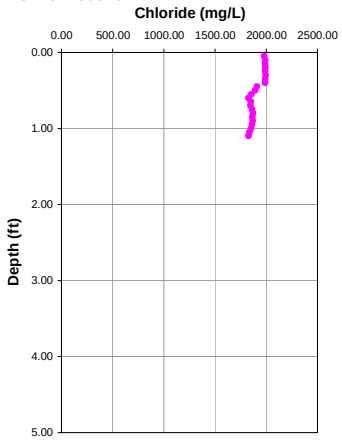
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2042	2042
Cl (mg/L)	60000	16000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-3.11
q (cm/yr)	-0.07	-2.02
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.69
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-30075-1



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = NA cm/year

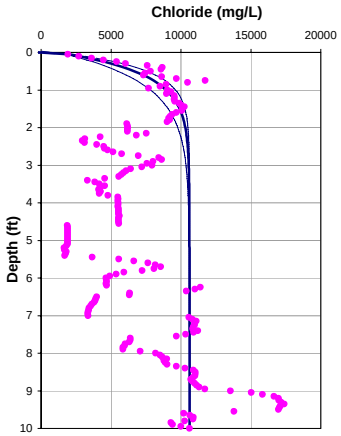
OL-GP-30075-1



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = NA cm/year

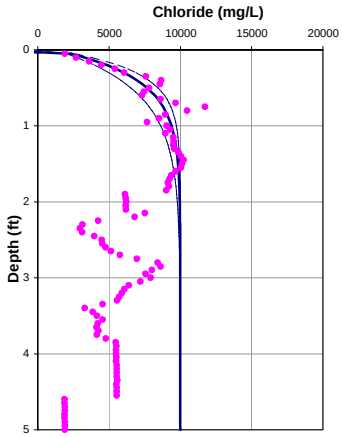
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1980	1980
Cl (mg/L)	1827	1827
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-19.90	-13.24
q (cm/yr)	-12.94	-8.61
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	1.17	0.78
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-GP-30075-2



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -18.9 cm/year

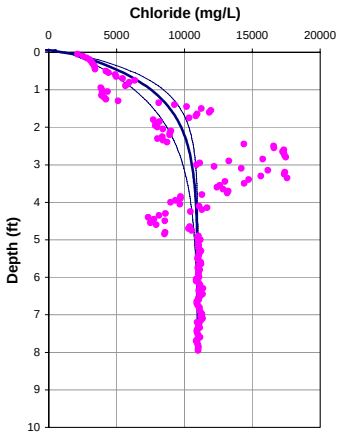
OL-GP-30075-2



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -18.9 cm/year

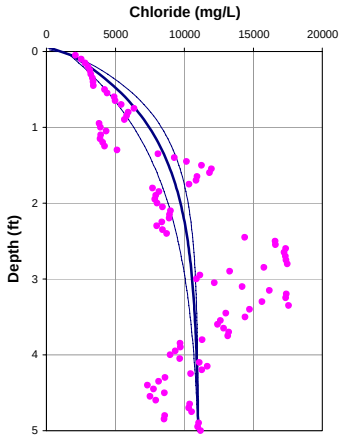
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1268	1268
Cl (mg/L)	10608	10000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********		
V(cm/yr)	-29.00	-29.10
q (cm/yr)	-18.85	-18.92
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	1.40	0.92
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-3.25	

OL-GP-30075-3



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -7.7 cm/year

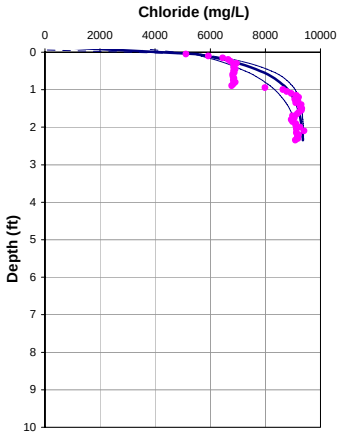
OL-GP-30075-3



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -5.7 cm/year

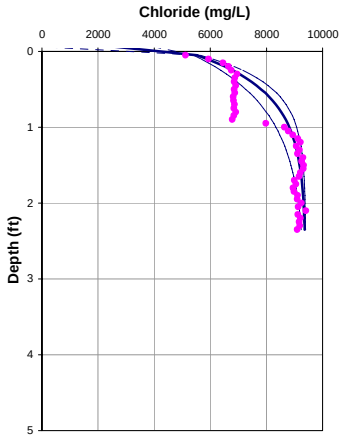
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1373	1373
Cl (mg/L)	11000	11000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-11.82	-8.75
q (cm/yr)	-7.68	-5.68
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.97	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-30075-4



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -13.0 cm/year

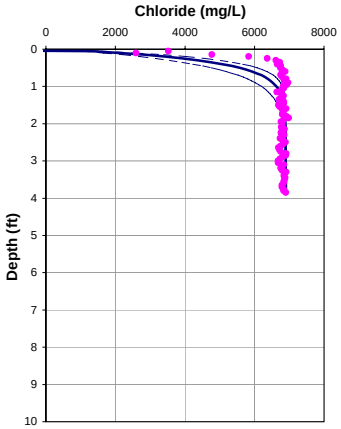
OL-GP-30075-4



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -13.0 cm/year

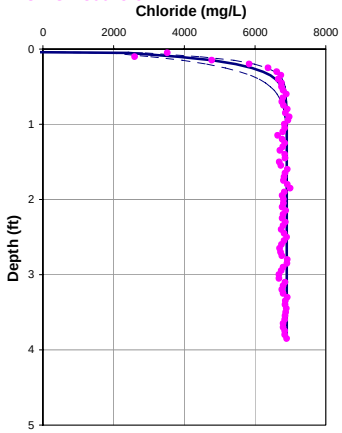
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	5120	5120
Cl (mg/L)	9400	9400
L(ft)	5	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-20.00	-20.00
q (cm/yr)	-13.00	-13.00
dispersion length (ft)	0.11	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.11	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.84	0.84
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-GP-30075-5



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = <-32.5 cm/year

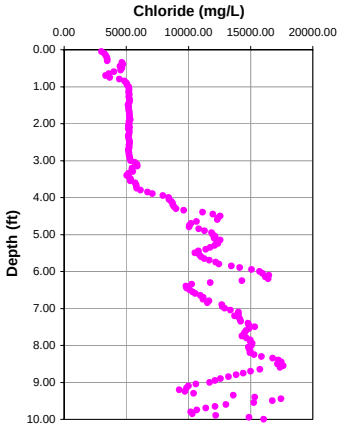
OL-GP-30075-5



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = <-32.5 cm/year

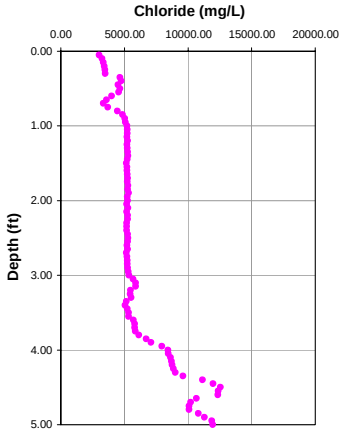
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	6900	6900
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********		
V(cm/yr)	-1000.00	-300.00
q (cm/yr)	-650.00	-195.00
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	-0.09	-0.03
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	26.14	3.31
Diffusion + Dispersion (ft2/day)	0.03	0.00
Adjusted depth	0	

OL-GP-30075-6



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = NA cm/year

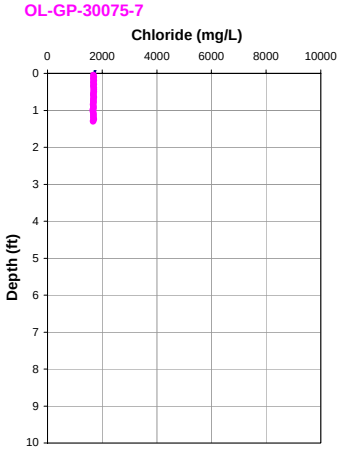
OL-GP-30075-6



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = NA cm/year

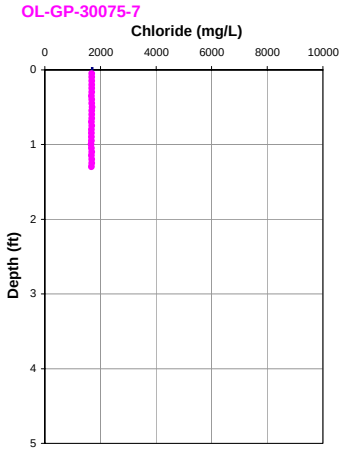
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2609	2609
Cl (mg/L)	16060	11945
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.42	-0.10
q (cm/yr)	-0.27	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.66
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-5	

OL-GP-30075-7



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = NA cm/year

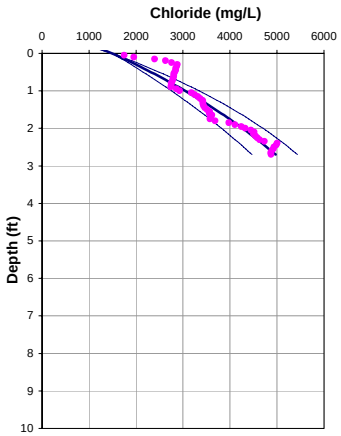
OL-GP-30075-7



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = NA cm/year

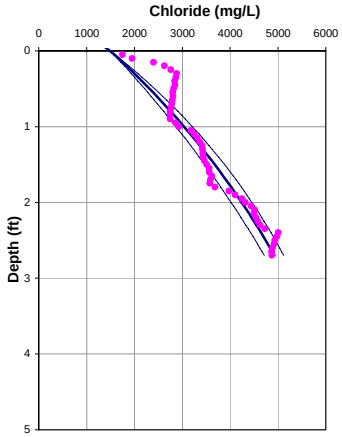
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1709	1709
Cl (mg/L)	1680	1680
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-50.00	4916.20
q (cm/yr)	-32.50	3195.53
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.44
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	1.94	44.04
Diffusion + Dispersion (ft2/day)	0.00	0.05
Adjusted depth	-0.4	

OL-GP-30076-1



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -1.3 cm/year

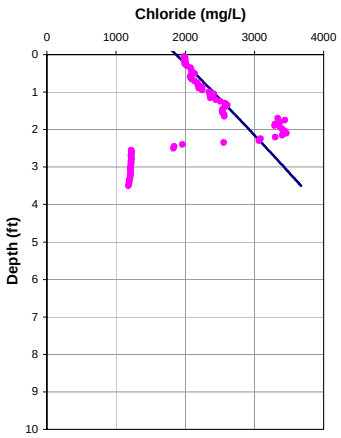
OL-GP-30076-1



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -1.3 cm/year

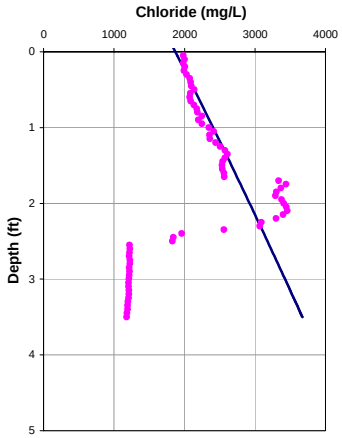
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1500	1500
Cl (mg/L)	8200	6500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********		
V(cm/yr)	-2.00	-2.00
q (cm/yr)	-1.30	-1.30
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.71	0.68
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-4	

OL-GP-30076-2



Porosity = 0.65
Dispersion length = 0.0 feet
Upwelling Velocity = NA cm/year

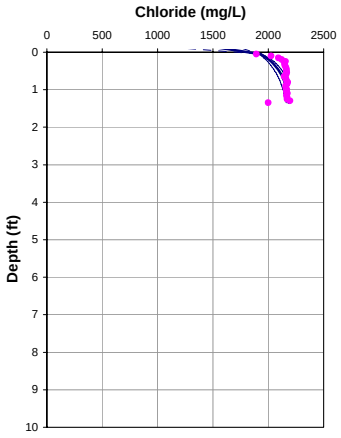
OL-GP-30076-2



Porosity = 0.65
Dispersion length = 0.0 feet
Upwelling Velocity = NA cm/year

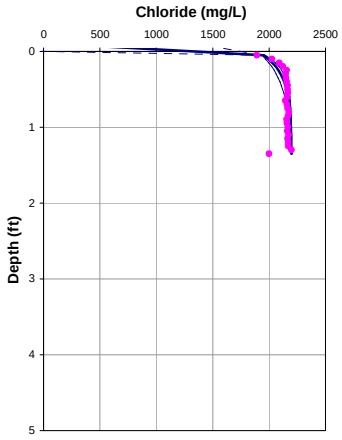
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1870	1870
Cl (mg/L)	3000	3000
L(ft)	2	2
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.24	-0.24
q (cm/yr)	-0.16	-0.16
dispersion length (ft)	0.03	0.03
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.03	0.03
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.66	0.66
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-3	

OL-GP-30076-3



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = <-32.5 cm/year

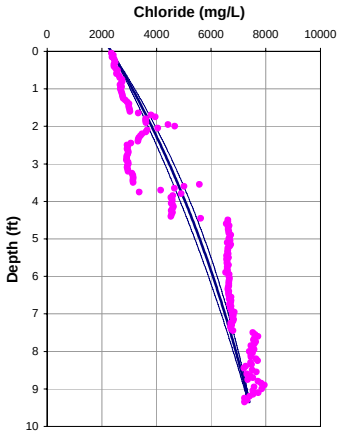
OL-GP-30076-3



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = <-32.5 cm/year

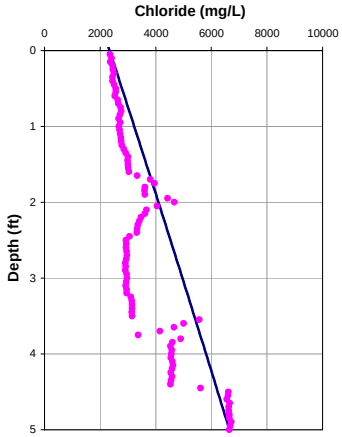
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1900	1900
Cl (mg/L)	2200	2200
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-50.00	-50.00
q (cm/yr)	-32.50	-32.50
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	1.94	1.11
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-GP-30076-4



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.5 cm/year

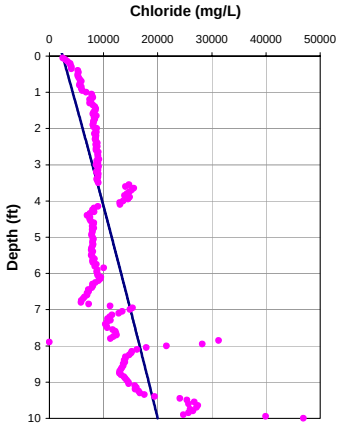
OL-GP-30076-4



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

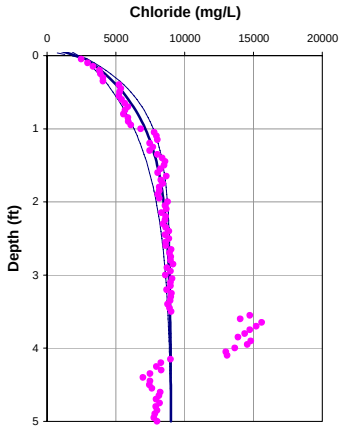
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2343	2343
Cl (mg/L)	7600	6650
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********		
V(cm/yr)	-0.77	-0.10
q (cm/yr)	-0.50	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.68	0.66
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-3.65	

OL-GP-30077



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

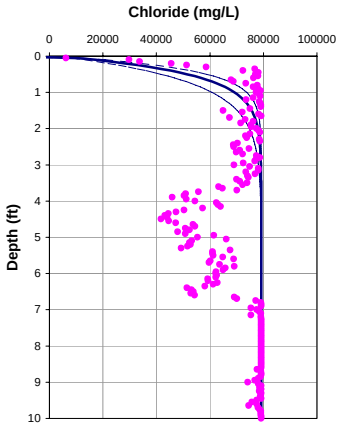
OL-GP-30077



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -7.5 cm/year

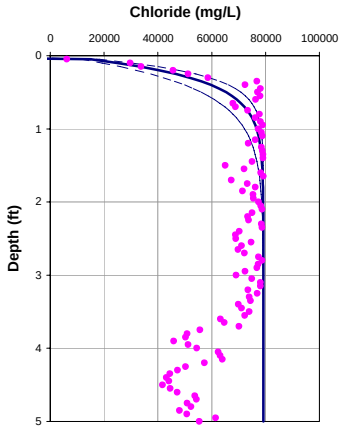
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2446	2446
Cl (mg/L)	20000	9000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-11.48
q (cm/yr)	-0.07	-7.46
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.77
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-40074



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = <-37.5 cm/year

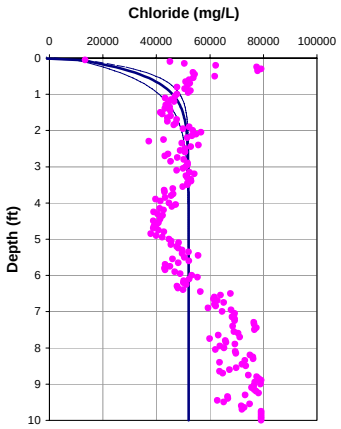
OL-GP-40074



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = <-37.5 cm/year

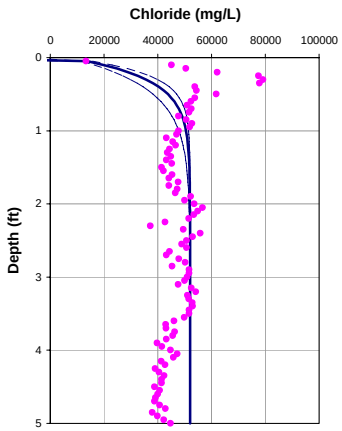
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	3124	3124
Cl (mg/L)	79200	79200
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-50.00	-50.00
q (cm/yr)	-37.50	-37.50
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	2.06	1.23
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.6	

OL-GP-40074A



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = <-37.5 cm/year

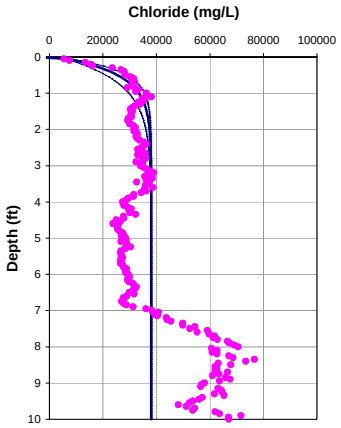
OL-GP-40074A



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = <-37.5 cm/year

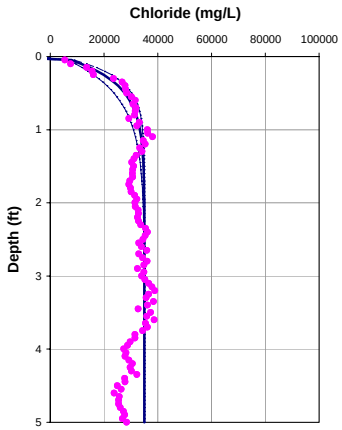
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	6717	6717
Cl (mg/L)	52000	52000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-50.00	-50.00
q (cm/yr)	-37.50	-37.50
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	2.06	1.23
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-40075



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = <-37.5 cm/year

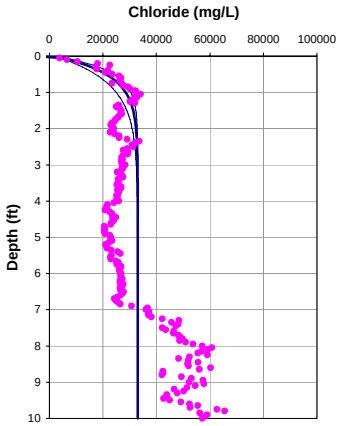
OL-GP-40075



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -29.6 cm/year

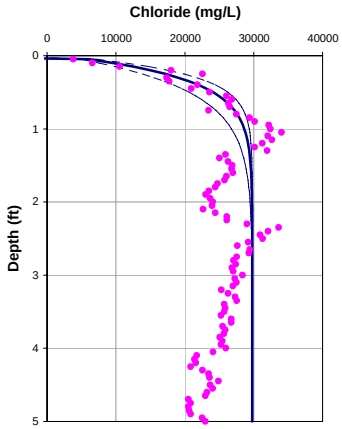
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	3539	3539
Cl (mg/L)	38000	35050
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-50.00	-39.47
q (cm/yr)	-37.50	-29.60
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	2.06	1.13
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.6	

OL-GP-40076



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -33.0 cm/year

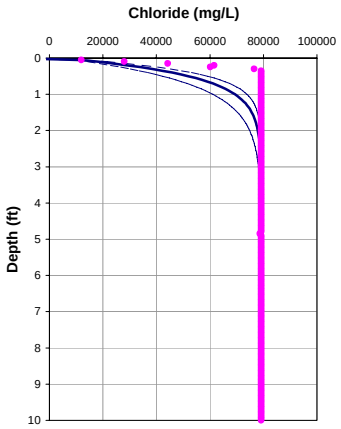
OL-GP-40076



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -33.5 cm/year

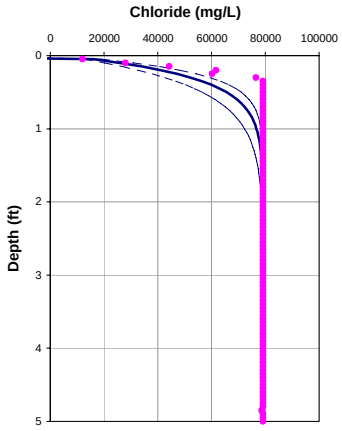
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2071	2071
Cl (mg/L)	33000	29800
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-44.00	-44.67
q (cm/yr)	-33.00	-33.50
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	1.91	1.18
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-40076A



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = <-37.5 cm/year

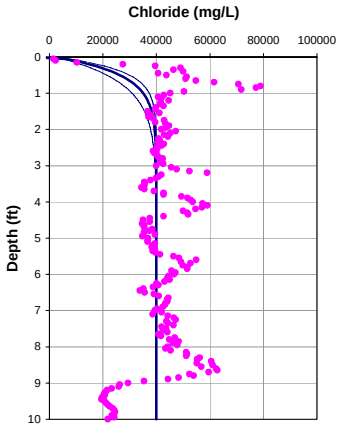
OL-GP-40076A



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = <-37.5 cm/year

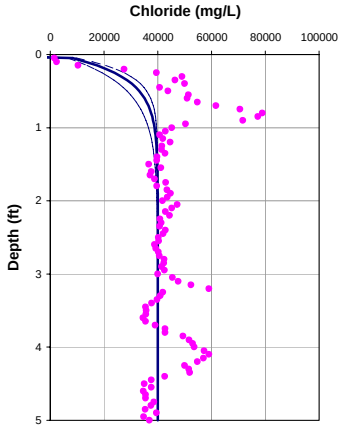
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	4329	4329
Cl (mg/L)	79200	79200
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-50.00	-50.00
q (cm/yr)	-37.50	-37.50
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	2.06	1.23
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-40077



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = <-37.5 cm/year

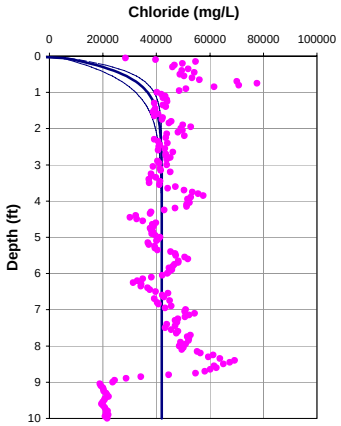
OL-GP-40077



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = <-37.5 cm/year

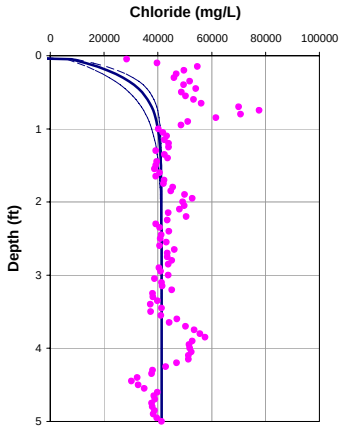
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2400	2400
Cl (mg/L)	40000	40000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-50.00	-50.00
q (cm/yr)	-37.50	-37.50
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	2.06	1.23
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-GP-40078



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = <-37.5 cm/year

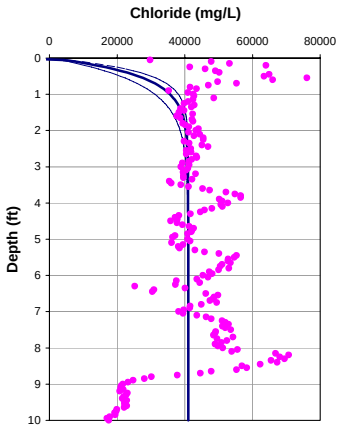
OL-GP-40078



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = <-37.5 cm/year

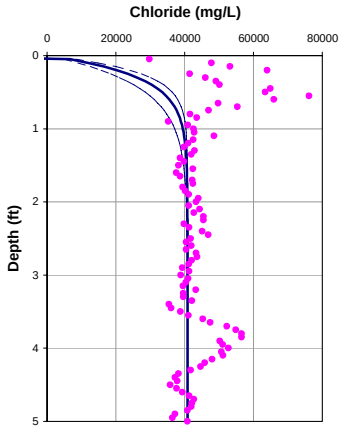
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1700	1700
Cl (mg/L)	42000	41332
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-50.00	-50.00
q (cm/yr)	-37.50	-37.50
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	2.06	1.23
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.7	

OL-GP-40079



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = <-37.5 cm/year

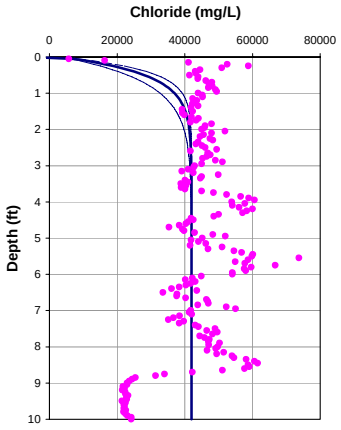
OL-GP-40079



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = <-37.5 cm/year

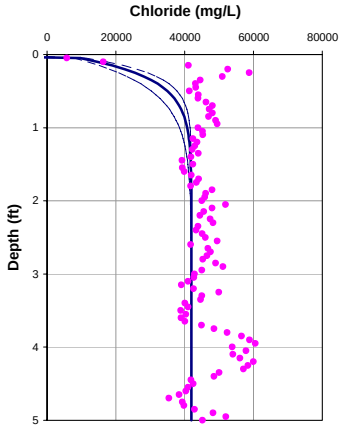
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	41000	40812
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-50.00	-50.00
q (cm/yr)	-37.50	-37.50
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	2.06	1.23
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-GP-40079A



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = <-37.5 cm/year

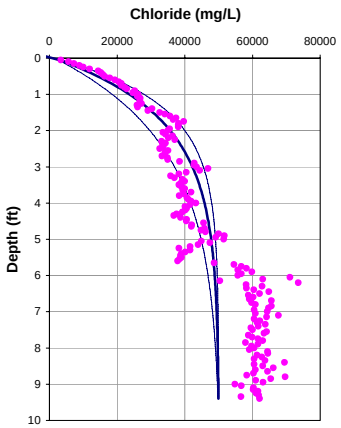
OL-GP-40079A



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = <-37.5 cm/year

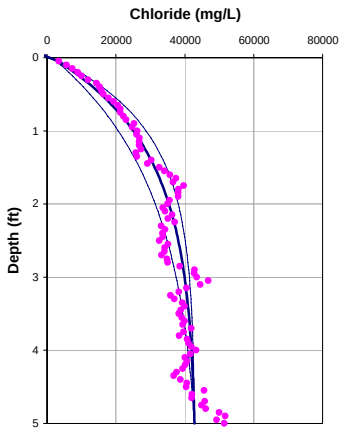
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	3633	3633
Cl (mg/L)	42000	42000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-50.00	-50.00
q (cm/yr)	-37.50	-37.50
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	2.06	1.23
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.35	

OL-GP-40080



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -5.3 cm/year

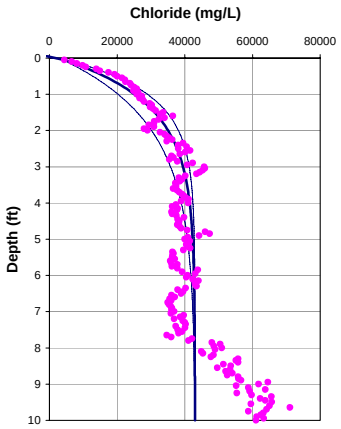
OL-GP-40080



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -6.3 cm/year

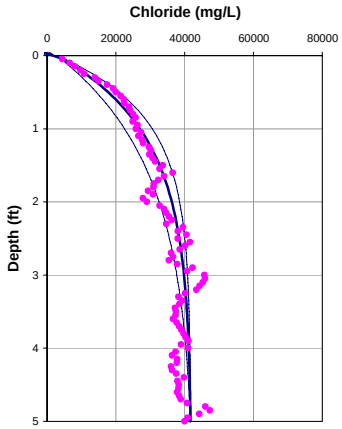
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		1572	1572
Cl (mg/L)		50000	42800
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.75	0.75
Calculated Values **********			
V(cm/yr)		-7.00	-8.44
q (cm/yr)		-5.25	-6.33
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.78	0.78
Diffusion + Dispersion (cm2/day)		0.96	0.86
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	-0.85		

OL-GP-40081



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -7.6 cm/year

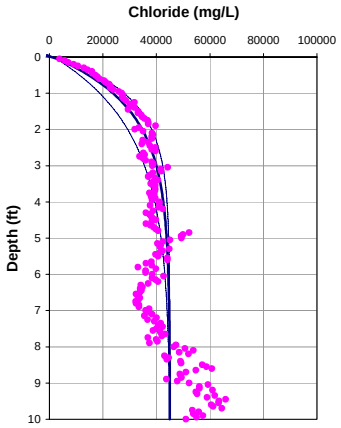
OL-GP-40081



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -7.5 cm/year

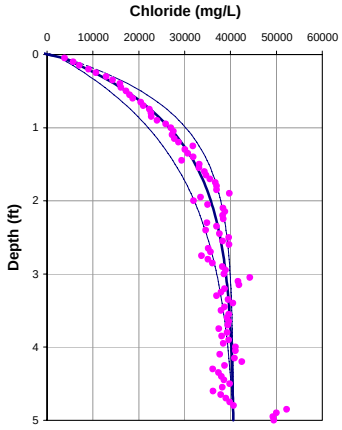
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		2885	2885
Cl (mg/L)		43000	41700
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.8	0.8
Calculated Values **********			
V(cm/yr)		-10.10	-10.00
q (cm/yr)		-7.58	-7.50
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.78	0.78
Diffusion + Dispersion (cm2/day)		1.04	0.87
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	-1		

OL-GP-40082



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -6.5 cm/year

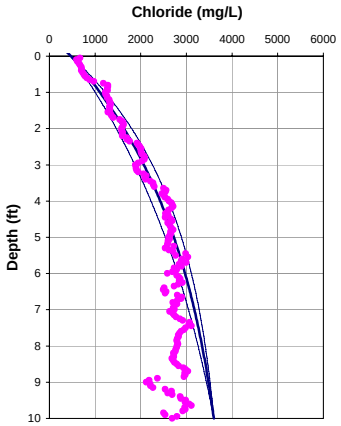
OL-GP-40082



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -8.0 cm/year

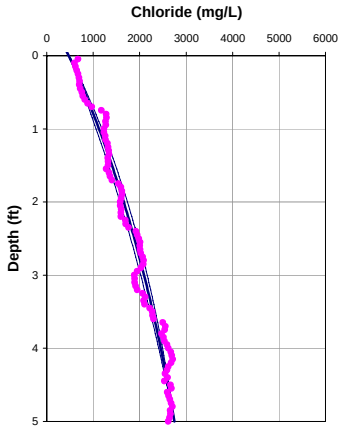
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		1587	1587
Cl (mg/L)		45000	40600
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.8	0.8
Calculated Values **********			
V(cm/yr)		-8.61	-10.71
q (cm/yr)		-6.45	-8.03
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.78	0.78
Diffusion + Dispersion (cm2/day)		1.00	0.88
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	-0.7		

OL-GP-40107



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -1.4 cm/year

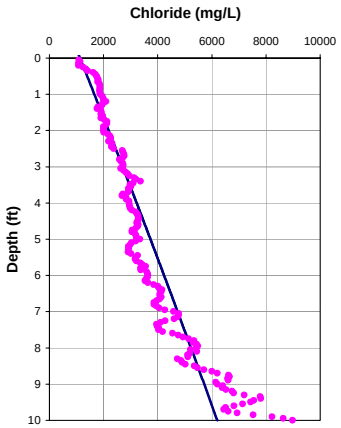
OL-GP-40107



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -1.4 cm/year

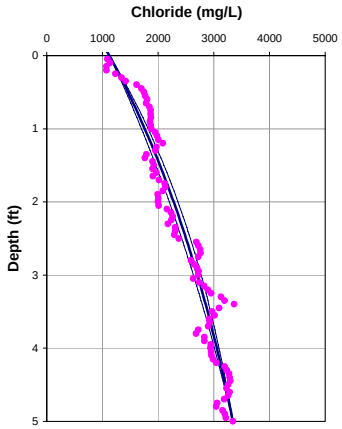
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	477	477
Cl (mg/L)	3600	2750
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-1.88	-1.88
q (cm/yr)	-1.41	-1.41
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.83	0.80
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.85	

OL-GP-40108



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

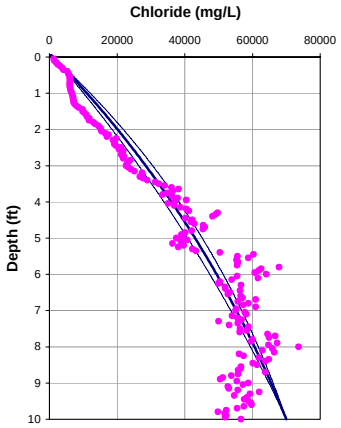
OL-GP-40108



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -1.4 cm/year

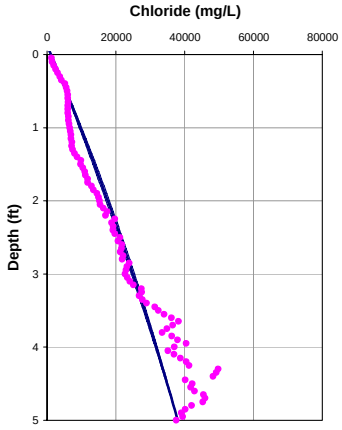
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1129	1129
Cl (mg/L)	6200	3343
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-0.10	-1.89
q (cm/yr)	-0.08	-1.41
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.80
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-40109



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -0.6 cm/year

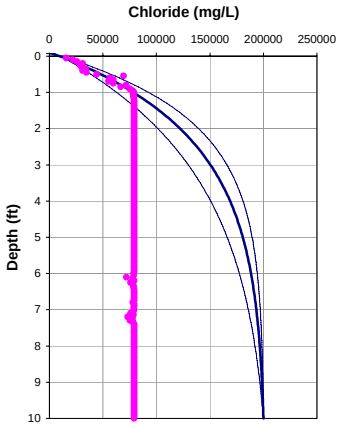
OL-GP-40109



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -0.6 cm/year

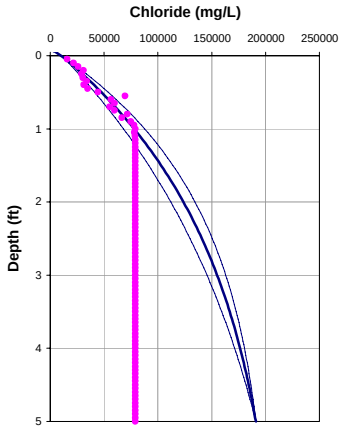
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1155	1155
Cl (mg/L)	70000	38000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-0.85	-0.74
q (cm/yr)	-0.64	-0.55
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.81	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-40110



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -3.5 cm/year

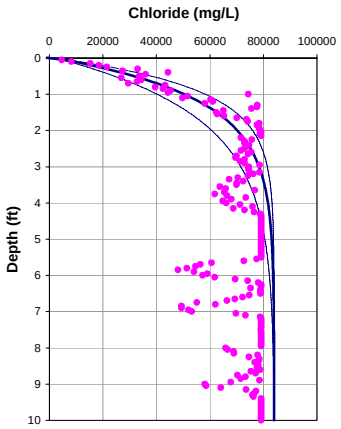
OL-GP-40110



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -2.8 cm/year

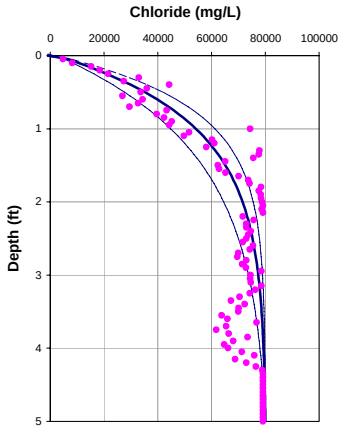
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	10703	10703
Cl (mg/L)	200000	191000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-4.71	-3.73
q (cm/yr)	-3.53	-2.80
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.90	0.82
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.25	

OL-GP-40110A



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -8.6 cm/year

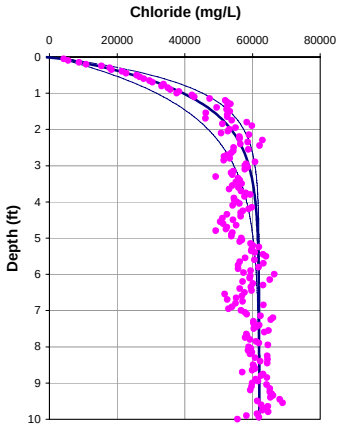
OL-GP-40110A



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -8.7 cm/year

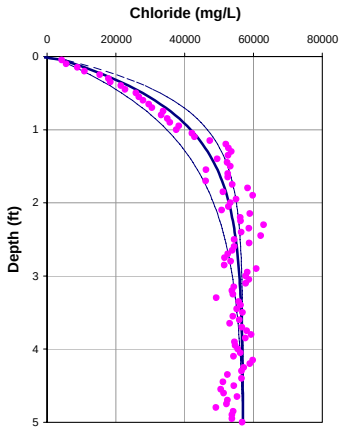
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2499	2499
Cl (mg/L)	84000	80000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-11.48	-11.58
q (cm/yr)	-8.61	-8.68
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	1.08	0.89
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-40114



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -10.1 cm/year

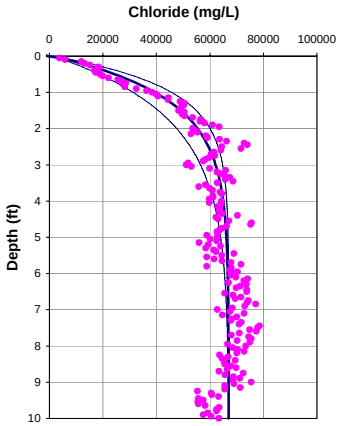
OL-GP-40114



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -10.6 cm/year

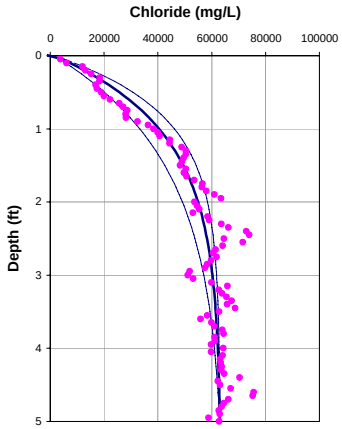
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1108	1108
Cl (mg/L)	62000	56950
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-13.42	-14.12
q (cm/yr)	-10.07	-10.59
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	1.13	0.91
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.45	

OL-GP-40115



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -8.3 cm/year

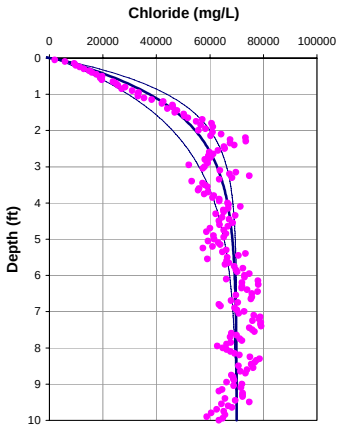
OL-GP-40115



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -7.8 cm/year

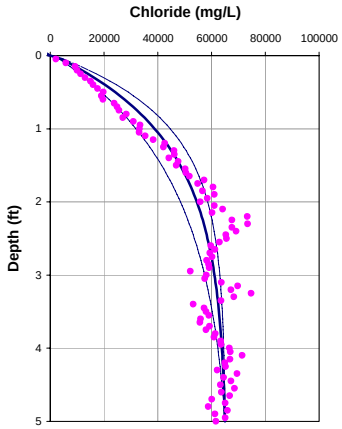
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1508	1508
Cl (mg/L)	67000	63000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-11.04	-10.39
q (cm/yr)	-8.28	-7.79
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	1.07	0.88
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.75	

OL-GP-40116



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -6.8 cm/year

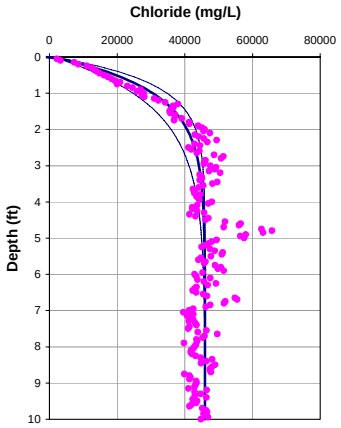
OL-GP-40116



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -6.7 cm/year

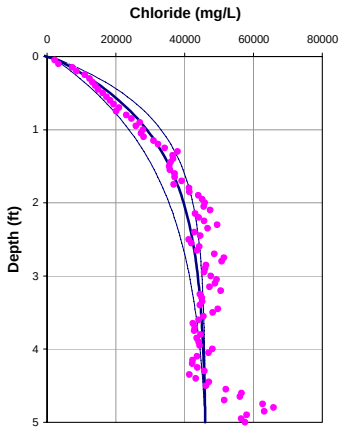
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1514	1514
Cl (mg/L)	70000	65000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-9.03	-8.99
q (cm/yr)	-6.77	-6.74
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	1.01	0.86
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-40117



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -11.1 cm/year

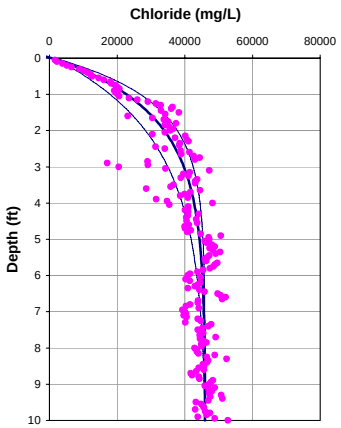
OL-GP-40117



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -7.5 cm/year

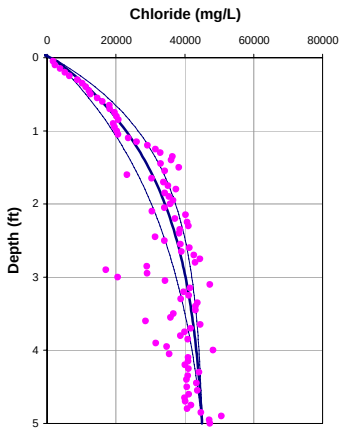
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1102	1102
Cl (mg/L)	46000	46000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-14.86	-10.00
q (cm/yr)	-11.14	-7.50
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	1.16	0.87
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.2	

OL-GP-40118



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -5.7 cm/year

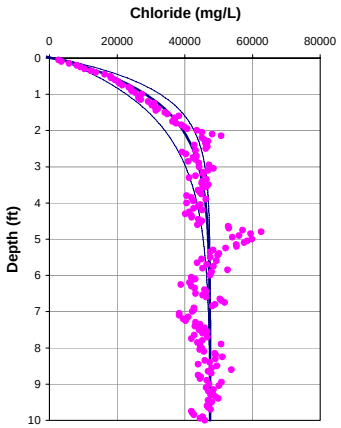
OL-GP-40118



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -4.8 cm/year

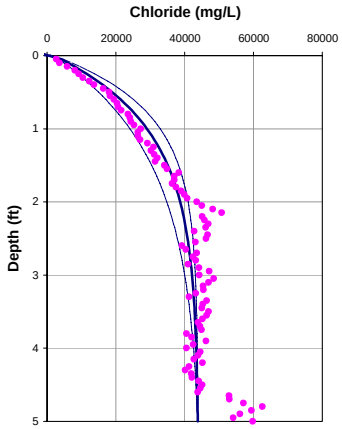
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1455	1455
Cl (mg/L)	46000	45000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-7.63	-6.44
q (cm/yr)	-5.72	-4.83
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.98	0.84
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.7	

OL-GP-40119



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -8.3 cm/year

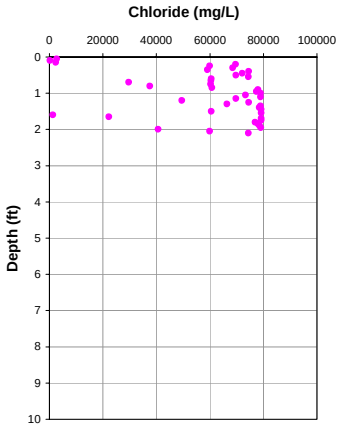
OL-GP-40119



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -8.2 cm/year

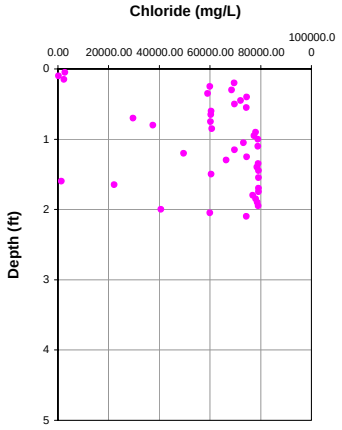
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1974	1974
Cl (mg/L)	47500	43800
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-11.12	-10.87
q (cm/yr)	-8.34	-8.15
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	1.07	0.88
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-40123



Porosity = 0.75
Dispersion length = 0.0 feet
Upwelling Velocity = NA cm/year

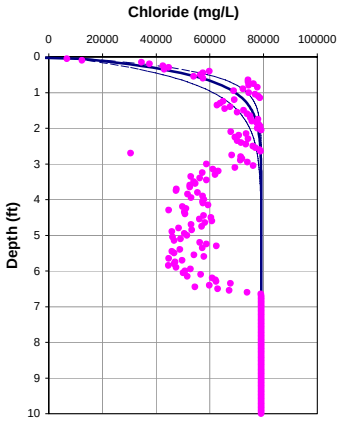
OL-GP-40123



Porosity = 0.75
Dispersion length = 0.0 feet
Upwelling Velocity = NA cm/year

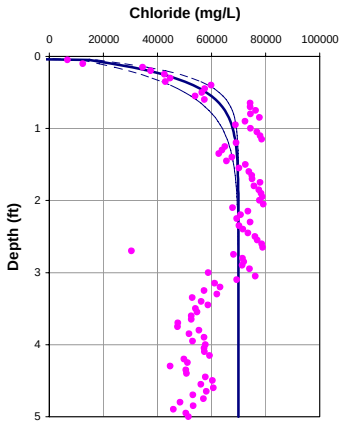
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	72	72
Cl (mg/L)	74386	74386
L(ft)	2	2
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-6.74	-4.97
q (cm/yr)	-5.06	-3.72
dispersion length (ft)	0.03	0.03
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.03	0.03
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.80	0.80
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.1	

OL-GP-40143



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = <-37.5 cm/year

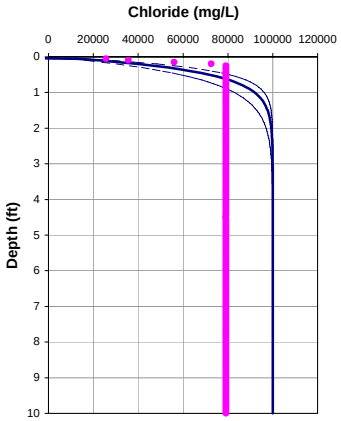
OL-GP-40143



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = <-37.5 cm/year

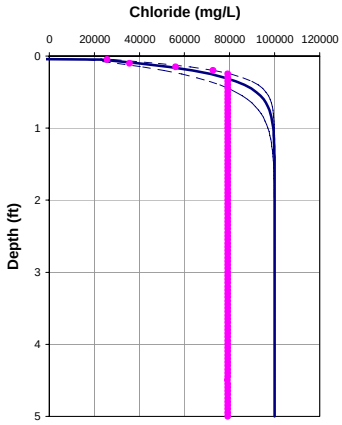
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		4583	4583
Cl (mg/L)		79200	70000
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.75	0.75
Calculated Values **********			
V(cm/yr)		-50.00	-50.00
q (cm/yr)		-37.50	-37.50
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.78	0.78
Diffusion + Dispersion (cm2/day)		2.06	1.23
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	-1.2		

OL-GP-40144



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = <-37.5 cm/year

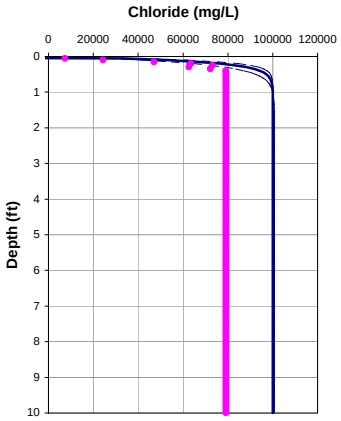
OL-GP-40144



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = <-37.5 cm/year

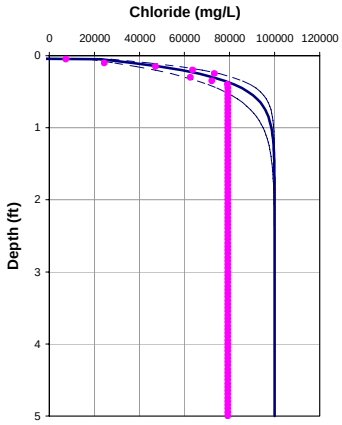
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		1000	1000
Cl (mg/L)		100000	100000
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.8	0.8
Calculated Values **********			
V(cm/yr)		-100.00	-100.00
q (cm/yr)		-75.00	-75.00
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		-0.01	-0.01
Effective. Diffusion (cm2/day)		0.78	0.78
Diffusion + Dispersion (cm2/day)		3.33	1.67
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	-2		

OL-GP-40145



Porosity = 0.75
Dispersion length = 0.0 feet
Upwelling Velocity = <-37.5 cm/year

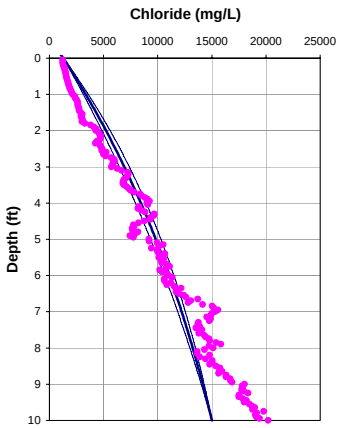
OL-GP-40145



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = <-37.5 cm/year

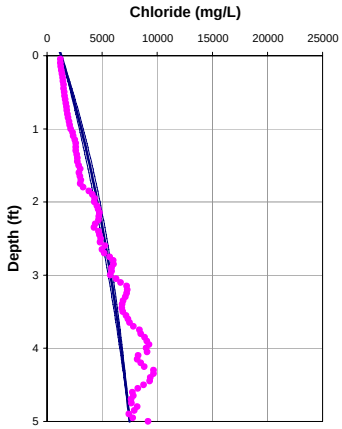
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		5020	5020
Cl (mg/L)		100000	100000
L(ft)		1	5
D (cm2/day)		1.236	1.236
porosity		0.8	0.8
Calculated Values **********			
V(cm/yr)		-70.00	-70.00
q (cm/yr)		-52.50	-52.50
dispersion length (ft)		0.01	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.01	0.11
V(ft/d)		-0.01	-0.01
Effective. Diffusion (cm2/day)		0.78	0.78
Diffusion + Dispersion (cm2/day)		0.84	1.40
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	-1.8		

OL-GP-40148



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -0.7 cm/year

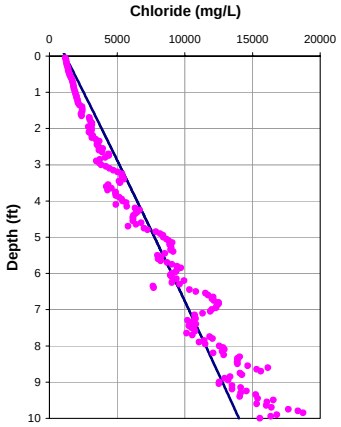
OL-GP-40148



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -1.5 cm/year

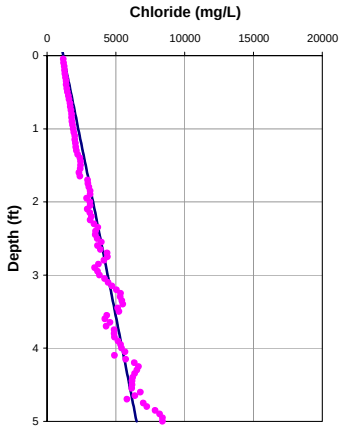
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1288	1288
Cl (mg/L)	15000	7500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-0.97	-2.04
q (cm/yr)	-0.73	-1.53
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.81	0.80
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.95	

OL-GP-40149



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

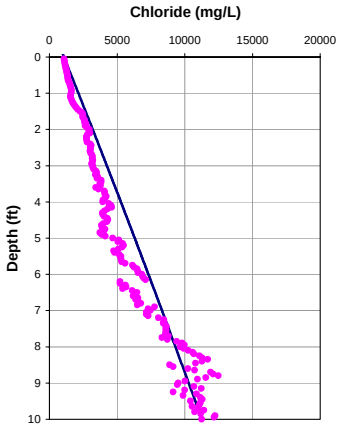
OL-GP-40149



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

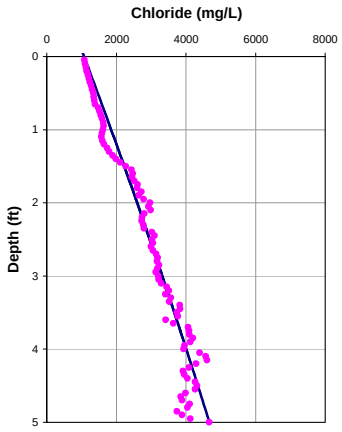
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1180	1180
Cl (mg/L)	14000	6500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.08	-0.08
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-40150



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

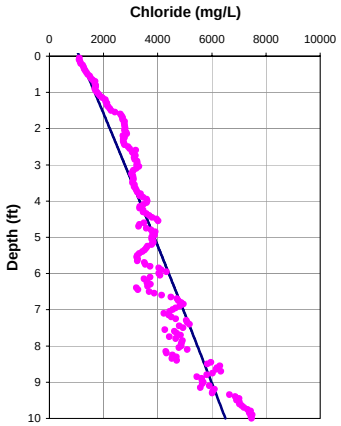
OL-GP-40150



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -0.3 cm/year

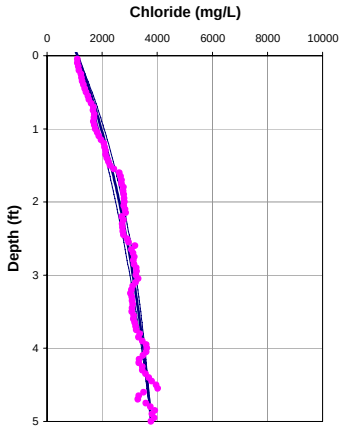
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1072	1072
Cl (mg/L)	11259	4674
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-0.10	-0.37
q (cm/yr)	-0.08	-0.28
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.1	

OL-GP-40151



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

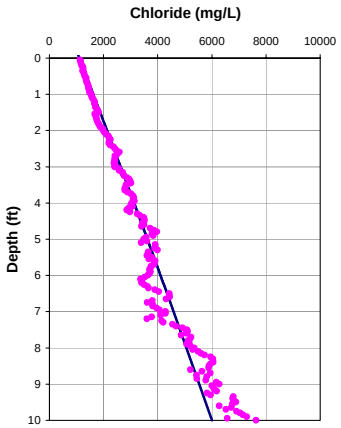
OL-GP-40151



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -2.0 cm/year

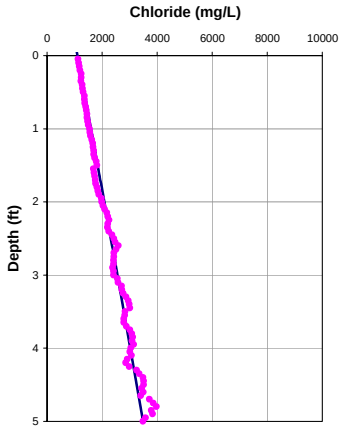
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1107	1107
Cl (mg/L)	6500	3779
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-0.10	-2.66
q (cm/yr)	-0.08	-2.00
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.81
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.4	

OL-GP-40152



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

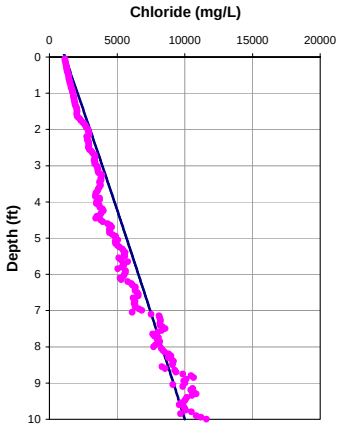
OL-GP-40152



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

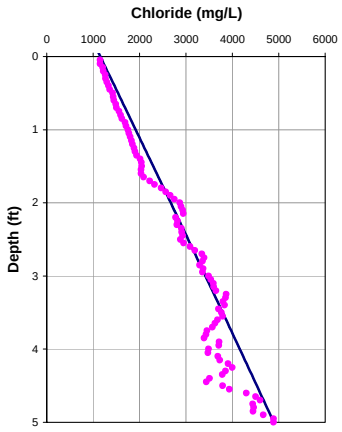
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1108	1108
Cl (mg/L)	6000	3488
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-0.10	-0.13
q (cm/yr)	-0.08	-0.10
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-40153



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

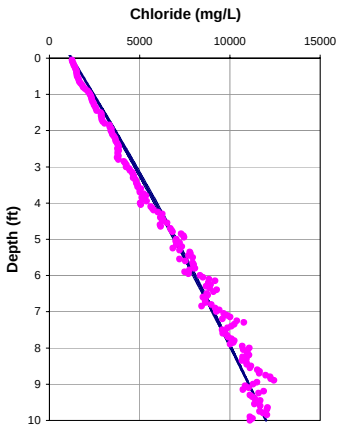
OL-GP-40153



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

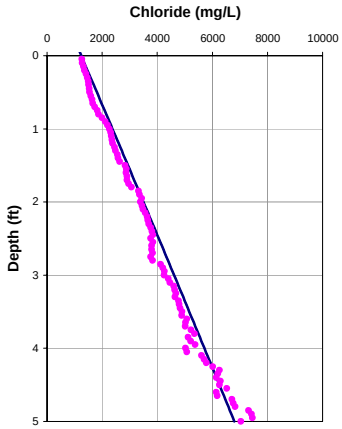
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1153	1153
Cl (mg/L)	10000	4893
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.08	-0.08
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.75	

OL-GP-40154



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -0.2 cm/year

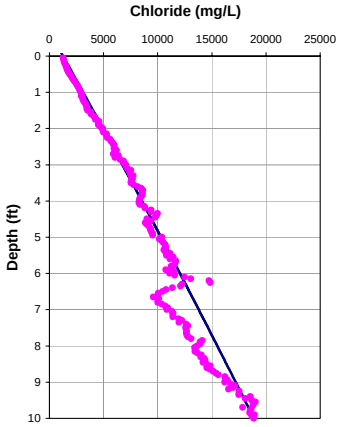
OL-GP-40154



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

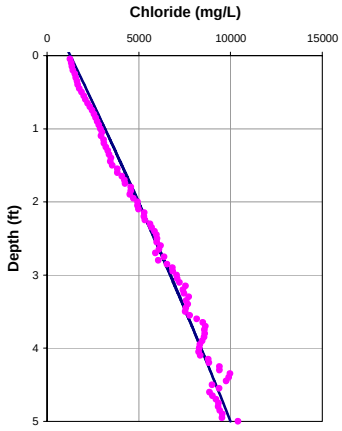
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1239	1239
Cl (mg/L)	12000	6800
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-0.25	-0.10
q (cm/yr)	-0.19	-0.08
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.6	

OL-GP-40155



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

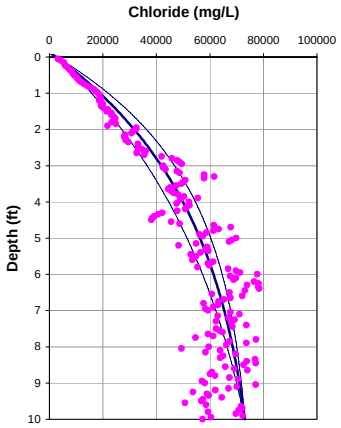
OL-GP-40155



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -0.3 cm/year

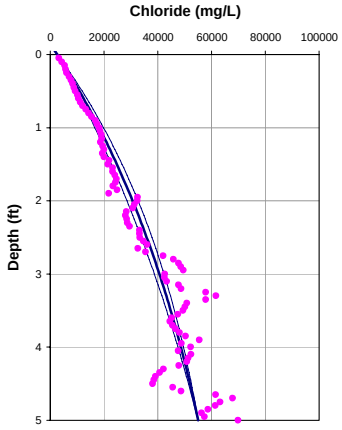
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1267	1267
Cl (mg/L)	18875	10000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-0.10	-0.38
q (cm/yr)	-0.08	-0.29
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-40156



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -1.8 cm/year

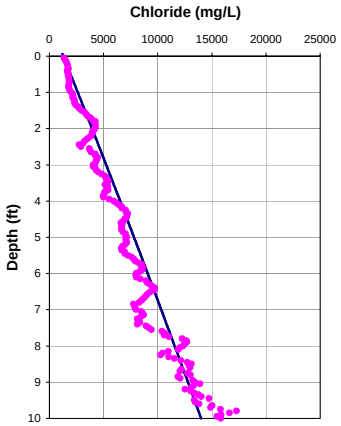
OL-GP-40156



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -1.6 cm/year

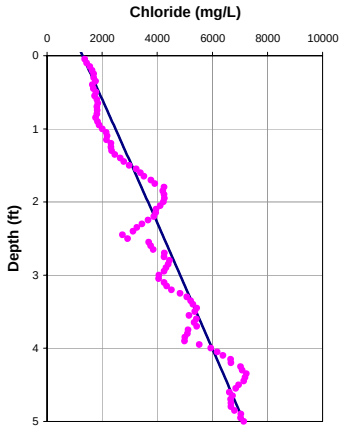
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2676	2676
Cl (mg/L)	73000	55000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-2.36	-2.13
q (cm/yr)	-1.77	-1.60
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.84	0.80
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-40157



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

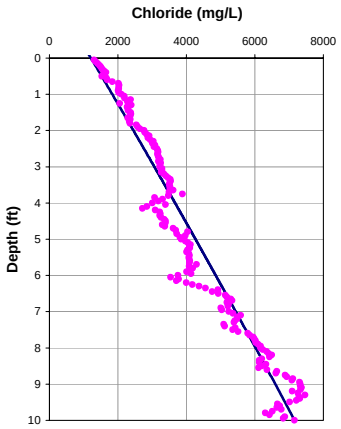
OL-GP-40157



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

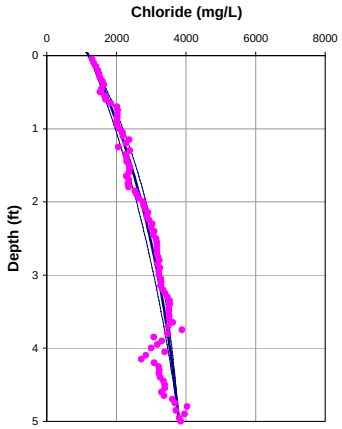
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1285	1285
Cl (mg/L)	14000	7140
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.08	-0.08
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.2	

OL-GP-40158



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

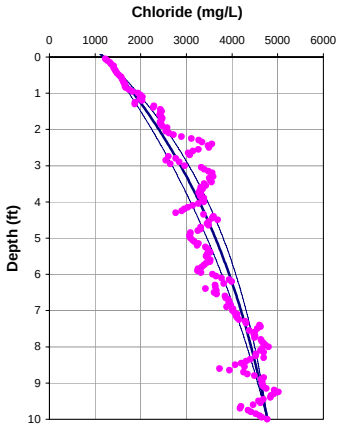
OL-GP-40158



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -2.2 cm/year

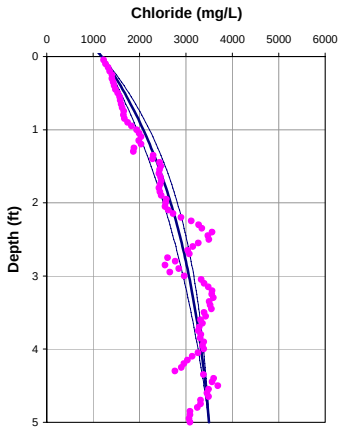
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1213	1213
Cl (mg/L)	7163	3800
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-0.10	-2.93
q (cm/yr)	-0.08	-2.20
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.81
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-40159



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -1.1 cm/year

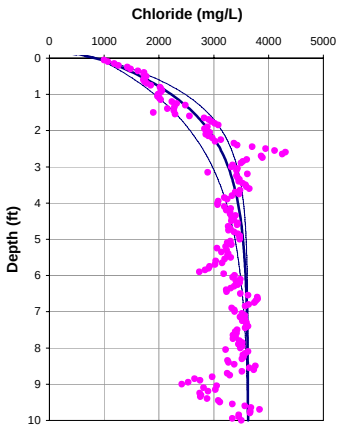
OL-GP-40159



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -3.0 cm/year

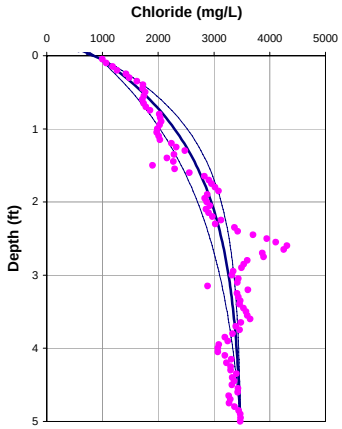
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1192	1192
Cl (mg/L)	4773	3500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-1.51	-4.00
q (cm/yr)	-1.13	-3.00
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.82	0.82
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.65	

OL-GP-40160



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -6.0 cm/year

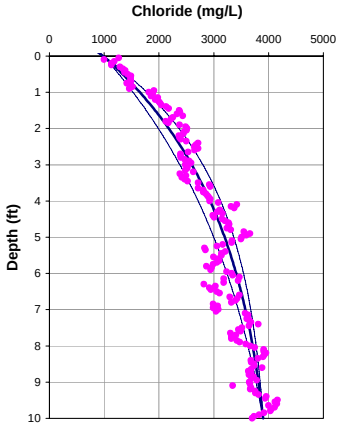
OL-GP-40160



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -5.8 cm/year

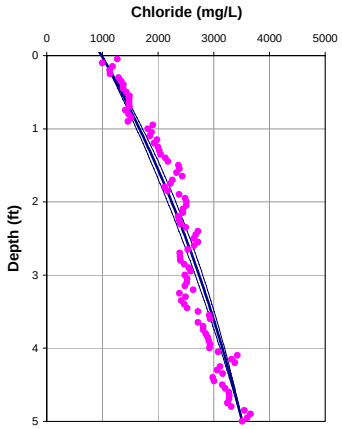
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	881	881
Cl (mg/L)	3625	3474
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-7.94	-7.75
q (cm/yr)	-5.96	-5.81
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.99	0.85
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.65	

OL-GP-40161



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -1.7 cm/year

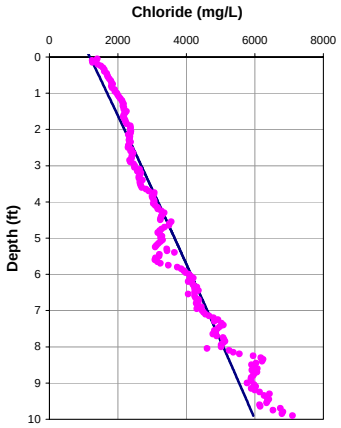
OL-GP-40161



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -1.2 cm/year

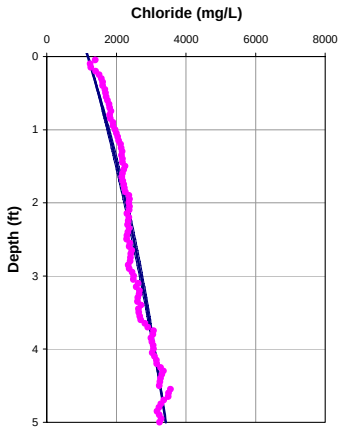
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	986	986
Cl (mg/L)	3900	3512
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-2.32	-1.54
q (cm/yr)	-1.74	-1.15
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.84	0.80
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-40162



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

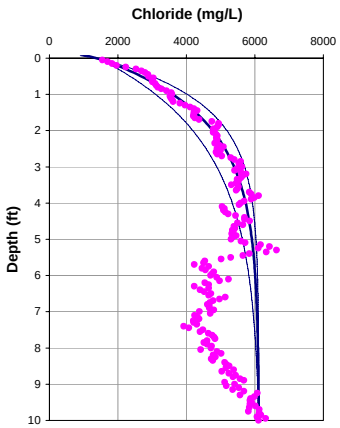
OL-GP-40162



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -1.0 cm/year

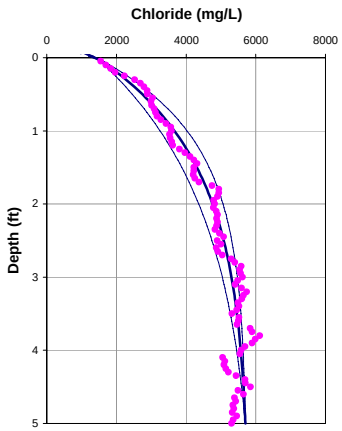
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1185	1185
Cl (mg/L)	6000	3420
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-0.10	-1.35
q (cm/yr)	-0.08	-1.01
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.80
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2.1	

OL-GP-40163



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -5.4 cm/year

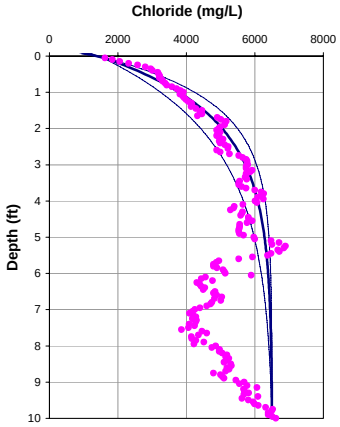
OL-GP-40163



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -5.4 cm/year

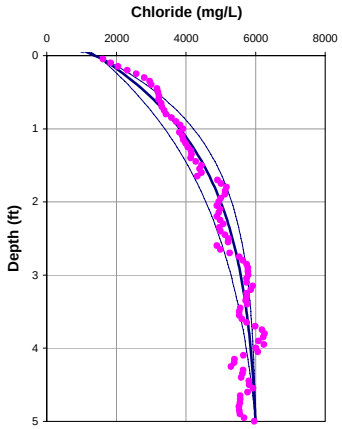
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		1432	1432
Cl (mg/L)		6113	5700
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.75	0.75
Calculated Values **********			
V(cm/yr)		-7.20	-7.20
q (cm/yr)		-5.40	-5.40
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.78	0.78
Diffusion + Dispersion (cm2/day)		0.97	0.85
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	-1.3		

OL-GP-40163-A



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -5.4 cm/year

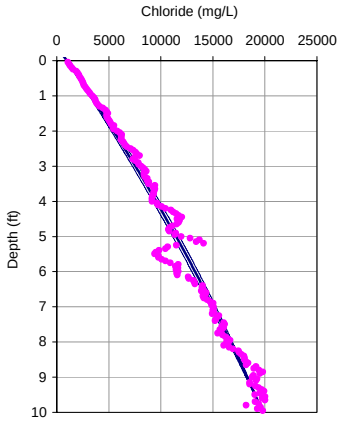
OL-GP-40163-A



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -5.4 cm/year

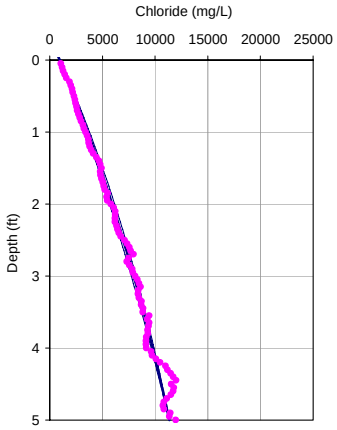
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		1449	1449
Cl (mg/L)		6500	6000
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.8	0.8
Calculated Values **********			
V(cm/yr)		-7.18	-7.18
q (cm/yr)		-5.39	-5.38
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.78	0.78
Diffusion + Dispersion (cm2/day)		0.97	0.85
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	-1		

OL-GP-40164.DAT



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -0.3 cm/year

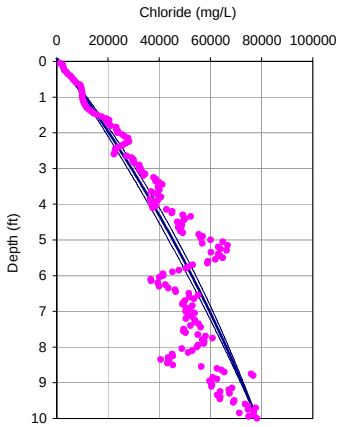
OL-GP-40164.DAT



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -0.9 cm/year

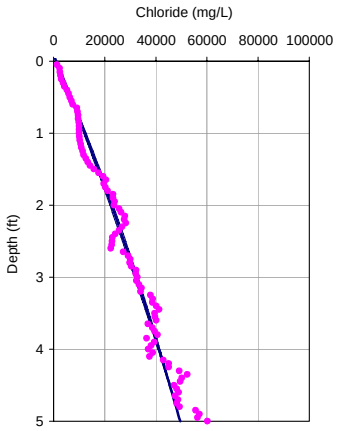
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		957	957
Cl (mg/L)		19799	11350
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.8	0.8
Calculated Values **********			
V(cm/yr)		-0.44	-1.22
q (cm/yr)		-0.33	-0.91
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.78	0.78
Diffusion + Dispersion (cm2/day)		0.80	0.80
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	-0.35		

OL-GP-40165.DAT



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -0.4 cm/year

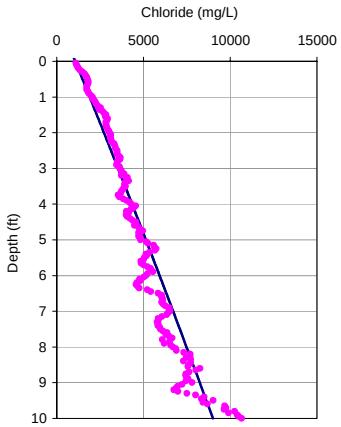
OL-GP-40165.DAT



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -0.5 cm/year

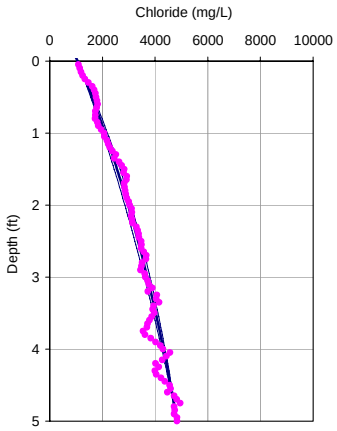
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1034	1034
Cl (mg/L)	78194	49500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-0.58	-0.72
q (cm/yr)	-0.43	-0.54
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.80	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.3	

OL-GP-40166



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

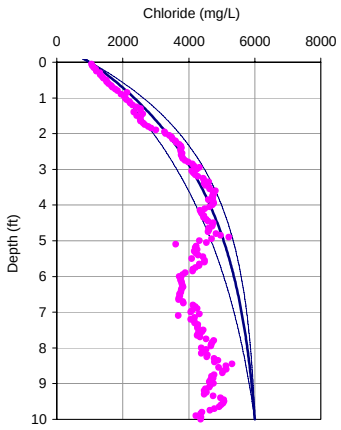
OL-GP-40166



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -1.3 cm/year

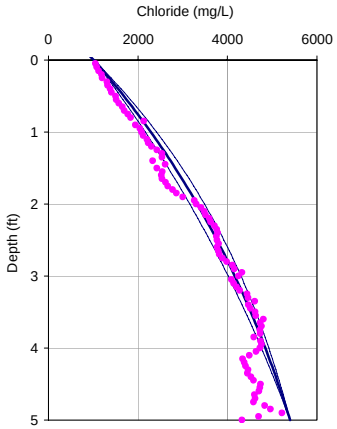
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1065	1065
Cl (mg/L)	9000	4835
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-0.10	-1.67
q (cm/yr)	-0.08	-1.25
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.80
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-40167.DAT



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -2.3 cm/year

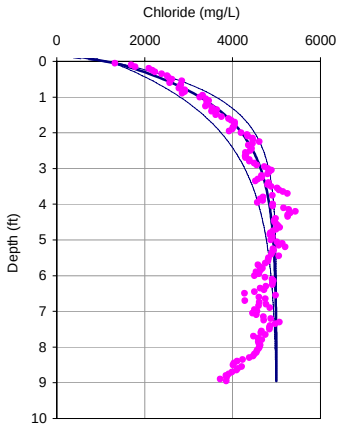
OL-GP-40167.DAT



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -1.5 cm/year

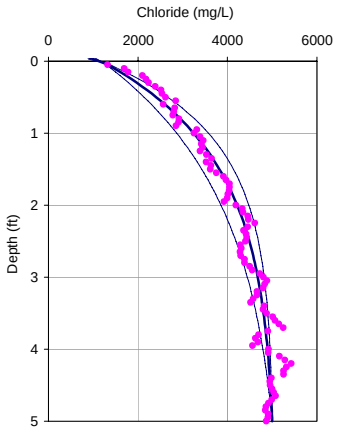
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1015	1015
Cl (mg/L)	6000	5400
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-3.00	-2.00
q (cm/yr)	-2.25	-1.50
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.86	0.80
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.6	

OL-GP-40168.DAT



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -7.2 cm/year

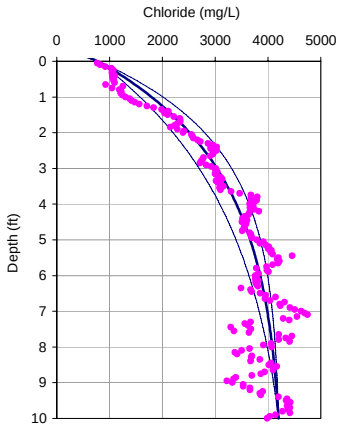
OL-GP-40168.DAT



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -5.7 cm/year

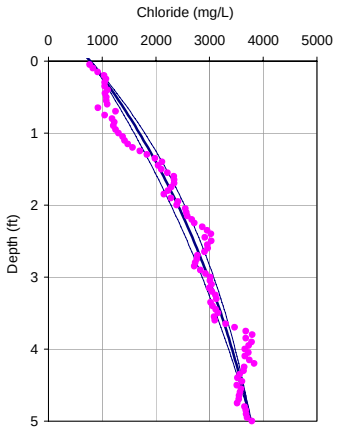
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1196	1196
Cl (mg/L)	5000	5000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-9.66	-7.61
q (cm/yr)	-7.24	-5.71
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	1.03	0.85
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-40169.DAT



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -2.6 cm/year

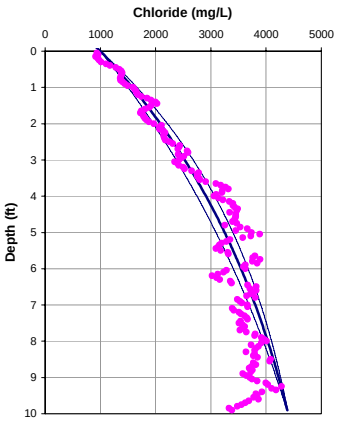
OL-GP-40169.DAT



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -1.7 cm/year

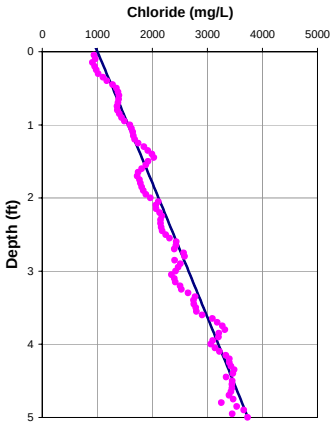
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	786	786
Cl (mg/L)	4200	3770
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-3.52	-2.29
q (cm/yr)	-2.64	-1.72
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.87	0.80
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-40170.DAT



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -1.0 cm/year

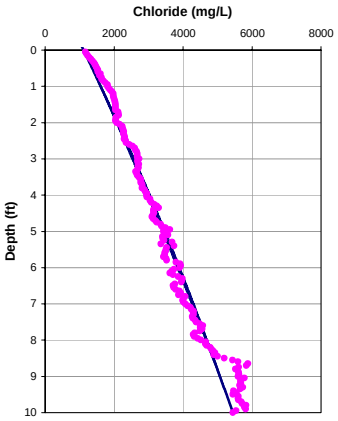
OL-GP-40170.DAT



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

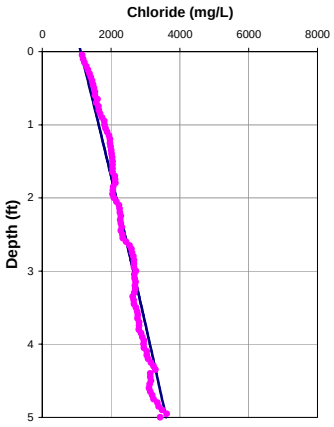
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1003	1003
Cl (mg/L)	4400	3735
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-1.31	-0.10
q (cm/yr)	-0.99	-0.08
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.82	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.9	

OL-GP-40171.DAT



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -0.2 cm/year

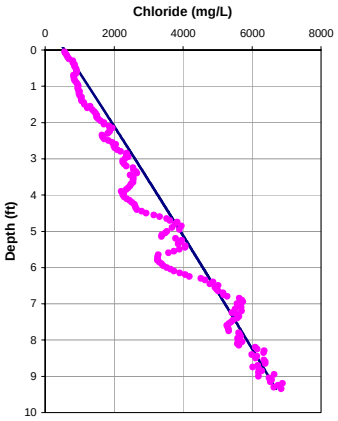
OL-GP-40171.DAT



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -0.2 cm/year

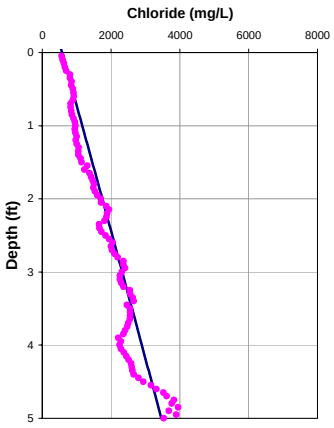
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1116	1116
Cl (mg/L)	5445	3600
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-0.29	-0.26
q (cm/yr)	-0.22	-0.19
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-40172.DAT



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

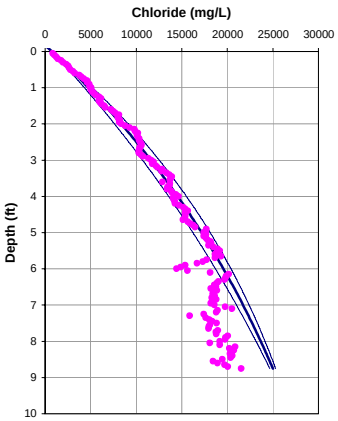
OL-GP-40172.DAT



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

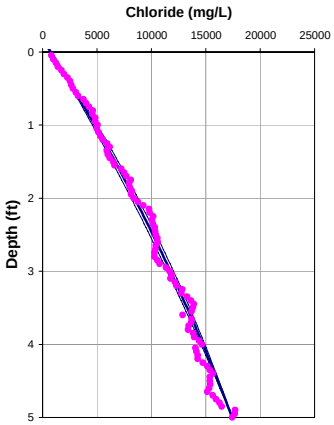
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	572	572
Cl (mg/L)	7100	3460
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.08	-0.08
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.65	

OL-GP-40173.DAT



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -0.8 cm/year

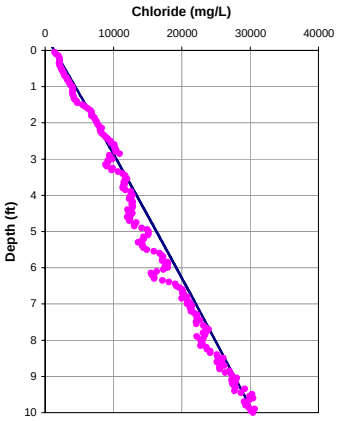
OL-GP-40173.DAT



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -0.7 cm/year

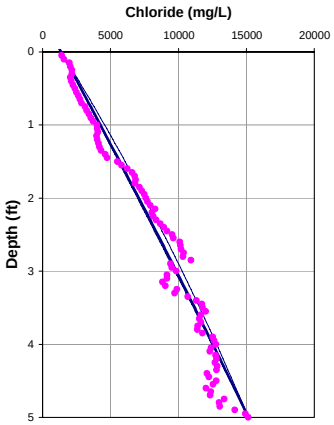
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	759	759
Cl (mg/L)	27000	17431
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-1.00	-0.96
q (cm/yr)	-0.75	-0.72
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.81	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.6	

OL-GP-40174.DAT



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

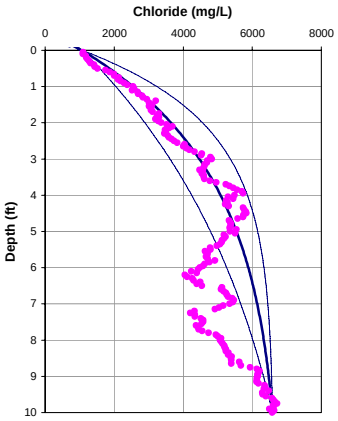
OL-GP-40174.DAT



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -0.2 cm/year

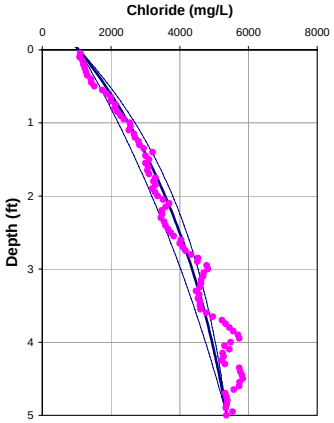
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1362	1362
Cl (mg/L)	30461	15150
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-0.10	-0.25
q (cm/yr)	-0.08	-0.19
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-40175.DAT



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -2.3 cm/year

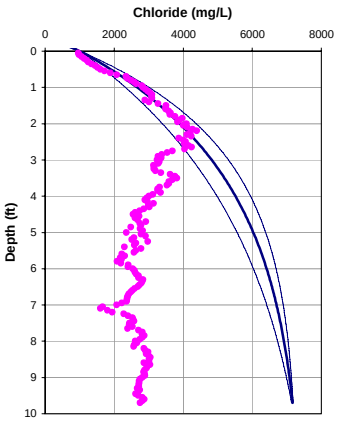
OL-GP-40175.DAT



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -2.2 cm/year

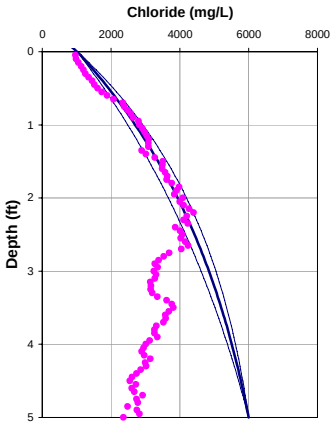
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1074	1074
Cl (mg/L)	6585	5370
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-3.00	-2.94
q (cm/yr)	-2.25	-2.21
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.86	0.81
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.6	

OL-GP-40176.DAT



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -2.3 cm/year

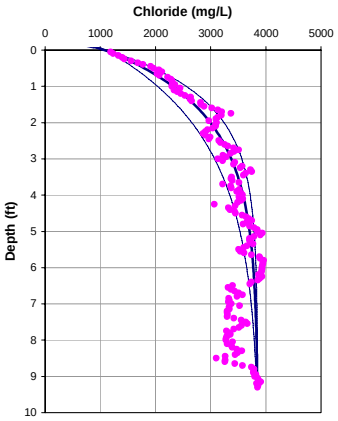
OL-GP-40176.DAT



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -2.3 cm/year

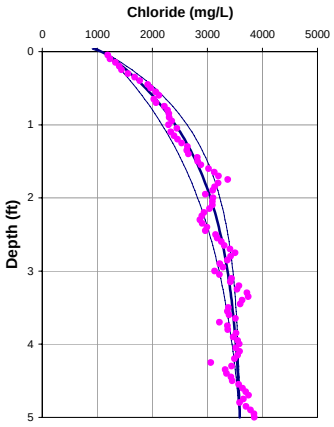
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1018	1018
Cl (mg/L)	7200	6000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-3.00	-3.00
q (cm/yr)	-2.25	-2.25
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.86	0.81
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-40177.DAT



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -5.0 cm/year

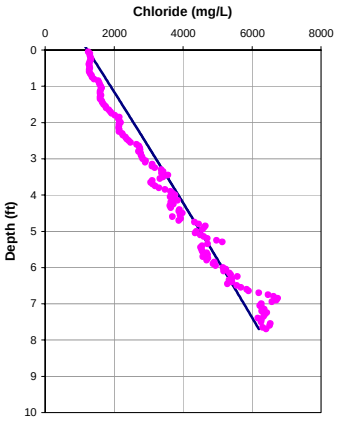
OL-GP-40177.DAT



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -5.5 cm/year

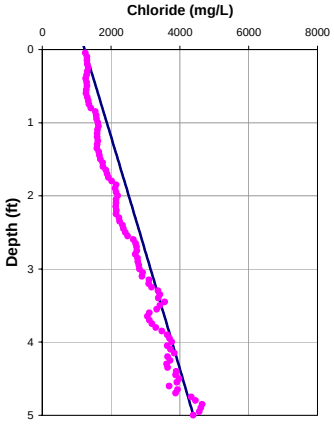
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1108	1108
Cl (mg/L)	3850	3590
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-6.61	-7.33
q (cm/yr)	-4.96	-5.49
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.95	0.85
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-40178.DAT



Porosity = 0.75
Dispersion length = 0.2 feet
Upwelling Velocity = ~0 cm/year

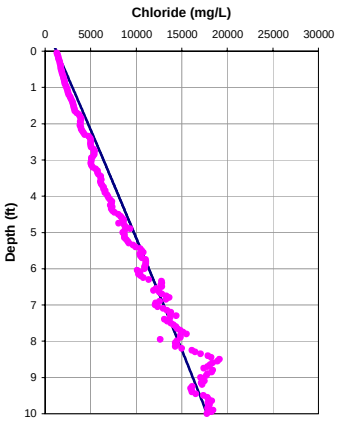
OL-GP-40178.DAT



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

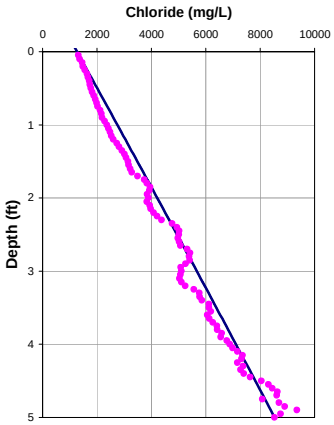
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1231	1231
Cl (mg/L)	6200	4393
L(ft)	8	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.08	-0.08
dispersion length (ft)	0.20	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.20	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-3.9	

OL-GP-40179.DAT



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

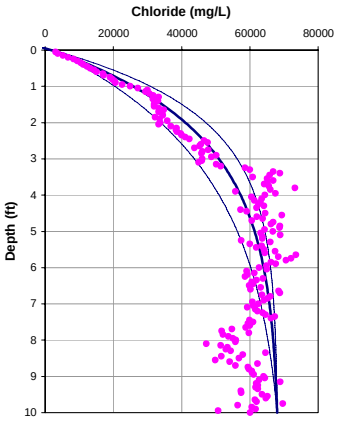
OL-GP-40179.DAT



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

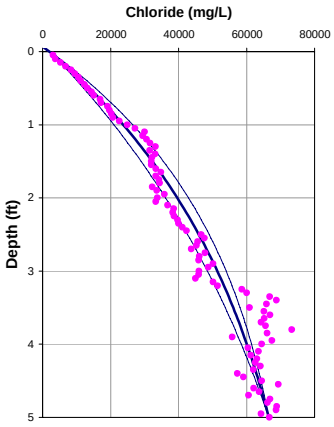
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1264	1264
Cl (mg/L)	17782	8531
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.08	-0.08
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.3	

