High Resolution Paleolimnology of Lakes in the Athabasca Oil Sands Mining Region, Alberta, Canada

by

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A thesis submitted to the Faculty of Graduate and Postdoctoral Affairs in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

in

Earth Sciences

Carleton University
Ottawa, Ontario

Abstract

The Athabasca oil sands (AOS) represent one of Canada's most economically important natural resources. Understanding the origin, fate and long-term impact of these industrial operations requires geoscientific knowledge of the potential environmental impacts. To quantify current impact an understanding of long-term environmental drivers is required. Here we utilize arcellaceans (testate lobose amoebae) to identify the long-term peleoecologic history of the area, against which ecological stress associated with anthropogenic activities may be defined.

Surface sediment samples were collected from 63 lakes forming a 75 km radius encompassing potential airborne and waterborne contaminate pathways. Total mercury (THg) in lakes close to the AOS were similar to values recorded in lakes farthest away and to values recorded in lakes surrounding coal fire plants in central Alberta. All lakes except one had THg concentrations lower than current CCME guidelines. The spatial extent of arcellacean ecosystem stress did not correlate with THg concentrations.

To understand the long-term history of the AOS area a freeze core (ALE) spanning 1,870 cal yr BP - present was used to assess how climate anomalies influence lake hydrology and ecology. Deconvolution of the grain size spectra indicates that populations are likely responding to overarching environmental controls. The coarser bedload material was interpreted to reflect high discharge events that occur during spring melts. A proxy ratio of the coarse:fine fractions demonstrates abrupt oscillations of both high and low frequency and indicates that variation in spring melt volume and velocity was likely forced by climate change. Further

investigation of the grain size data showed that the hydrologic character of ALE has responded to known ocean-atmosphere cycles, particularly the El Niño Southern Oscillation (ENSO) and that these cycles are underwent abrupt expression shifts every ca. 270-370 years. We attribute the expression shift to movement of the jet stream, which controls air mass distribution at this locality. An investigation of the ecological character of ALE from 1875 AD - present reveals that the arcellacean community was also influenced by climate anomalies and that decreased nutrient input, which is a function of precipitation during the El Niño phase of ENSO, applied stress to benthic ecology in these boreal lakes.

Acknowledgments

It is a pleasure to finally thank the many people that have been a part of this project. This thesis would not have been possible without the valuable contributions of several individuals, including friends, teachers, and colleagues. I am most grateful to my supervisors and mentors, Dr. Paul Gammon, research scientist for the Geological Survey of Canada and Dr. Tim Patterson, professor of Earth Sciences at Carleton University, for their advice and encouragement. All of which was invaluable during this thesis program.

I give thanks to the Geological Survey of Canada, Environment Geoscience Program CORES project for providing the funding for this project and CORES team for their assistance and support throughout the entire project but notably during fieldwork. I also thank Dr. Graeme Swindles and Dr. Jennifer Galloway for their mentorship and assistance, they've been supportive from start (on the ice road) to finish. I acknowledge the Earth Sciences department at Carleton University for their support, and would like to thank graduate students past and present. I am particularly grateful that Andrew Macumber transferred into the Ph.D. program and took this interesting journey with me.

I would like to express my deepest thanks to my family and friends for their encouragement throughout my academic studies. Mom, Dad and Shell B.Sc.Pharm (my little sister the pharmacist), all I have to say is that you guys are amazing. Thank you Dr. Ellen Robb (wow, it seems like just yesterday we were undergrads), Karen Vaccaro (Logan; I can't believe we found each other after so much time) and Dr. Francine McCarthy for your continued encouragement.

Preface

The following is an integrated thesis consisting of one peer-reviewed journal article and three manuscripts ready for submission. The order of the submitted manuscripts follows the order of assumed publication given that later manuscripts reference work in earlier manuscripts. For the research described in each article, I along with the CORES team formulated the problem to be addressed; I had the primary role in the design and execution of fieldwork as well as analysis of the acquired data and final interpretation. As the first author, I took the leadership role in developing the content of each article and in drafting the supporting figures and tables. I preformed the majority of the data modeling and analyses, excluding the spectral and wavelet analyses, which were preformed by Dr. Graeme Swindles, and the deconvolution work, which was preformed by Dr. Paul Gammon. For each article, co-authors Dr. Gammon and Dr. Tim Patterson provided guidance during planning, execution of fieldwork and during the interpretation of results. Dr. Gammon also contributed greatly to the finalization of the age models used. The remaining co-authors provided comments on the form and content for each article in addition to specific contributions described below. Dr. Martine Savard GSC- Québec is the CORES project manager and was an integral part of project planning. Mr. Andrew Macumber B.Sc., Ph.D candidate, assisted with fieldwork.

For each article the text, tables and figures are reproduced in whole. Table and figure numbers as well as references have been updated in accordance with the thesis document. Complete bibliographical details for each article are listed below.

1. Neville, L.A.[a], Patterson, R.T.[a], Gammon, P.[b], Macumber, A.L.[a]. 2013. Relationship between ecological indicators (arcellacea), total mercury concentrations and grain size in lakes within the Athabasca Oil Sands region, Alberta. Environmental Earth Sciences, DOI: 10.1007/s12665-013-2979-6.

2. Neville, L.A.[a], Gammon, P.[b], Patterson, R.T.[a], Savard M.M.[d.]. in prep. Grain size distributions and cyclic sedimentation processes in a lower Athabasca lake, northeastern Alberta, Canada.

3. Neville, L.A.[a], Gammon, P.[b], Patterson, R.T.[a], Macumber, A.L.[a], Swindles, G.T.[c]. in prep. Solar driven abrupt changes in the El Niño/Southern Oscillation expression: influence on northern Alberta precipitation.

4. Neville, L.A.[a], Gammon, P.[b], Patterson, R.T.[a], Swindles, G.T.[c], Macumber, A.L.[a]. in prep. The Ecological Response of Lacustrine Protists to Climate Cycles in Northern Alberta, Canada.

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1 Introduction

1.1 General Introduction

The Alberta oil sands represent one of Canada's most economically important natural resource. Understanding the long-term impacts of these industrial operations requires geoscientific knowledge of the potential environmental impacts in north-eastern Alberta and western Saskatchewan.

The research presented in this thesis is an integral part of the "Coal and Oil Resources Environmental Sustainability Project (CORES)"; a multidisciplinary research project currently being conducted by the Geological Survey of Canada, an agency of Natural Resources Canada. The CORES project is part of a long-term Natural Resources Canada objective of identifying disturbances and risks to ecosystems due to the development of natural resources; and using this knowledge to mitigate any potential risks to ecosystem health.

At present, there is a lack of knowledge as to the origin and fate of metal and organic contaminant emissions from oil sands operations. The overall aim of CORES is to firstly determine a reliable method for discriminating anthropogenic from natural contaminant sources, and secondly to determine what ecological impacts, if any, can be attributed to metal or organic contaminants emanating from oil sands operations. Various environmental receptors such as air samples, carbonaceous material, lake sediments, soils, and tree rings are being or will be used to understand both the spatio-temporal distribution of contaminants, and the paths and mechanisms by which hazardous substances are transported to ecosystems in north-eastern Alberta and western Saskatchewan. The overall objective for the geoscientific knowledge generated by CORES research is for it to inform national environmental guidelines and regulations in relation to the development and use of oil sand natural resources; and if necessary, to contribute towards contaminant mitigation strategies.

1.2 Thesis Research

The research conducted in this study focused on the spatio-temporal ecological/paleoecological aspects of CORES research. We did this by undertaking a multi-proxy study of lake surface sediments and cores in two transects selected to mimic probable contaminant transport routes, one waterborne transect and one airborne transect. We therefore aimed to interpret the paleoenvironmental character/histories of the lakes selected. By doing so we contributed to the CORES research objectives by providing the paleoecological, paleolimnological, sedimentological, stratigraphic, and chronostratigraphic framework for understanding contaminant input, via different pathways, into lakes around the oil sands operations. This study also provided new knowledge on arcellacean ecology and paleoecology by furthering our understanding of the environmental interaction and response of these organisms. The specific contaminant focused on for the spatial investigation was mercury and the lake selected for the detailed climatic reconstruction is situated at the edge of the Polar front, and is therefore particularly sensitive to climatic changes involving movement of air masses or the jet.

1.3 Research in the Athabasca oil sands: a concise literature review

Surface mining of the Athabasca oil sands deposits began in the mid 1960's north of Fort McMurray (Alberta Energy 2008). Large-scale development of the oil sands has been underway since ~1978, and there are currently three commercial operations in production (Harris, 2007). Associated surface mining and tailings management has led to the disturbance of large areas of Boreal Forest. Current mine development has disturbed over 500 km^2, as oil production now exceeds over ~1.5 Mbbls/day of crude oil. If development meets expectations, production will approach 3 Mbbls/day by 2020 (CAPP, 2011).

The transport and impact of contaminates from the oil sands has received significant research and regulatory focus (see the many Regional Aquatics monitoring Program (RAMP - http://www.ramp-alberta.org/RAMP.aspx) and Cumulative Environmental Monitoring Association (CEMA - http://cemaonline.ca/) studies (Kelly et al., 2009; Kelly et al. 2010).

Previous limnological and paleoecological research has focused on the Peace-Athabasca Delta (PAD), an area ~100-150 km (straight-line distance) downstream but not downwind of from the oil sands operations. These studies have mainly focused on the investigation of surface sediments, typically only using a single indicator of past change, and/or have employed a low spatial and temporal resolution (centennial-scale). In addition the majority of studies investigating the transport and affects of airborne contaminates such as polycyclic aromatic compounds (PAHs), SO_x and NO_x (Hazewinkel et al., 2008; Kelly et al., 2009; Curtis et al., 2010) utilize diatoms as the ecological indicator, which are not strictly indicators of benthic conditions (Hazewinkel et al., 2008; Curtis et al., 2010).

The studies conducted by Hazewinkel et al. (2008) and Curtis et al. (2010) both investigated the affects of atmospheric emissions on lake acidification. Regional emissions of oxidised sulphur and nitrogen compounds increased rapidly over the period of oil sands development and similar emissions have been linked to lake acidification in other parts of North America and Europe (Curtis et al., 2010). Curtis et al. (2010) found evidence of industrial contamination based on spheroidal carbonaceous particles (SCPs), but there was no clear industrial signal in stable isotopes. Hazewinkel et al., 2008 also found no evidence that the lakes had become acidified. Both sets of researchers found changes in diatom assemblages and sediment C:N ratios consistent with nutrient enrichment over various timescales, but the relatively low resolution of their studies prevented discrimination of any oil sand operations signal in their data. These authors suggested that the potential drivers could include climatic change, forest fires and anthropogenic nitrogen deposition. Hazewinkel et al. (2008) suggests that the absence of evidence for acidification does not imply that emissions from the oil sands are environmentally benign, but rather that the biogeochemistry of these lakes differs from well studied acidified lakes in Europe and North America.

In contrast, Kelly et al. (2009) claim that oil sands operations are a greater source of contamination than previously realized. They show that in 2008, within 50 km of oil sands upgrading facilities, the loading to the snowpack of airborne particulates was 11,400 tons over 4 months and included 391 kg of PAHs, equivalent to 600 tons of bitumen. Dissolved PAH concentrations in tributaries to the Athabasca River increased from 0.009 g/L upstream of oil sands development to 0.023 g/L in winter and to 0.202 g/L in summer downstream. In melted snow, dissolved PAH concentrations were up to 4.8 g/L, although they concluded that due to hydrological unknowns (e.g. spring snowmelt washout rain events), this data cannot be taken as representing a known flux to the environment, suggesting that these issues require more research. Furthermore, there is no discrimination in the Kelly et al. (2009) river water data between oil sands operations-derived PAHs and those sourced from naturally outcropping and eroding bitumen along the banks of the Athabasca River. In a similar study, Kelly et al. (2010) sampled a number of environments upstream and downstream of the oil sands operations and found high metal contaminant loadings in and around the operations. However, the issue of natural versus anthropogenic metal sources remains unresolved in this data since the high concentration sites in the study coincide with outcropping bituminous Fort McMurray Formation.

It has become apparent that pinpointing environmental change and comparing lake stratigraphies may be difficult in the Athabasca region. Many researchers have found variability between lakes. They are hydrologically distinct and paleolimnological studies show they have responded to many climatic variations in even the past 300 years. A study by Gibson et al. (2010) looked at stable isotopes to estimate water yield in fifty lakes in the Athabasca region. They applied site-specific water yields for each lake to calculate critical loads of acidity using water chemistry data and a steady-state water chemistry model. The main goal of this research was to improve site-specific critical load estimates and to understand the sensitivity to hydrologic variability across a Boreal Plains region under significant oil sands development pressure. Overall, catchment water yields were found to vary significantly over the monitoring period, with distinct variations among lakes and between different regions, overprinted by inter-annual climate-driven shifts. In general, lakes with low (high) water yield tended to be more (less) acid sensitive but were typically less (more) affected by inter- annual hydrological variations. Gibson et al. (2010) suggests that without a long-term lake-gauging network it will be impossible to predict lakes at risk of acidification as lakes in the area are too variable.

A similar study by Wolfe et al. (2007) also used stable isotopes and water chemistry to characterize the water balance and hydrolimnological relationships of 57 shallow aquatic basins in the PAD. Evaporation-to-inflow ratios (E/I) were estimated using an isotope mass-balance model tailored to accommodate basin-specific input water compositions, which provided an effective, first-order, quantitative framework for identifying water balances and associated limnological characteristics characterizing previously identified drainage types. The close relationships evident between water balances and limnological conditions suggest that past and future changes in hydrology are likely to be coupled with marked alterations in water chemistry and, hence, the ecology of aquatic environments in the PAD.

Wolfe et al. (2005, 2006) conducted two similar studies investigating roles of flow regulation of the Peace River and climatic variability on the basin hydro-ecology. Floods caused by ice-jams on the Peace River are considered to be important for maintaining hydro-ecological conditions of perched basins in the PAD.

Concerns over the potential linkages between regulation of the Peace River in 1968 for hydroelectric production and low Peace River discharge during the filling of the hydroelectric reservoir, absence of a major ice-jam flood event, and low water levels in perched basins have sparked numerous environmental studies largely aimed at restoring water levels in the PAD. Both paleolimnological studies indicate substantial variability in basin hydro-ecology over the past 300 years ranging from seasonal to periodic desiccation in the 1700s to markedly wetter conditions during the early 1800s to early 1900s. The reconstruction is consistent with dry climatic conditions that defined the peak of the Little Ice Age and subsequent amelioration evident in conventional ring-width and isotopic analyses of tree-ring records located hydrologically and climatically upstream of the PAD. Although regulation of the Peace River for hydroelectric power generation has been considered a major stressor of the PAD ecosystem, these results show that current hydro-ecological status is not unprecedented as both wetter and drier conditions have persisted for decades in the recent past under natural climatic variability.

Due to the hydrologic sensitivity of lakes surrounding the Athabasca oil sands (Wolfe et al., 2005, 2006, 2007; Hazewinkel et al., 2008; Gibson et al., 2010) some ecological fluctuations may initially appear as stress, which could be interpreted as responses to increased contamination input. Therefore, understating long and short term "background" natural hydrologic changes is important when attempting to identify natural vs. anthropogenic environmental changes.

1.4 Arcellaceans as ecological indicators: a concise literature review

Arcellaceans, informally known as thecamoebians (Patterson and Kumar 2002) or testate lobose amoebae (Mitchell et al. 2008), are rhizopods characterized by a single rigid organic or agglutinated test into which the entire body can be withdrawn (Medioli and Scott 1983; McCarthy et al., 1995). They are found worldwide in moist soils, wetlands, and lakes. They are a diverse and important component of the microbial trophic level within the benthic community of lakes and wetlands, and play a critical role in food webs as the intermediate between bacterial and benthic invertebrate communities (Beyens and Meisterfeld, 2003; Patterson and Kumar, 2002). These epifaunal/ shallow infaunal benthic protozoans, particularly those belonging to the Superfamily Arcellacea, produce a fossilizable test of pseudo-chitinous material that is variably agglutinated by different species (Medioli and others, 1983). Their fossilized tests are found in all aquatic and moist terrestrial sediments although the preservation potential varies between species (Neville et al., 2010b). The fossil remains (tests) of arcellaceans preserve a record of their populations over time. Their tests are generally resistant to dissolution (Medioli et al., 1990; McCarthy et al., 1995) and fossilize well in most aquatic environments (Patterson et al., 1985). Unlike most microfossil groups, arcellaceans do not dissolve in low pH environments, and in comparison to other microfossil types that preserve well (e.g., diatoms, spores and pollen) arcellaceans reflect depositional conditions at the sediment/ water interface of lacustrine freshwater and peat environments where they live and are ultimately preserved (Patterson et al., 1985). Their small size (60-300 μm), combined with their wide distribution in large populations in a variety of freshwater and brackish environments, ensures that even in sediment samples of relatively small volume, statistically significant numbers of tests will commonly be found (McCarthy et al., 1995).

Arcellaceans display a rapid generation time and a high degree of sensitivity to environmental conditions at the sediment-water interface and epibenthic zone (Collins et al. 1990; McCarthy et al. 1995; Asioli et al. 1996; Beyens and Meisterfeld 2001; Scott et al. 2001; Neville et al. 2010b). As a result, they have proven to be useful paleoecological indicators in studies of paleoclimate (Boudreau et al., 2005; McCarthy et al., 1995), sea-level change (Scott et al., 2001), and anthropogenic impact, including the impact of sulphide mining in acid-sensitive lakes in Ontario (Patterson and Kumar, 2002; Kumar and Patterson, 2000; Reinhardt et al., 1998; Patterson et al., 1996) and in Finland (Kauppila et al., 2006; Kihlman and Kauppila 2009). These latter studies led me to investigate their sensitivity to the byproducts of oil sands production. My observations suggest that arcellaceans provide a valuable proxy of wetland and end pit lake ecosystem health and posses the ability to assist in the development of reclamation strategies. Studies show that arcellaceans can be used as indicators of ecosystem health because their populations rapidly respond to changing chemical concentrations in the benthic zone of oil sands tailings ponds (Neville et al., 2011).

The rapid generation time of arcellaceans (typically reproducing once every two to eleven days according to Ogden and Hedley, 1980) allows communities to respond quickly to environmental change. The advantage of using microfossil-based proxy records to indicate water quality and environmental change over conventional monitoring approaches is that microfossils provide a time-averaged signal of current conditions, unlike water chemistry which only indicates conditions at time of collection. The advantage to using arcellaceans over pollen in paleoclimate reconstructions is that arcellaceans show a more discrete climate signal than that of fossil pollen, possibly due to their inability to adapt and tolerate wide ranges of environmental conditions, as well as their rapid generation time, allowing the potential for small-scale environmental changes to be reflected quickly in the geologic record (McCarthy et al., 1995). The short generation time also means that changes in industrial practices can potentially be assessed shortly afterward using arcellacean population response.