OL-GP-40180.DAT



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -3.6 cm/year

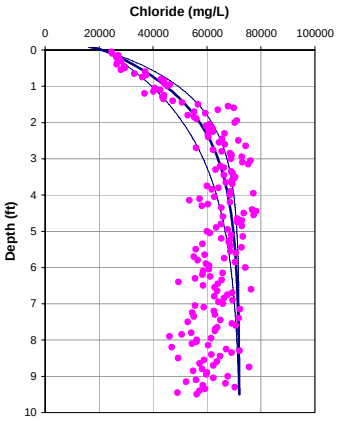
OL-GP-40180.DAT



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -2.2 cm/year

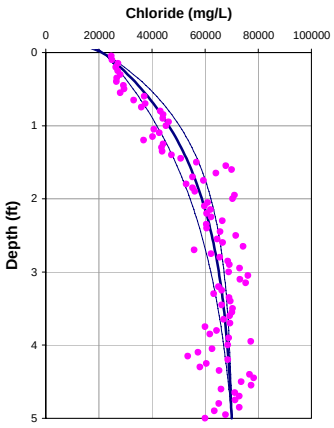
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2173	2173
Cl (mg/L)	68000	66500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-4.76	-2.94
q (cm/yr)	-3.57	-2.20
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.91	0.81
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-40181.DAT



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -5.3 cm/year

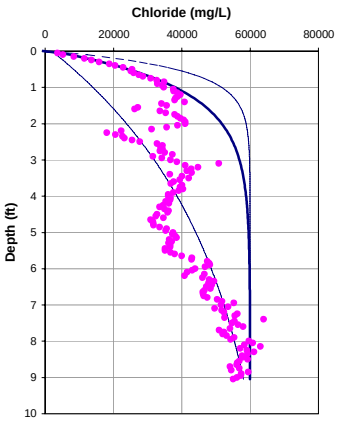
OL-GP-40181.DAT



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -5.1 cm/year

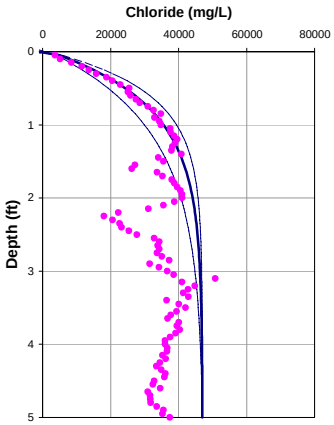
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	21702	21702
Cl (mg/L)	72000	70000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-7.07	-6.85
q (cm/yr)	-5.30	-5.14
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.96	0.85
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-40182.DAT



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -9.8 cm/year

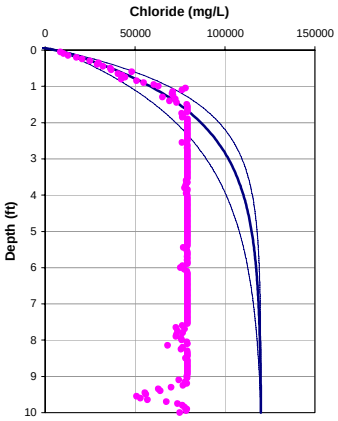
OL-GP-40182.DAT



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -11.3 cm/year

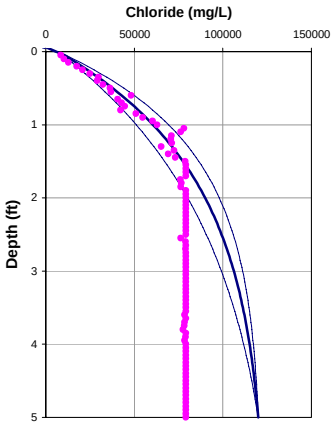
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2036	2036
Cl (mg/L)	60000	47000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-13.00	-15.00
q (cm/yr)	-9.75	-11.25
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	1.12	0.92
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2.05	

OL-GP-40183



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -5.3 cm/year

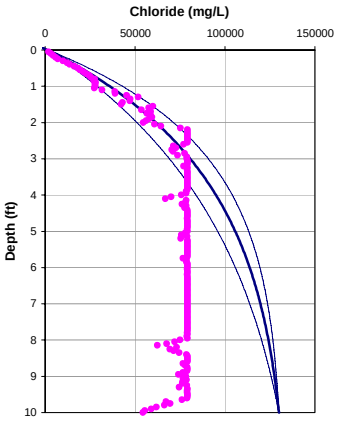
OL-GP-40183



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -4.5 cm/year

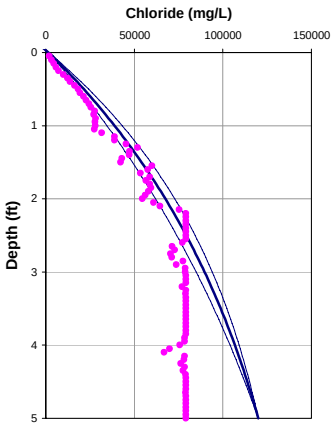
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	6962	6962
Cl (mg/L)	120000	120000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-7.00	-6.00
q (cm/yr)	-5.25	-4.50
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.96	0.84
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-40183.DAT



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -2.3 cm/year

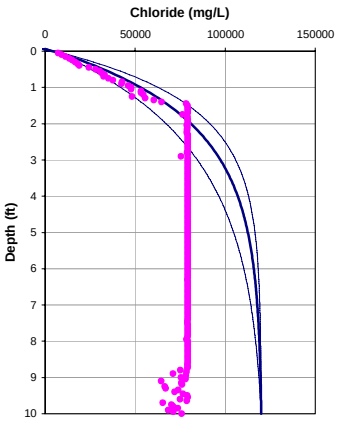
OL-GP-40183.DAT



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -1.9 cm/year

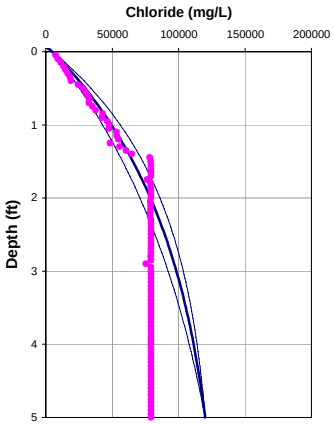
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1619	1619
Cl (mg/L)	130000	120000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-3.00	-2.50
q (cm/yr)	-2.25	-1.88
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.86	0.81
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.4	

OL-GP-40184



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -4.5 cm/year

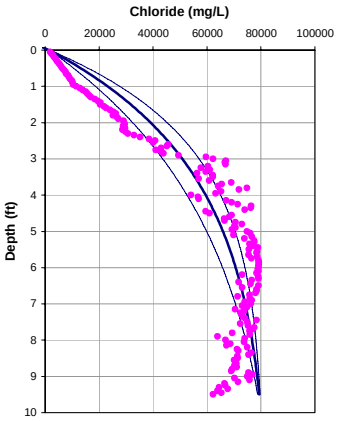
OL-GP-40184



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -3.0 cm/year

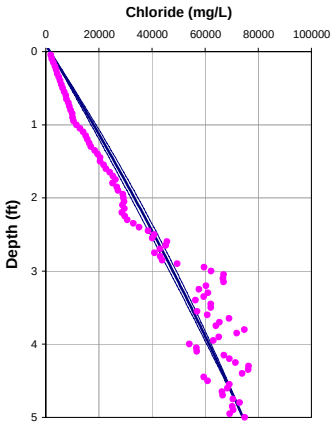
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	5276	5276
Cl (mg/L)	120000	120000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-6.00	-4.00
q (cm/yr)	-4.50	-3.00
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.94	0.82
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.25	

OL-GP-40184.DAT



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -2.4 cm/year

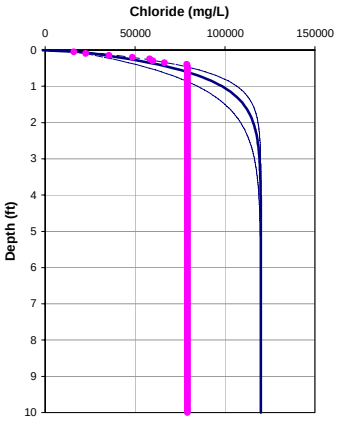
OL-GP-40184.DAT



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -0.4 cm/year

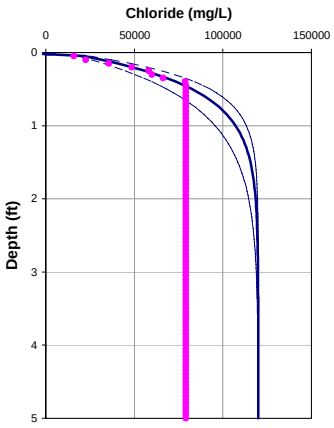
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1604	1604
Cl (mg/L)	80000	74286
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-3.14	-0.58
q (cm/yr)	-2.36	-0.44
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.86	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-40185



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -22.5 cm/year

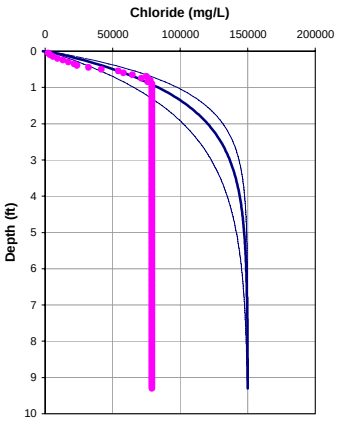
OL-GP-40185



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -19.5 cm/year

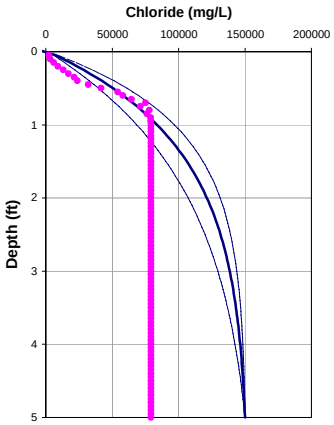
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	10701	10701
Cl (mg/L)	120000	120000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-30.00	-26.00
q (cm/yr)	-22.50	-19.50
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	1.55	1.01
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.65	

OL-GP-40185.DAT



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -7.5 cm/year

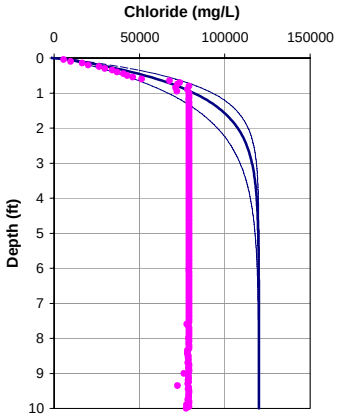
OL-GP-40185.DAT



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -6.0 cm/year

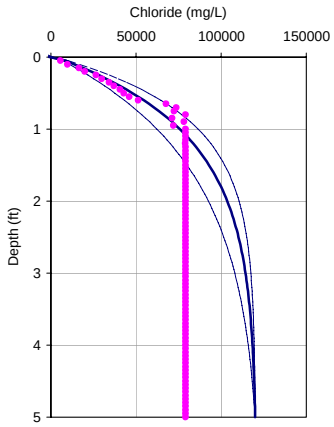
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1713	1713
Cl (mg/L)	150000	150000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-10.00	-8.00
q (cm/yr)	-7.50	-6.00
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	1.04	0.86
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.25	

OL-GP-40186



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = NA cm/year

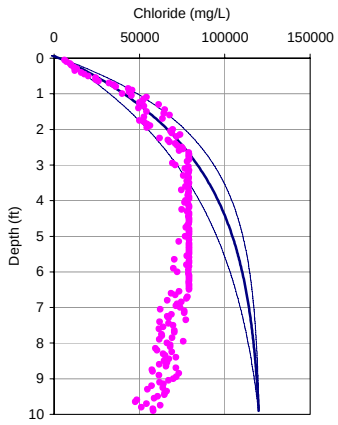
OL-GP-40186



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = NA cm/year

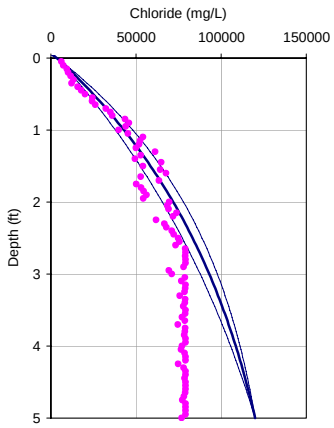
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	3178	3178
Cl (mg/L)	120000	120000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-16.00	-10.00
q (cm/yr)	-12.00	-7.50
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	1.19	0.87
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-GP-40186.DAT



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -3.0 cm/year

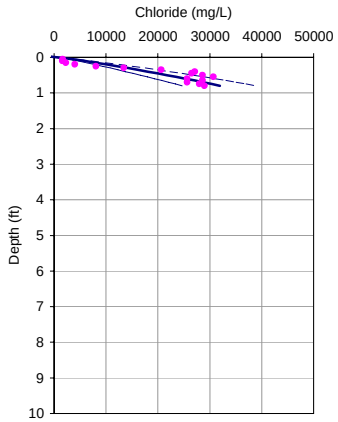
OL-GP-40186.DAT



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -2.3 cm/year

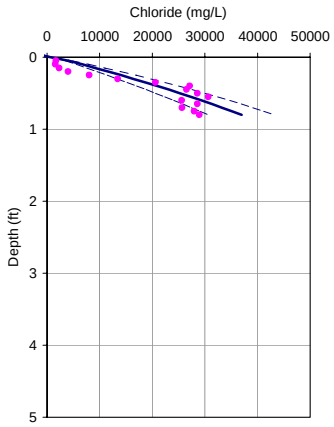
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	3672	3672
Cl (mg/L)	120000	120000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-3.97	-3.00
q (cm/yr)	-2.98	-2.25
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.89	0.81
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.95	

OL-GP-40187.DAT



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = NA cm/year

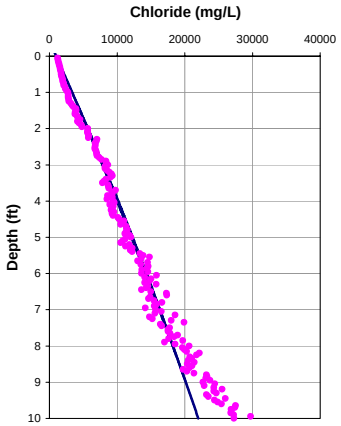
OL-GP-40187.DAT



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = NA cm/year

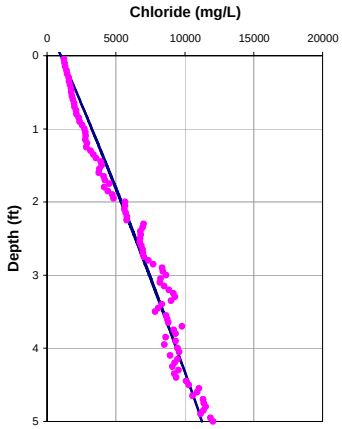
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1403	1403
Cl (mg/L)	100000	100000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-5.00	-5.00
q (cm/yr)	-3.75	-3.75
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.91	0.83
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.6	

OL-GP-50026



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -0.2 cm/year

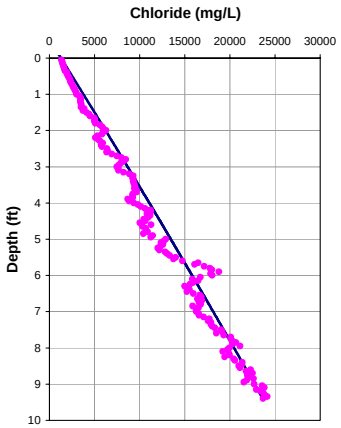
OL-GP-50026



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -0.3 cm/year

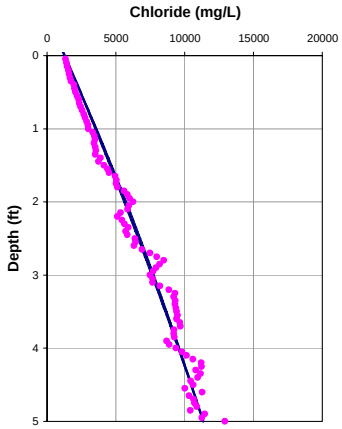
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1000	1000
Cl (mg/L)	22000	11250
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-0.25	-0.44
q (cm/yr)	-0.19	-0.33
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.05	

OL-GP-50027



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

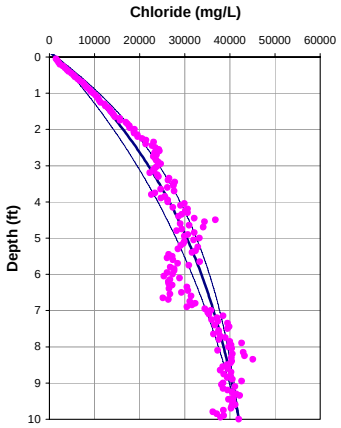
OL-GP-50027



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -0.4 cm/year

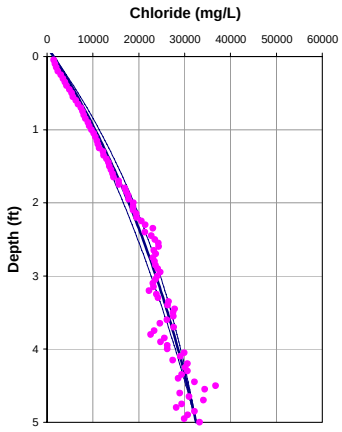
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1283	1283
Cl (mg/L)	25000	11350
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-0.10	-0.57
q (cm/yr)	-0.08	-0.43
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-3	

OL-GP-50028



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -1.4 cm/year

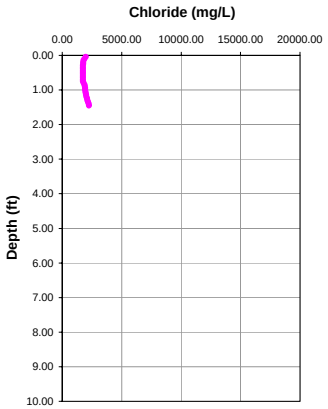
OL-GP-50028



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -1.5 cm/year

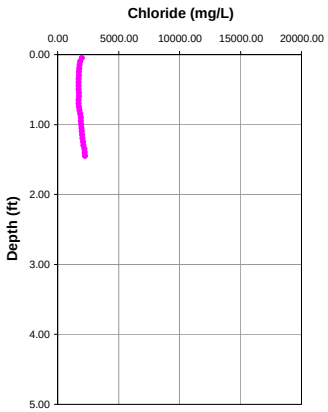
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1491	1491
Cl (mg/L)	41989	32500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-1.84	-1.99
q (cm/yr)	-1.38	-1.49
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.83	0.80
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.2	

OL-GP-50036



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = NA cm/year

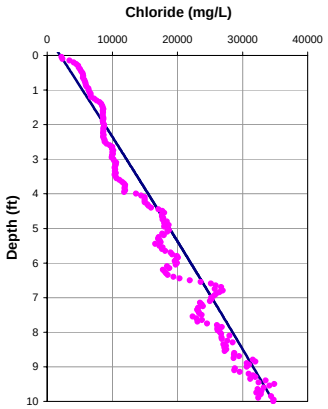
OL-GP-50036



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = NA cm/year

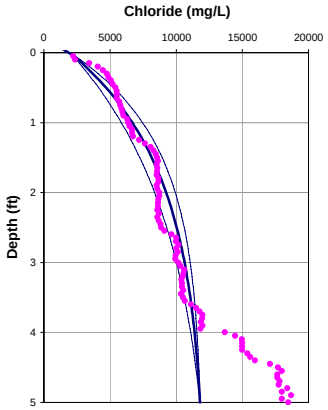
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2240	2240
Cl (mg/L)	2258	2258
L(ft)	5	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-0.10	1983661559.34
q (cm/yr)	-0.08	1487746169.50
dispersion length (ft)	0.11	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.11	0.11
V(ft/d)	0.00	178303.45
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	17501987.52
Diffusion + Dispersion (ft2/day)	0.00	18838.98
Adjusted depth	-0.25	

OL-GP-50037



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

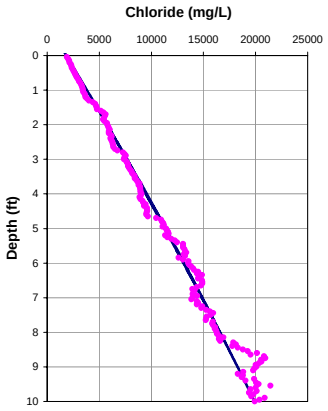
OL-GP-50037



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -4.6 cm/year

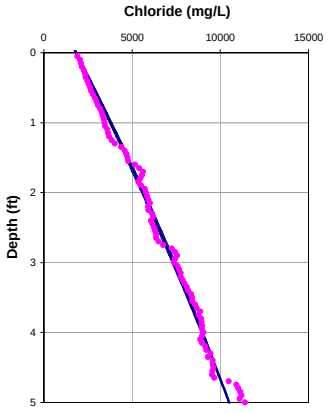
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1993	1993
Cl (mg/L)	34729	11800
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-0.10	-6.11
q (cm/yr)	-0.08	-4.58
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.84
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-50038



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -0.1 cm/year

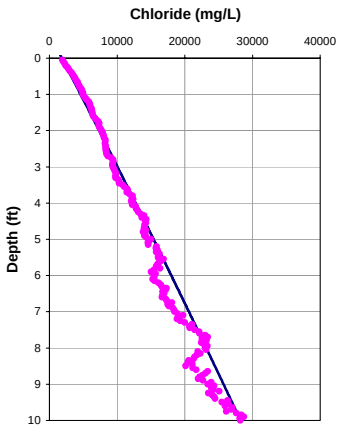
OL-GP-50038



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -0.4 cm/year

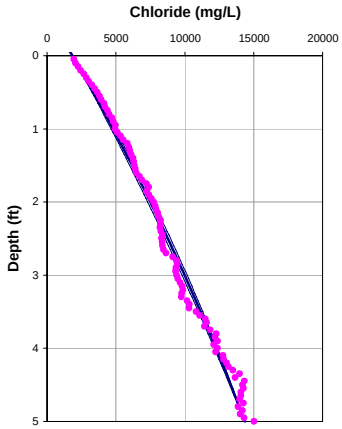
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1833	1833
Cl (mg/L)	19918	10500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-0.19	-0.59
q (cm/yr)	-0.14	-0.44
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.95	

OL-GP-50039



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

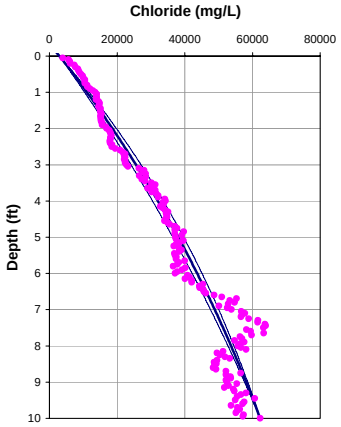
OL-GP-50039



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -0.6 cm/year

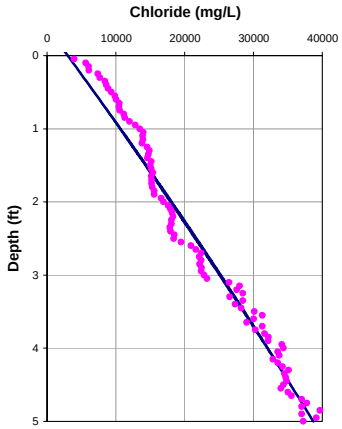
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1835	1835
Cl (mg/L)	28235	14350
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-0.10	-0.82
q (cm/yr)	-0.08	-0.61
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2.1	

OL-GP-50040



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -0.5 cm/year

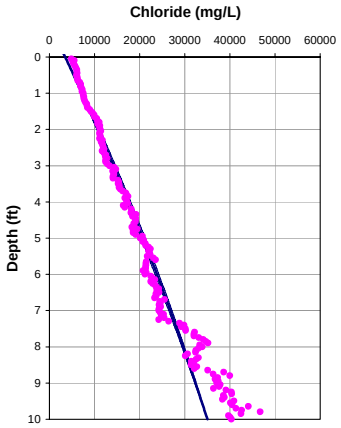
OL-GP-50040



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -0.2 cm/year

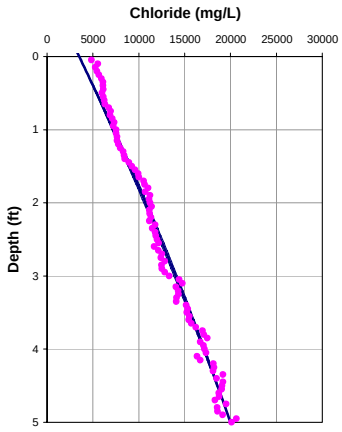
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	3000	3000
Cl (mg/L)	62289	38700
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-0.71	-0.33
q (cm/yr)	-0.54	-0.25
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.80	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-50041



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -0.3 cm/year

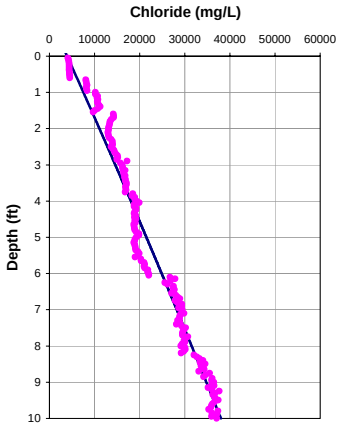
OL-GP-50041



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -0.4 cm/year

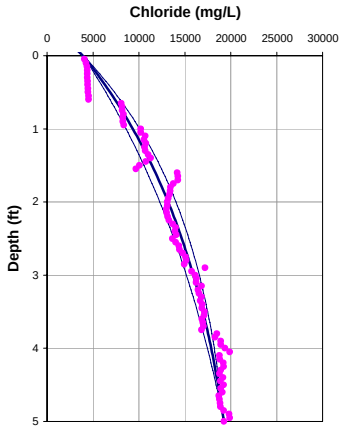
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	3500	3500
Cl (mg/L)	35000	20000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-0.37	-0.59
q (cm/yr)	-0.28	-0.45
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-3	

OL-GP-50042



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

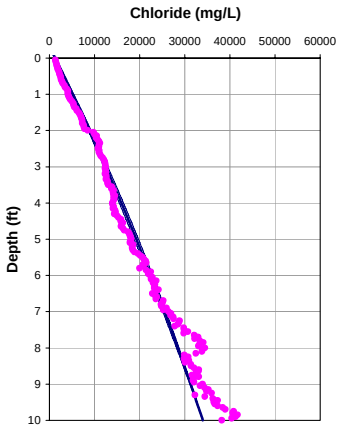
OL-GP-50042



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -2.5 cm/year

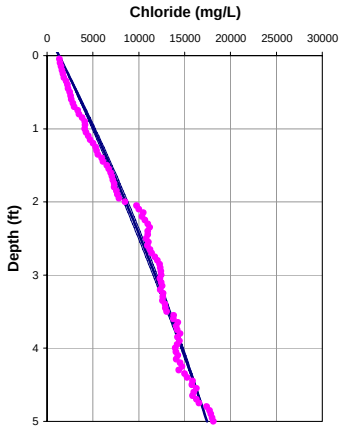
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	3932	3932
Cl (mg/L)	38000	19260
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-0.12	-3.31
q (cm/yr)	-0.09	-2.49
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.81
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.9	

OL-GP-50043



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -0.3 cm/year

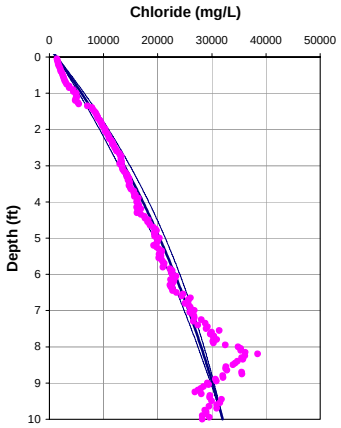
OL-GP-50043



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -0.6 cm/year

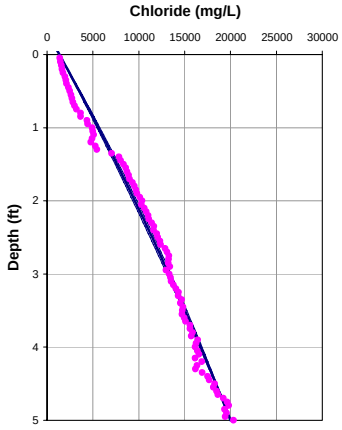
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1311	1311
Cl (mg/L)	34000	17436
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		17435.9406
V(cm/yr)	-0.37	-0.79
q (cm/yr)	-0.28	-0.59
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-50044



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -0.7 cm/year

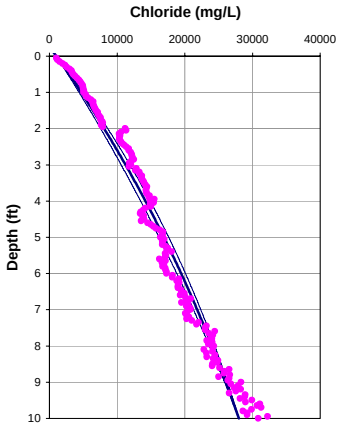
OL-GP-50044



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -0.5 cm/year

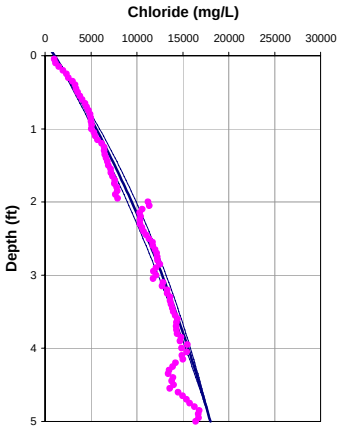
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1346	1346
Cl (mg/L)	32000	20000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-0.95	-0.64
q (cm/yr)	-0.71	-0.48
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.81	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.6	

OL-GP-50045



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -0.5 cm/year

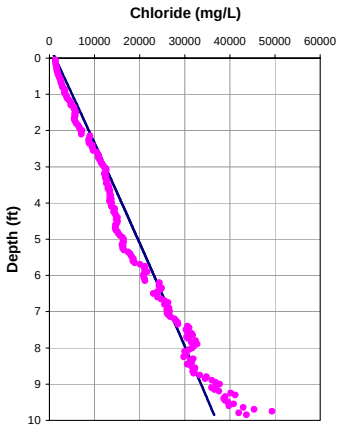
OL-GP-50045



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -1.1 cm/year

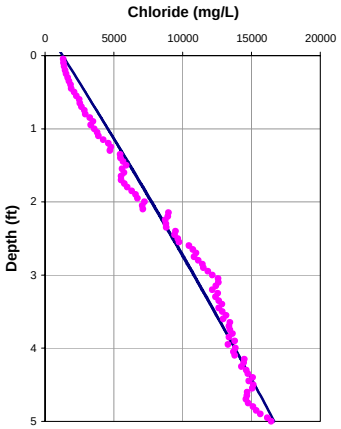
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1035	1035
Cl (mg/L)	28000	18000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-0.69	-1.50
q (cm/yr)	-0.52	-1.13
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.80	0.80
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-50046



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

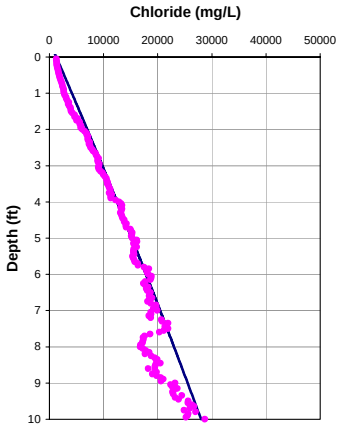
OL-GP-50046



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -0.2 cm/year

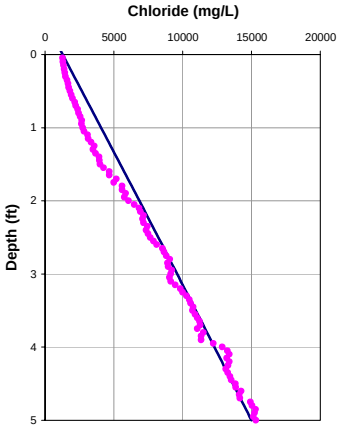
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1277	1277
Cl (mg/L)	37000	16658
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		16658.4061
V(cm/yr)	-0.10	-0.32
q (cm/yr)	-0.08	-0.24
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-50047



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -0.1 cm/year

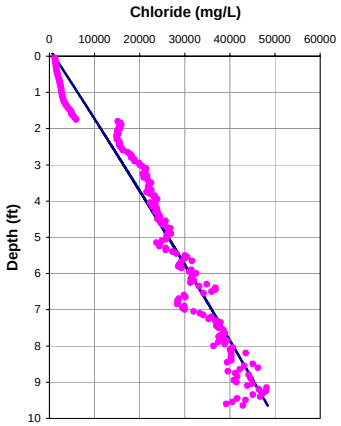
OL-GP-50047



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

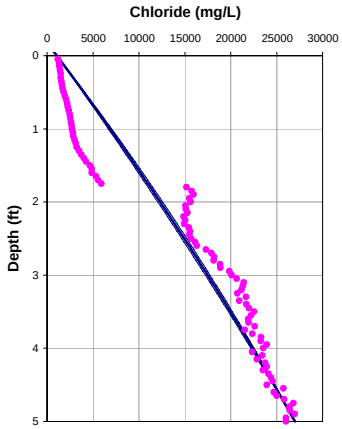
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1276	1276
Cl (mg/L)	28000	15000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		15000
V(cm/yr)	-0.16	-0.10
q (cm/yr)	-0.12	-0.08
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.15	

OL-GP-50048



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

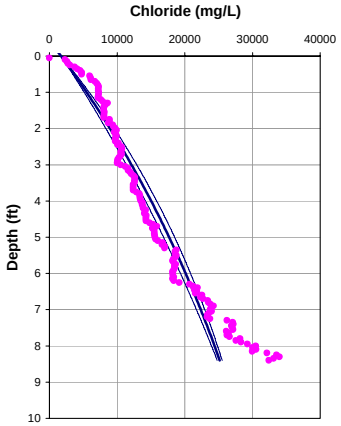
OL-GP-50048



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -0.4 cm/year

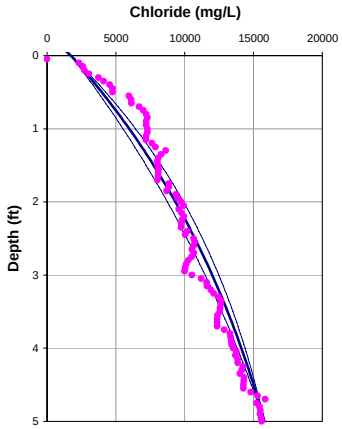
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1072	1072
Cl (mg/L)	50000	27000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-0.12	-0.53
q (cm/yr)	-0.09	-0.40
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-50049



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -0.6 cm/year

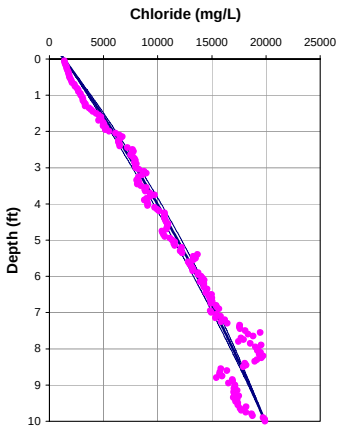
OL-GP-50049



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -1.7 cm/year

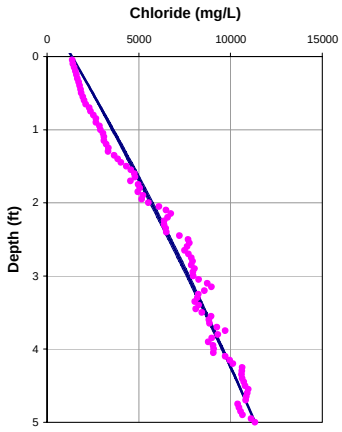
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1731	1731
Cl (mg/L)	28000	15800
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-0.84	-2.23
q (cm/yr)	-0.63	-1.67
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.81	0.80
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-50050



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -0.4 cm/year

OL-GP-50050

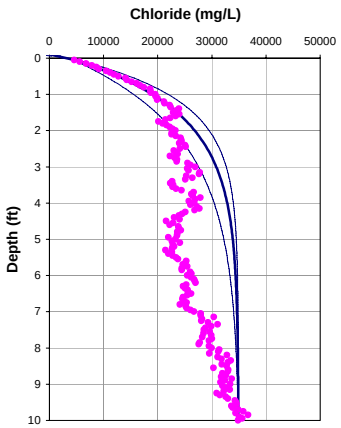


Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -0.4 cm/year

	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1359	1359
Cl (mg/L)	19915	11342
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-0.50	-0.52
q (cm/yr)	-0.38	-0.39
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.80	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.8	

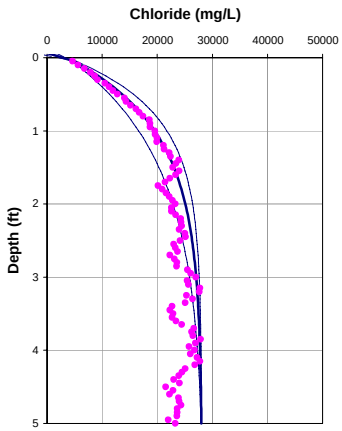
S.S. Papadopulos & Associates, Inc.

OL-GP-50051



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -6.0 cm/year

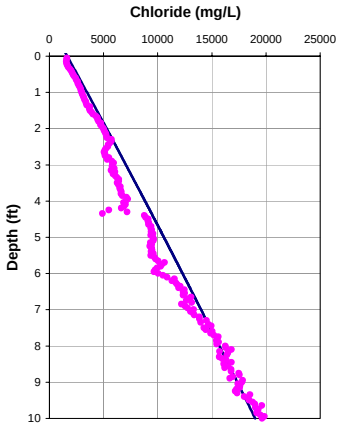
OL-GP-50051



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -8.3 cm/year

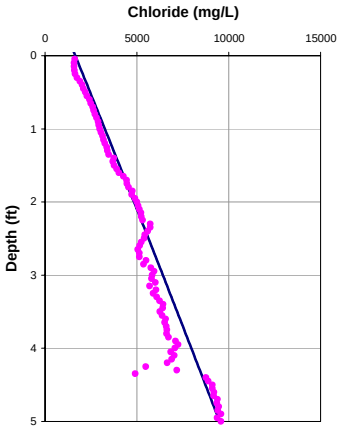
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	3689	3689
Cl (mg/L)	34888	28000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-8.00	-11.00
q (cm/yr)	-6.00	-8.25
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.99	0.88
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.3	

OL-GP-60119



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

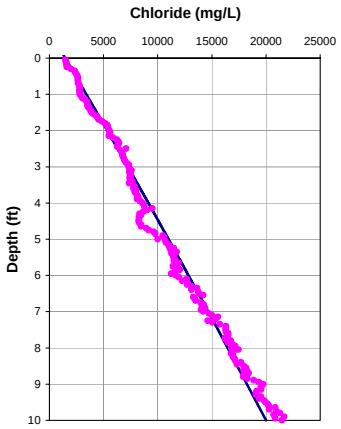
OL-GP-60119



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

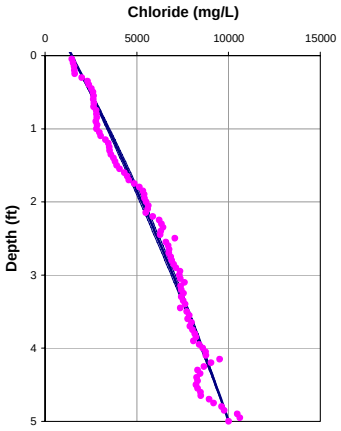
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1647	1647
Cl (mg/L)	19000	9500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.07	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.6	

OL-GP-60120



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

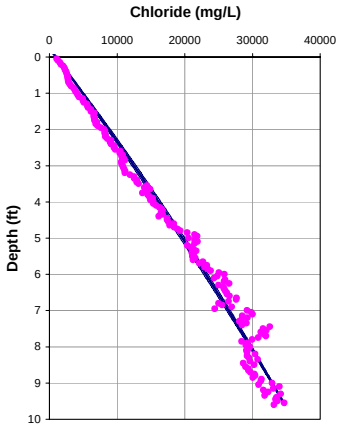
OL-GP-60120



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -0.5 cm/year

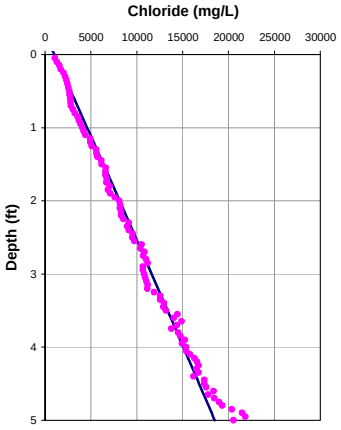
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1461	1461
Cl (mg/L)	20000	10017
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-0.66
q (cm/yr)	-0.07	-0.46
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-60121



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.2 cm/year

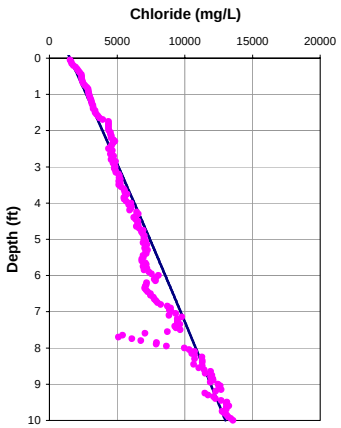
OL-GP-60121



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

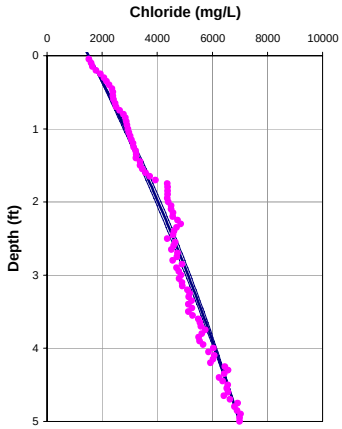
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1004	1004
Cl (mg/L)	36000	18500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.23	-0.10
q (cm/yr)	-0.16	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.73	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.4	

OL-GP-60122



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

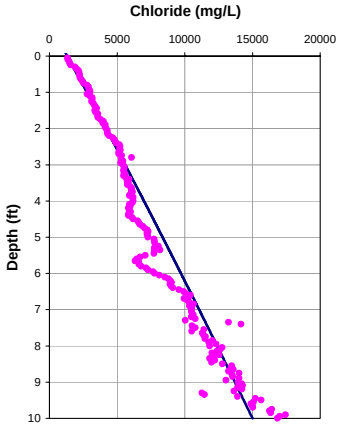
OL-GP-60122



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.6 cm/year

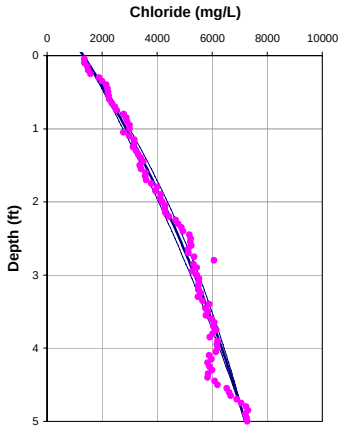
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1515	1515
Cl (mg/L)	13000	6988
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-0.87
q (cm/yr)	-0.07	-0.61
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.9	

OL-GP-60123



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

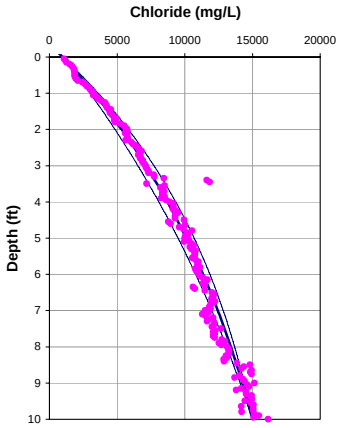
OL-GP-60123



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -0.9 cm/year

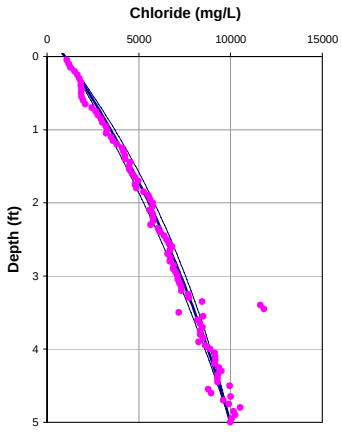
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1322	1322
Cl (mg/L)	15000	7200
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-1.33
q (cm/yr)	-0.07	-0.93
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-60124



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.8 cm/year

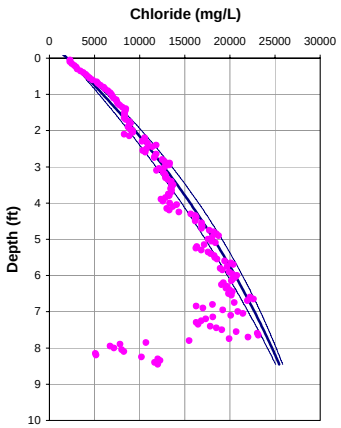
OL-GP-60124



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.1 cm/year

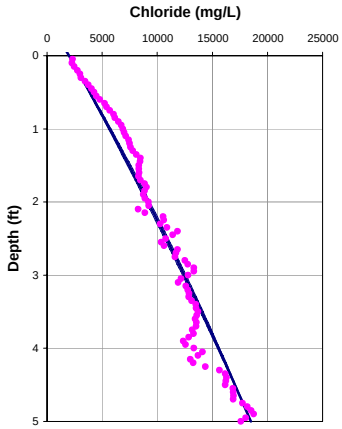
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	986	986
Cl (mg/L)	15000	9989
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.12	-1.55
q (cm/yr)	-0.79	-1.09
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.75	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-60125



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.6 cm/year

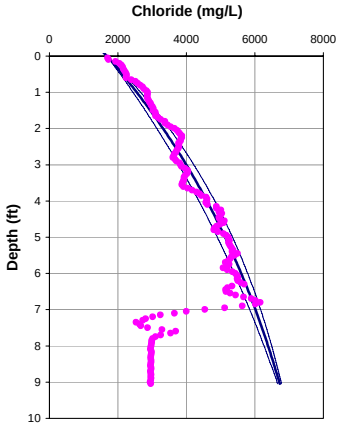
OL-GP-60125



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.3 cm/year

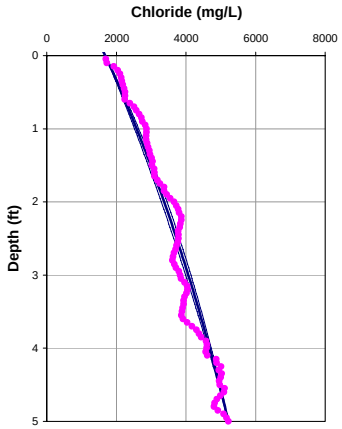
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2000	2000
Cl (mg/L)	28000	18500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.90	-0.49
q (cm/yr)	-0.63	-0.34
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.74	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-3	

OL-GP-60125.DAT



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -0.8 cm/year

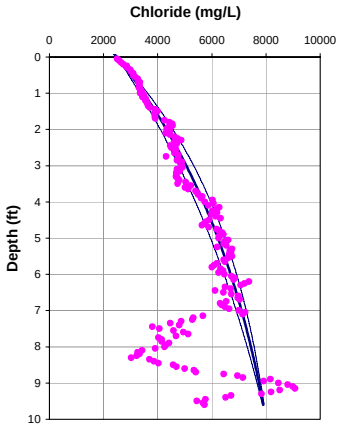
OL-GP-60125.DAT



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -0.8 cm/year

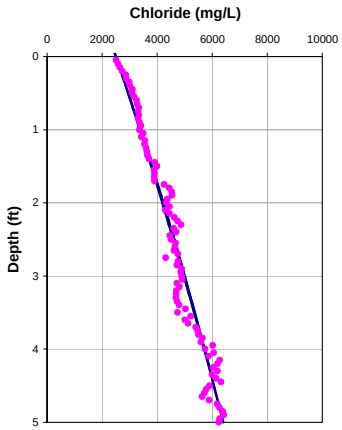
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1683	1683
Cl (mg/L)	7000	5221
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.10	-1.12
q (cm/yr)	-0.77	-0.78
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.75	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-60125-A



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.9 cm/year

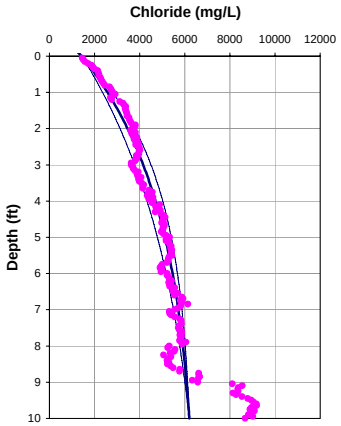
OL-GP-60125-A



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.4 cm/year

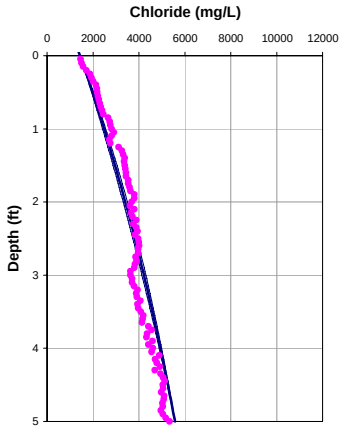
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2497	2497
Cl (mg/L)	8000	6400
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.35	-0.55
q (cm/yr)	-0.94	-0.39
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.76	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.9	

OL-GP-60126



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.6 cm/year

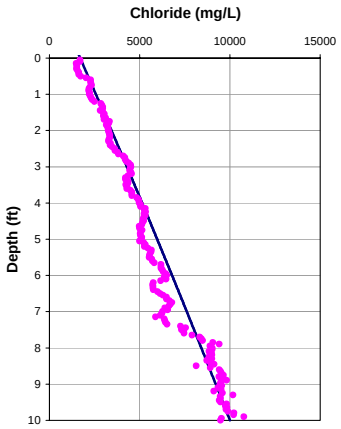
OL-GP-60126



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.8 cm/year

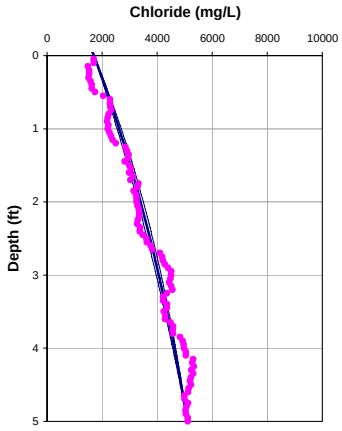
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1440	1440
Cl (mg/L)	6200	5570
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-2.30	-1.10
q (cm/yr)	-1.61	-0.77
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.78	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-60127



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

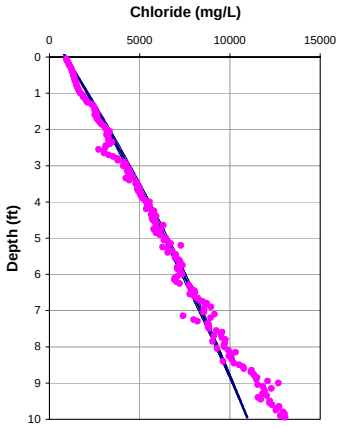
OL-GP-60127



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -1.0 cm/year

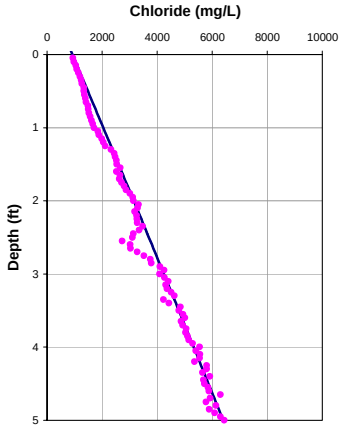
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1704	1704
Cl (mg/L)	10000	5100
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-1.42
q (cm/yr)	-0.07	-1.00
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-60128



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.2 cm/year

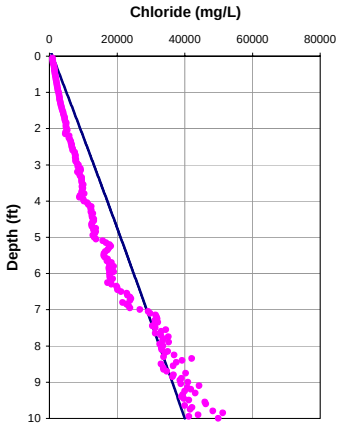
OL-GP-60128



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

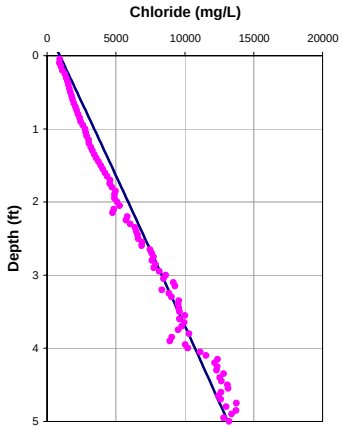
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	921	921
Cl (mg/L)	11000	6400
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.34	-0.10
q (cm/yr)	-0.24	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.73	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.45	

OL-GP-60129



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

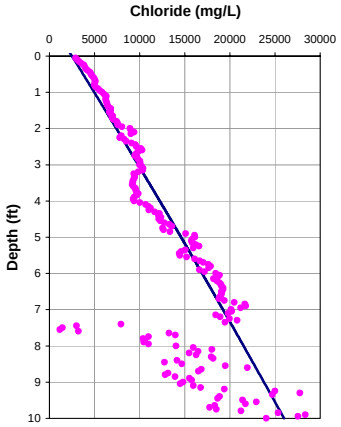
OL-GP-60129



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

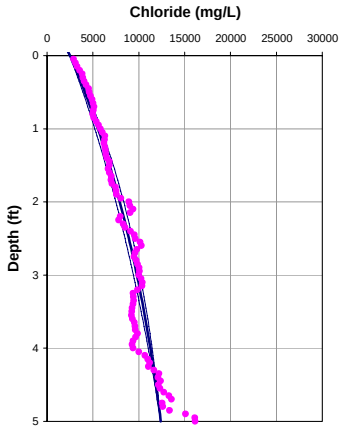
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	924	924
Cl (mg/L)	40000	13124
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		13123.9117
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.07	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.5	

OL-GP-60130



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

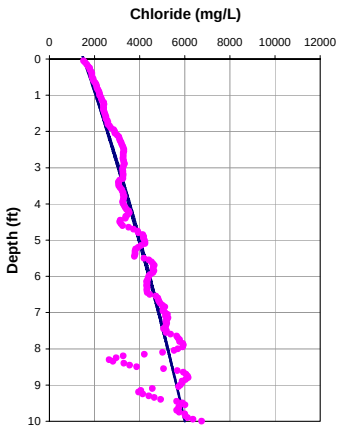
OL-GP-60130



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -1.5 cm/year

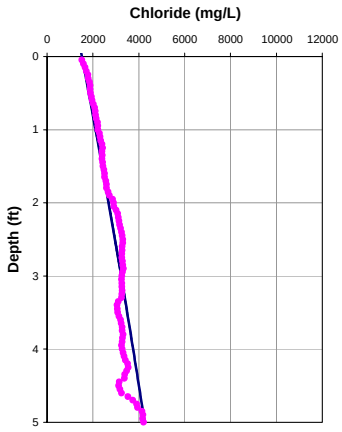
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2500	2500
Cl (mg/L)	26000	12400
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-2.17
q (cm/yr)	-0.07	-1.52
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-60130.DAT



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.3 cm/year

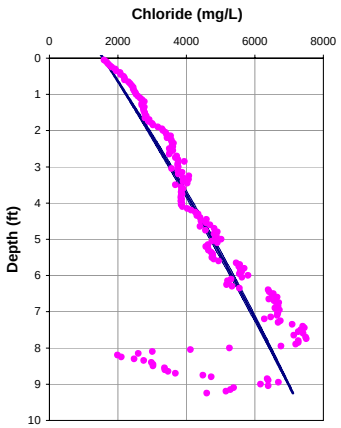
OL-GP-60130.DAT



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.3 cm/year

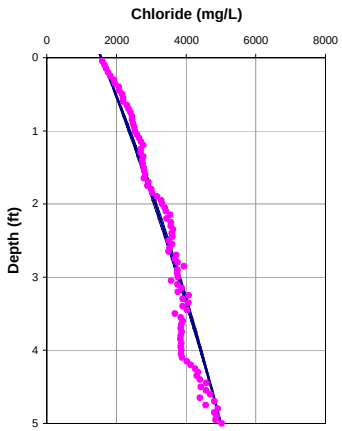
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1515	1515
Cl (mg/L)	6000	4250
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.36	-0.40
q (cm/yr)	-0.25	-0.28
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.73	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-60130-A



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.2 cm/year

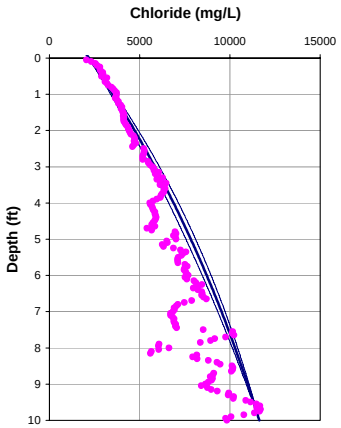
OL-GP-60130-A



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.5 cm/year

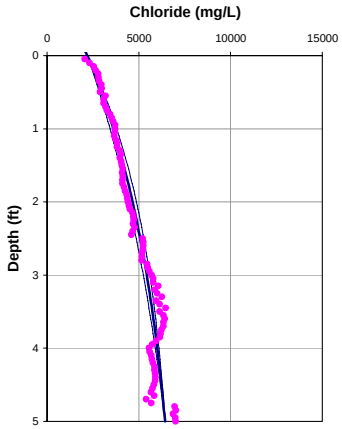
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1569	1569
Cl (mg/L)	7500	5000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.25	-0.71
q (cm/yr)	-0.18	-0.50
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.73	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2.4	

OL-GP-60131



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -0.5 cm/year

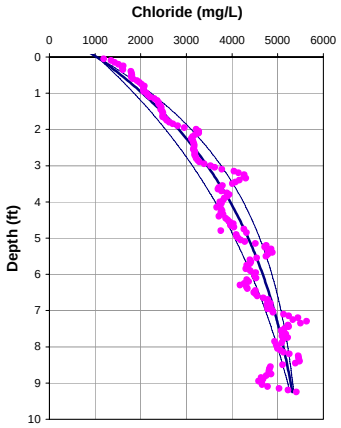
OL-GP-60131



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -1.9 cm/year

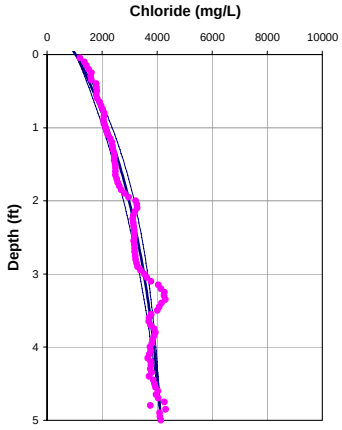
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2200	2200
Cl (mg/L)	11629	6430
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********	6429.62145	
V(cm/yr)	-0.70	-2.69
q (cm/yr)	-0.49	-1.88
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.74	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-60132



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.5 cm/year

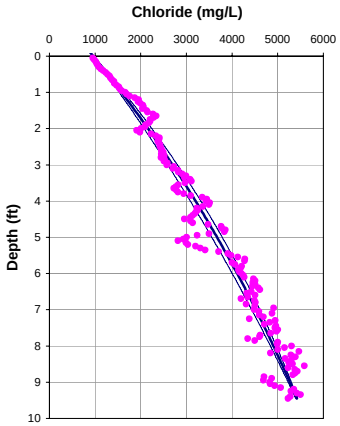
OL-GP-60132



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.4 cm/year

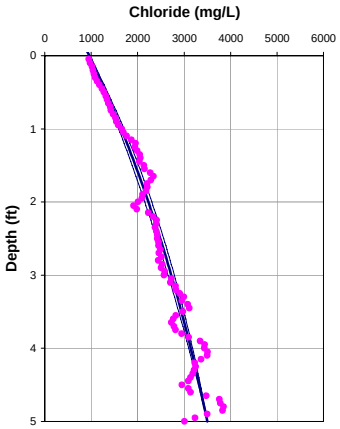
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1045	1045
Cl (mg/L)	5410	4135
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-2.13	-3.43
q (cm/yr)	-1.49	-2.40
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.78	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.95	

OL-GP-60133



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.4 cm/year

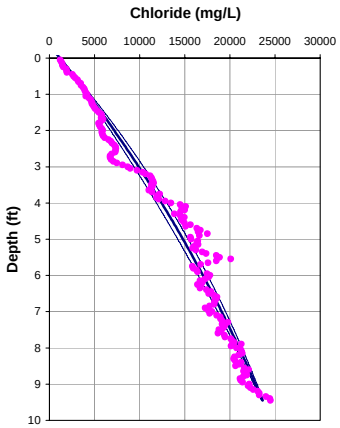
OL-GP-60133



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.0 cm/year

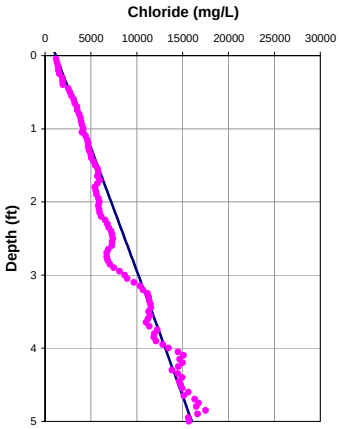
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	962	962
Cl (mg/L)	5600	3500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.60	-1.44
q (cm/yr)	-0.42	-1.01
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.74	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.95	

OL-GP-60134



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -0.4 cm/year

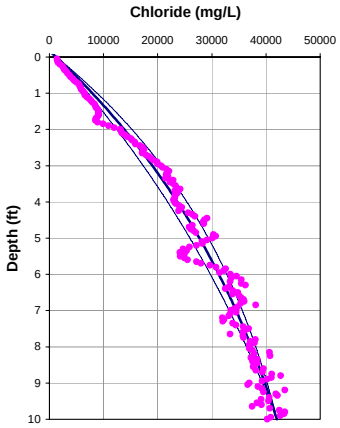
OL-GP-60134



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

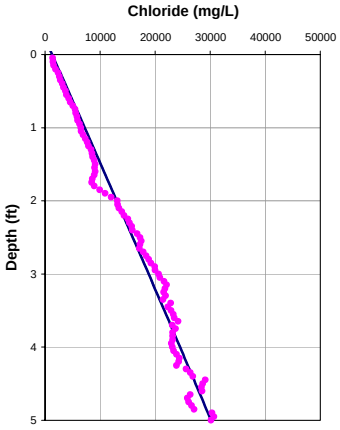
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1173	1173
Cl (mg/L)	24520	16000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.60	-0.10
q (cm/yr)	-0.42	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.74	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-60135



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.8 cm/year

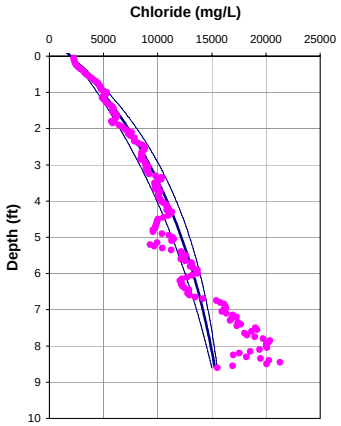
OL-GP-60135



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

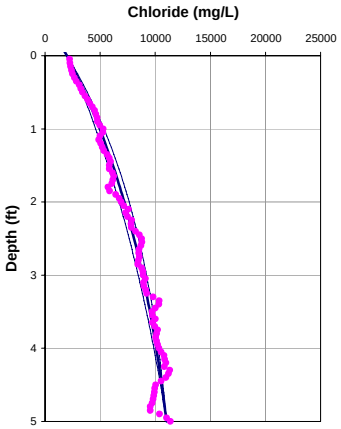
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1280	1280
Cl (mg/L)	42000	30158
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.10	-0.11
q (cm/yr)	-0.77	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.75	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.8	

OL-GP-60136



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.3 cm/year

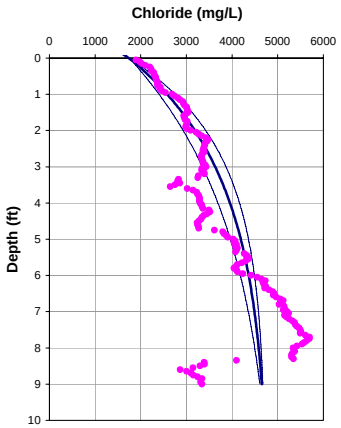
OL-GP-60136



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.8 cm/year

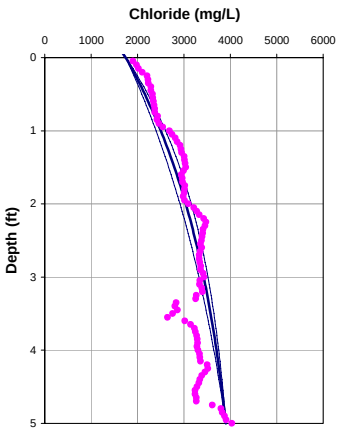
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2000	2000
Cl (mg/L)	16000	11021
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		11021.226
V(cm/yr)	-1.81	-2.58
q (cm/yr)	-1.26	-1.81
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.77	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.85	

OL-GP-60136.DAT



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -2.1 cm/year

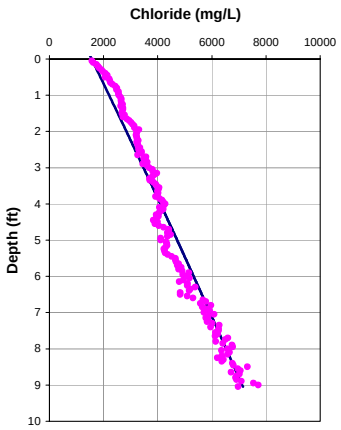
OL-GP-60136.DAT



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -2.1 cm/year

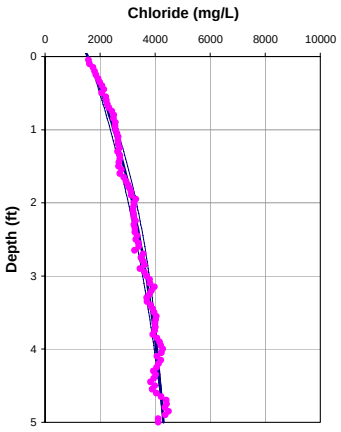
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1748	1748
Cl (mg/L)	4700	3900
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-3.00	-2.99
q (cm/yr)	-2.10	-2.09
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.80	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-60136-A



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

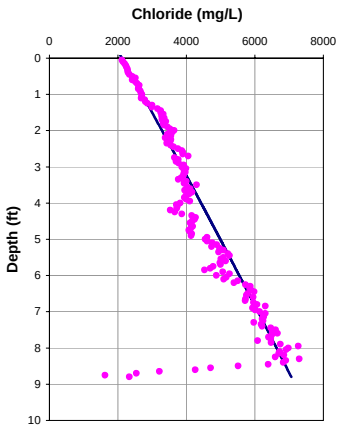
OL-GP-60136-A



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.0 cm/year

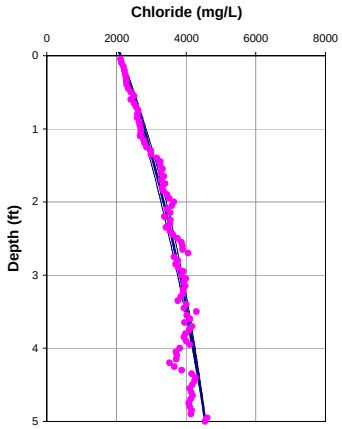
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1559	1559
Cl (mg/L)	7700	4303
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		4303.01704
V(cm/yr)	-0.10	-2.82
q (cm/yr)	-0.07	-1.97
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2.5	

OL-GP-60136-B



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

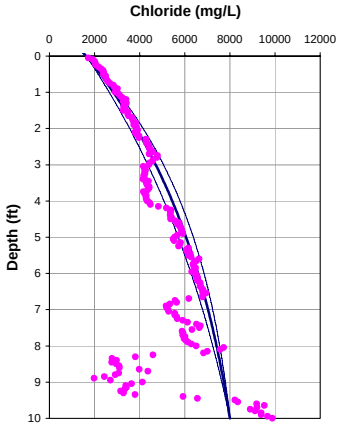
OL-GP-60136-B



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.1 cm/year

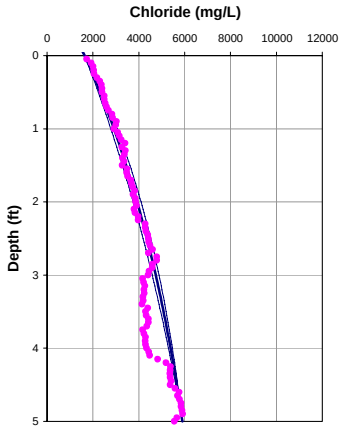
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2120	2120
Cl (mg/L)	7700	4550
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-1.56
q (cm/yr)	-0.07	-1.09
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-3.1	

OL-GP-60137



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -1.1 cm/year

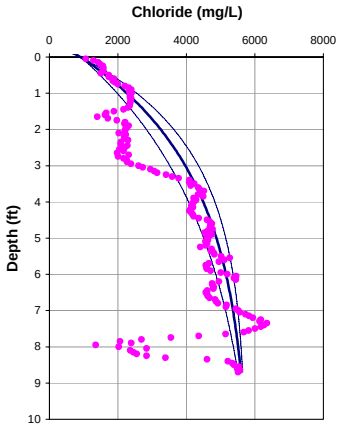
OL-GP-60137



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -1.4 cm/year

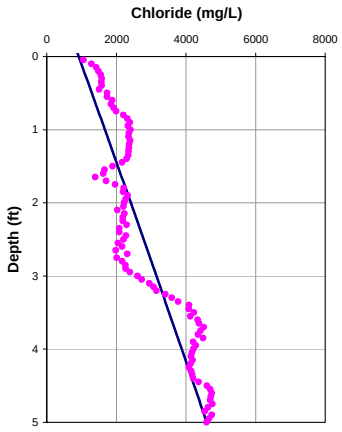
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1640	1640
Cl (mg/L)	8000	5900
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.50	-2.00
q (cm/yr)	-1.05	-1.40
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.76	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-60138



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -2.1 cm/year

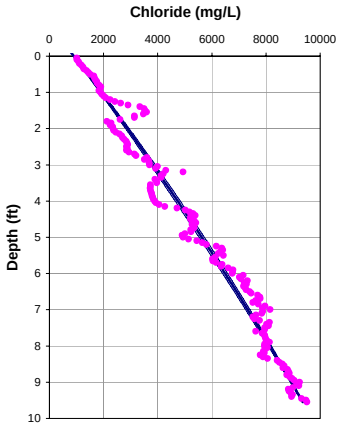
OL-GP-60138



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

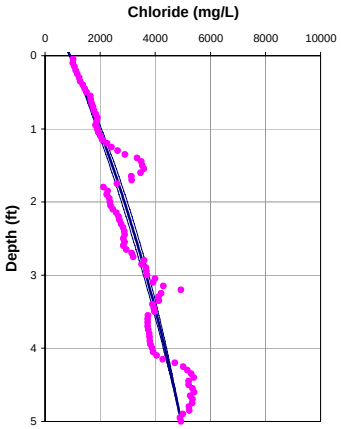
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	919	919
Cl (mg/L)	5700	4597
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-3.00	-0.10
q (cm/yr)	-2.10	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.80	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.75	

OL-GP-60139



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.2 cm/year

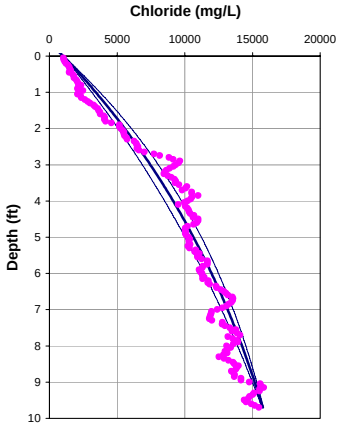
OL-GP-60139



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.9 cm/year

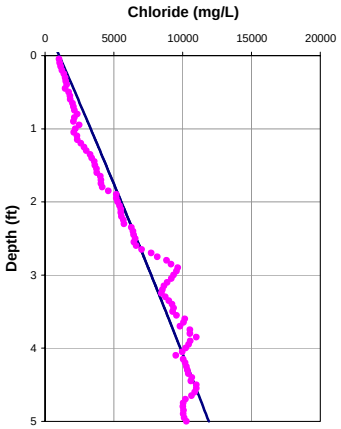
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	907	907
Cl (mg/L)	9700	4941
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.26	-1.29
q (cm/yr)	-0.18	-0.90
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.73	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.95	

OL-GP-60140



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -0.7 cm/year

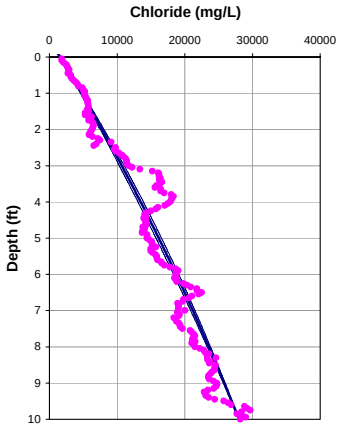
OL-GP-60140



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -0.2 cm/year

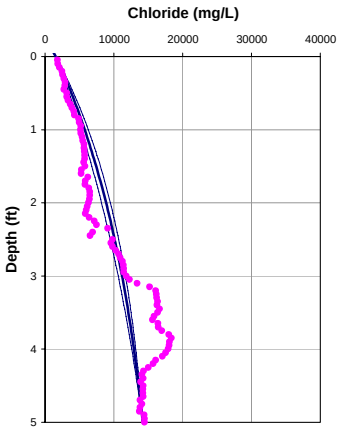
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1031	1031
Cl (mg/L)	16000	11899
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********	11898.7447	
V(cm/yr)	-1.05	-0.22
q (cm/yr)	-0.73	-0.15
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.75	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-60141



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.3 cm/year

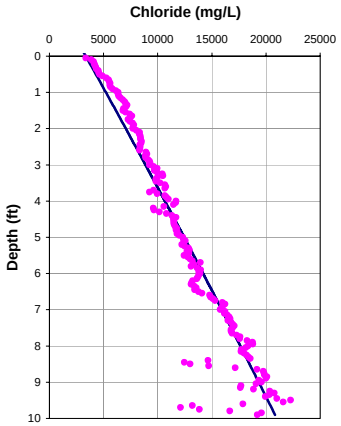
OL-GP-60141



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.8 cm/year

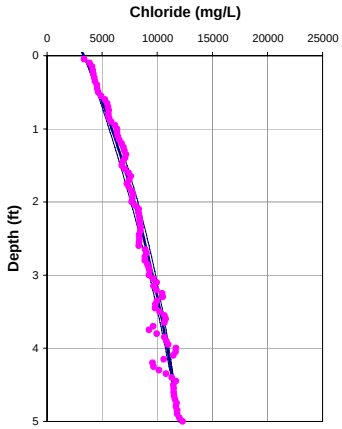
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1579	1579
Cl (mg/L)	28000	14200
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.36	-2.62
q (cm/yr)	-0.25	-1.84
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.73	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.7	

OL-GP-60142



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

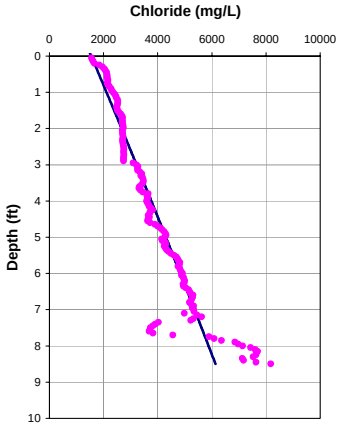
OL-GP-60142



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.3 cm/year

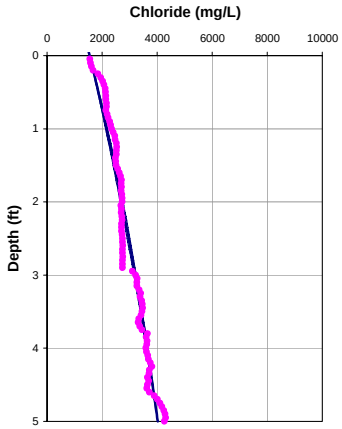
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	3360	3360
Cl (mg/L)	21000	12000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-1.85
q (cm/yr)	-0.07	-1.30
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2.05	

OL-GP-60142.DAT



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

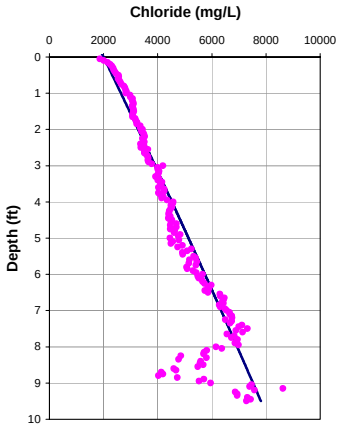
OL-GP-60142.DAT



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -0.7 cm/year

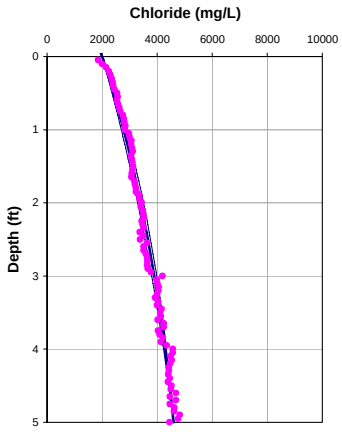
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1546	1546
Cl (mg/L)	6900	4020
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-1.02
q (cm/yr)	-0.07	-0.72
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-60142-A



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

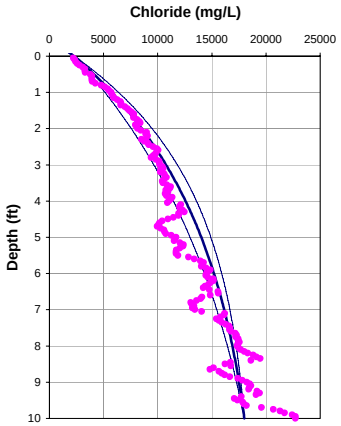
OL-GP-60142-A



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.4 cm/year

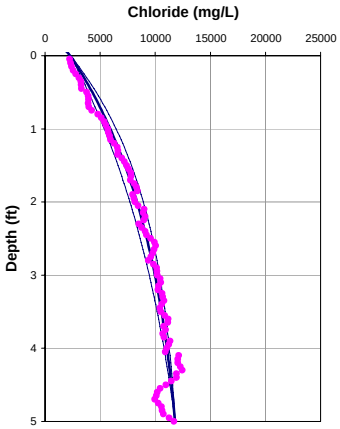
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2000	2000
Cl (mg/L)	8100	4600
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-2.02
q (cm/yr)	-0.07	-1.41
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2.4	

OL-GP-60143



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.4 cm/year

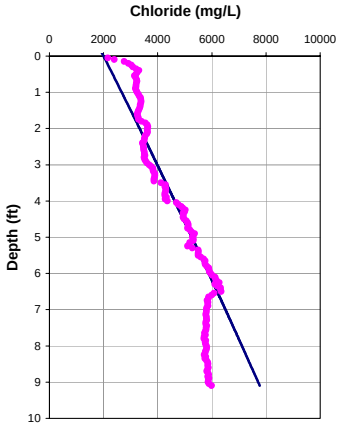
OL-GP-60143



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.5 cm/year

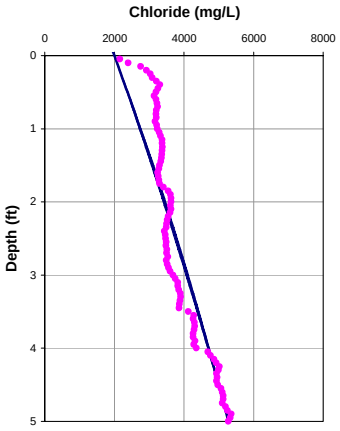
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		2300	2300
Cl (mg/L)		18000	11800
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.7	0.7
Calculated Values **********			
V(cm/yr)		-2.00	-3.58
q (cm/yr)		-1.40	-2.51
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.72	0.72
Diffusion + Dispersion (cm2/day)		0.77	0.75
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	-1.85		

OL-GP-60143.DAT



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

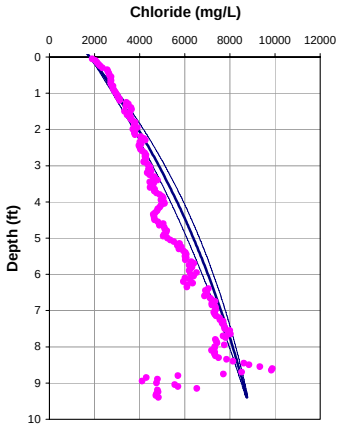
OL-GP-60143.DAT



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -0.4 cm/year

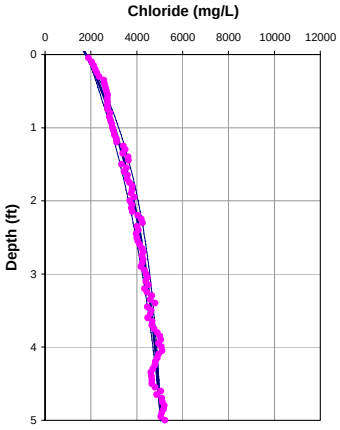
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		2000	2000
Cl (mg/L)		8300	5278
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.7	0.7
Calculated Values **********			
V(cm/yr)		-0.12	-0.56
q (cm/yr)		-0.09	-0.39
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.72	0.72
Diffusion + Dispersion (cm2/day)		0.72	0.73
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	-3		

OL-GP-60143-A



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.7 cm/year

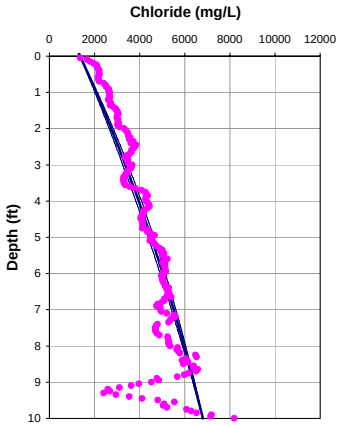
OL-GP-60143-A



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.5 cm/year

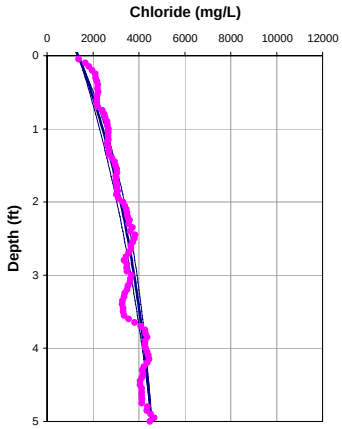
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		1800	1800
Cl (mg/L)		9000	5050
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.7	0.7
Calculated Values **********			
V(cm/yr)		-1.00	-3.55
q (cm/yr)		-0.70	-2.49
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.72	0.72
Diffusion + Dispersion (cm2/day)		0.75	0.75
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	-2.7		

OL-GP-60144



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.4 cm/year

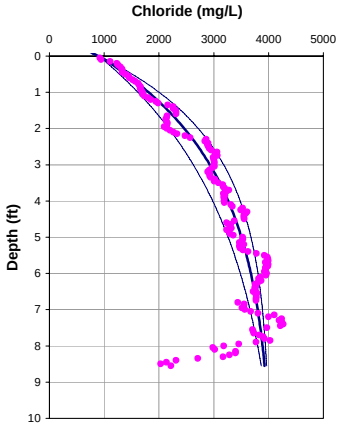
OL-GP-60144



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.8 cm/year

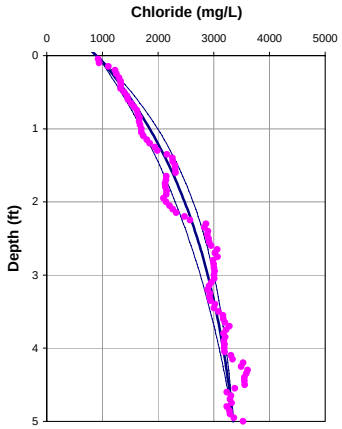
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1362	1362
Cl (mg/L)	6800	4550
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.55	-2.64
q (cm/yr)	-0.39	-1.85
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.74	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-60145



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -2.2 cm/year

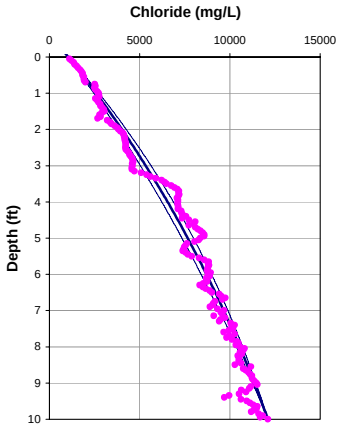
OL-GP-60145



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -2.6 cm/year

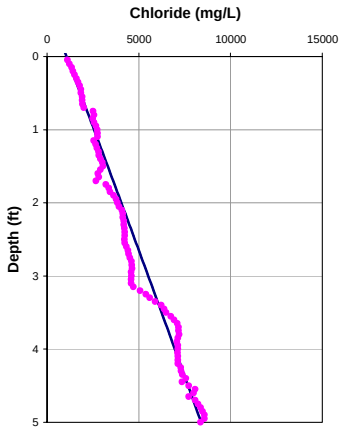
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	904	904
Cl (mg/L)	4000	3350
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-3.19	-3.71
q (cm/yr)	-2.23	-2.60
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.80	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-GP-60146



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.5 cm/year

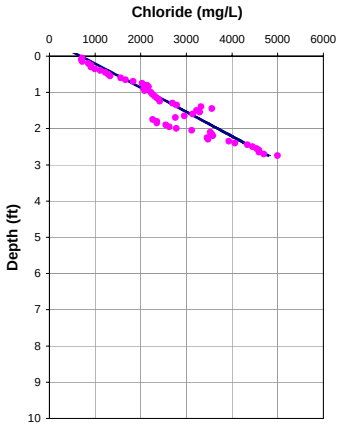
OL-GP-60146



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

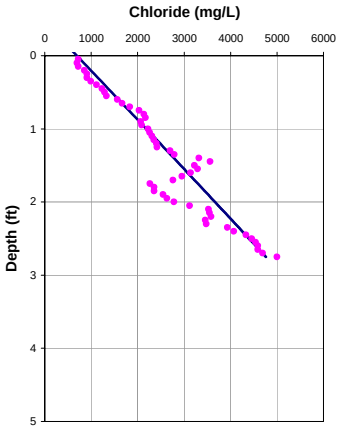
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1060	1060
Cl (mg/L)	12106	8400
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.70	-0.10
q (cm/yr)	-0.49	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.74	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.25	

OL-GP-60147



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

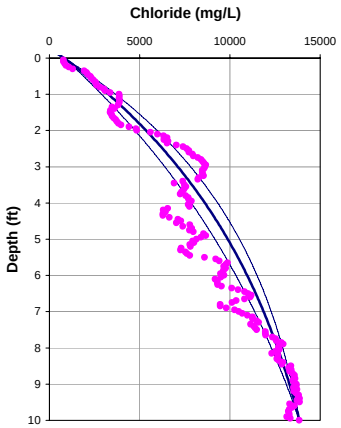
OL-GP-60147



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

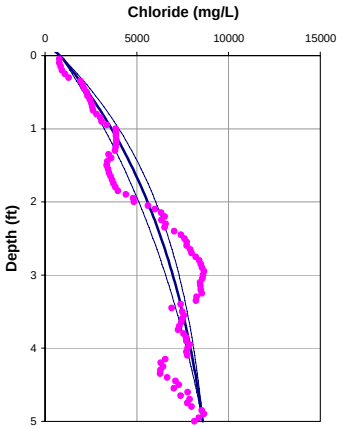
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	690	690
Cl (mg/L)	15000	8000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.07	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.05	

OL-GP-60148



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -1.1 cm/year

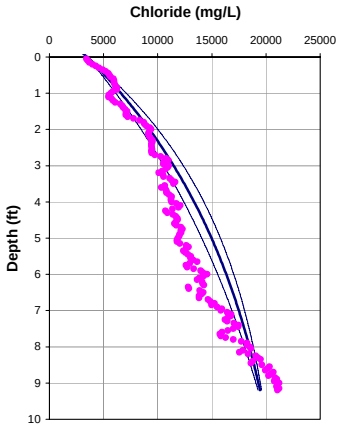
OL-GP-60148



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -2.2 cm/year

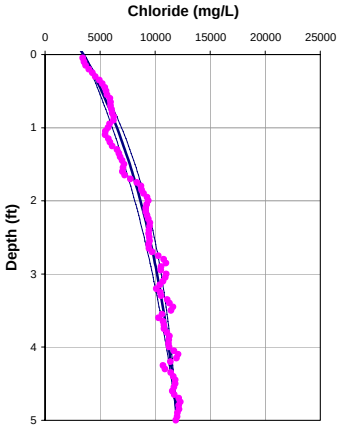
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	821	821
Cl (mg/L)	13854	8600
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.50	-3.19
q (cm/yr)	-1.05	-2.24
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.76	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-60149



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.1 cm/year

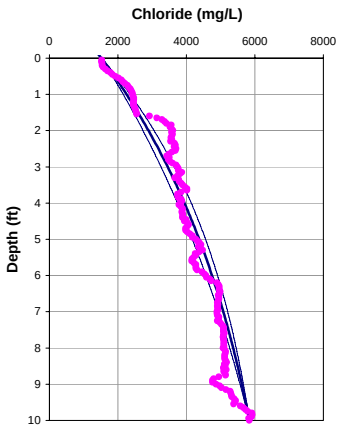
OL-GP-60149



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.2 cm/year

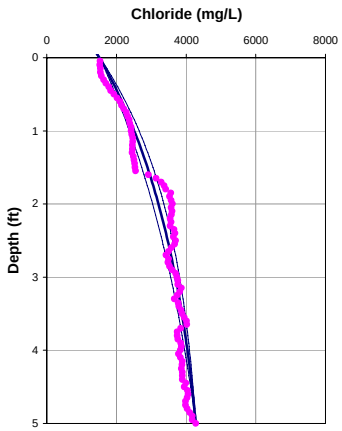
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	3500	3500
Cl (mg/L)	20000	12000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.50	-3.12
q (cm/yr)	-1.05	-2.18
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.76	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2.6	

OL-GP-60149.DAT



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.8 cm/year

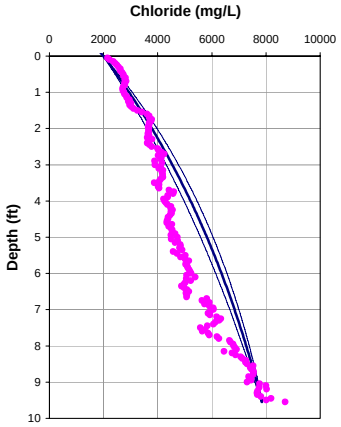
OL-GP-60149.DAT



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.2 cm/year

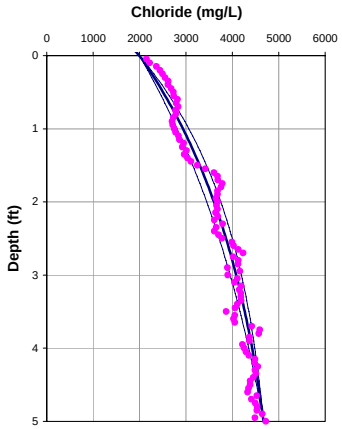
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1524	1524
Cl (mg/L)	5840	4278
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.20	-3.16
q (cm/yr)	-0.84	-2.21
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.75	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.65	