To date there have been no studies in the Athabasca oil sands region looking specifically at linking arcellaceans with regional environmental variability, and although arcellaceans have been shown to respond to a variety of environmental parameters (Patterson et al. 1996; Reinhardt et al. 1998; Kauppila et al. 2006; Kumar and Patterson 2000; Escobar, et al. 2008; Kihlmanm and Kauppila 2009, 2010, 2012; Roe et al., 2010; Neville et al. 2010, 2011; Patterson et al. 2012b), to date their environmental and contaminant specificity has not been exploited as an indicator of paleoenvironmental contaminant changes, nor have arcellaceans been used in paleoecological studies at the temporal resolution utilized by this study. The combination of high-resolution with arcellacean microfossils with contaminant loadings was a novel approach in paleolimnological analysis.

1.5 Research Objectives

The primary objective of this study was to establish a spatio-temporal multi-proxy dataset that is used to assess ecological-paleoecological controls on northern Albertan lakes surrounding oil sands operations. To achieve the study primary objectives, research aimed to address multiple goals.

- ❖ Establish what, if any contaminants are being emitted from the oil sands operation;
- ❖ Establish the geographic extent of emissions and determine the primary transport pathway (i.e. waterborne or airborne);
- ❖ Identify any ecological stress associated with potential emissions; and,
- ❖ Discern natural from anthropogenic environmental change by identifying natural climatic controls influencing northern Albertan lakes and establish how current lake dynamics fit into historical trends.

Achieving these aims will create a framework that can then be used to interpret the level of contaminant emissions to lacustrine systems in the study region on benthos and associated environmental disturbances attributable to the exploitation of oil sands, including the degree to which lake sediment geochemistry has changed from natural background levels.

The objectives of each paper listed below address one or multiple primary research aims. Results from the lake sediment core used to characterize temporal climate controls were excellent, in that they allowed for the full characterization of lake hydraulic conditions that were linked to known climate cycles. Assessment of arcellacea preserved in the core permitted characterization of ecological response to these cycles. The results of the paleolimnological study receive much of the focus of this thesis because a detailed understanding of these results is a critical first step in the definition of anthropogenic impact.

The objective of article 1, "Relationship between ecological indicators (arcellacea), total mercury concentrations and grain size in lakes within the Athabasca oil sands region, Alberta" was to delineate the spatial distribution of total mercury in sediment-water interface sediments of lakes to determine if they are: (1) primarily influenced by atmospheric deposition, and/or (2) receiving input from snowmelt, streams or rivers and related tributaries downstream of the oil sands operations; and (3) make an assessment of any total mercury-induced ecological pressure on lacustrine benthic fauna.

The objective of article 2, "Grain size distributions and cyclic sedimentation processes in a lower Athabasca lake, northeastern Alberta, Canada" was to (1) produce a conceptual process-based understanding of the stratigraphic grain size dataset from a freeze core taken in the Athabasca oil sands area that could then move forward to time-series analysis and (2) define the sedimentologic context of the study lake to achieve a process-based interpretation of the grain size populations.

The objective of article 3, "Solar driven abrupt changes in the El Niño/Southern Oscillation expression: influence on northern Alberta precipitation" was to (1) relate the detailed stratigraphic model of the high-resolution local-scale process-based record (developed in article 2) to the larger scale climate forcing factors in the region, and (2) interpret what the abrupt changes in the record may represent.

The objective of article 4, “The Ecological Response of Lacustrine Protists to Climate Cycles in Northern Alberta, Canada”, was to determine if lake ecology in northern boreal regions is influenced by climate cycles.

1.6 Methodology

Each article in this integrated thesis follows a methodology with common elements described in the following section. Some articles contain additional methodologies specific to the research objectives of that article.

1.6.1 Field-based Research

Sixty-five lakes were sampled from the Peace-Athabasca region over a period of three years (2009-2011) (Table1.1), sediment cores were collected from six lakes using a freeze corer and Glew corer, four lakes were sampled with a Glew core only and surface sediment grab samples were collected from the remaining 55 lakes using an Ekman grab sampler. Water samples and water property data (pH, dissolved oxygen, temperature, conductivity, nitrate, ammonium, oxygen reduction potential) were collected at each of the 65 lakes. Lakes were selected in order to create an up/down stream and airborne transect radiating out from the operation (Figure 1.1). Additional lake selection criterion for the lakes included: proximity to the oil sands operation, accessibility, size, maximum depth, and substrate type. Sampling locations were chosen based on water depth, location within the lake and substrate type. Water depth was established using a fish finder. Ideal lakes had water depths of less than 8 m, to reduce the incidence of capturing sediments exposed to bottom water anoxia during summer thermal water column stratification, but greater than 2 m, so as to not have the bottom freeze during the winter. Bottom water anoxia is harmful to arcellaceans because these benthic organisms require oxygenated conditions. Sites that were greater than 3 meters away from the shoreline were targeted, to reduce shore effects (e.g. erosion) on arcellacean assemblages. Substrate types were also important, a muddy substrate was ideal.

Table 1.1: Date and coordinates of samples collected.

Lake Names	Date Collected	Latitude	Longitude
Sask 10W	Oct. 2009	57 30 19.28	109 49 16.46
Sask 10M	Sept. 2010	56 55 15.1	109 43 53.5
Albt D	Sept. 2010	57 04 00.1	110 50 44.8
Albt E	Sept. 2010	56 52 42.0	110 34 5.3
Coffey	Sept. 2010	57 38 37.2	111 25 20.3
Salina	Sept. 2010	57 05 02.6	111 31 37.6
PAD 31	Sept. 2010	58 29 43.8	111 31 19.2
PAD 39	Sept. 2010	58 27 56.8	111 11 02.7
PAD 23	Sept. 2010	58 23 28.3	111 26 37.7
PAD 15	Sept. 2010	58 57 00.0	111 29 35.2
1	Aug. 2011	56 29 09.08	110 14 01.0
2	Aug. 2011	56 26 51.01	110 12 12.02
3	Aug. 2011	56 26 01.05	110 07 24.09
4	Aug. 2011	56 23 14.5	110 24 05.09
5	Aug. 2011	56 12 12.07	110 21 50.04
6	Aug. 2011	56 07 56.00	110 19 50.09
7	Aug. 2011	56 08 06.08	110 42 35.02
8	Aug. 2011	56 16 42.09	110 47 53.01
9	Aug. 2011	56 18 33. 05	110 51 21.08
10	Aug. 2011	56 46 32.08	111 47 24.04
11	Aug. 2011	56 46 58.04	111 47 21.05
12	Aug. 2011	56 46 30.09	111 54 51.07
13	Aug. 2011	56 46 14.09	111 56 41.09
14	Aug. 2011	57 00 16.00	112 56 23.04
15	Aug. 2011	57 01 57.07	112 57 06.05
16	Aug. 2011	57 03 09.00	113 03 22.01
17	Aug. 2011	57 10 30.06	113 24 54.04
18	Aug. 2011	57 11 18.07	113 34 20.02
19	Aug. 2011	57 20 40.04	113 41 35.07
20	Aug. 2011	57 29 19.04	113 45 58.01
21	Aug. 2011	57 28 53.02	113 25 26.07
22	Aug. 2011	57 22 05.02	113 05 28.04
23	Aug. 2011	57 10 09.07	112 37 38.01
24	Aug. 2011	57 02 39.08	110 53 20.00
25	Aug. 2011	57 04 47.00	110 49 45.00
26	Aug. 2011	57 36 05.05	110.39 21.03
27	Aug. 2011	57 38 53.2	110 28 18.0
28	Aug. 2011	57 41 21.08	110 42 06.04
29	Aug. 2011	57 31 09.09	110 53 08.00
30	Aug. 2011	56 40 14.05	111 08 17.03
31	Aug. 2011	56 41 39.05	111 00 08.08
32	Aug. 2011	56 45 57.07	110 54 42.08
33	Aug. 2011	56 53 35.01	110 54 05.05
34	Aug. 2011	56 52 53.04	110 37 28.02
35A	Aug. 2011	56 52 42.09	110 34 24.06
35B	Aug. 2011	56 52 49.06	110 33 14.07
36	Aug. 2011	56 58 57.01	110 32 37.01
37	Aug. 2011	56 59 43.03	110 31 51.07
38	Aug. 2011	57 02 24.03	110 29 09.02
39	Aug. 2011	57 10 30.08	110 11 15.05
40	Aug. 2011	56 51 14.03	111 13 55.08
41	Aug. 2011	56 57 30.04	110 46 39.05
42	Aug. 2011	56 57 07.04	110 45 12.06
43	Aug. 2011	57 01 59.01	110 43 03.03

Table 1.1: cont.