OL-GP-60149-A



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -0.7 cm/year

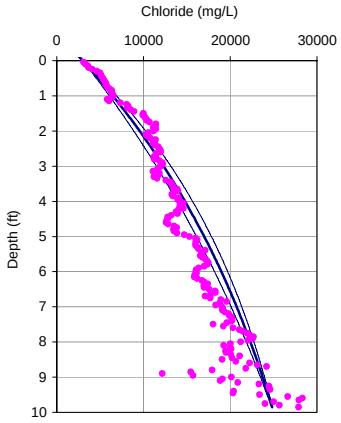
OL-GP-60149-A



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -2.1 cm/year

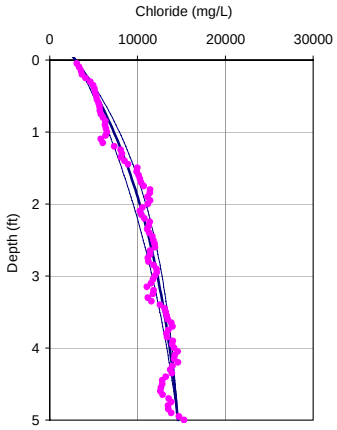
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2000	2000
Cl (mg/L)	8000	4670
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.00	-3.00
q (cm/yr)	-0.70	-2.10
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.75	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-60150



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.7 cm/year

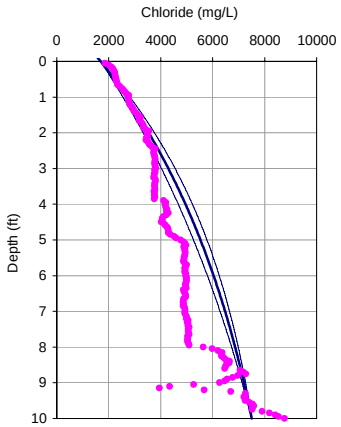
OL-GP-60150



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.4 cm/year

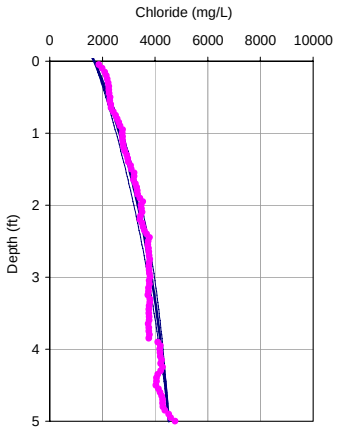
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	3000	3000
Cl (mg/L)	25000	14600
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.00	-3.41
q (cm/yr)	-0.70	-2.39
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.75	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.55	

OL-GP-60150.DAT



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.8 cm/year

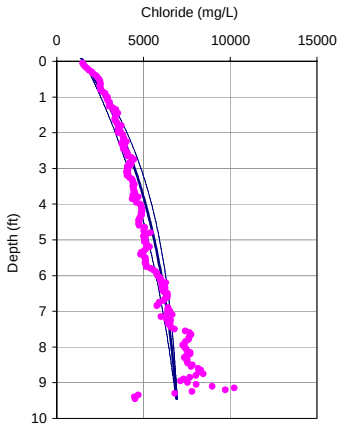
OL-GP-60150.DAT



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.9 cm/year

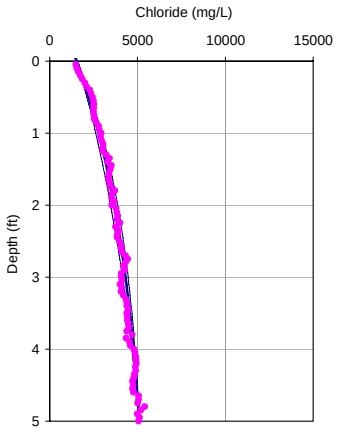
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		1693	1693
Cl (mg/L)		7500	4525
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.7	0.7
Calculated Values **********			
V(cm/yr)		-1.20	-2.71
q (cm/yr)		-0.84	-1.90
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.72	0.72
Diffusion + Dispersion (cm2/day)		0.75	0.75
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	-0.8		

OL-GP-60150-A



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -1.4 cm/year

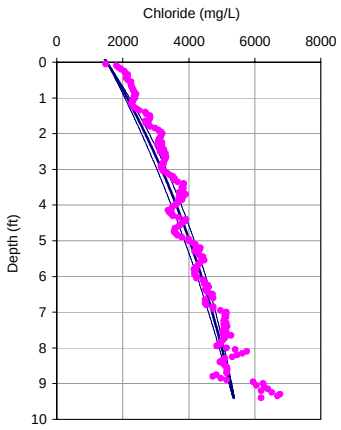
OL-GP-60150-A



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -2.1 cm/year

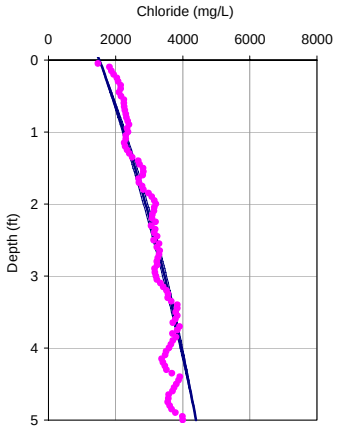
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		1550	1550
Cl (mg/L)		7000	5100
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.7	0.7
Calculated Values **********			
V(cm/yr)		-2.00	-2.97
q (cm/yr)		-1.40	-2.08
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.72	0.72
Diffusion + Dispersion (cm2/day)		0.77	0.75
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	-2		

OL-GP-60151



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.7 cm/year

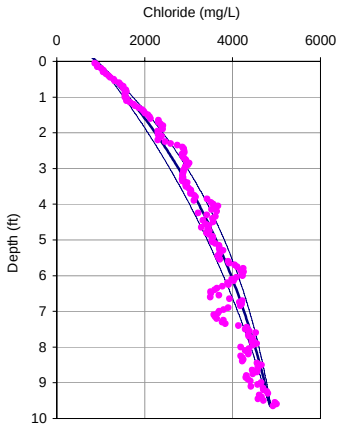
OL-GP-60151



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.8 cm/year

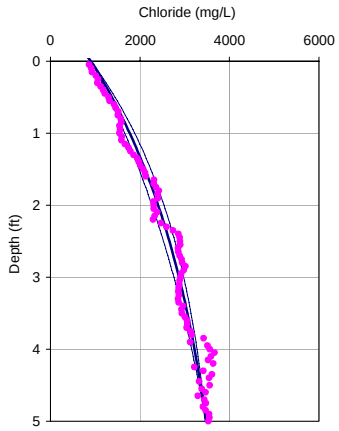
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		1520	1520
Cl (mg/L)		5500	4400
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.7	0.7
Calculated Values **********			
V(cm/yr)		-0.94	-1.11
q (cm/yr)		-0.66	-0.78
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.72	0.72
Diffusion + Dispersion (cm2/day)		0.75	0.73
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	-2.7		

OL-GP-60152



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.9 cm/year

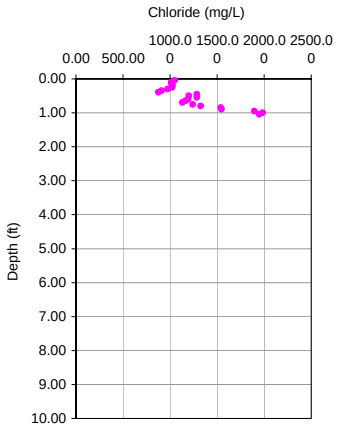
OL-GP-60152



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.9 cm/year

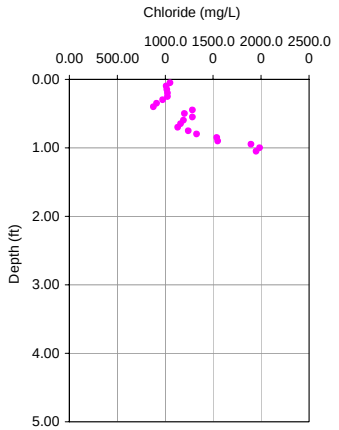
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	910	910
Cl (mg/L)	4920	3475
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.34	-2.71
q (cm/yr)	-0.94	-1.90
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.76	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.05	

OL-GP-60153



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = NA cm/year

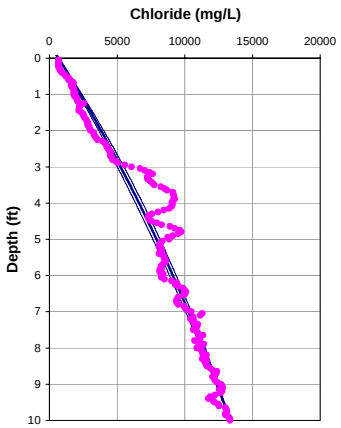
OL-GP-60153



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = NA cm/year

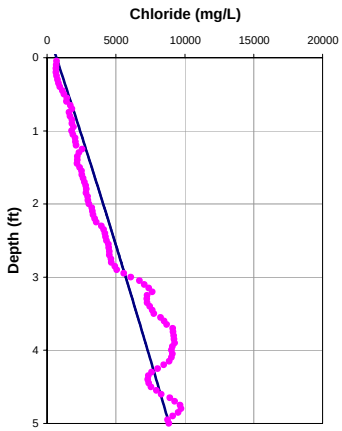
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1070	1070
Cl (mg/L)	1949	1949
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.07	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-60154



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.4 cm/year

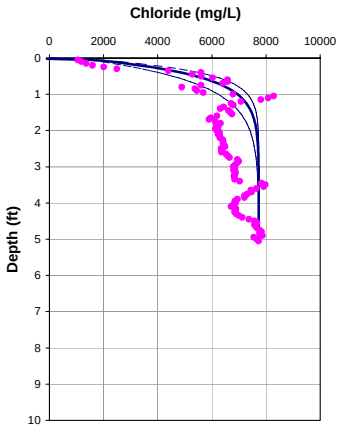
OL-GP-60154



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.2 cm/year

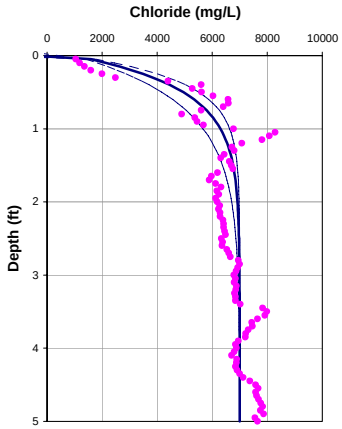
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	677	677
Cl (mg/L)	13350	8856
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.50	-0.22
q (cm/yr)	-0.35	-0.16
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.73	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.1	

OL-GP-60155



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -16.8 cm/year

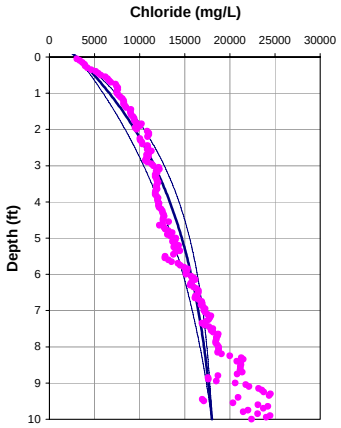
OL-GP-60155



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -16.8 cm/year

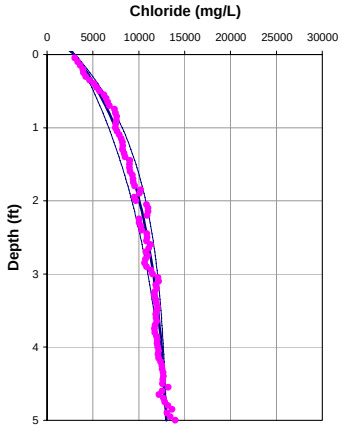
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	982	982
Cl (mg/L)	7736	7000
L(ft)	5	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-24.00	-24.06
q (cm/yr)	-16.80	-16.84
dispersion length (ft)	0.11	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.11	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.93	0.93
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-60156



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.6 cm/year

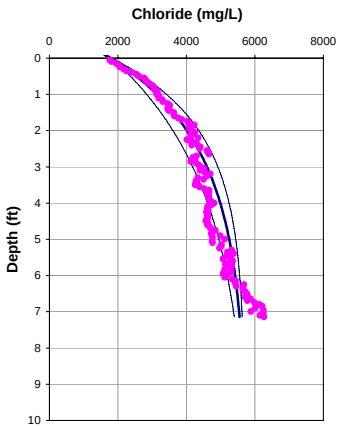
OL-GP-60156



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -3.4 cm/year

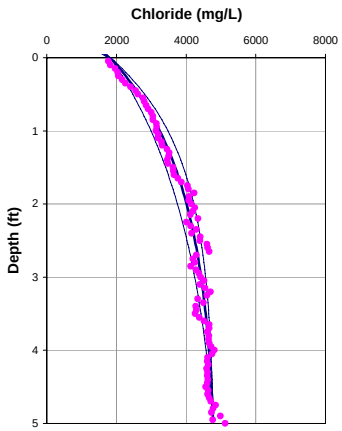
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	3049	3049
Cl (mg/L)	18000	13000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-2.34	-4.88
q (cm/yr)	-1.64	-3.42
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.78	0.76
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-GP-60156-A



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -2.8 cm/year

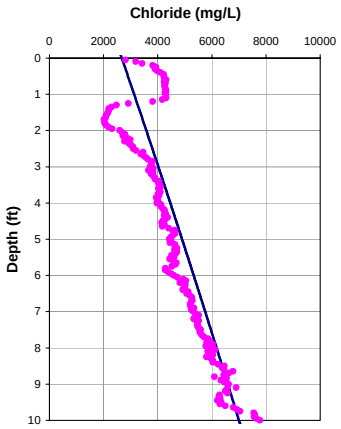
OL-GP-60156-A



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -4.0 cm/year

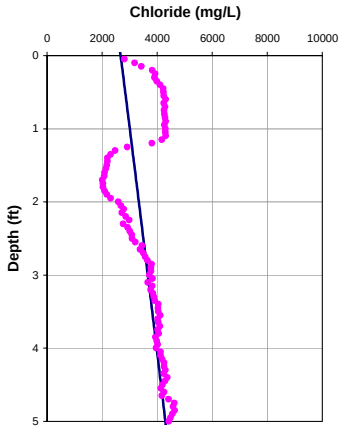
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1824	1824
Cl (mg/L)	5700	4780
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-4.00	-5.66
q (cm/yr)	-2.80	-3.96
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.82	0.77
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-7.55	

OL-GP-60157



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

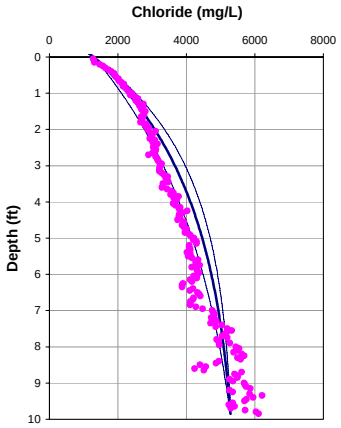
OL-GP-60157



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

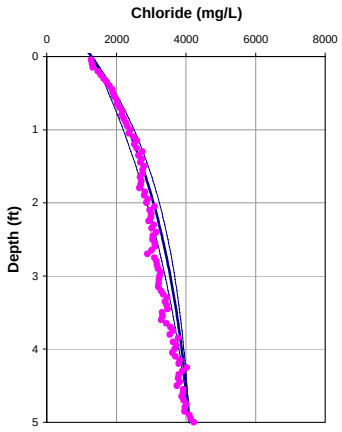
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2673	2673
Cl (mg/L)	7000	4300
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.07	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-GP-60158



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.8 cm/year

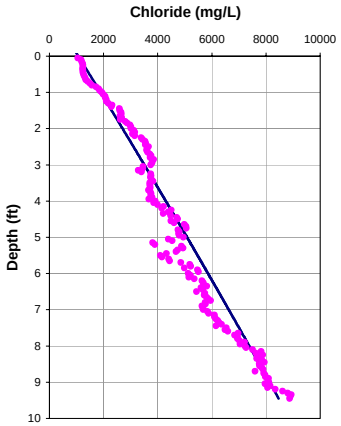
OL-GP-60158



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.5 cm/year

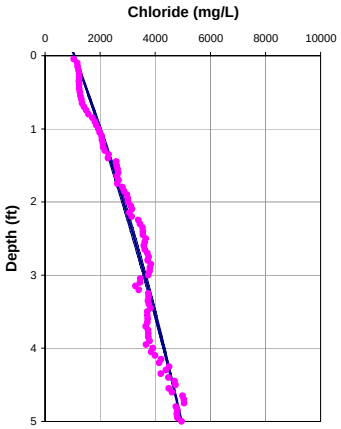
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1300	1300
Cl (mg/L)	5300	4100
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-2.50	-3.50
q (cm/yr)	-1.75	-2.45
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.79	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2.3	

OL-GP-60159



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

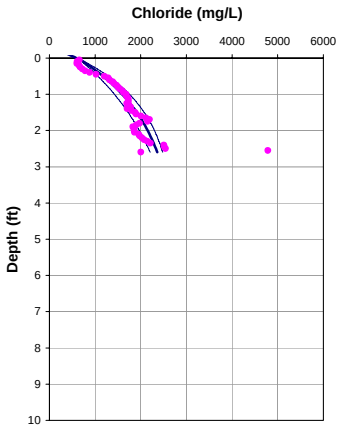
OL-GP-60159



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.6 cm/year

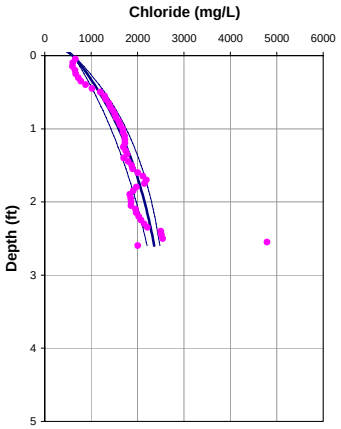
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1070	1070
Cl (mg/L)	8872	4955
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-0.82
q (cm/yr)	-0.07	-0.57
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.3	

OL-GP-60160



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -3.6 cm/year

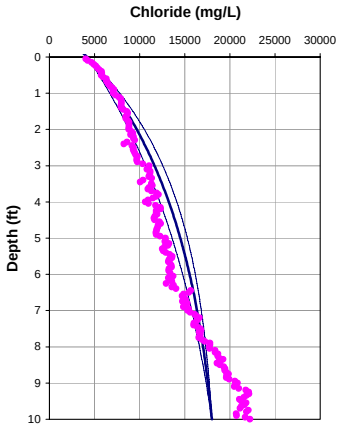
OL-GP-60160



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -3.6 cm/year

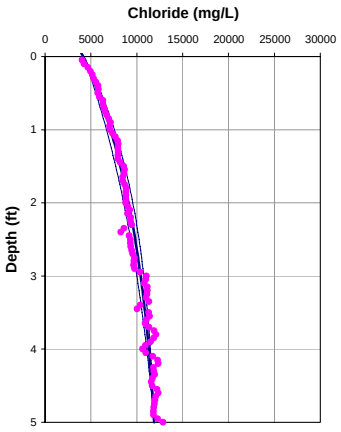
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	617	617
Cl (mg/L)	2750	2750
L(ft)	5	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-5.18	-5.18
q (cm/yr)	-3.62	-3.62
dispersion length (ft)	0.11	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.11	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.77	0.77
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-60161



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.4 cm/year

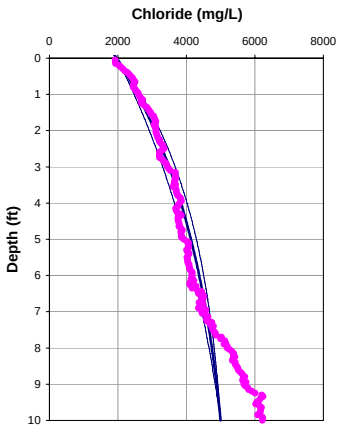
OL-GP-60161



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.5 cm/year

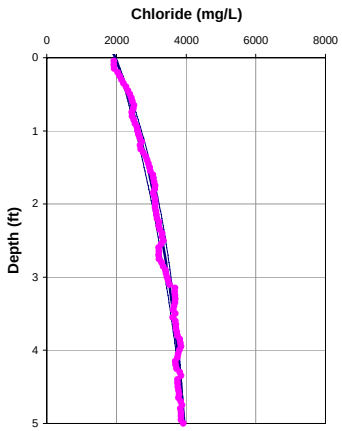
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	4200	4200
Cl (mg/L)	18000	11900
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-2.00	-3.59
q (cm/yr)	-1.40	-2.51
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.77	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.55	

OL-GP-60161.DAT



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.2 cm/year

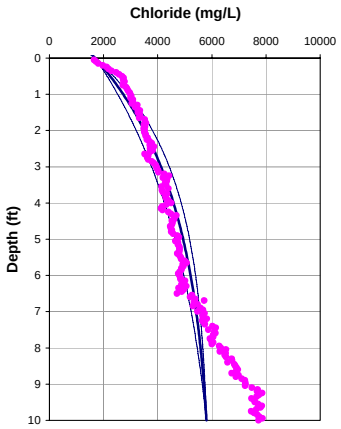
OL-GP-60161.DAT



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.9 cm/year

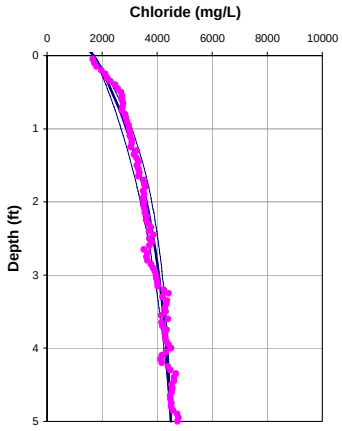
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1969	1969
Cl (mg/L)	5000	3950
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.67	-2.72
q (cm/yr)	-1.17	-1.90
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.76	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.7	

OL-GP-60161-A



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -1.7 cm/year

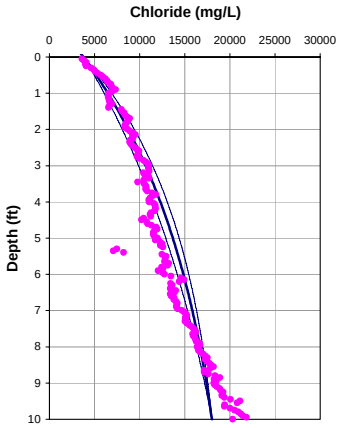
OL-GP-60161-A



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -3.1 cm/year

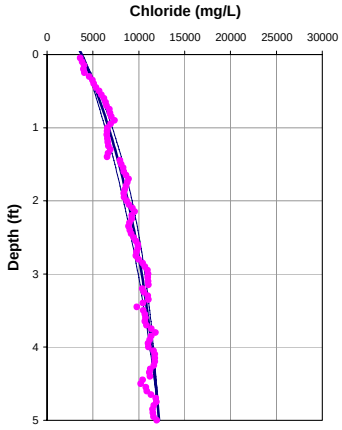
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1700	1700
Cl (mg/L)	5800	4500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-2.49	-4.46
q (cm/yr)	-1.74	-3.12
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.78	0.76
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-60162



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.1 cm/year

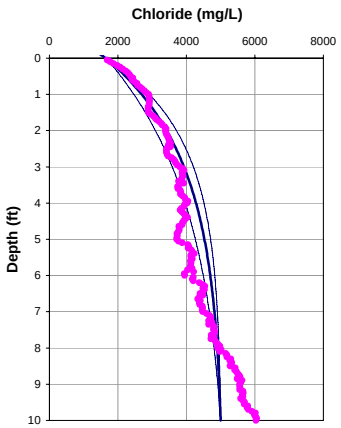
OL-GP-60162



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.1 cm/year

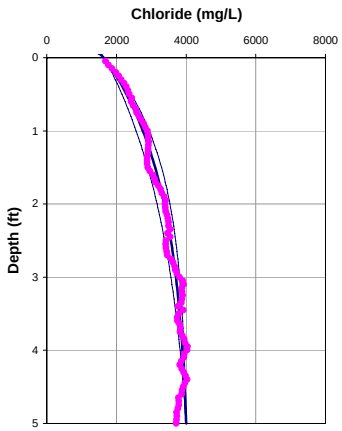
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	3800	3800
Cl (mg/L)	18000	12200
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.50	-2.94
q (cm/yr)	-1.05	-2.05
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.76	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.75	

OL-GP-60162.DAT



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -2.5 cm/year

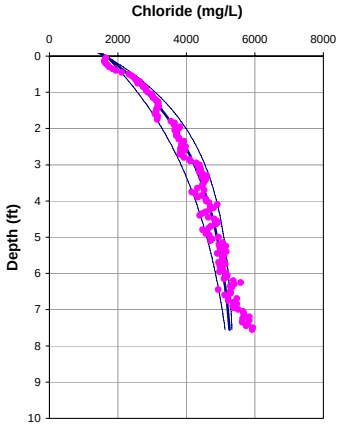
OL-GP-60162.DAT



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -3.8 cm/year

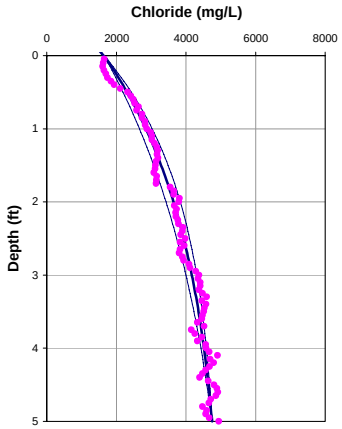
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1656	1656
Cl (mg/L)	5000	4000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-3.50	-5.44
q (cm/yr)	-2.45	-3.81
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.81	0.77
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.9	

OL-GP-60162-A



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -2.5 cm/year

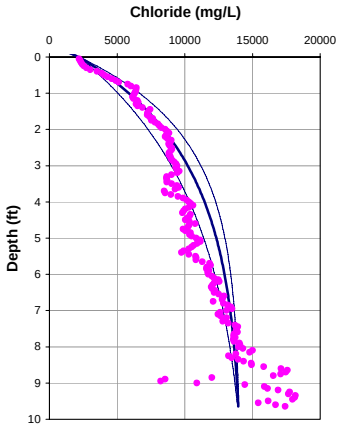
OL-GP-60162-A



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -2.6 cm/year

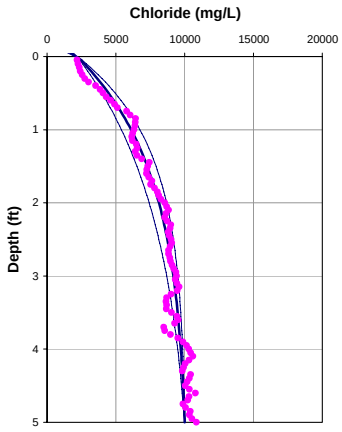
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1645	1645
Cl (mg/L)	5400	4750
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-3.62	-3.72
q (cm/yr)	-2.53	-2.61
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.81	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-4	

OL-GP-60163



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -2.5 cm/year

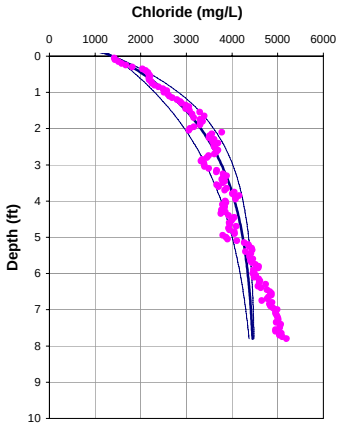
OL-GP-60163



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -4.3 cm/year

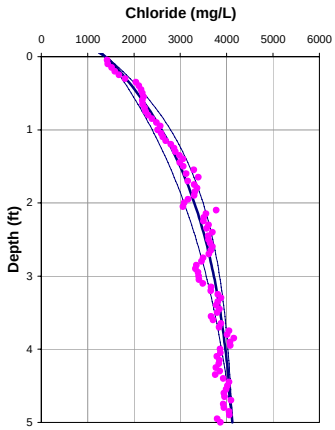
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2200	2200
Cl (mg/L)	14000	10000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-3.50	-6.11
q (cm/yr)	-2.45	-4.28
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.81	0.78
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2.2	

OL-GP-60163-A



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -3.3 cm/year

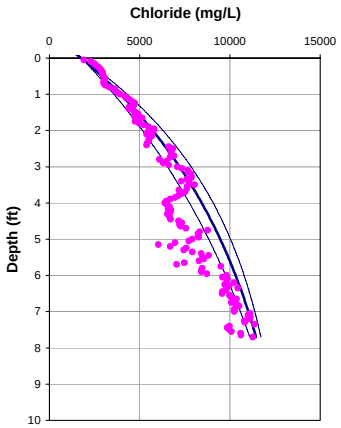
OL-GP-60163-A



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -3.3 cm/year

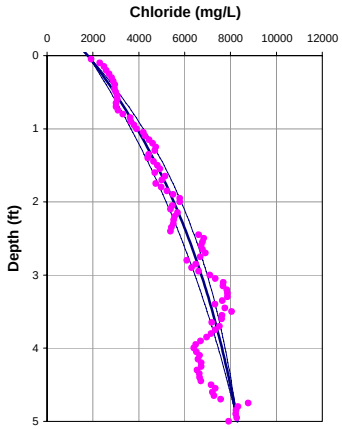
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1400	1400
Cl (mg/L)	4500	4120
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-4.78	-4.78
q (cm/yr)	-3.34	-3.34
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.84	0.76
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-3.75	

OL-GP-60164



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -1.2 cm/year

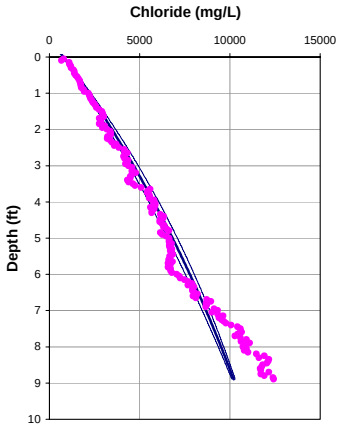
OL-GP-60164



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -1.8 cm/year

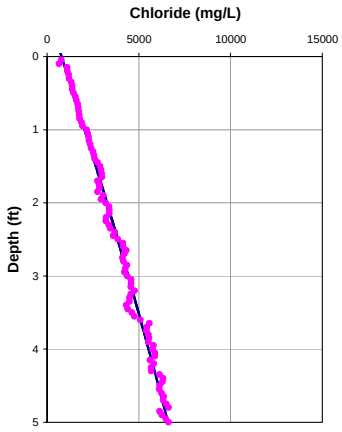
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1786	1786
Cl (mg/L)	12500	8300
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.70	-2.58
q (cm/yr)	-1.19	-1.80
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.76	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-4	

OL-GP-60165



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.5 cm/year

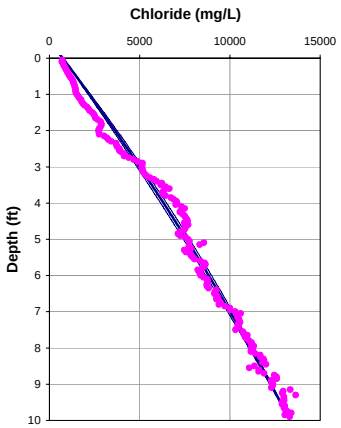
OL-GP-60165



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.3 cm/year

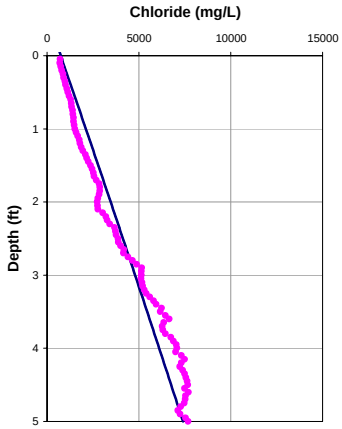
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	783	783
Cl (mg/L)	11000	6600
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.65	-0.37
q (cm/yr)	-0.45	-0.26
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.74	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.6	

OL-GP-60166



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.2 cm/year

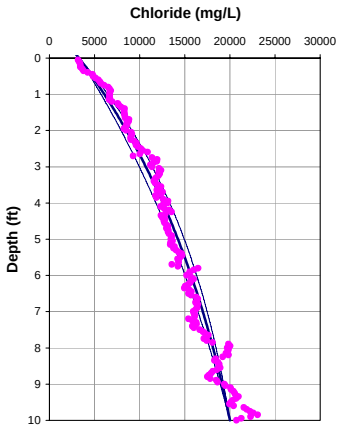
OL-GP-60166



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

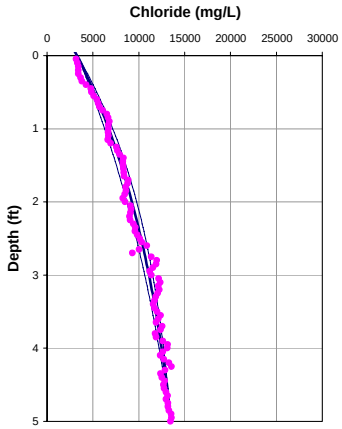
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	742	742
Cl (mg/L)	13324	7400
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.31	-0.12
q (cm/yr)	-0.22	-0.09
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.73	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.75	

OL-GP-60167



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -0.8 cm/year

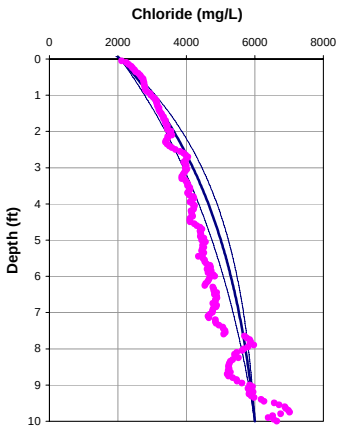
OL-GP-60167



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -1.9 cm/year

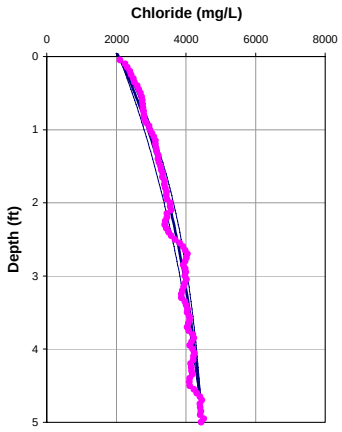
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	3300	3300
Cl (mg/L)	20000	13500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.15	-2.71
q (cm/yr)	-0.81	-1.90
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.75	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-GP-60167.DAT



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.4 cm/year

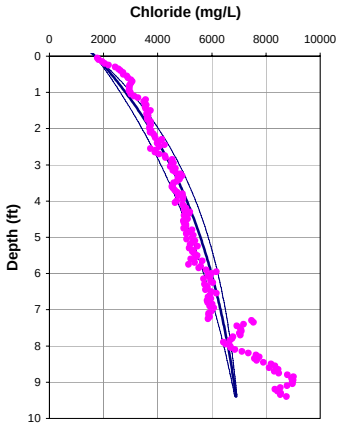
OL-GP-60167.DAT



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.1 cm/year

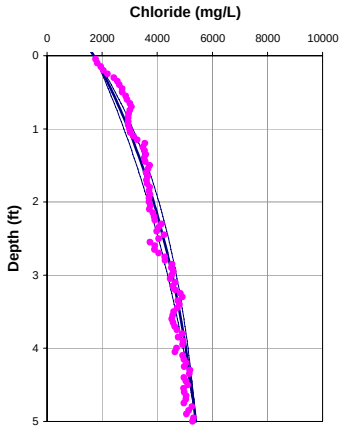
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2073	2073
Cl (mg/L)	6000	4470
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-2.00	-2.99
q (cm/yr)	-1.40	-2.09
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.77	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.7	

OL-GP-60167-A



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.3 cm/year

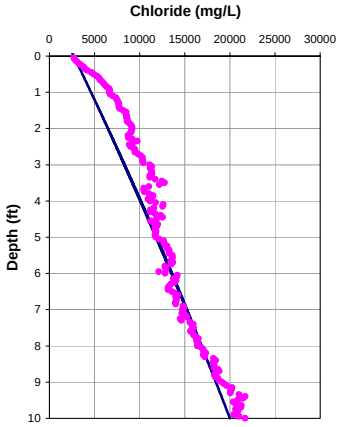
OL-GP-60167-A



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.9 cm/year

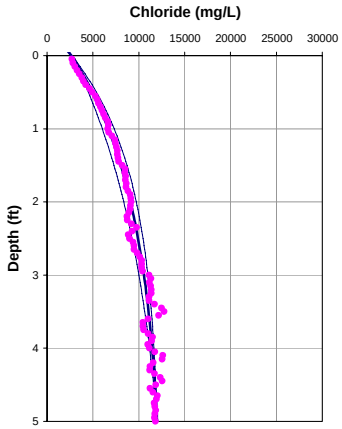
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1700	1700
Cl (mg/L)	7000	5400
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.84	-2.76
q (cm/yr)	-1.29	-1.93
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.77	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.9	

OL-GP-60168



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -0.1 cm/year

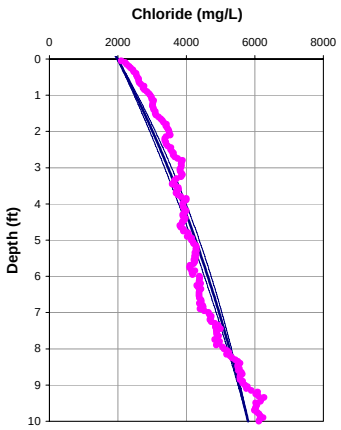
OL-GP-60168



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -3.2 cm/year

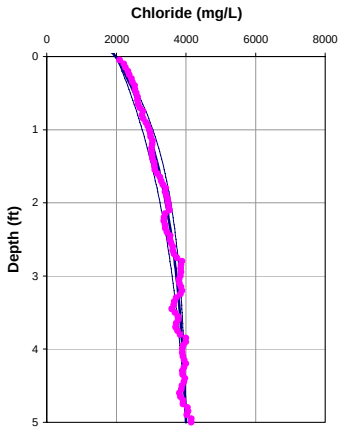
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2700	2700
Cl (mg/L)	20000	12000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.20	-4.54
q (cm/yr)	-0.14	-3.18
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.73	0.76
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-60168.DAT



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.5 cm/year

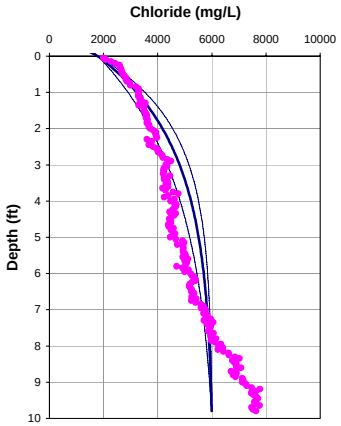
OL-GP-60168.DAT



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -3.5 cm/year

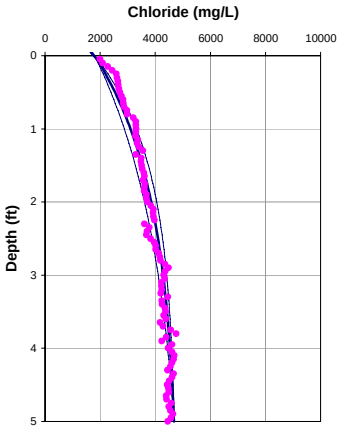
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1990	1990
Cl (mg/L)	5800	4000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.71	-5.06
q (cm/yr)	-0.49	-3.54
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.74	0.77
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.4	

OL-GP-60168-A



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -2.8 cm/year

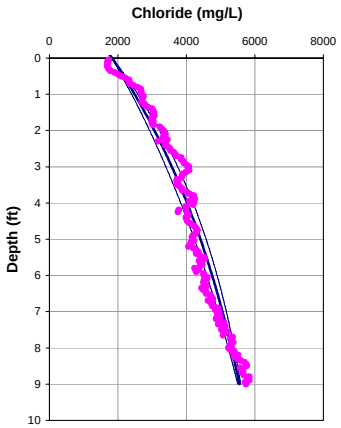
OL-GP-60168-A



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -3.5 cm/year

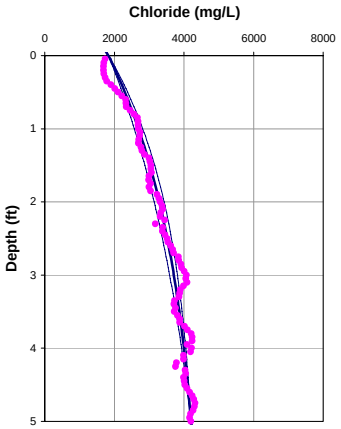
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1800	1800
Cl (mg/L)	6000	4680
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-4.00	-5.03
q (cm/yr)	-2.80	-3.52
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.82	0.77
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2.2	

OL-GP-60169



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -0.8 cm/year

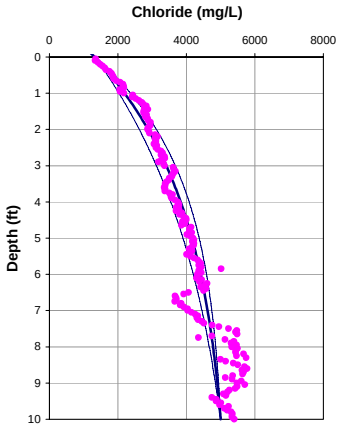
OL-GP-60169



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -2.3 cm/year

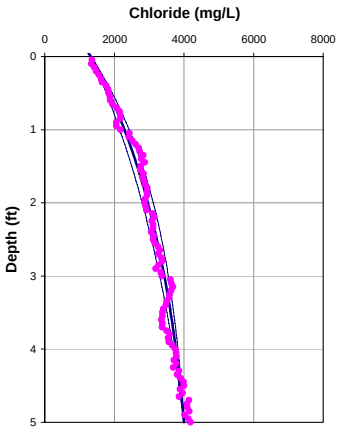
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1833	1833
Cl (mg/L)	5750	4200
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.18	-3.27
q (cm/yr)	-0.82	-2.29
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.75	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-3	

OL-GP-60170



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.6 cm/year

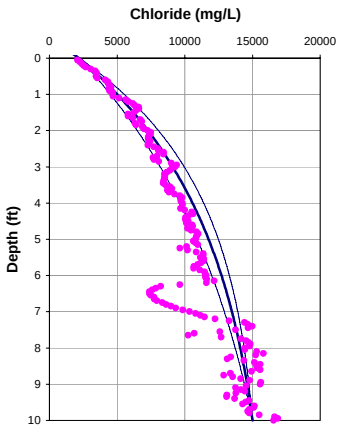
OL-GP-60170



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.2 cm/year

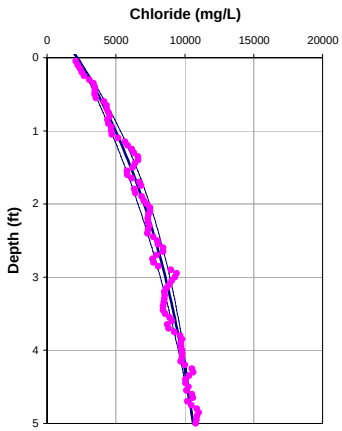
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1330	1330
Cl (mg/L)	5000	4000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-2.27	-3.19
q (cm/yr)	-1.59	-2.23
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.78	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.15	

OL-GP-60170-200



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.4 cm/year

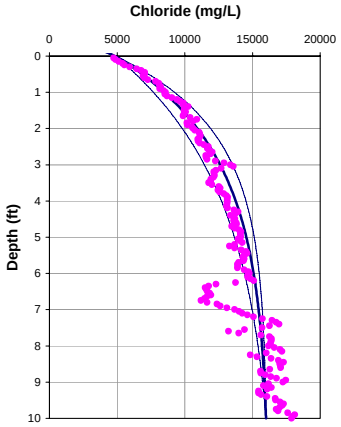
OL-GP-60170-200



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.8 cm/year

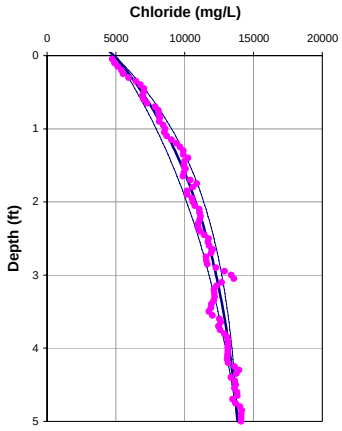
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2200	2200
Cl (mg/L)	15000	10600
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-2.00	-2.60
q (cm/yr)	-1.40	-1.82
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.77	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.45	

OL-GP-60170-400



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -2.6 cm/year

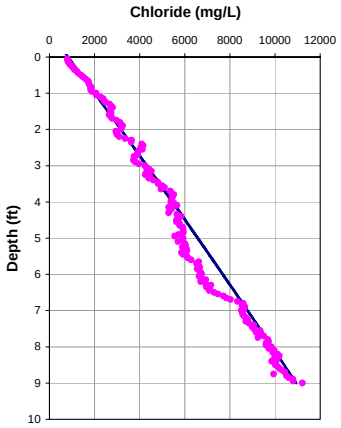
OL-GP-60170-400



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -2.8 cm/year

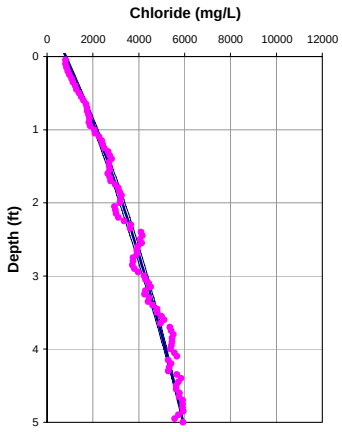
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	4900	4900
Cl (mg/L)	16000	13850
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-3.70	-4.01
q (cm/yr)	-2.59	-2.80
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.82	0.76
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-60171



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

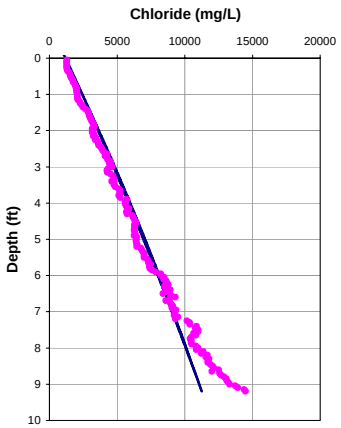
OL-GP-60171



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.8 cm/year

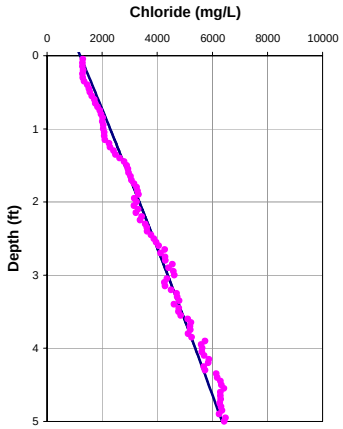
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	829	829
Cl (mg/L)	12000	5933
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-1.14
q (cm/yr)	-0.07	-0.80
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.75	

OL-GP-60172



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.2 cm/year

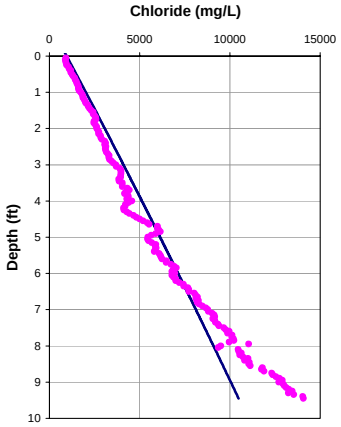
OL-GP-60172



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.2 cm/year

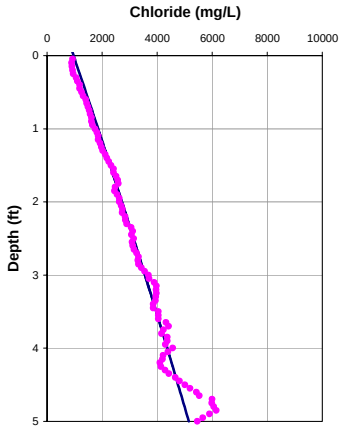
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1200	1200
Cl (mg/L)	12000	6350
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.26	-0.25
q (cm/yr)	-0.18	-0.18
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.73	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-4.1	

OL-GP-60173



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

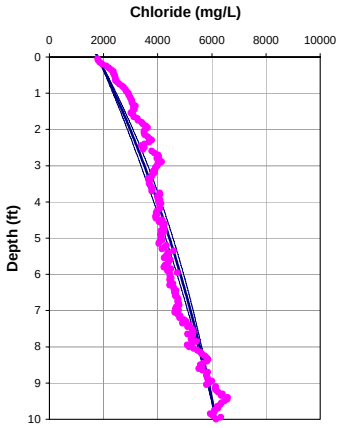
OL-GP-60173



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -0.2 cm/year

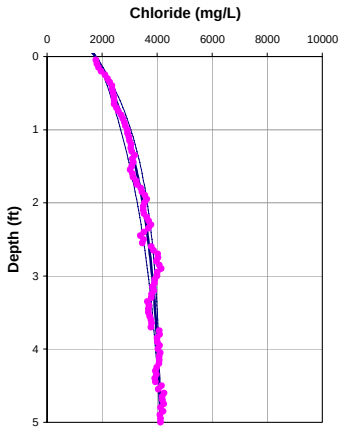
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	961	961
Cl (mg/L)	11000	5150
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.11	-0.29
q (cm/yr)	-0.07	-0.20
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-60174



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.5 cm/year

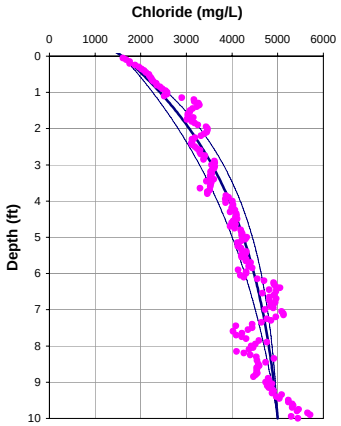
OL-GP-60174



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -3.7 cm/year

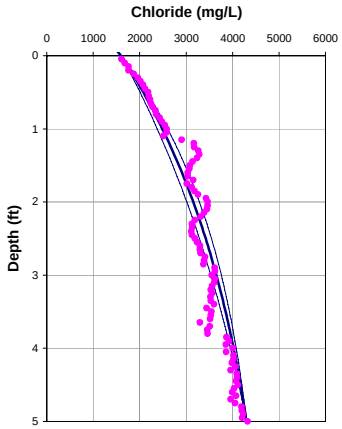
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1784	1784
Cl (mg/L)	6155	4125
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.76	-5.26
q (cm/yr)	-0.53	-3.68
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.74	0.77
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.45	

OL-GP-60175



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.7 cm/year

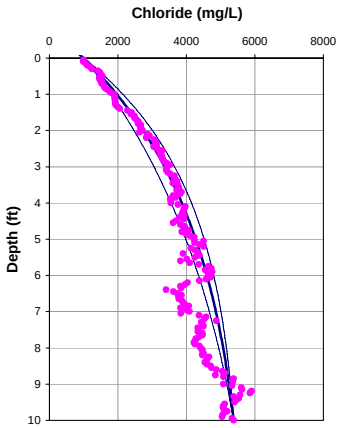
OL-GP-60175



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.8 cm/year

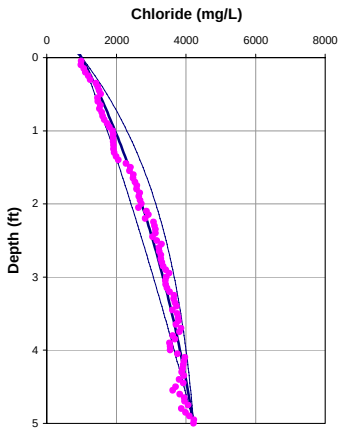
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1600	1600
Cl (mg/L)	5000	4300
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-2.36	-2.60
q (cm/yr)	-1.65	-1.82
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.78	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.6	

OL-GP-60176



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -1.4 cm/year

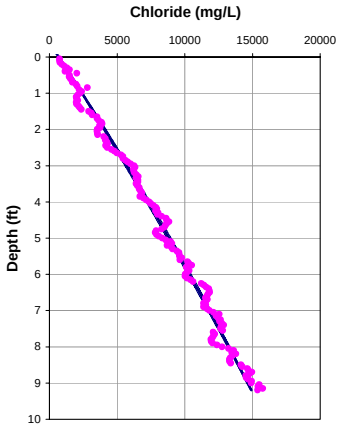
OL-GP-60176



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -1.4 cm/year

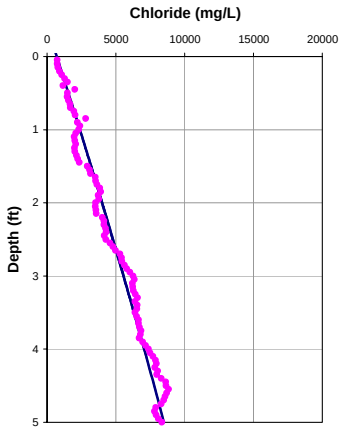
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1007	1007
Cl (mg/L)	5380	4220
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-2.00	-1.98
q (cm/yr)	-1.40	-1.38
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.77	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-60177



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.2 cm/year

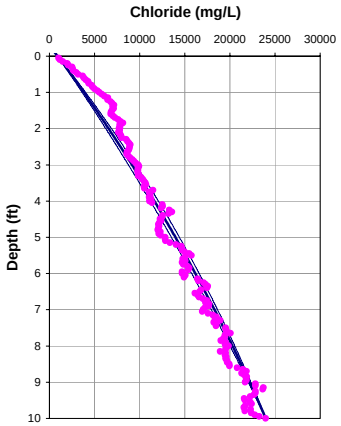
OL-GP-60177



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.2 cm/year

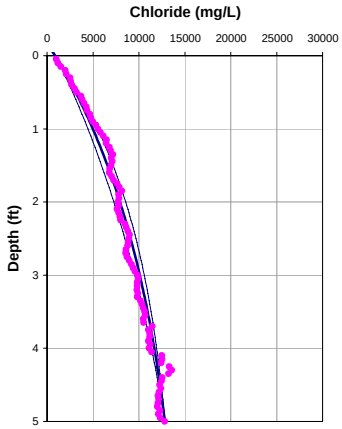
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	704	704
Cl (mg/L)	16000	8500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.22	-0.33
q (cm/yr)	-0.15	-0.23
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.73	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.35	

OL-GP-60178



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.3 cm/year

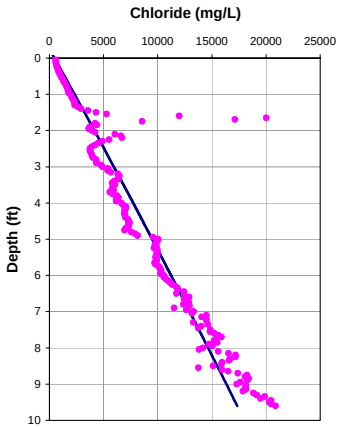
OL-GP-60178



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.0 cm/year

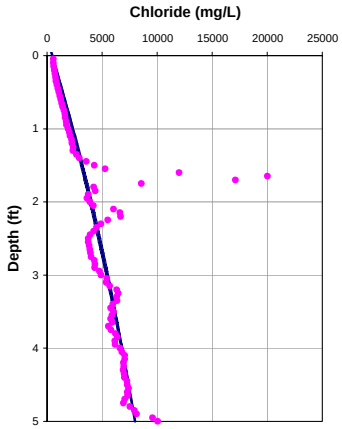
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	928	928
Cl (mg/L)	23981	12830
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.46	-2.80
q (cm/yr)	-0.32	-1.96
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.73	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.15	

OL-GP-60179



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

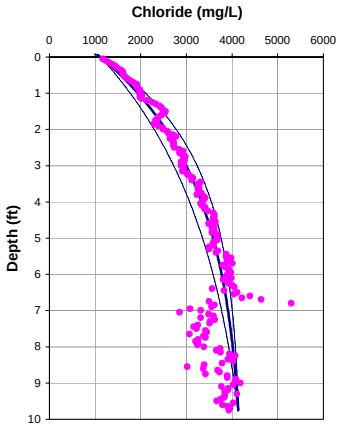
OL-GP-60179



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -0.6 cm/year

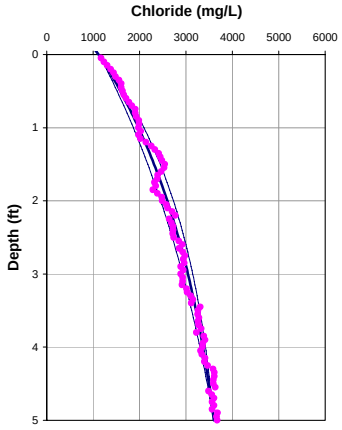
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	480	480
Cl (mg/L)	18000	8000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-0.92
q (cm/yr)	-0.07	-0.64
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-60180



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -2.0 cm/year

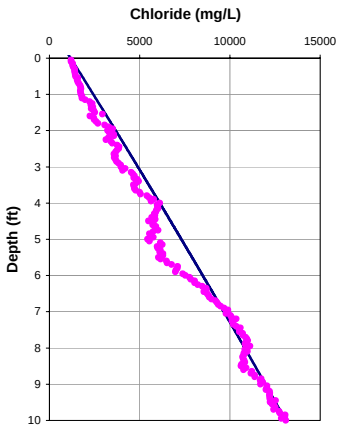
OL-GP-60180



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.0 cm/year

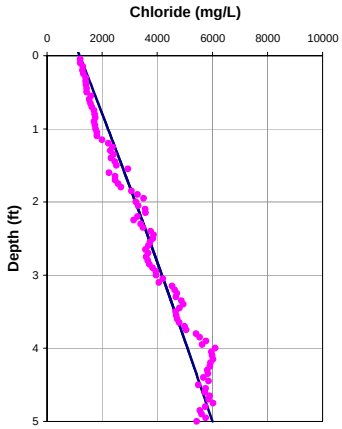
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1125	1125
Cl (mg/L)	4150	3600
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-2.79	-2.90
q (cm/yr)	-1.95	-2.03
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.79	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.45	

OL-GP-60181



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

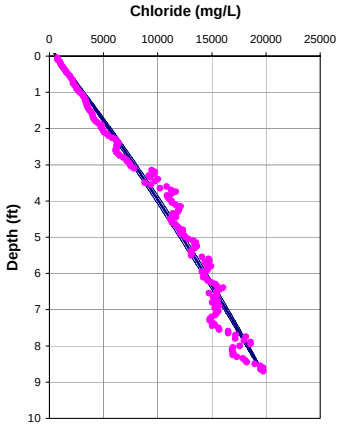
OL-GP-60181



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.2 cm/year

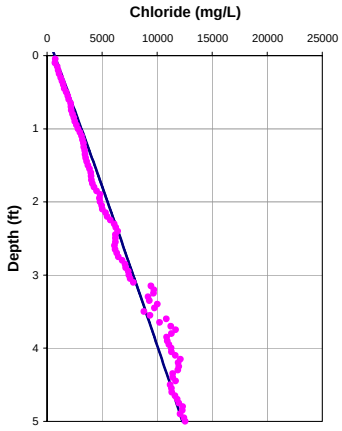
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1181	1181
Cl (mg/L)	13098	6000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-0.29
q (cm/yr)	-0.07	-0.20
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.7	

OL-GP-60182



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -0.2 cm/year

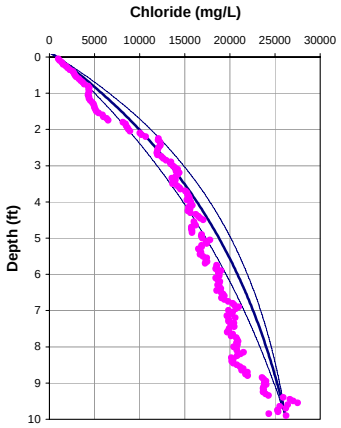
OL-GP-60182



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -0.2 cm/year

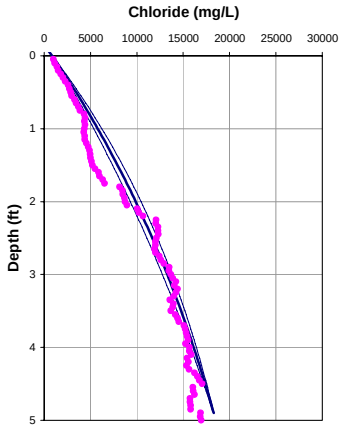
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	683	683
Cl (mg/L)	22000	12300
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.29	-0.22
q (cm/yr)	-0.21	-0.15
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.73	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-60183



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.1 cm/year

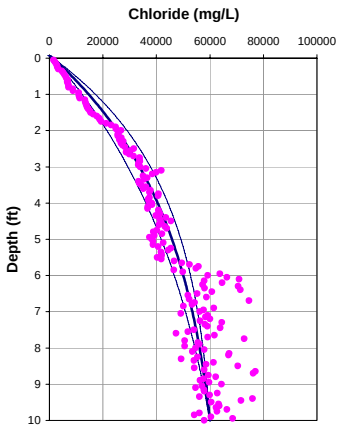
OL-GP-60183



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.1 cm/year

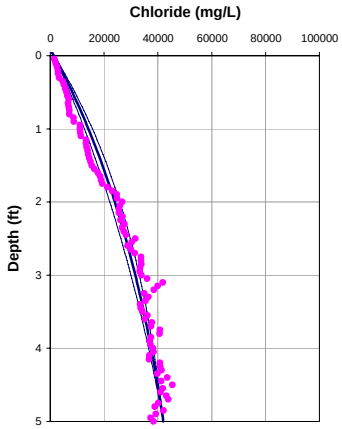
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	874	874
Cl (mg/L)	26249	18500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.60	-1.60
q (cm/yr)	-1.12	-1.12
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.76	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.85	

OL-GP-60184



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.5 cm/year

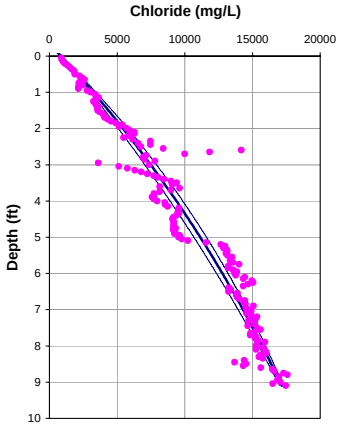
OL-GP-60184



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.6 cm/year

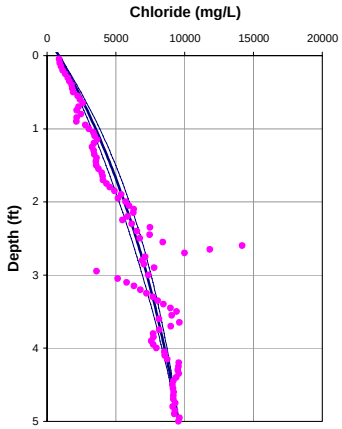
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1404	1404
Cl (mg/L)	60000	42000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-2.11	-2.30
q (cm/yr)	-1.48	-1.61
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.78	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.35	

OL-GP-60185



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -0.5 cm/year

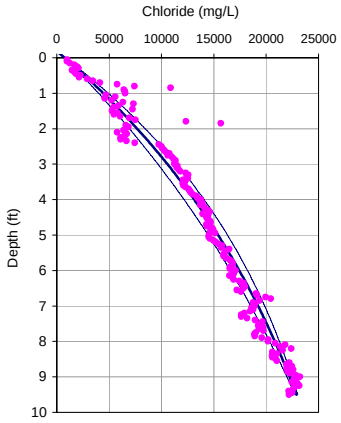
OL-GP-60185



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -1.5 cm/year

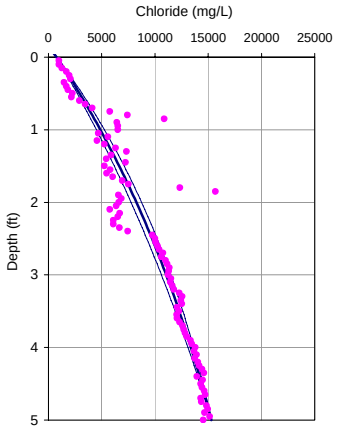
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	866	866
Cl (mg/L)	18250	9553
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.65	-2.15
q (cm/yr)	-0.46	-1.50
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.74	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-60186



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.7 cm/year

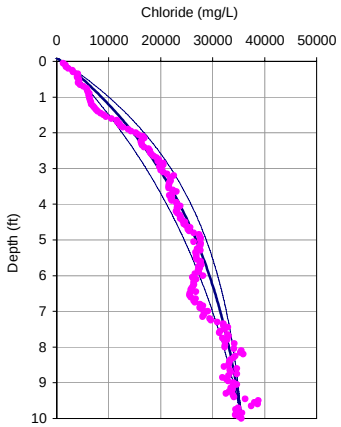
OL-GP-60186



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.2 cm/year

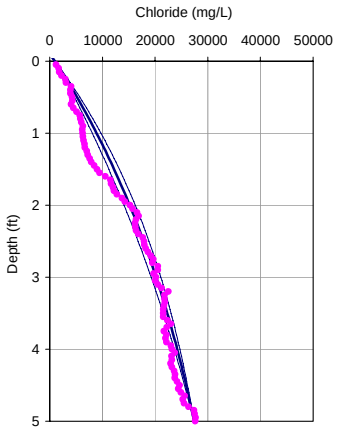
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	783	783
Cl (mg/L)	23500	15300
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.06	-1.66
q (cm/yr)	-0.74	-1.16
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.75	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.15	

OL-GP-60187



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.4 cm/year

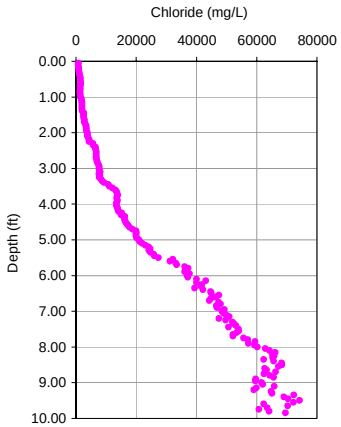
OL-GP-60187



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.4 cm/year

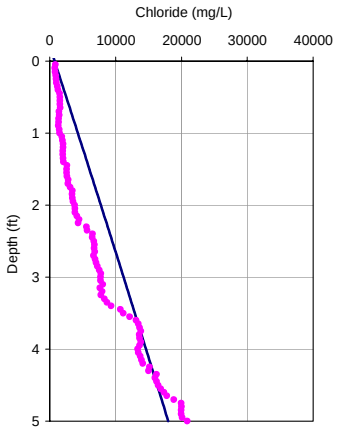
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		1016	1016
Cl (mg/L)		35555	27400
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.7	0.7
Calculated Values **********			
V(cm/yr)		-2.00	-2.00
q (cm/yr)		-1.40	-1.40
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.72	0.72
Diffusion + Dispersion (cm2/day)		0.77	0.74
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	-0.9		

OL-GP-60188



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = NA cm/year

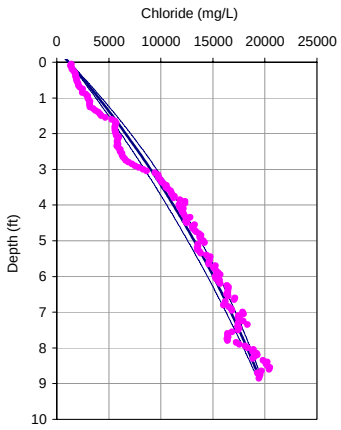
OL-GP-60188



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = NA cm/year

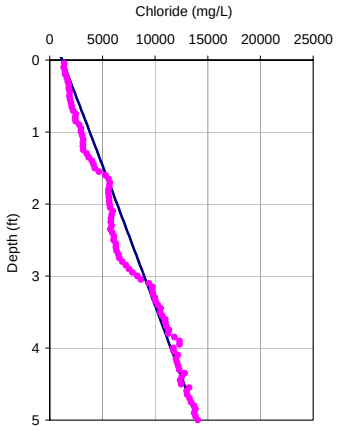
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		738	738
Cl (mg/L)		45000	18000
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.7	0.7
Calculated Values **********			
V(cm/yr)		-0.66	-0.10
q (cm/yr)		-0.46	-0.07
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.72	0.72
Diffusion + Dispersion (cm2/day)		0.74	0.72
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	-1		

OL-GP-60189



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.5 cm/year

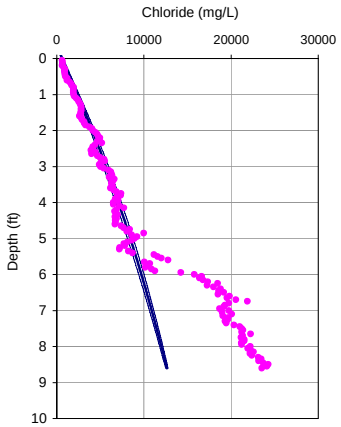
OL-GP-60189



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

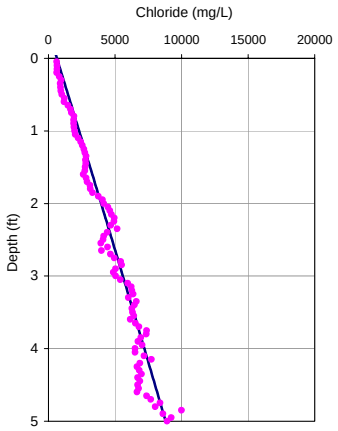
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		1176	1176
Cl (mg/L)		21000	14000
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.7	0.7
Calculated Values **********			
V(cm/yr)		-0.77	-0.10
q (cm/yr)		-0.54	-0.07
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.72	0.72
Diffusion + Dispersion (cm2/day)		0.74	0.72
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	-1.65		

OL-GP-60190



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.4 cm/year

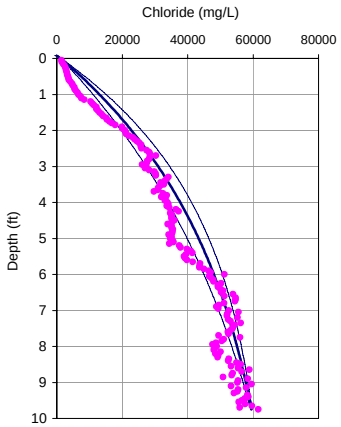
OL-GP-60190



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

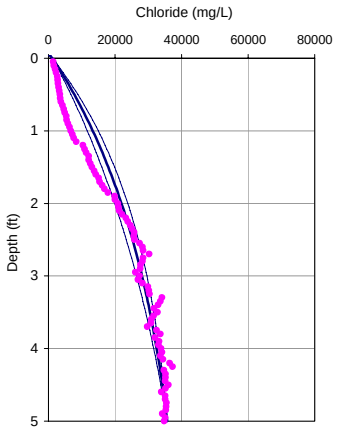
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	631	631
Cl (mg/L)	14000	8800
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.60	-0.10
q (cm/yr)	-0.42	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.74	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.75	

OL-GP-60191



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -1.2 cm/year

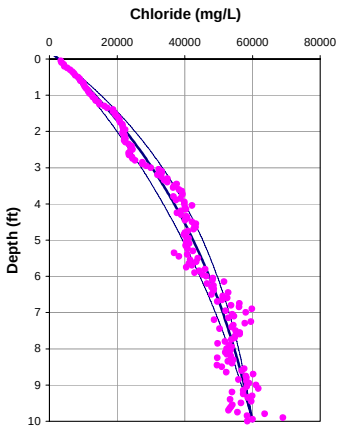
OL-GP-60191



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -2.1 cm/year

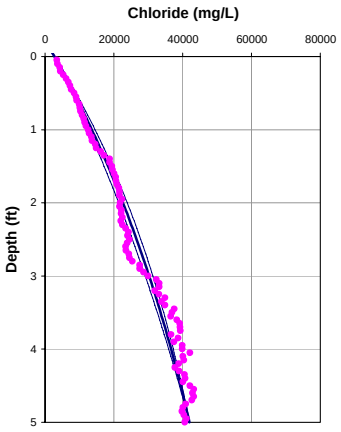
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1227	1227
Cl (mg/L)	60000	35700
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.70	-3.00
q (cm/yr)	-1.19	-2.10
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.76	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-60192



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.0 cm/year

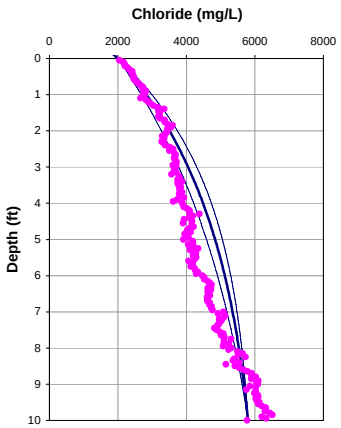
OL-GP-60192



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.1 cm/year

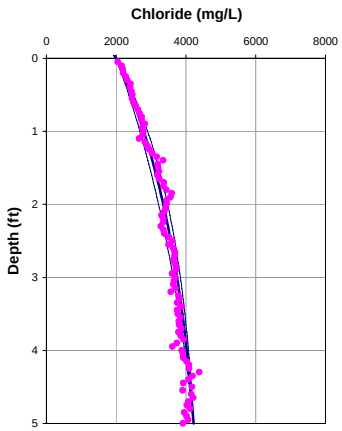
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2783	2783
Cl (mg/L)	60000	42000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.49	-1.54
q (cm/yr)	-1.04	-1.08
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.76	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.1	

OL-GP-60193



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.4 cm/year

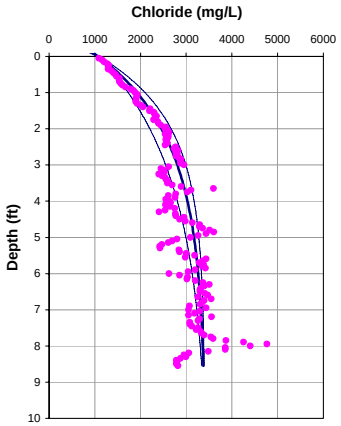
OL-GP-60193



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.2 cm/year

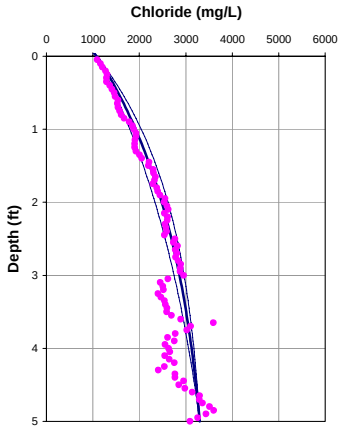
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2000	2000
Cl (mg/L)	5800	4220
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-2.00	-3.12
q (cm/yr)	-1.40	-2.18
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.77	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-60194



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -3.1 cm/year

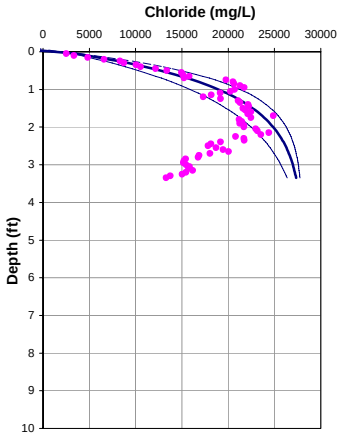
OL-GP-60194



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -2.5 cm/year

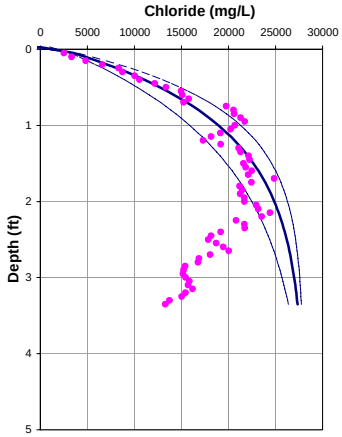
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1088	1088
Cl (mg/L)	3400	3300
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-4.40	-3.50
q (cm/yr)	-3.08	-2.45
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.83	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-70051



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -7.0 cm/year

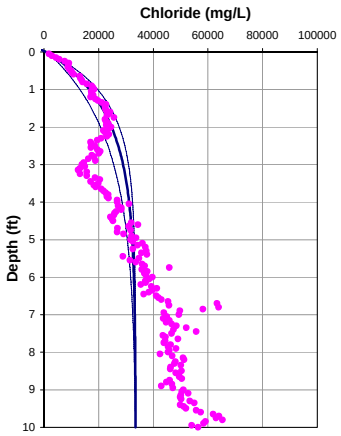
OL-GP-70051



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -7.0 cm/year

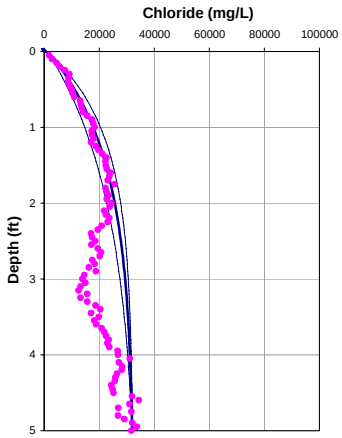
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2305	2305
Cl (mg/L)	28000	28000
L(ft)	5	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-10.00	-10.00
q (cm/yr)	-7.00	-7.00
dispersion length (ft)	0.11	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.11	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.81	0.81
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-70051A



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -4.9 cm/year

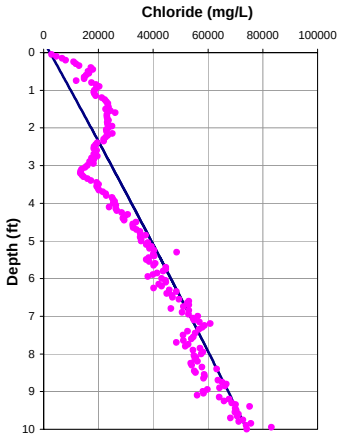
OL-GP-70051A



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -4.9 cm/year

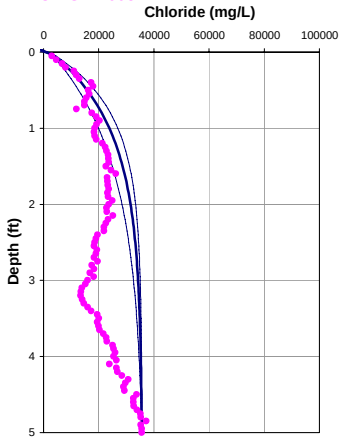
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1200	1200
Cl (mg/L)	33500	32000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-7.00	-7.00
q (cm/yr)	-4.90	-4.90
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.90	0.78
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-70052



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

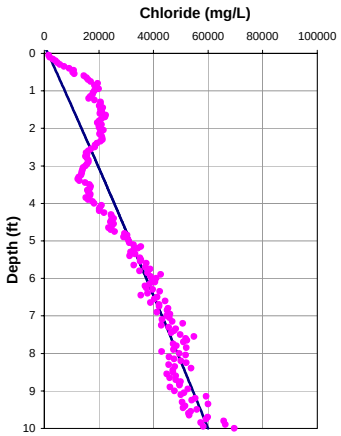
OL-GP-70052



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -7.0 cm/year

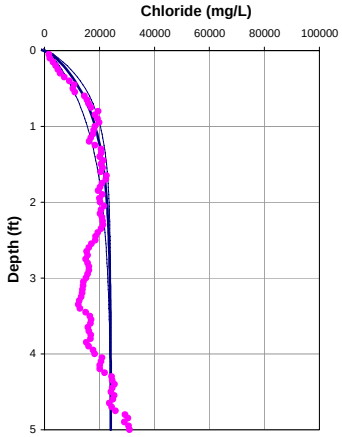
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2316	2316
Cl (mg/L)	74194	35600
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-10.00
q (cm/yr)	-0.07	-7.00
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.81
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.6	

OL-GP-70053



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

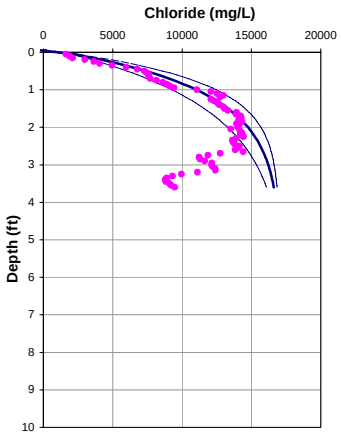
OL-GP-70053



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -9.8 cm/year

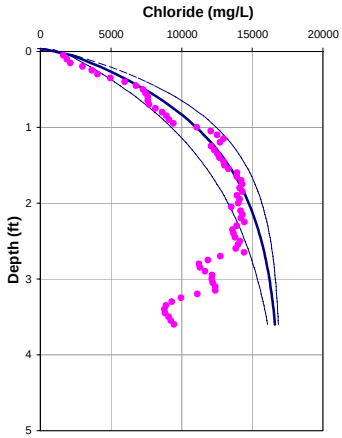
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1357	1357
Cl (mg/L)	60000	24100
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-14.00
q (cm/yr)	-0.07	-9.80
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.84
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.8	

OL-GP-70053-1



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -6.3 cm/year

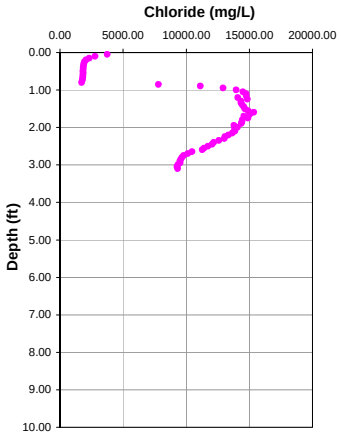
OL-GP-70053-1



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -6.3 cm/year

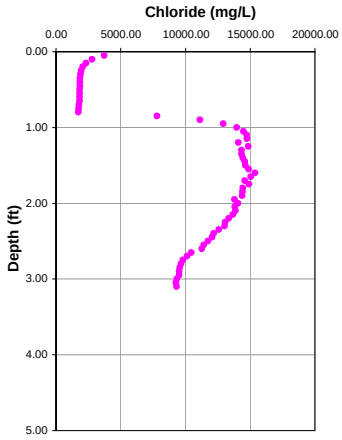
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1537	1537
Cl (mg/L)	17000	17000
L(ft)	5	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-9.00	-9.00
q (cm/yr)	-6.30	-6.30
dispersion length (ft)	0.11	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.11	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.80	0.80
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-70053-2



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = NA cm/year

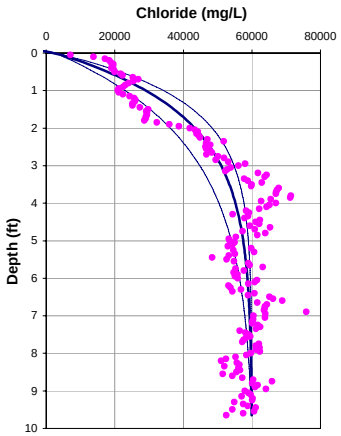
OL-GP-70053-2



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = NA cm/year

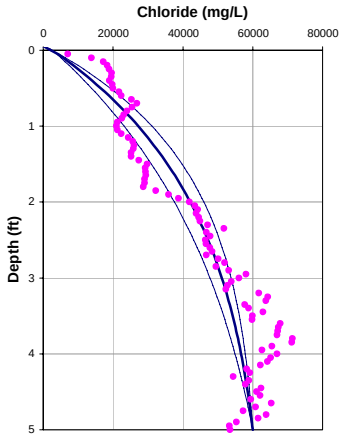
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	9323	9323
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-50.00	-25.27
q (cm/yr)	-35.00	-17.69
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	2.00	0.94
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-GP-70054



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -4.6 cm/year

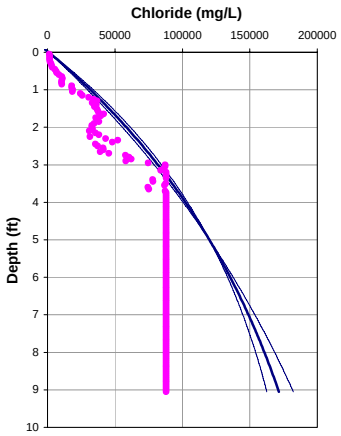
OL-GP-70054



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -3.2 cm/year

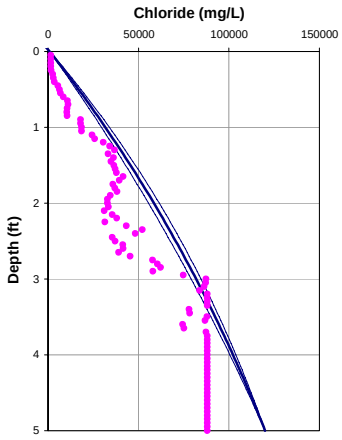
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2707	2707
Cl (mg/L)	60000	60000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-6.53	-4.54
q (cm/yr)	-4.57	-3.18
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.89	0.76
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.4	

OL-GP-70054A



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -0.8 cm/year

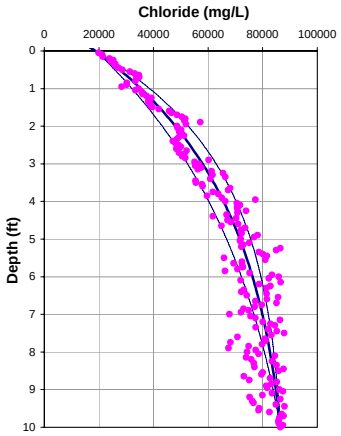
OL-GP-70054A



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -0.8 cm/year

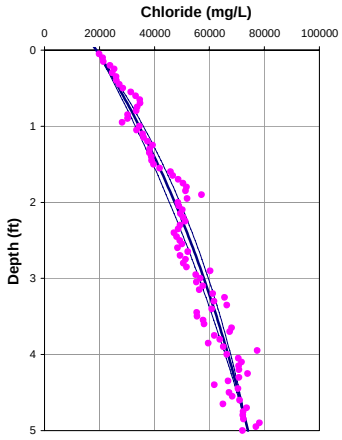
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1000	1000
Cl (mg/L)	120000	120000
L(ft)	5	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.20	-1.20
q (cm/yr)	-0.84	-0.84
dispersion length (ft)	0.11	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.11	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.73	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-70055



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.7 cm/year

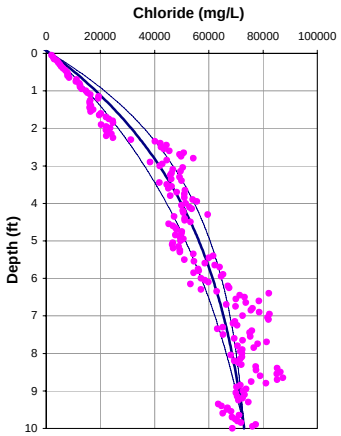
OL-GP-70055



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.2 cm/year

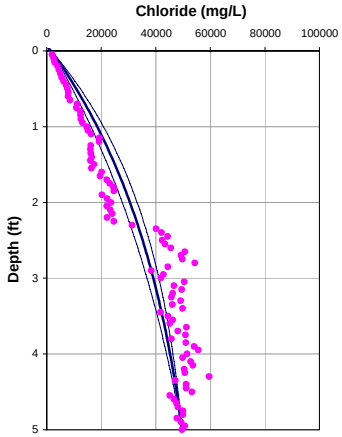
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	18893	18893
Cl (mg/L)	86514	74000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-2.37	-1.69
q (cm/yr)	-1.66	-1.19
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.78	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-70056



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.5 cm/year

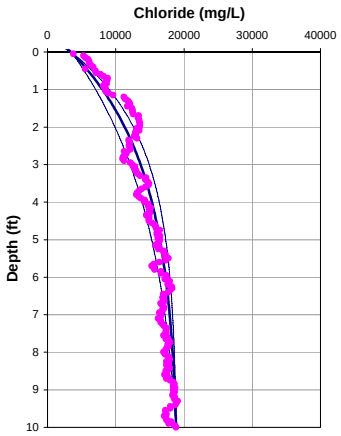
OL-GP-70056



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.1 cm/year

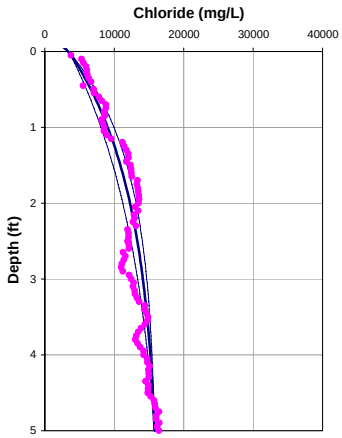
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1692	1692
Cl (mg/L)	73000	49627
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-2.21	-3.01
q (cm/yr)	-1.55	-2.11
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.78	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.4	

OL-GP-70075



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -2.3 cm/year

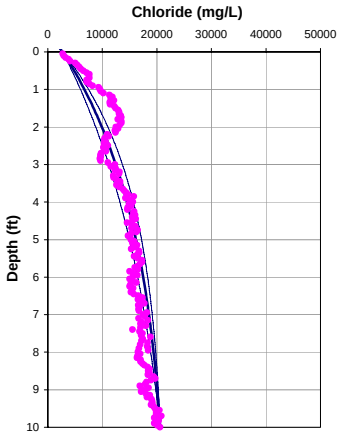
OL-GP-70075



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -3.5 cm/year

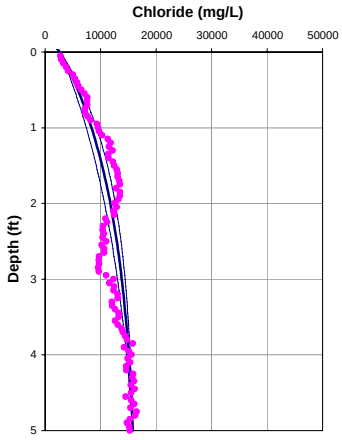
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	3463	3463
Cl (mg/L)	18846	15800
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-3.28	-5.06
q (cm/yr)	-2.29	-3.55
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.80	0.77
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-70076



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.4 cm/year

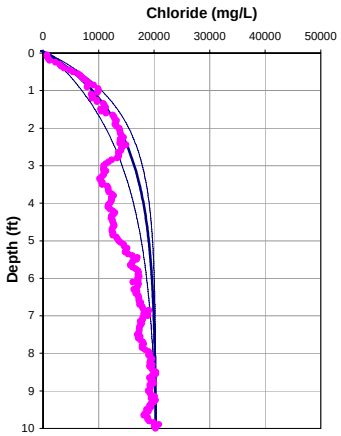
OL-GP-70076



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -3.2 cm/year

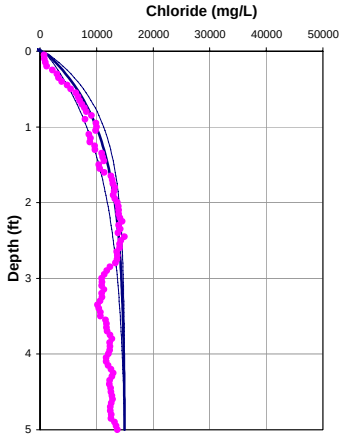
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2725	2725
Cl (mg/L)	20611	15800
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-2.05	-4.60
q (cm/yr)	-1.43	-3.22
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.77	0.76
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.65	

OL-GP-70077



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -3.9 cm/year

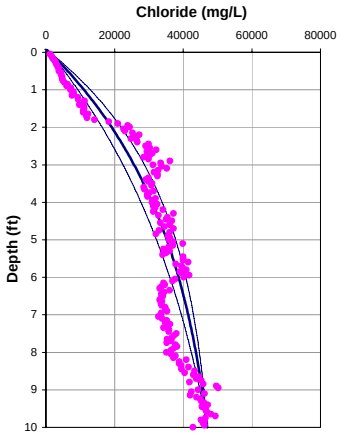
OL-GP-70077



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -7.0 cm/year

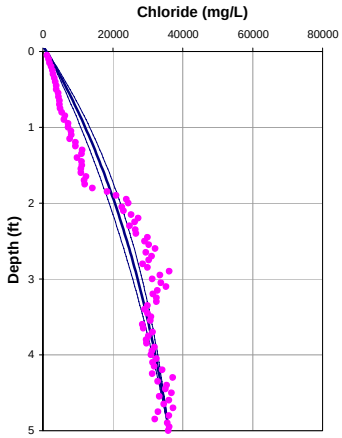
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	750	750
Cl (mg/L)	20304	14950
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-5.50	-10.00
q (cm/yr)	-3.85	-7.00
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.86	0.81
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.1	

OL-GP-70078



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -1.4 cm/year

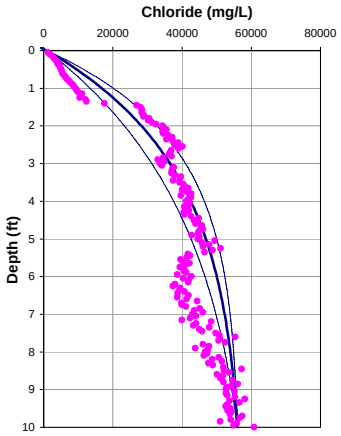
OL-GP-70078



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -1.6 cm/year

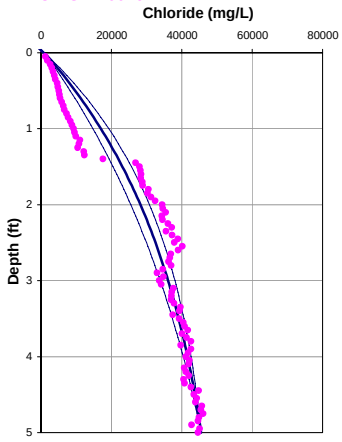
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1110	1110
Cl (mg/L)	47000	36000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.97	-2.31
q (cm/yr)	-1.38	-1.62
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.77	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-70079



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -2.2 cm/year

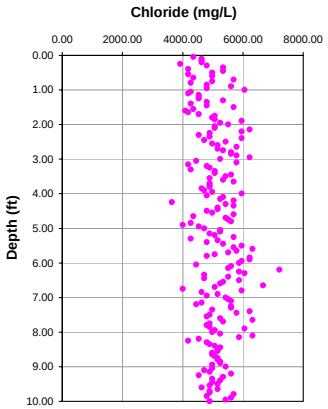
OL-GP-70079



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.2 cm/year

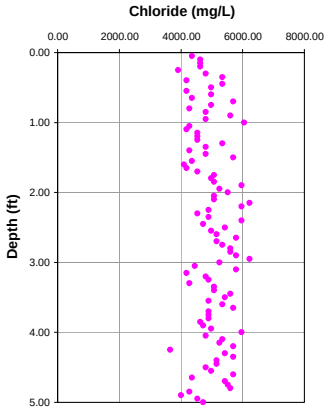
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	993	993
Cl (mg/L)	56000	45500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-3.10	-3.19
q (cm/yr)	-2.17	-2.23
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.80	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.85	

OL-GP-70080



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = NA cm/year

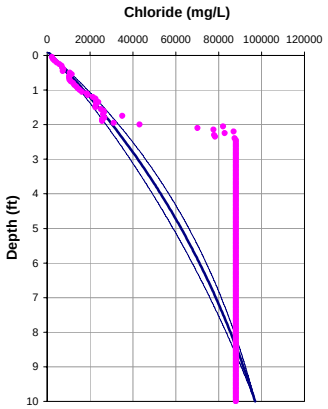
OL-GP-70080



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = NA cm/year

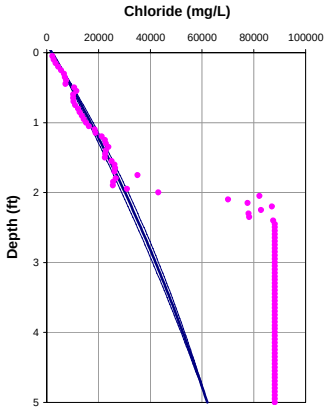
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	4806	4806
Cl (mg/L)	4895	4717
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-30.30	53687090.93
q (cm/yr)	-21.21	37580963.65
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	4825.72
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	1.49	473685.74
Diffusion + Dispersion (ft2/day)	0.00	509.87
Adjusted depth	-1.5	

OL-GP-70081



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -0.7 cm/year

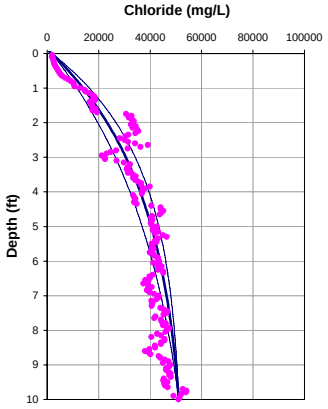
OL-GP-70081



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -0.7 cm/year

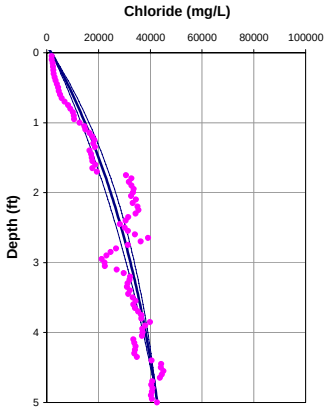
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2112	2112
Cl (mg/L)	97000	62000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.00	-1.00
q (cm/yr)	-0.70	-0.70
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.75	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-70082



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.7 cm/year

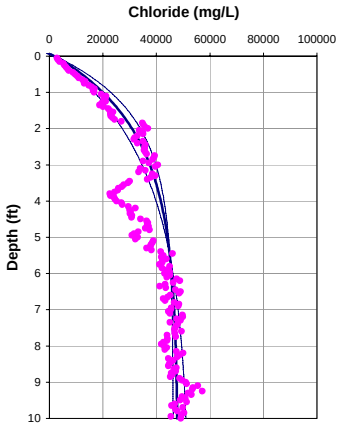
OL-GP-70082



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.6 cm/year

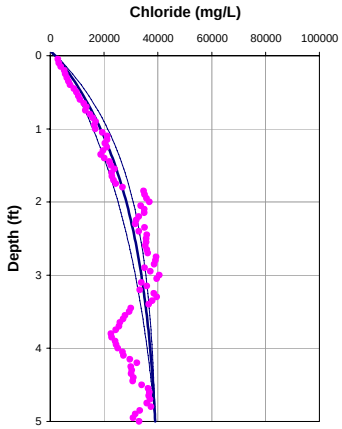
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1840	1840
Cl (mg/L)	51155	42701
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-2.41	-2.35
q (cm/yr)	-1.69	-1.64
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.78	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.5	

OL-GP-70083



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -3.2 cm/year

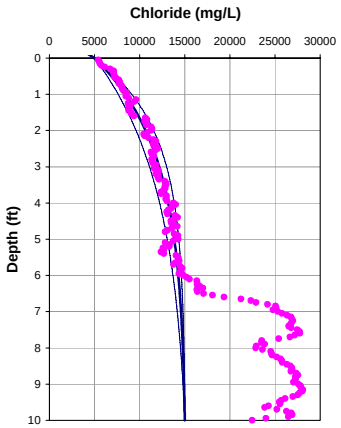
OL-GP-70083



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -3.5 cm/year

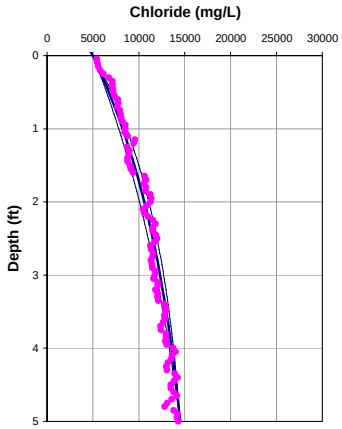
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2193	2193
Cl (mg/L)	45000	39000
L(ft)	6	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-4.50	-4.95
q (cm/yr)	-3.15	-3.46
dispersion length (ft)	0.12	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.12	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.77	0.77
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.4	

OL-GP-70088



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -2.8 cm/year

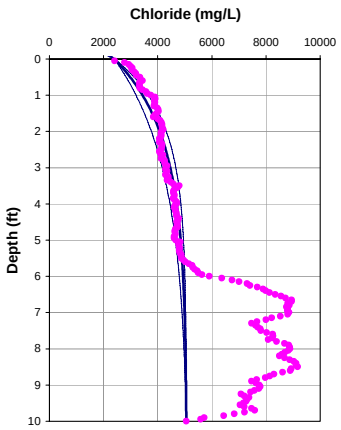
OL-GP-70088



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -2.0 cm/year

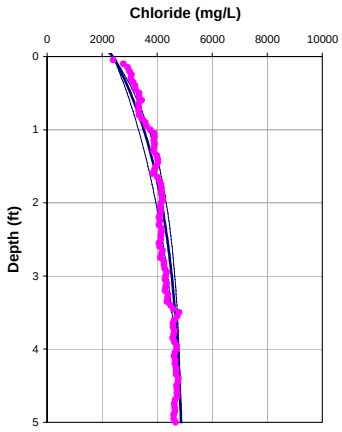
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	5000	5000
Cl (mg/L)	15000	14500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-4.00	-2.81
q (cm/yr)	-2.80	-1.97
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.82	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-70088.DAT



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -3.5 cm/year

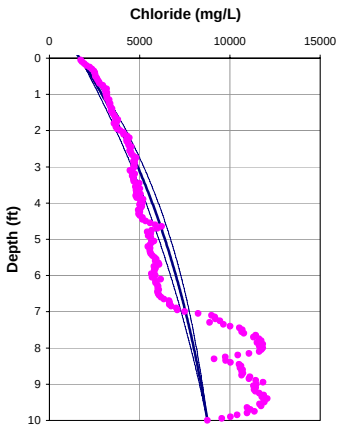
OL-GP-70088.DAT



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -3.5 cm/year

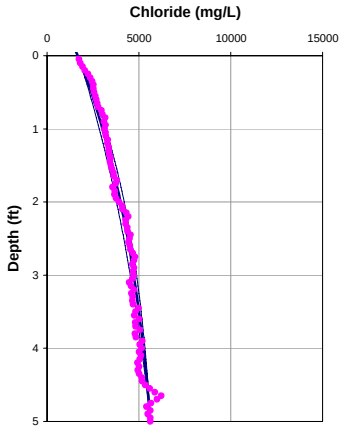
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2400	2400
Cl (mg/L)	5056	4870
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-5.00	-5.02
q (cm/yr)	-3.50	-3.51
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.85	0.77
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-GP-70088-A



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.9 cm/year

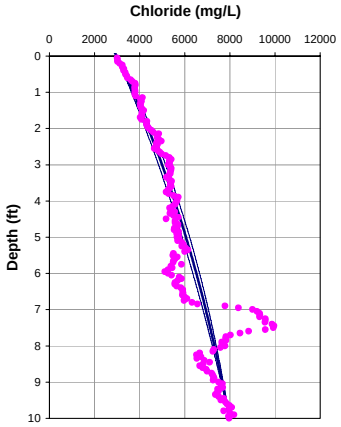
OL-GP-70088-A



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.9 cm/year

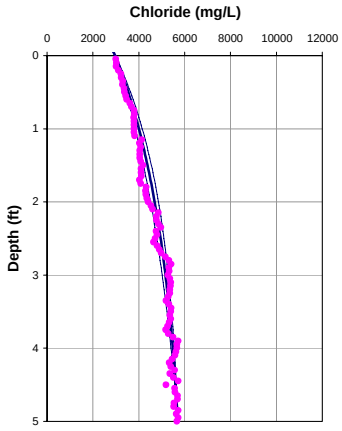
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1686	1686
Cl (mg/L)	8750	5633
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.26	-2.75
q (cm/yr)	-0.88	-1.92
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.75	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.45	

OL-GP-70089-A



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -0.6 cm/year

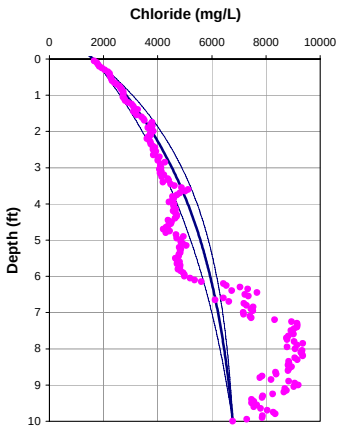
OL-GP-70089-A



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -2.5 cm/year

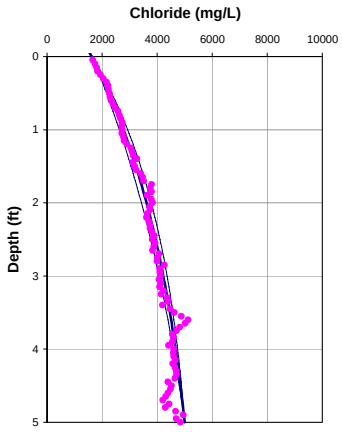
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2977	2977
Cl (mg/L)	7975	5700
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.84	-3.50
q (cm/yr)	-0.58	-2.45
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.74	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-70090



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.6 cm/year

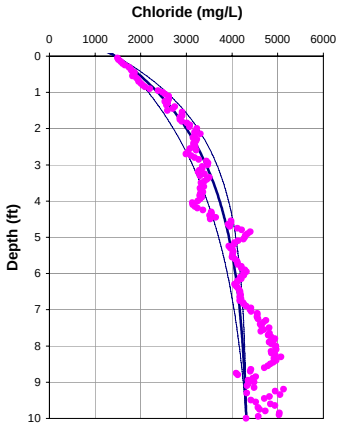
OL-GP-70090



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.9 cm/year

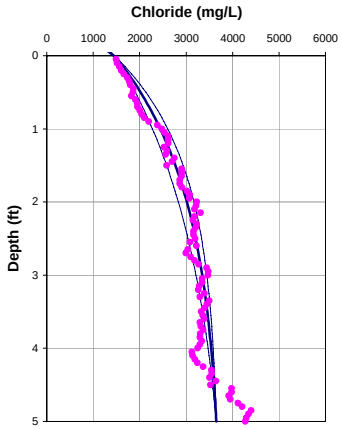
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1634	1634
Cl (mg/L)	6771	5000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-2.22	-2.78
q (cm/yr)	-1.55	-1.95
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.78	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.3	

OL-GP-70091



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -2.6 cm/year

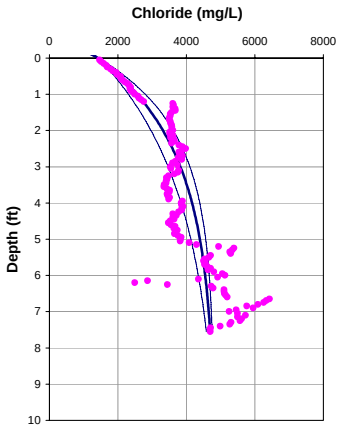
OL-GP-70091



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -3.5 cm/year

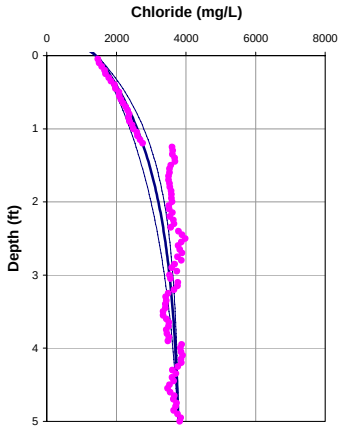
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1460	1460
Cl (mg/L)	4311	3650
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-3.66	-5.00
q (cm/yr)	-2.56	-3.50
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.81	0.77
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.9	

OL-GP-70092



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -2.7 cm/year

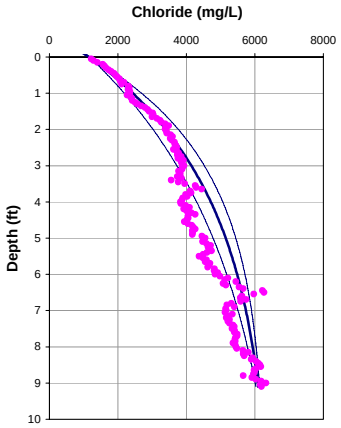
OL-GP-70092



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -4.2 cm/year

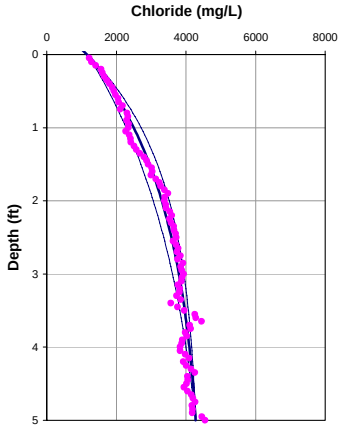
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1437	1437
Cl (mg/L)	4800	3780
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-3.91	-6.00
q (cm/yr)	-2.74	-4.20
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.82	0.77
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-70093



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.8 cm/year

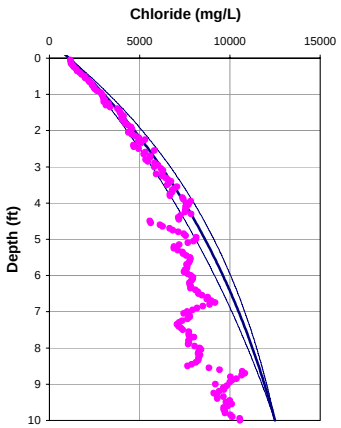
OL-GP-70093



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -3.2 cm/year

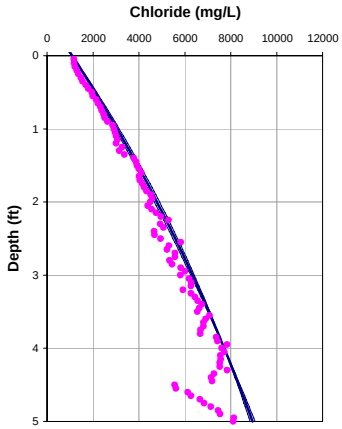
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1175	1175
Cl (mg/L)	6200	4280
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-2.50	-4.52
q (cm/yr)	-1.75	-3.16
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.79	0.76
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-70094



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.8 cm/year

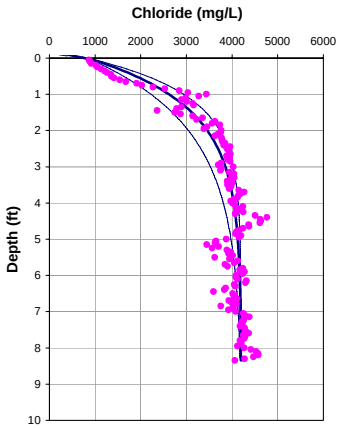
OL-GP-70094



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.7 cm/year

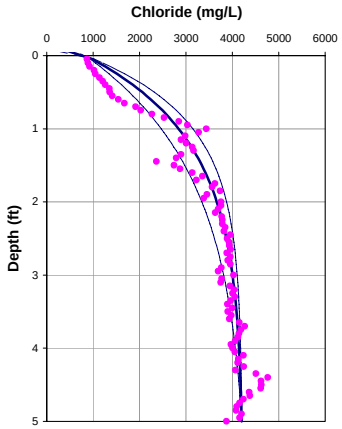
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1100	1100
Cl (mg/L)	12500	7718
L(ft)	10	4
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.19	-1.00
q (cm/yr)	-0.83	-0.70
dispersion length (ft)	0.31	0.08
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.08
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.75	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.3	

OL-GP-70095



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -5.9 cm/year

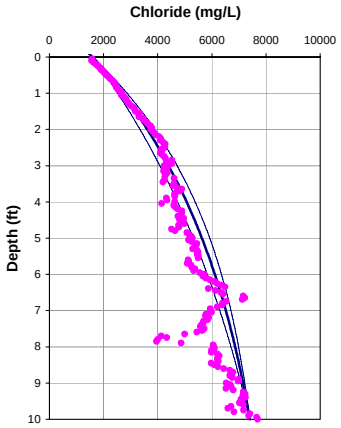
OL-GP-70095



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -5.9 cm/year

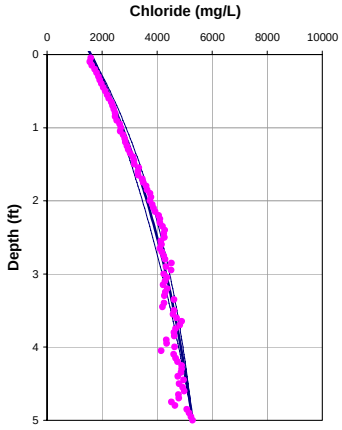
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	838	838
Cl (mg/L)	4200	4200
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-8.48	-8.48
q (cm/yr)	-5.94	-5.94
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.94	0.80
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-70096



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.1 cm/year

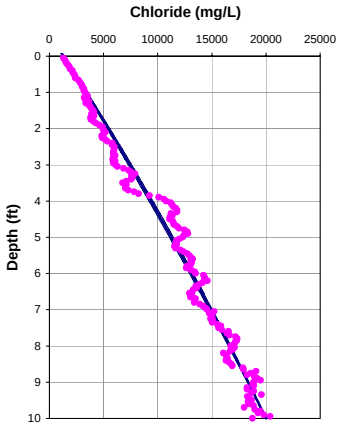
OL-GP-70096



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.5 cm/year

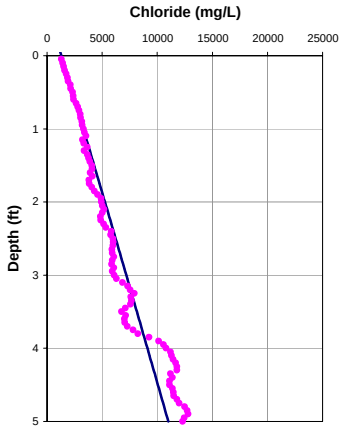
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1600	1600
Cl (mg/L)	7400	5288
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.50	-2.20
q (cm/yr)	-1.05	-1.54
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.76	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-GP-70097



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.2 cm/year

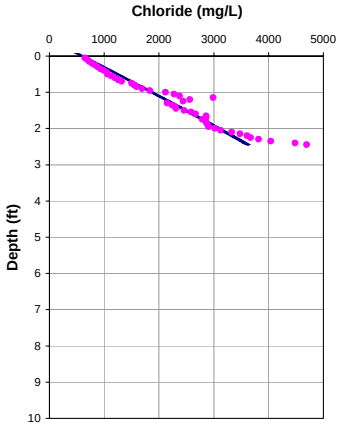
OL-GP-70097



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

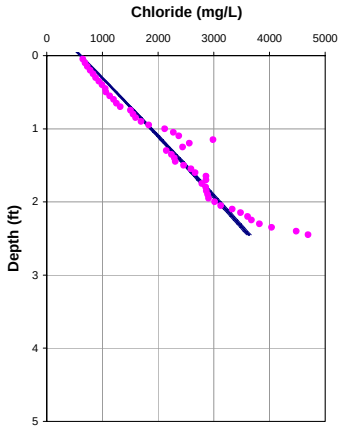
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1303	1303
Cl (mg/L)	20000	11000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.23	-0.10
q (cm/yr)	-0.16	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.73	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.85	

OL-GP-70098



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -0.2 cm/year

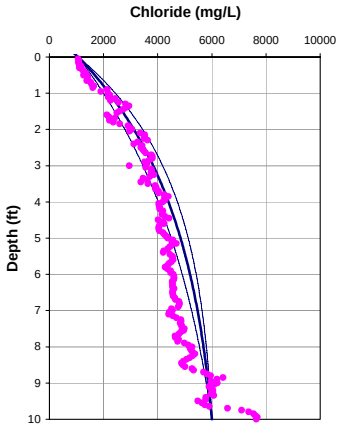
OL-GP-70098



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -0.2 cm/year

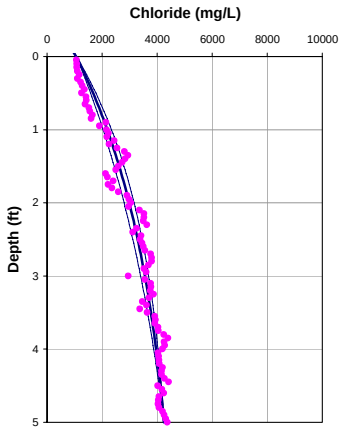
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	609	609
Cl (mg/L)	6500	6500
L(ft)	5	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.32	-0.32
q (cm/yr)	-0.22	-0.22
dispersion length (ft)	0.11	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.11	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-70099



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.5 cm/year

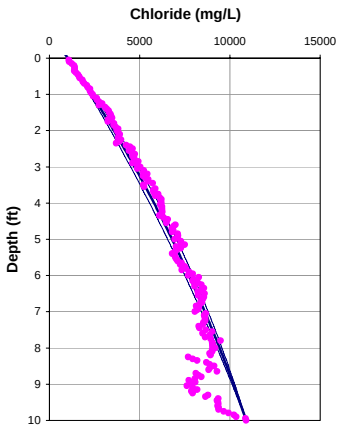
OL-GP-70099



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.1 cm/year

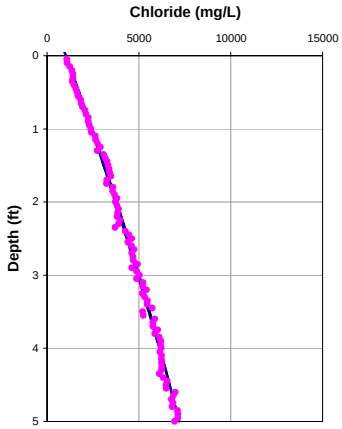
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1068	1068
Cl (mg/L)	6000	4250
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-2.20	-3.03
q (cm/yr)	-1.54	-2.12
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.78	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-70100



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.4 cm/year

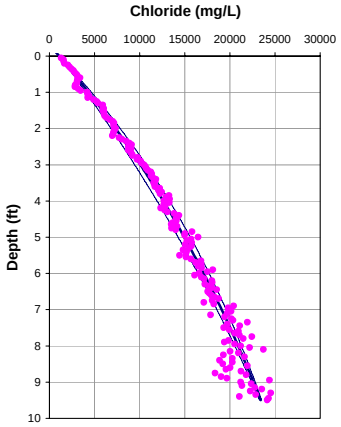
OL-GP-70100



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.4 cm/year

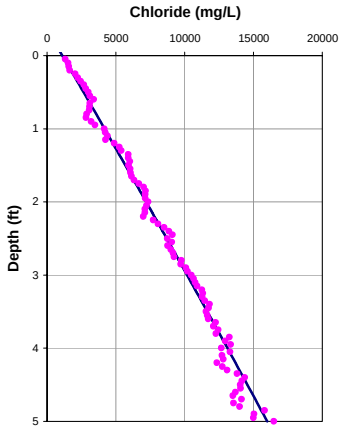
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1023	1023
Cl (mg/L)	10907	7200
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.60	-0.60
q (cm/yr)	-0.42	-0.42
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.74	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-0.45	

OL-GP-70101



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -0.5 cm/year

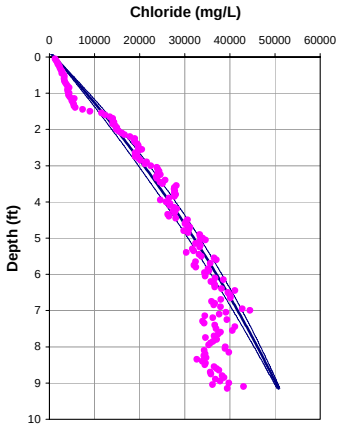
OL-GP-70101



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

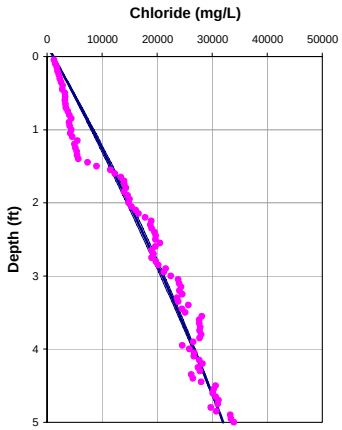
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1112	1112
Cl (mg/L)	24161	16000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.72	-0.13
q (cm/yr)	-0.50	-0.09
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.74	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-2	

OL-GP-70102



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.4 cm/year

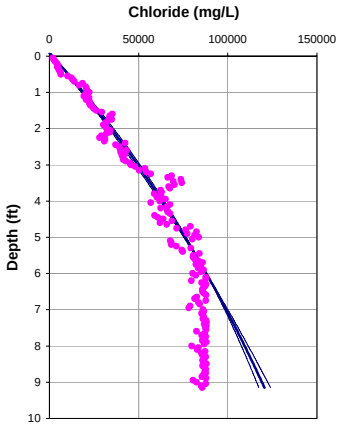
OL-GP-70102



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.4 cm/year

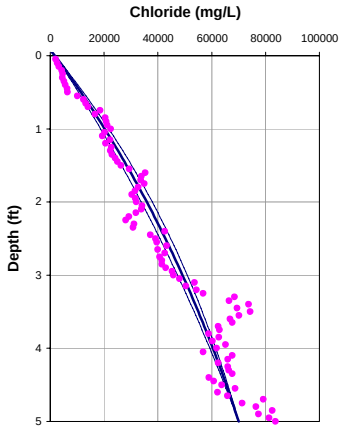
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1158	1158
Cl (mg/L)	54000	32000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.60	-0.62
q (cm/yr)	-0.42	-0.43
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.74	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.8	

OL-GP-70103



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.4 cm/year

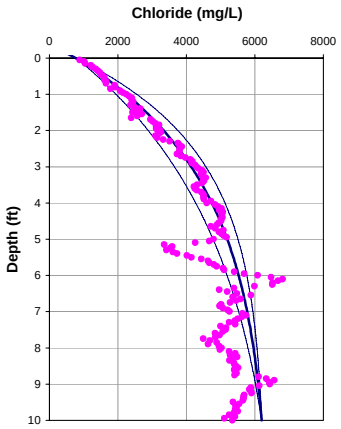
OL-GP-70103



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.0 cm/year

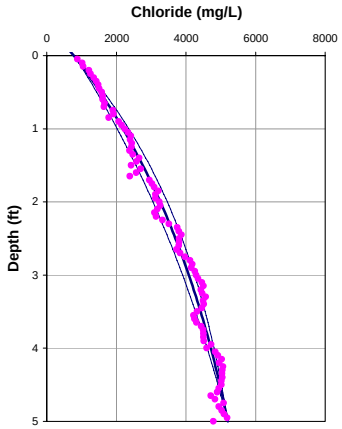
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1786	1786
Cl (mg/L)	88000	70000
L(ft)	6	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.62	-1.44
q (cm/yr)	-0.43	-1.01
dispersion length (ft)	0.14	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.14	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.73	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.2	

OL-GP-70104



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -2.0 cm/year

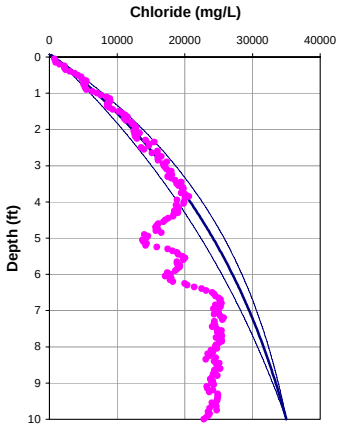
OL-GP-70104



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -1.6 cm/year

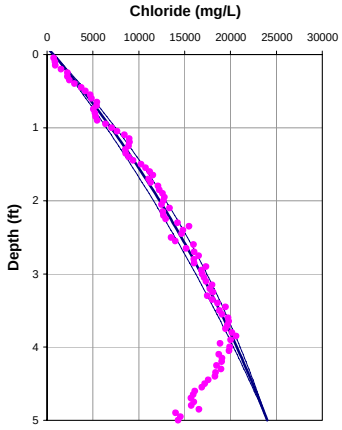
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	790	790
Cl (mg/L)	6200	5200
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-2.80	-2.36
q (cm/yr)	-1.96	-1.65
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.79	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-70105



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.0 cm/year

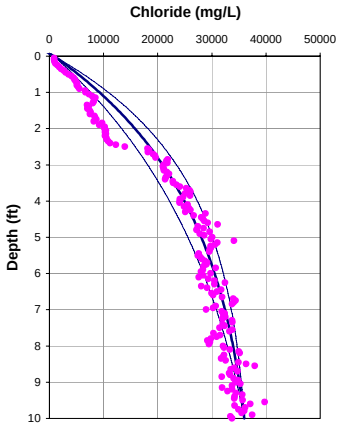
OL-GP-70105



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.0 cm/year

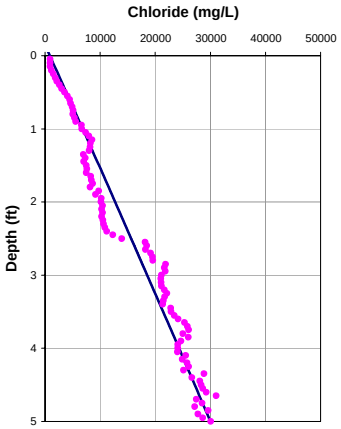
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	709	709
Cl (mg/L)	35000	24000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.40	-1.40
q (cm/yr)	-0.98	-0.98
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.76	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-70106



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.6 cm/year

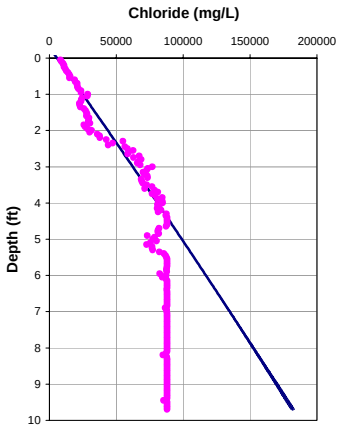
OL-GP-70106



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

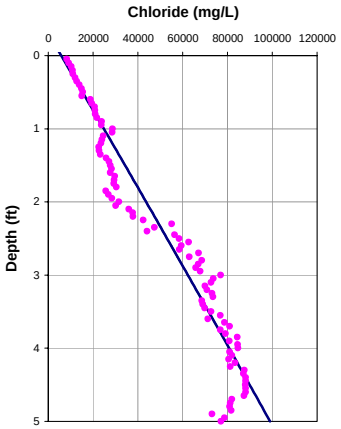
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	870	870
Cl (mg/L)	36000	30000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-2.30	-0.10
q (cm/yr)	-1.61	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.78	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.35	

OL-GP-70107



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

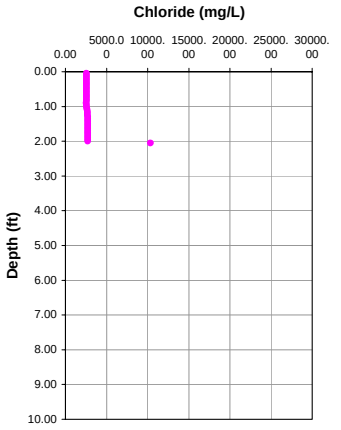
OL-GP-70107



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

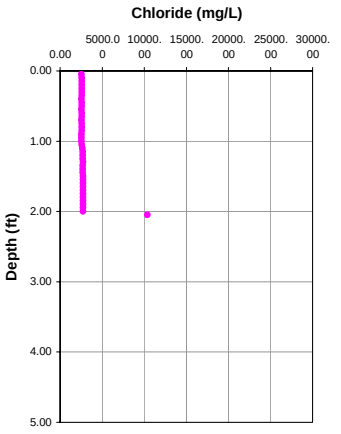
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	5734	5734
Cl (mg/L)	99000	99000
L(ft)	5	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.07	-0.07
dispersion length (ft)	0.11	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.11	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

OL-GP-70107-1



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = NA cm/year

OL-GP-70107-1



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = NA cm/year

	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2571	2571
Cl (mg/L)	10362	10362
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	6.05
q (cm/yr)	-0.07	4.23
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.77
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.4	

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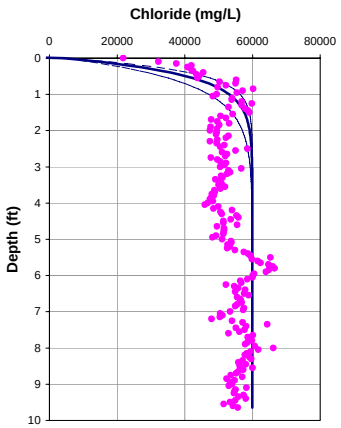
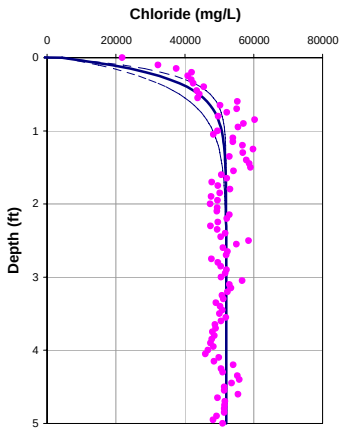
OL-GP-70107-2



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = <-35 cm/year

OL-GP-70107-2

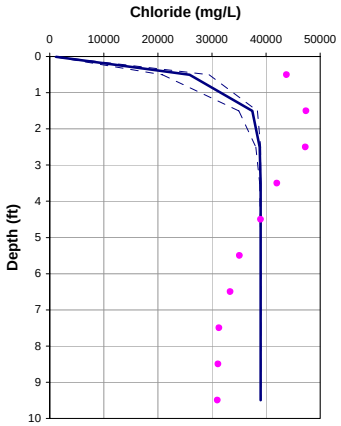


Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = <-35 cm/year

	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	4364	4364
Cl (mg/L)	60000	52000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-50.00	-50.00
q (cm/yr)	-35.00	-35.00
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	2.00	1.16
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.5	

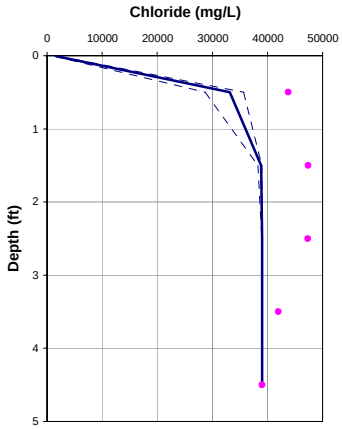
Upwelling Velocities from Sediment Pore-Water Chloride Data

OL-STA-10111



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = <-32.5 cm/year

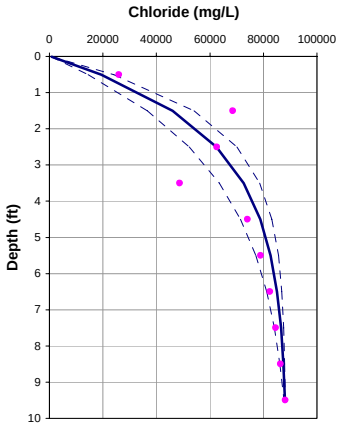
OL-STA-10111



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = <-32.5 cm/year

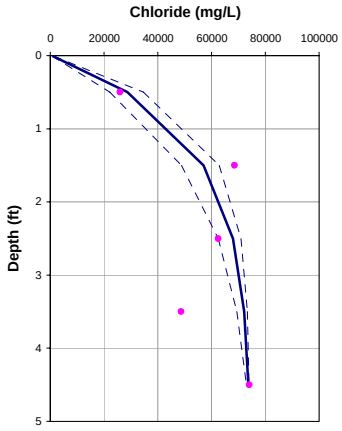
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	39000	39000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********		
V(cm/yr)	-50.00	-50.00
q (cm/yr)	-32.50	-32.50
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	1.94	1.11
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-STA-20087



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -2.9 cm/year

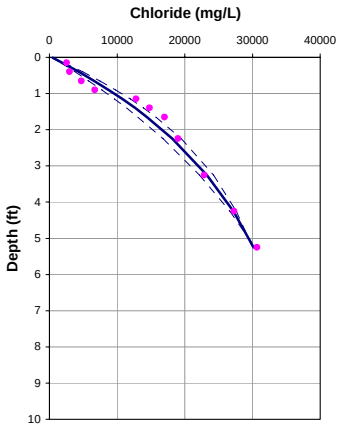
OL-STA-20087



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -5.5 cm/year

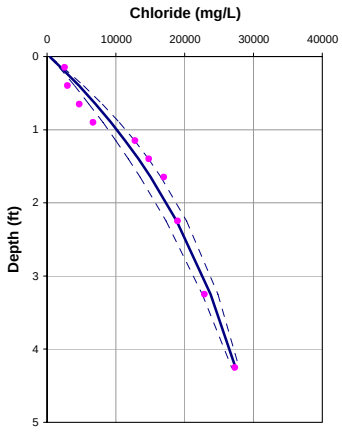
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	88200	74100
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-4.51	-8.47
q (cm/yr)	-2.93	-5.51
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.78	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-20111



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -1.4 cm/year

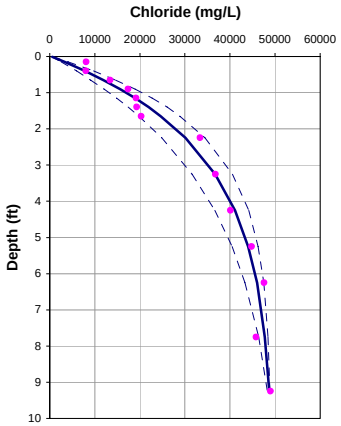
OL-VC-20111



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -1.6 cm/year

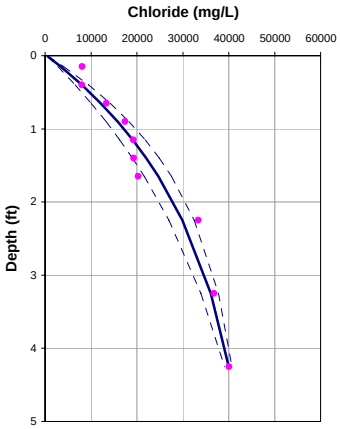
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	29500	29500
L(ft)	5	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-2.16	-2.50
q (cm/yr)	-1.40	-1.63
dispersion length (ft)	0.11	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.11	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.68	0.69
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-20113



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -2.4 cm/year

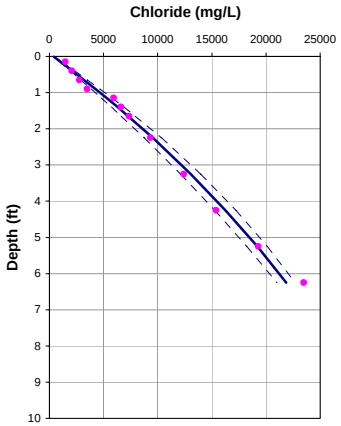
OL-VC-20113



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -2.4 cm/year

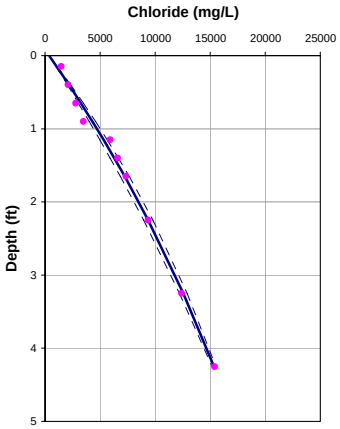
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	49000	42000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********		
V(cm/yr)	-3.72	-3.73
q (cm/yr)	-2.42	-2.42
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.76	0.70
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-20118



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.5 cm/year

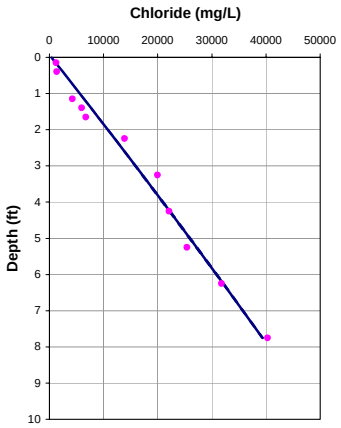
OL-VC-20118



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -0.7 cm/year

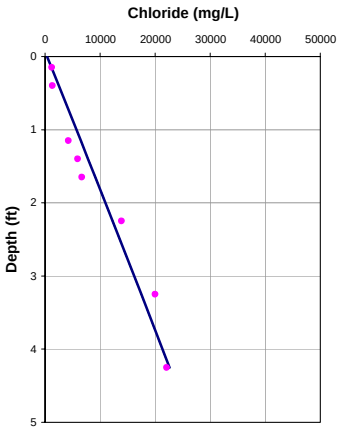
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	30000	17208
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		17207.7489
V(cm/yr)	-0.74	-1.10
q (cm/yr)	-0.48	-0.72
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.68	0.67
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-20119



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

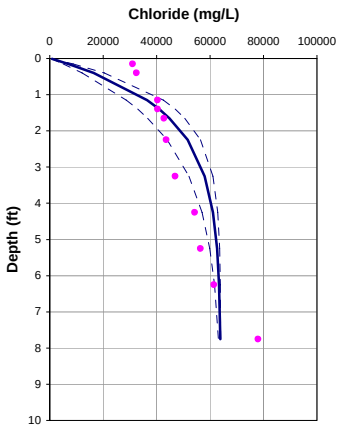
OL-VC-20119



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

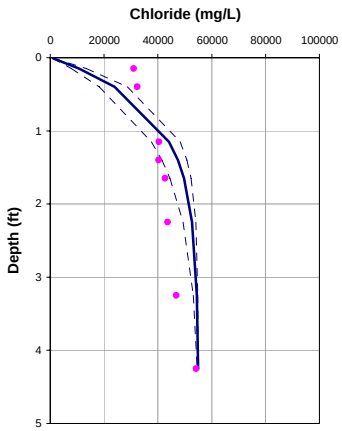
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	50000	26403
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		26402.6329
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.07	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.66
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-20133



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -4.8 cm/year

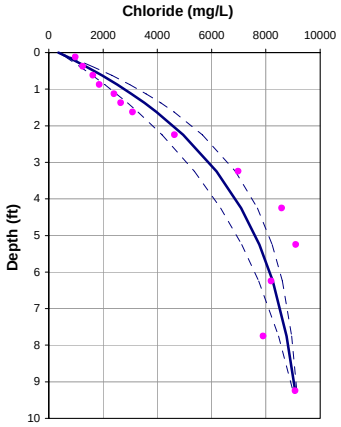
OL-VC-20133



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -8.5 cm/year

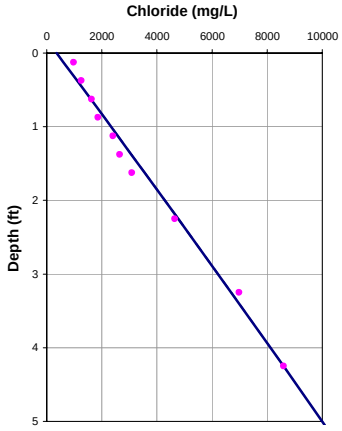
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		359	359
Cl (mg/L)		64000	55000
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.65	0.65
Calculated Values **********			
V(cm/yr)		-7.40	-13.11
q (cm/yr)		-4.81	-8.52
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.66	0.66
Diffusion + Dispersion (cm2/day)		0.85	0.78
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	0		

OL-VC-20187



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -1.7 cm/year

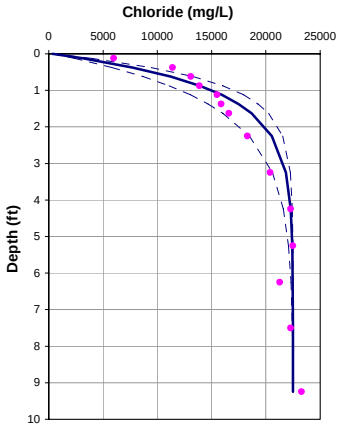
OL-VC-20187



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -0.1 cm/year

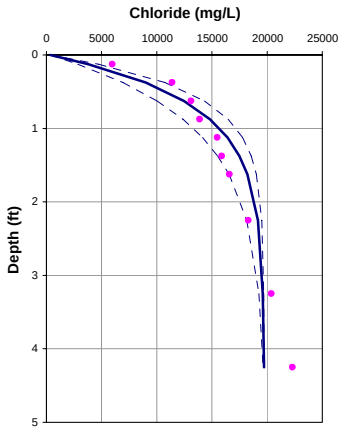
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		359	359
Cl (mg/L)		9200	10000
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.7	0.7
Calculated Values **********			
V(cm/yr)		-2.66	-0.10
q (cm/yr)		-1.73	-0.07
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.66	0.66
Diffusion + Dispersion (cm2/day)		0.73	0.66
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	0		

OL-VC-20188



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -8.3 cm/year

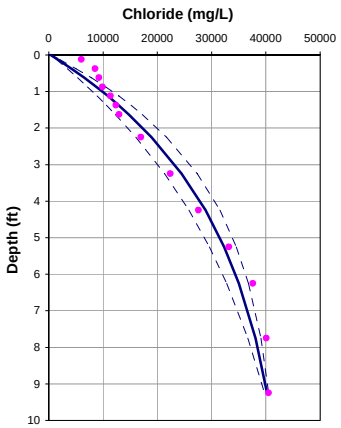
OL-VC-20188



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -9.7 cm/year

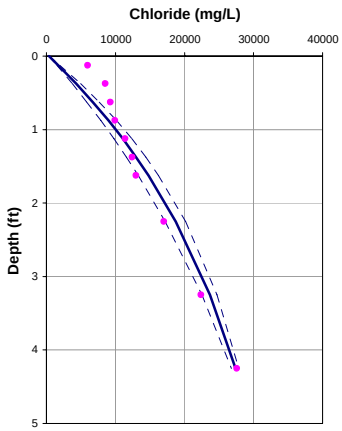
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		359	359
Cl (mg/L)		22500	19726
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.7	0.7
Calculated Values **********		21025.03537	19726.05503
V(cm/yr)		-12.83	-14.97
q (cm/yr)		-8.34	-9.73
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.66	0.66
Diffusion + Dispersion (cm2/day)		0.99	0.80
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	0		

OL-VC-20189



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -1.3 cm/year

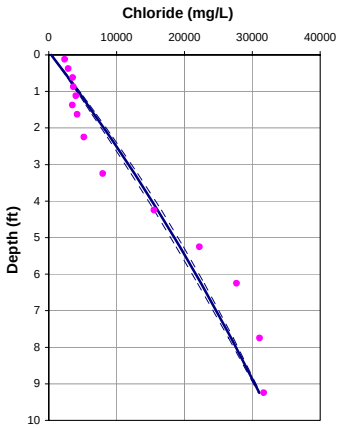
OL-VC-20189



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -1.6 cm/year

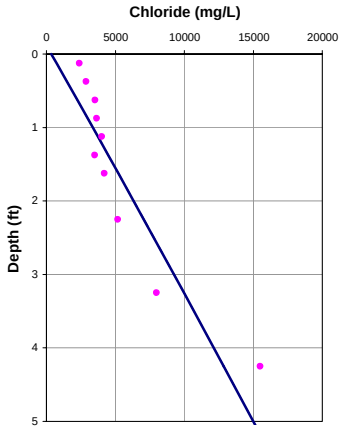
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	41000	29500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********		
V(cm/yr)	-2.04	-2.44
q (cm/yr)	-1.33	-1.58
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.72	0.69
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-20190



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.2 cm/year

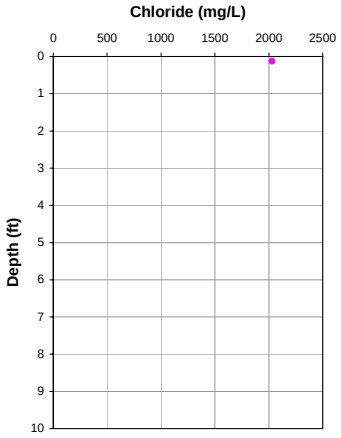
OL-VC-20190



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -0.1 cm/year

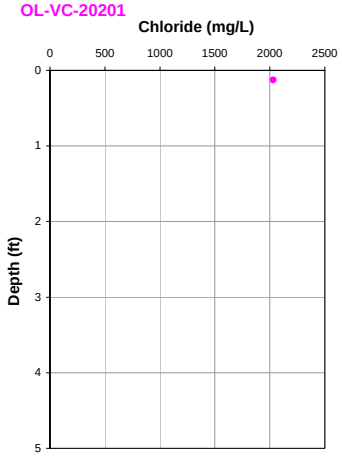
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	33000	15000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		15000
V(cm/yr)	-0.36	-0.10
q (cm/yr)	-0.24	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.66
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-20201



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = <0 cm/year

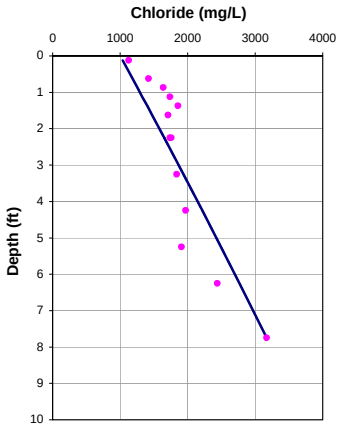
OL-VC-20201



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = <0 cm/year

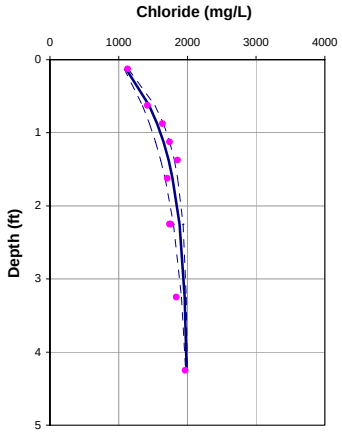
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	2030	2030
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	1.00	1.00
q (cm/yr)	0.70	0.70
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.75	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-20202



Porosity = 0.65
Dispersion length = 0.2 feet
Upwelling Velocity = <0 cm/year

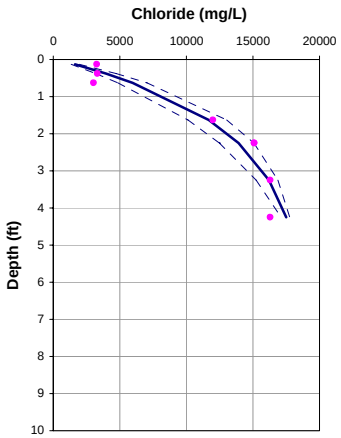
OL-VC-20202



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -5.3 cm/year

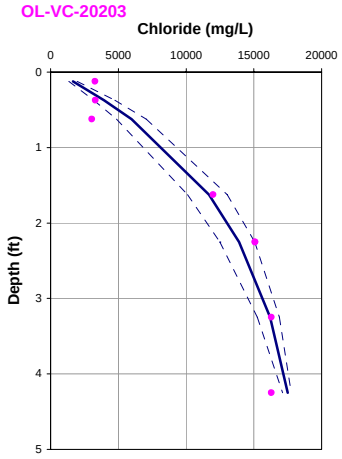
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1000	1000
Cl (mg/L)	3170	2000
L(ft)	8	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********		1779.00873
V(cm/yr)	-0.10	-8.14
q (cm/yr)	-0.07	-5.29
dispersion length (ft)	0.21	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.21	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-20203



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -3.1 cm/year

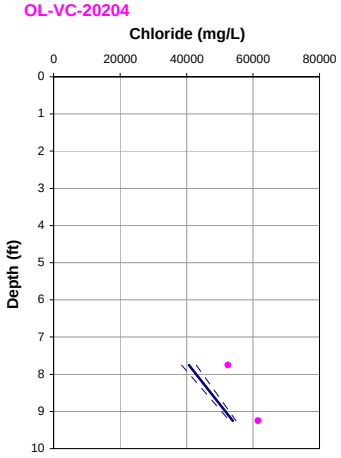
OL-VC-20203



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -3.1 cm/year

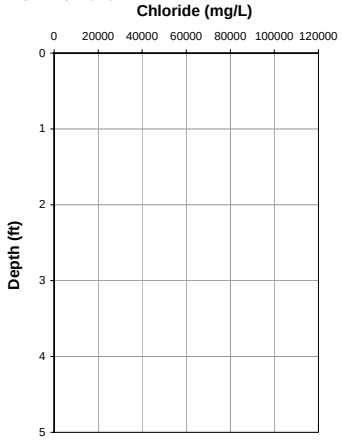
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	18095	18095
L(ft)	5	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********	18094.9788	18094.9788
V(cm/yr)	-4.77	-4.77
q (cm/yr)	-3.10	-3.10
dispersion length (ft)	0.11	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.11	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.71	0.71
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-20204



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = NA cm/year

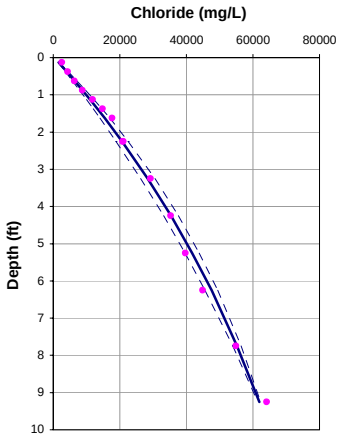
OL-VC-20204



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = NA cm/year

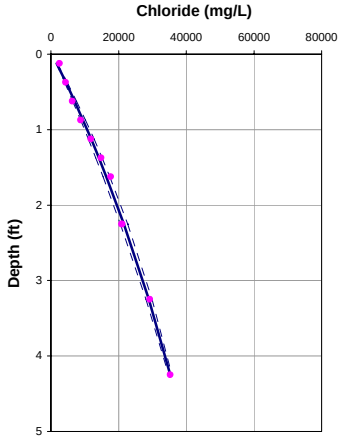
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	61500	52500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	1.00	1.00
q (cm/yr)	0.65	0.65
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.69	0.67
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-20204A



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.5 cm/year

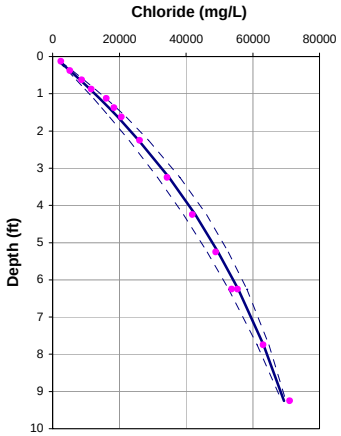
OL-VC-20204A



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -0.8 cm/year

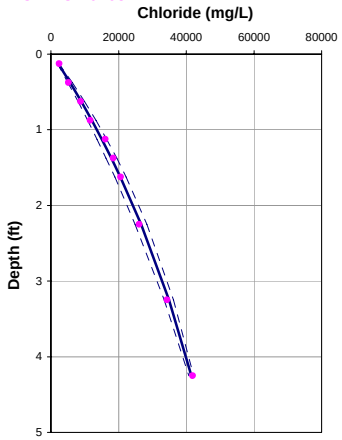
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	64876	39487
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********	64875.5223	39486.88
V(cm/yr)	-0.79	-1.21
q (cm/yr)	-0.51	-0.79
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.68	0.67
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-20205



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.7 cm/year

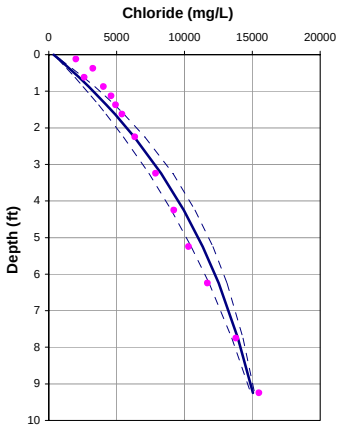
OL-VC-20205



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -1.1 cm/year

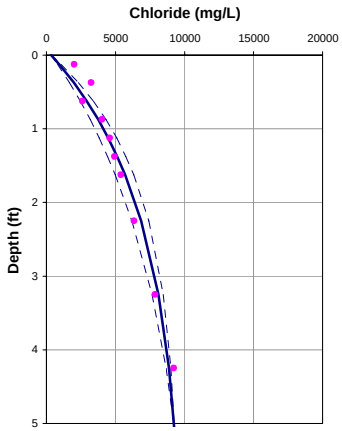
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	71972	45634
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********	71972.0536	45634.2847
V(cm/yr)	-1.14	-1.72
q (cm/yr)	-0.74	-1.12
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.69	0.68
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-30129



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.9 cm/year

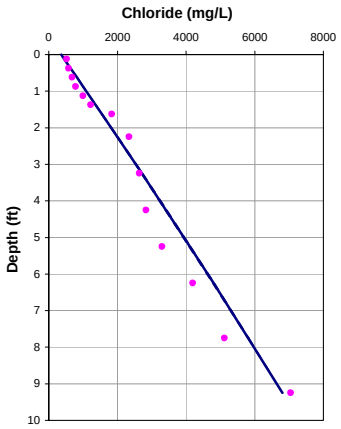
OL-VC-30129



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -2.7 cm/year

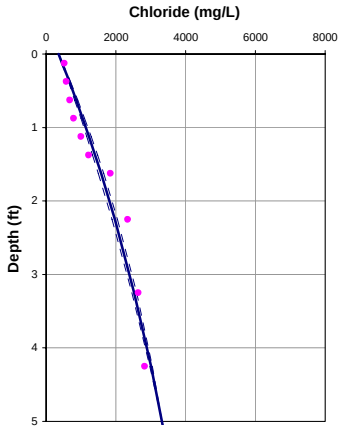
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	15500	9250
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********		9127.39145
V(cm/yr)	-1.45	-4.09
q (cm/yr)	-0.94	-2.66
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.70	0.70
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-30130



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.1 cm/year

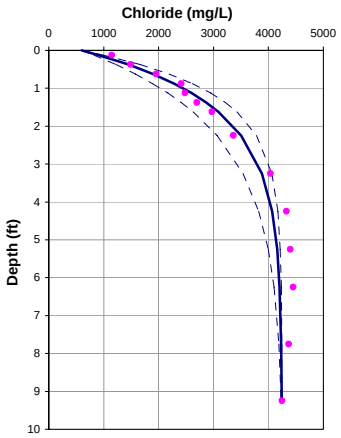
OL-VC-30130



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -0.8 cm/year

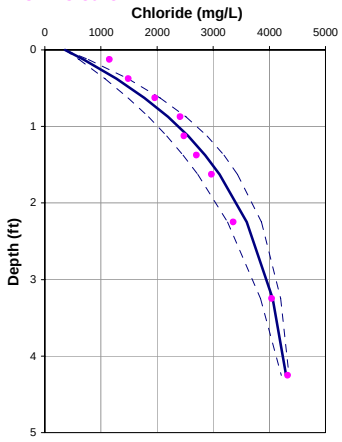
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	7300	3326
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		3325.57116
V(cm/yr)	-0.10	-1.21
q (cm/yr)	-0.07	-0.78
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.67
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-30131



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -4.7 cm/year

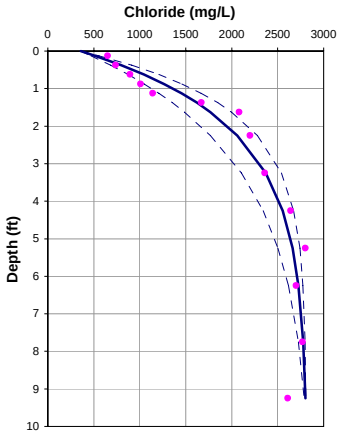
OL-VC-30131



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -3.7 cm/year

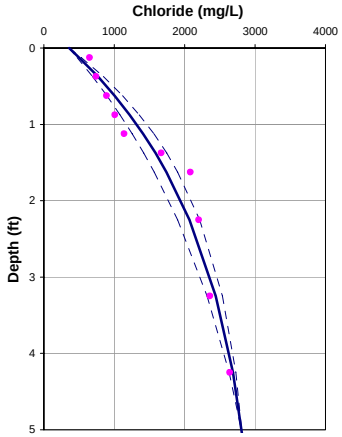
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	600	359
Cl (mg/L)	4245	4400
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********	4429.64375	4374.44768
V(cm/yr)	-7.16	-5.62
q (cm/yr)	-4.66	-3.65
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.85	0.71
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-30132



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -3.2 cm/year

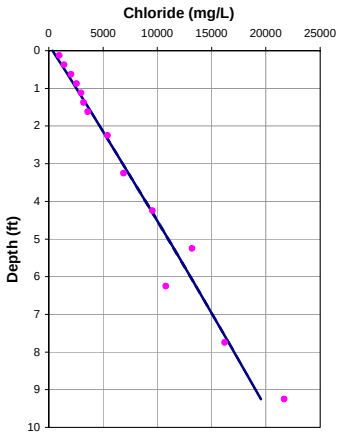
OL-VC-30132



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -2.3 cm/year

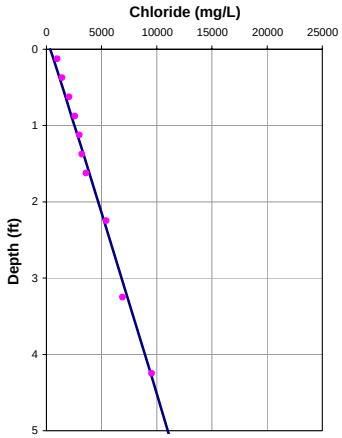
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	2807	2813
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********	2807.24448	2812.79355
V(cm/yr)	-4.94	-3.49
q (cm/yr)	-3.21	-2.27
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.79	0.69
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-30133



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.1 cm/year

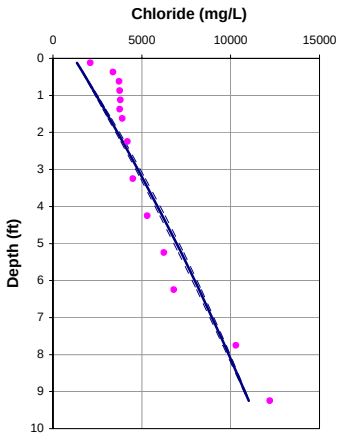
OL-VC-30133



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -0.1 cm/year

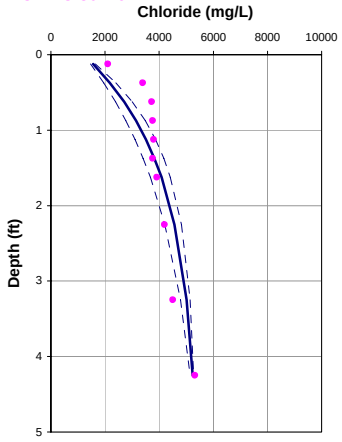
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	21000	11000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********	21000	19000
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.07	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.66
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-30176



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.2 cm/year

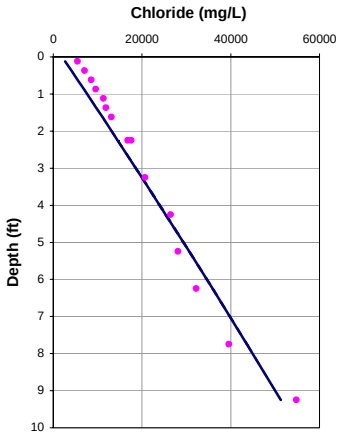
OL-VC-30176



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -3.9 cm/year

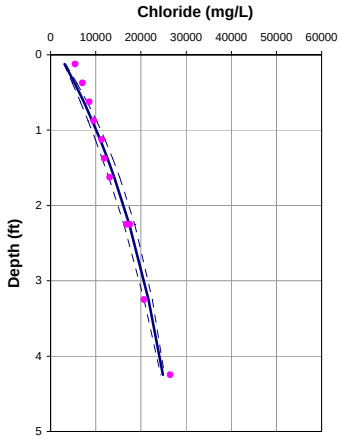
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1200	1200
Cl (mg/L)	11676	5320
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********	11675.787	4222.69806
V(cm/yr)	-0.32	-6.00
q (cm/yr)	-0.21	-3.90
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-30177



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = <0 cm/year

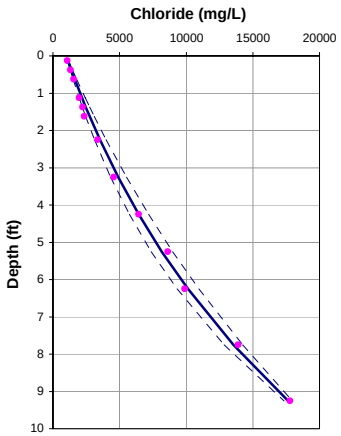
OL-VC-30177



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -1.5 cm/year

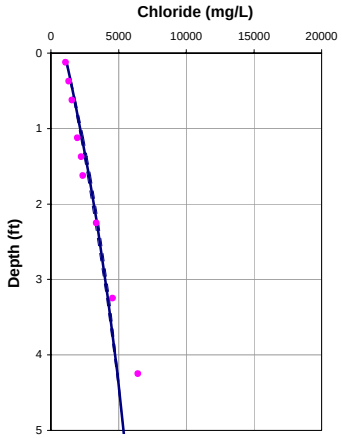
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2000	2000
Cl (mg/L)	55000	26700
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********	26800	26800
V(cm/yr)	-0.10	-2.37
q (cm/yr)	-0.06	-1.54
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.68
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-30178



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = <0 cm/year

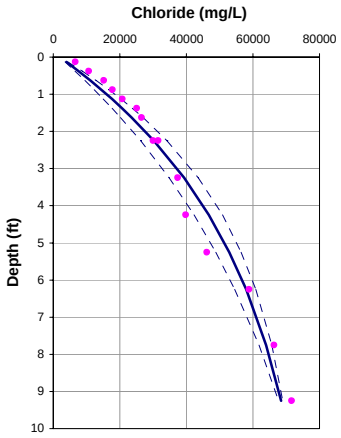
OL-VC-30178



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -0.8 cm/year

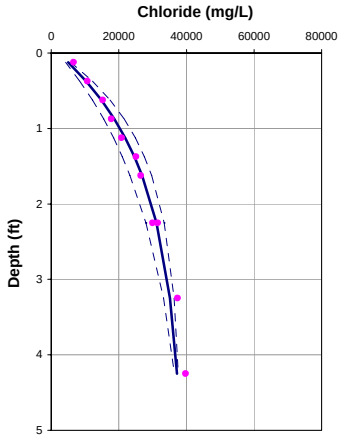
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	1000	1000
Cl (mg/L)	20000	5366
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********	17800	5366.36014
V(cm/yr)	1.00	-1.28
q (cm/yr)	0.65	-0.83
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.69	0.68
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-30179



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -1.1 cm/year

OL-VC-30179



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -3.8 cm/year

	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	2000	2000
Cl (mg/L)	70217	38000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********	70217.2	40752.9281
V(cm/yr)	-1.64	-5.80
q (cm/yr)	-1.07	-3.77
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.71	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

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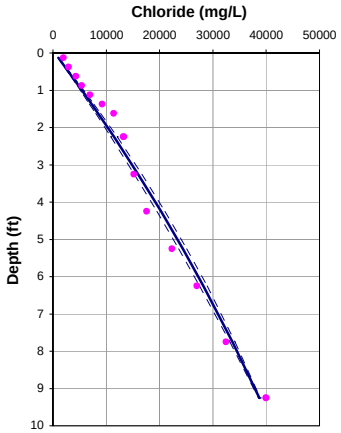
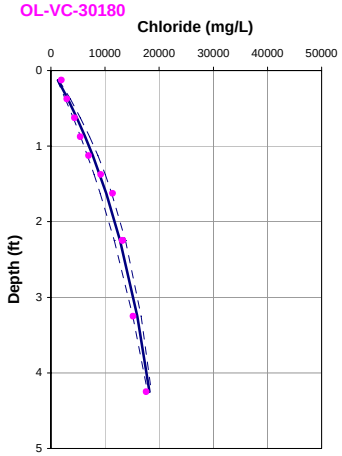
OL-VC-30180



Porosity = 0.65
Dispersion length = 0.3 feet
Upwelling Velocity = -0.3 cm/year

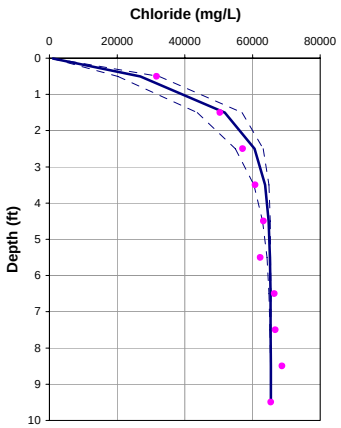
OL-VC-30180



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -1.8 cm/year

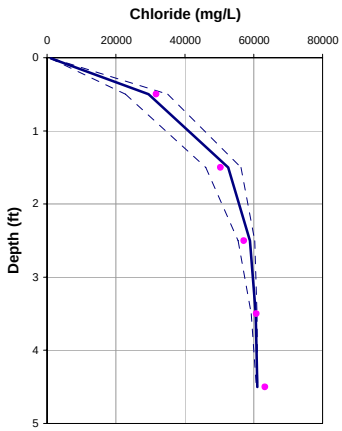
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	41111	19500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.65	0.65
Calculated Values **********	48000	
V(cm/yr)	-0.42	-2.73
q (cm/yr)	-0.27	-1.77
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.66	0.66
Diffusion + Dispersion (cm2/day)	0.67	0.69
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-STA-40055



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -10.8 cm/year

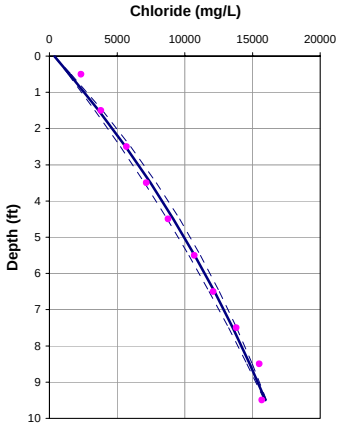
OL-STA-40055



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -10.6 cm/year

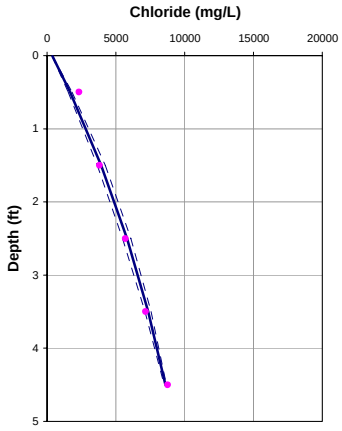
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	65400	61140
L(ft)	5	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		61140.1723
V(cm/yr)	-14.40	-14.14
q (cm/yr)	-10.80	-10.60
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	1.15	0.91
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-STA-40056



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -0.6 cm/year

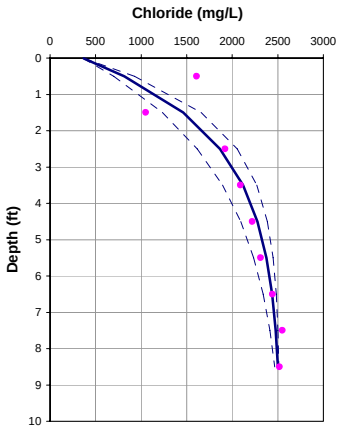
OL-STA-40056



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -1.4 cm/year

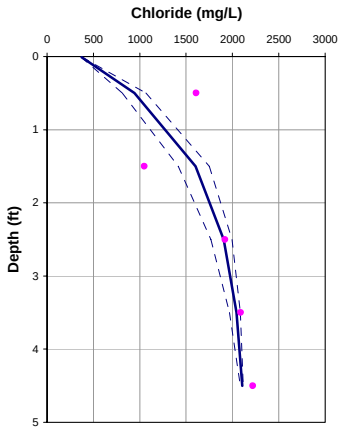
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	16500	9145
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		9144.7256
V(cm/yr)	-0.74	-1.87
q (cm/yr)	-0.56	-1.41
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.80	0.80
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-STA-40057



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -3.9 cm/year

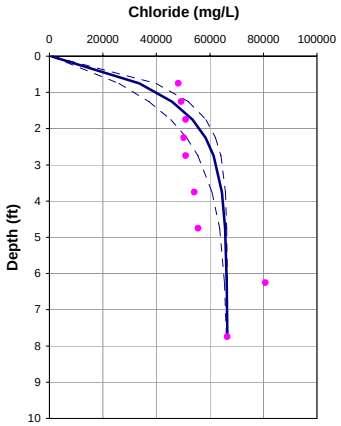
OL-STA-40057



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -6.0 cm/year

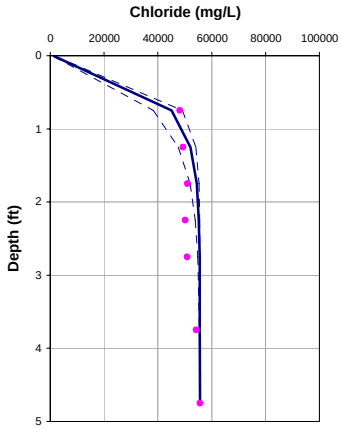
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	2520	2124
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		2124.03232
V(cm/yr)	-5.14	-8.01
q (cm/yr)	-3.86	-6.01
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.92	0.86
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40083



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -9.1 cm/year

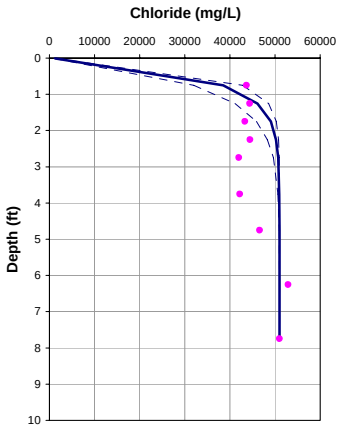
OL-VC-40083



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -20.2 cm/year

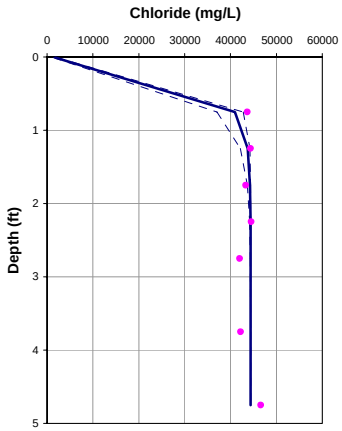
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	66500	55600
L(ft)	5	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-12.19	-26.98
q (cm/yr)	-9.14	-20.23
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	1.10	1.02
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40084



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -30.6 cm/year

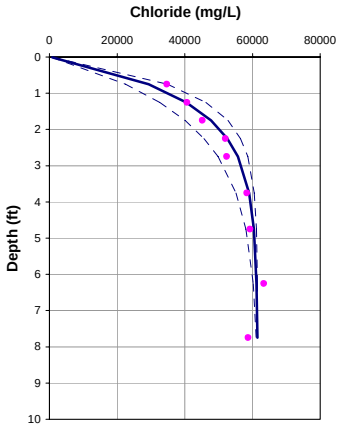
OL-VC-40084



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = <-37.5 cm/year

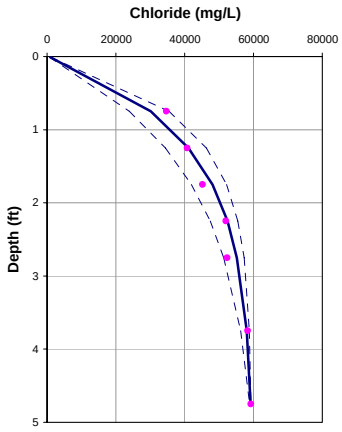
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	51000	44378
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		44378.23258
V(cm/yr)	-40.81	-50.00
q (cm/yr)	-30.61	-37.50
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	1.82	1.23
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40085



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -8.1 cm/year

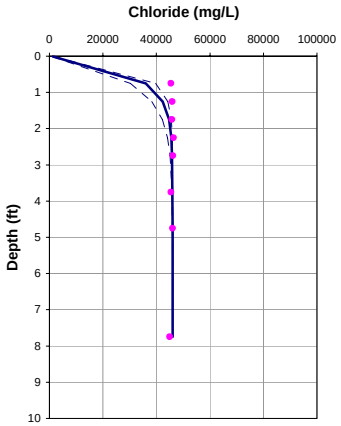
OL-VC-40085



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -7.2 cm/year

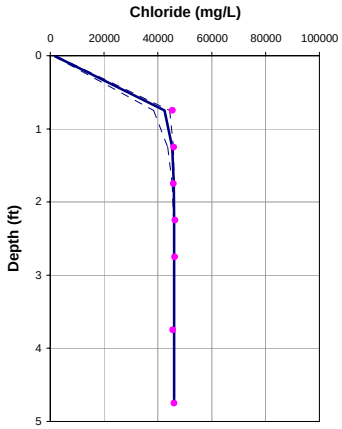
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	61500	59300
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-10.86	-9.62
q (cm/yr)	-8.14	-7.22
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	1.06	0.87
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40087



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = <-37.5 cm/year

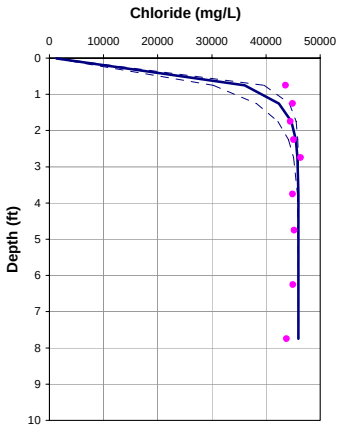
OL-VC-40087



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = <-37.5 cm/year

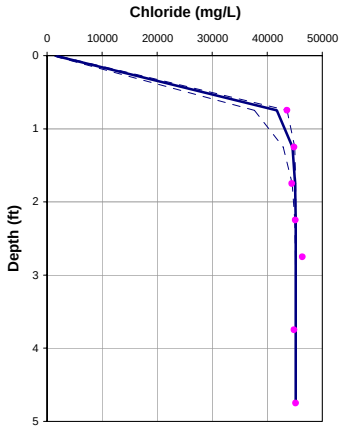
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	46000	46000
L(ft)	5	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-50.00	-50.00
q (cm/yr)	-37.50	-37.50
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	2.06	1.23
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40088



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = <-37.5 cm/year

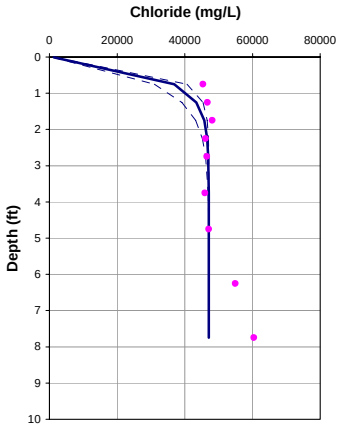
OL-VC-40088



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = <-37.5 cm/year

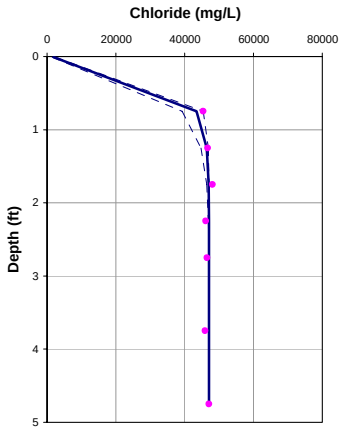
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	46000	45200
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-50.00	-50.00
q (cm/yr)	-37.50	-37.50
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	2.06	1.23
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40089



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = <-37.5 cm/year

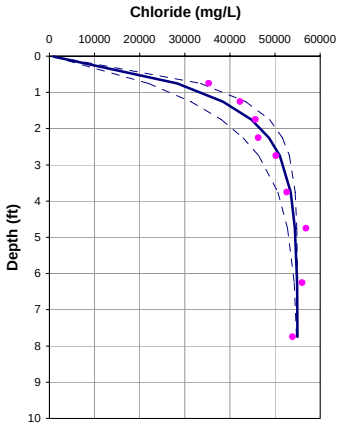
OL-VC-40089



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = <-37.5 cm/year

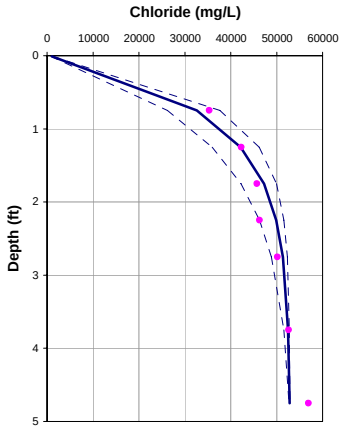
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	47100	47100
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-50.00	-50.00
q (cm/yr)	-37.50	-37.50
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	2.06	1.23
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40091



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -9.5 cm/year

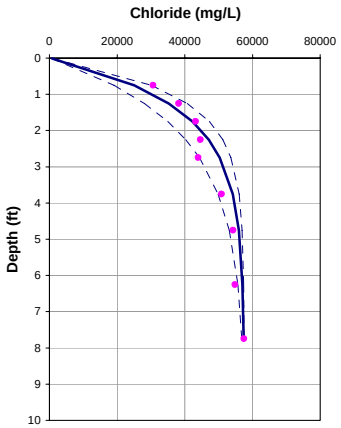
OL-VC-40091



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -10.3 cm/year

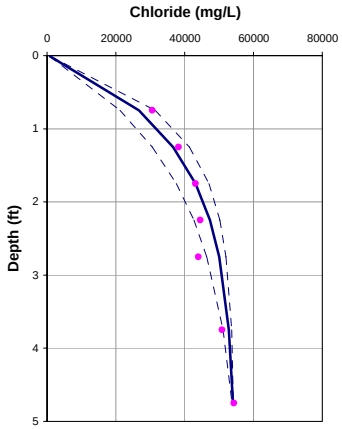
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	55000	52870
L(ft)	5	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		52870.00119
V(cm/yr)	-12.68	-13.74
q (cm/yr)	-9.51	-10.31
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	1.11	0.91
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40092



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -6.9 cm/year

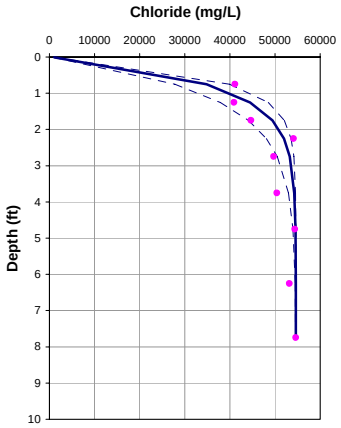
OL-VC-40092



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -6.8 cm/year

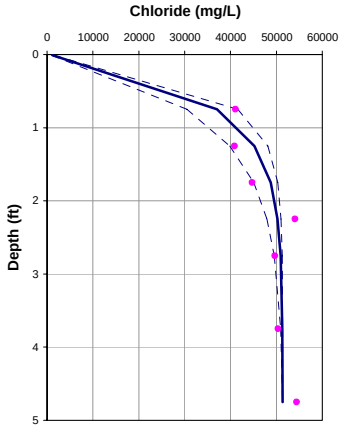
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	57500	54200
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-9.21	-9.10
q (cm/yr)	-6.91	-6.82
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	1.02	0.86
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40093



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -16.0 cm/year

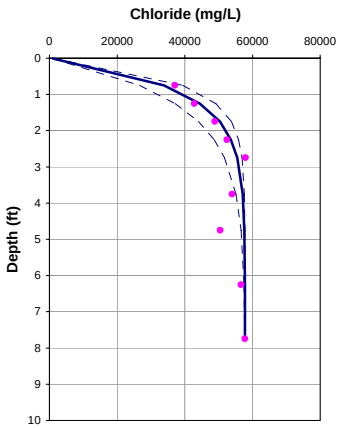
OL-VC-40093



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -14.5 cm/year

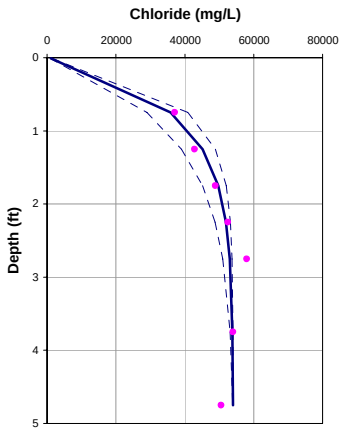
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	54600	51378
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		51378.22751
V(cm/yr)	-21.38	-19.34
q (cm/yr)	-16.03	-14.50
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	1.33	0.96
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40126



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -12.8 cm/year

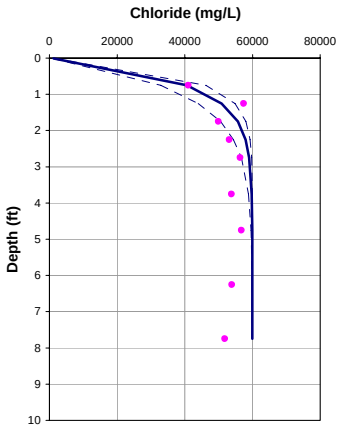
OL-VC-40126



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -12.0 cm/year

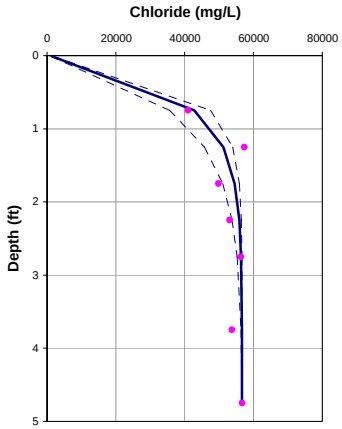
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	57800	54000
L(ft)	5	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-17.06	-15.99
q (cm/yr)	-12.79	-11.99
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	1.22	0.93
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40127



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -19.6 cm/year

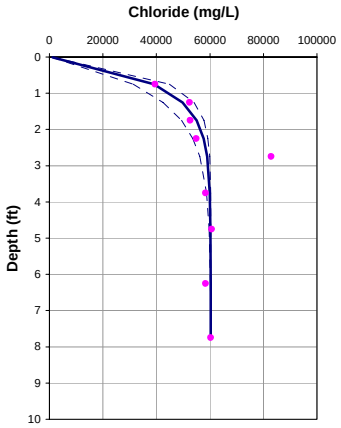
OL-VC-40127



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -16.4 cm/year

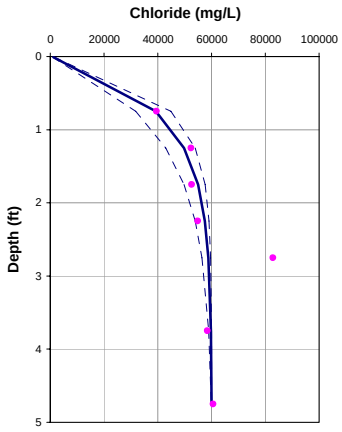
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	60000	56700
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-26.11	-21.85
q (cm/yr)	-19.58	-16.39
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	1.45	0.98
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40128



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -17.0 cm/year

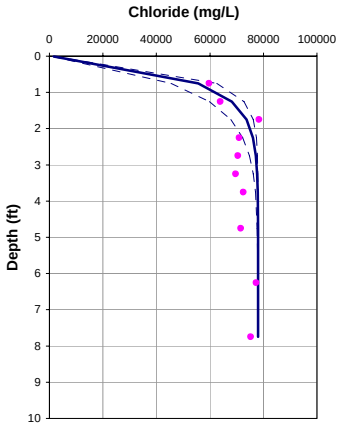
OL-VC-40128



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -11.7 cm/year

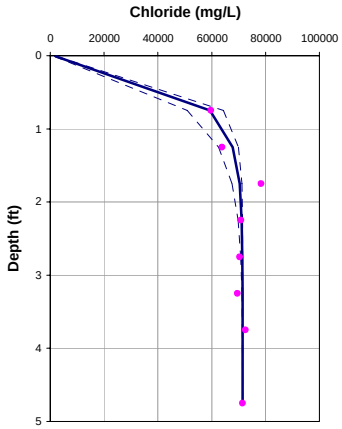
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	60300	60000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-22.65	-15.55
q (cm/yr)	-16.99	-11.66
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	1.36	0.92
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40129



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -23.6 cm/year

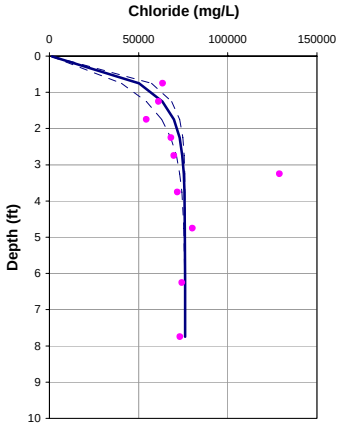
OL-VC-40129



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -22.2 cm/year

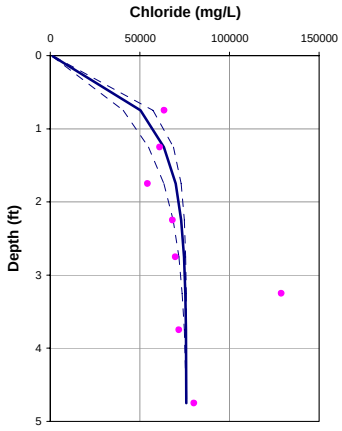
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	78000	71500
L(ft)	5	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-31.48	-29.55
q (cm/yr)	-23.61	-22.16
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	1.59	1.05
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40130



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -17.9 cm/year

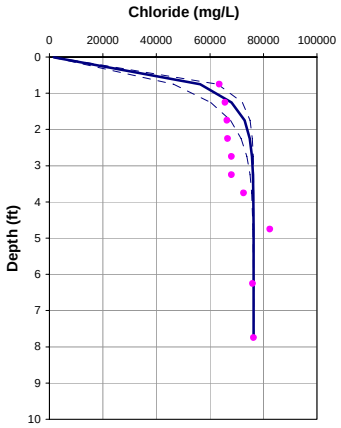
OL-VC-40130



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -11.9 cm/year

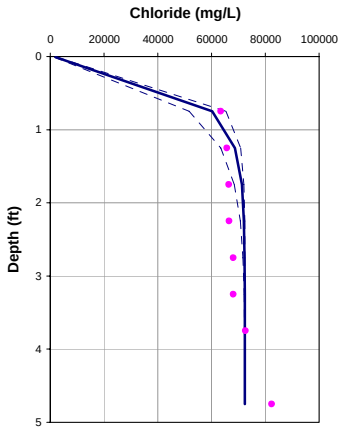
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	76000	76000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values ********** 71054.49758		
V(cm/yr)	-23.88	-15.90
q (cm/yr)	-17.91	-11.93
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	1.39	0.92
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40131