Lake Names	Date Collected	Latitude	Longitude
44	Aug. 2011	57 03 07.06	110 36 12.02
45	Aug. 2011	57 02 44.05	110 35 40.01
46	Aug. 2011	57 04 44.05	110 30 37.05
47	Aug. 2011	57 09 07.01	110 31 04.01
48	Aug. 2011	57 10 18.08	110 27 23.00
49	Aug. 2011	57 12 48.02	110 35 33.08
50	Aug. 2011	57 14 19.02	110 39 02.08
51	Aug. 2011	57 14 08.02	110 47 42.05
52	Aug. 2011	57 25 46.03	110 00 35.02
53	Aug. 2011	57 21 39.02	111 14 48.01
54	Aug. 2011	57 04 16.04	111 28 33.01
50	Aug. 2011	57 14 19.02	110 39 02.08

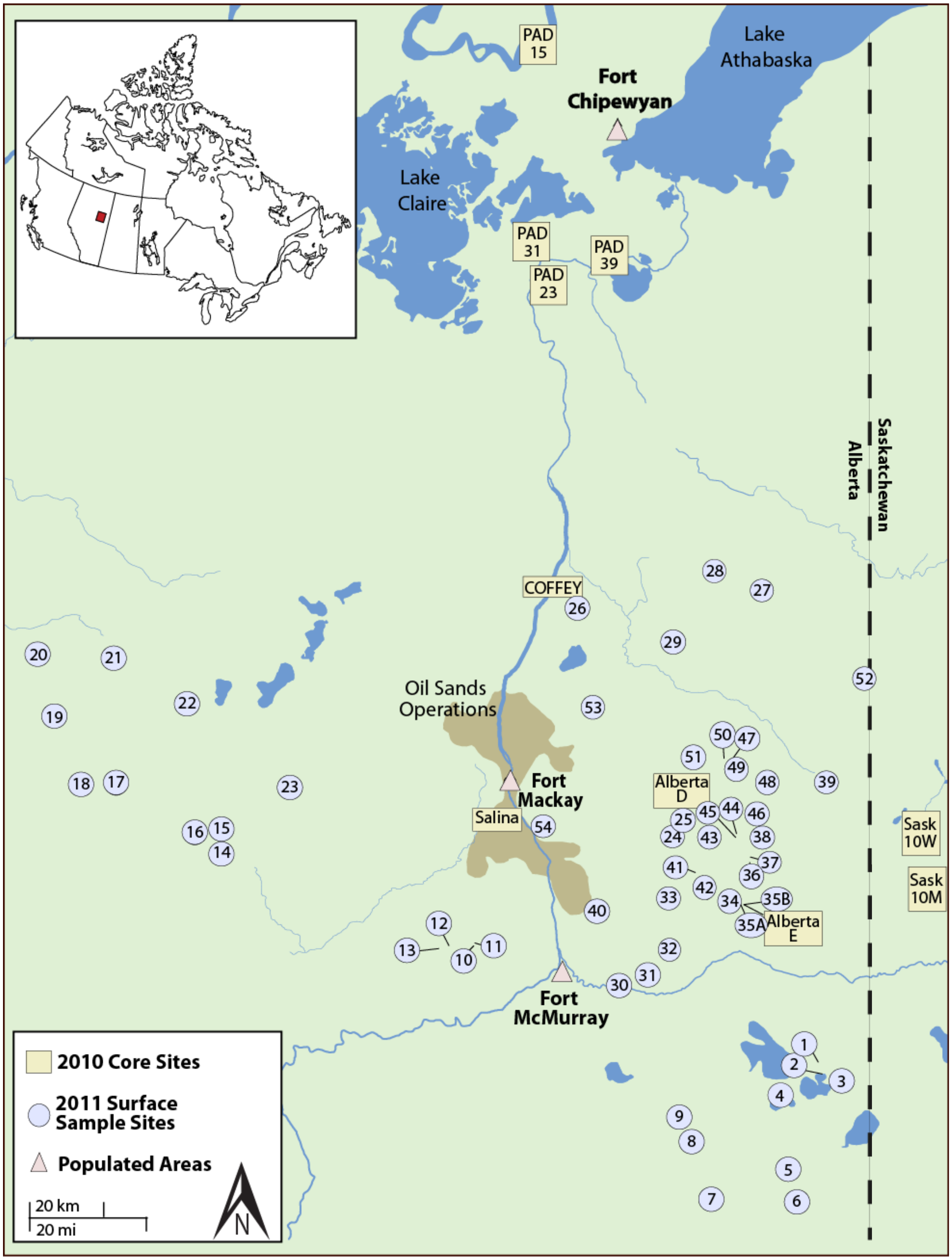

Figure 1.1: Map of sample sites in the Athabasca Oil Sands region of Alberta, Canada.

1.6.1.1 Coring

A single faced freeze corer was used during the 2009 field season and a significantly larger two faced freeze corer was used for core collection during the 2010 field season. The singe faced freeze corer is 1.9 m in length with one metal face, 12 cm wide. The two-faced freeze core is 2.0 m in length with two metal faces, both 15 cm in width. The freeze corers were filled with a slurry of dry ice (solidified carbon dioxide) and isopropanol. The coring device was lowered into the water at a steady pace with the assistance of a coring tripod secured to the sampling/staging raft equipped with a winch and wire attached to the core. The coring device was then pushed with metal core rods into the sediment as far as it could go or to a calculated depth that would not overshoot the sediment-water interface. The coring device remained in the sediment for approximately 20 minutes to allow the lake sediments to freeze to the metal face/faces of the corer. After the required time had passed the core was pulled up and any unfrozen sediment was scraped off horizontally across the face with a chisel since the origin of the unfrozen sediment cannot be ascertained. The core was then placed wood face down on a tarp for transportation to the shore. On shore the dry ice was emptied, and the chamber filled with hot water to loosen the sediment core from the metal face. A hacksaw and chisel were used to separate the core into ~30-60 cm slabs that were secured to wood slats with plastic wrap and duct tape and transported in coolers with dry ice to Carleton University for logging, subsampling and subsequent analysis.

In some cases, due to the distance from dry ice, the freeze corer could not be deployed and an alternate method of sampling was used. In this study the PAD had no source of dry ice and a Glew gravity corer was utilized. In an attempt to collected adequate amounts of sediment, multiple cores were collected from a small area in each lake. After collection each core was capped and placed in a box specially designed to reduce sediment movement during transportation. Cores were transported to the field staging area were a sedimentological description was recorded and the cores were subsampled at 0.5 cm resolution then packed in coolers and shipped to Carleton University for subsequent analysis.

1.6.1.2 Surface Sediment Collection

Surface sediment samples were collected from a float helicopter using an Ekman grab sampler. The top ~ 0.5 cm of the sediment obtained was collected and a sedimentological description was recorded. Samples were packed in coolers and shipped to Carleton University for subsequent analysis. Site 35 was comprised of two large bodies of water connected by a stream. Both bodies of water were sampled and labeled 35A and 35B (Table 1.1).

1.6.1.3 Water Property Data Collection

Water quality characteristics (pH, dissolved oxygen (%), temperature, conductivity (µS/cm), nitrate (mg/L), ammonium (mg/L), oxygen reduction potential (mV) were recorded at 50 cm depth increments at each core and sample location using a YSI multi-meter equipped with thermodynamic and ion-selective probes.

1.6.2 Laboratory-based Research

1.6.2.1 Sedimentological Description of Freeze Cores

The sediment cores were unwrapped and the surface ice allowed to thaw prior to sedimentological-stratigraphic description and photographing. Sediment colour (Munsell colour charts), grain size, bedding, core dimensions (length, width, height), and special features (fractures, macrofossils, textures) were recorded. Cores were transported in coolers to the Merivale Medical Imaging Clinic, Ottawa, Ontario for X-Ray imaging.

1.6.2.2 Freeze Core Slicing

A custom-designed freeze core microtome (Macumber et al., 2010) was used to slice sediments obtained using the freeze corers at a 1 mm resolution. During slicing the core was measured regularly to ensure the desired resolution. Slices were collected using a small spatula to push sediments into a plastic vial.

1.6.2.3 Magnetic Susceptibility

The protocol developed by Dearing (1999) was used in measuring magnetic susceptibility. A Bartington MS2 System fitted with the MS2B sensor was be used to make measurements. Magnetic susceptibility was performed at a 0.5 cm resolution on Glew cores and a 2 mm resolution on freeze cores.

1.6.2.4 Loss on Ignition (LOI)

Loss on Ignition (LOI) was used as a measure of organics and carbonates in the sediment, which reflects sediment sources and surface processes such as erosion and lake productivity (Huang et al., 2004). LOI was performed using the protocol designed by Heiri et al. (2001) at a 0.5 cm resolution on Glew cores and a 4 mm resolution on freeze cores.

1.6.2.5 Arcellacean Analysis

From the Glew cores and sediment surface samples 2 cc of sediment were prepared for arcellacean analysis, while samples from freeze cores consisted of 1 mm thick sediment slices. Samples were sieved, first with a 250 µm sieve to remove coarse organic debris and then with a 37 µm sieve to remove fine organic material and mineral detritus. The retained 37-250 µm fraction was subdivided into aliquots for quantitative analysis using a wet splitter (Scott and Hermelin, 1993). The wet aliquots were examined under an Olympus SZH10 dissecting binocular microscope (40-80X magnification) until a statistically significant number of specimens were counted (Patterson and Fishbein 1989; Boudreau et al., 2005). Identification of arcellaceans followed standard reference keys (e.g. Medioli and Scott, 1983; Kumar and Dalby, 1998) (Appendix A). Scanning electron micrograph images of common species and strains were obtained using a Tescan Vega-II XMU VP scanning electron microscope at the Carleton University SEM facility (Fig. 6.1).

1.6.2.6 Chronostratigraphy

Glew cores were analyzed for ^{210}Pb geochronology at INRS Eau Terre Environment, Québec, Canada, at a 0.5 cm resolution and bulk organic sub-samples from freeze cores were radiocarbon dated at the ^{14}CHRONO Centre, Queens

University, Belfast, Ireland (UK) (Appendix B). An age-depth model was produced using the ‘classical’ age-depth modeling software Clam (Blaauw, 2010) and the IntCal13 calibration curve for terrestrial material (Reimer et al., 2013).

1.6.2.7 Particle Size Analysis (PSA)

Sediment samples were digested in a heated bath (~ 50°C) with 10% H_2O_2 to remove organics (van Hengstum et al. 2007; Murray 2002; Donato 2009). Digested samples were then analyzed using a Beckman Coulter LS 13 320 Laser Diffraction Analyzer fitted with a Universal Liquid Medium (ULM) sample chamber over a measurement range between 0.4 and 2000 µm. The samples were loaded into the machine until an obscuration level of 10% +/-3% was attained. The Fraunhofer diffraction model was used to estimate grain sizes (Appendix C). Particle size analysis was performed on all sediment surface samples at a 0.5 cm resolution on Glew cores and 2 mm resolution on freeze cores.

1.6.2.8 Geochemical Analysis

The following geochemical analyses were performed on the sediment surface samples. ICP-MS (Inductively Coupled Plasma Mass Spectrometry) and ICP-ES (Inductively Coupled Plasma Emission Spectrometry) were performed at the Geological Survey of Canada, Ottawa, ON. Caduceon Environmental Laboratories, Ottawa, ON performed the nutrient analysis, total bulk concentrations of mercury were determined by the Geological Survey of Canada (Atlantic) (Leco Corporation

2012) and Rock-Eval® 6 was performed at the Geological Survey of Canada, Calgary, AB.

2 Relationship Between Ecological Indicators (Arcellacea), Total Mercury Concentrations and Grain Size in Lakes Within the Athabasca Oil Sands Region, Alberta

2.1 Connection to Project

In order to understand the geographic extent and transport pathways of potential contaminants emitted from the Athabasca oil sands we conducted a surface sample survey. Sites were selected both up/down stream and wind of the operation. Samples were analysed for a suite of characteristics including: grain size and micropaleontological character, water and sediment geochemistry, total mercury in sediments and sediment organic matter characteristics (rock eval).

Mercury was analyzed in the samples because it is produced during the processing of oil sand (Hazewinkel et al., 2008; Kelly et al., 2009; Kelly et al., 2010; Curtis et al., 2010; Kurek et al., 2013), is a priority pollutant on Environment Canada's National Pollutant Release Inventory (NPRI, 2010) and is a proven benthic ecological stressor (Patterson et al., 1996; Reinhardt et al., 1998). A full geochemical analysis was conducted on the samples but the mercury results were available one year prior to the rest and given that mercury contamination related to the oil sands operations in Alberta had recently been made a nationally sensitive topic by Kelly et al. (2009) and Kelly et al. (2010) we proceeded with interpreting the results and producing this paper.

This paper investigates the geographic distribution of mercury and ecological response to current mercury concentrations in lakes surrounding the Athabasca oil sands.

A follow up to this paper using the already collected data will investigate the airborne and waterborne distribution of the remaining geochemical parameters. The geochemical parameters will also be used to interpret which parameters (environmental or chemical) most significantly influence the benthic lake ecology in the oil sands region.

2.2 Abstract

Industrial Mercury (Hg) sources associated with the processing of Athabasca Oil Sands (AOS), Alberta, Canada may pose an environmental risk to nearby water bodies via either waterborne or airborne transport. Using a dataset derived from 63 lakes in the area, this study investigates the relationships between total-Hg (THg), organic matter, grain size, and lake ecology as measured by environmentally sensitive Arcellacea (testate lobose amoeba) communities. The lakes studied include 59 lakes within a 75 km radius of the operations, plus four distal lakes ~150 km from the main industrial operations. Hg transport to the lakes is primarily through airborne pathways. The four distal lakes in the Peace Athabasca Delta (~150 km downstream of the AOS operations) were examined to determine if the operation is emitting potential waterborne inputs, in addition to airborne inputs, and to identify any associated impact to those ecosystems.

Total mercury in lakes close to the AOS were similar to values recorded in lakes farthest away. THg was most closely linked to the silt fraction, suggesting much of the Hg in these lakes is minerogenic in origin, either adsorbed and/or lattice-bound. THg is not statistically related to organic matter as has been observed in other Canadian lakes. The ecologic response to THg levels was investigated via the distribution of key indicator species and, or species diversity (Shannon Diversity Index, SDI). The spatial extent of arcellacean ecosystem stress in the study lakes did not correlate with THg concentrations. This is perhaps due to the generally low THg levels found in these lakes, all except one had THg concentrations lower than current CCME guidelines. While these findings may rule out any direct link between THg

concentrations in the lakes and observed Arcellacea faunas, ecosystem stress unrelated to THg was observed northeast of the AOS, which warrants further examination. The results of this research suggest that the natural lake arcellacean faunas in the region are not being significantly impacted by current THg concentrations.

2.3 Keywords

Athabasca, Oil Sands, Mercury, Contamination, Arcellacea, Testate Lobose Amoeba, Grain Size

2.4 Introduction

The Athabasca Oil Sands (AOS) represent one of Canada's most economically important natural resources (Alberta Energy 2008). The process of upgrading bitumen to synthetic crude oil involves coking, coke combustion, and production of wastes and fly ash (Jang and Etsell 2006; Allen 2008). Environment Canada's National Pollutant Release Inventory (NPRI 2010) suggests that upgrading is a substantial and increasing source of priority air pollutants. Consequently the transport of priority pollutants such-as Hg from oil sands industrial processes and their ecological impacts has been extensively researched (Hazewinkel et al. 2008; Kelly et al. 2009; Kelly et al. 2010; Curtis et al. 2010; Kurek et al. 2013) and regulatory focus (e.g. the Regional Aquatics monitoring Program (RAMP 2012); Cumulative Environmental Monitoring Association (CEMA 2012)).

Mercury (Hg) is a trace element that can be toxic to aquatic biota at elevated concentrations (CEPA 1985). Airborne Hg emissions from oil sands industrial sources in 2010 were approximately 120 kg, which represents a six-fold increase from 2002 (NPRI 2010). This is consistent with the findings of Kelly et al. (2010) who reported elevated concentrations of Hg in the snow packs and waters surrounding, and downstream of the oil sands operations. However, results of a recent lake sediment core study in the region concluded that current Hg levels are above background levels but have been decreasing due to improved industrial practices (Wiklund et al. 2012).

This study investigates THg concentrations in the surface sediments of 63 lakes encompassing a broad geographic radius around the oil sands operations. Hg commonly enters a lake via surface run-off, and then generally is quickly transported to and deposited with the lake bottom sediments. Lake sediments are an important component of aquatic ecosystems, providing habitat for a wide range of benthic and epibenthic organisms. Exposure to deleterious contaminants in sediments may represent a potential hazard to the health of these organisms, and this harm may be propagated throughout the ecosystem (Luoma et al. 1993; Mason et al. 1995; CCME 2001). Effective assessment of this hazard requires that a causal link be established between the distribution of substances of environmental concern in the sediments and the occurrence of adverse biological effects (Environment Canada 1997). The objective of this research is to delineate the spatial distribution of THg in sediment-water interface sediments of lakes to determine if they are: (1) primarily influenced by atmospheric deposition, and/or (2) receiving input from snowmelt, streams or rivers and related tributaries downstream of the oil sands operations; and (3) make an assessment of any THg-induced ecological pressure on lacustrine benthic fauna using environmentally sensitive Arcellacea as a proxy.

2.5 Ecological Indicators

Arcellacea, informally known as thecamoebians (Patterson and Kumar 2002) or testate lobose amoebae (Mitchell et al. 2008), are protists that constitute an important component of the benthic community within the microbial trophic level in lakes and wetlands (Patterson and Kumar 2000; Beyens and Meisterfeld 2001; Elliott et al. 2012). Species and strains are characterized by a simple sac-like, decay-resistant organic test of pseudo-chitinous material that is variably agglutinated in different species (Scott et al. 2001; Patterson and Kumar 2002). Arcellaceans are useful in environmental research as they are characterized by rapid generation times and sensitivity to environmental conditions at the sediment/water interface and epibenthic zone (Collins et al. 1990; Neville et al. 2010a). Their abundant fossilized remains preserve a record of pollutant responses and changing environmental conditions over time (Patterson 1987; McCarthy et al. 1995; Asioli et al. 1996; Patterson, et al. 2002; Boudreau et al. 2005; Patterson et al. 2012a; Watchorn et al. 2012). Unlike most microfossil groups, arcellaceans are resistant to dissolution in lower pH environments (Swindles et al. 2007) and are one of the few microfossils that can be used to investigate depositional conditions at the sediment/water interface of lacustrine freshwater environments (Patterson et al. 1985; Roe, et al. 2010).

Variations in arcellacean community assemblages have been successfully used to investigate the impact of mine tailing deposition (Patterson et al. 1996; Reinhardt et al. 1998; Kauppila et al. 2006; Kihlmanm and Kauppila 2009, 2010, 2012), remediation in oil sands tailings ponds (Neville et al. 2011), and identification of lake pH (Reinhardt et al. 1998; Kumar and Patterson 2000; Escobar, et al. 2008; Patterson et al. 2012b). Patterson et al. (1996) and Reinhardt et al. (1998) have demonstrated that arcellacean assemblages and species diversity are sensitive to, and can be significantly impacted by, heavy metal contamination, specifically Hg and arsenic.

2.6 Study Area

Sixty-three freshwater lakes from two major drainage basins (the Athabasca and the Peace/Slave river basins) in northern Alberta were sampled for this study (Figure 2.1). The majority of these lakes are situated within a 75 km radius of Fort Mackay, the center of major AOS surface mining and upgrading (Kelly et al. 2010). Fifty-seven lakes were selected to potentially capture the spatial distribution of atmospheric borne emissions. These lakes are not directly connected to any drainage network that passes through the industrial areas, and consequently they are considered to only receive industrial emissions via atmospheric transport. Six additional lakes were selected along a 150 km transect on the Athabasca river, located directly upstream (n=1), within the AOS mining operation (n=1) and downstream (n=4) of the mining operation as far as the Peace Athabasca Delta (PAD). These lakes are partially linked to the oil sands through permanent or intermittent tributaries, or potentially influenced by flooding events. These lakes may therefore contain both waterborne and airborne emissions derived from oil sands mining operations (Figure 2.1).

The sampled lakes comprise sites that are distal and proximal; upwind and downwind; upstream and downstream from the AOS mining operations (Figure 2.1). The prevailing wind direction in the region is variable and may come from the north, west, northeast and northwest depending on the time of the year (Environment Canada 2003) (Figure 2.1). Bedrock in Alberta is primarily sedimentary and consists of sandstone, siltstone, shale, coal, and limestone, some of which is bituminous. The till veneer across much of the area is mainly comprised of the same components (Andriashek et al. 2002). Most of the studied lakes were formed by retreating glaciers and till piles, where holes or kettles were left in the landscape due to melting ice (Mitchell and Prepas 1990). Notable exceptions are the northern lakes located in the PAD, which are part of a large sandy braid-like delta system (Hugenholtz et al. 2009). In all lakes in the PAD region there is potential for oil sands derived material to have been introduced by natural means; i.e. via local erosion and/or dissolution of tills and/or bedrock.