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -27.4 cm/year

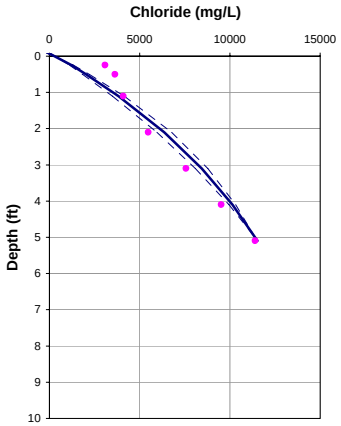
OL-VC-40131



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -22.4 cm/year

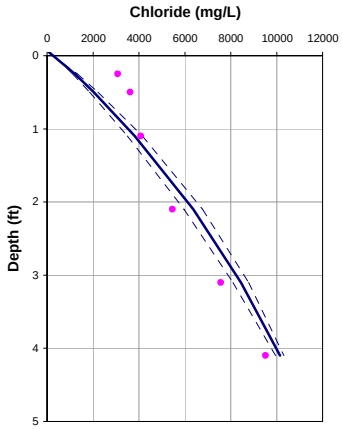
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	76300	72400
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-36.59	-29.81
q (cm/yr)	-27.44	-22.36
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	1.72	1.05
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40149



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -1.5 cm/year

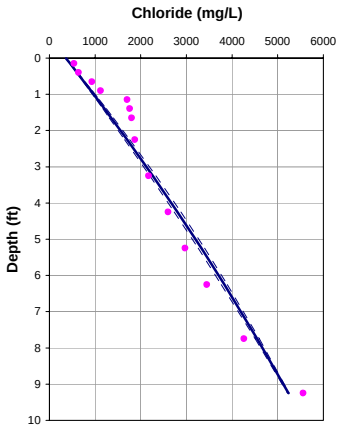
OL-VC-40149



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -1.5 cm/year

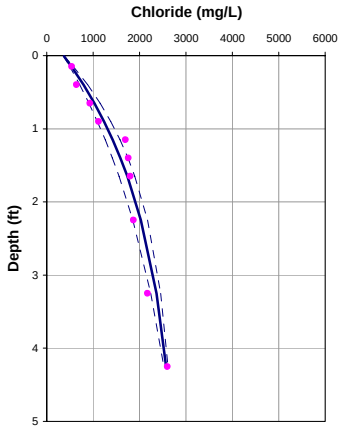
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	11400	11400
L(ft)	5	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		9280.75885
V(cm/yr)	-1.95	-1.95
q (cm/yr)	-1.46	-1.46
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.83	0.80
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1.15	

OL-VC-40151



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -0.3 cm/year

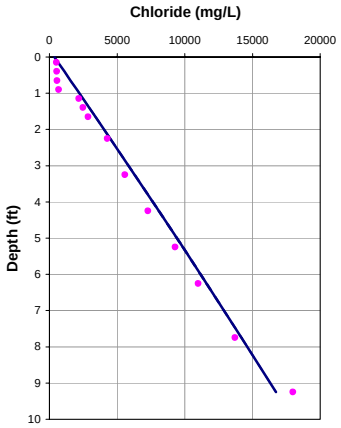
OL-VC-40151



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -3.4 cm/year

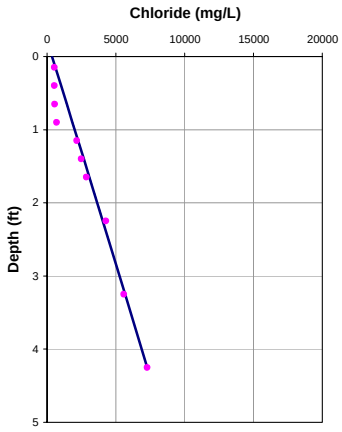
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	5560	2680
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-0.35	-4.57
q (cm/yr)	-0.26	-3.43
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.82
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40154



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

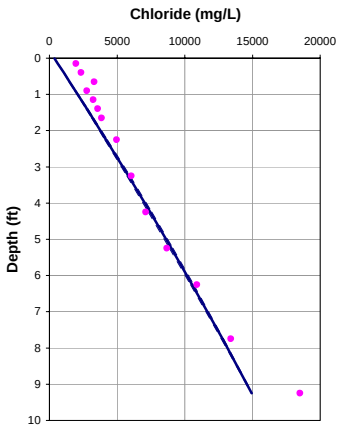
OL-VC-40154



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

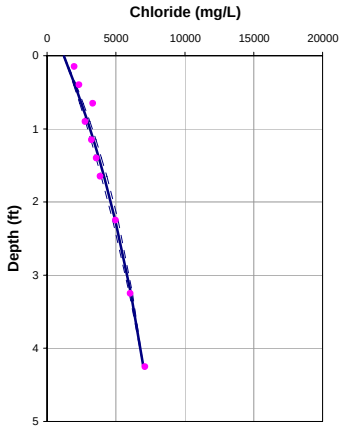
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	18000	7270
L(ft)	10	4
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.08	-0.08
dispersion length (ft)	0.31	0.08
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.08
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40157



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -0.2 cm/year

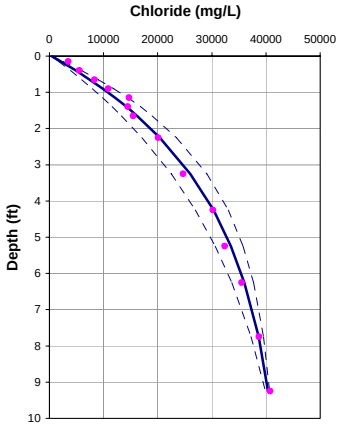
OL-VC-40157



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -1.7 cm/year

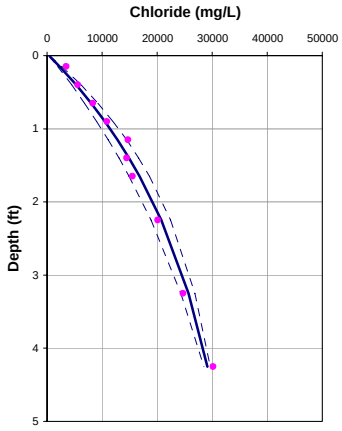
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	1200
Cl (mg/L)	16000	7000
L(ft)	5	4
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-0.21	-2.21
q (cm/yr)	-0.16	-1.65
dispersion length (ft)	0.31	0.08
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.08
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.80
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40165



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -2.1 cm/year

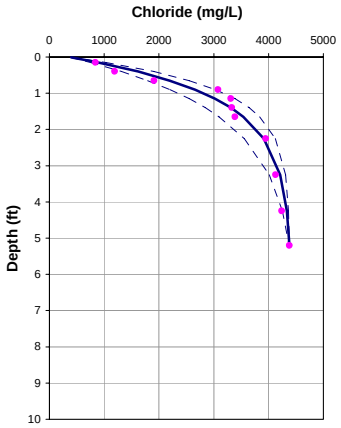
OL-VC-40165



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -2.6 cm/year

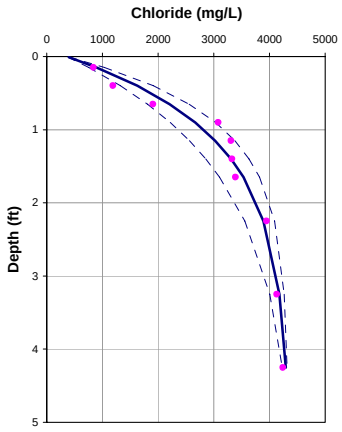
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	41000	31030
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		31029.9025
V(cm/yr)	-2.82	-3.50
q (cm/yr)	-2.12	-2.63
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.86	0.82
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40168



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -7.3 cm/year

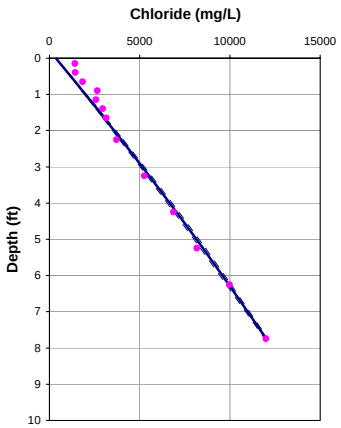
OL-VC-40168



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -7.5 cm/year

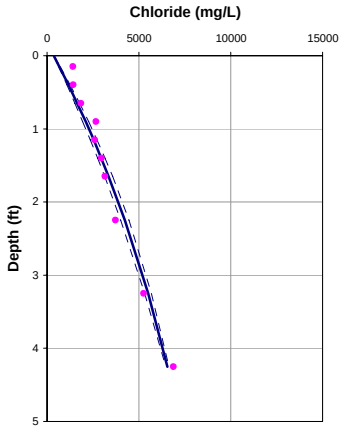
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	4380	4327
L(ft)	5	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		4326.79641
V(cm/yr)	-9.78	-9.97
q (cm/yr)	-7.34	-7.48
dispersion length (ft)	0.11	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.11	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.88	0.87
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40172



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -0.2 cm/year

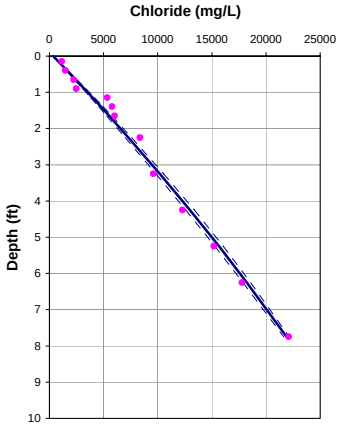
OL-VC-40172



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -1.3 cm/year

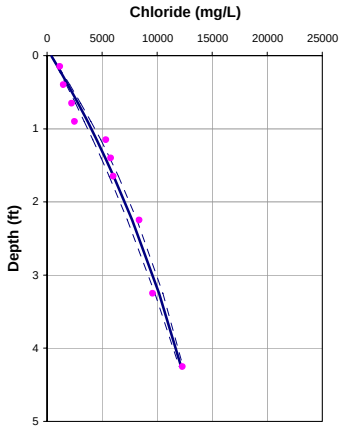
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	15000	7233
L(ft)	5	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		7233.25161
V(cm/yr)	-0.24	-1.76
q (cm/yr)	-0.18	-1.32
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.80
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40179



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -0.3 cm/year

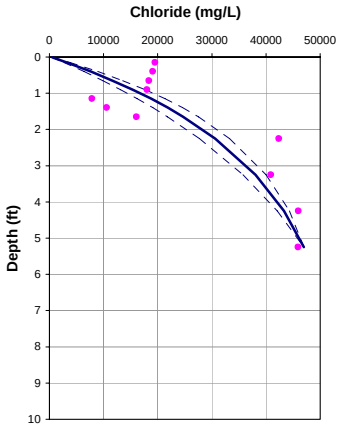
OL-VC-40179



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -1.3 cm/year

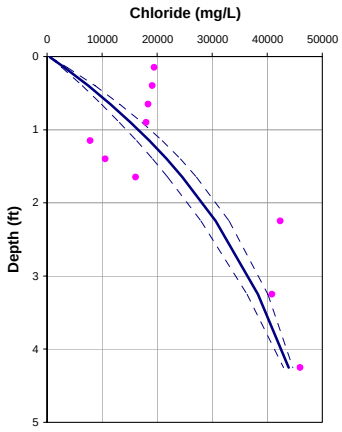
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	27000	13484
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		13484.357
V(cm/yr)	-0.38	-1.75
q (cm/yr)	-0.28	-1.31
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.80
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40184



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = NA cm/year

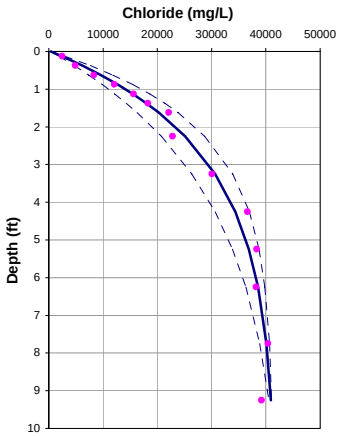
OL-VC-40184



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = NA cm/year

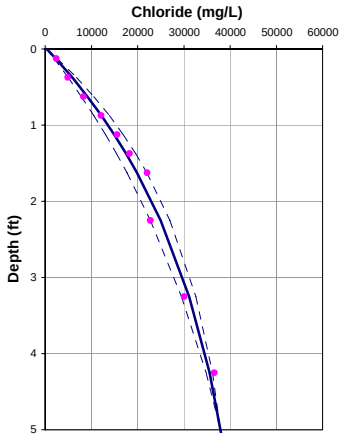
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	47000	47000
L(ft)	5	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-3.44	-3.22
q (cm/yr)	-2.58	-2.41
dispersion length (ft)	0.11	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.11	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.82	0.81
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40238



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -3.2 cm/year

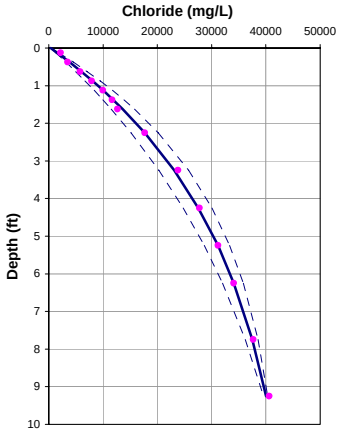
OL-VC-40238



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -2.5 cm/year

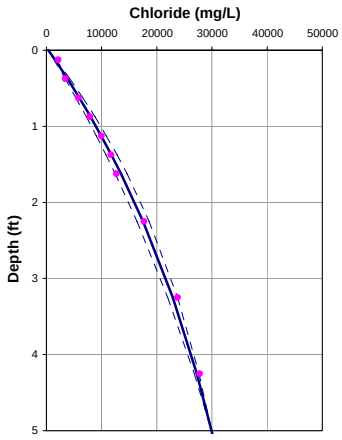
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	41163	38000
L(ft)	5	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********	41163.2858	37186.0394
V(cm/yr)	-4.31	-3.30
q (cm/yr)	-3.23	-2.48
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.89	0.81
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40239



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -1.6 cm/year

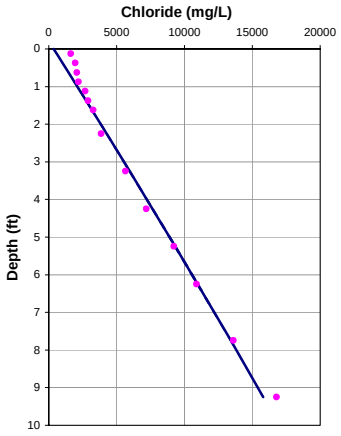
OL-VC-40239



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -1.5 cm/year

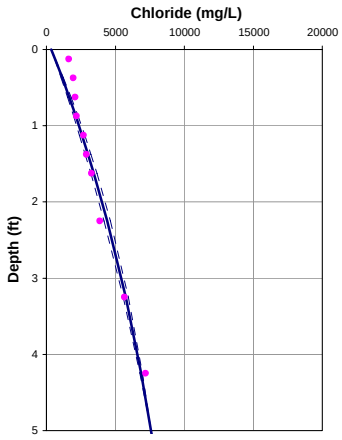
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	41000	30000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		28059.6116
V(cm/yr)	-2.07	-2.01
q (cm/yr)	-1.56	-1.51
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.84	0.80
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40240



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -0.1 cm/year

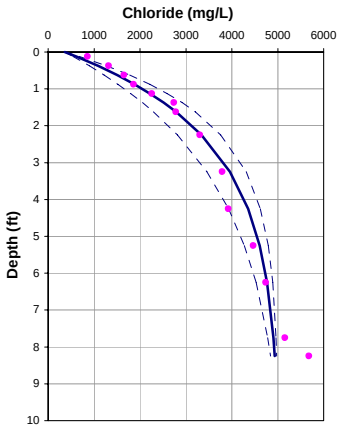
OL-VC-40240



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -1.3 cm/year

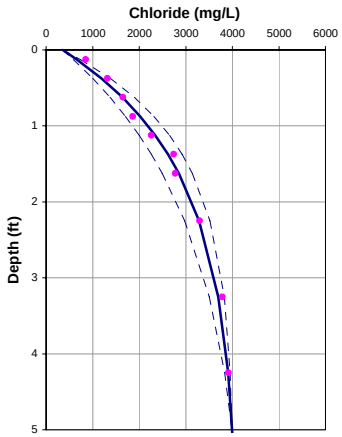
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	17000	7600
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		7414.62962
V(cm/yr)	-0.10	-1.70
q (cm/yr)	-0.08	-1.27
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.80
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40241



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -3.7 cm/year

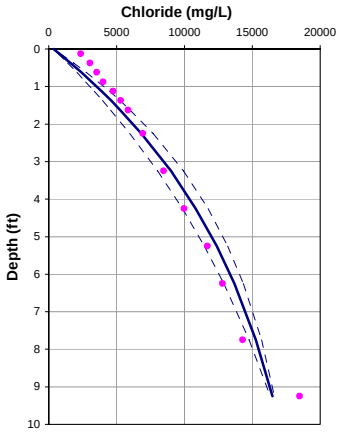
OL-VC-40241



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -5.0 cm/year

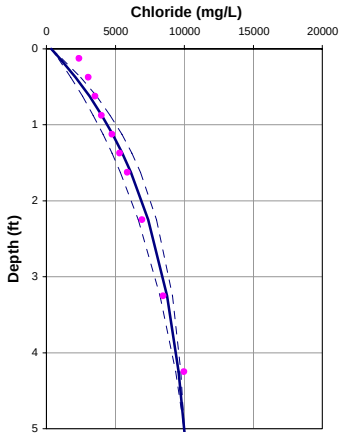
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	5000	4000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		4293.71244
V(cm/yr)	-4.87	-6.70
q (cm/yr)	-3.65	-5.02
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.91	0.84
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40242



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -1.3 cm/year

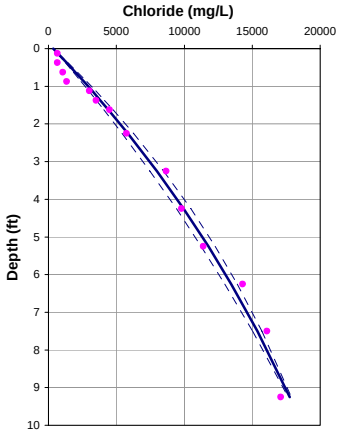
OL-VC-40242



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -3.6 cm/year

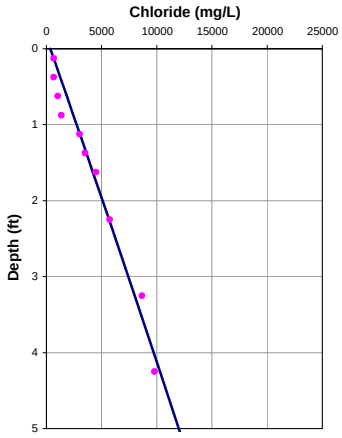
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	17000	10000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		9861.99421
V(cm/yr)	-1.68	-4.80
q (cm/yr)	-1.26	-3.60
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.83	0.83
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40243



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -0.6 cm/year

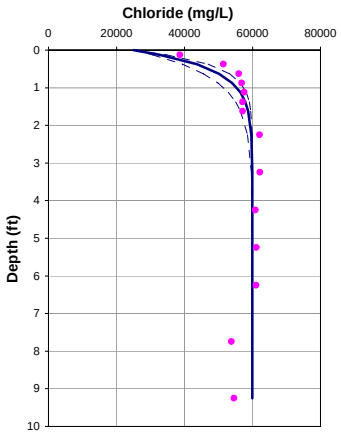
OL-VC-40243



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -0.1 cm/year

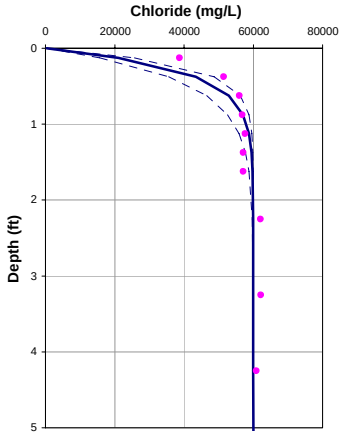
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	18700	12000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		12339.2774
V(cm/yr)	-0.77	-0.10
q (cm/yr)	-0.57	-0.08
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.80	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40244



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = <-35.0 cm/year

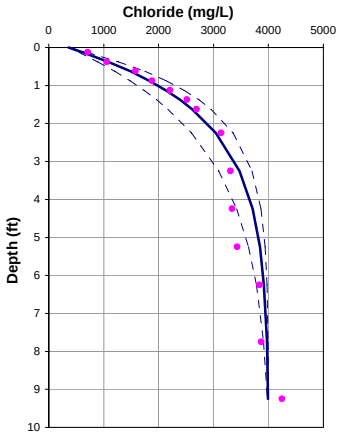
OL-VC-40244



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = <-35.0 cm/year

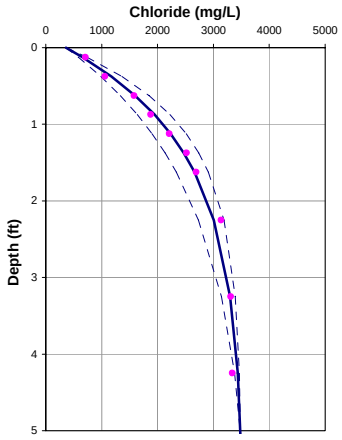
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	25000	359
Cl (mg/L)	60000	60000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-50.00	-50.00
q (cm/yr)	-37.50	-37.50
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	2.06	1.23
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40245



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -5.1 cm/year

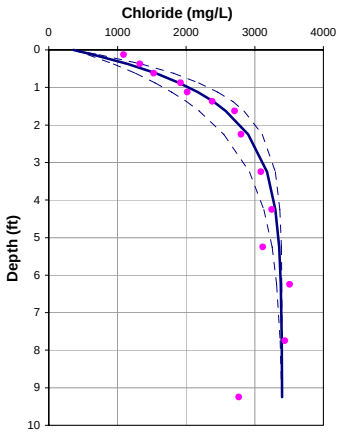
OL-VC-40245



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -6.1 cm/year

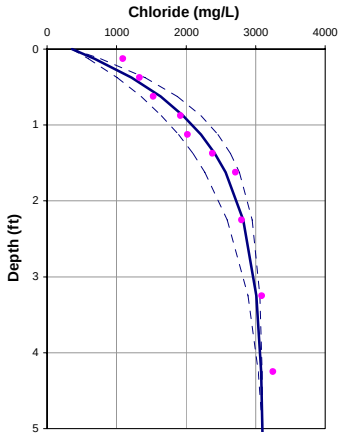
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	4000	3485
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		3485.022855
V(cm/yr)	-6.77	-8.09
q (cm/yr)	-5.08	-6.06
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.96	0.86
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40246



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -7.5 cm/year

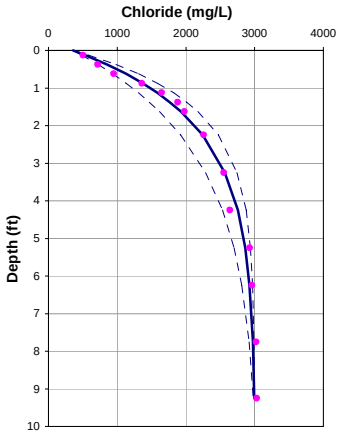
OL-VC-40246



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -7.8 cm/year

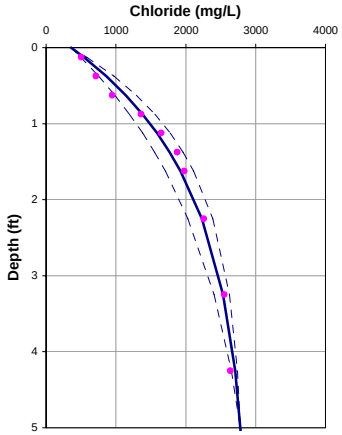
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	3400	3100
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		3393.544814
V(cm/yr)	-10.03	-10.38
q (cm/yr)	-7.52	-7.79
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	1.04	0.88
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40247



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -4.7 cm/year

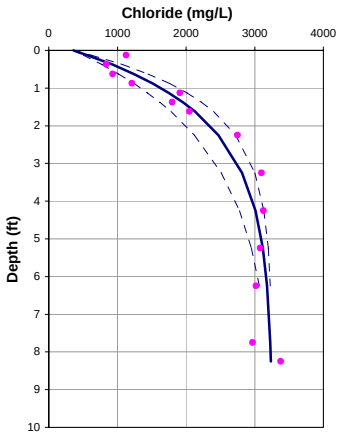
OL-VC-40247



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -4.3 cm/year

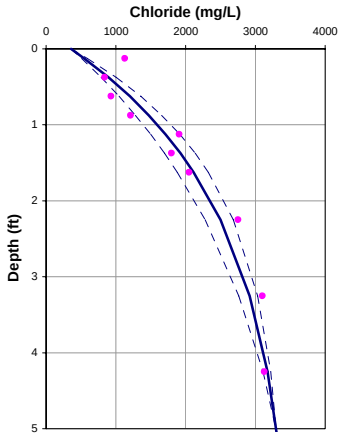
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	3000	2785
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		2784.76807
V(cm/yr)	-6.22	-5.80
q (cm/yr)	-4.66	-4.35
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.94	0.84
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40248



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -5.0 cm/year

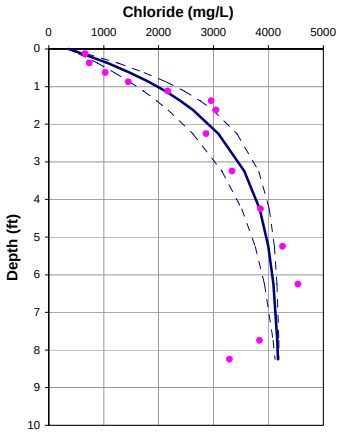
OL-VC-40248



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -3.6 cm/year

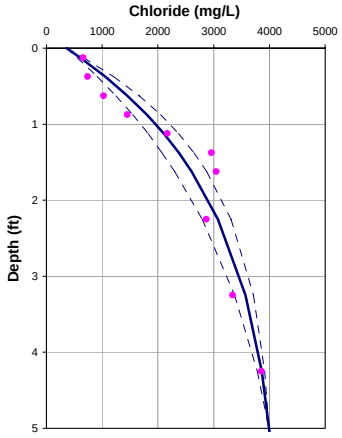
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	3250	3300
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		3098.41048
V(cm/yr)	-6.62	-4.78
q (cm/yr)	-4.96	-3.58
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.95	0.83
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40249



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -4.6 cm/year

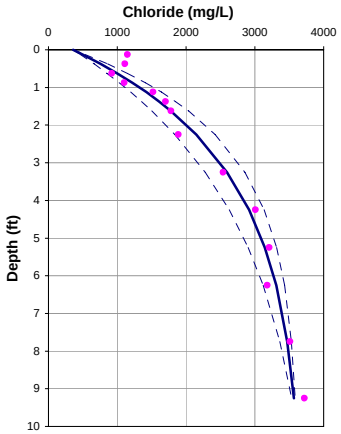
OL-VC-40249



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -3.9 cm/year

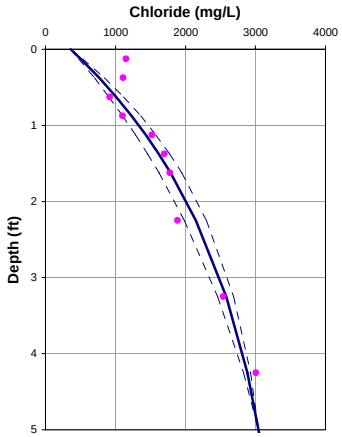
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	4200	4000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		4523.64821
V(cm/yr)	-6.16	-5.20
q (cm/yr)	-4.62	-3.90
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.94	0.83
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40250



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -2.7 cm/year

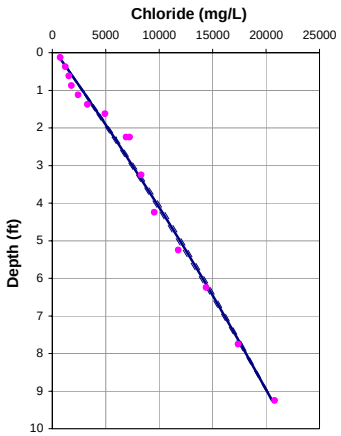
OL-VC-40250



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -2.6 cm/year

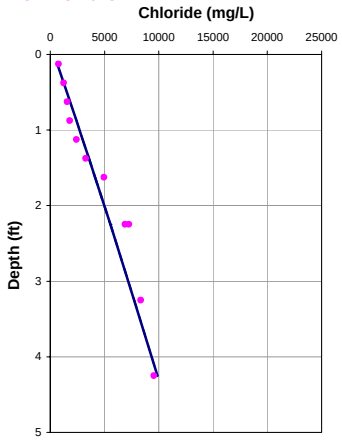
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	3600	3049
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		3049.38374
V(cm/yr)	-3.55	-3.53
q (cm/yr)	-2.66	-2.64
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.87	0.82
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40287



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -0.2 cm/year

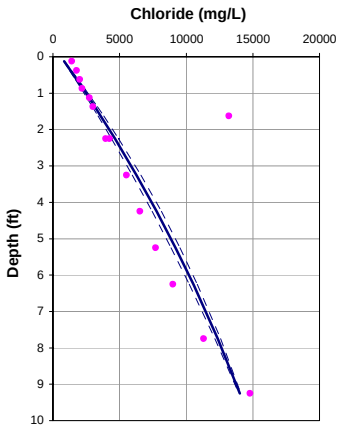
OL-VC-40287



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -0.2 cm/year

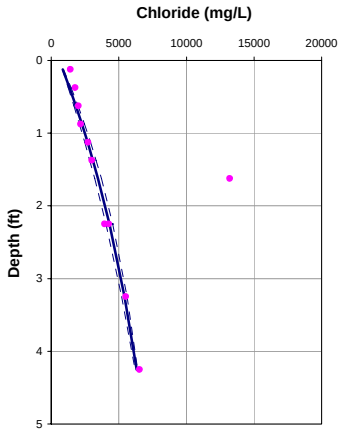
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	22000	11436
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		11435.8514
V(cm/yr)	-0.27	-0.27
q (cm/yr)	-0.20	-0.20
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40288



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -0.5 cm/year

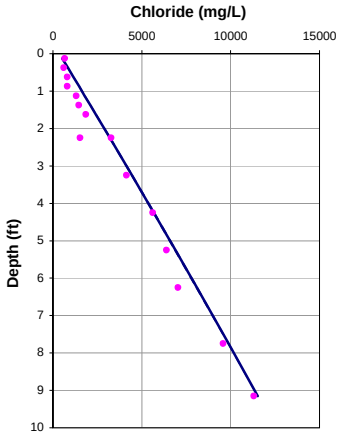
OL-VC-40288



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -1.7 cm/year

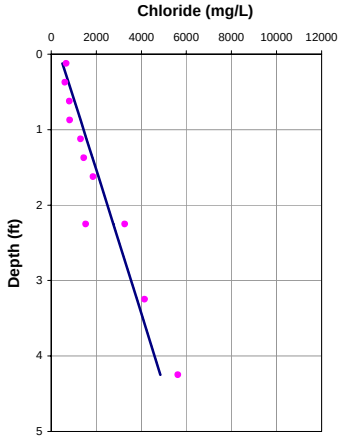
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	600	600
Cl (mg/L)	14800	6851
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		6851.36476
V(cm/yr)	-0.63	-2.23
q (cm/yr)	-0.47	-1.68
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.80	0.80
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40289



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = <0 cm/year

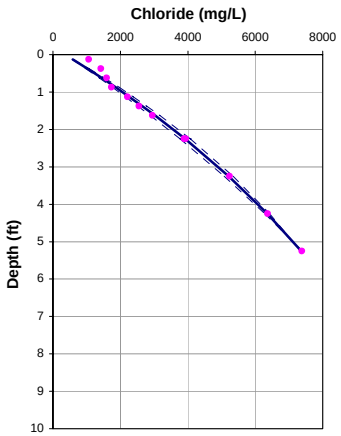
OL-VC-40289



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = <0 cm/year

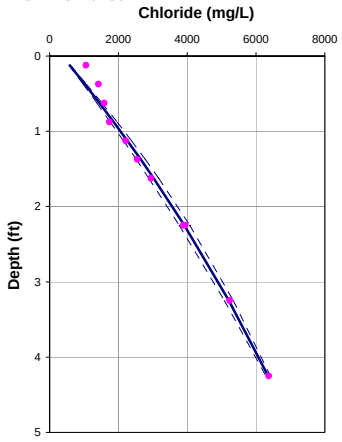
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	12500	5620
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********	12500	5620
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.08	-0.08
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40289A



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -0.9 cm/year

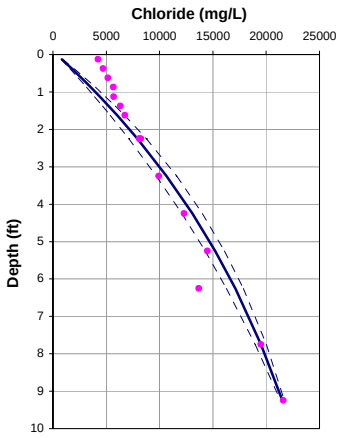
OL-VC-40289A



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -0.9 cm/year

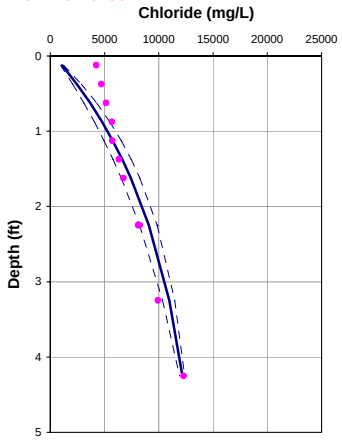
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	7125	7125
L(ft)	5	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********	7124.74417	7124.74018
V(cm/yr)	-1.17	-1.17
q (cm/yr)	-0.88	-0.88
dispersion length (ft)	0.11	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.11	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40290



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -0.9 cm/year

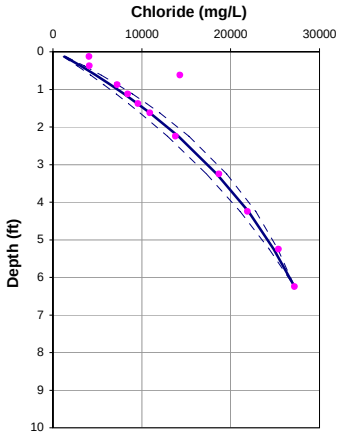
OL-VC-40290



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -3.2 cm/year

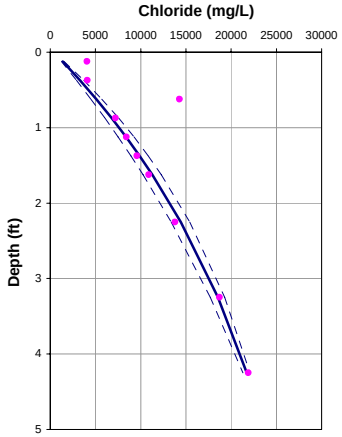
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	22400	12800
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********	22400	12800
V(cm/yr)	-1.22	-4.23
q (cm/yr)	-0.91	-3.17
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.82	0.82
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40291



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -1.5 cm/year

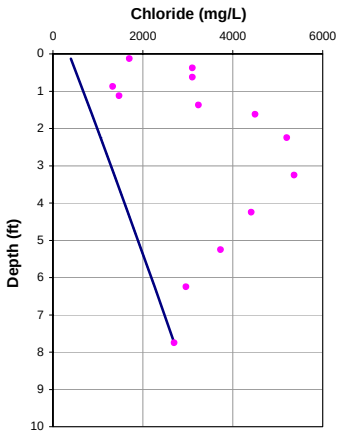
OL-VC-40291



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -1.8 cm/year

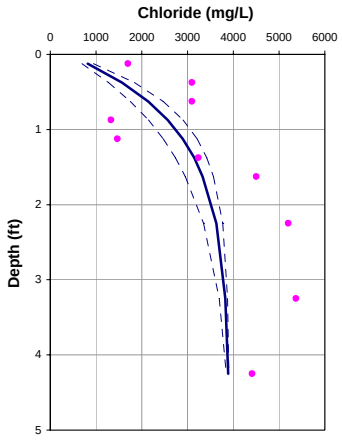
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	27200	23621
L(ft)	6	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		23620.89008
V(cm/yr)	-2.00	-2.44
q (cm/yr)	-1.50	-1.83
dispersion length (ft)	0.15	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.15	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.81	0.81
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40292



Porosity = 0.75
Dispersion length = 0.2 feet
Upwelling Velocity = <0 cm/year

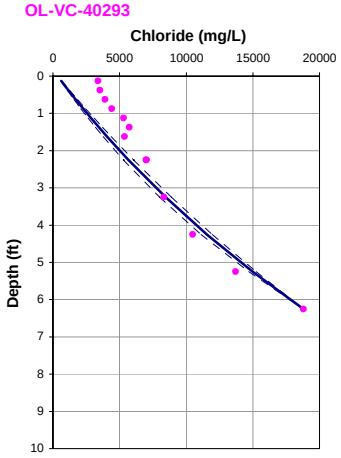
OL-VC-40292



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -8.8 cm/year

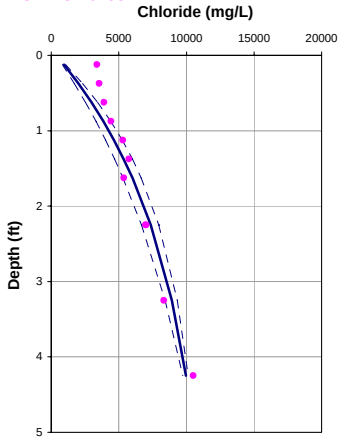
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	2700	3907
L(ft)	8	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		3906.510363
V(cm/yr)	-0.10	-11.79
q (cm/yr)	-0.08	-8.84
dispersion length (ft)	0.21	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.21	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.89
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40293



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = <0 cm/year

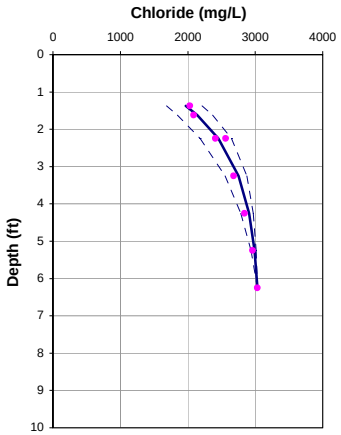
OL-VC-40293



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -3.0 cm/year

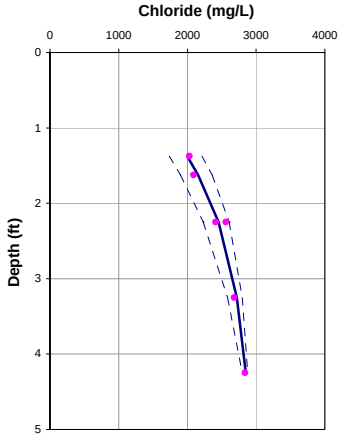
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	18800	10500
L(ft)	6	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		10500
V(cm/yr)	1.00	-4.00
q (cm/yr)	0.75	-3.00
dispersion length (ft)	0.15	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.15	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.80	0.82
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40294



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -5.1 cm/year

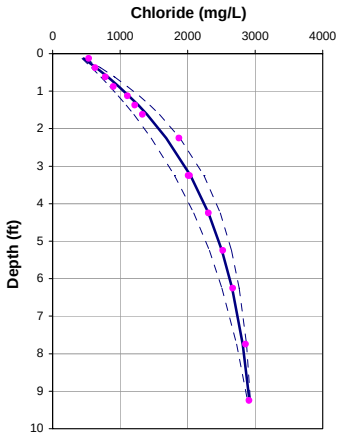
OL-VC-40294



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -5.5 cm/year

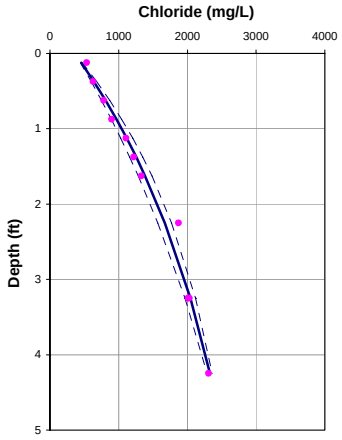
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	3030	2900
L(ft)	6	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		2900
V(cm/yr)	-6.81	-7.29
q (cm/yr)	-5.11	-5.47
dispersion length (ft)	0.15	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.15	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.87	0.85
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40295



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -2.3 cm/year

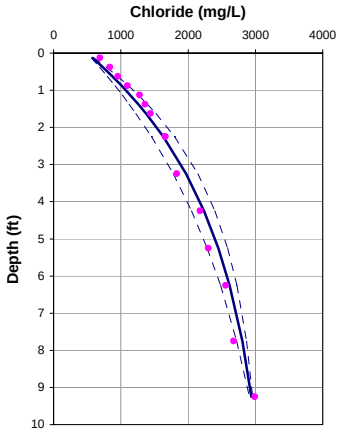
OL-VC-40295



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -2.0 cm/year

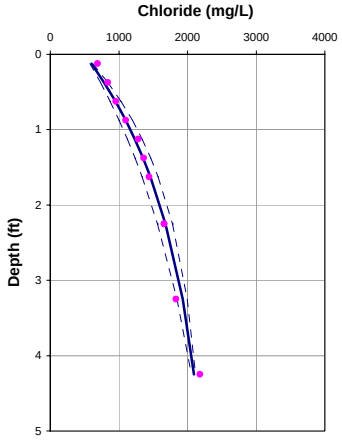
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	2950	2494
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		2493.89325
V(cm/yr)	-3.03	-2.63
q (cm/yr)	-2.27	-1.98
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.86	0.81
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40296



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -1.8 cm/year

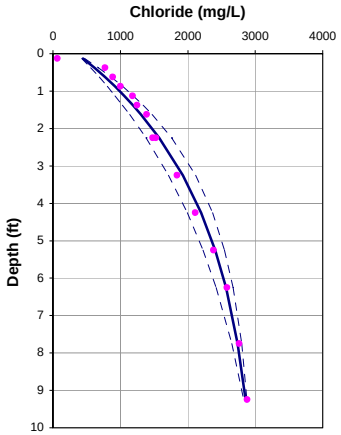
OL-VC-40296



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -3.2 cm/year

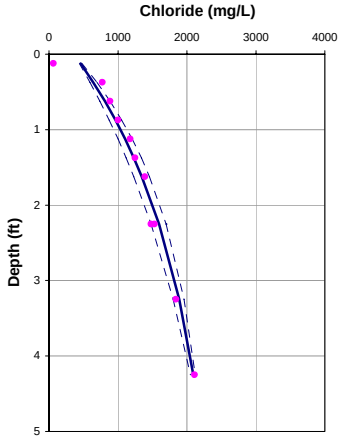
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	500	500
Cl (mg/L)	2990	2174
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		2173.95221
V(cm/yr)	-2.37	-4.30
q (cm/yr)	-1.78	-3.23
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.85	0.82
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40296A



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -2.0 cm/year

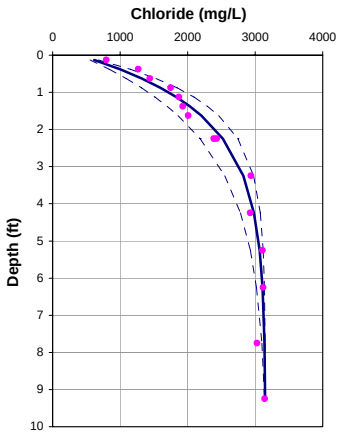
OL-VC-40296A



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -2.7 cm/year

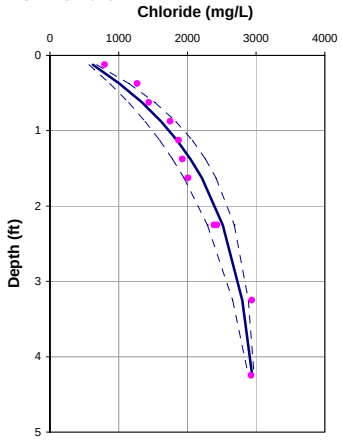
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	2900	2200
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		
V(cm/yr)	-2.66	-3.63
q (cm/yr)	-2.00	-2.72
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.85	0.82
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40297



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -5.8 cm/year

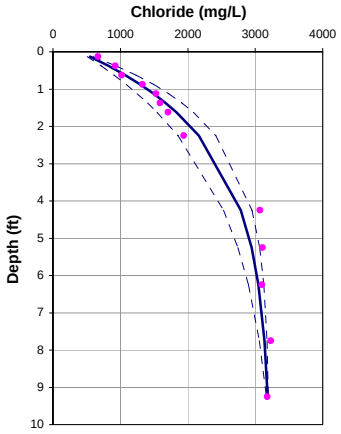
OL-VC-40297



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -5.2 cm/year

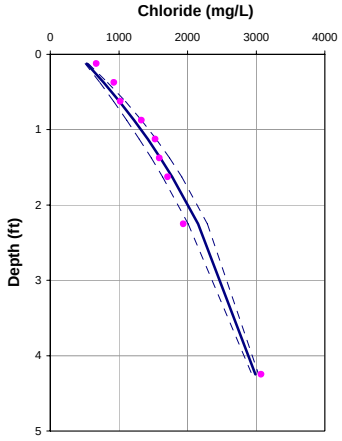
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	400	400
Cl (mg/L)	3150	3000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		
V(cm/yr)	-7.67	-6.99
q (cm/yr)	-5.75	-5.24
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.98	0.85
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40297A



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -3.5 cm/year

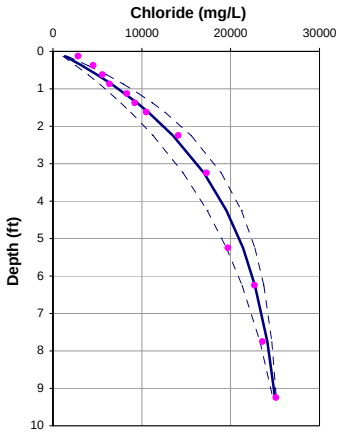
OL-VC-40297A



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -2.1 cm/year

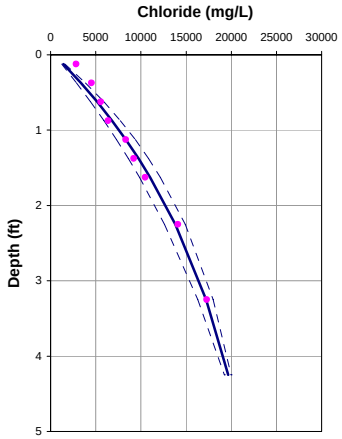
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	400	400
Cl (mg/L)	3200	3198
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		3197.77901
V(cm/yr)	-4.68	-2.83
q (cm/yr)	-3.51	-2.12
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.90	0.81
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40298



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -2.4 cm/year

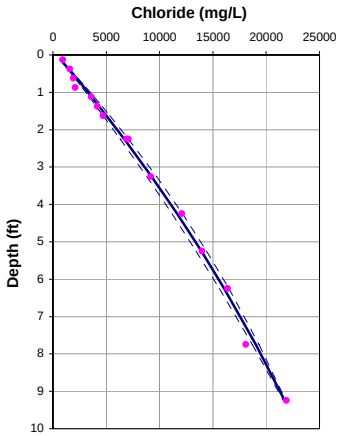
OL-VC-40298



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -2.4 cm/year

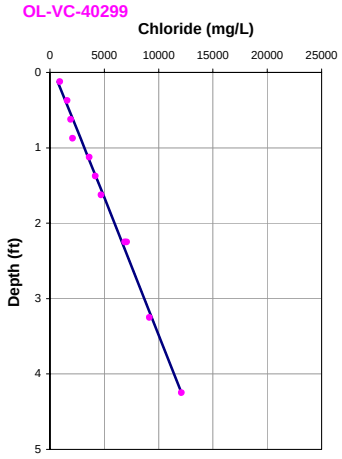
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	25300	21000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		21000
V(cm/yr)	-3.24	-3.26
q (cm/yr)	-2.43	-2.45
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.87	0.81
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40299



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -0.4 cm/year

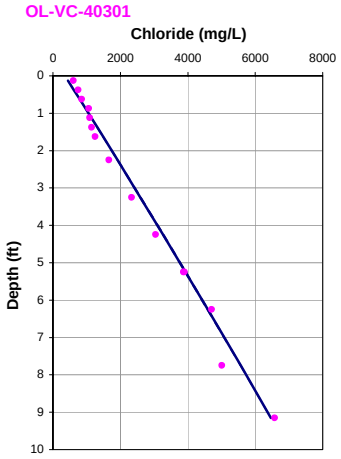
OL-VC-40299



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = <0 cm/year

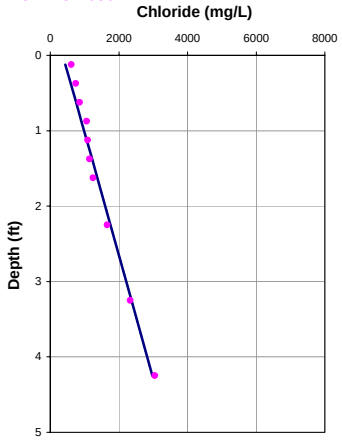
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	23000	14108
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		14107.642
V(cm/yr)	-0.58	-0.10
q (cm/yr)	-0.43	-0.08
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.80	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40301



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = <0 cm/year

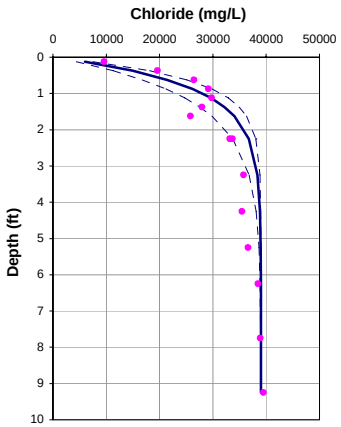
OL-VC-40301



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = <0 cm/year

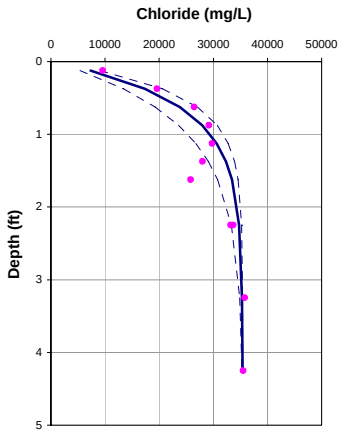
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	7000	3422
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********	7000	3421.84544
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.08	-0.08
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-40302



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -14.5 cm/year

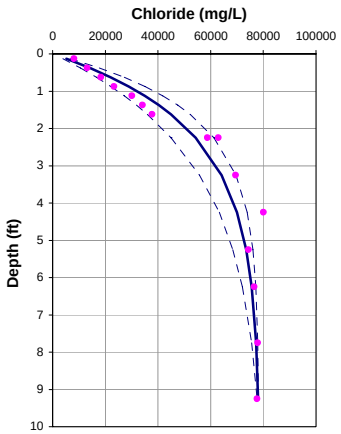
OL-VC-40302



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -15.3 cm/year

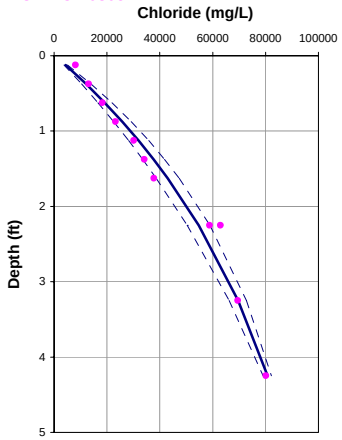
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		359	359
Cl (mg/L)		39000	35400
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.75	0.75
Calculated Values **********		35776.1492	32717.479
V(cm/yr)		-19.28	-20.47
q (cm/yr)		-14.46	-15.35
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.78	0.78
Diffusion + Dispersion (cm2/day)		1.28	0.97
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	0		

OL-VC-40305



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -4.3 cm/year

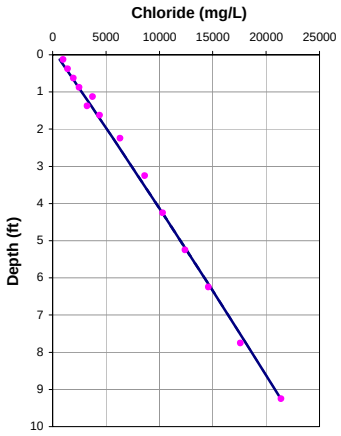
OL-VC-40305



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -2.1 cm/year

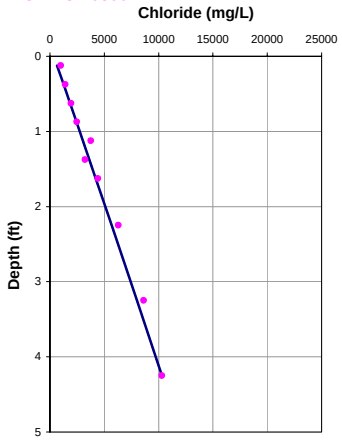
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		359	359
Cl (mg/L)		78250	87214
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.8	0.8
Calculated Values **********			87214
V(cm/yr)		-5.79	-2.82
q (cm/yr)		-4.34	-2.11
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.78	0.78
Diffusion + Dispersion (cm2/day)		0.93	0.81
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	0		

OL-VC-40306



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = <0 cm/year

OL-VC-40306



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = <0 cm/year

		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		359	359
Cl (mg/L)		23000	12000
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.8	0.8
Calculated Values **********			11087.928
V(cm/yr)		-0.10	-0.10
q (cm/yr)		-0.08	-0.08
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.78	0.78
Diffusion + Dispersion (cm2/day)		0.79	0.79
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	0		

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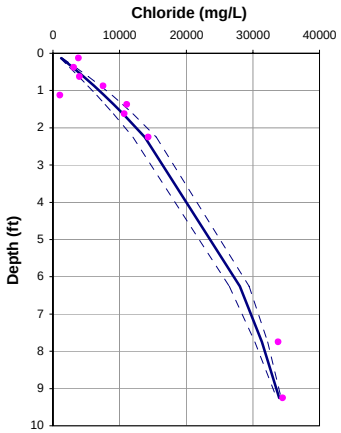
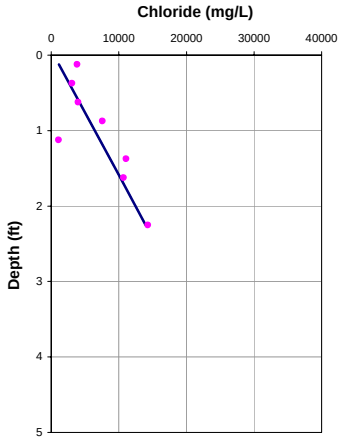
OL-VC-40307



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -1.2 cm/year

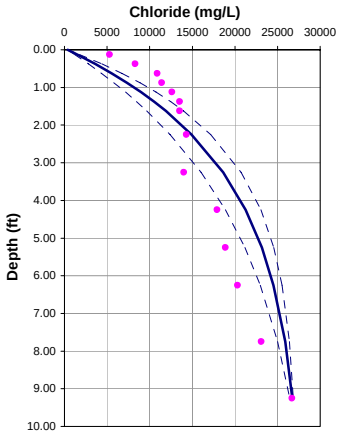
OL-VC-40307



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = <0 cm/year

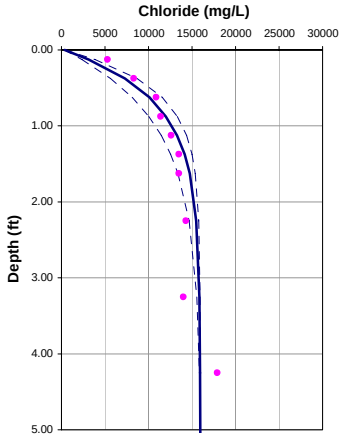
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	35000	30134
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		30133.8285
V(cm/yr)	-1.66	-0.10
q (cm/yr)	-1.25	-0.08
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.83	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-50071



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = -2.6 cm/year

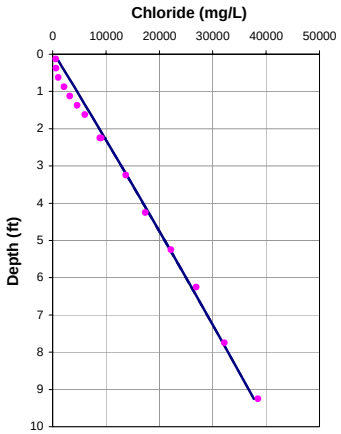
OL-VC-50071



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -13.3 cm/year

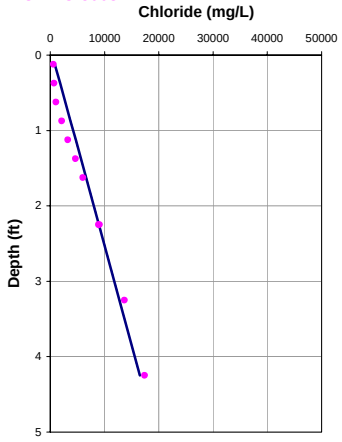
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	27000	15940
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		0
V(cm/yr)	-3.48	-17.67
q (cm/yr)	-2.61	-13.25
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.87	0.94
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-50087



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = <0 cm/year

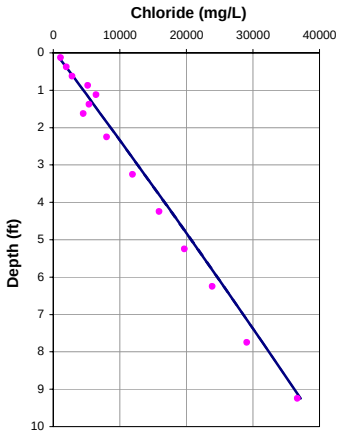
OL-VC-50087



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = <0 cm/year

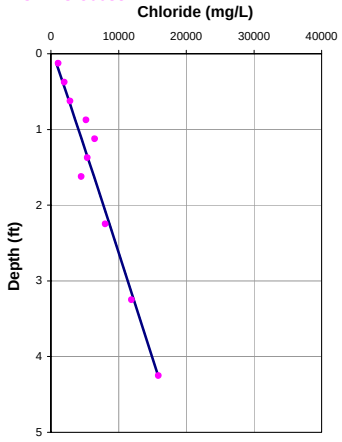
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	40572	19259
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********	40571.5897	19259.1322
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.08	-0.08
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-50088



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = <0 cm/year

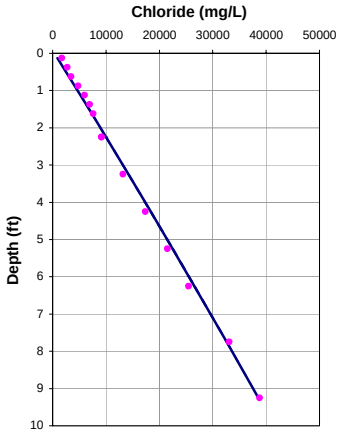
OL-VC-50088



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = <0 cm/year

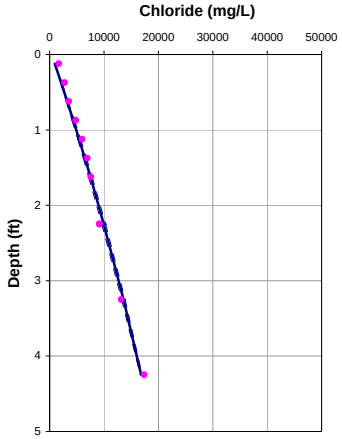
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	40000	18500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********		15900
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.08	-0.08
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-50088A



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = <0 cm/year

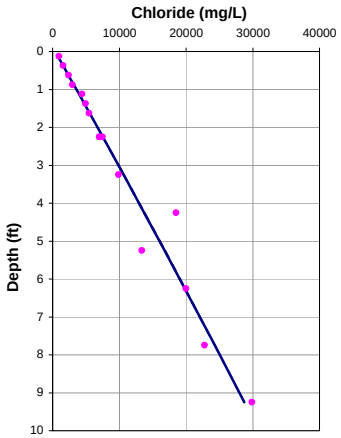
OL-VC-50088A



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -0.7 cm/year

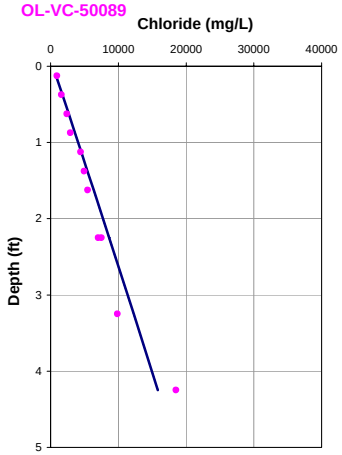
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	41500	19067
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.75	0.75
Calculated Values **********		19067.2498
V(cm/yr)	-0.10	-0.97
q (cm/yr)	-0.08	-0.73
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-50089



Porosity = 0.75
Dispersion length = 0.3 feet
Upwelling Velocity = <0 cm/year

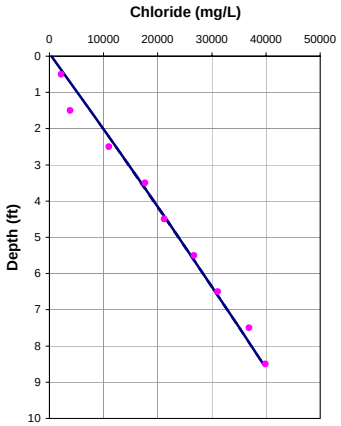
OL-VC-50089



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = <0 cm/year

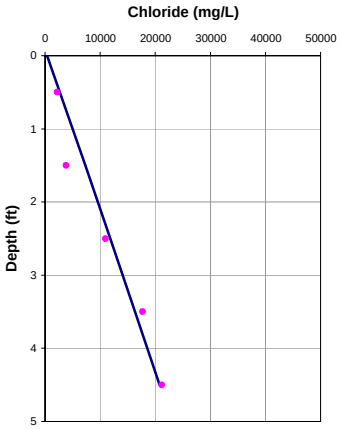
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	30886	18500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.8	0.8
Calculated Values **********	30885.6743	18500
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.08	-0.08
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.78	0.78
Diffusion + Dispersion (cm2/day)	0.79	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-STA-60072



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

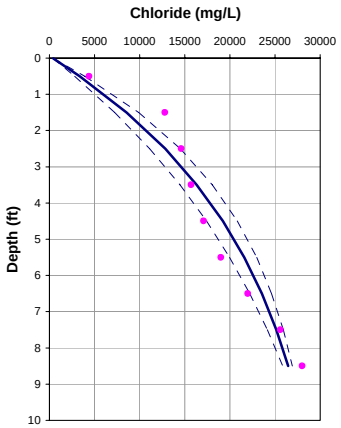
OL-STA-60072



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = NA cm/year

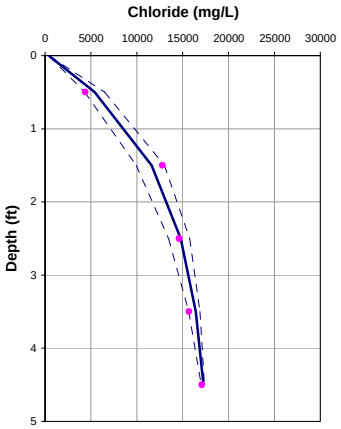
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	46000	23000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.07	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-STA-60078



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -1.3 cm/year

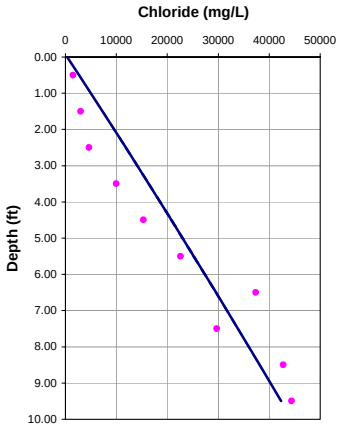
OL-STA-60078



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -4.4 cm/year

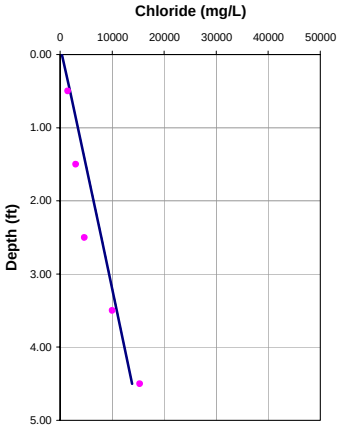
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	28000	17500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.80	-6.23
q (cm/yr)	-1.26	-4.36
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.77	0.78
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-STA-60081



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

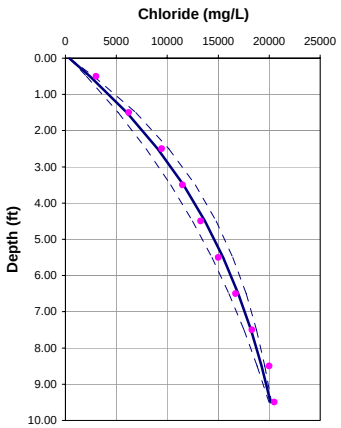
OL-STA-60081



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

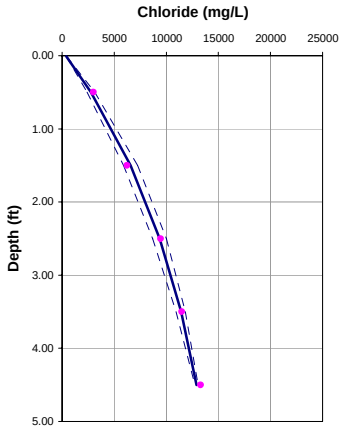
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	44400	15300
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.07	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-STA-60087



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.1 cm/year

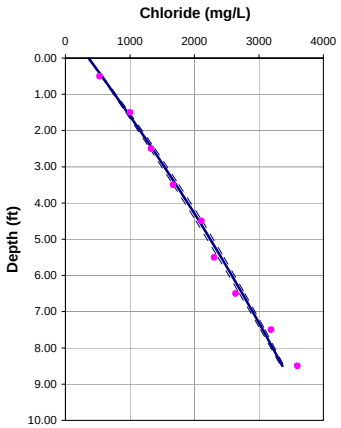
OL-STA-60087



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.0 cm/year

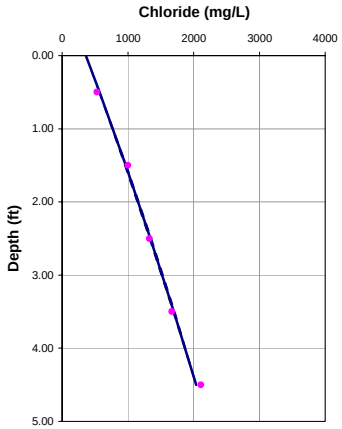
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	20500	13500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-1.62	-2.79
q (cm/yr)	-1.13	-1.96
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.76	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-STA-60090



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -0.2 cm/year

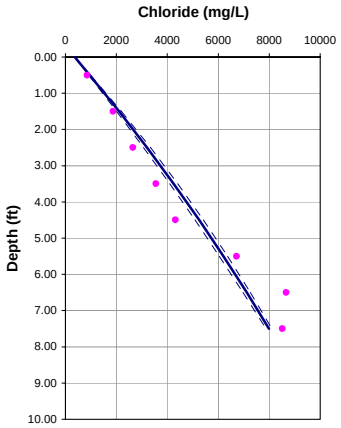
OL-STA-60090



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -0.3 cm/year

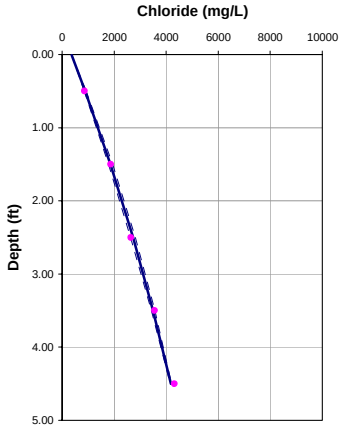
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	3800	2200
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.34	-0.49
q (cm/yr)	-0.24	-0.34
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.73	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-STA-60096



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.3 cm/year

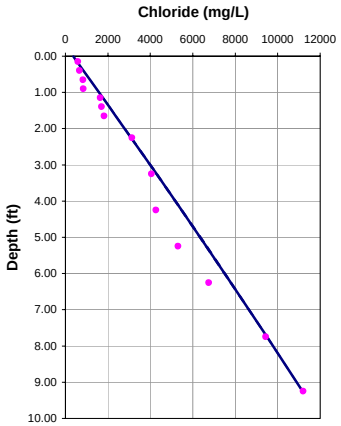
OL-STA-60096



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.7 cm/year

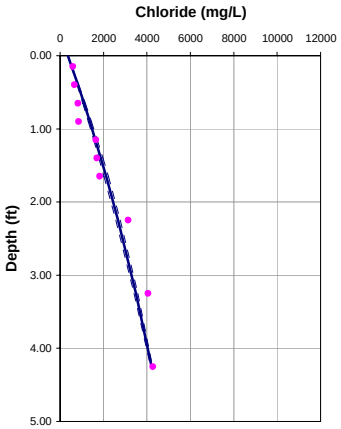
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	10000	4500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.41	-1.00
q (cm/yr)	-0.28	-0.70
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.73	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60125



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

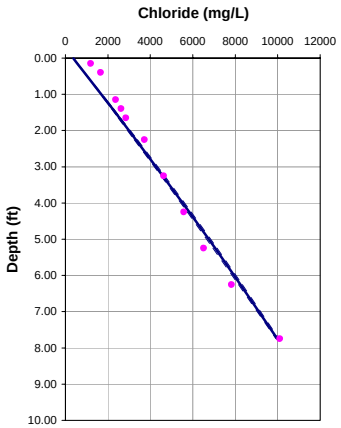
OL-VC-60125



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.8 cm/year

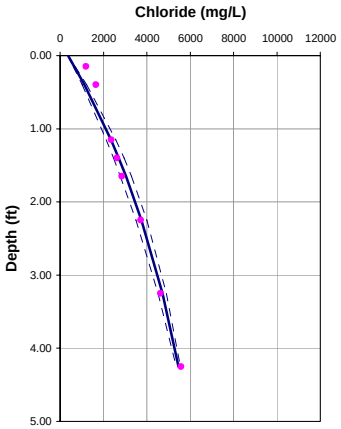
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	12000	4700
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.10	-1.17
q (cm/yr)	-0.07	-0.82
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60127



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -0.1 cm/year

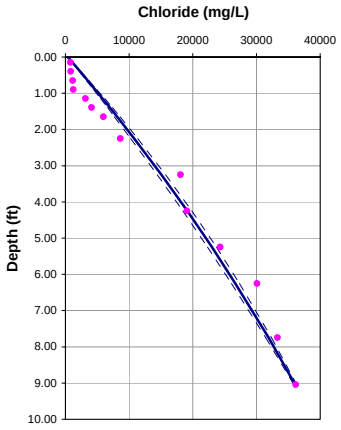
OL-VC-60127



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -1.7 cm/year

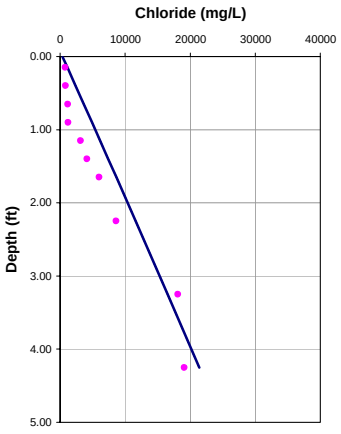
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	12500	5895
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		5895.28983
V(cm/yr)	-0.18	-2.38
q (cm/yr)	-0.13	-1.67
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.73	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60129



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.3 cm/year

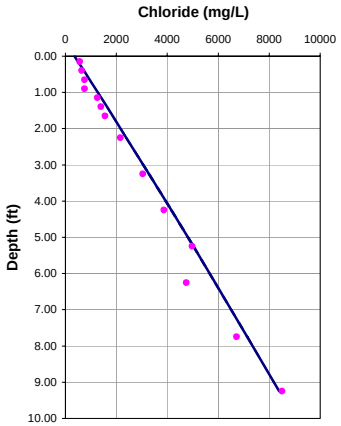
OL-VC-60129



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

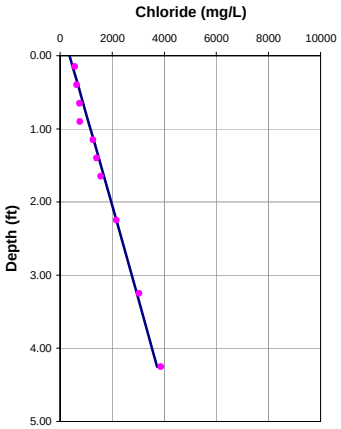
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	39000	25000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.44	-0.10
q (cm/yr)	-0.31	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.73	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60150



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

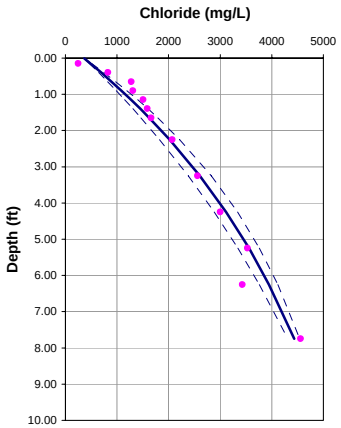
OL-VC-60150



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

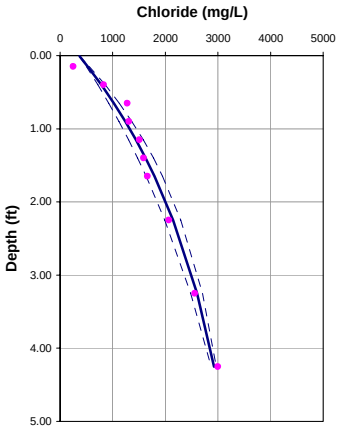
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	9000	4300
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		4300
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.07	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60152



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -0.9 cm/year

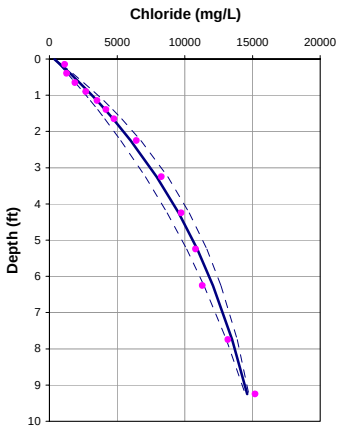
OL-VC-60152



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -2.1 cm/year

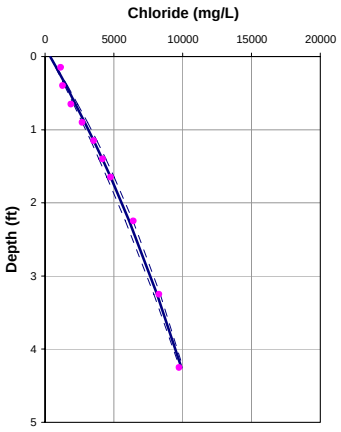
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	5000	3104
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		3104.47509
V(cm/yr)	-1.26	-3.01
q (cm/yr)	-0.88	-2.11
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.75	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60154



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.1 cm/year

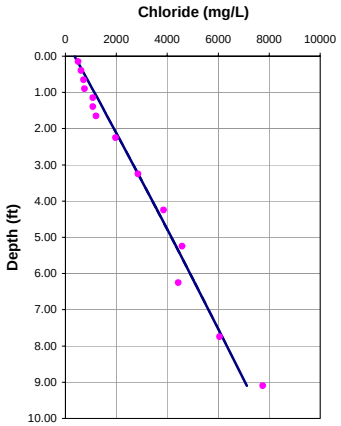
OL-VC-60154



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.9 cm/year

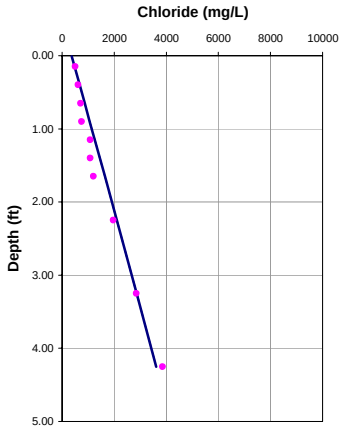
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	15070	11068
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********	15069.6517	11067.6184
V(cm/yr)	-1.51	-1.25
q (cm/yr)	-1.06	-0.88
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.76	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60162



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

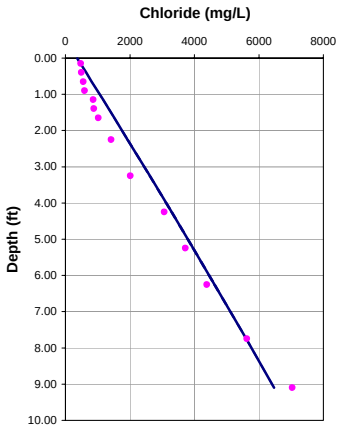
OL-VC-60162



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

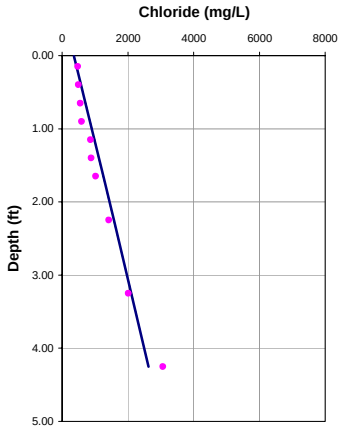
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	7750	4912
L(ft)	10	6
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		4912.23363
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.07	-0.07
dispersion length (ft)	0.31	0.14
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.14
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60168



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

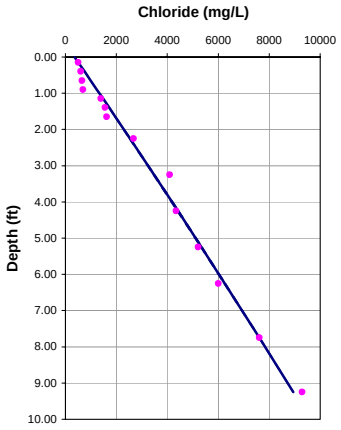
OL-VC-60168



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

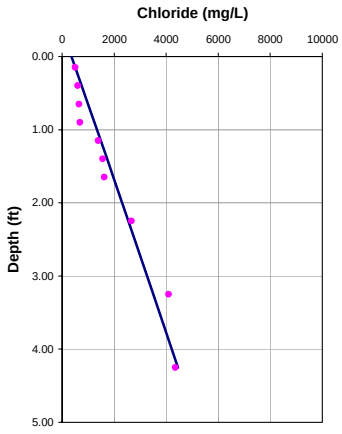
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	7040	3016
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		3016.43241
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.07	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60171



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

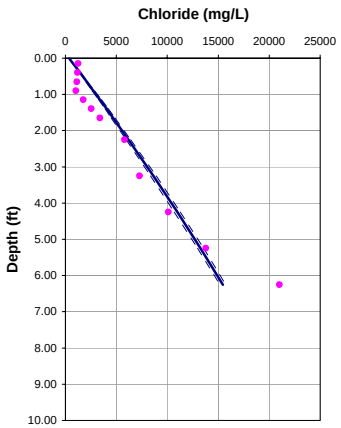
OL-VC-60171



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

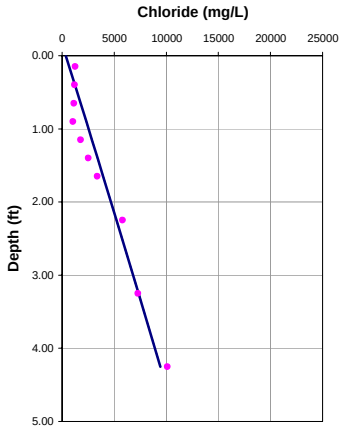
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	9600	5153
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		5153.36207
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.07	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60179



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.2 cm/year

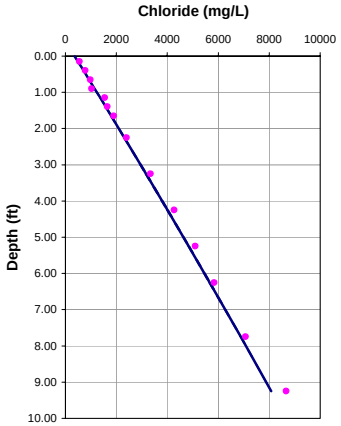
OL-VC-60179



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

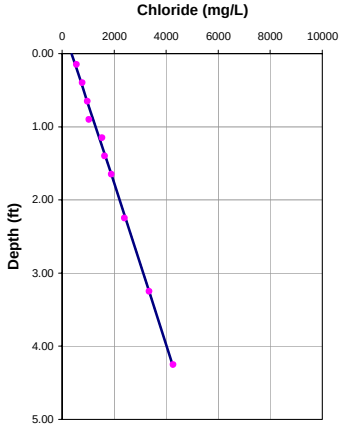
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	23000	11000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		11000
V(cm/yr)	-0.32	-0.10
q (cm/yr)	-0.22	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.73	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60181



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

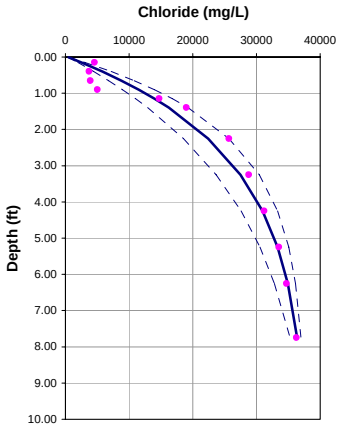
OL-VC-60181



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

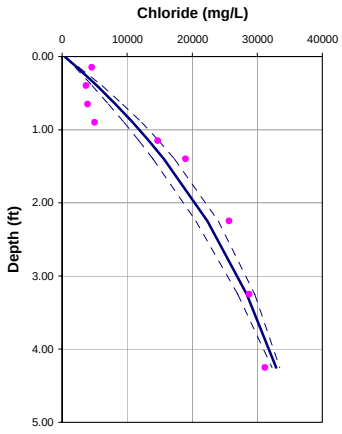
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	8670	4910
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		4909.54502
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.07	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60191



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -2.7 cm/year

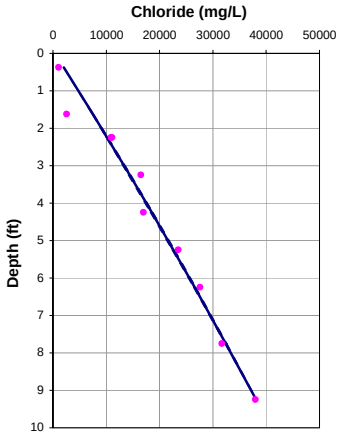
OL-VC-60191



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.8 cm/year

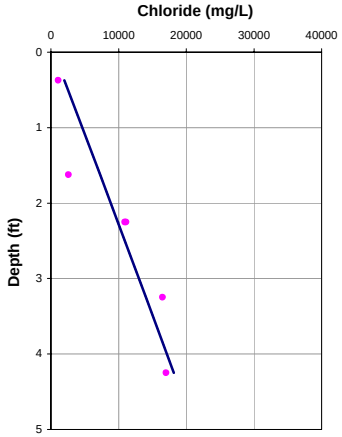
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	37500	35568
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		35568.0176
V(cm/yr)	-3.79	-2.55
q (cm/yr)	-2.65	-1.79
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.82	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60274



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = <0 cm/year

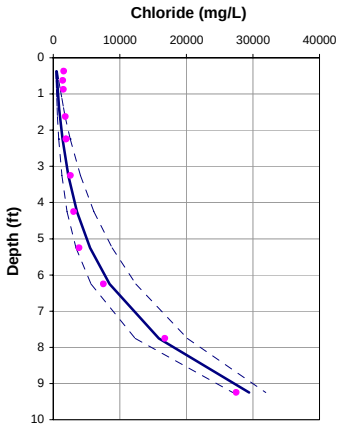
OL-VC-60274



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = <0 cm/year

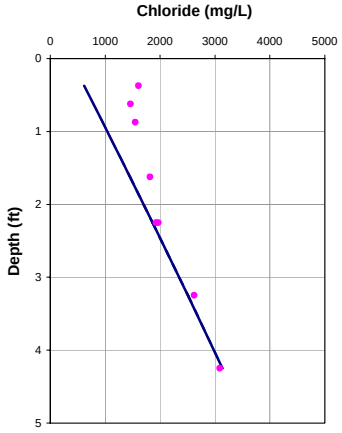
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	40924	21219
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********	40923.635	21218.6265
V(cm/yr)	-0.16	-0.10
q (cm/yr)	0.22	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.73	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60275



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = <0 cm/year

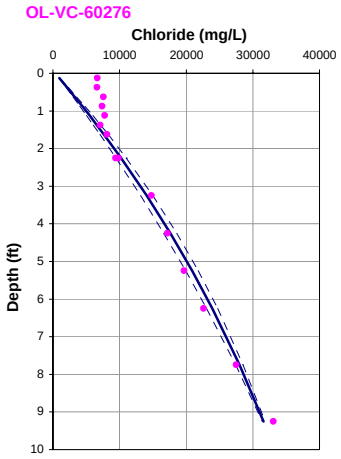
OL-VC-60275



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -0.1 cm/year

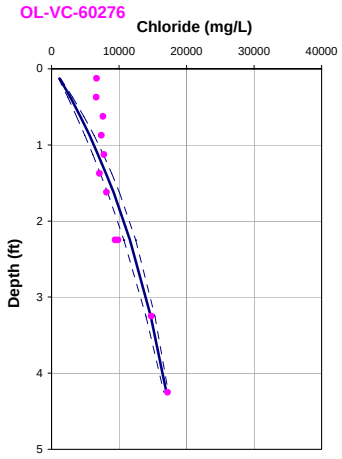
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	40000	3600
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********	30000	3090
V(cm/yr)	4.00	-0.20
q (cm/yr)	2.80	-0.14
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.82	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60276



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.5 cm/year

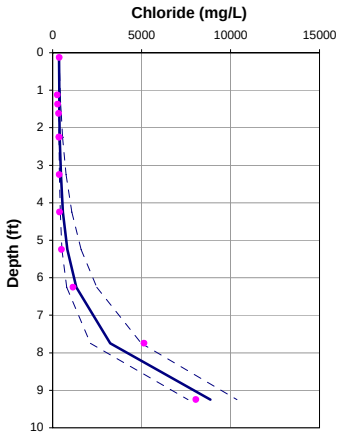
OL-VC-60276



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.8 cm/year

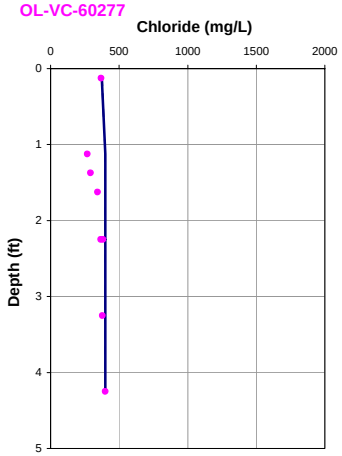
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	33275	18331
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********	33274.9693	18330.564
V(cm/yr)	-0.71	-2.58
q (cm/yr)	-0.50	-1.81
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.74	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60277



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = <0 cm/year

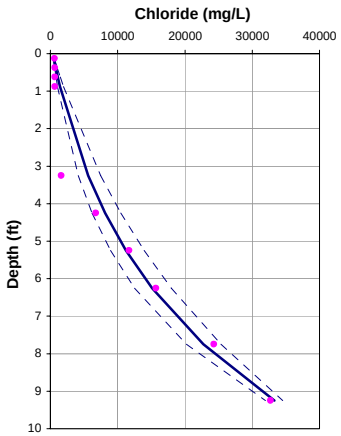
OL-VC-60277



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = NA cm/year

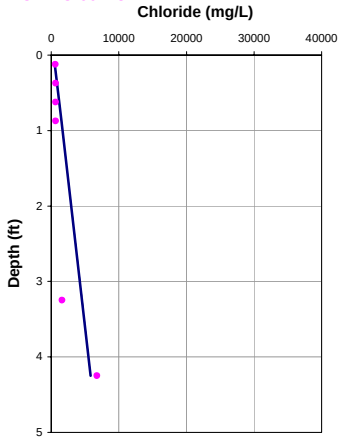
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	15000	400
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		400
V(cm/yr)	8.00	-48.75
q (cm/yr)	5.60	-34.13
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.93	1.15
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60278



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = <0 cm/year

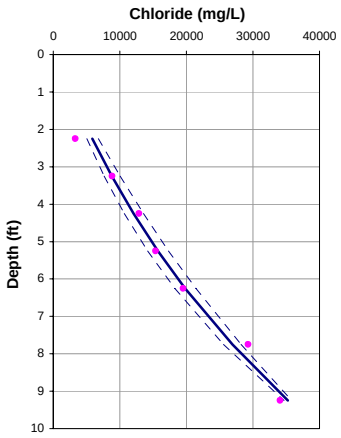
OL-VC-60278



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = <0 cm/year

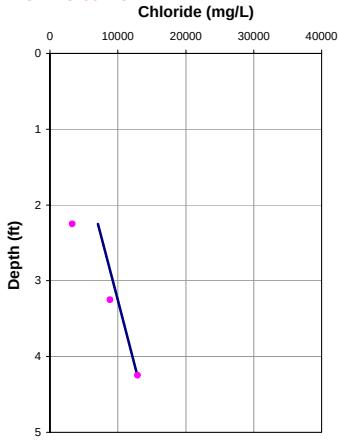
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	40000	6760
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		6760
V(cm/yr)	2.00	-0.10
q (cm/yr)	1.40	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.77	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60278A



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = <0 cm/year

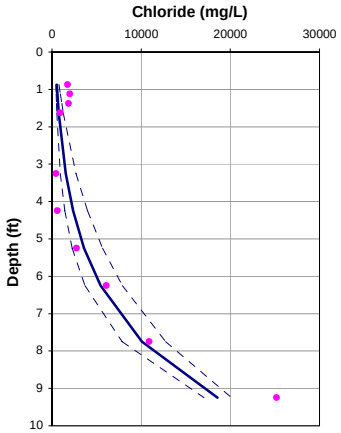
OL-VC-60278A



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = <0 cm/year

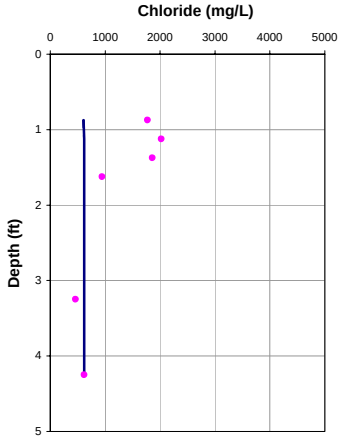
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	40000	15000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		12900
V(cm/yr)	1.00	-0.10
q (cm/yr)	0.70	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.75	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60279



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = <0 cm/year

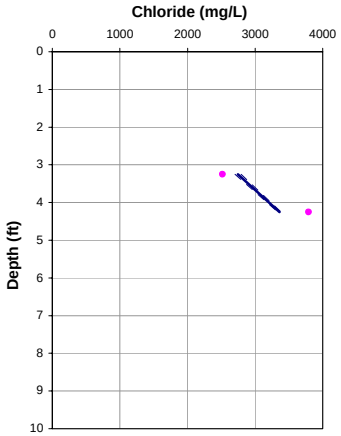
OL-VC-60279



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = NA cm/year

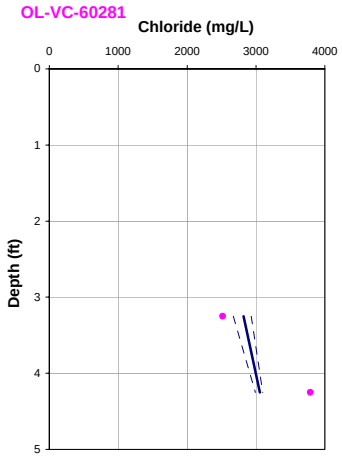
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	25200	620
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		620
V(cm/yr)	4.00	-50.00
q (cm/yr)	2.80	-35.00
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.82	1.16
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60281



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = NA cm/year

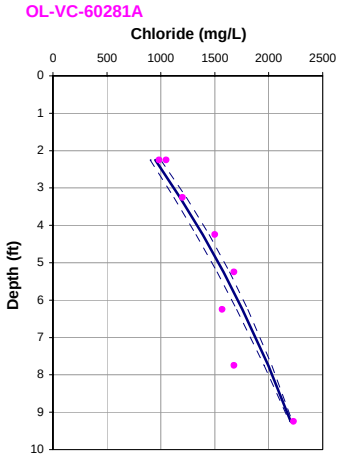
OL-VC-60281



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = NA cm/year

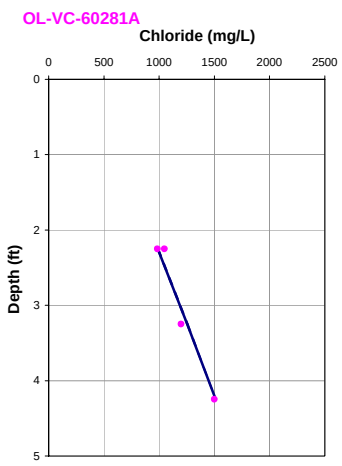
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	3790	3169
L(ft)	5	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		3168.74713
V(cm/yr)	-0.72	-4.57
q (cm/yr)	-0.51	-3.20
dispersion length (ft)	0.11	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.11	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.73	0.76
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60281A



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.5 cm/year

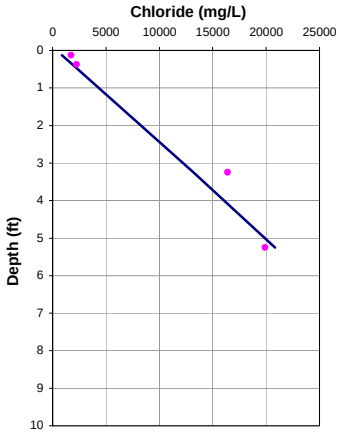
OL-VC-60281A



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.2 cm/year

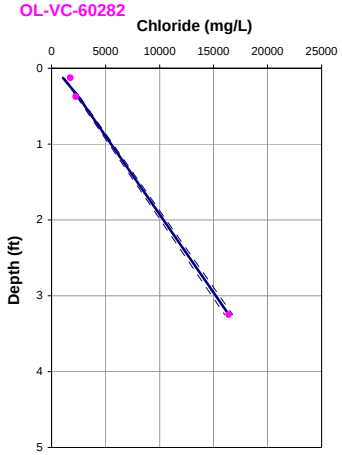
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	2300	1700
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-0.76	-0.28
q (cm/yr)	-0.53	-0.20
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.74	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60282



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = <0 cm/year

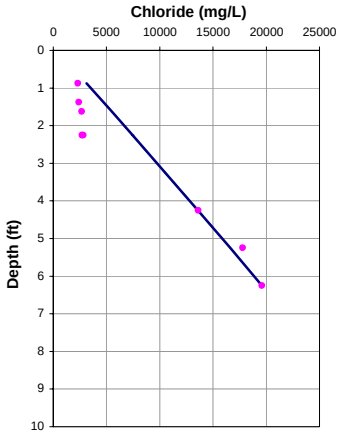
OL-VC-60282



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.6 cm/year

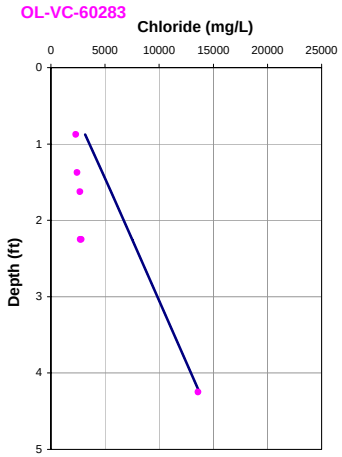
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	19900	23113
L(ft)	5	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		23113.1254
V(cm/yr)	-0.10	-0.87
q (cm/yr)	-0.07	-0.61
dispersion length (ft)	0.11	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.11	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60283



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = <0 cm/year

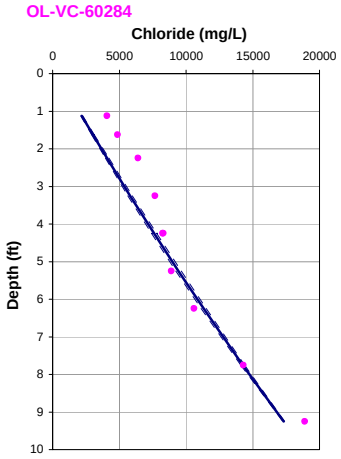
OL-VC-60283



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = <0 cm/year

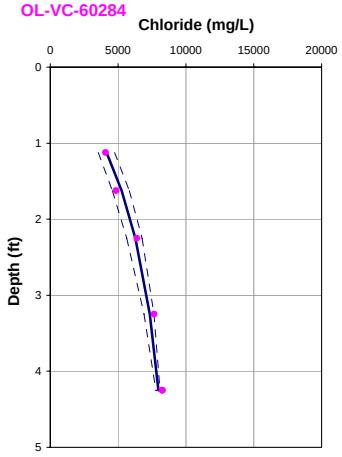
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	19600	16000
L(ft)	6	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		13600
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.07	-0.07
dispersion length (ft)	0.15	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.15	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60284



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = <0 cm/year

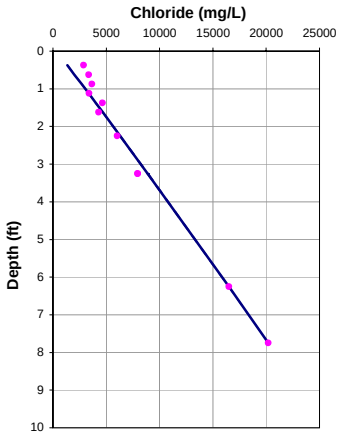
OL-VC-60284



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -3.4 cm/year

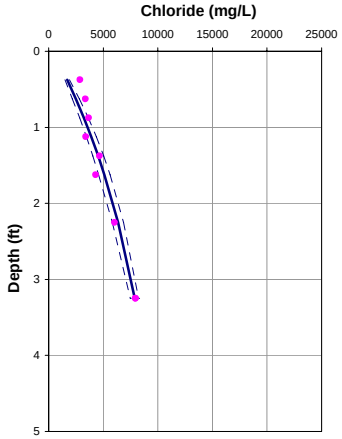
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	18900	8260
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		8260
V(cm/yr)	0.25	-4.80
q (cm/yr)	0.18	-3.36
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.73	0.76
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60285



Porosity = 0.70
Dispersion length = 0.2 feet
Upwelling Velocity = <0 cm/year

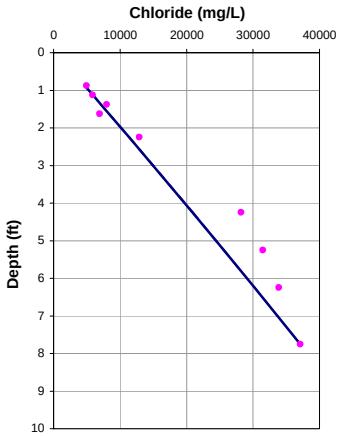
OL-VC-60285



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.1 cm/year

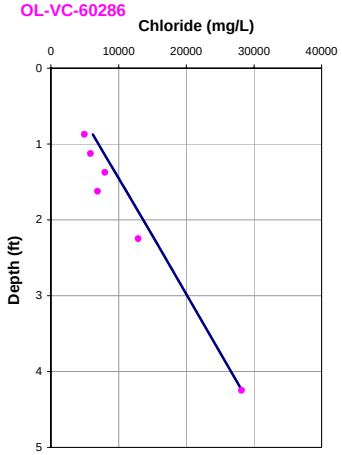
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		359	359
Cl (mg/L)		20200	9600
L(ft)		8	5
D (cm2/day)		1.236	1.236
porosity		0.7	0.7
Calculated Values **********			9158.49374
V(cm/yr)		-0.10	-2.97
q (cm/yr)		-0.07	-2.08
dispersion length (ft)		0.21	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.21	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.72	0.72
Diffusion + Dispersion (cm2/day)		0.72	0.75
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	0		

OL-VC-60286



Porosity = 0.7
Dispersion length = 0.2 feet
Upwelling Velocity = <0 cm/year

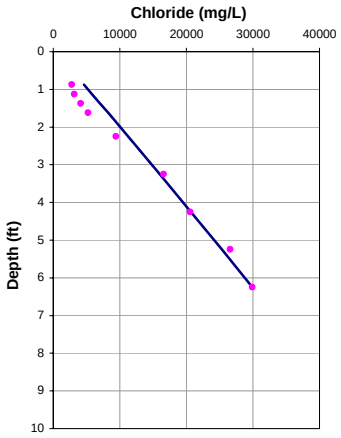
OL-VC-60286



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = <0 cm/year

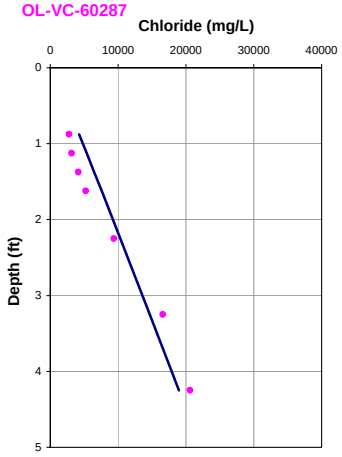
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		359	359
Cl (mg/L)		37100	33000
L(ft)		8	5
D (cm2/day)		1.236	1.236
porosity		0.7	0.7
Calculated Values **********			28200
V(cm/yr)		-0.10	-0.10
q (cm/yr)		-0.07	-0.07
dispersion length (ft)		0.21	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.21	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.72	0.72
Diffusion + Dispersion (cm2/day)		0.72	0.72
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	0		

OL-VC-60287



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = <0 cm/year

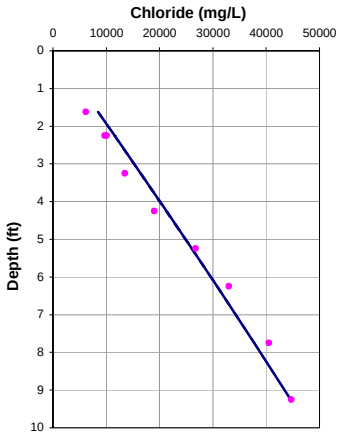
OL-VC-60287



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = <0 cm/year

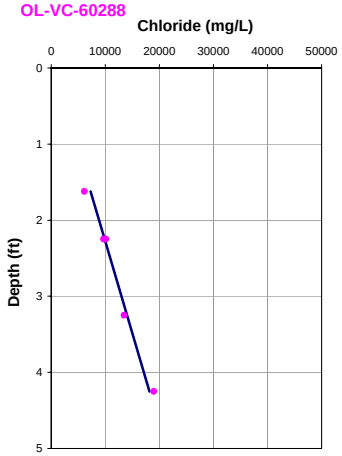
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		359	359
Cl (mg/L)		29900	22171
L(ft)		6	5
D (cm2/day)		1.236	1.236
porosity		0.7	0.7
Calculated Values **********			22170.7447
V(cm/yr)		-0.10	-0.10
q (cm/yr)		-0.07	-0.07
dispersion length (ft)		0.15	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.15	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.72	0.72
Diffusion + Dispersion (cm2/day)		0.72	0.72
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	0		

OL-VC-60288



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = <0 cm/year

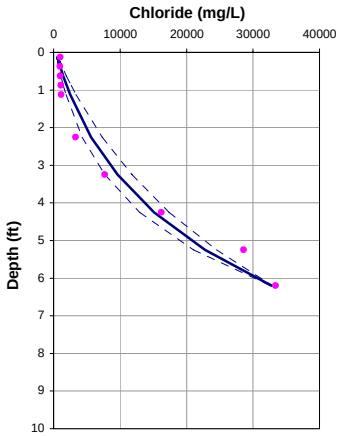
OL-VC-60288



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = <0 cm/year

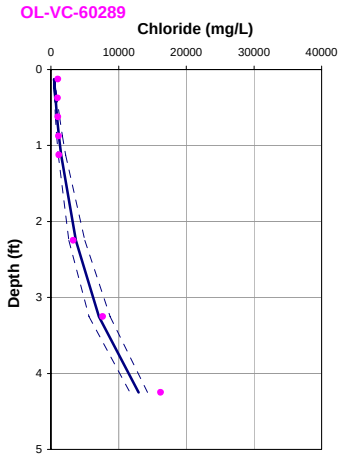
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	48000	21216
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		21215.8276
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.07	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60289



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = <0 cm/year

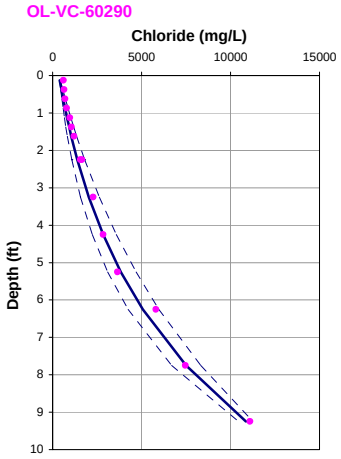
OL-VC-60289



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = <0 cm/year

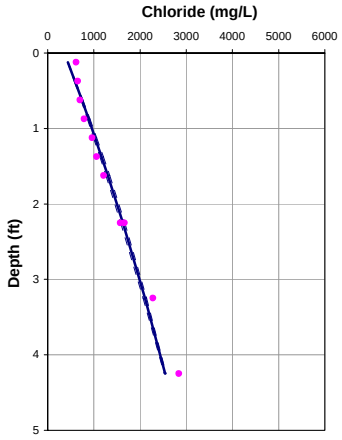
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	33400	20000
L(ft)	6	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		20000
V(cm/yr)	3.00	5.00
q (cm/yr)	2.10	3.50
dispersion length (ft)	0.15	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.15	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.76	0.77
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60290



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = <0 cm/year

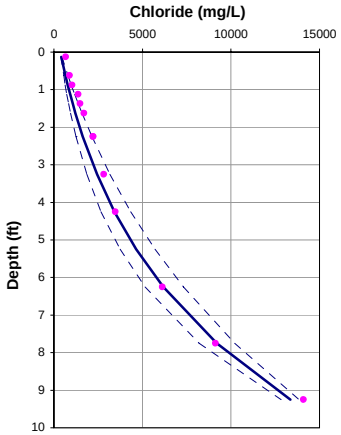
OL-VC-60290



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.6 cm/year

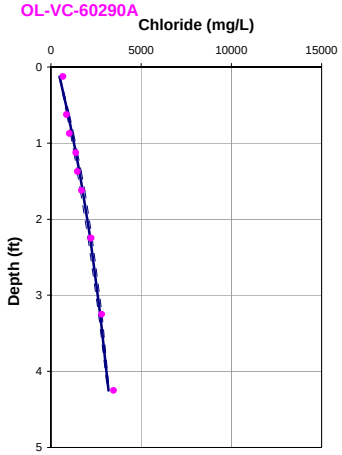
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	13000	2840
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		2840
V(cm/yr)	2.00	-0.85
q (cm/yr)	1.40	-0.60
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.77	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60290A



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = <0 cm/year

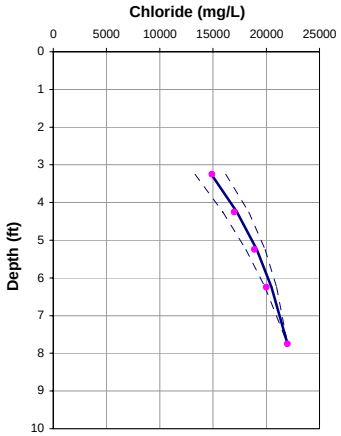
OL-VC-60290A



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.3 cm/year

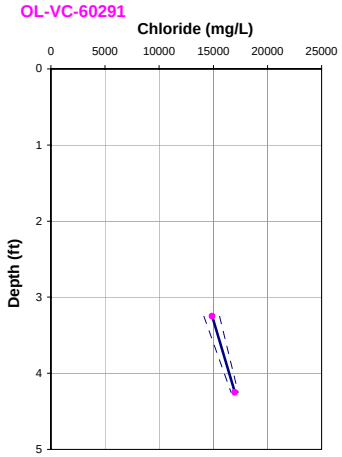
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	16000	3470
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		3470
V(cm/yr)	2.00	-1.93
q (cm/yr)	1.40	-1.35
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.77	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60291



Porosity = 0.7
Dispersion length = 0.2 feet
Upwelling Velocity = -1.8 cm/year

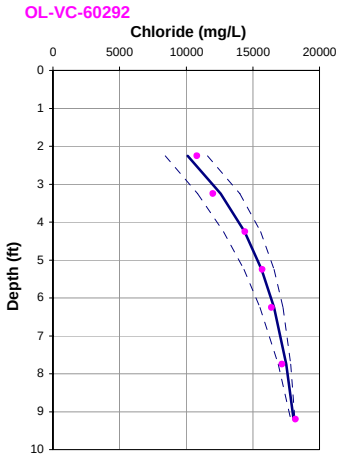
OL-VC-60291



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -2.1 cm/year

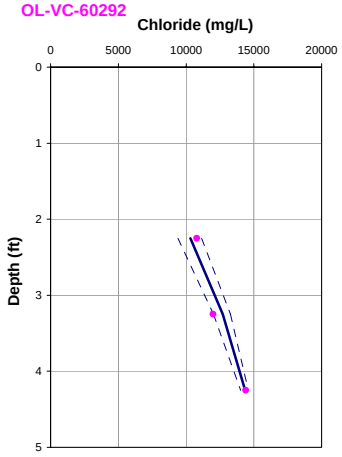
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	22000	18172
L(ft)	8	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		18172.3198
V(cm/yr)	-2.50	-3.00
q (cm/yr)	-1.75	-2.10
dispersion length (ft)	0.21	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.21	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.76	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60292



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -2.2 cm/year

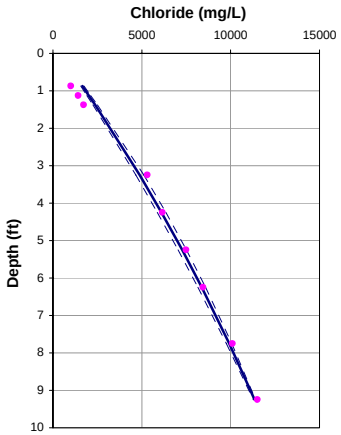
OL-VC-60292



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.3 cm/year

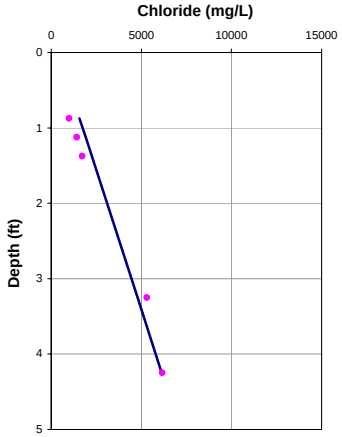
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	18250	15250
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		14400
V(cm/yr)	-3.18	-3.29
q (cm/yr)	-2.22	-2.30
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.80	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60293



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.3 cm/year

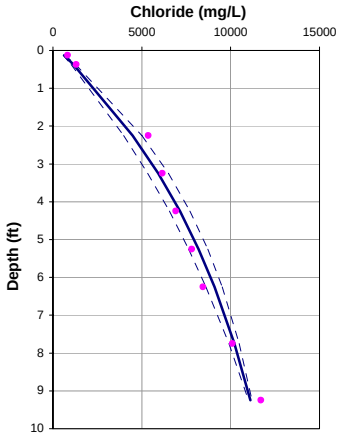
OL-VC-60293



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = <0 cm/year

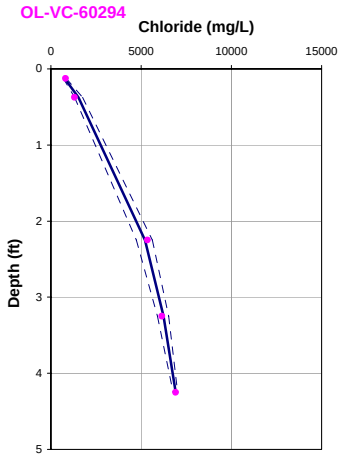
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	12000	7118
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********	12404.3759	7117.86638
V(cm/yr)	-0.49	-0.10
q (cm/yr)	-0.35	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.73	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60294



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -1.0 cm/year

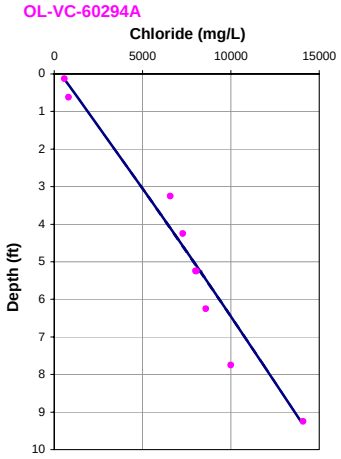
OL-VC-60294



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -2.7 cm/year

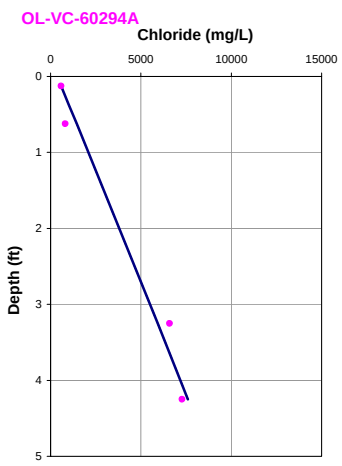
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	11483	7263
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********	11483.3569	7263.09563
V(cm/yr)	-1.38	-3.90
q (cm/yr)	-0.97	-2.73
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.76	0.76
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60294A



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = <0 cm/year

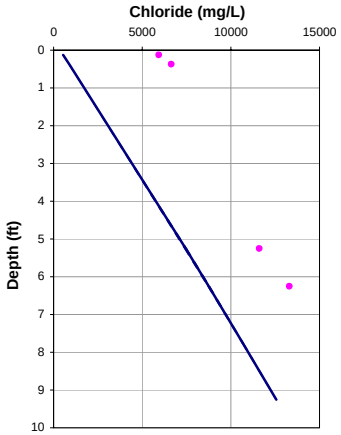
OL-VC-60294A



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = <0 cm/year

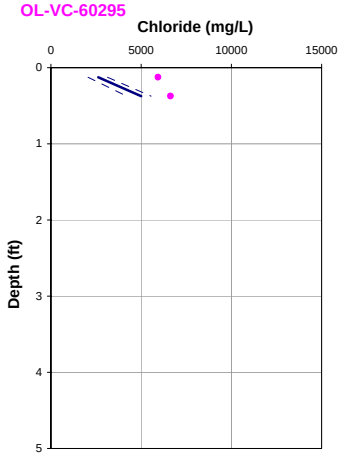
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	15000	8839
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		8838.77449
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.07	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60295



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = NA cm/year

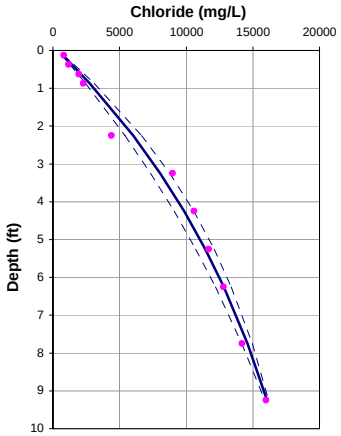
OL-VC-60295



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = NA cm/year

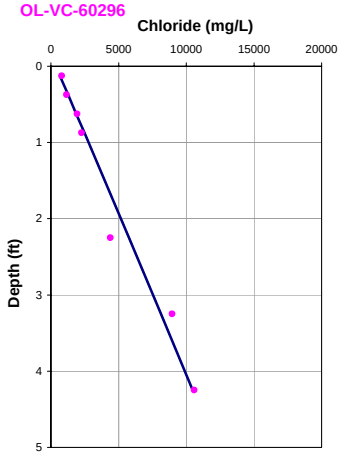
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	13500	6640
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		6640
V(cm/yr)	-0.10	-50.00
q (cm/yr)	-0.07	-35.00
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	1.16
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60296



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -0.8 cm/year

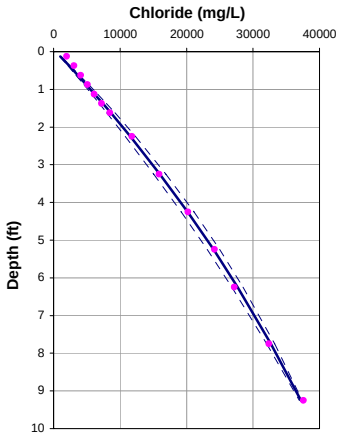
OL-VC-60296



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = <0 cm/year

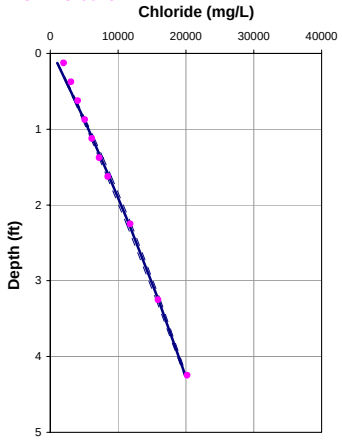
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	16685	12199
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********	16685.2303	12198.8212
V(cm/yr)	-1.15	-0.10
q (cm/yr)	-0.80	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.75	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60297



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.4 cm/year

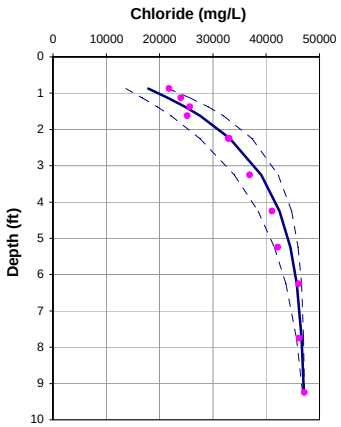
OL-VC-60297



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.5 cm/year

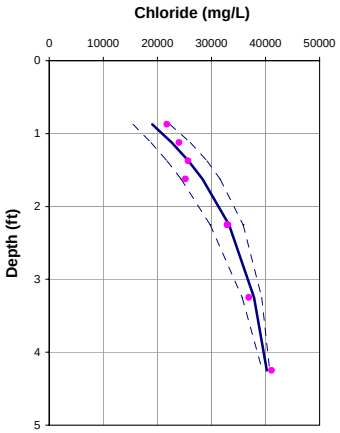
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	39307	22700
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********	39307.3832	22881.2657
V(cm/yr)	-0.60	-0.73
q (cm/yr)	-0.42	-0.51
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.74	0.73
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60302



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -3.8 cm/year

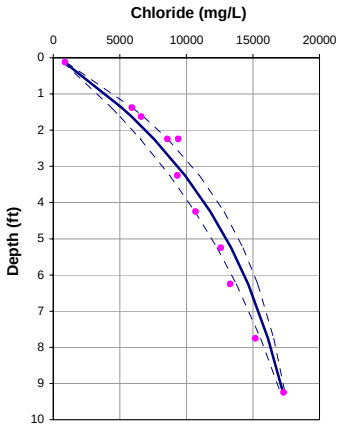
OL-VC-60302



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -4.3 cm/year

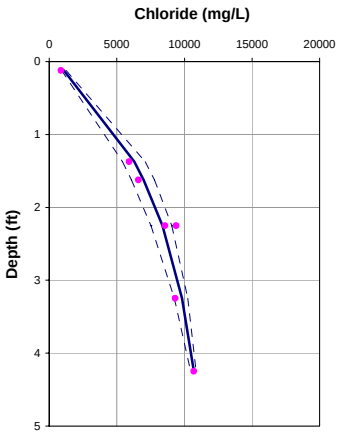
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	47200	41250
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		40000
V(cm/yr)	-5.48	-6.16
q (cm/yr)	-3.84	-4.31
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.86	0.78
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60303



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -1.3 cm/year

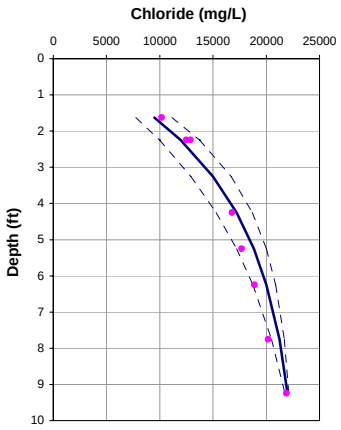
OL-VC-60303



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -3.3

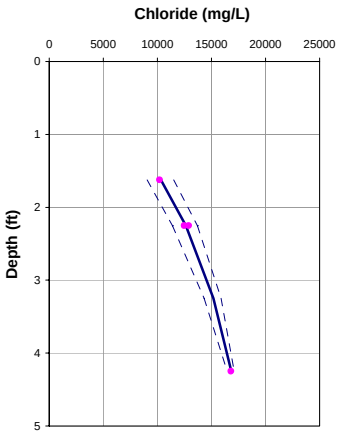
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	17700	11111
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		11111.2004
V(cm/yr)	-1.82	-4.76
q (cm/yr)	-1.27	-3.33
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.77	0.76
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-60304



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -2.1 cm/year

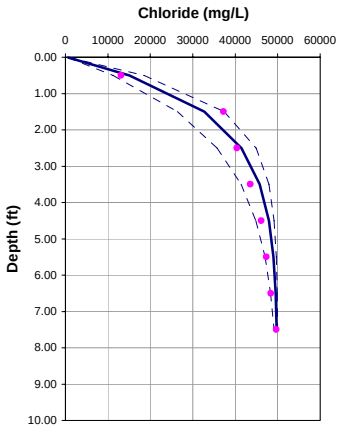
OL-VC-60304



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.8 cm/year

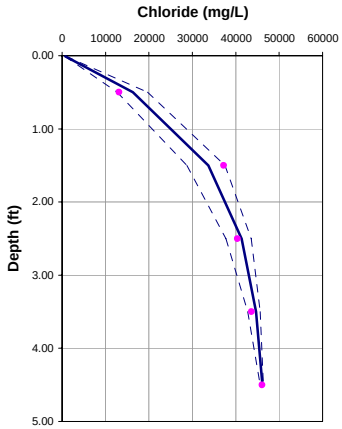
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	22250	17668
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		17667.7648
V(cm/yr)	-3.00	-4.02
q (cm/yr)	-2.10	-2.81
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.80	0.76
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-STA-70040



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -5.4 cm/year

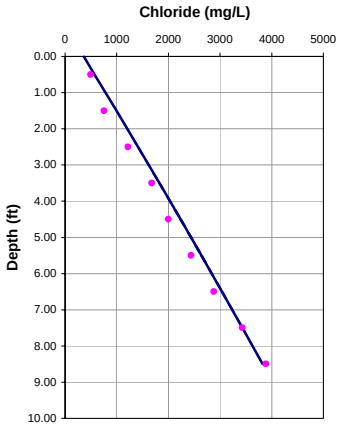
OL-STA-70040



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -5.5 cm/year

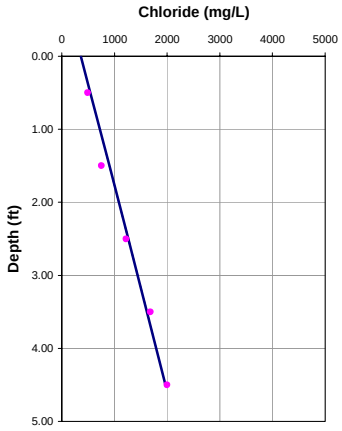
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		359	359
Cl (mg/L)		50000	46500
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.7	0.7
Calculated Values **********			
V(cm/yr)		-7.70	-7.84
q (cm/yr)		-5.39	-5.49
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.72	0.72
Diffusion + Dispersion (cm2/day)		0.92	0.79
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	0		

OL-STA-70042



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

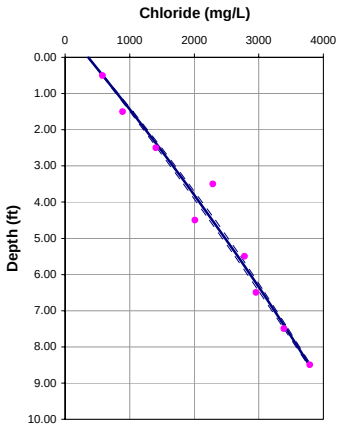
OL-STA-70042



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

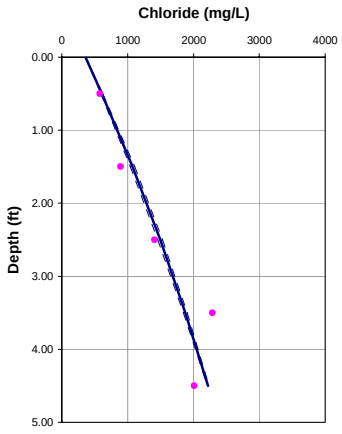
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		359	359
Cl (mg/L)		4400	2142
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.7	0.7
Calculated Values **********			2142.06455
V(cm/yr)		-0.10	-0.10
q (cm/yr)		-0.07	-0.07
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.72	0.72
Diffusion + Dispersion (cm2/day)		0.72	0.72
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	0		

OL-STA-70043



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.2 cm/year

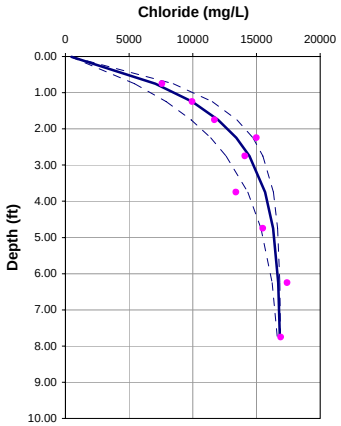
OL-STA-70043



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.6 cm/year

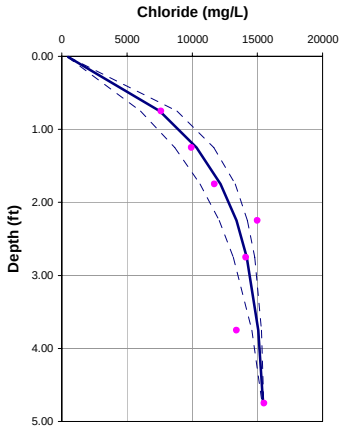
		10 feet	5 feet
Input Parameters **********			
Co (mg/L)		359	359
Cl (mg/L)		4300	2383
L(ft)		10	5
D (cm2/day)		1.236	1.236
porosity		0.7	0.7
Calculated Values **********			2382.57532
V(cm/yr)		-0.27	-0.86
q (cm/yr)		-0.19	-0.60
dispersion length (ft)		0.31	0.11
Internal Parameters *********(do not alter except as noted)*********			
Neuman dispersion length (ft)		0.31	0.11
V(ft/d)		0.00	0.00
Effective. Diffusion (cm2/day)		0.72	0.72
Diffusion + Dispersion (cm2/day)		0.73	0.73
Diffusion + Dispersion (ft2/day)		0.00	0.00
Adjusted depth	0		

OL-VC-70057



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -5.3 cm/year

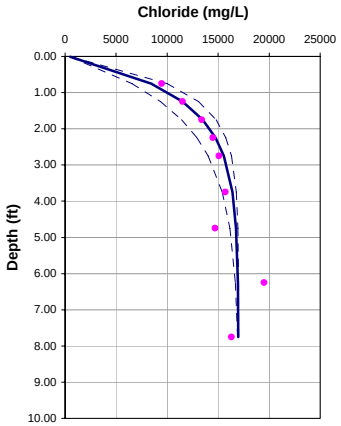
OL-VC-70057



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -5.5 cm/year

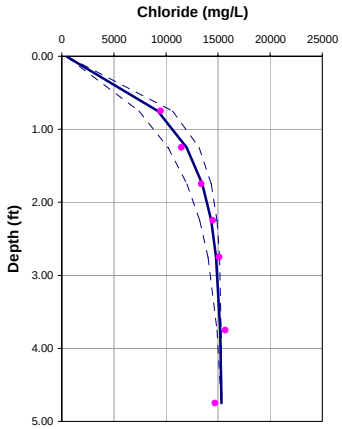
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	16900	15500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-7.57	-7.91
q (cm/yr)	-5.30	-5.54
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.91	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-70058



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -7.4 cm/year

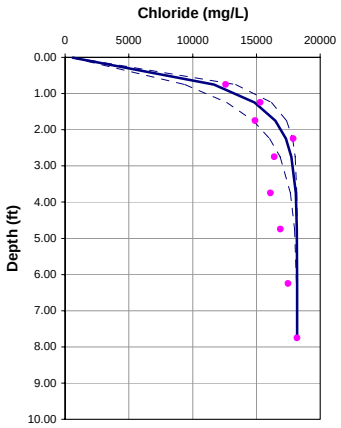
OL-VC-70058



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -8.2 cm/year

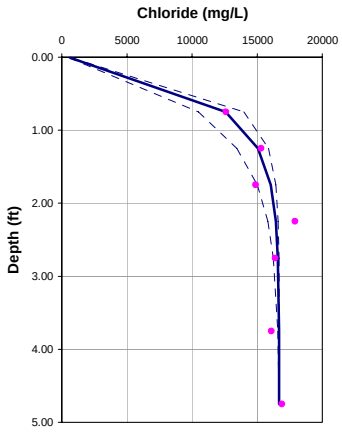
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	17000	15350
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		15349.79203
V(cm/yr)	-10.51	-11.68
q (cm/yr)	-7.36	-8.18
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.99	0.82
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-70059



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -13.7 cm/year

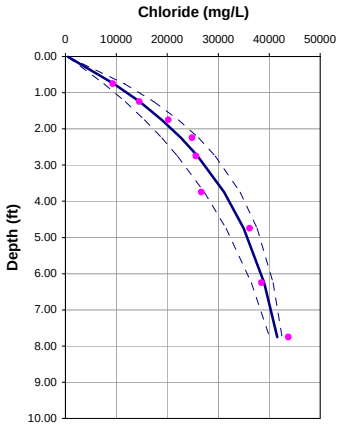
OL-VC-70059



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -13.8 cm/year

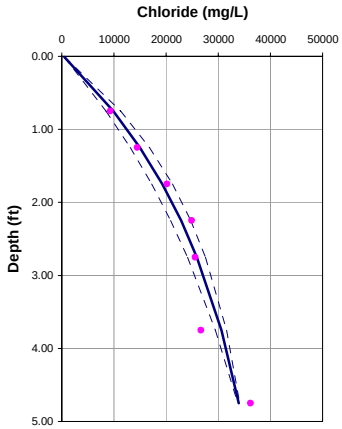
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	18200	16696
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		16696.27198
V(cm/yr)	-19.60	-19.72
q (cm/yr)	-13.72	-13.81
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	1.22	0.90
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-70061



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -2.0 cm/year

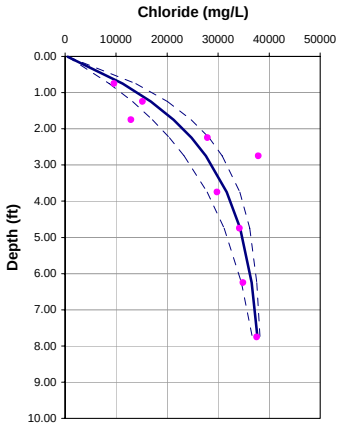
OL-VC-70061



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.2 cm/year

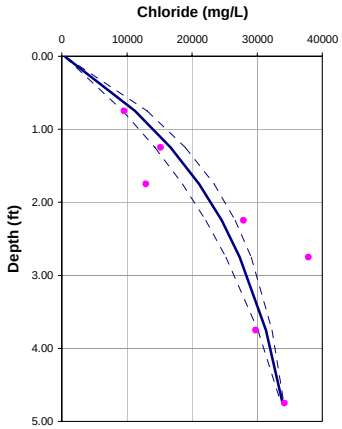
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	43800	34623
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		34623.35
V(cm/yr)	-2.83	-3.10
q (cm/yr)	-1.98	-2.17
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.79	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-70062



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -3.1 cm/year

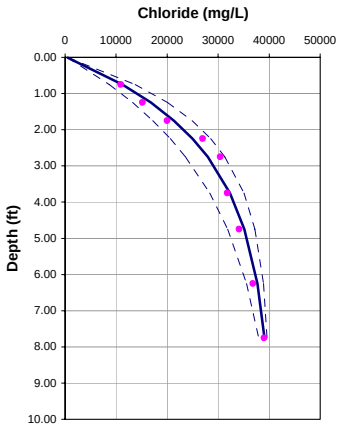
OL-VC-70062



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -2.8 cm/year

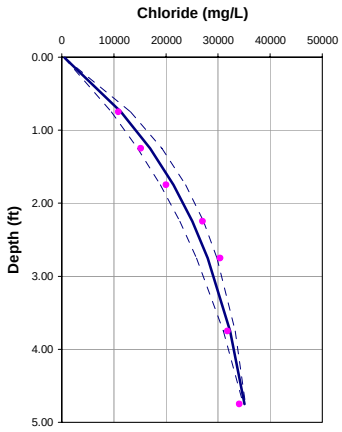
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	38500	34400
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		
V(cm/yr)	-4.45	-4.06
q (cm/yr)	-3.12	-2.84
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.83	0.76
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-70063



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -2.9 cm/year

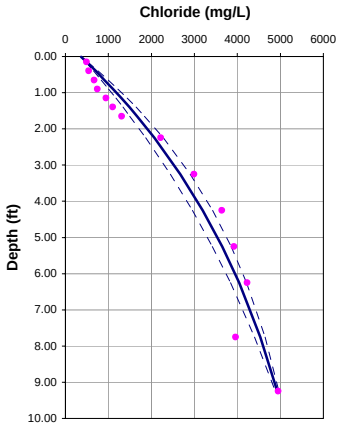
OL-VC-70063



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.7 cm/year

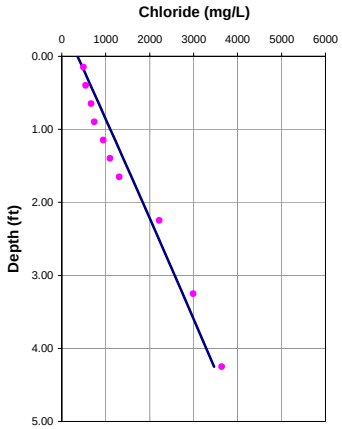
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	40000	35611
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		35611.4897
V(cm/yr)	-4.17	-3.88
q (cm/yr)	-2.92	-2.72
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.83	0.76
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-70089



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.9 cm/year

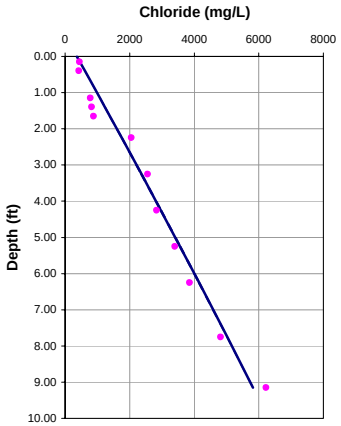
OL-VC-70089



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

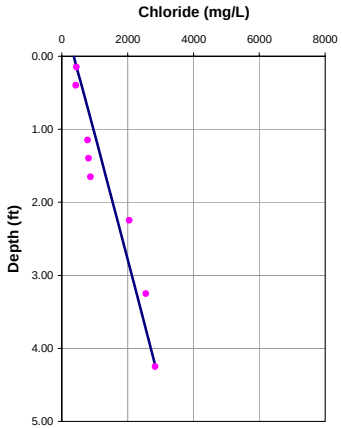
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	5100	4000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		3999.9998
V(cm/yr)	-1.29	-0.10
q (cm/yr)	-0.90	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.75	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-70093



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = ~0 cm/year

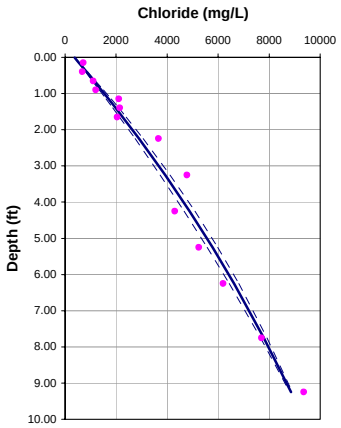
OL-VC-70093



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = ~0 cm/year

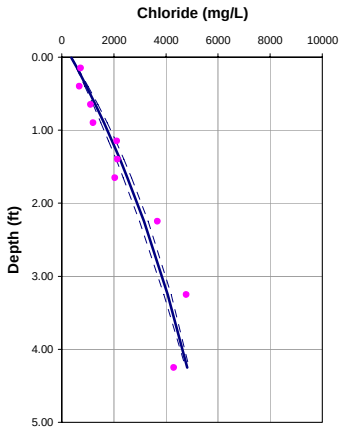
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	6300	3280
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		3280.07314
V(cm/yr)	-0.10	-0.10
q (cm/yr)	-0.07	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.72	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-70100



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.4 cm/year

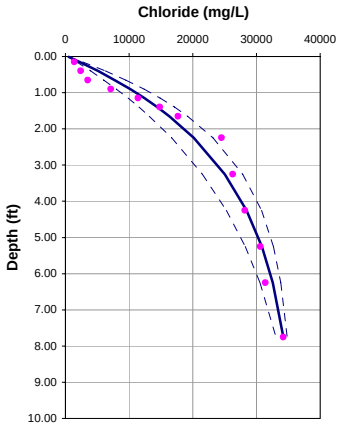
OL-VC-70100



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.2 cm/year

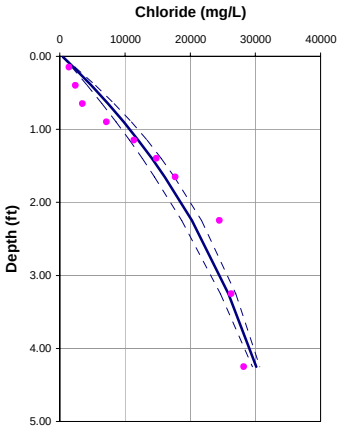
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	9360	5302
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		5301.61247
V(cm/yr)	-0.55	-1.65
q (cm/yr)	-0.39	-1.15
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.74	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-70102



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -2.4 cm/year

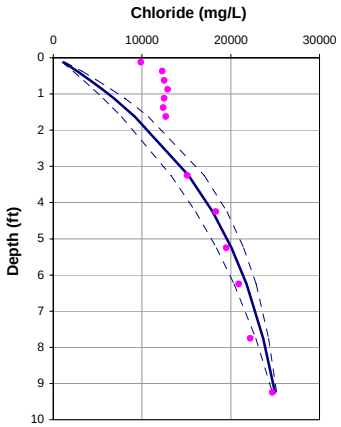
OL-VC-70102



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.7 cm/year

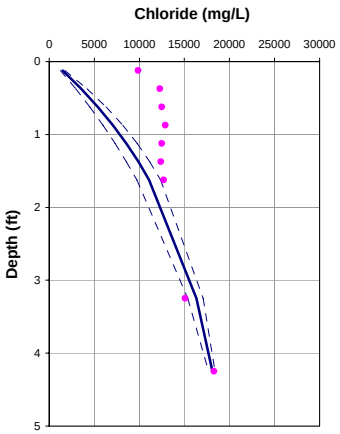
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	35500	32680
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		32680.4989
V(cm/yr)	-3.40	-2.42
q (cm/yr)	-2.38	-1.69
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.81	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-70144



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -1.5 cm/year

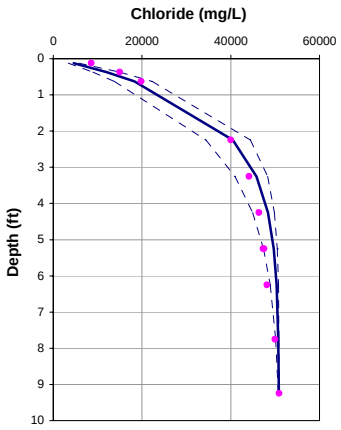
OL-VC-70144



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -2.8 cm/year

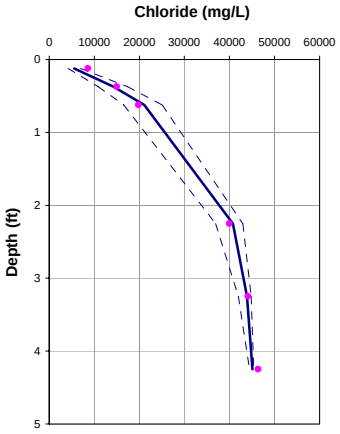
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	25500	19000
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		13813.9223
V(cm/yr)	-2.20	-4.00
q (cm/yr)	-1.54	-2.80
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.78	0.76
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-70145



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -5.4 cm/year

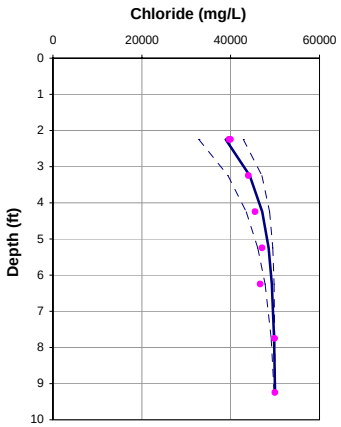
OL-VC-70145



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -6.5 cm/year

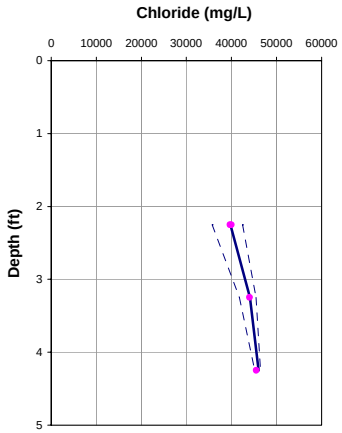
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	50900	45500
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		45983.4307
V(cm/yr)	-7.70	-9.35
q (cm/yr)	-5.39	-6.54
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.92	0.80
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-70146



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -5.0 cm/year

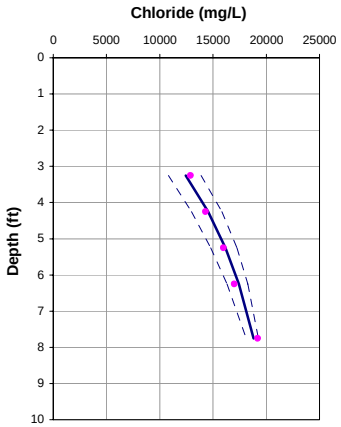
OL-VC-70146



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -5.3 cm/year

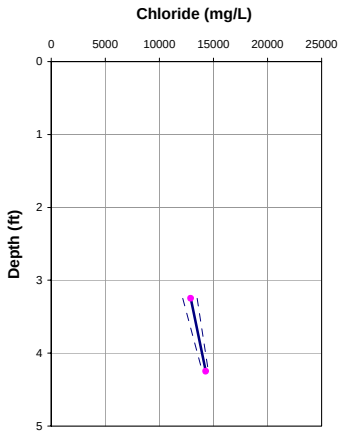
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	50000	46750
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		45828.3907
V(cm/yr)	-7.19	-7.53
q (cm/yr)	-5.04	-5.27
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.90	0.79
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-70147



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -1.7 cm/year

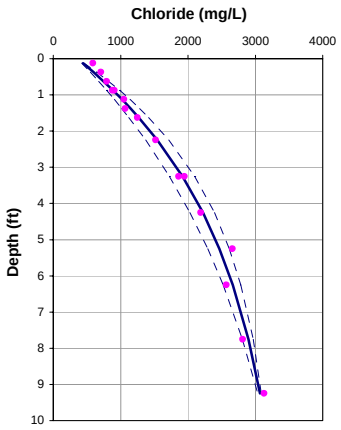
OL-VC-70147



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -2.8 cm/year

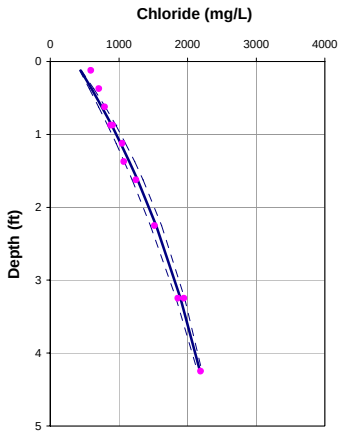
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	20083	15011
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********	20083.0604	15011.1332
V(cm/yr)	-2.40	-4.00
q (cm/yr)	-1.68	-2.80
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.78	0.76
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-70148



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.3 cm/year

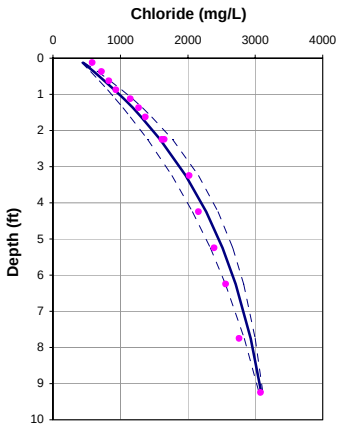
OL-VC-70148



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.4 cm/year

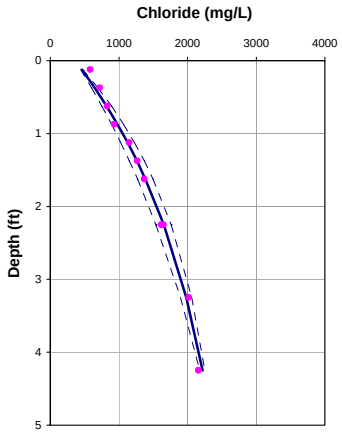
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	3134	2353
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********	3134.11483	2352.75845
V(cm/yr)	-1.92	-2.06
q (cm/yr)	-1.35	-1.44
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.77	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-70148A



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.4 cm/year

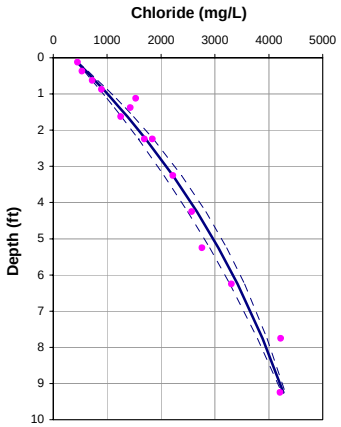
OL-VC-70148A



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.1 cm/year

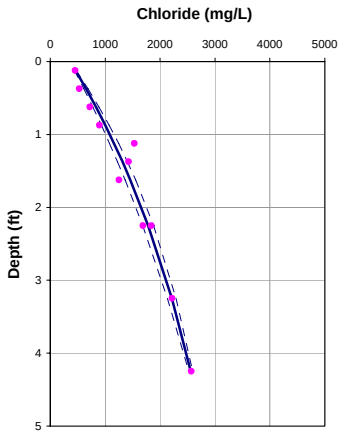
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	3150	2350
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		2297.73612
V(cm/yr)	-2.06	-2.99
q (cm/yr)	-1.44	-2.09
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.77	0.75
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-70149



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -0.7 cm/year

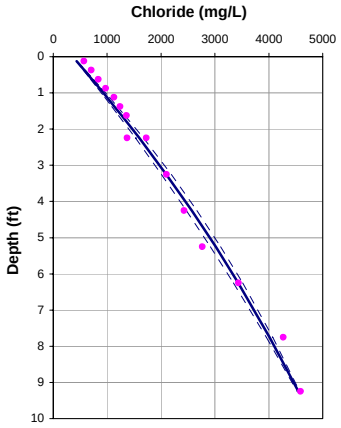
OL-VC-70149



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -1.4 cm/year

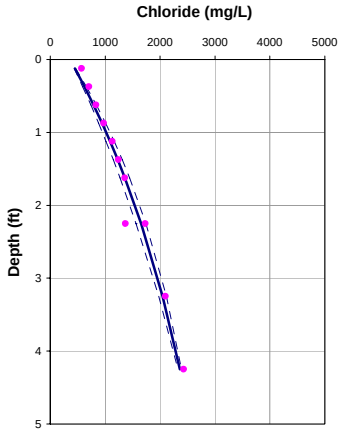
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	4444	2771
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********	4443.70568	2771.29834
V(cm/yr)	-1.02	-2.03
q (cm/yr)	-0.72	-1.42
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.75	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-70150



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -0.4 cm/year

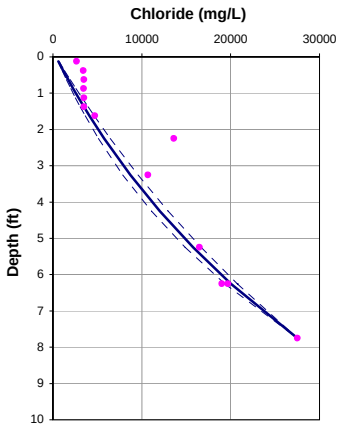
OL-VC-70150



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.4 cm/year

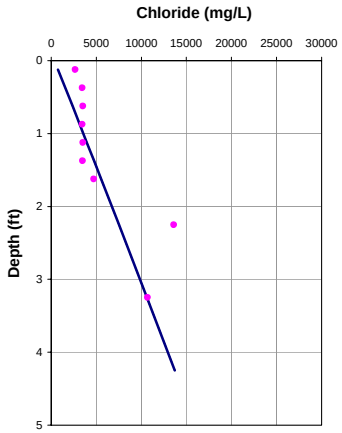
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	4800	2550
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		2282.624
V(cm/yr)	-0.52	-2.04
q (cm/yr)	-0.36	-1.43
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.73	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-70151



Porosity = 0.70
Dispersion length = 0.2 feet
Upwelling Velocity = <0 cm/year

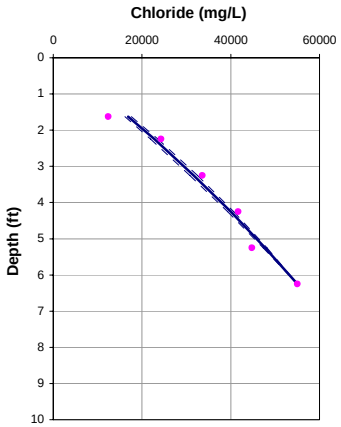
OL-VC-70151



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = <0 cm/year

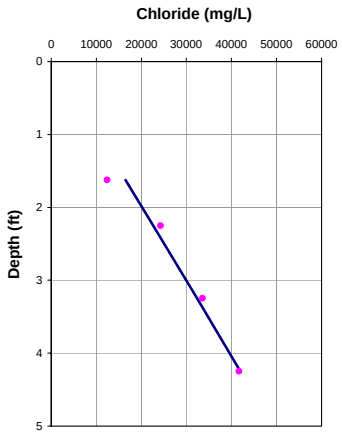
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	27500	16000
L(ft)	8	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		13801.0154
V(cm/yr)	1.10	-0.10
q (cm/yr)	0.77	-0.07
dispersion length (ft)	0.21	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.21	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.74	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-70152



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -0.4 cm/year

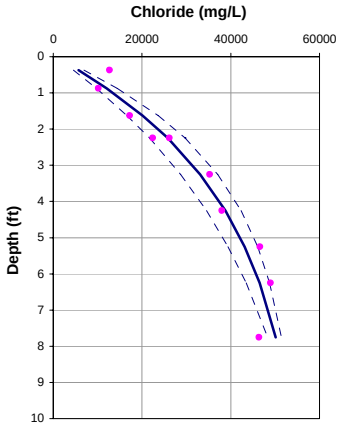
OL-VC-70152



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = <0 cm/year

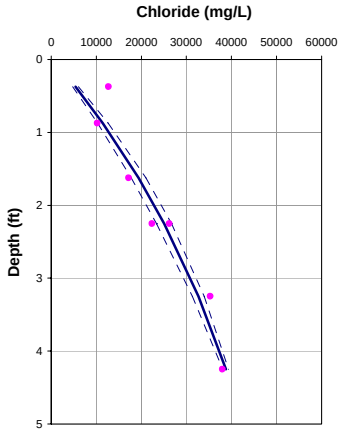
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	55000	49088
L(ft)	6	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********		49087.9664
V(cm/yr)	-0.60	-0.10
q (cm/yr)	-0.42	-0.07
dispersion length (ft)	0.15	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.15	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.73	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-70153



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.7 cm/year

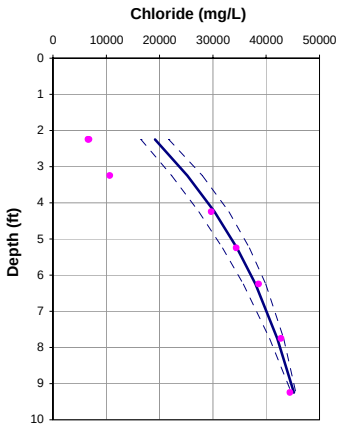
OL-VC-70153



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.4 cm/year

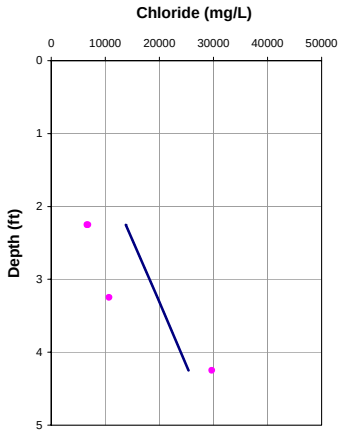
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	53539	42531
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********	53538.6687	42531.0393
V(cm/yr)	-2.44	-1.95
q (cm/yr)	-1.71	-1.37
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.78	0.74
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-70154



Porosity = 0.70
Dispersion length = 0.3 feet
Upwelling Velocity = -1.2 cm/year

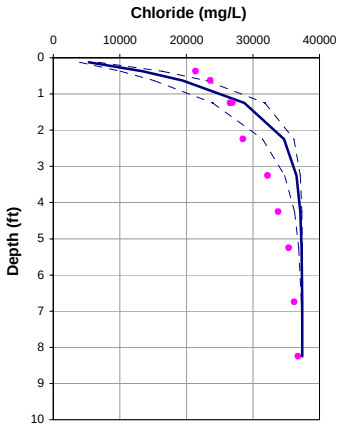
OL-VC-70154



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = <0 cm/year

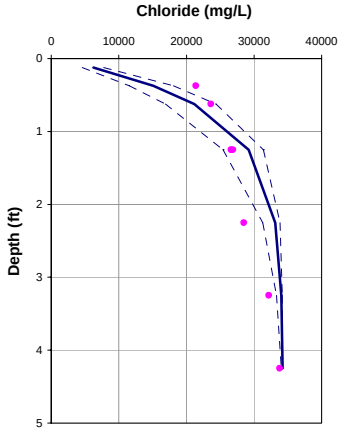
	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	46468	29700
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********	46467.60411	29700
V(cm/yr)	-1.72	-0.10
q (cm/yr)	-1.21	-0.07
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	0.77	0.72
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	0	

OL-VC-70155



Porosity = 0.7
Dispersion length = 0.3 feet
Upwelling Velocity = -10.8 cm/year

OL-VC-70155



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -11.0 cm/year

	10 feet	5 feet
Input Parameters **********		
Co (mg/L)	359	359
Cl (mg/L)	37400	34250
L(ft)	10	5
D (cm2/day)	1.236	1.236
porosity	0.7	0.7
Calculated Values **********	5000	5000
V(cm/yr)	-15.48	-15.65
q (cm/yr)	-10.83	-10.95
dispersion length (ft)	0.31	0.11
Internal Parameters *********(do not alter except as noted)*********		
Neuman dispersion length (ft)	0.31	0.11
V(ft/d)	0.00	0.00
Effective. Diffusion (cm2/day)	0.72	0.72
Diffusion + Dispersion (cm2/day)	1.12	0.86
Diffusion + Dispersion (ft2/day)	0.00	0.00
Adjusted depth	-1	

Attachment VIII

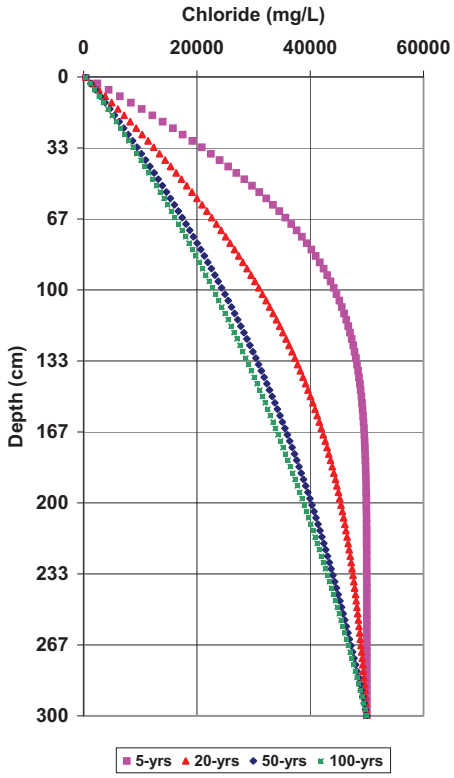
Transient Evaluation of Chloride-Depth Profiles

Attachment VIII
Transient Evaluation of Chloride-Depth Profiles

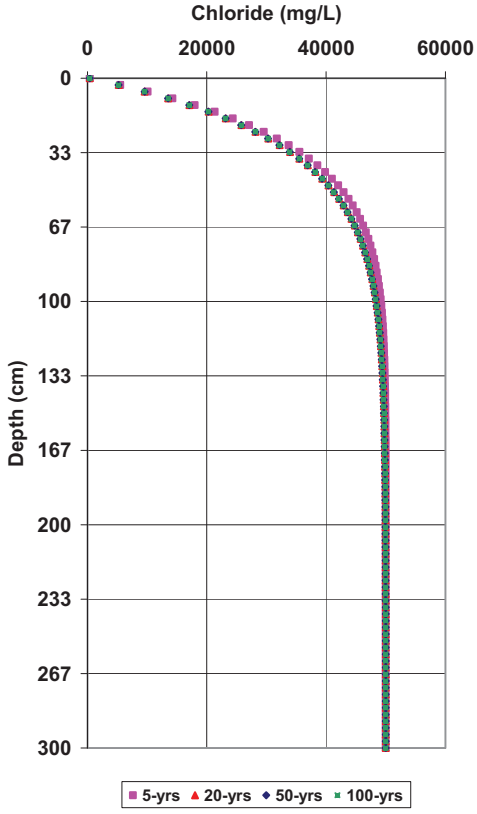
The transient analyses were conducted to determine the time required for an equilibrium chloride depth profile to be established after placement of high salinity pore waters in the subsurface. For these analyses, it was assumed that the chloride concentration in the sediment from the sediment-water interface to infinite depth was at a concentration of 50,000 mg/L and that chloride concentration in the overlying lake water was 350 mg/L.

A transient version of Equation 1 (Section 3 of the main report) was then used to calculate the time required to achieve relatively stable conditions. The time to achieve steady-state chloride profiles varies with upwelling velocity, and for these analyses upwelling velocities of 0 cm/year and 10 cm/year were evaluated. The results of these analyses are shown below.

Transient Diffusion/Advection Profiles



No Upwelling



10 cm/yr Upwelling

These results indicate that in shallow sediments, steady-state chloride profiles are achieved in a relatively short period of time if there is a small upwelling velocity. With an upwelling velocity of 10 cm/year, after five years the chloride-depth profile is approaching the steady-state profile. With no upwelling velocity, after 100 years a linear-steady-state diffusion profile is approximated.

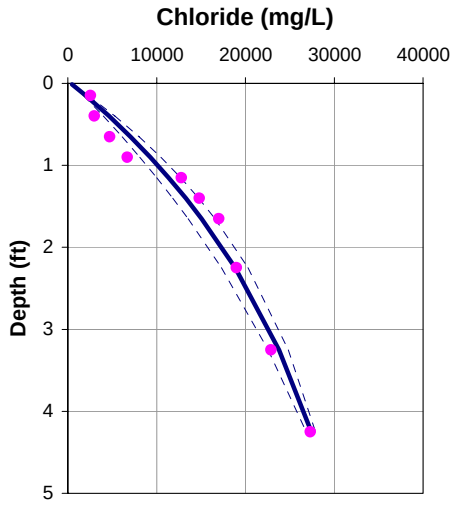
Attachment IX

Comparison of Upwelling Estimates from Pore Water and Sediment Conductivity Data from Same Location

Attachment IX
Comparison of Upwelling Estimates from Pore Water and Sediment Conductivity Data from Same Location

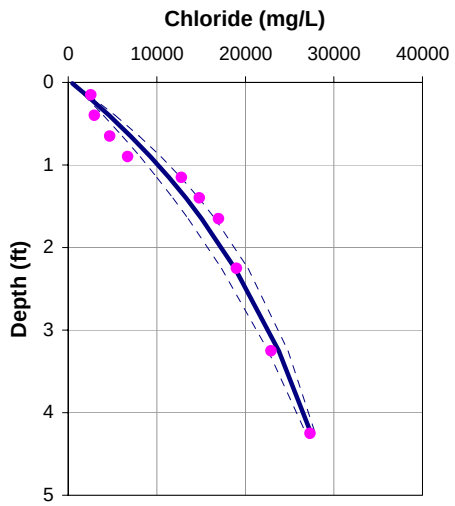
This Attachment contains a comparison of chloride-depth profiles from co-located Vibracore and sediment conductivity borings. At each location with co-located borings, plots of chloride-depth profiles are presented side by side to illustrate the similarities between profiles obtained from the two methods. In addition, the results of the co-located borings are tabulated with the difference between the upwelling velocities from the two methods noted. At several locations with co-located Vibracore and sediment-conductivity borings, duplicate and/or triplicate sediment conductivity borings were advanced. The chloride-depth profiles from the duplicates and/or triplicates are also plotted and the estimated upwelling velocities tabulated. There are a total of 30 locations with co-located Vibracore and sediment-conductivity borings.

OL-VC-20111



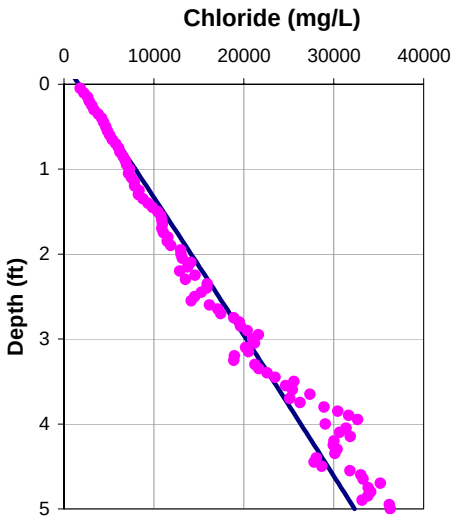
Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -1.6 cm/year

OL-VC-20111



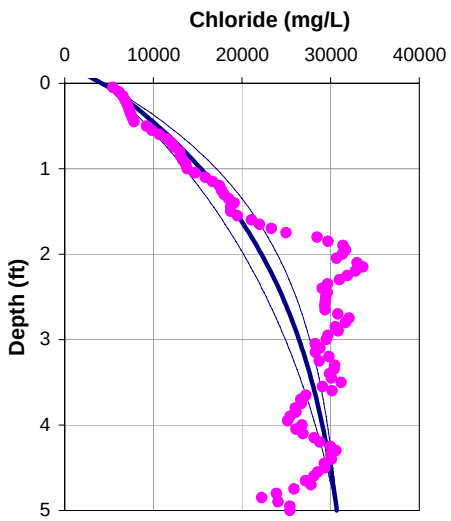
Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -1.6 cm/year

OL-GP-20111



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = 0 cm/year

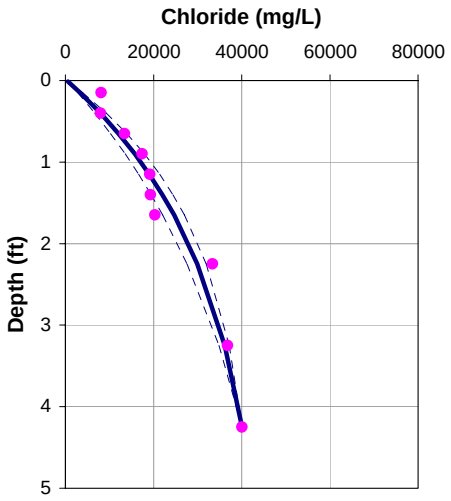
OL-GP-20111.DAT



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -2.6 cm/year

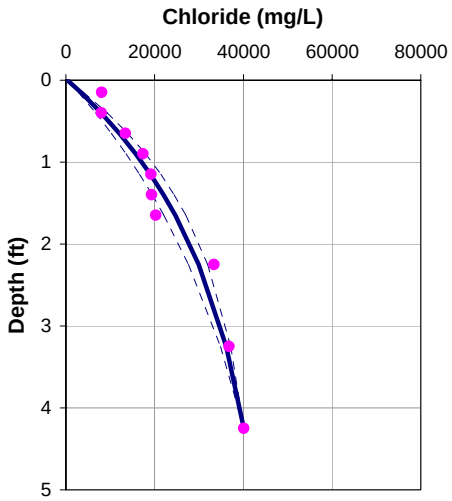
	20111	20111.DAT
Vibracore (cm/year)	-1.6	-1.6
Geoprobe (cm/year)	0.0	-2.6
Difference (cm/year)	1.6	-1.0

OL-VC-20113



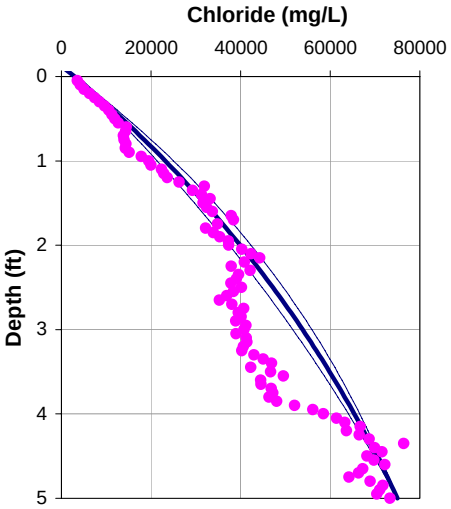
Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -2.4 cm/year

OL-VC-20113



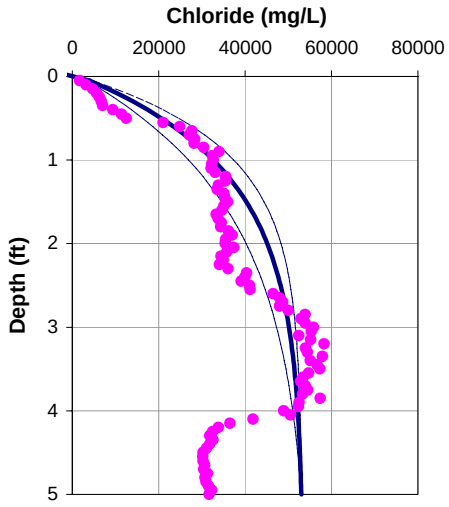
Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -2.4 cm/year

OL-GP-20113



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -1.0 cm/year

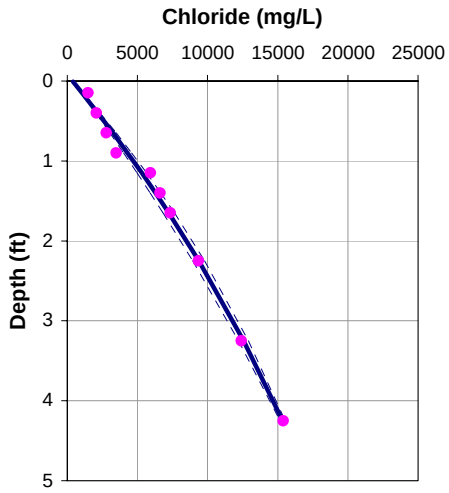
OL-GP-20113.DAT



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -5.2 cm/year

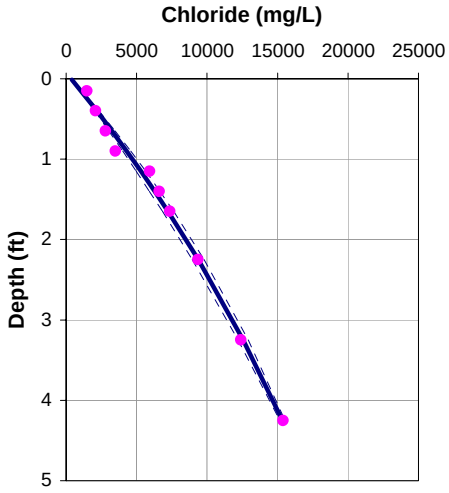
	20113	20113.DAT
Vibracore (cm/year)	-2.4	-2.4
Geoprobe (cm/year)	-1.0	-7.3
Difference (cm/year)	1.4	-4.9

OL-VC-20118



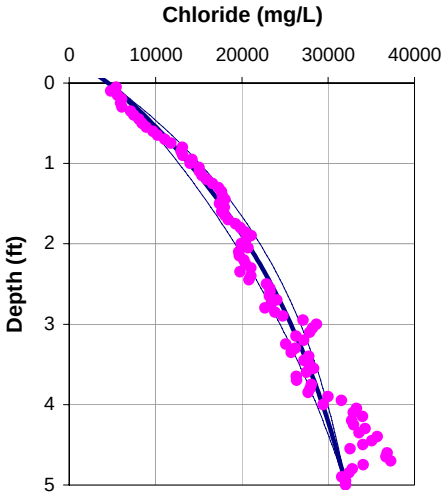
Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -0.7 cm/year

OL-VC-20118



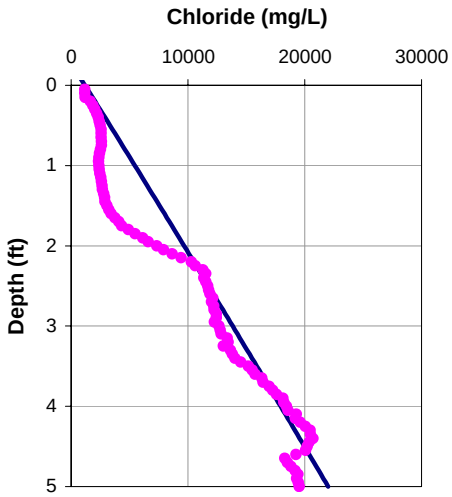
Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -0.7 cm/year

OL-GP-20118



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -1.6 cm/year

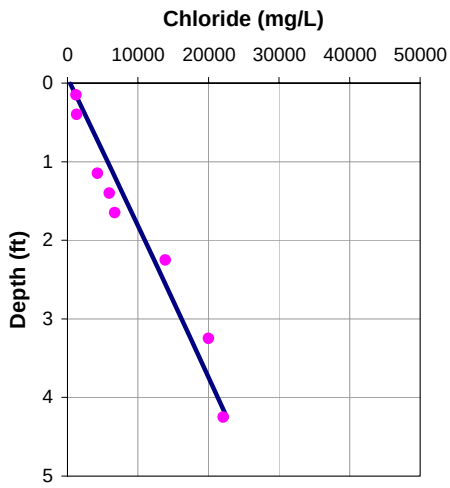
OL-GP-20118.DAT



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = 0.0 cm/year

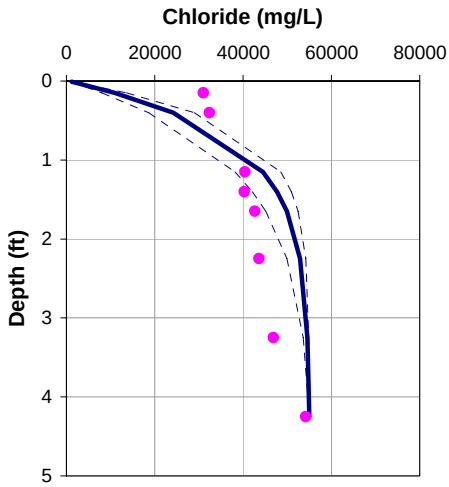
	20118	20118.DAT
Vibracore (cm/year)	-0.7	-0.7
Geoprobe (cm/year)	-1.6	0.0
Difference (cm/year)	-0.9	0.7

OL-VC-20119



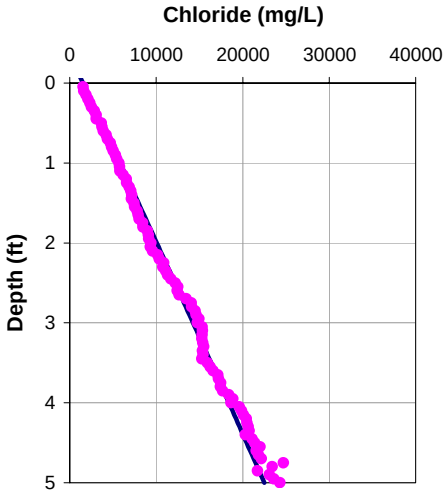
Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = 0.0 cm/year

OL-VC-20133



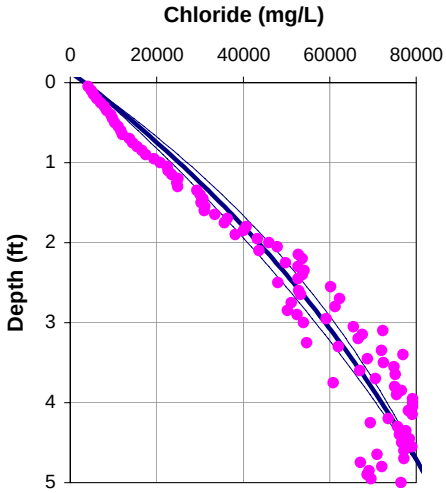
Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -8.5 cm/year

OL-GP-20119



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = 0.0 cm/year

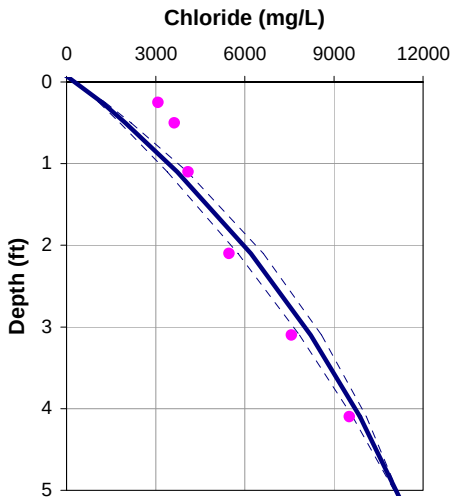
OL-GP-20133



Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -0.9 cm/year

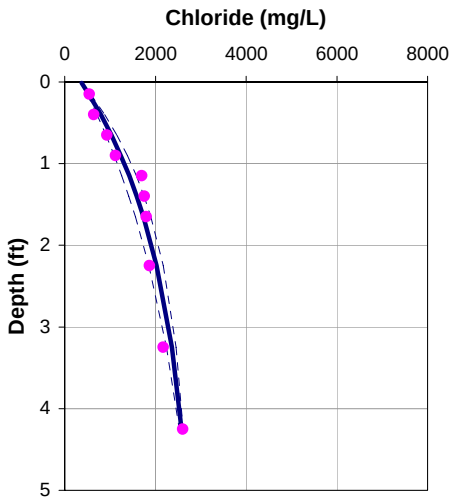
	20119	20133
Vibracore (cm/year)	0.0	-8.5
Geoprobe (cm/year)	0.0	-0.9
Difference (cm/year)	0.0	7.6

OL-VC-40149



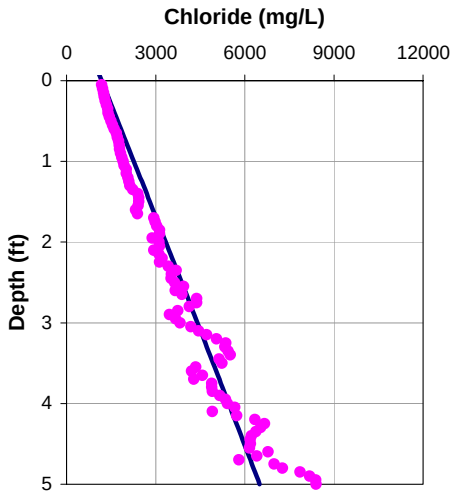
Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -1.5 cm/year

OL-VC-40151



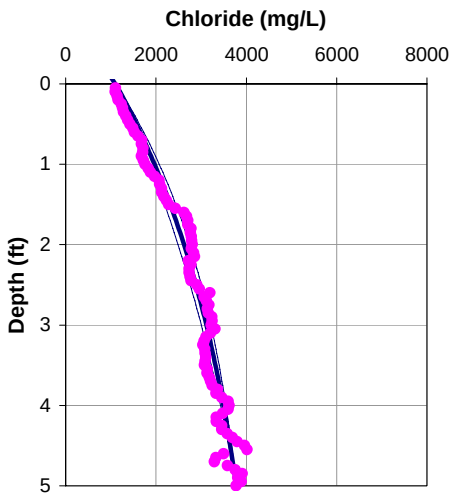
Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -3.4 cm/year

OL-GP-40149



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = 0.0 cm/year

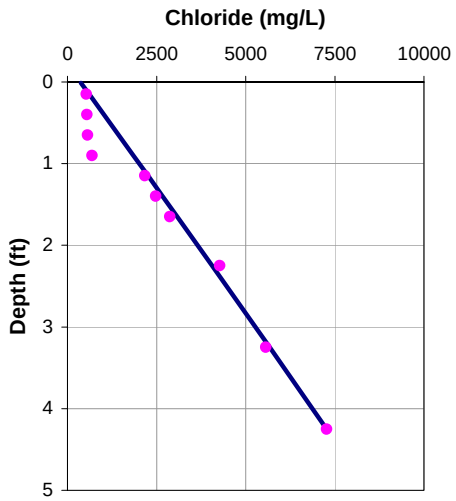
OL-GP-40151



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -2.0 cm/year

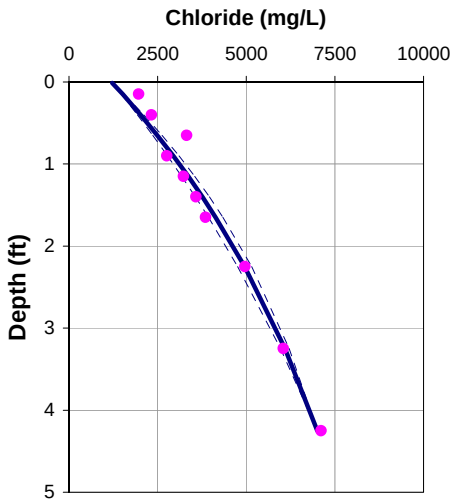
	40149	40151
Vibracore (cm/year)	-1.5	-3.4
Geoprobe (cm/year)	0.0	-2.0
Difference (cm/year)	1.5	1.4

OL-VC-40154



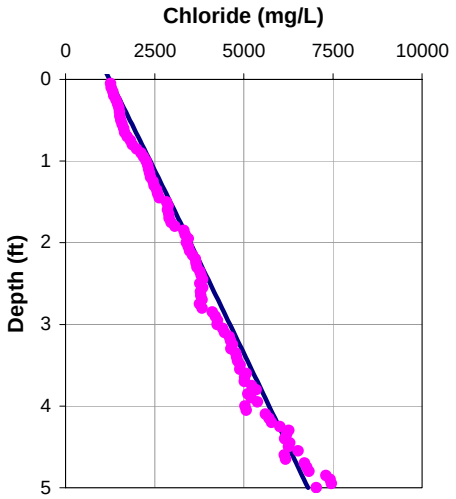
Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = 0.0 cm/year

OL-VC-40157



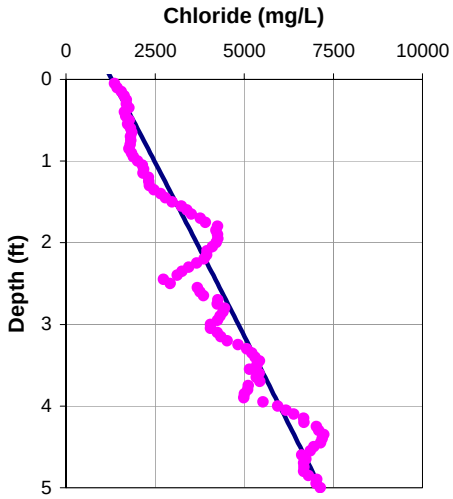
Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -1.7 cm/year

OL-GP-40154



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = 0.0 cm/year

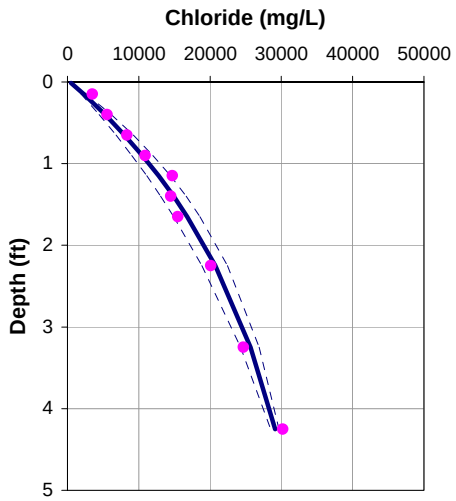
OL-GP-40157



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = 0.0 cm/year

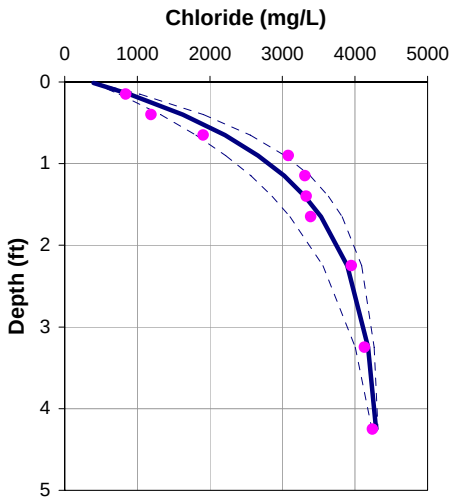
	40154	40157
Vibracore (cm/year)	0.0	-1.7
Geoprobe (cm/year)	0.0	0.0
Difference (cm/year)	0.0	1.7

OL-VC-40165



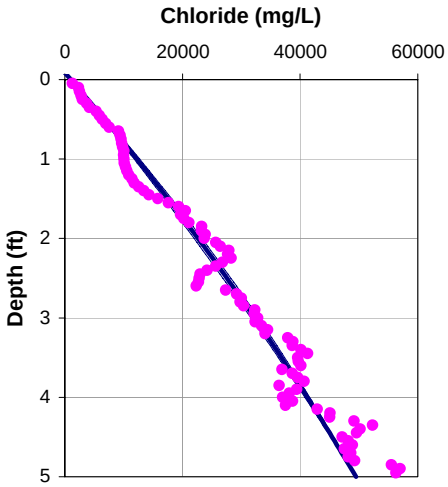
Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -2.6 cm/year

OL-VC-40168



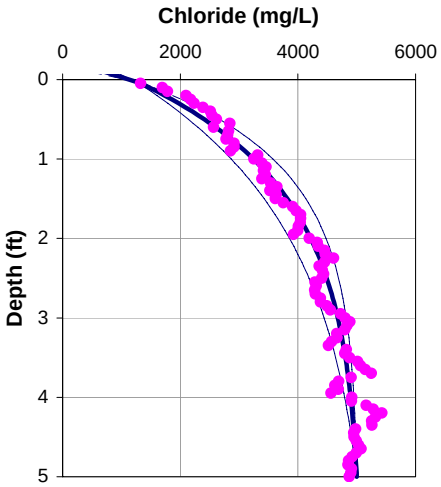
Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -7.5 cm/year

OL-GP-40165.DAT



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -0.5 cm/year

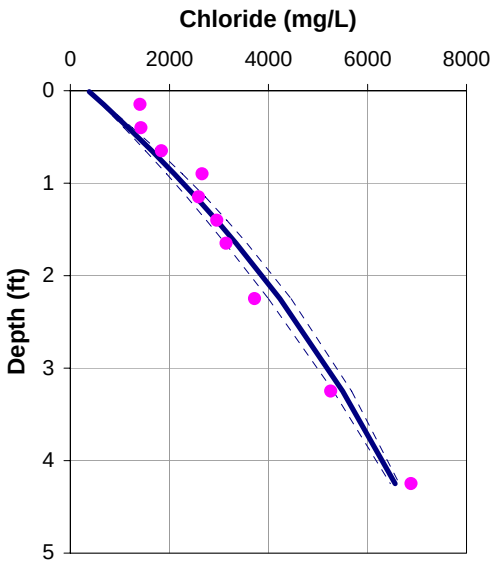
OL-GP-40168.DAT



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -5.7 cm/year

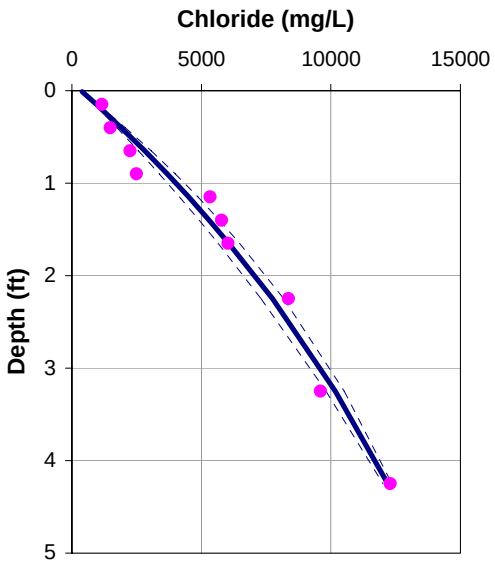
	40165.DAT	40168.DAT
Vibracore (cm/year)	-2.6	-7.5
Geoprobe (cm/year)	-0.5	-5.7
Difference (cm/year)	2.1	1.8

OL-VC-40172



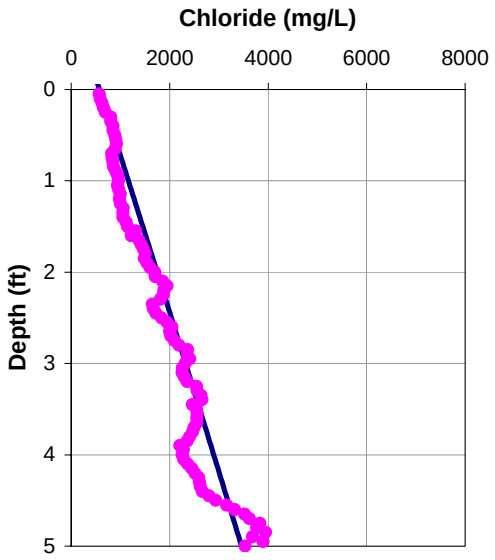
Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -1.3 cm/year