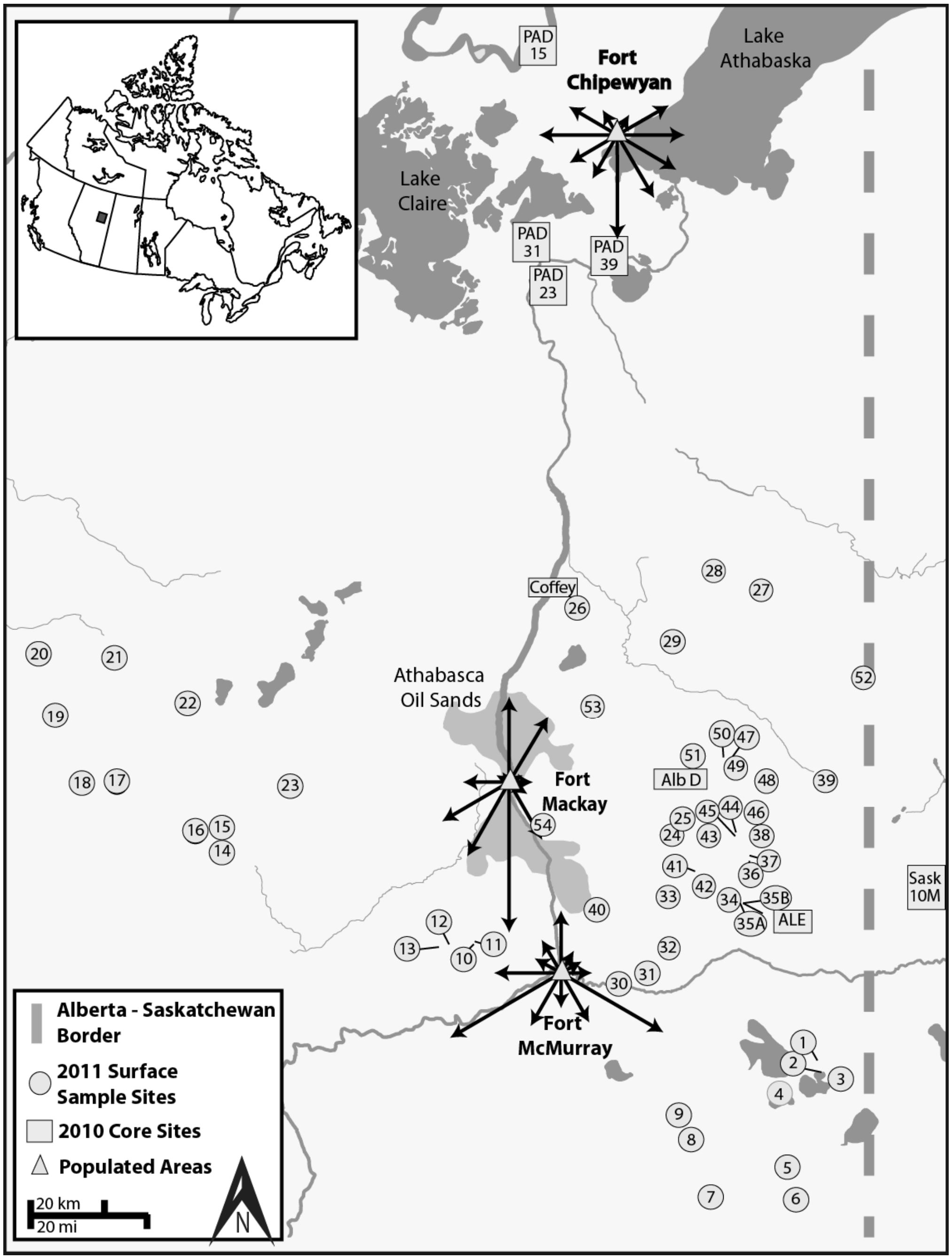

Figure 2.1: Map of study area showing study lakes in relation to the Alberta's Athabasca Oil sands operations and arrows indicating prevailing wind directions at different times of the year.

2.7 Methodology

2.7.1 Sediment and Water Collection

Selection criterion for the lakes included: accessibility, size, depth and substrate type. Ideal lakes had water depths of less than 8 m to reduce the potential for sampling sediments exposed to bottom water anoxia during summer or winter water column stratification, but greater than 2 m so as to avoid disruption to the sediment bottom as a result of freezing during the winter. Bottom water anoxia precludes arcellacean colonization because these benthic organisms require oxygenated conditions. Sites further than 3 m away from the shoreline were targeted to reduce shore effects (e.g. erosion) on arcellacean assemblages.

Sediment-water interface samples were collected from eight lakes in August 2010 and 55 lakes in August 2011 (Table 2.1; Figure 2.1). Sample collection took place in two parts to meet the needs of the multidisciplinary CORES program. The 2010 sample set was collected from a raft using a Glew gravity corer (Glew et al. 2001). These cores were subsampled at 0.5 cm intervals using an extraction device (Glew et al. 2001) and stored in a cool room at Carleton University at 4°C. The top 0.5 cm of the Glew core was sampled for analysis in this study. The 2011 sample set was collected from a float helicopter using an Ekman grab sampler, and again only the top ~ 0.5 cm was collected for analysis. Site 35 was comprised of two large bodies of water connected by a stream. Both bodies of water were sampled and labeled 35A and 35B. Only grab and core samples that presented a well-preserved sediment-water interface were sampled.

Surface water samples were also collected at each site. Water property data was recorded at 50 cm water depth increments (Table 2.1) at each core location using a YSI multi-meter equipped with thermodynamic probes.

Table 2.1: Site names and coordinates of lakes investigated, water quality data measured during sample collection, sediment grain size fractions, sediment total bulk concentrations of Hg (dry weight, mg kg^{-1}), total organic carbon (TOC%), and species diversity index (SDI).

Lake Names	Latitude	Longitude	Temp	Conductivity	Hg	S1	S2	TOC	RC	MINC	Sand	Silt	Clay	SDI
			(^{o}C)	(ms/cm)	(ppb)	(mg HC/g^{b})	(mg HC/g^{b})	%	%	%	%	%	%	
Sask 10M	56 55 15.1	109 43 53.5	9.5	94.6	68	52.80	104.62	28.44	13.91	1.0	6.3	86.6	7.2	2.17
Albt D	57 04 00.1	110 50 44.8	10.4	94.1	98	21.84	92.07	24.03	13.04	1.5	4.6	90.8	4.7	2.53
Albt E	56 52 42.0	110 34 5.3	8.6	111.5	210	22.16	85.21	24.48	14.13	1.5	6.0	84.6	9.4	2.04
Coffey	57 38 37.2	111 25 20.3	9.5	195	117	2.22	16.82	11.02	8.38	1.93	0.5	88.8	10.7	1.74
PAD 31	58 29 43.8	111 31 19.2	7.4	171	62	1.56	14.11	5.25	3.61	1.2	0.6	81.7	17.6	2.53
PAD 39	58 27 56.8	111 11 02.7	7.6	146.5	74	6.11	36.72	10.20	6.02	2.8	3.4	82.4	14.2	2.10
PAD 23	58 23 28.3	111 26 37.7	7.9	92	55	19.24	75.73	24.33	15.03	1.79	0.0	79.1	20.9	1.61
PAD 15	58 57 00.0	111 29 35.2	8.5	159	75	0.33	2.39	2.92	2.37	1.13	0.0	74.3	25.7	1.76
1	56 29 09.08	110 14 01.0	15.4	160	76	29.54	106.86	25.20	12.45	4.1	51.9	43.4	4.7	1.91
2	56 26 51.01	110 12 12.02	16.3	213.5	41	43.68	152.66	33.77	15.86	2.2	18.3	71.8	9.9	1.78
3	56 26 01.05	110 07 24.09	15.9	168.6	67	33.55	144.46	36.40	19.64	2.0	20.9	70.5	8.5	2.06
4	56 23 14.5	110 24 05.09	16.2	229.1	64	24.14	126.14	24.14	10.56	1.3	23.7	65.2	11.2	2.01
5	56 12 12.07	110 21 50.04	16.3	134.7	108	18.34	153.42	33.21	17.30	1.8	4.5	78.8	16.7	1.31
6	56 07 56.00	110 19 50.09	14.9	32.6	142	21.56	126.71	39.48	24.92	2.4	6.9	80.9	12.2	1.58
7	56 08 06.08	110 42 35.02	15.9	121.6	106	29.30	222.50	44.27	21.32	2.0	25.6	70.4	4.0	1.52
8	56 16 42.09	110 47 53.01	17.2	269.3	23	0.59	3.59	1.60	1.11	0.5	92.1	6.0	1.9	2.04
9	56 18 33. 05	110 51 21.08	17.8	201.1	45	36.87	159.83	36.44	18.36	1.8	10.2	78.9	10.9	1.83
10	56 46 32.08	111 47 24.04	16	134	113	29.82	159.66	38.50	20.84	1.8	19.7	74.0	6.3	1.73
11	56 46 58.04	111 47 21.05	16.4	75	95	28.98	170.19	41.33	22.78	1.8	16.7	79.0	4.3	1.41
12	56 46 30.09	111 54 51.07	16.4	99.2	109	32.37	138.07	34.75	18.79	1.5	7.1	81.3	11.6	2.04
13	56 46 14.09	111 56 41.09	15.8	69.7	67	34.94	163.22	41.06	22.56	1.8	11.6	72.5	15.8	1.60
14	57 00 16.00	112 56 23.04	15	95	94	20.57	122.47	33.75	20.07	1.9	10.0	76.2	13.8	2.00
15	57 01 57.07	112 57 06.05	16.1	253.5	75	22.30	153.69	27.84	12.02	1.5	16.3	70.6	13.1	2.31
16	57 03 09.00	113 03 22.01	15.9	84.3	110	26.99	232.86	40.77	17.54	1.3	6.4	84.1	9.5	2.05
17	57 10 30.06	113 24 54.04	14.4	57.9	109	8.82	54.12	13.66	7.70	0.9	83.5	12.8	3.7	2.15
18	57 11 18.07	113 34 20.02	14.5	53	102	16.49	77.42	19.33	10.46	1.1	8.6	78.6	12.8	2.22
19	57 20 40.04	113 41 35.07	14.6	97	105	17.14	105.27	27.90	16.25	1.6	6.6	78.4	15.1	1.82