OL-VC-40179



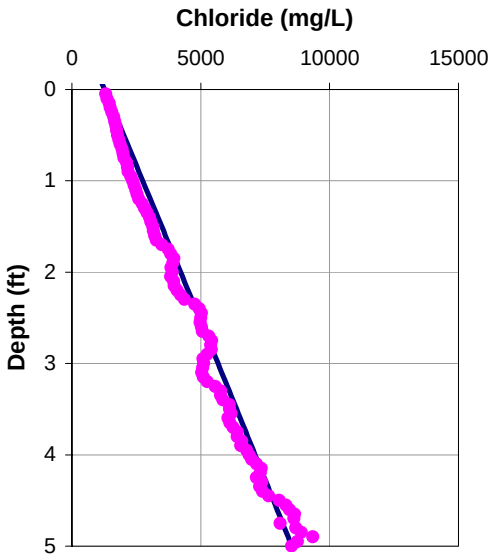
Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -1.3 cm/year

OL-GP-40172.DAT



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = 0.0 cm/year

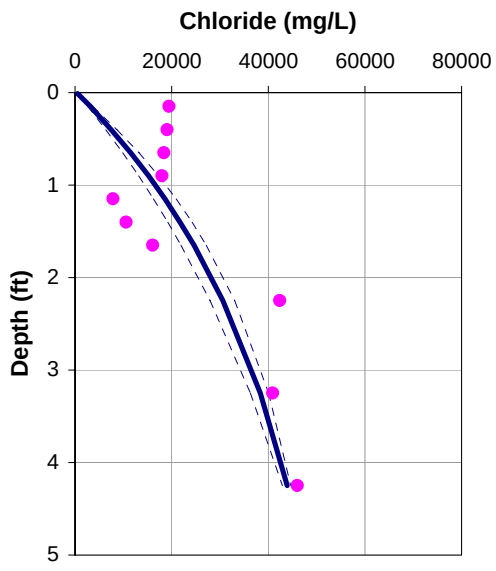
OL-GP-40179.DAT



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = 0.0 cm/year

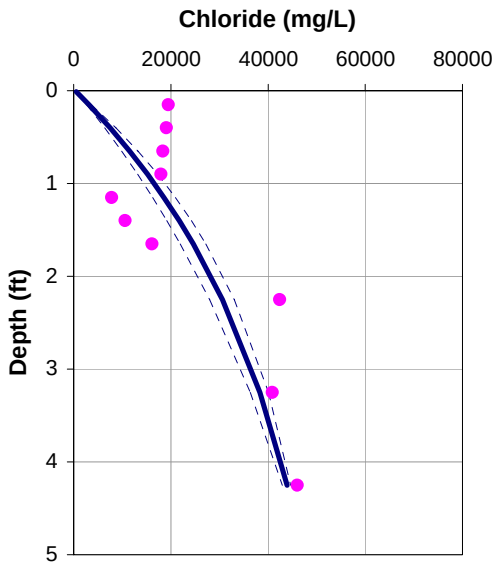
	40172	40179.DAT
Vibracore (cm/year)	-1.3	-1.3
Geoprobe (cm/year)	0.0	0.0
Difference (cm/year)	1.3	1.3

OL-VC-40184



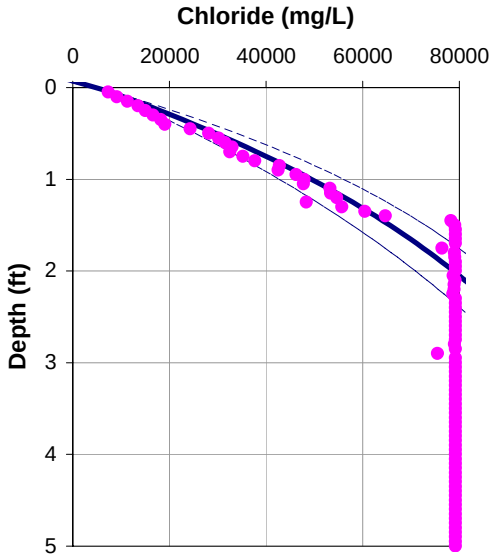
Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -2.4 cm/year

OL-VC-40184



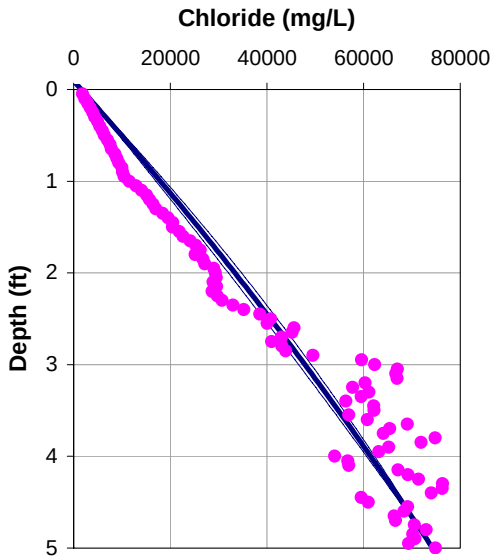
Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -2.4 cm/year

OL-GP-40184



Porosity = 0.75
Dispersion length = 0.0 feet
Upwelling Velocity = -3.0 cm/year

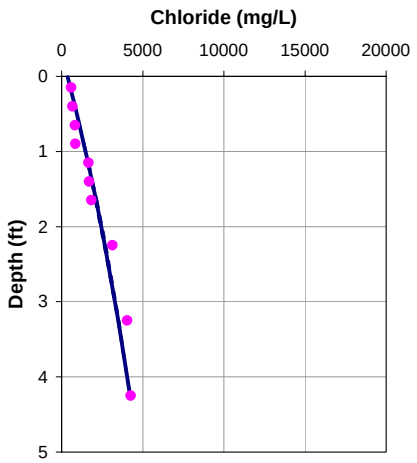
OL-GP-40184.DAT



Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -0.4 cm/year

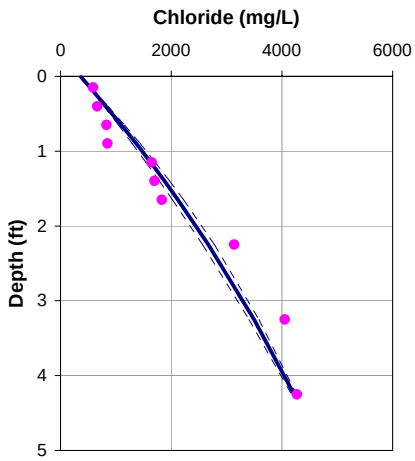
	40184	40184.DAT
Vibracore (cm/year)	-2.4	-2.4
Geoprobe (cm/year)	-3.0	-0.4
Difference (cm/year)	-0.6	2.0

OL-VC-60125



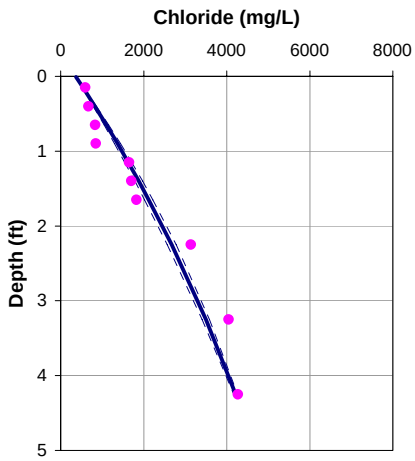
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.8 cm/year

OL-VC-60125



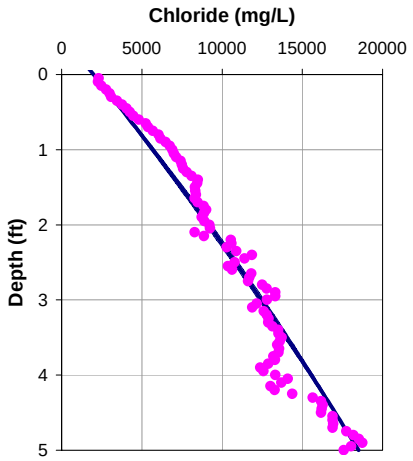
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.8 cm/year

OL-VC-60125



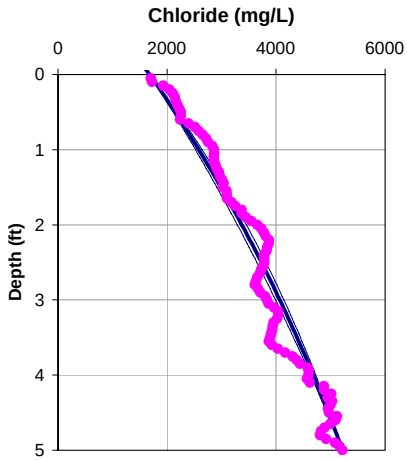
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.8 cm/year

OL-GP-60125



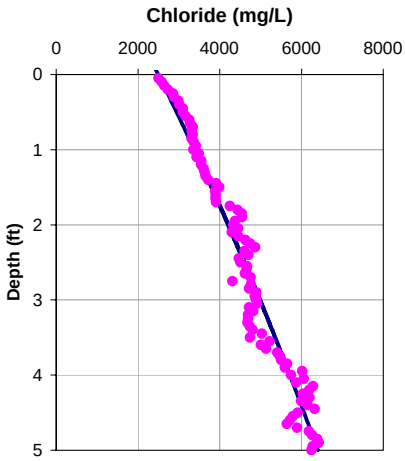
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.3 cm/year

OL-GP-60125.DAT



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.8 cm/year

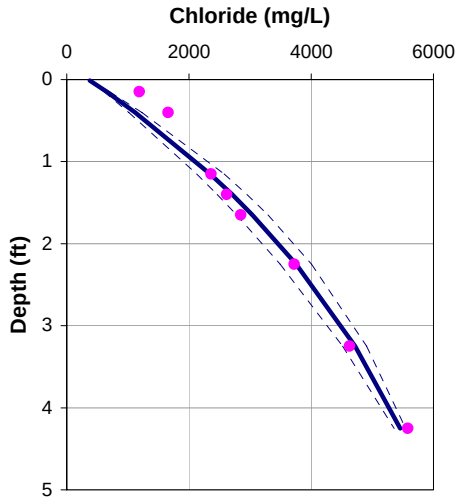
OL-GP-60125-A



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.4 cm/year

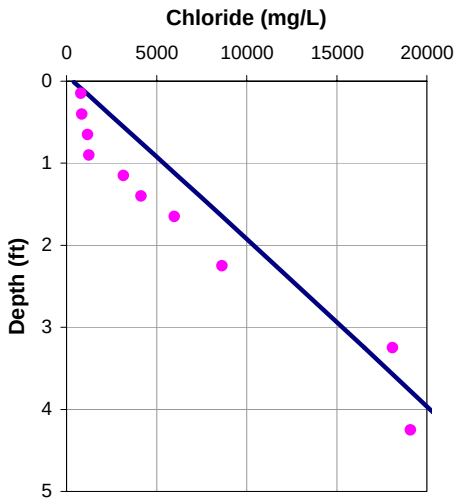
	60125	60125.DAT	60125-A
Vibracore (cm/year)	-0.8	-0.8	-0.8
Geoprobe (cm/year)	-0.3	-0.8	-0.4
Difference (cm/year)	0.5	0.0	0.4

OL-VC-60127



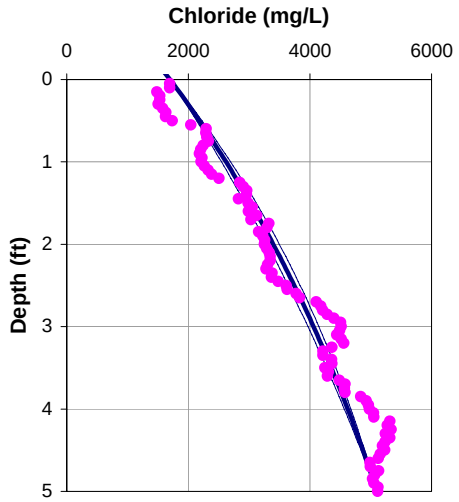
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.7 cm/year

OL-VC-60129



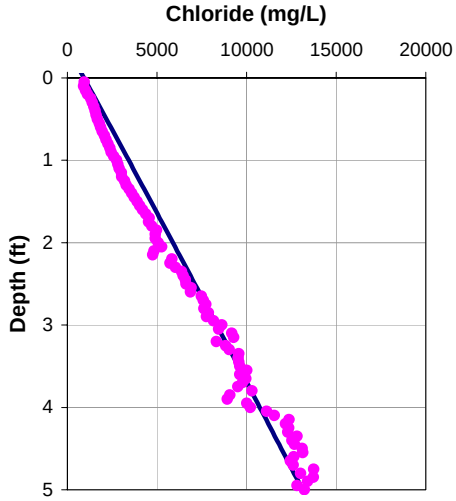
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = 0.0 cm/year

OL-GP-60127



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.0 cm/year

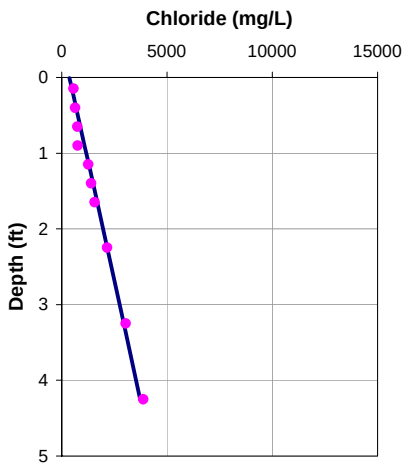
OL-GP-60129



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = 0.0 cm/year

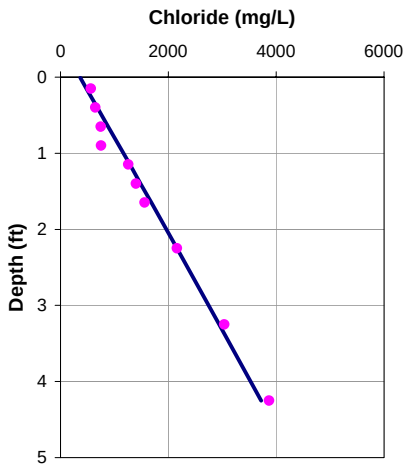
	60127	60129
Vibracore (cm/year)	-1.7	0.0
Geoprobe (cm/year)	-1.0	0.0
Difference (cm/year)	0.7	0.0

OL-VC-60150



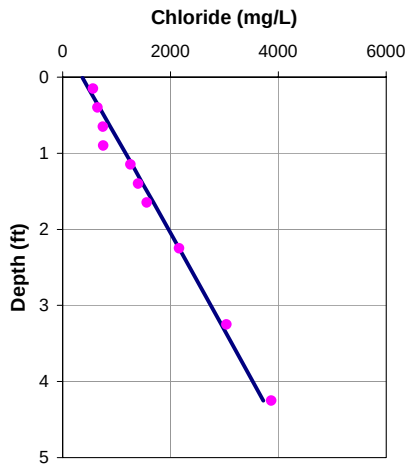
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = 0.0 cm/year

OL-VC-60150



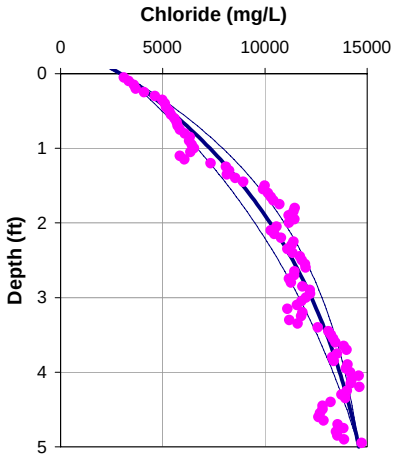
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = 0.0 cm/year

OL-VC-60150



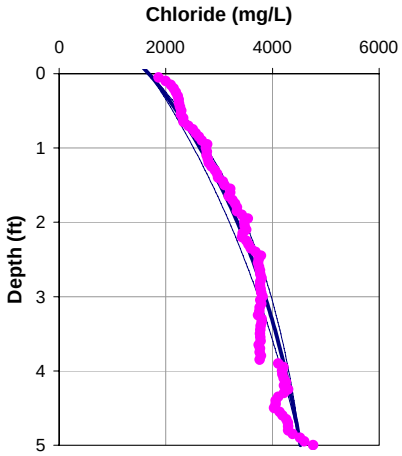
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = 0.0 cm/year

OL-GP-60150



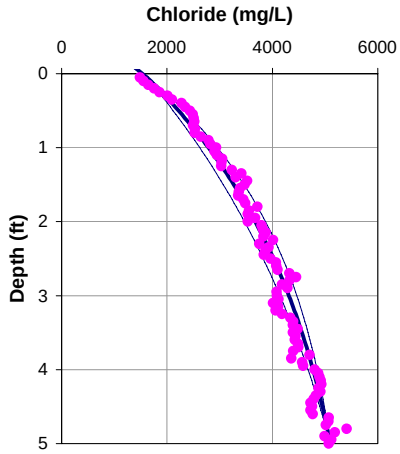
Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -2.4 cm/year

OL-GP-60150.DAT



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.9 cm/year

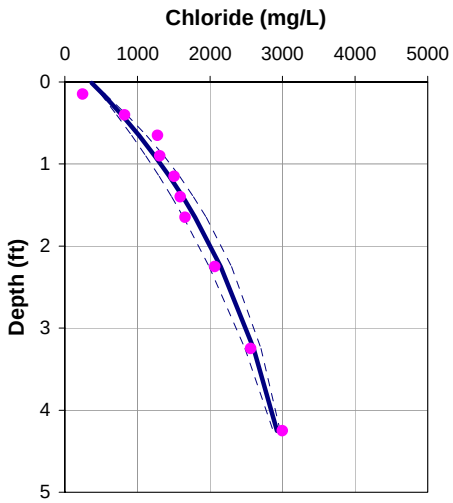
OL-GP-60150-A



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.1 cm/year

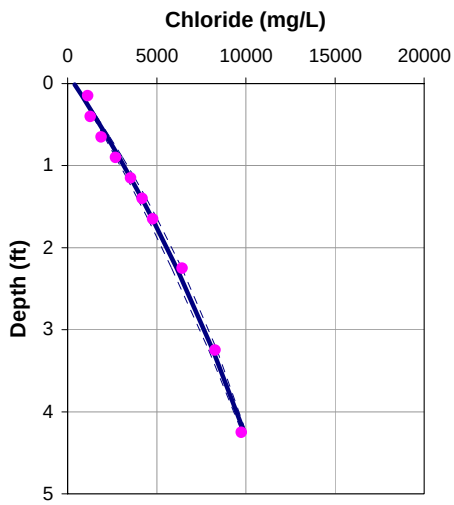
	60150	60150.DAT	60150-A
Vibracore (cm/year)	0.0	0.0	0.0
Geoprobe (cm/year)	-2.4	-1.9	-2.1
Difference (cm/year)	-2.4	-1.9	-2.1

OL-VC-60152



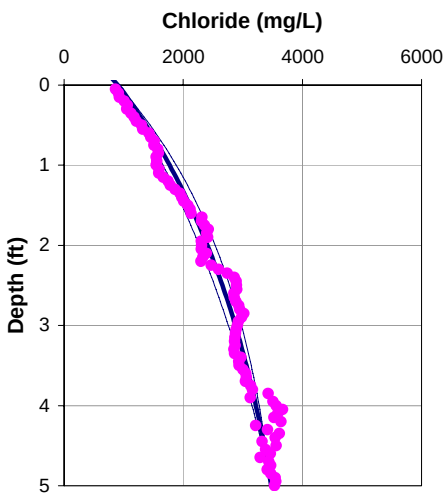
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.1 cm/year

OL-VC-60154



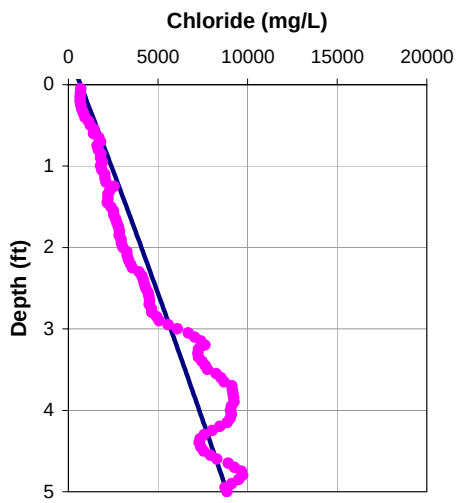
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.9 cm/year

OL-GP-60152



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -1.9 cm/year

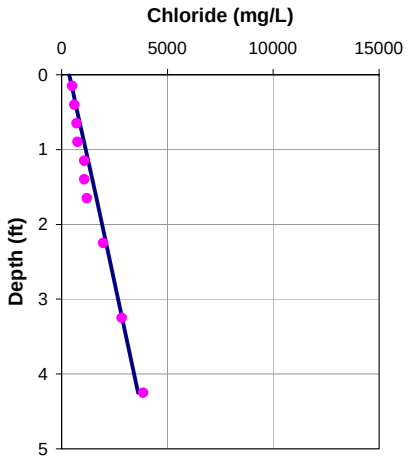
OL-GP-60154



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -0.2 cm/year

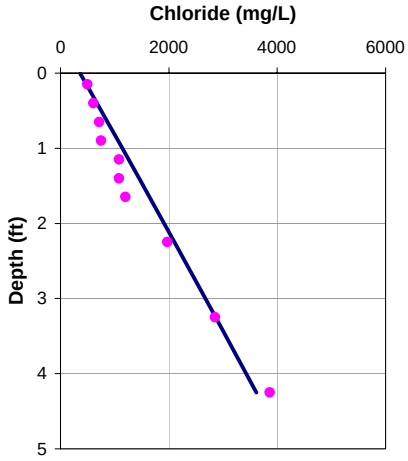
	60152	60154
Vibracore (cm/year)	-2.1	-0.9
Geoprobe (cm/year)	-1.9	-0.2
Difference (cm/year)	0.2	0.7

OL-VC-60162



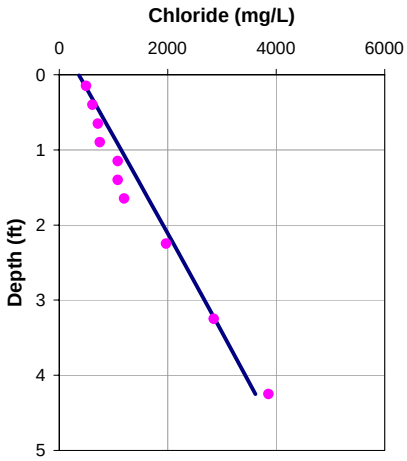
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = 0.0 cm/year

OL-VC-60162



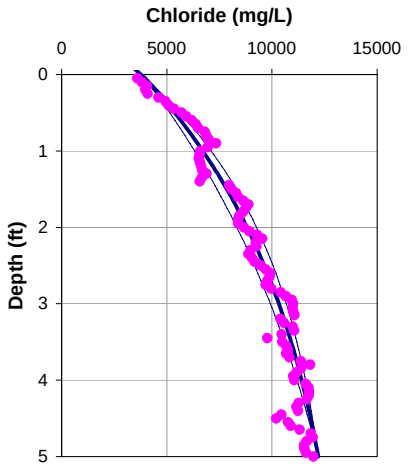
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = 0.0 cm/year

OL-VC-60162



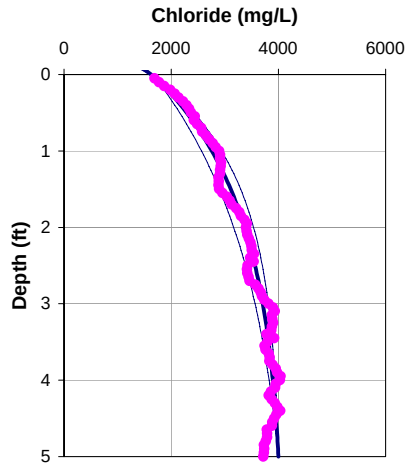
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = 0.0 cm/year

OL-GP-60162



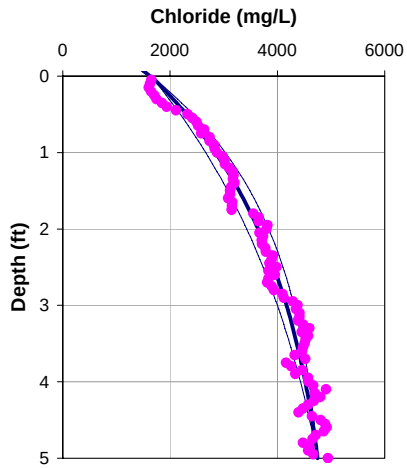
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.1 cm/year

OL-GP-60162.DAT



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -3.8 cm/year

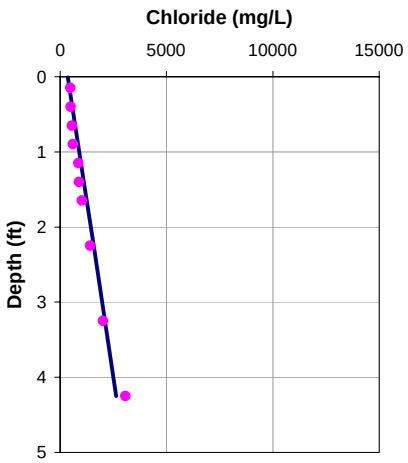
OL-GP-60162-A



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.6 cm/year

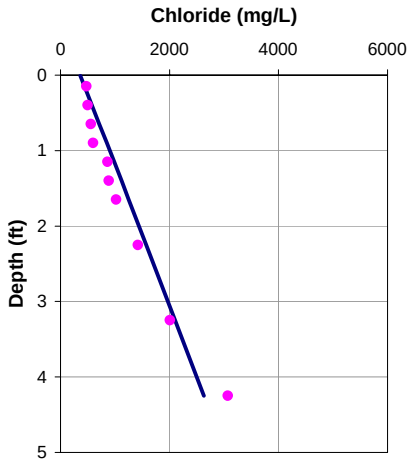
	60162	60162.DAT	60162-A
Vibracore (cm/year)	0.0	0.0	0.0
Geoprobe (cm/year)	-2.1	-3.8	-2.6
Difference (cm/year)	-2.1	-3.8	-2.6

OL-VC-60168



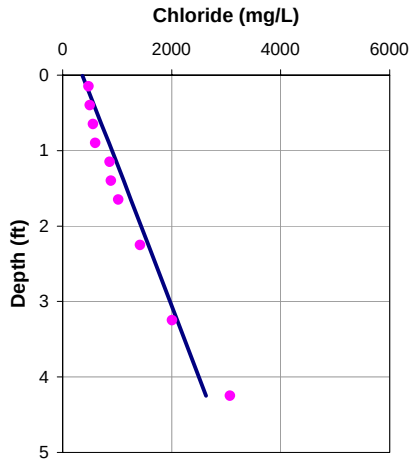
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = 0.0 cm/year

OL-VC-60168



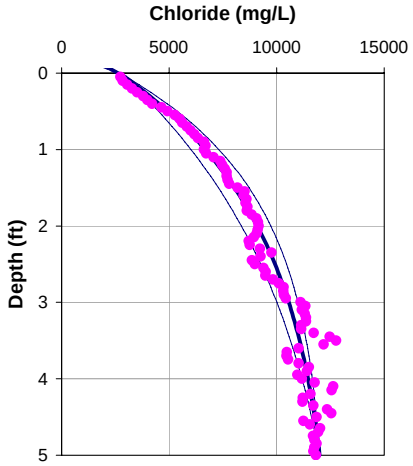
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = 0.0 cm/year

OL-VC-60168



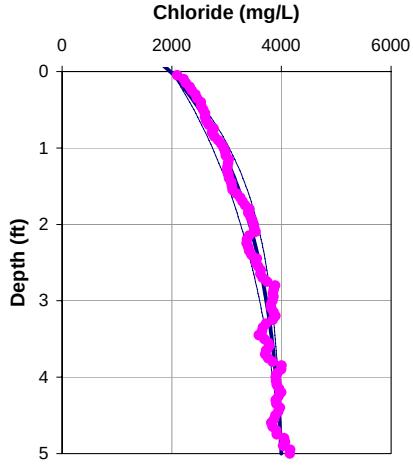
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = 0.0 cm/year

OL-GP-60168



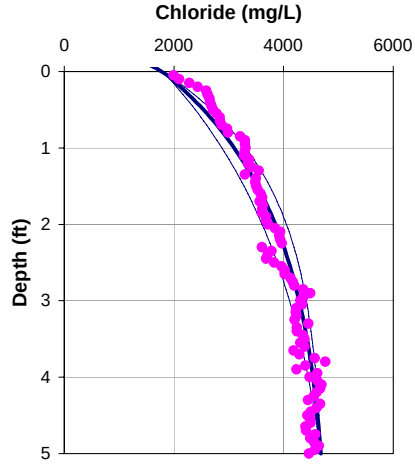
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -3.2 cm/year

OL-GP-60168.DAT



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -3.5 cm/year

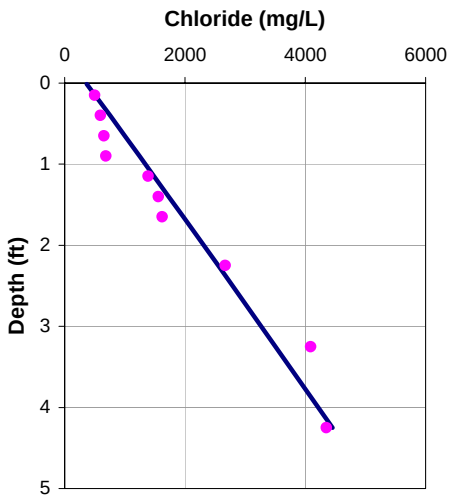
OL-GP-60168-A



Porosity = 0.70
Dispersion length = 0.1
Upwelling Velocity = -3.5

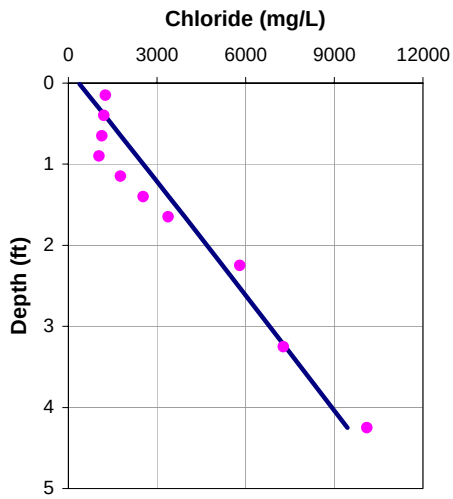
	60168	60168.DAT	60168-A
Vibracore (cm/year)	0.0	0.0	0.0
Geoprobe (cm/year)	-3.2	-3.5	-3.5
Difference (cm/year)	-3.2	-3.5	-3.5

OL-VC-60171



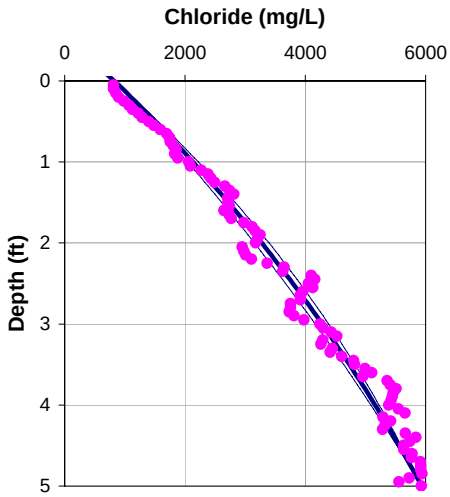
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = 0.0 cm/year

OL-VC-60179



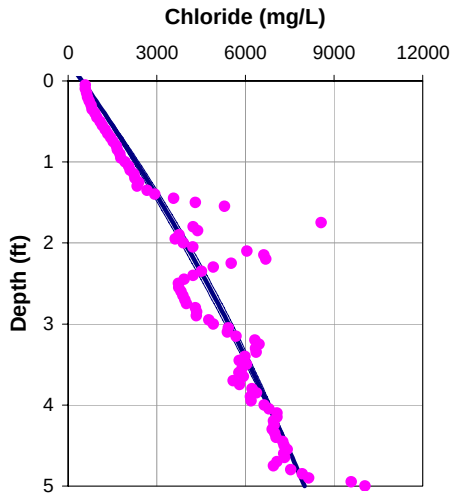
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = 0.0 cm/year

OL-GP-60171



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.8 cm/year

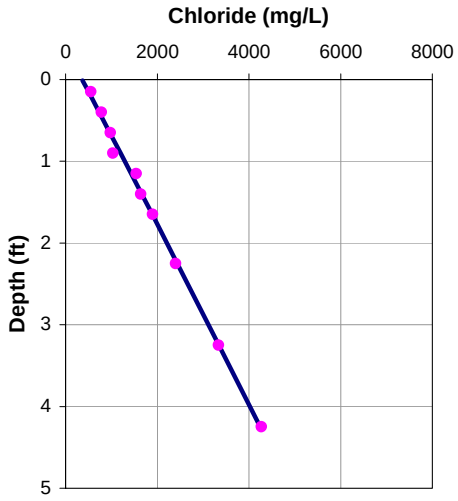
OL-GP-60179



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.6 cm/year

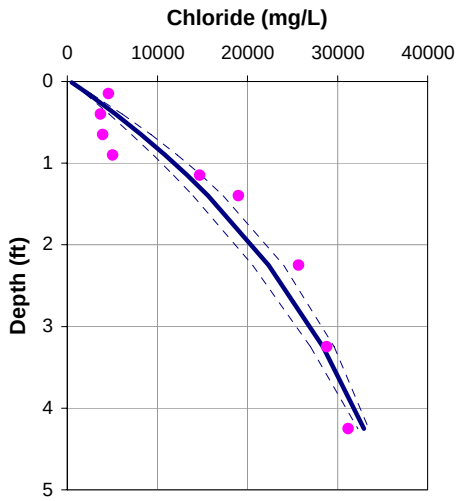
	60171	60179
Vibracore (cm/year)	0.0	0.0
Geoprobe (cm/year)	-0.8	-0.6
Difference (cm/year)	-0.8	-0.6

OL-VC-60181



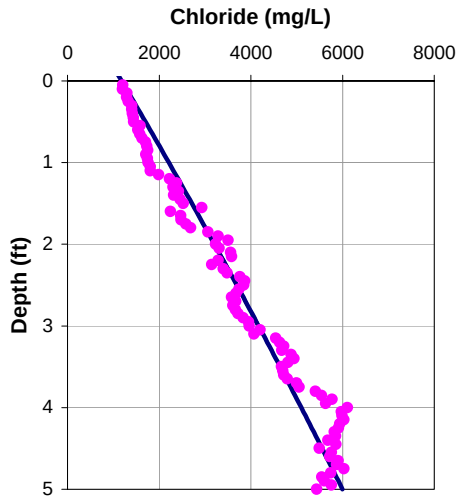
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = 0.0 cm/year

OL-VC-60191



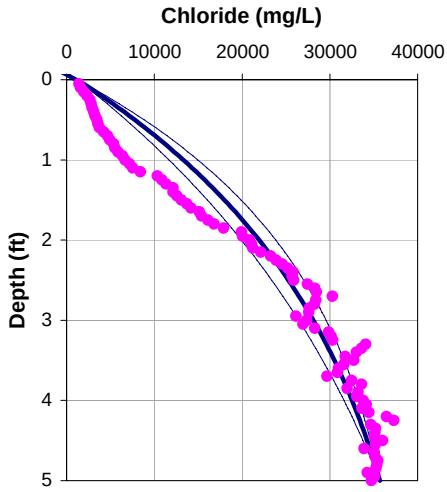
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.8 cm/year

OL-GP-60181



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.2 cm/year

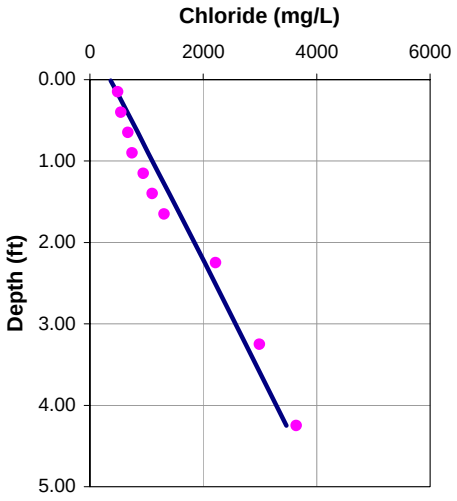
OL-GP-60191



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -2.1 cm/year

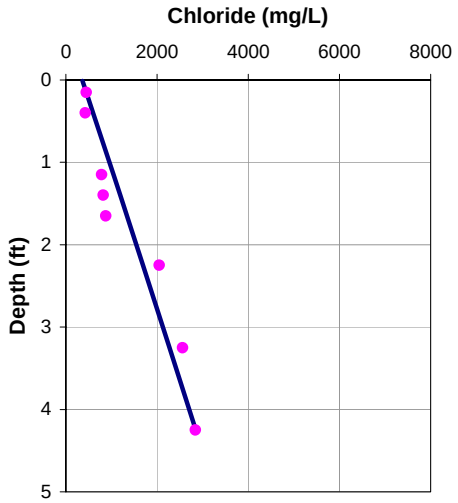
	60181	60191
Vibracore (cm/year)	0.0	-1.8
Geoprobe (cm/year)	-0.2	-2.1
Difference (cm/year)	-0.2	-0.3

OL-VC-70089



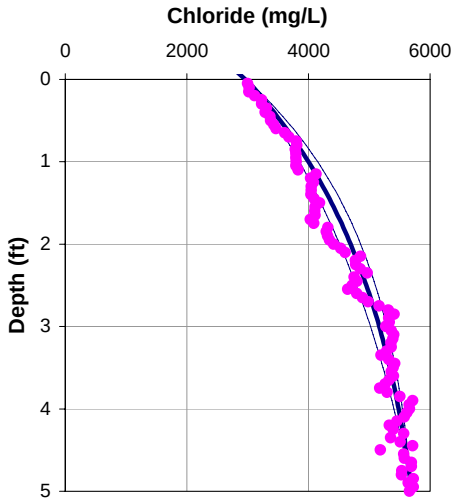
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = 0.0 cm/year

OL-VC-70093



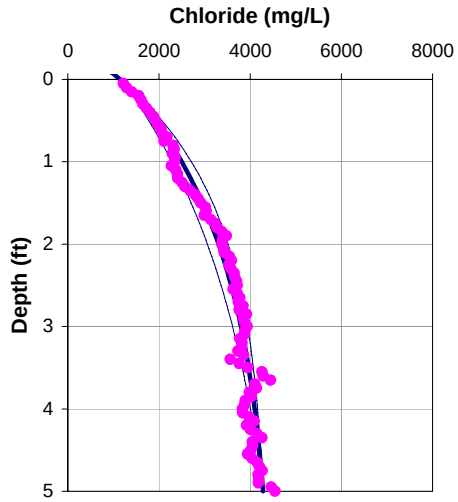
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = 0.0 cm/year

OL-GP-70089-A



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -2.5 cm/year

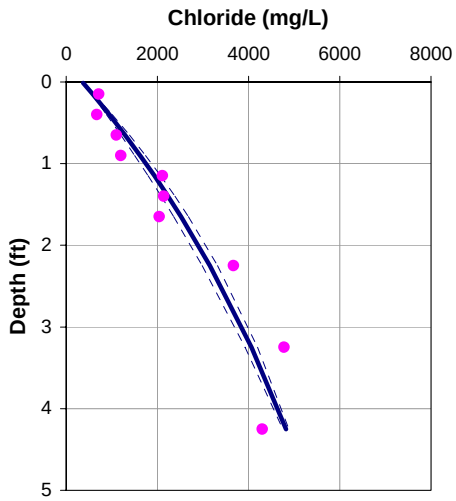
OL-GP-70093



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -3.2 cm/year

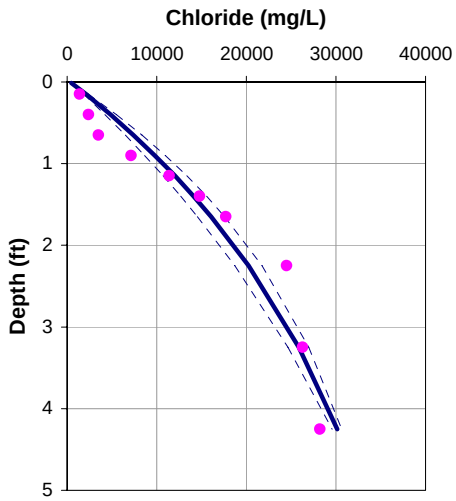
	70089-A	70093
Vibracore (cm/year)	0.0	0.0
Geoprobe (cm/year)	-2.5	-3.2
Difference (cm/year)	-2.5	-3.2

OL-VC-70100



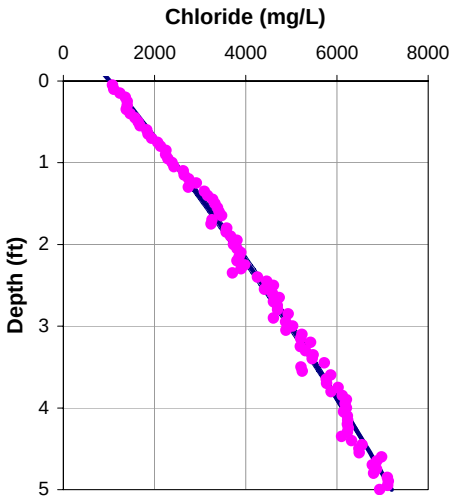
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.2 cm/year

OL-VC-70102



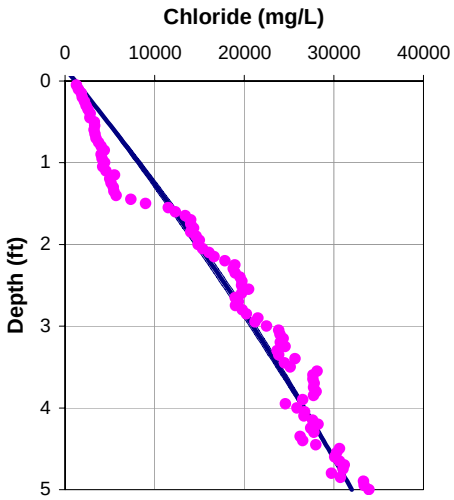
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.7 cm/year

OL-GP-70100



Porosity = 0.7
Dispersion length = 0.1 feet
Upwelling Velocity = -0.4 cm/year

OL-GP-70102



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -0.4 cm/year

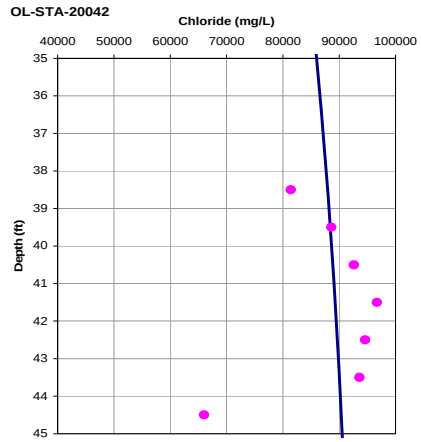
	70100	70102
Vibracore (cm/year)	-1.2	-1.7
Geoprobe (cm/year)	-0.4	-0.4
Difference (cm/year)	0.7	1.3

Attachment X

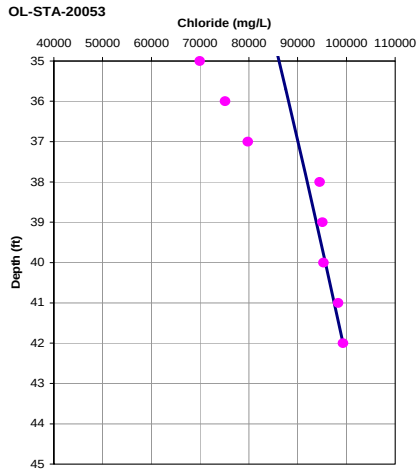
Evaluation of Velocity in Silt and Clay Unit

Attachment X
Evaluation of Velocity in Silt and Clay Unit

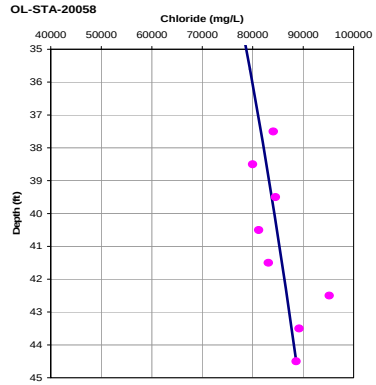
Three borings were advanced approximately 10 feet into the silt and clay unit in 2007 SMU-2. These borings are identified as OL-STA-20042, OL-STA-20053, and OL-STA-20058 and their locations are shown in Figure X-1. Pore water samples were collected at approximately one foot intervals after the boring had been advanced approximately three feet into the silt and clay unit. A total of eight pore water samples were collected at each interval. The pore water was analyzed for common cations and anions. Plots of chloride concentrations with depth are shown below for the four locations. The velocity has been estimated using the technique described in Section 3. In these evaluations a lake water concentration of 359 mg/L was assumed and this concentration was used as an upper boundary conditions. The calculated upwelling velocities with this boundary condition ranged from 0.1 to 0.4 cm/year. The calculated chloride-depth profile with this boundary condition matches the data from location OL-STA-20058 quite well, but it does not match the data well from locations OL-STA-22042 and OL-STA-20053 very well. This suggests that this method does not provide a reliable estimate of the upwelling velocities at these two locations.



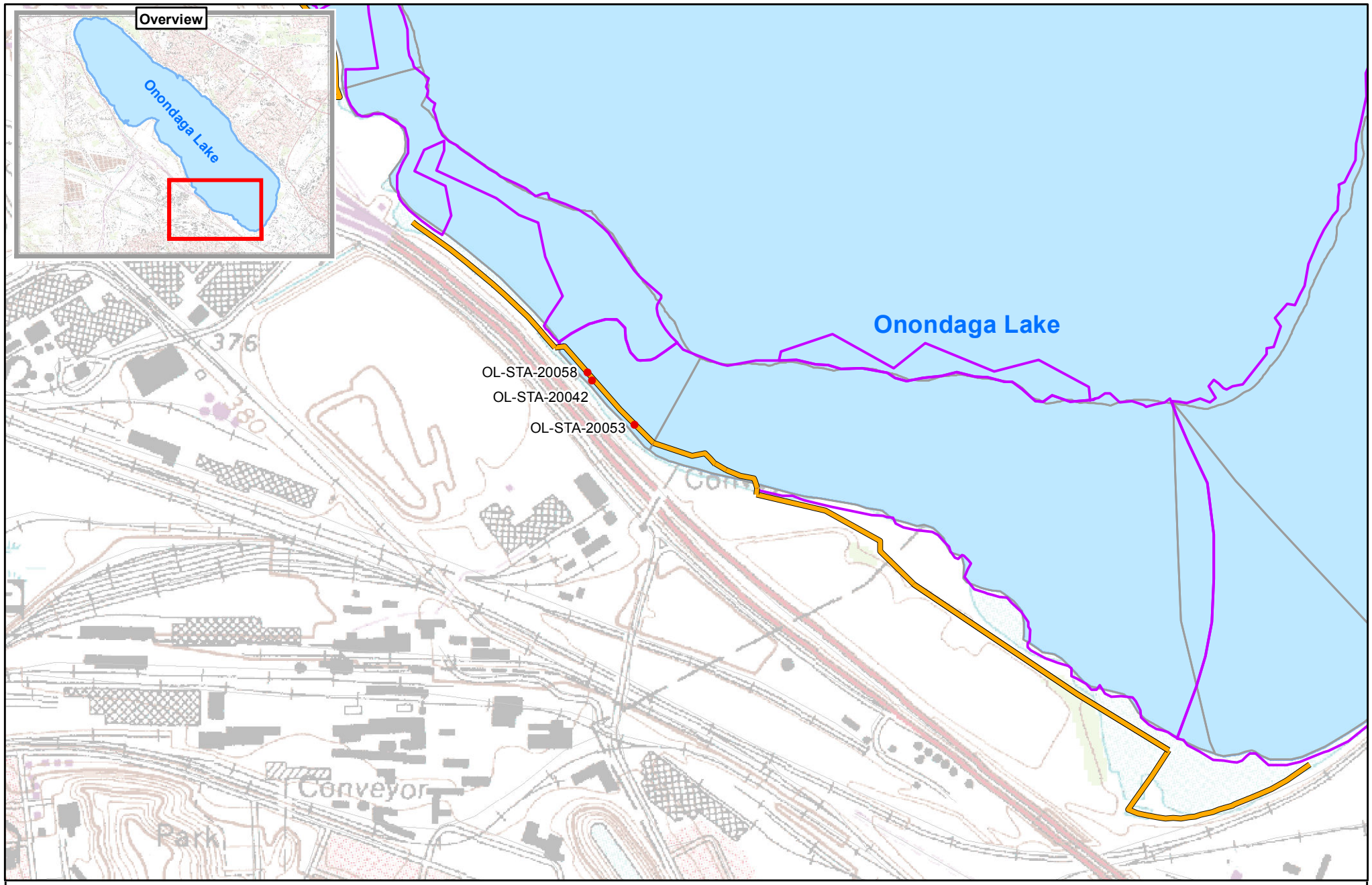
porosity = 0.65
dispersion length = 0.5 feet
Upwelling Velocity = -0.4 cm/year



porosity = 0.65
dispersion length = 0.5 feet
Upwelling Velocity = -0.1 cm/year



porosity = 0.65
dispersion length = 0.5 feet
Upwelling Velocity = -0.2 cm/year



Boring Location
SMU Boundary
Hydraulic Containment System
Remediation Areas

0 500 1,000
Feet

FIGURE X-1

Honeywell

Onondaga Lake
Syracuse, New York

Boring Location Map

S. S. Papadopulos & Assoc.

Attachment XI

Sensitivity Evaluations

Attachment XI
Sensitivity Evaluations

The sensitivity of calculated upwelling velocities from Geoprobe sediment conductivity data to chloride-conductivity factor, porosity, and dispersion length was evaluated for data from location GP-40168. In addition, the sensitivity of calculated velocities to porosity and dispersion length wa evaluated for chloride data from VC-30179, VC-40091, VC-40092, VC-40297, VC-40302, VC-60303, and VC-70058. These locations were chosen to represent a range of estimated upwelling velocities up to 15.3 cm/year. The results of these evaluations are shown on the figures at the end of this attachment. The evaluations indicate that calculated upwelling velocities are sensitive to the dispersion length.

Dispersion Length

Because the calculated upwelling velocities are sensitive to dispersion length, it is important to critically evaluate what is an appropriate dispersion length to use in the analyses of upwelling velocities. This section provides such a critical review.

The range of dispersion lengths that were evaluated in the sensitivity analyses were based on language contained in an email from Don Hesler, NYSDEC, to Tim Johnson at Parsons dated December 10, 2007. This email stated:

"Schulze-Makuch (2005) compiled data on dispersion length from 109 authors for different types of media including consolidated media and unconsolidated sediment. Schulze-Makuch discusses that the data included in the compilation differ in the degree of reliability, but it is Earth Tech's opinion that for purposes of choosing a range of values to use in a simple sensitivity analysis, these should be considered adequate. Based on review of the dispersion lengths reported for unconsolidated sediment from scales on the order of 10 ft (ranging from 3 to 16 ft), a range in dispersion lengths from about 0.01 ft to about 0.8 ft should be selected for use in the sensitivity analysis."

For the selection of an appropriate dispersion length for shallow sediments in Onondaga Lake it is important to understand the physical meaning of a dispersion length. The dispersion length is a measure of the variability in the velocity distribution in sediments; a small dispersion length implies that the velocity variations are small and a large dispersion length indicates that there are significant velocity variations. The variations in velocity are a function of heterogeneities in the hydraulic conductivity distribution; a homogeneous media has a very small dispersion length whereas a very heterogeneous media has a larger dispersion length. Therefore, it is important to understand sediment heterogeneity to select an appropriate dispersion length.

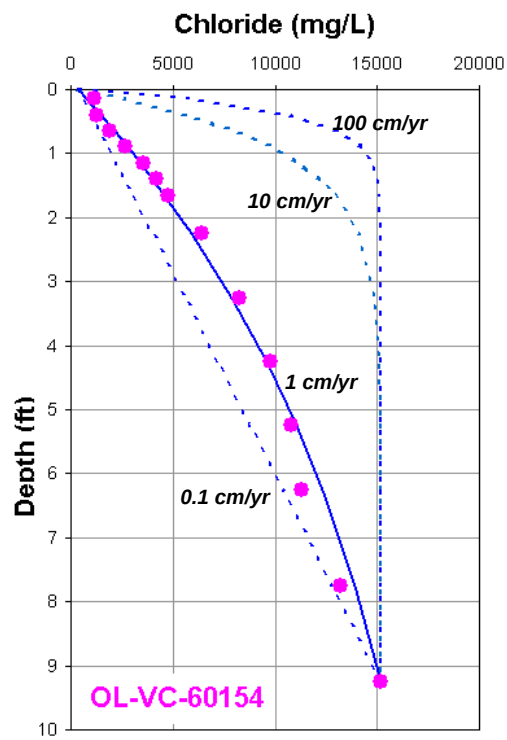
Before assessing sediment heterogeneities, it is necessary to understand the depth interval of interest for estimating the dispersion length. The depth interval of interest is defined as that

interval over which dispersive transport of chloride is significant. This interval can be determined by examining the dispersive flux equation

$$flux = -D\frac{\partial C}{\partial z} \qquad (1)$$

where D = sum of dispersion and diffusion coefficients, C = chloride concentration, and
z = vertical distance.

From this equation it is obvious that the magnitude of the dispersive flux is dependent on the change in chloride concentration with depth, and that the dispersive flux is zero if the chloride concentration is constant with depth.



The expected change in chloride concentration is illustrated on the plot to the right for velocities of 0.1 cm/year, 10 cm/year and 100 cm/year, respectively. The expected change in chloride concentrations is a function of the upwelling velocity; at an upwelling velocity of 1 cm/year the rate of change in chloride concentration with depth is relatively constant over the depth interval 0 to 9 feet, at an upwelling velocity of 10 cm/year, the chloride concentration is changing significantly with depth only in the upper three feet, and at an upwelling velocity of 100 cm/year the chloride concentration is only changing significantly with depth in the upper foot. Therefore, it can be concluded that the appropriate depth intervals for evaluating the dispersion length for velocities of 10 cm/year and 100 cm/year are approximately 3 feet and 1 foot, respectively as at deeper depths there is no significant dispersive transport as the term $\frac{\partial C}{\partial z}$ in equation 1 is approximately zero.

The dispersion coefficient is defined as

$$D = \omega D^* + \alpha_L v \qquad (2)$$

where D^* is the diffusion coefficient, ω is coefficient related to tortuosity, v is the upwelling velocity and α_L is dispersion length. When the upwelling velocity is small, the term $\alpha_L v$ approaches zero and the dispersion coefficient is mainly a function of the diffusion coefficient. Therefore, the depth interval of interest for estimating the dispersion length for purposes of analyzing upwelling velocities is only the upper few feet of sediments (deeper depths are not of

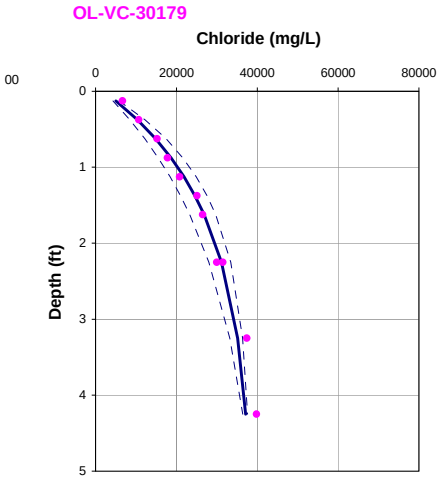
interest either because chloride concentrations are not changing with depth when upwelling velocities are more than a few centimeters per year or because the term $\alpha_L v$ is small relative to the diffusion coefficient when upwelling velocities are low).

A review of the boring logs for the many borings that have been advanced in the lake indicate that typically the lithologic characteristics of the upper few feet of sediment are relatively uniform; typically silt with little to some clay and fine sand. As a result, the general observation is that heterogeneity with respects to composition of sediments is small.

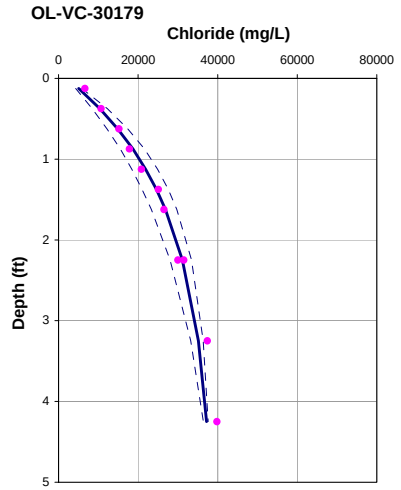
A few researchers have specifically looked at dispersion in lacustrine sediments. A study by Cornett and others (1989), where chloride and tritium depth profiles within the sediments of Perch Lake in Ontario were used to estimate groundwater upwelling velocities in the range of 0 to 5 cm/year, specified that dispersion was approximately equal to diffusion for the fine-grained sediments in this lake. This conclusion was similar to that reached by Lerman (1979). Another study by Roychoudhury (2001) that specifically looked at dispersion in unconsolidated aquatic sediments also concluded that dispersion is approximately equal to diffusion for the range of upwelling velocities that were examined in Onondaga Lake. These studies indicated that the appropriate dispersion length for evaluation of fine-grained lake lacustrine sediments is very small.

Several researchers have attempted to develop a general relationship between the scale of a problem and the dispersion length (Neuman 1990 and 1996, Xu and Eckstein 1995, and Schulze-Makuch 2005). These studies all relied on compilations of dispersion lengths determined by a large number of researchers, but in most case the dispersion lengths were determined for horizontal groundwater flow rather than vertical groundwater flow. Based on these studies, the estimated dispersion length, when the depth interval of interest is five feet, is in the range of 0.045 feet to 0.496 feet. The estimate based on the work of Neuman (1990), which in our opinion is the most rigorous of the evaluations, is about 0.1 foot. We have used this value in our evaluation of data from the upper five feet and in our opinion this value of the dispersion length likely overestimates the actual dispersion length at most locations because of the relatively uniform composition of shallow sediments. In our evaluations of data from the upper ten feet, a dispersion length of 0.3 feet has been used. In the Lake RI, a dispersion length of 1 cm was used for a depth interval of interest of 3 meters which is significantly lower than the preferred value used in these analyses.

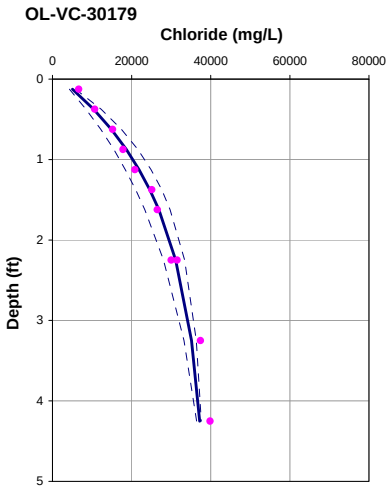
VC-30179



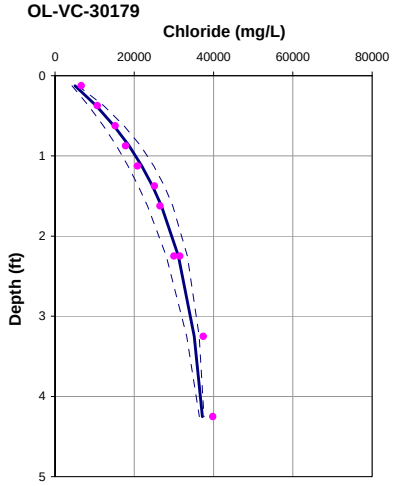
Porosity = 0.65
Dispersion length = 0.1 feet
Upwelling Velocity = -3.8 cm/year



Porosity = 0.65
Dispersion length = 0.5 feet
Upwelling Velocity = -5.3 cm/year +/- 0.60 (90% CI)



Porosity = 0.77
Dispersion length = 0.1 feet
Upwelling Velocity = -5.5 cm/year +/- 0.53 (90% CI)



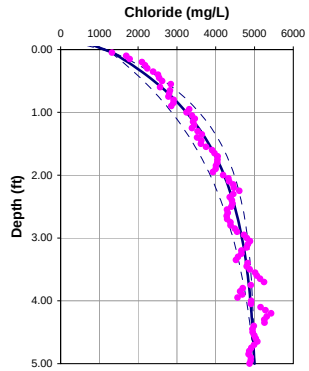
Porosity = 0.77
Dispersion length = 0.5 feet
Upwelling Velocity = -7.7 cm/year +/- 0.74 (90% CI)

Comparison of Results

Locations	Porosity	Dispersion Length (feet)	Calculated Velocity (cm/year)
VC-30179	0.65	0.1	-3.8
VC-30179-sen1	0.65	0.5	-5.3
VC-30179-sen2	0.77	0.1	-5.5
VC-30179-sen3	0.77	0.5	-7.7

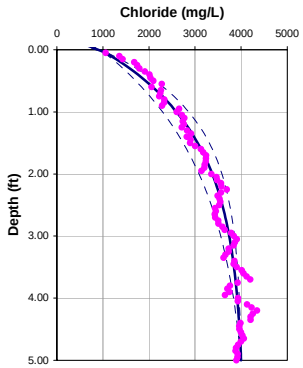
GP-40168

OL-GP-40168



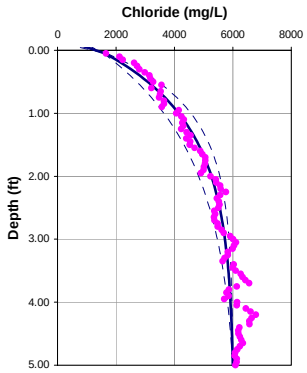
porosity = 0.75
dispersion length = 0.1 feet
Upwelling Velocity = -5.7 cm/year

OL-GP-40168-sen2



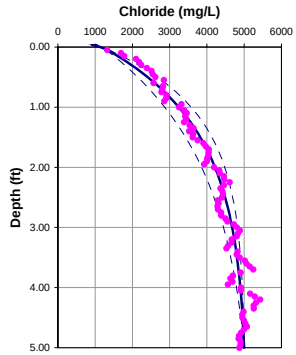
porosity = 0.75
dispersion length = 0.1 feet
Upwelling Velocity = -5.7 cm/year

OL-GP-40168-sen1



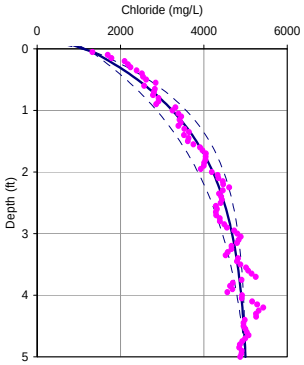
porosity = 0.75
dispersion length = 0.1 feet
Upwelling Velocity = -6.9 cm/year

OL-GP-40168



porosity = 0.52
dispersion length = 0.1 feet
Upwelling Velocity = -2.7 cm/year

OL-GP-40168.DAT

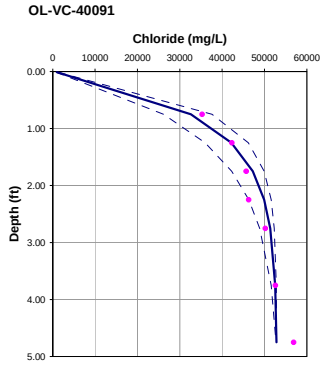


Porosity = 0.75
Dispersion length = 0.8 feet
Upwelling Velocity = -13.0 cm/year

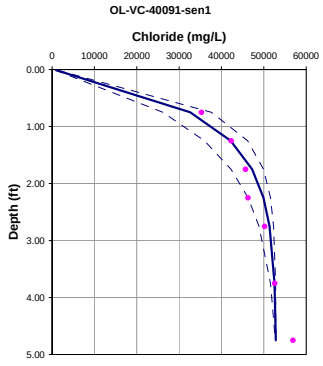
Comparison of Results

Locations	Chloride - Conductivity Factor	Porosity	Dispersion Length (feet)	Calculated Velocity (cm/year)
GP-40168	0.8	0.75	0.1	-5.7
GP-40168-sen2	1.0	0.75	0.1	-5.7
GP-40168-sen1	0.64	0.75	0.1	-6.9
GP-40168	0.8	0.52	0.1	-2.7
GP-40168	0.8	0.75	0.8	-13.0

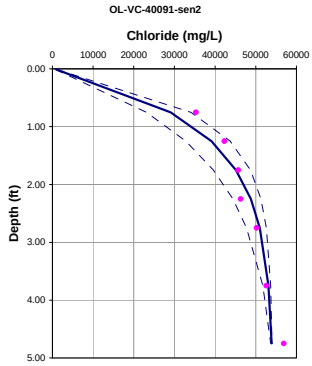
VC-40091



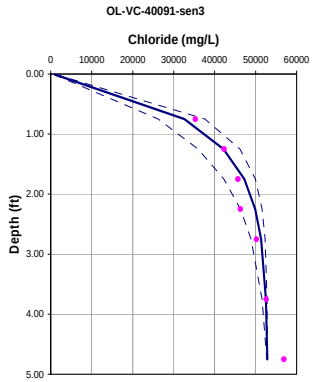
Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -10.3 cm/year



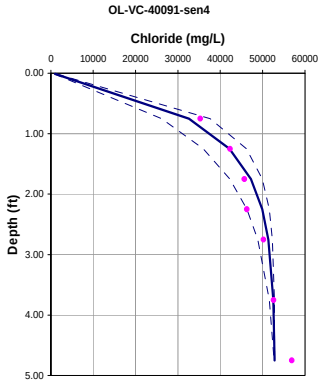
Porosity = 0.75
Dispersion length = 0.5 feet
Upwelling Velocity = -24.4 cm/year



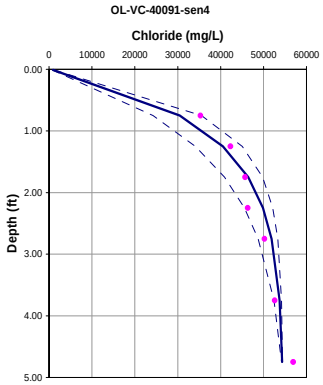
Porosity = 0.75
Dispersion length = 0.8 feet
Upwelling Velocity = -37.5 cm/year



Porosity = 0.52
Dispersion length = 0.1 feet
Upwelling Velocity = -4.8 cm/year



Porosity = 0.52
Dispersion length = 0.5 feet
Upwelling Velocity = -11.5 cm/year

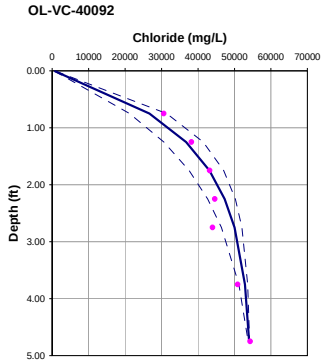


Porosity = 0.52
Dispersion length = 0.8 feet
Upwelling Velocity = <-37.5 cm/year

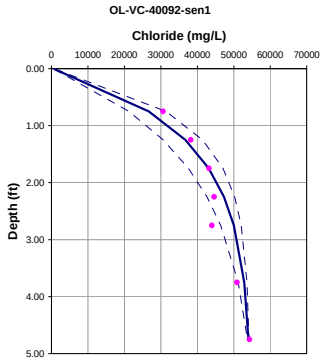
Comparison of Results

Locations	Porosity	Dispersion Length (feet)	Calculated Velocity (cm/year)
VC-40091	0.75	0.1	-10.3
VC-40091-sen1	0.75	0.5	-24.4
VC-40091-sen2	0.75	0.8	<-37.5
VC-40091-sen3	0.52	0.1	-4.8
VC-40091-sen4	0.52	0.5	-11.5
VC-40091-sen5	0.52	0.8	<-37.5

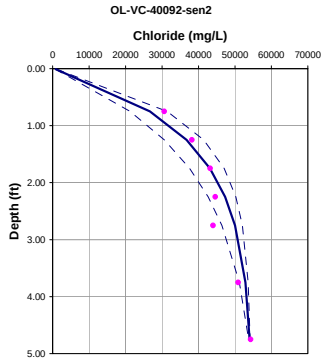
VC-40092



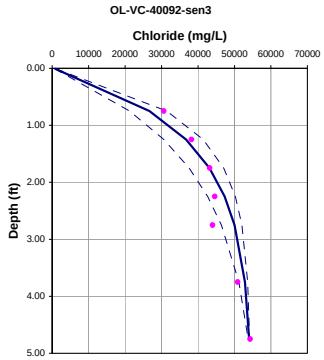
Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -6.8 cm/year



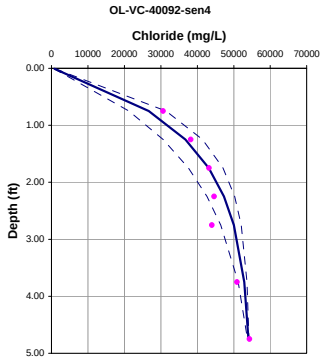
Porosity = 0.75
Dispersion length = 0.5 feet
Upwelling Velocity = -11.0 cm/year



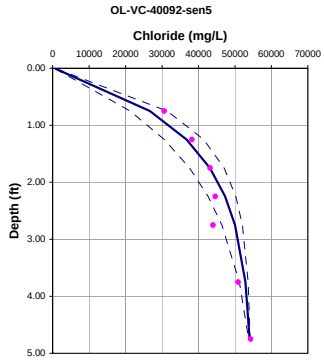
Porosity = 0.75
Dispersion length = 0.8 feet
Upwelling Velocity = -20.8 cm/year



Porosity = 0.52
Dispersion length = 0.1 feet
Upwelling Velocity = -3.2 cm/year



Porosity = 0.52
Dispersion length = 0.5 feet
Upwelling Velocity = -5.2 cm/year

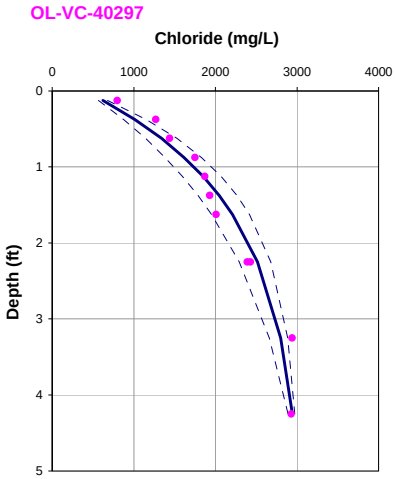


Porosity = 0.52
Dispersion length = 0.8 feet
Upwelling Velocity = -9.9 cm/year

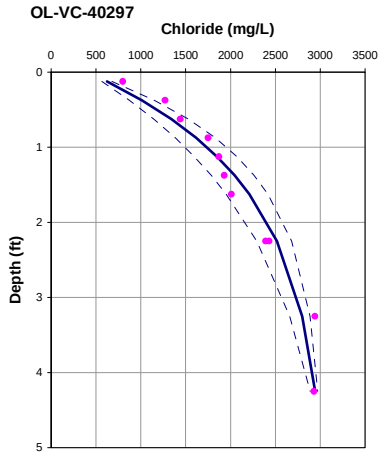
Comparison of Results

Locations	Porosity	Dispersion Length (feet)	Calculated Velocity (cm/year)
VC-40092	0.75	0.1	-6.8
VC-40092-sen1	0.75	0.5	-11.0
VC-40092-sen2	0.75	0.8	-20.8
VC-40092-sen3	0.52	0.1	-3.2
VC-40092-sen4	0.52	0.5	-5.2
VC-40092-sen5	0.52	0.8	-9.9

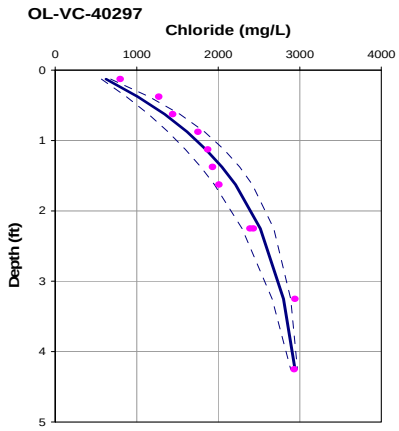
VC-40297



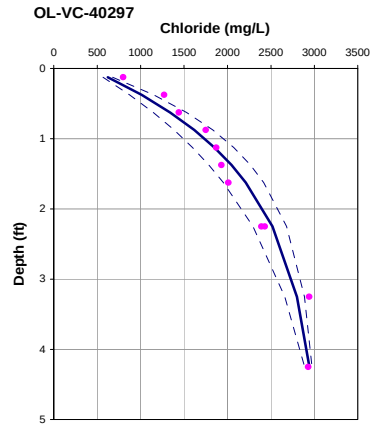
Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -5.2 cm/year



Porosity = 0.75
Dispersion length = 0.5 feet
Upwelling Velocity = -7.4 cm/year +/- 1.10 (90% CI)



Porosity = 0.64
Dispersion length = 0.1 feet
Upwelling Velocity = -3.7 cm/year +/- 0.65 (90% CI)

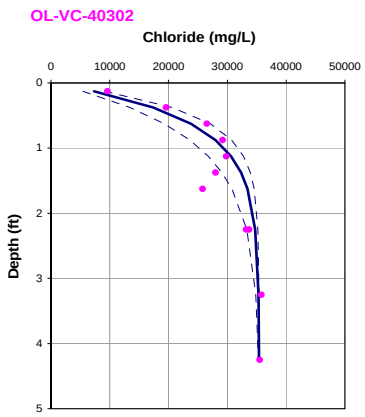


Porosity = 0.64
Dispersion length = 0.5 feet
Upwelling Velocity = -5.3 cm/year +/- 0.92 (90% CI)

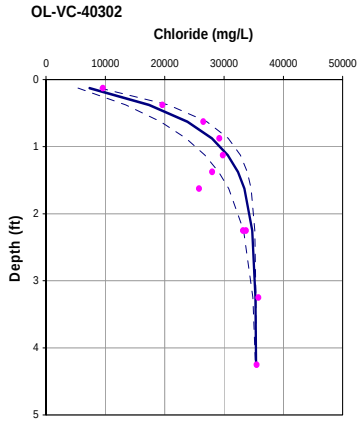
Comparison of Results

Locations	Porosity	Dispersion Length (feet)	Calculated Velocity (cm/year)
VC-40297	0.75	0.1	-5.2
VC-40297-sen1	0.75	0.5	-7.4
VC-40297-sen2	0.64	0.1	-3.7
VC-40297-sen3	0.64	0.5	-5.3

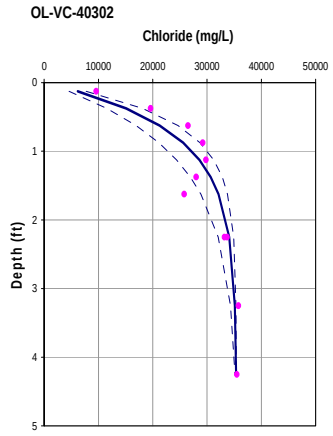
VC-40302



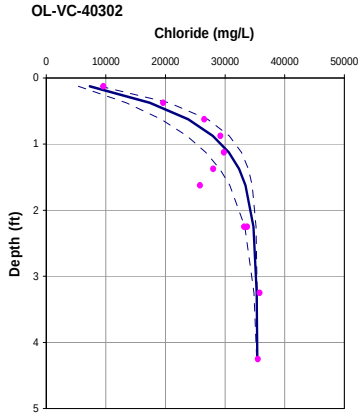
Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -15.3 cm/year



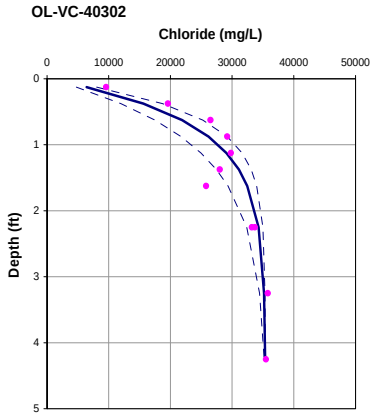
Porosity = 0.75
Dispersion length = 0.2 feet
Upwelling Velocity = -19.3 cm/year +/- 5.32 (90% CI)



Porosity = 0.75
Dispersion length = 0.5 feet
Upwelling Velocity = -37.5 cm/year +/- 10.50 (90% CI)



Porosity = 0.64
Dispersion length = 0.1 feet
Upwelling Velocity = -10.9 cm/year +/- 3.52 (90% CI)

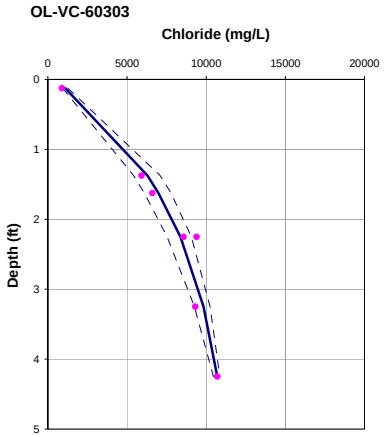


Porosity = 0.64
Dispersion length = 0.5 feet
Upwelling Velocity = -32.0 cm/year +/- 10.27 (90% CI)

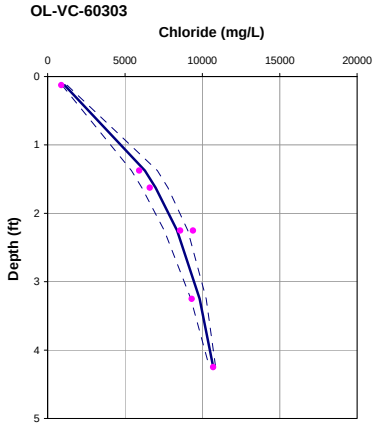
Comparison of Results

Locations	Porosity	Dispersion Length (feet)	Calculated Velocity (cm/year)
VC-40302	0.75	0.1	-15.3
VC-40302-sen1	0.75	0.2	-19.3
VC-40302-sen2	0.75	0.5	-37.5
VC-40302-sen3	0.64	0.1	-10.9
VC-40302-sen3	0.64	0.5	-32.0

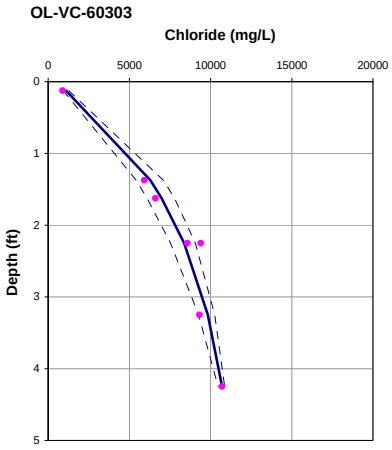
VC-60303



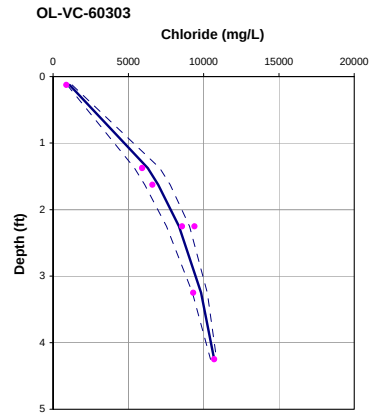
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -3.3 0.58 (90% CI)



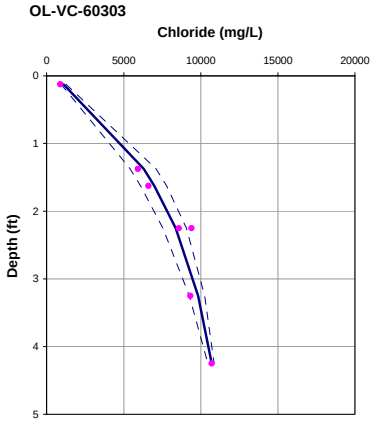
Porosity = 0.70
Dispersion length = 0.2 feet
Upwelling Velocity = -3.5 0.61 (90% CI)



Porosity = 0.70
Dispersion length = 0.5 feet
Upwelling Velocity = -4.3 0.74 (90% CI)



Porosity = 0.60
Dispersion length = 0.1 feet
Upwelling Velocity = -2.4 0.49 (90% CI)

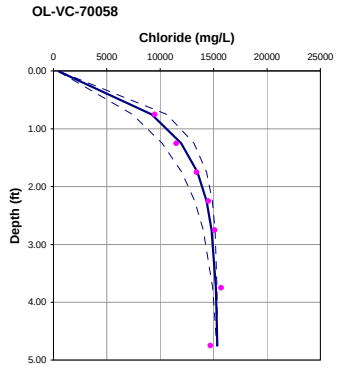


Porosity = 0.60
Dispersion length = 0.5 feet
Upwelling Velocity = -3.1 0.63 (90% CI)

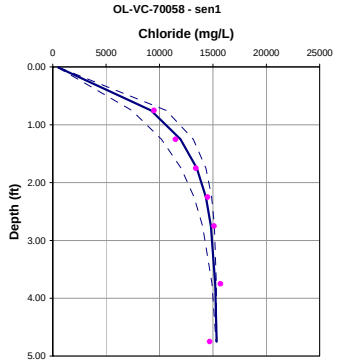
Comparison of Results

Locations	Porosity	Dispersion Length (feet)	Calculated Velocity (cm/year)
VC-70145	0.70	0.1	-3.3
VC-70145-sen1	0.70	0.2	-3.5
VC-70145-sen2	0.7	0.5	-4.3
VC-70145-sen3	0.60	0.1	-2.4
VC-70145-sen4	0.60	0.5	-3.1

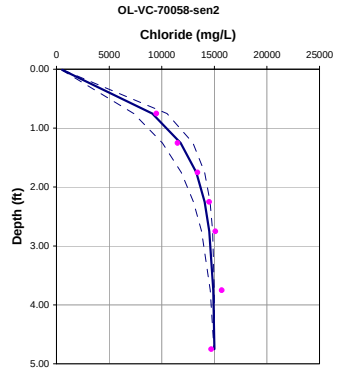
VC-70058



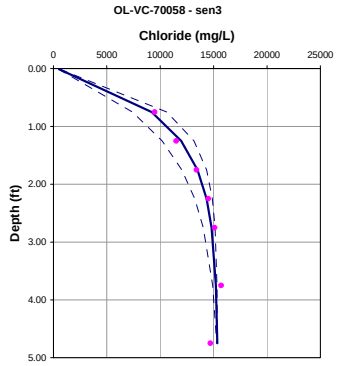
Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -8.2 cm/year



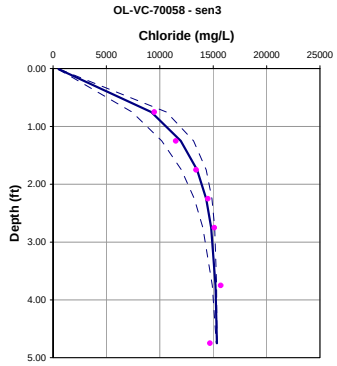
Porosity = 0.70
Dispersion length = 0.5 feet
Upwelling Velocity = -17.5 cm/year



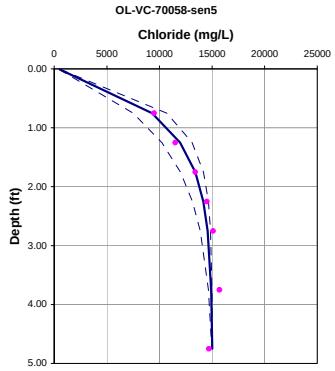
Porosity = 0.70
Dispersion length = 0.8 feet
Upwelling Velocity = <-50 cm/year



Porosity = 0.60
Dispersion length = 0.1 feet
Upwelling Velocity = -5.9 cm/year



Porosity = 0.60
Dispersion length = 0.5 feet
Upwelling Velocity = -12.7 cm/year



Porosity = 0.60
Dispersion length = 0.8 feet
Upwelling Velocity = <-50 cm/year

Comparison of Results

Locations	Porosity	Dispersion Length (feet)	Calculated Velocity (cm/year)
VC-70058	0.70	0.1	-8.2
VC-70058-sen1	0.70	0.5	-17.5
VC-70058-sen2	0.70	0.8	<-50
VC-70058-sen3	0.60	0.1	-5.9
VC-70058-sen4	0.60	0.5	-12.7
VC-70058-sen5	0.60	0.8	<-50

References

Cornett, R.J., B.A. Risto, and D. Lee, 1989. Measuring Groundwater Transport Through Lake Sediments by Advection and Diffusion. Water Resources Research, v.25:1815-1823.

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Neuman, S.P. 1990. Universal Scaling of Hydraulic Conductivites and Dispersivities in Geologic Media: Water Resources Research, v. 26, no. 8: 1749-1758.

Neuman, S.P. 2006. Comment on Longitudinal Dispersivity Data and Implications for Scaling Behavior: Ground Water, v. 44, no. 2: 139-141.

Roychoudhury, A.N. 2001. Dispersion in Unconsolidated Aquatic Sediments. Estuarine, Coastal and Shelf Science. V. 53:745-757.

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Xu, M. and Y. Eckstein, 1995. Use of Weighted Least-Squares Method in Evaluation of the Relationship Between Dispersivity and Field Scale. v. 33: 905-916.

Attachment XII

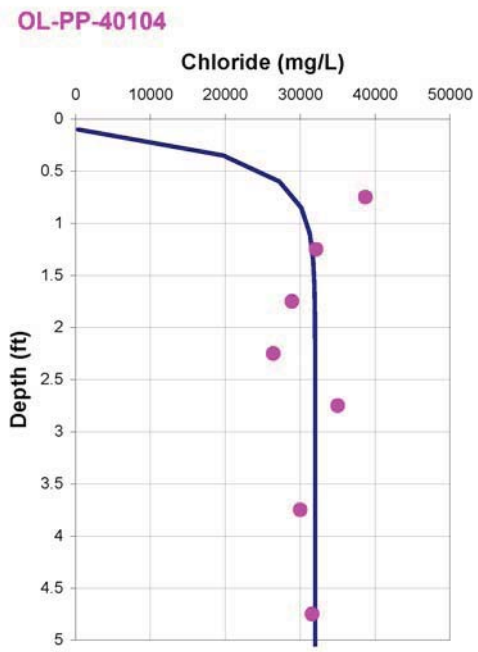
Results from Diffusion Samplers – Phase III

Attachment XII
Results from Diffusion Samplers – Phase III

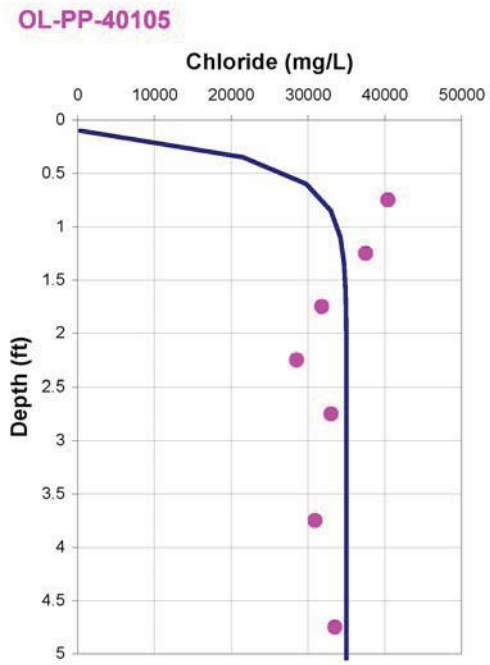
This attachment contains chloride-depth profiles determined from the diffusion samplers (extended peepers) installed at each of the seepage meter clusters in the Phase III investigation in 2007. Attached is one figure for each of the five seepage meter clusters with the chloride-depth profiles for the diffusion samples as well as a chloride-depth profile for a nearby Vibracore location. Also shown on each figure is a location map in the vicinity of the seepage meter cluster with a reference circle with a radius of 25 feet. On the attached figures the location prefix "OL-PP" indicates data from an extended peeper and the prefix "OL-VC" indicates data collected with a Vibracore.

Seepage Meter Cluster 4-1

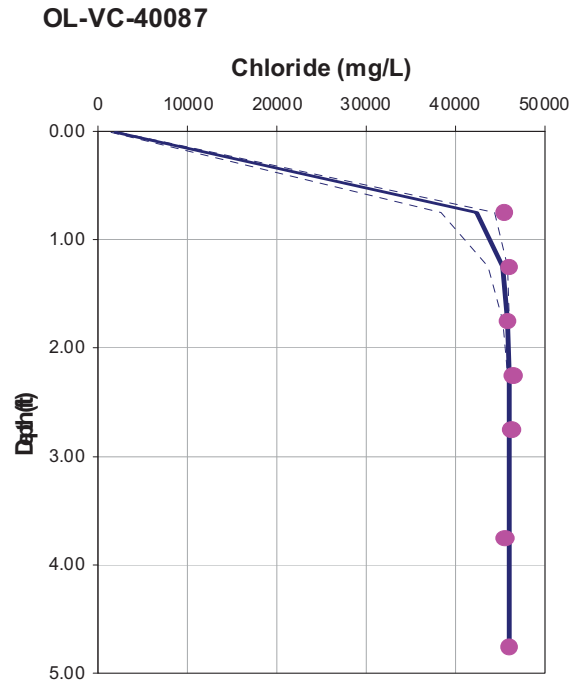
S.S. Papadopulos & Associates, Inc.



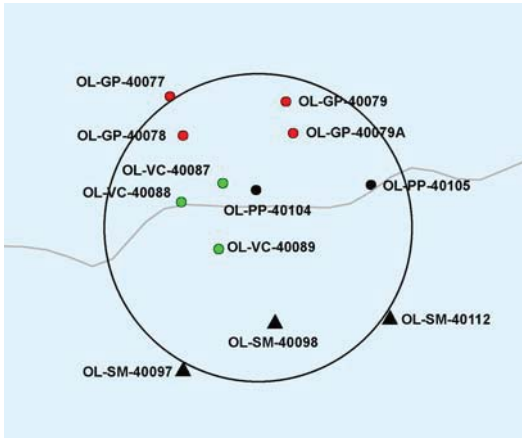
porosity = 0.65
dispersion length = 0.1 feet
Upwelling Velocity = -32.5 cm/year



porosity = 0.65
dispersion length = 0.1 feet
Upwelling Velocity = -32.5 cm/year

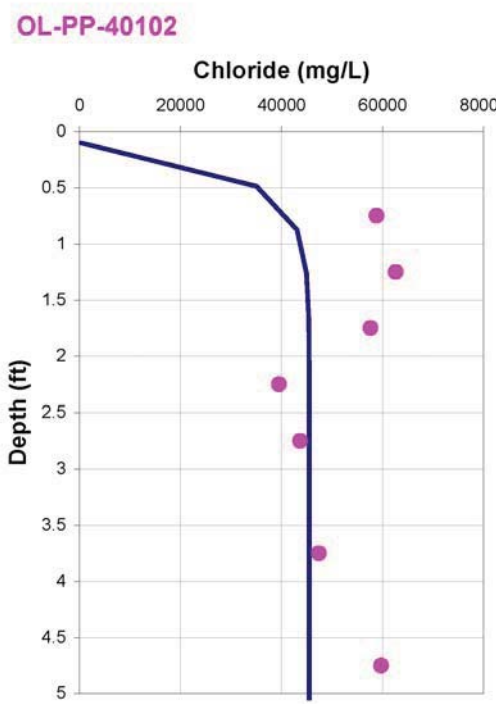


Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -37.5 cm/year

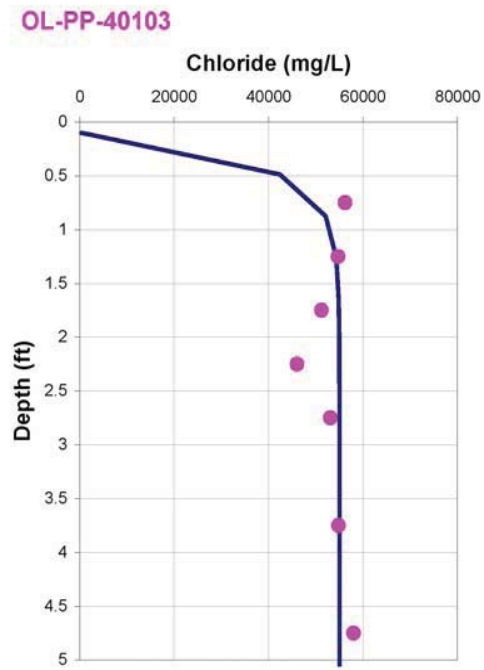


Seepage Meter Cluster 4-2

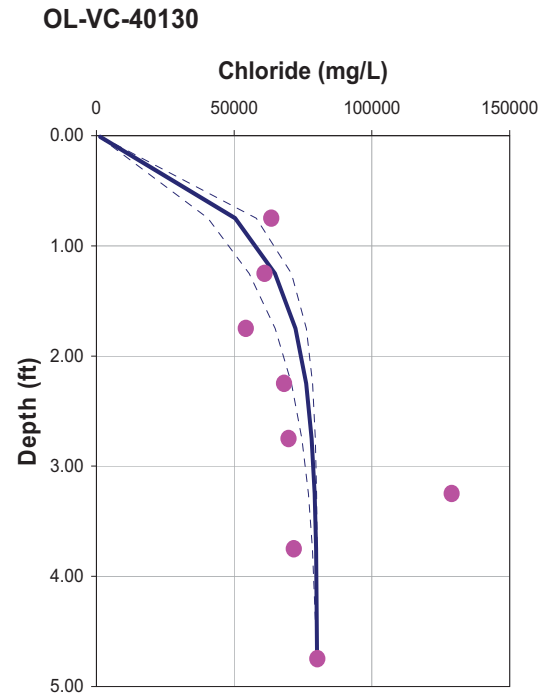
S.S. Papadopulos & Associates, Inc.