Lake Names	Latitude	Longitude	Temp	Conductivity	Hg	S1	S2	TOC	RC	MINC	Sand	Silt	Clay	SDI
			(^{o}C)	(ms/cm)	(ppb)	(mg HC/g^{b})	(mg HC/g^{b})	%	%	%	%	%	%	
20	57 29 19.04	113 45 58.01	14	112	103	27.28	111.02	29.23	16.20	1.5	12.0	77.4	10.6	1.64
21	57 28 53.02	113 25 26.07	14.4	141.8	119	18.29	72.34	23.97	15.10	1.2	12.4	80.2	7.4	1.46
22	57 22 05.02	113 05 28.04	15.1	48.5	135	15.18	97.95	24.74	14.03	1.4	11.6	74.1	14.3	2.18
23	57 10 09.07	112 37 38.01	15.8	119.1	82	25.98	163.30	34.01	16.87	1.2	5.2	78.8	16.0	0.89
24	57 02 39.08	110 53 20.00	16.1	55.7	127	26.95	149.61	32.02	15.77	1.4	18.5	76.0	5.5	1.44
25	57 04 47.00	110 49 45.00	16.2	163.6	108	22.71	115.01	26.87	14.05	1.3	17.6	75.8	6.6	1.56
26	57 36 05.05	110.39 21.03	16.6	227.8	92	48.25	128.27	32.70	16.29	1.3	23.6	72.0	4.4	1.32
27	57 38 53.2	110 28 18.0	16.7	124.1	77	54.46	118.12	30.42	14.38	1.3	25.6	70.3	4.1	1.17
28	57 41 21.08	110 42 06.04	17.1	256.8	61	46.43	167.10	36.55	17.13	1.2	21.5	73.5	5.0	0.95
29	57 31 09.09	110 53 08.00	17.1	118	76	39.00	174.85	40.70	21.00	1.5	11.7	85.5	2.8	1.16
30	56 40 14.05	111 08 17.03	13.5	404.7	29	19.11	68.14	15.47	7.44	7.2	42.8	51.5	5.7	1.73
31	56 41 39.05	111 00 08.08	17.8	34.2	63	30.34	131.36	28.52	13.80	1.1	12.8	71.5	15.8	1.51
32	56 45 57.07	110 54 42.08	16.6	116	76	34.64	169.86	40.28	21.39	1.5	14.8	74.9	10.3	1.86
33	56 53 35.01	110 54 05.05	16.6	42.6	120	34.13	170.83	38.76	19.83	1.4	11.7	80.9	7.4	1.64
34	56 52 53.04	110 37 28.02	17.2	192.1	87	26.42	123.05	34.32	20.14	1.7	8.2	77.0	14.8	1.70
35A	56 52 42.09	110 34 24.06	16.4	137	93	19.39	93.49	26.05	15.28	1.4	20.2	65.8	14.0	1.48
35B	56 52 49.06	110 33 14.07	16.9	138.6	12	1.54	5.20	2.17	1.44	0.3	95.1	3.8	1.1	1.45
36	56 58 57.01	110 32 37.01	15.6	60.9	134	5.28	31.91	11.39	7.59	0.9	38.4	54.2	7.4	1.32
37	56 59 43.03	110 31 51.07	15.8	158.3	96	18.72	106.49	35.51	23.04	2.3	13.7	77.6	8.6	0.80
38	57 02 24.03	110 29 09.02	15.9	74.2	101	11.64	68.36	20.07	12.25	1.3	13.6	74.2	12.2	2.18
39	57 10 30.08	110 11 15.05	17	136.9	58	54.07	158.39	35.00	15.81	1.2	36.2	60.1	3.7	1.28
40	56 51 14.03	111 13 55.08	17.6	103.1	76	35.76	172.01	43.17	23.98	1.5	72.6	26.0	1.3	1.75
41	56 57 30.04	110 46 39.05	15.6	75.5	58	33.87	189.45	43.70	23.23	1.5	41.6	54.5	3.8	2.10
42	56 57 07.04	110 45 12.06	15.9	77.7	84	30.68	159.06	40.71	23.03	1.7	15.7	75.3	9.1	1.85
43	57 01 59.01	110 43 03.03	15.8	70.4	157	12.69	64.39	23.40	15.52	1.6	15.2	76.3	8.5	2.21
44	57 03 07.06	110 36 12.02	14.8	31.4	130	23.41	146.57	32.13	16.46	1.4	12.6	77.5	9.9	2.16
45	57 02 44.05	110 35 40.01	14.7	37.1	127	26.22	159.18	34.89	17.88	1.6	16.2	76.5	7.3	0.97
46	57 04 44.05	110 30 37.05	15.1	43.1	151	13.53	72.20	21.46	13.10	1.3	8.4	76.3	15.3	2.14
47	57 09 07.01	110 31 04.01	14.9	158.1	62	27.07	117.61	27.39	13.99	3.2	17.7	74.0	8.3	1.56
48	57 10 18.08	110 27 23.00	15.3	124.9	120	20.00	136.56	31.44	16.85	1.7	10.8	77.5	11.8	1.88
49	57 12 48.02	110 35 33.08	15.1	102.4	93	16.99	117.56	30.67	17.73	2.1	8.6	82.6	8.8	2.01
50	57 14 19.02	110 39 02.08	15	63.9	113	18.02	103.84	33.34	21.02	2.3	8.9	78.5	12.5	1.98
51	57 14 08.02	110 47 42.05	14.1	133.3	86	10.23	70.20	25.03	16.55	1.9	4.5	78.2	17.3	1.42
52	57 25 46.03	110 00 35.02	16	248.1	68	31.32	142.97	38.25	21.90	1.9	21.5	71.1	7.5	1.81
53	57 21 39.02	111 14 48.01	16.5	314.2	30	19.65	94.20	20.65	10.18	6.6	36.1	57.5	6.4	0.70

Lake Names	Latitude	Longitude	Temp	Conductivity	Hg	S1	S2	TOC	RC	MINC	Sand	Silt	Clay	SDI
			(^{o}C)	(ms/cm)	(ppb)	(mg HC/g[b])	(mg HC/g[b])	%	%	%	%	%	%	
54	57 04 16.04	111 28 33.01	17.4	321.3	18	15.47	43.41	9.83	4.32	8.6	40.9	51.2	7.9	1.65
50	57 14 19.02	110 39 02.08	15	63.9	113	18.02	103.84	33.34	21.02	2.3	8.9	78.5	12.5	1.98
Median			15.8	119.1	92	22.71	118.12	30.42	15.86	1.51	13.6	76.0	9.1	1.75
Mean			15.0	133.0	89.4	24.1	114.5	28.2	15.3	1.9	20.0	70.3	9.7	1.7

[a] - Residual Carbon
[b] - mg hydrocarbons/g of dry sediment

2.7.2 Mercury Analysis

The total bulk concentration of Hg (THg) in sediments was determined using a Leco AMA254 Advanced Hg Analyzer at the Geological Survey of Canada (Atlantic) (Leco Corporation 2012). Sample preparation included freeze-drying followed by powdering using an agate mortar and pestle. Prior to sediment analysis a clean sample and 5 blanks were run to condition the instrument. Analysis of two reference samples was subsequently carried out to derive a calibration curve against which the lake sediment analyses were compared. The average reproducibility was better than 2% using n=12 duplicate analyses.

2.7.3 Analysis of Organic Matter (Rock-Eval® Analysis)

The bulk quantity of total organic carbon (TOC) in the sediment was determined using Rock-Eval® 6 Analyses (Vinci Technologies, Rueil- Malmaison, France) at the Geological Survey of Canada, Calgary. The standard reference materials used for this method included IFP 160000, Institut Français du Pétrole and internal 9107 Shale standard. The analytical reproducibility based on measurements of series duplicates was generally better than 5%.

2.7.4 Grain Size Analysis

Sediment samples were digested in a heated bath (~ 50°C) with 10% H_2O_2 to remove organics (van Hengstum et al. 2007; Murray 2002; Donato 2009). Digested samples were then analyzed using a Beckman Coulter LS 13 320 Laser Diffraction Analyzer fitted with a Universal Liquid Medium (ULM) sample chamber over a measurement range between 0.4 and 2000 µm. The samples were loaded into the machine until an obscuration level of 10% +/-3% was attained. The Fraunhofer diffraction model was used to estimate grain sizes.

2.7.5 Arcellacea Analysis

Arcellaceans were separated from 2cc of sediment from each sample by sieving to remove the >250 µm and <37 µm fractions. The 37-250 µm fraction was subdivided into aliquots for quantitative analysis using a wet splitter (Scott and Hermelin 1993). The wet aliquots were subsequently examined under an Olympus SZH10 dissecting binocular microscope (40-80X magnification) until a statistically significant number of specimens were quantified (Patterson and Fishbein 1989). In most cases >150 (n=22), and more where possible >300 (n=35) arcellaceans were counted per sample. Identification of arcellaceans followed standard reference keys (e.g. Medioli and Scott 1983; Kumar and Dalby 1998).