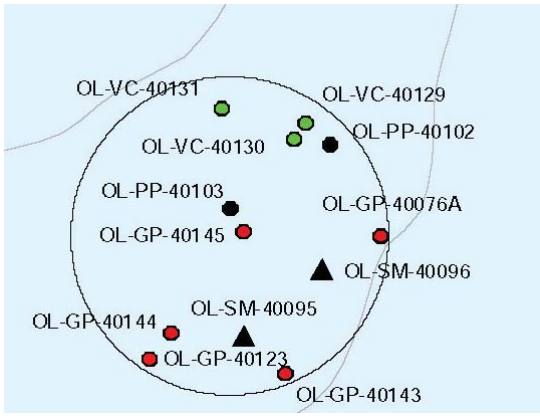
porosity = 0.65
dispersion length = 0.1 feet
Upwelling Velocity = -32.5 cm/year



porosity = 0.65
dispersion length = 0.1 feet
Upwelling Velocity = -32.5 cm/year

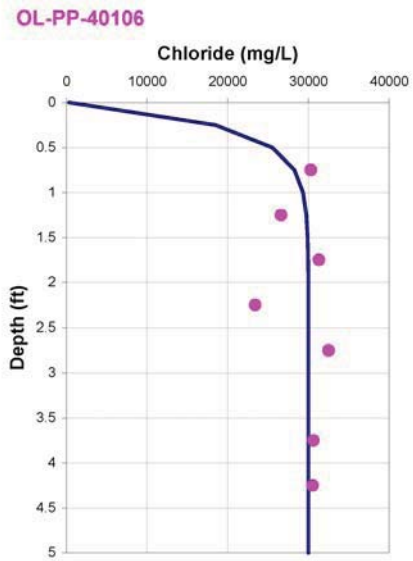


Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -10.7 cm/year

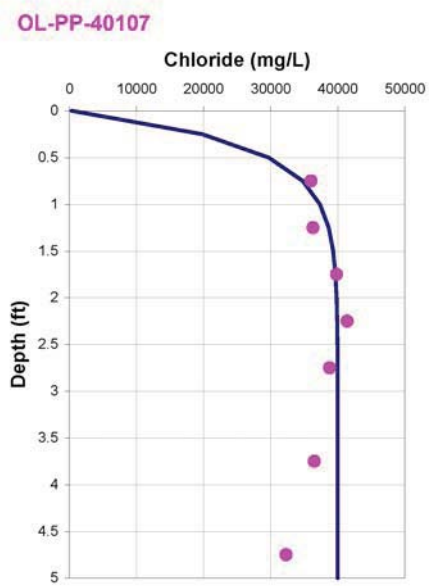


Seepage Meter Cluster 4-3

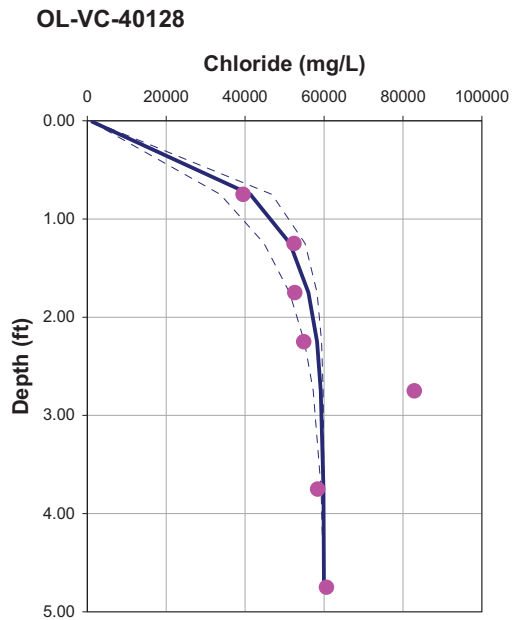
S.S. Papadopulos & Associates, Inc.



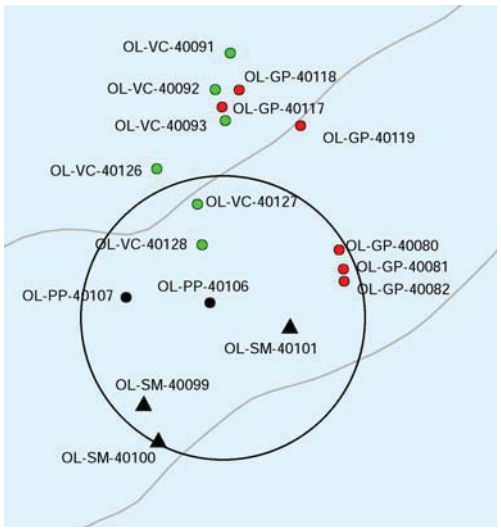
porosity = 0.65
dispersion length = 0.1 feet
Upwelling Velocity = -32.5 cm/year



porosity = 0.65
dispersion length = 0.1 feet
Upwelling Velocity = -19.5 cm/year

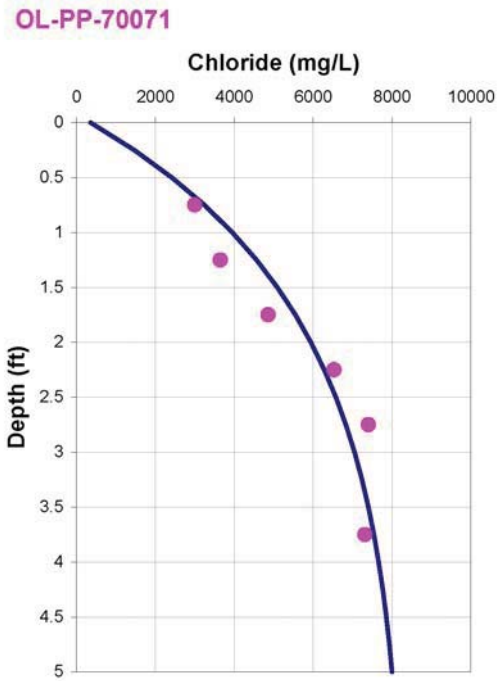


Porosity = 0.75
Dispersion length = 0.1 feet
Upwelling Velocity = -13.0 cm/year

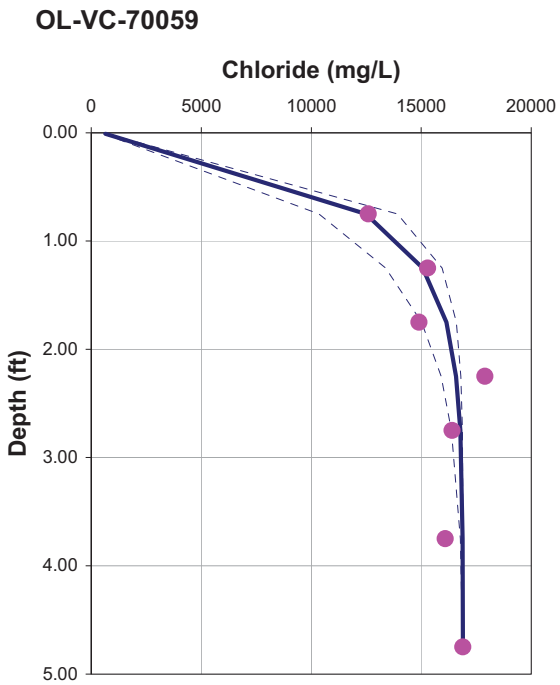


Seepage Meter Cluster 7-1

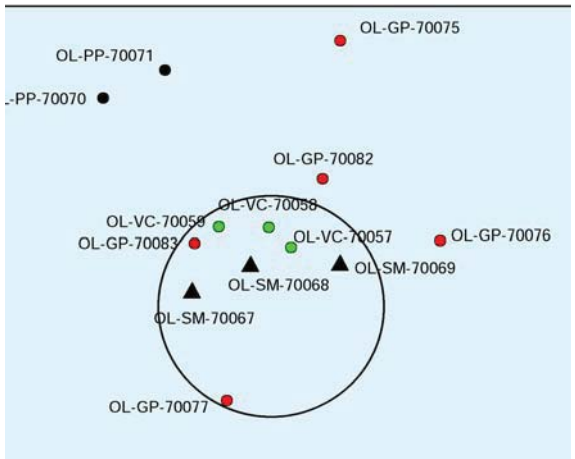
S.S. Papadopulos & Associates, Inc.



porosity = 0.65
dispersion length = 0.1 feet
Upwelling Velocity = -3.3 cm/year

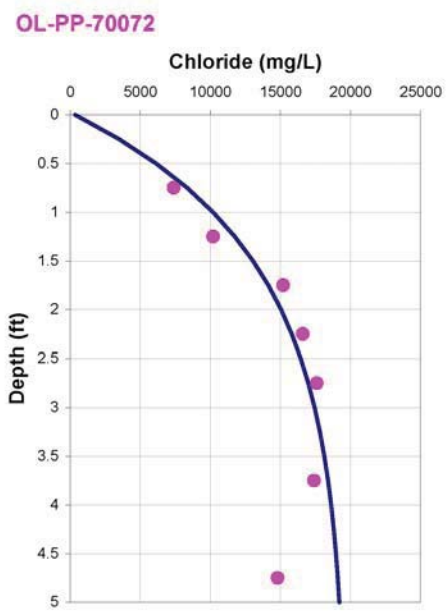


Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -13.1 cm/year

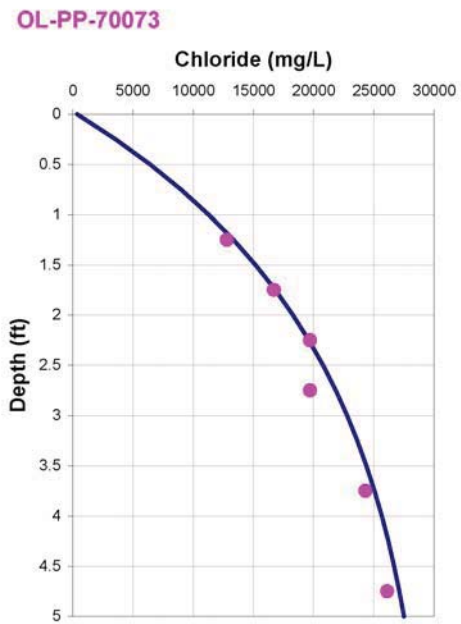


Seepage Meter Cluster 7-2

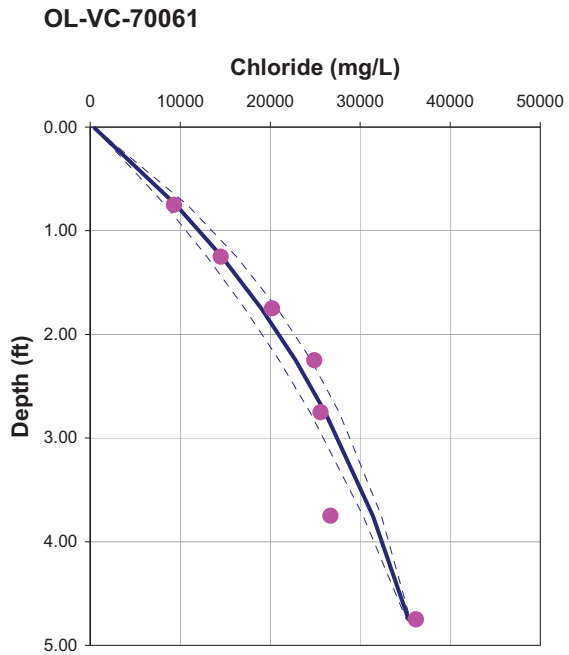
S.S. Papadopulos & Associates, Inc.



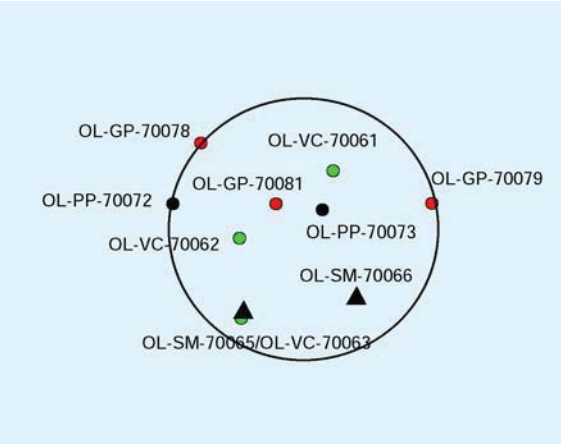
porosity = 0.65
dispersion length = 0.1 feet
Upwelling Velocity = -3.9 cm/year



porosity = 0.65
dispersion length = 0.1 feet
Upwelling Velocity = -2.4 cm/year



Porosity = 0.70
Dispersion length = 0.1 feet
Upwelling Velocity = -1.8 cm/year



Attachment XIII

Estimation of Hydraulic Conductivity from Consolidation Test Data

Attachment XIII

Estimation of hydraulic conductivity from consolidation test data

The vertical hydraulic conductivity has been calculated from consolidation tests on 11 samples of the silt and clay unit collected in Shelby tubes from Remediation Area D. The test data have been analyzed using "classical" consolidation theory (Terzaghi, 1943). The hydraulic conductivity estimates are tabulated below.

Location	Depth (feet, BGS)	m_υ (tst^{-1})	c_υ (in^2/sec)	K (cm/sec)
OL-STA-10013	41-43'	0.107	2.0E-04	1.4E-07
OL-STA-10018	48-50'	0.054	2.2E-04	7.8E-08
OL-STA-10022	64-66'	0.067	5.3E-04	2.3E-07
OL-STA-10024	64-66'	0.100	1.8E-04	1.2E-07
OL-STA-10025	52-54'	0.105	1.3E-04	9.0E-08
OL-STA-10026	50-52'	0.080	1.1E-04	5.8E-08
OL-STA-20001	45-47'	0.098	2.0E-04	1.3E-07
OL-STA-20007	39-41'	0.116	1.3E-04	1.0E-07
OL-STA-20018	47-49'	0.049	4.4E-04	1.4E-07
OL-STA-10108	64-66'	0.078	5.5E-04	2.8E-07
OL-STA-10108	68-70'	0.169	1.9E-04	2.1E-07

Overview

The consolidation test is a standard technique of geotechnical engineering for assessing the deformation characteristics of fine-grained materials. Although the objective of geotechnical testing is to quantify the deformation properties of a sample, if the appropriate data are reported it is also possible to estimate the hydraulic conductivity (Neuzil, 1986; van der Kamp, 2001).

During a consolidation test the total stress on a sample is increased suddenly and the change in the thickness of the sample is monitored through time. The increase in the total stress causes an immediate increase in the pore pressure in the sample. The increase in the pore pressure dissipates as water drains from the sample, accompanied by a compression of the sample. The compression of the sample is measured through time for each loading increment. The results for Onondaga Lake test number C-25, step 5, are reproduced in Figure 1.

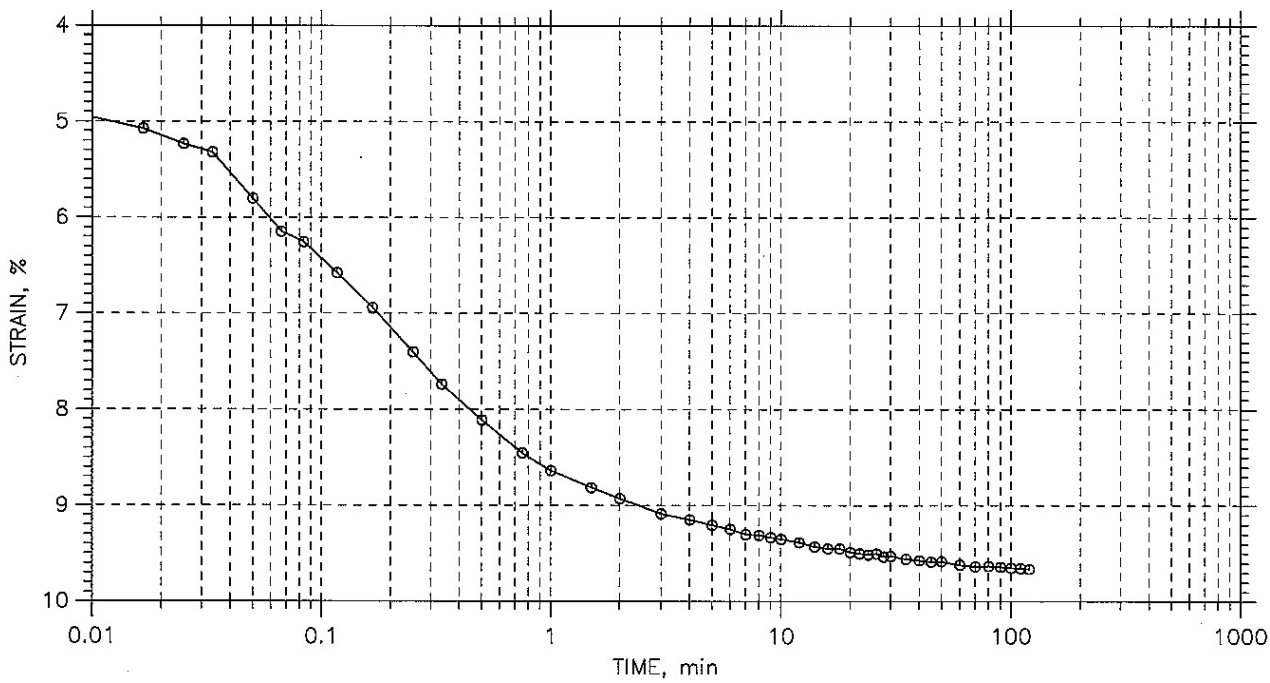


Figure 1. Deformation (strain) versus time for test C-25, step 5

Theory

Geotechnical engineers traditionally write the governing equation for the one-dimensional evolution of pore pressure changes as (Terzaghi, 1943; p. 271):

$$\gamma_w \, m_v \frac{\partial u}{\partial t} = K \frac{\partial^2 u}{\partial z^2} \tag{1}$$

where u is the pore pressure ($\mathrm{MLT^{-2}L^{-2}}$), γ_w is the unit weight of water (product of the density and acceleration due to gravity) ($\mathrm{ML^{-3}MT^{-2}}$), m_v is the coefficient of volume change $(\mathrm{MLT^{-2}L^{-2}})^{-1}$ [Terzaghi, 1943; p. 267], and K is the hydraulic conductivity ($\mathrm{LT^{-1}}$).

The governing equation is frequently written in terms of a lumped coefficient:

$$\frac{\partial u}{\partial t} = c_v \frac{\partial^2 u}{\partial z^2} \tag{2}$$

where c_v is referred to as the coefficient of consolidation (Terzaghi, 1943; p. 271):

$$c_v = \frac{K}{\gamma_w \, m_v} \tag{3}$$

In standard geotechnical practice the lumped coefficient c_v ($\mathrm{L^2T^{-1}}$) is estimated. This is consistent with the level of reporting for the tests on the Onondaga Lake samples. However, if the coefficient of volume change, m_v, is also known, the hydraulic conductivity, K, can be estimated by back-calculation:

$$K = \gamma_w \, m_v \, c_v \tag{4}$$

<u>Check units</u>:

$$\begin{aligned}\left[K\right] = \mathrm{LT^{-1}} &= \left[\gamma_w\right]\left[m_v\right]\left[c_v\right] \\ &= \left[\mathrm{ML^{-3}LT^{-2}}\right]\left[\mathrm{MLT^{-2}L^{-2}}\right]^{-1}\left[\mathrm{L^2T^{-1}}\right] = \mathrm{LT^{-1}} \ \surd\end{aligned}$$

Sufficient data are provided in the reporting of the tests on the Onondaga Lake samples to estimate m_v.

Estimation of the coefficient of consolidation, c_v

If it is assumed that the sample is drained at both ends, and that the initial change in pore pressure across the sample is uniform, the coefficient of consolidation is estimated from: (Lambe and Whitman, 1969; p. 411; Craig, 1978; p. 195):

$$c_v = 0.196 \frac{d^2}{t_{50}} \tag{5}$$

where d is half the average thickness of the specimen for the particular stress increment, and t_{50} is the time required to achieve 50% of the primary consolidation. The time to achieve 50% of the primary consolidation is estimated with either the "square root of time" approach (Taylor, 1948), or the "log time" or Casagrande approach (Lambe and Whitman, 1969). The reporting of the testing of the Onondaga Lake samples includes results for both approaches. The application of the "square root of time" approach is illustrated below for test C-5, step 5. A complete set of estimates of c_v is available for the "square root of time" approach for the Onondaga Lake samples. For consistency, the estimates of c_v reported for this approach have been used in the estimation of hydraulic conductivity.

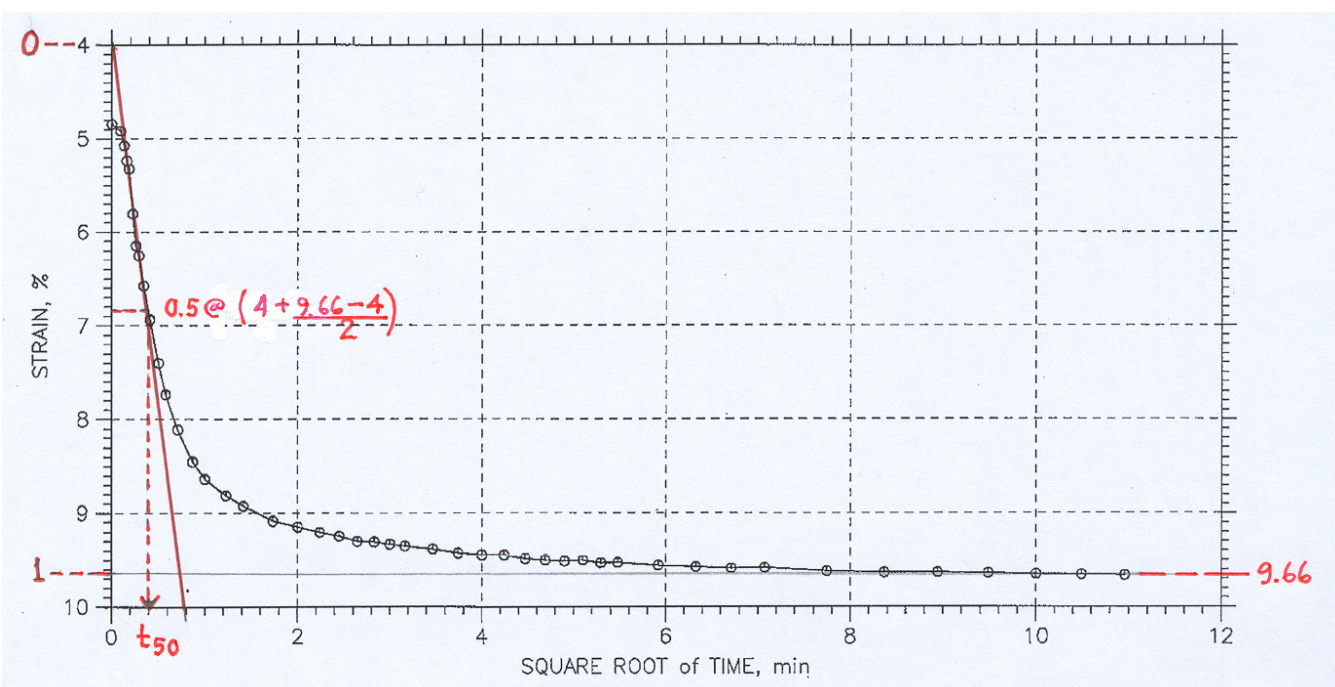


Figure 2. Estimation of t_{50} with the "square root of time" approach

The reported estimates of c_v for all of the loading steps during test C-25 are plotted in Figure 3. The "classical" theory of consolidation assumes that c_v is constant. This assumption appears to be satisfied approximately over the stress range of about 0.25 to 4 tsf.

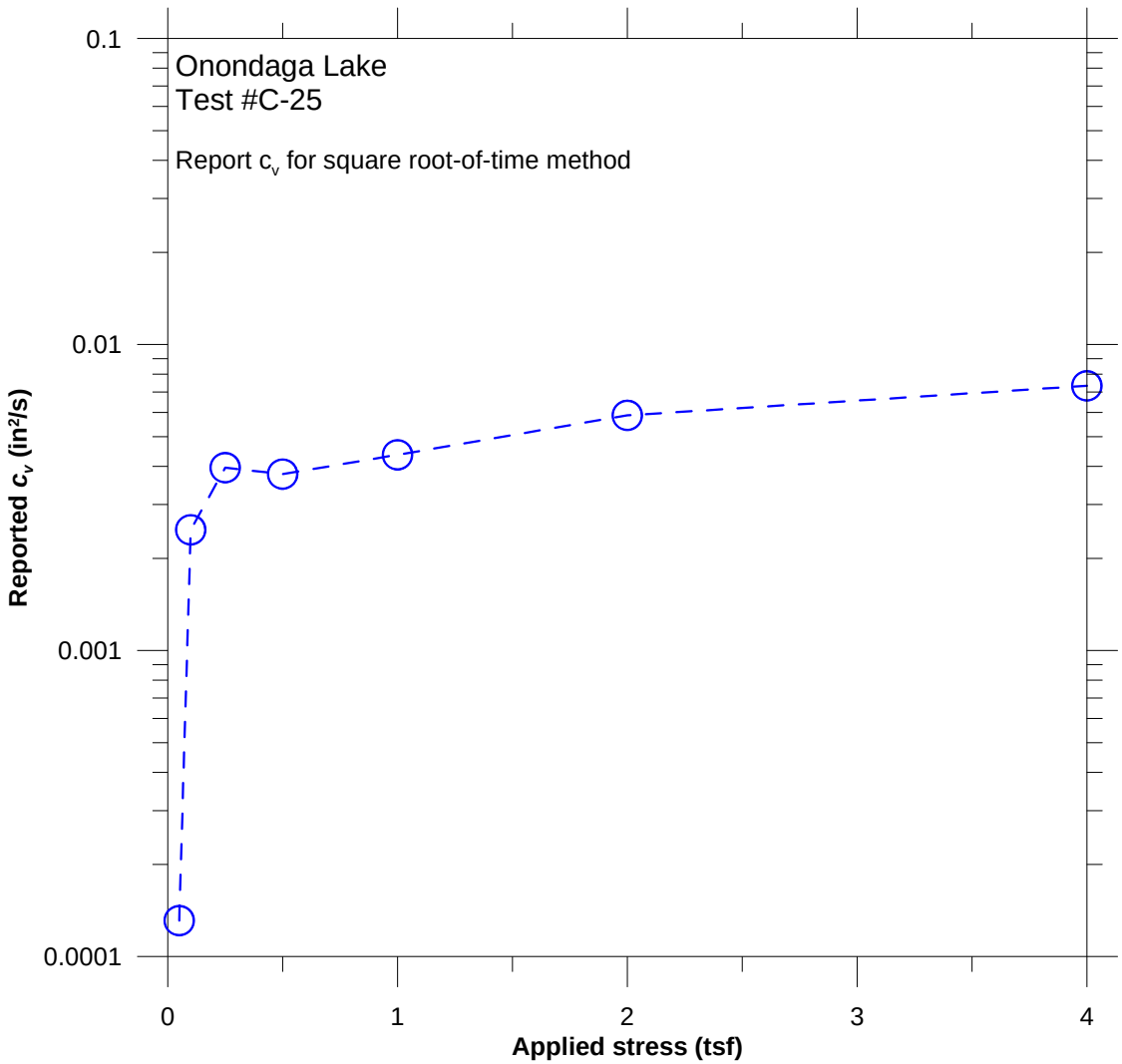


Figure 3. Coefficient of consolidation estimates for test C-25

Estimation of the coefficient of volume change, m_v

The coefficient of volume change, m_v, can be estimated from deformation data if the consolidation test is conducted as a sequence of steps that are each sufficiently long to estimate the final, fully-drained, deformation for each loading step. The tests on the Onondaga Lake samples meet this criterion.

The coefficient of volume change is estimated from the slope of a plot of the vertical strain ($\varepsilon_{vert} = \Delta e/(1+e_0) = \Delta L/L_0$) versus the vertical effective stress, σ_V' on arithmetic axes (Lambe and Whitman, 1969; p. 319):

$$m_v = -\frac{d\left(\Delta L / L_0\right)}{d\sigma'} \qquad (6)$$

The results for test C-25 are shown in Figure 4. As with c_v, the classical theory assumes that the coefficient of volume change is constant. This is equivalent to assuming that there is a linear relation between stress and strain. As shown in Figure 4, this condition is violated for test C-25. This is also the case for the other 6 consolidation tests, and appears to be generally the case (Lambe and Whitman, 1969). To estimate the hydraulic conductivity, the slope m_v is estimated from the portion of the response that approximates a straight line. For this test we estimate m_v = 0.10 /tsf:

$$m_v = 0.10\,\frac{1}{\text{tsf}}\left|\frac{\text{ton}}{2000\text{ lb}}\right| = 5.0\times10^{-5}\,\frac{\text{ft}^2}{\text{lb}}$$

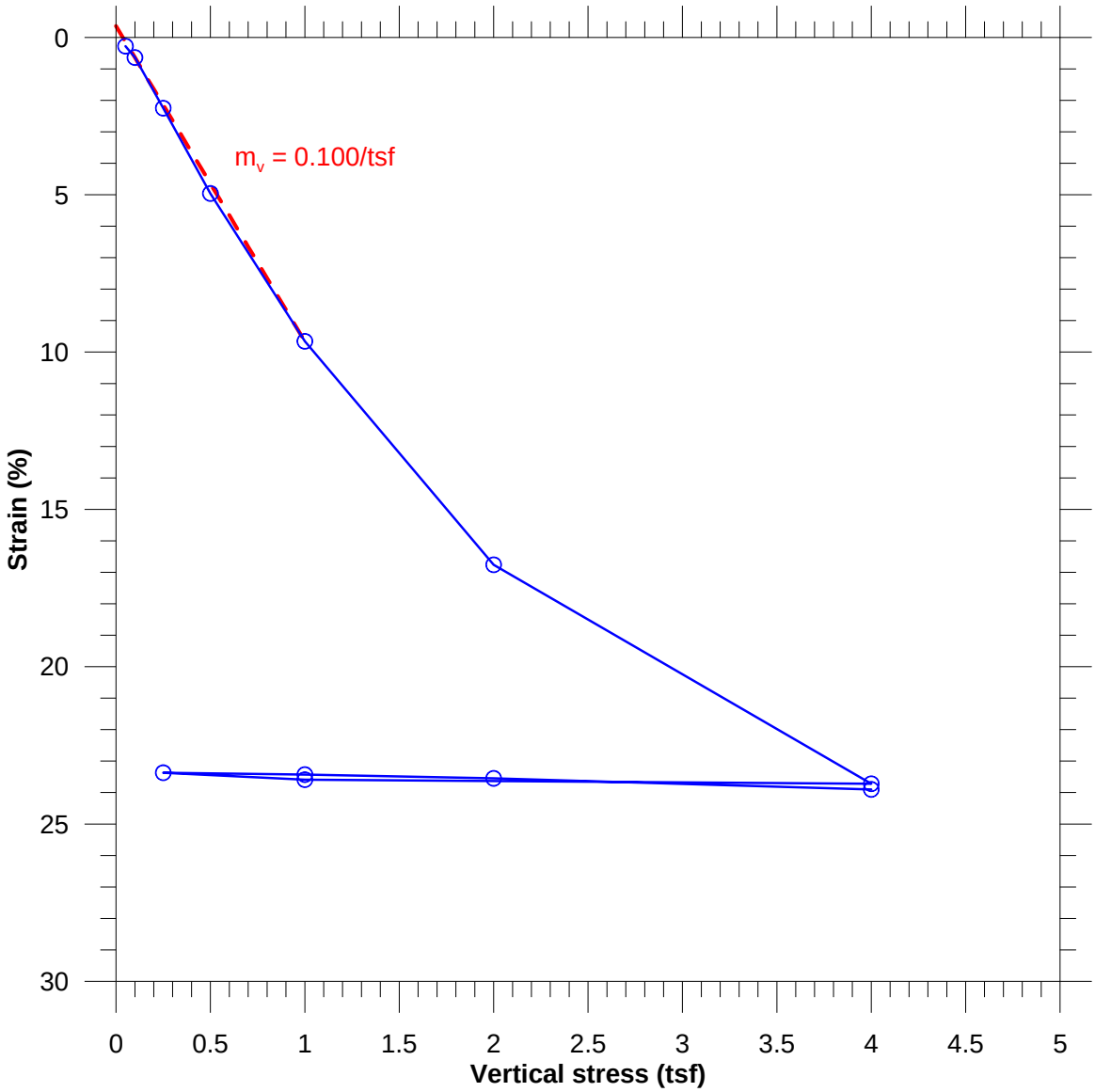


Figure 4. Final strain at the end of each loading step

Estimation of hydraulic conductivity

The hydraulic conductivity of each sample is estimated from Equation (4):

$$K = \gamma_w \, m_v \, c_v$$

The unit weight of water is about 62.43 lb/ft^3. For test C-25, over the stress range of 0 to 1.0 tsf, we estimated m_v = 0.10 /tsf = 5.0×10^{-5} lb/ft^2. The value of c_v at the end of this stress range is taken directly from the reported consolidation test data (Step 5), 4.36×10^{-3} in^2/s. The hydraulic conductivity is therefore:

$$K = \left(62.43\frac{\text{lb}}{\text{ft}^3}\right)\left(5.0\times10^{-5}\,\frac{\text{ft}^2}{\text{lb}}\right)\left(4.36\times10^{-3}\,\frac{\text{in}^2}{\text{s}}\right)\left|\frac{\text{ft}^2}{144\,\text{in}^2}\right|$$

$$= 9.45\times10^{-8}\,\frac{\text{ft}}{\text{s}}$$

$$K\left(\text{cm/s}\right) = K\left(\text{ft/s}\right)\left|\frac{30.48\,\text{cm}}{\text{ft}}\right|$$

$$= 2.9\times10^{-6}\,\frac{\text{cm}}{\text{s}}$$

As indicated below, the order-of-magnitude value of the hydraulic conductivity is relatively insensitive to value of c_v specified in the calculation.

Stress step	**Reported c_v (in^2/s)**	**Estimated K (cm/s)**
2	2.48×10^{-3}	1.6×10^{-6}
3	3.96×10^{-3}	2.6×10^{-6}
4	3.77×10^{-3}	2.5×10^{-6}
5	4.36×10^{-3}	2.9×10^{-6}

References

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Terzaghi, K., 1943: **Theoretical Soil Mechanics**, John Wiley & Sons, New York, New York.

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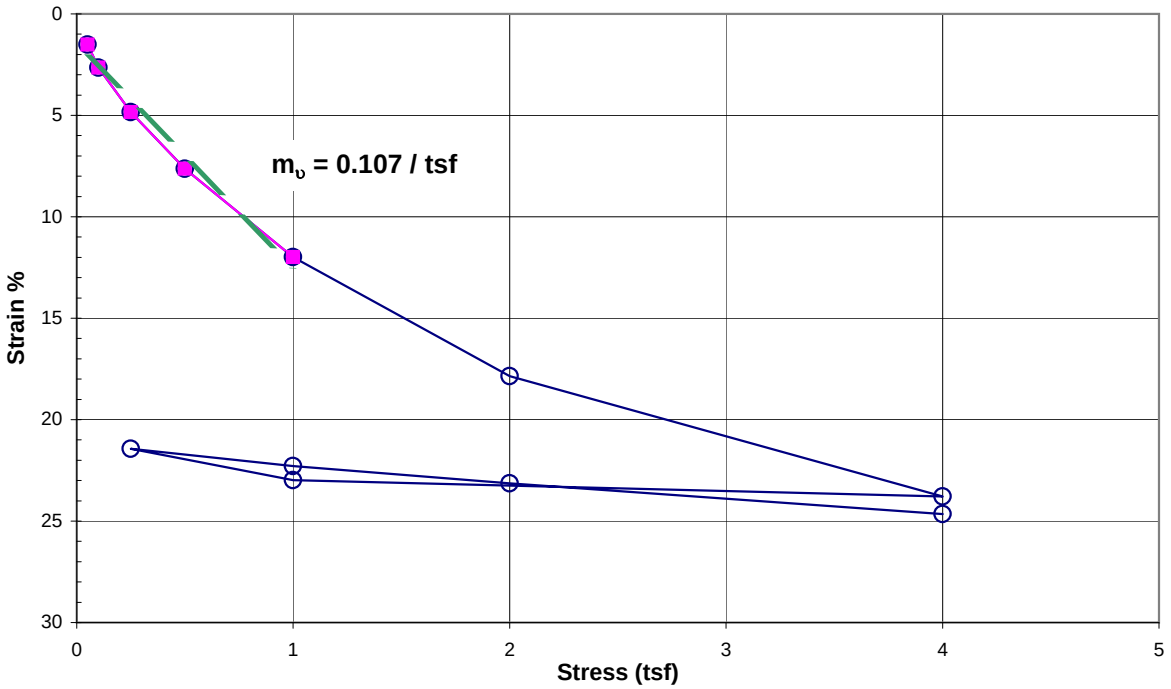
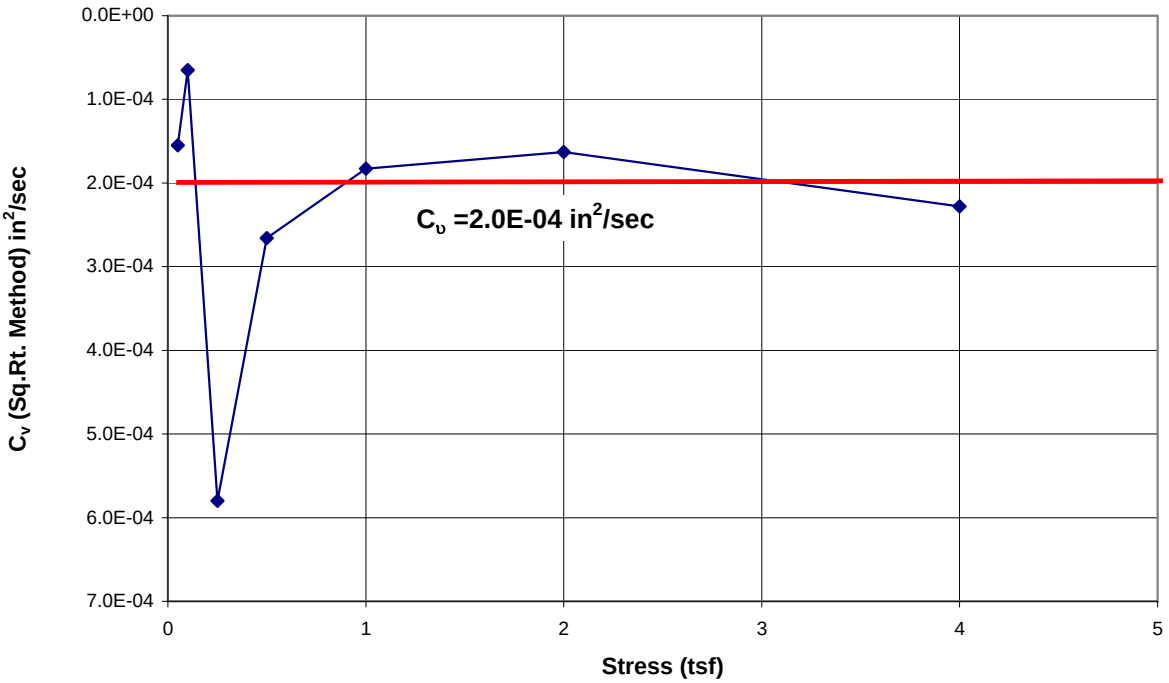
Estimation of coefficient of volume change (m_v) and estimation of coefficient of consolidation (c_v).

The following graphs illustrate the derivation of the parameters m_v and c_v for the eleven consolidation tests conducted on samples from the silt and clay unit in Remediation Area D. The samples for which results are presented are the following:

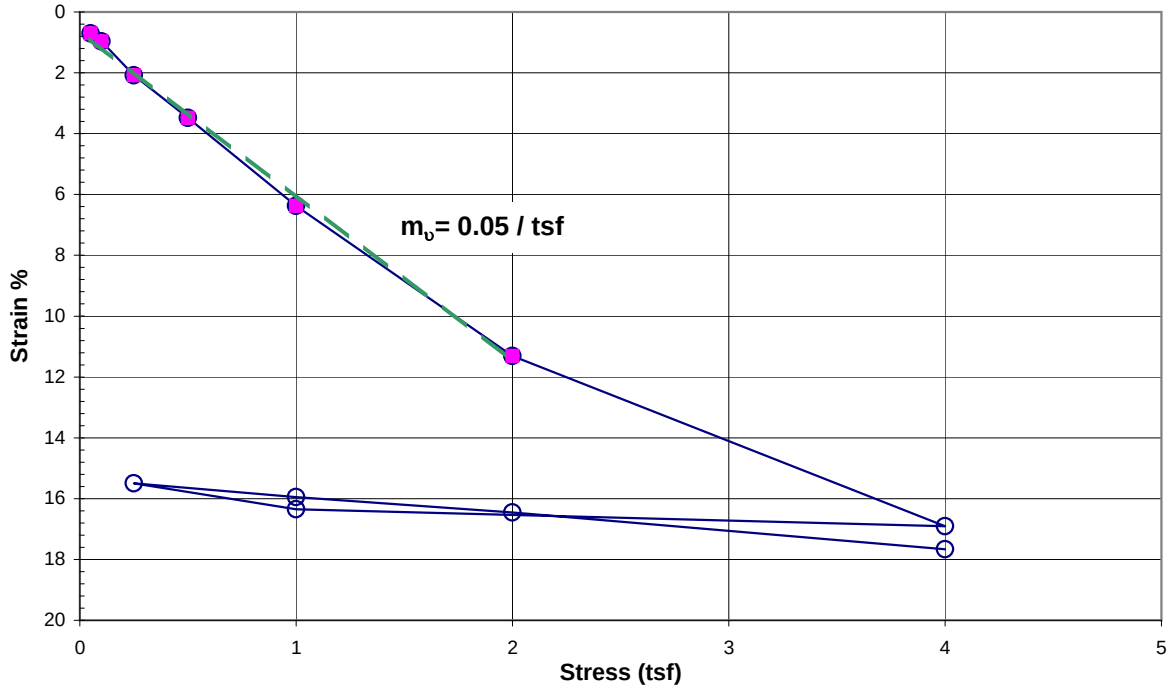
1. OL-STA-10013 41-43’
2. OL-STA-10018 48-50’
3. OL-STA-10022 64-66’
4. OL-STA-10024 64-66’
5. OL-STA-10025 52-54’
6. OL-STA-10026 50-52’
7. OL-STA-20001 45-47’
8. OL-STA-20007 39-41’
9. OL-STA-20018 47-49’
10. OL-STA-10108 64-66’
11. OL-STA-10108 68-70’

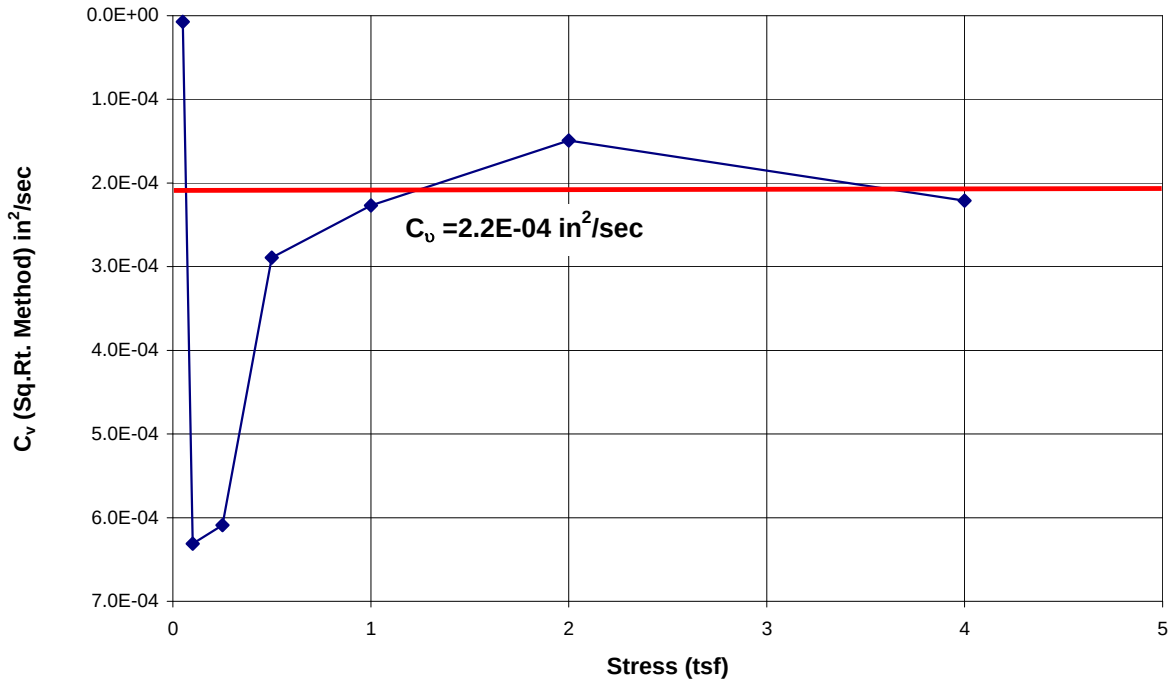
OL-STA-10013 (depth 41'- 43')



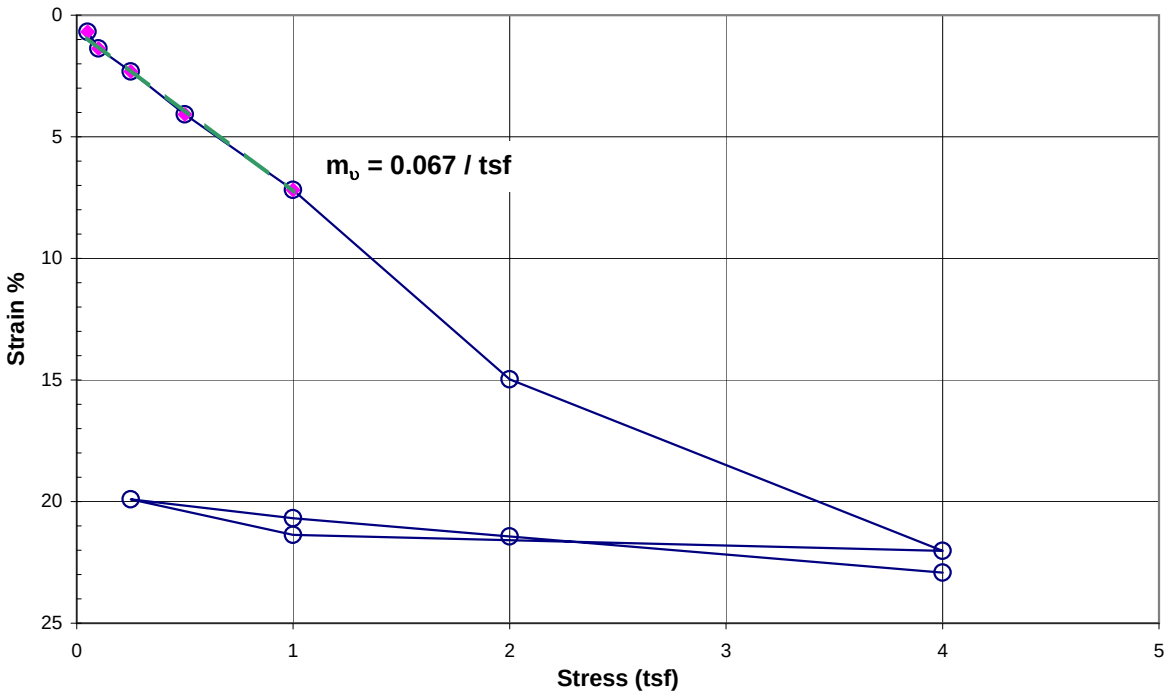


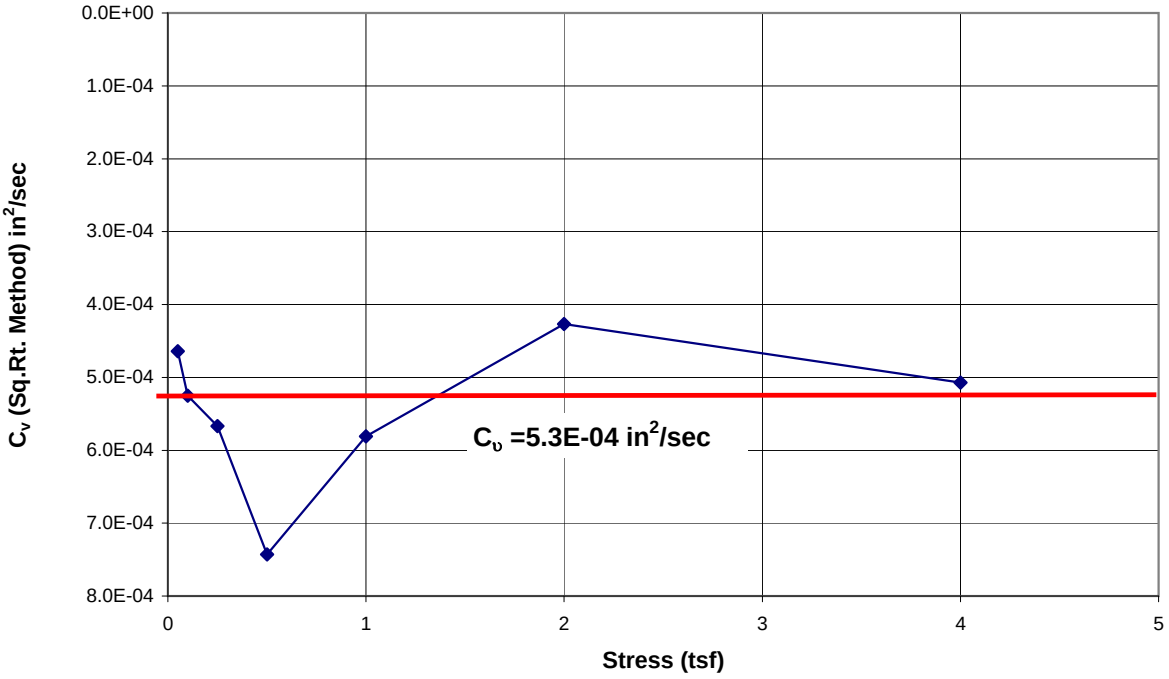
OL-STA-10018 (depth 48'-50')



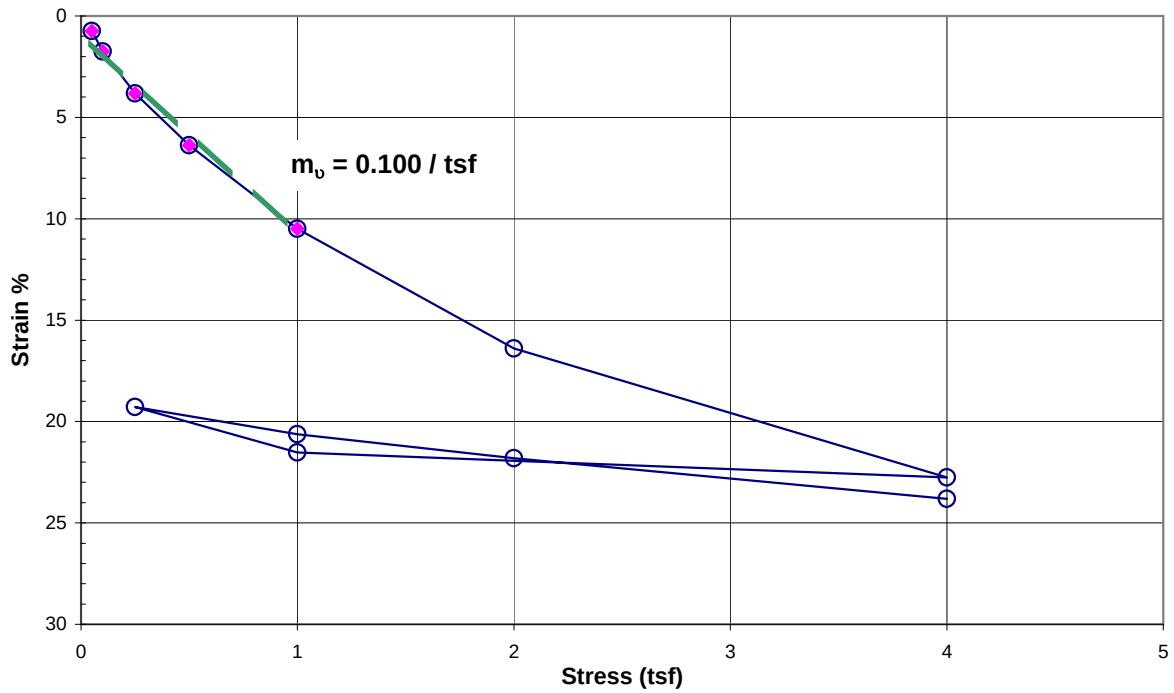


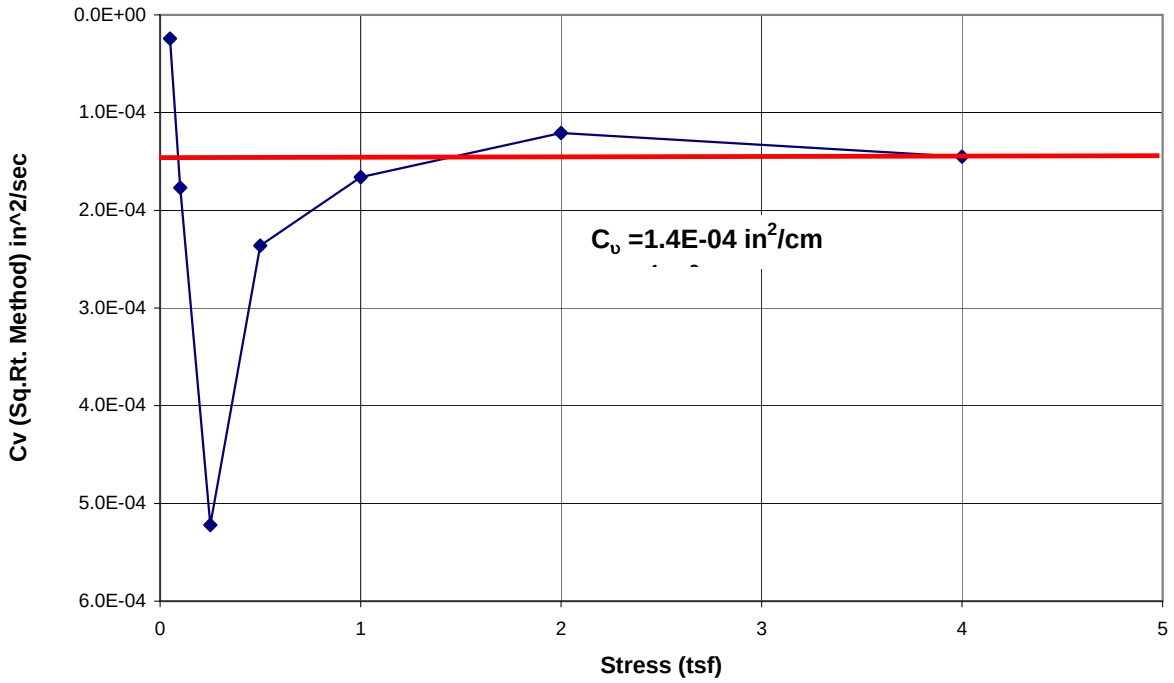
OL-STA-10022 (depth 64'-66')



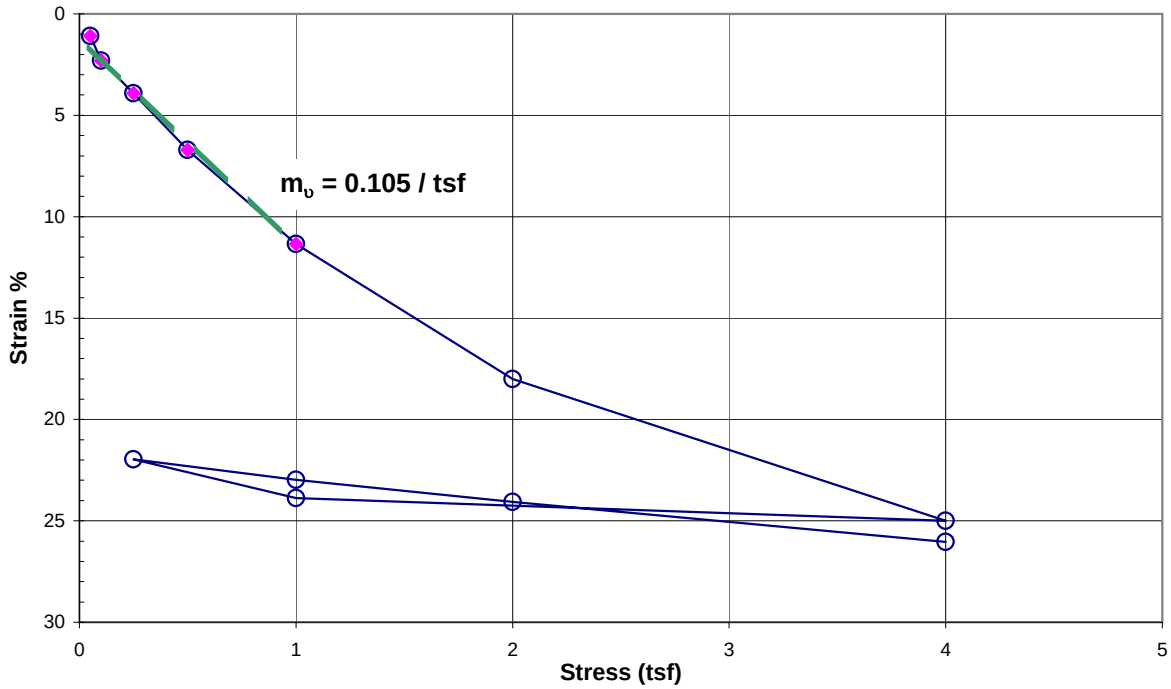


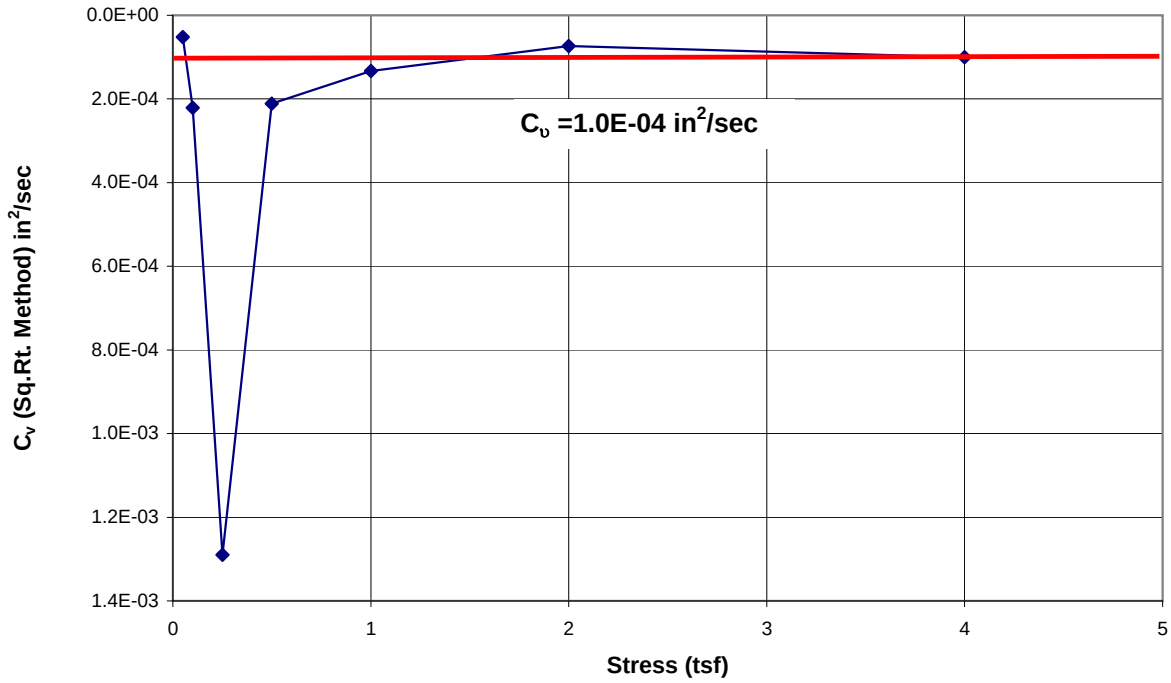
OL-STA-10024 (depth 64'-66')



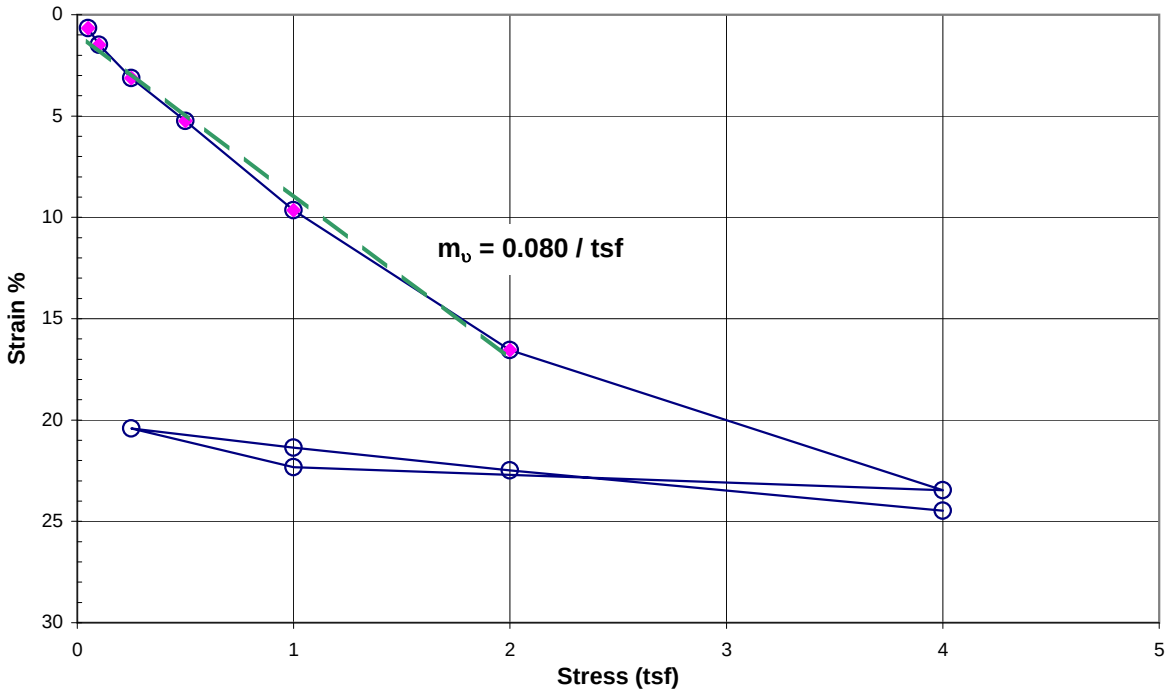


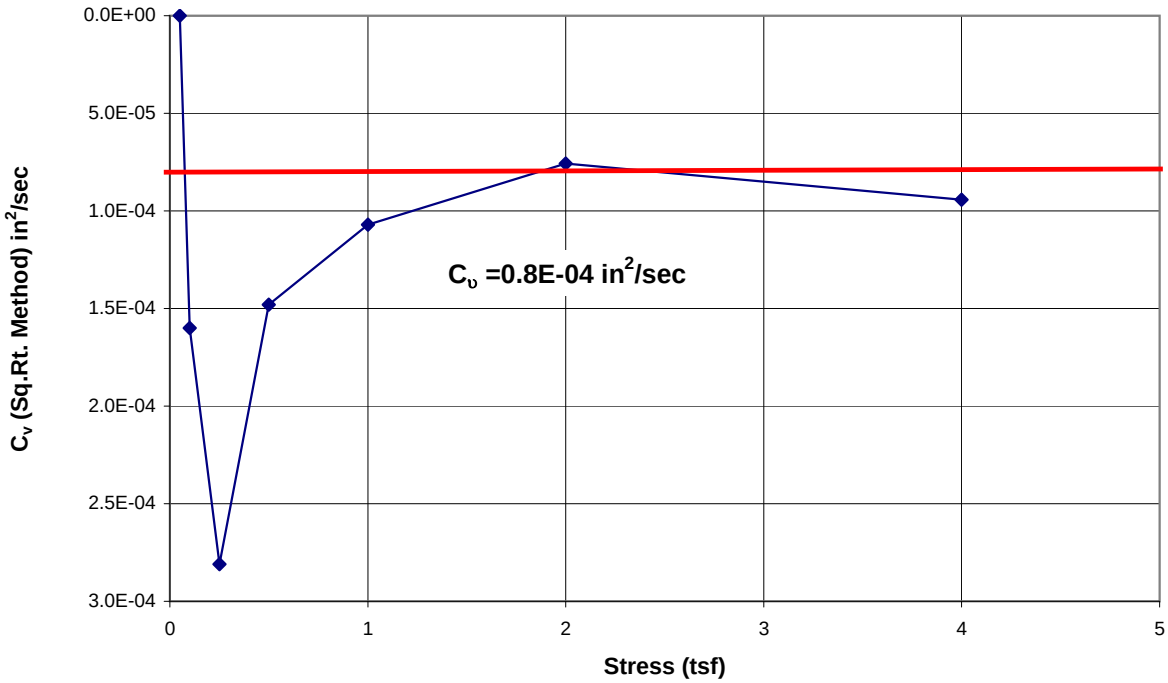
OL-STA-10025 (depth 52'-54')



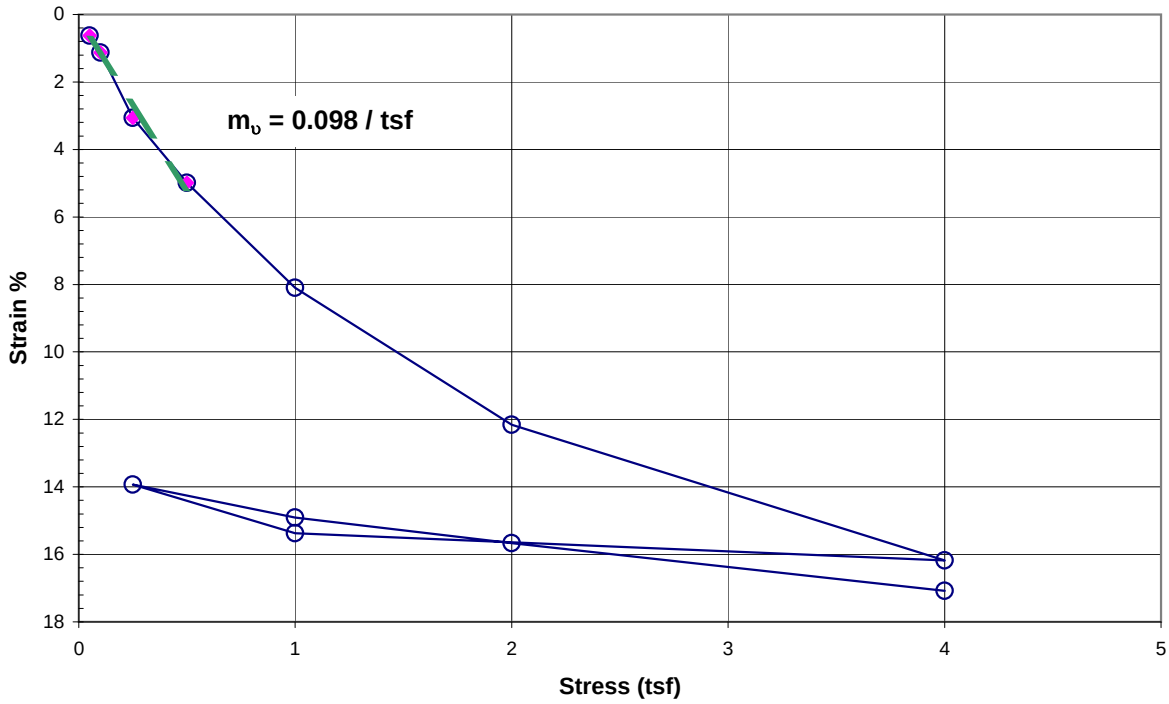


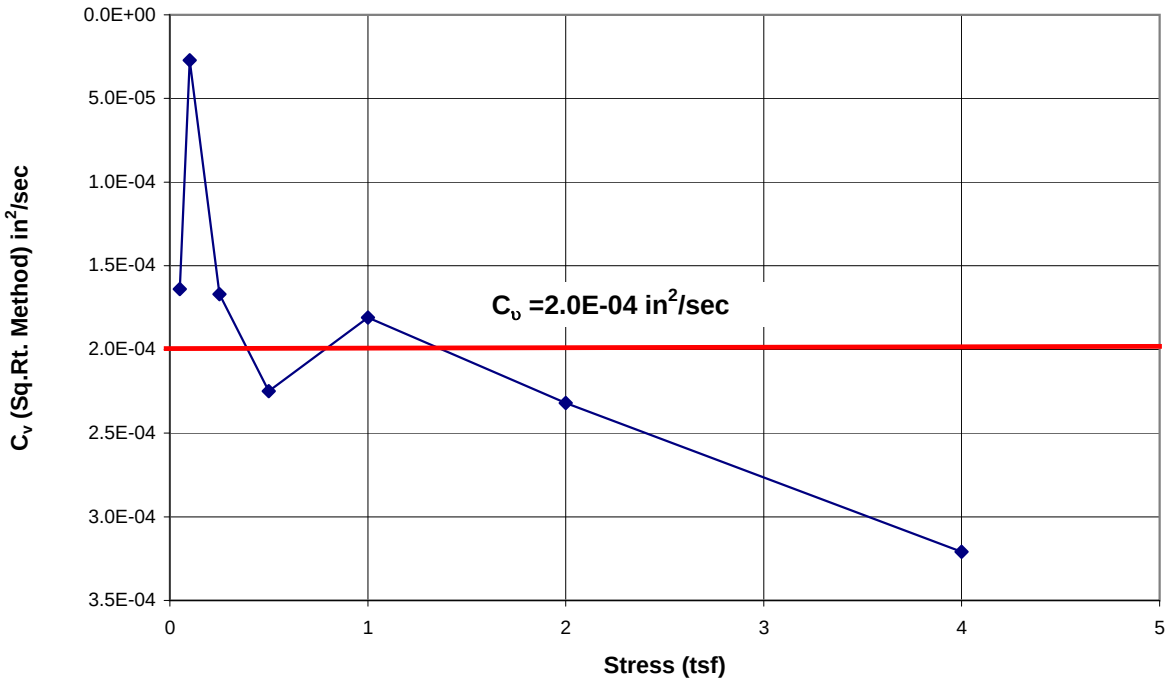
OL-STA-10026 (depth 50'-52')



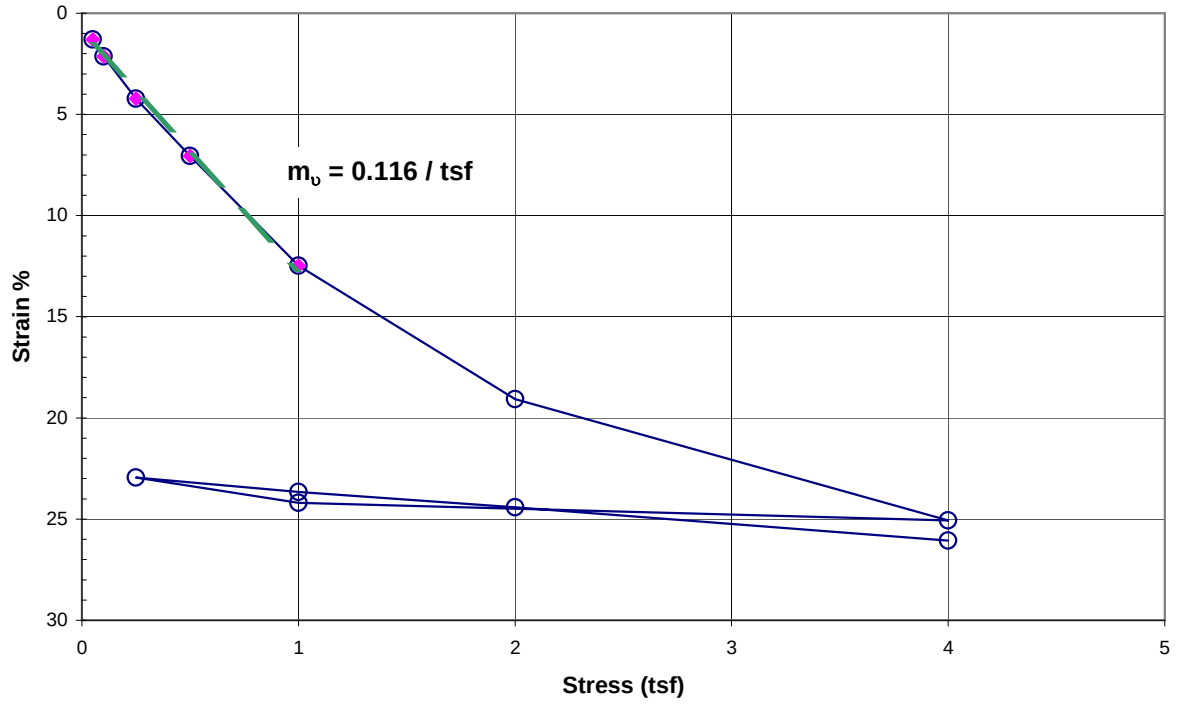


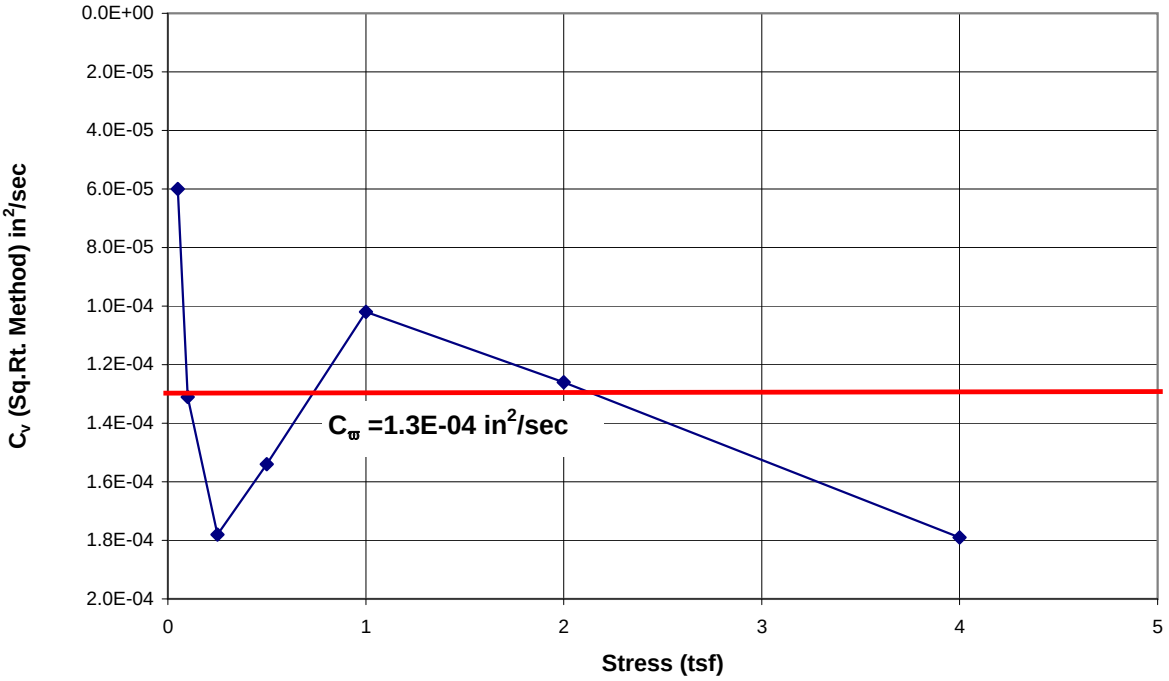
OL-STA-20001 (depth 45'-47')



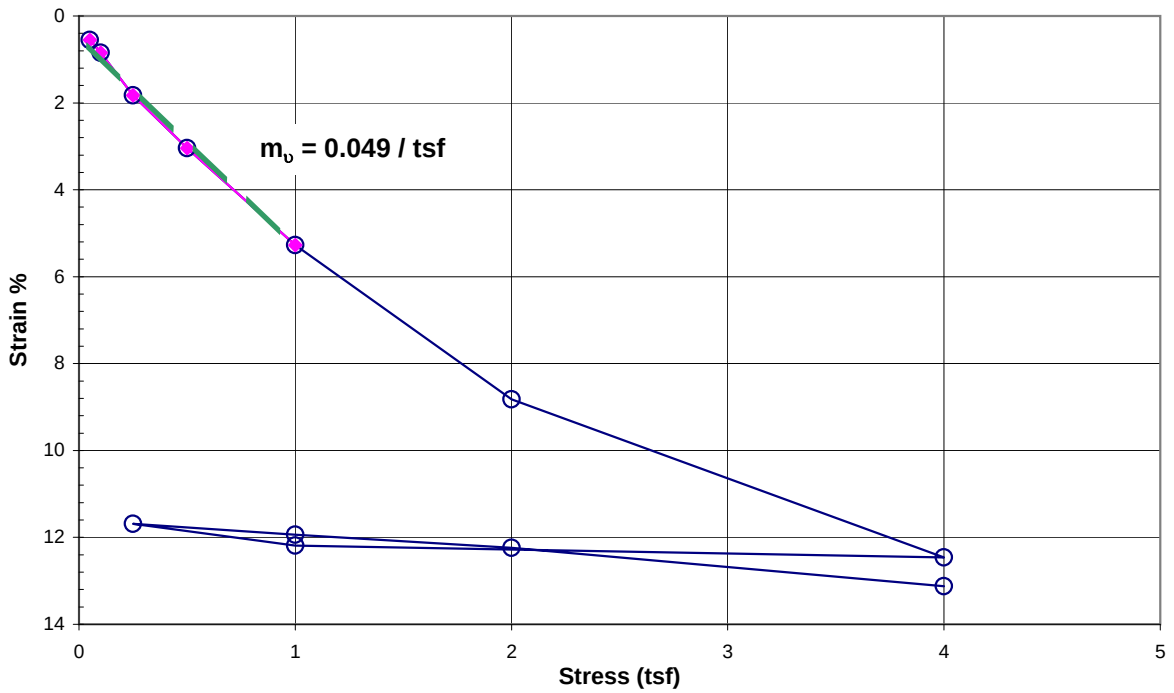


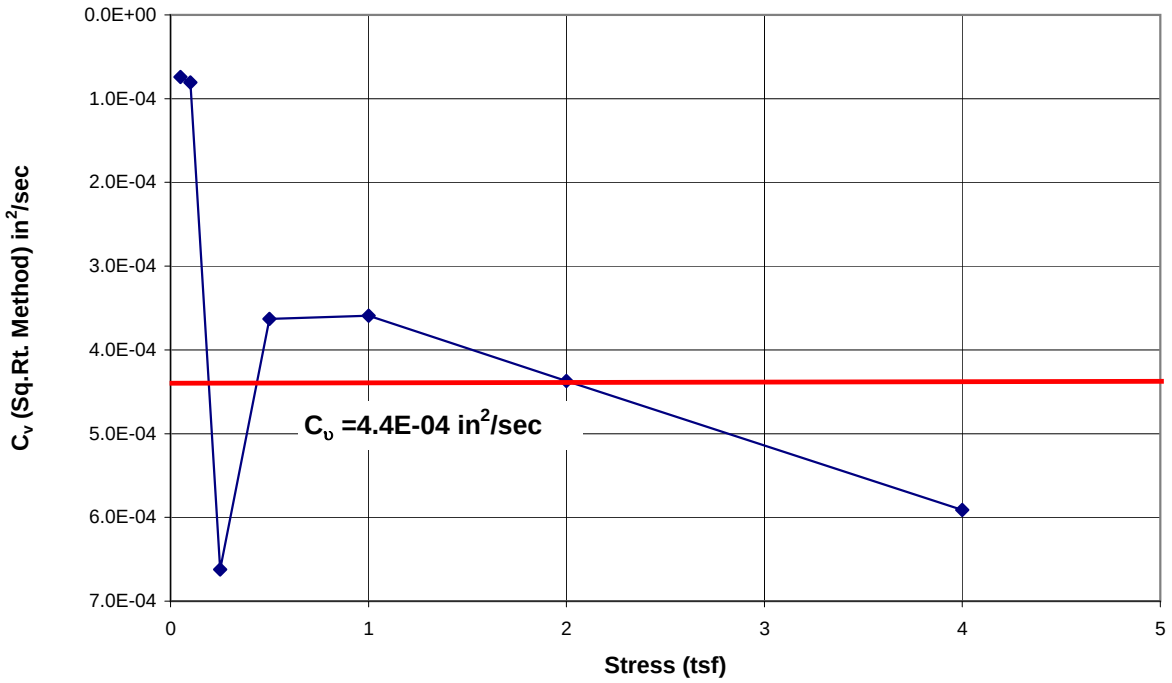
OL-STA-20007 (depth 38.6'-40.6')



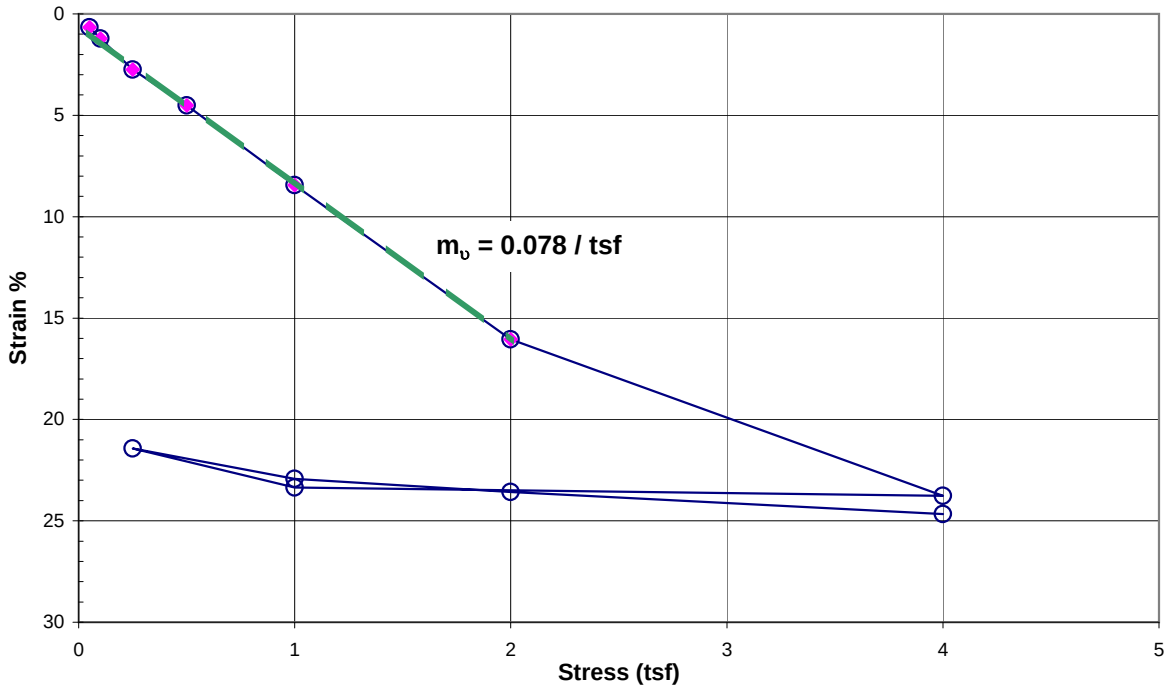


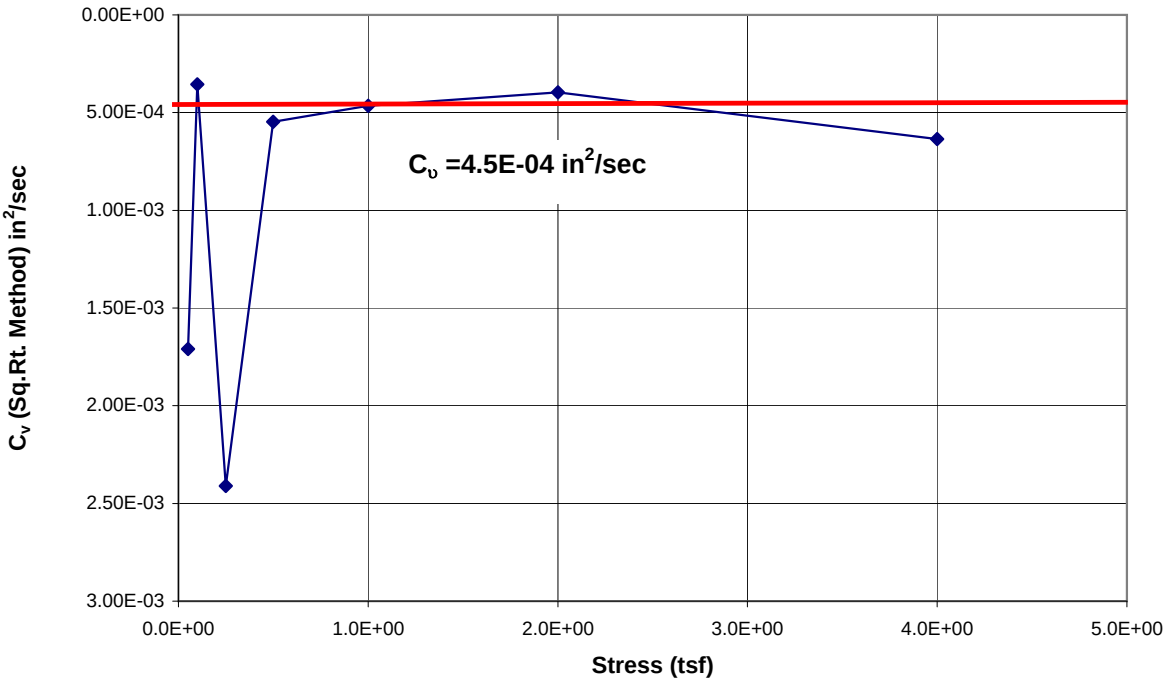
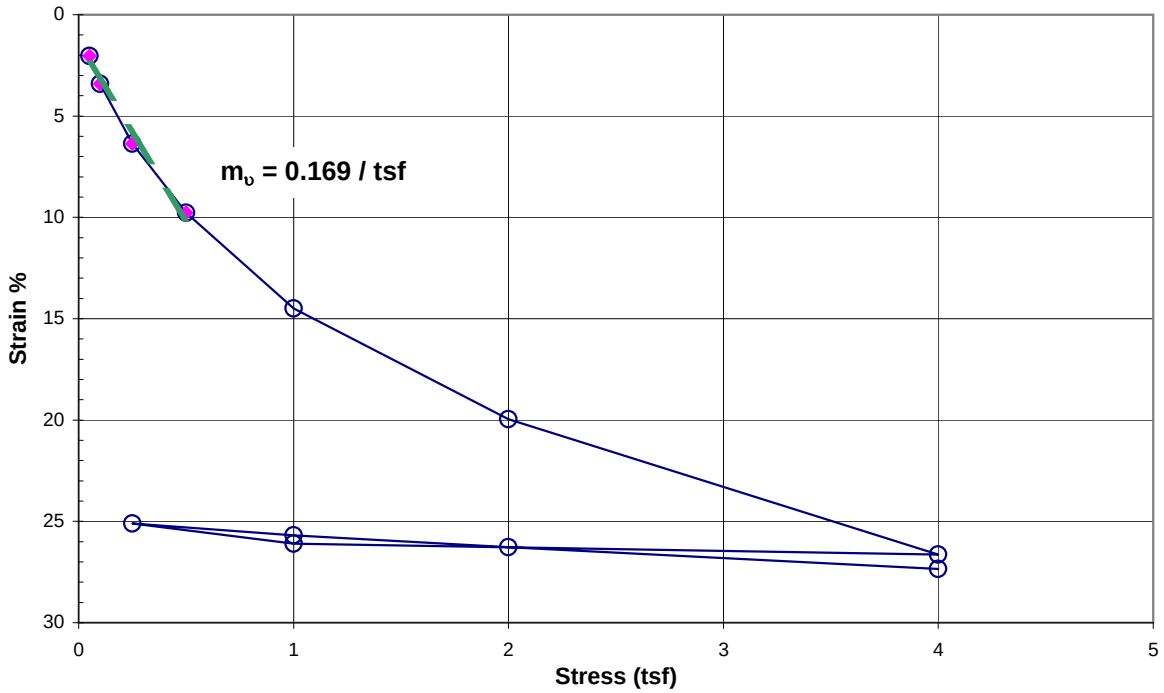
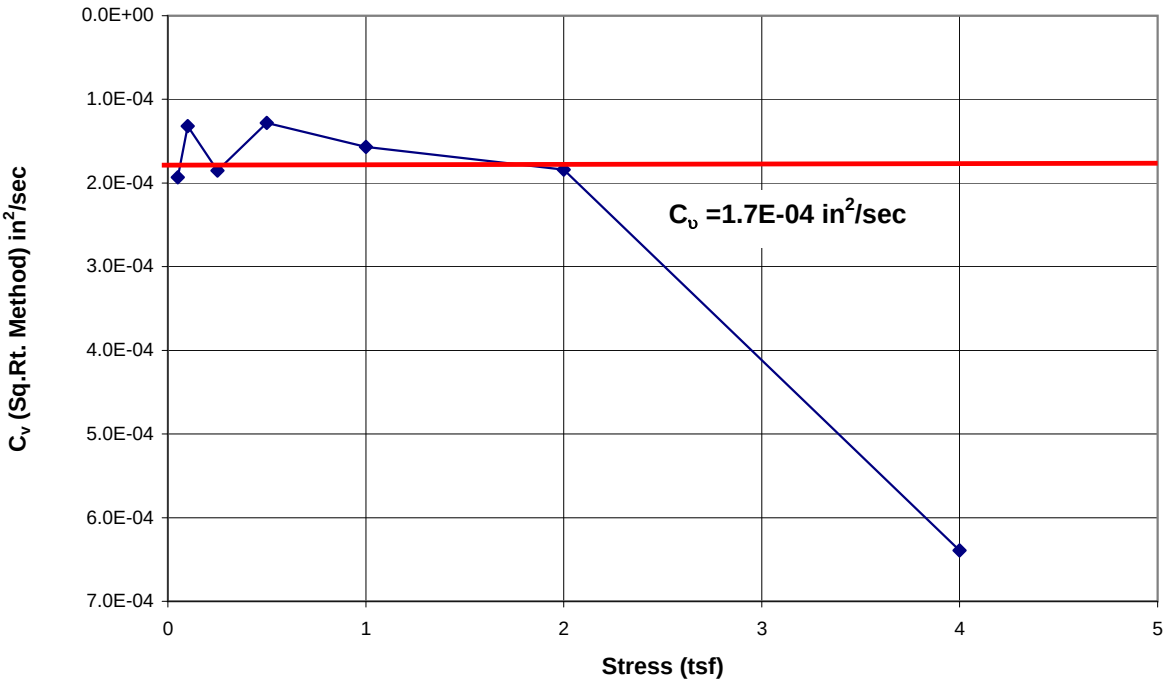
OL-STA-20018 (depth 47'-49')





OL-STA-10108 (depth 64'-66')





OL-STA-10108 (depth 68'-70')