Species diversity was calculated using the Shannon Diversity index (SDI) (Shannon 1948). SDI is a measure of faunal diversity and is useful for determining the relative health of the community from which the sample was taken (Patterson and Kumar 2002). The SDI is calculated using the following formula:

$$SDI = -\sum_{I}^{S}\left(\frac{Fi}{Ni}\right) * \ln\left(\frac{Fi}{Ni}\right)$$

where X_i is the abundance of each taxon in a sample, N_i is the total abundance of the sample, and S is equal to the species richness of the sample. Generally harsh environmental conditions are normally characterized with an SDI between 0.3-1.5, transitional/intermediate conditions range from 1.5-2.5 and favorable stable conditions have an SDI >2.5 (Magurran 1988; Patterson et al. 2002).

2.7.6 Correlation Analysis

Correlation analysis was conducted on temperature, conductivity, THg, organic matter parameters (S1, S2, total organic carbon (TOC), residual carbon (RC)), % mineral concentration, % water, % sand, % silt, % clay and SDI. The Pearson product-moment correlation coefficient (Pearson's /r/) is a measure of the linear dependence (correlation) between two variables (Rodgers and Nicewander 1988).

2.7.7 Spatial interpolation

Spatial interpolation was depicted using a conventional inverse distance weighting technique incorporated in the Geostatistical Analysis component of the ArcGIS software (Zimmerman et al. 1999).

2.8 Results and Discussion

2.8.1 Total Mercury concentrations in study lakes

Total mercury concentrations in surface sediments from the 63 lakes studied ranged from 0.018 to 0.210 mg kg $^{-1}$ (average 0.089 mg kg $^{-1}$) (Table 2.1). Only lake "Alb E" with a THg concentration of 0.21 mg kg $^{-1}$ (Table 2.1, Fig. 2.2) had a concentration higher than the Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (CCME 2002) of 0.17 mg kg^{-1}, albeit by a methodology that can overestimate the Hg concentration (Table 2.2). The relative distance of this sample from the oil sands facilities cannot explain the observed higher concentrations of THg in Alb E. Generally, higher concentrations are expected in close proximity to a pollutant point source followed by declining concentrations with increasing distance from the emission source (a "bulls-eye" spatial pattern; Kelepertsis et al. 2006; Fältmarsch et al. 2007). An expanded geochemical study of these lakes may produce chemical data for normalizing THg concentrations, which could reduce the influence of limnological and/or geogenic variability between lakes and provide a more critical interpretation of the spatial Hg distribution in relation to the oil sands operation.

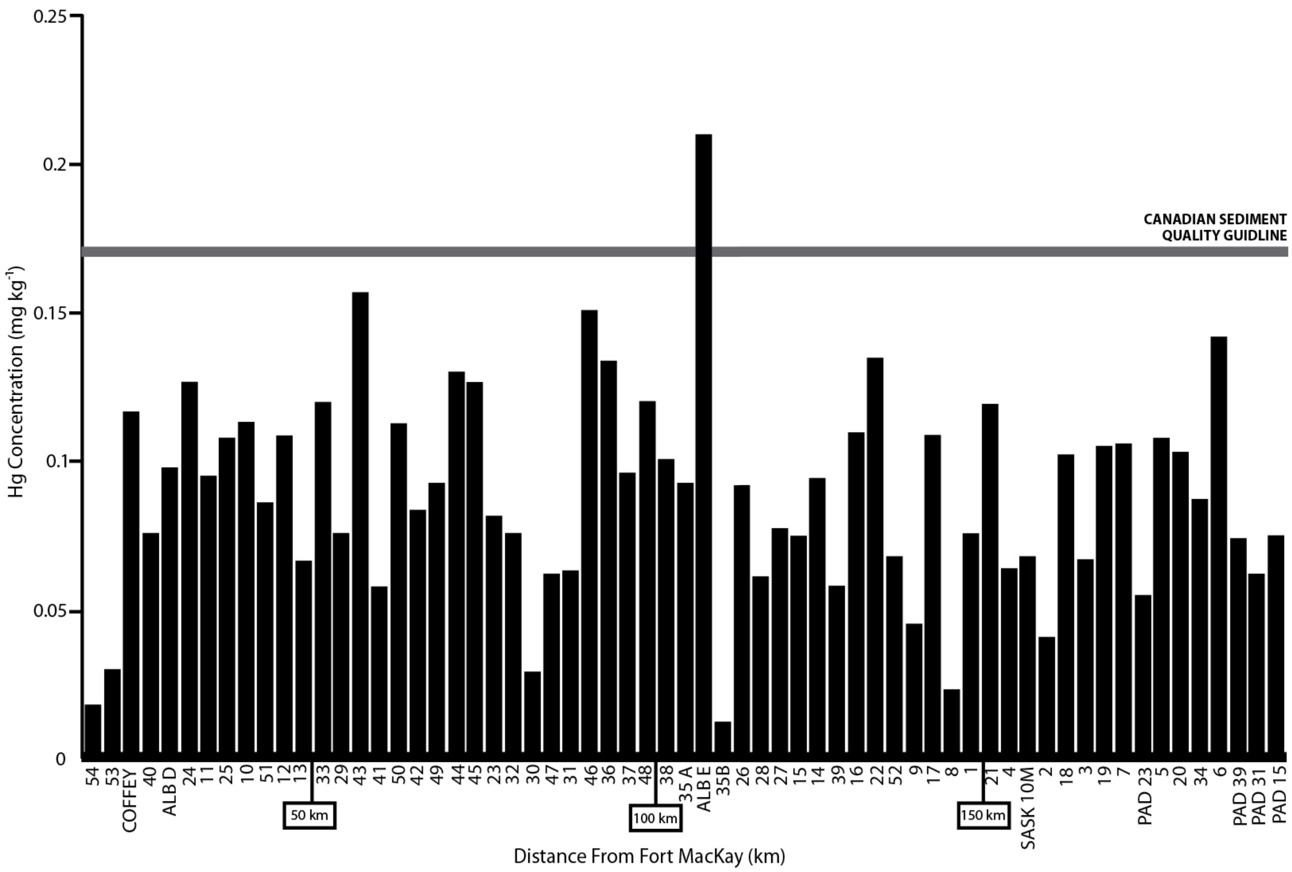

Figure 2.2: Histogram depicting the total concentrations of Hg (mg kg^{-1}) in study sediments verses distance of sites from Fort McKay relative to the Canadian sediment quality guidelines (CCME, 2002) and concentrations in sediment from central Alberta.

Table 2.2: Comparison of values produced using different mercury analysis methodologies. All values are compared to the values produced using the Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (CCME) methodology. Bulk Hg concentration analytical methods produce estimates equivalent to or higher than those recommended by the CCME guidelines (López-Antónet et al. 2012).

Study	**Method Used**	**Comparison to CCME Guidelines**
CCME Guidelines (2002)	Strong acid digestion	-
This Study	Thermal decomposition	Can overestimate [Hg] in comparison to CCME
Sanei et al. (2010)	Aqua regia	Similar to guidelines
Friske and Hornbrook, (1991)	Aqua regia	Similar to guidelines
Environment Canada (1997)	Aqua regia	Similar to guidelines
Outridge et al. (2011)	Thermal decomposition	Can overestimate [Hg] in comparison to CCME

Correlation analysis using Pearson's r was conducted on the available data in order to minimize the signal to noise ratio associated with lake variability. The strongest correlation occurred between THg and silt ($r = 0.44$; n=63, Pearson) fractions in sediments suggesting that THg concentrations are at least partially influenced by grain size. The correlation may imply that the processes impacting THg in the regions' lakes are: 1) adsorption on to silt-sized particulates, and/or; 2) the silt-sized fraction contains minerals with high Hg concentrations, and/or; 3) the sedimentary flux of these particulates varies across the region. The correlation analysis ruled out clays as the driver of THg sequestration in these lakes since the clay-sized fraction has a very weak correlation of ($r = 0.13$; n=63, Pearson). In order to partially remove the influence of mineral matrix and grain size variability, THg concentrations were normalized to the silt fraction. Such a normalization procedure will minimize the bias due to silt concentration variability between lakes (cf. Covelli and Fontolan 1997; Kersten and Smedes 2002).

Previous research suggests that organic matter (OM) is important in controlling the distribution of mercury and other trace elements in soil and suspended or bottom aquatic sediment (Gibbs 1973; Orem et al. 1986; Chin and Gschwend 1991; Johansson and Iverfeldt 1994; Kainz et al. 2003; Mirlean et al. 2003). Typically it is understood that the enrichment of Hg in some sediment may be linked to the degree of a lake's OM production/input (e.g., OM scavenging of the atmospheric Hg input, Outridge et al. 2007). However, in this study the correlation between OM and Hg is low ($r = 0.19$; n=63; Pearson) suggesting that OM is not controlling Hg distribution and does not significantly explain the observed Hg distribution pattern. Further research is required to explain this result.

A recent winter snow pack and summer water Hg survey in the region classified sites greater than 50 km away from the operation as being characterized by background Hg levels and showed that values increased with proximity to the operation (Kelly et al. 2010). In comparison to the study by Kelly et al. (2010), this study encompasses a larger geographic radius and includes a variety of sites up to 150 km away. Sites for the Kelly et al. (2010) study were identified as “background” or “near development” based upon the shape of the concentration-distance from development curve. Kelly et al. (2010) noted that none of the THg values downstream of the operation were significantly greater than those upstream but they also concluded that Hg values in melted snow, tributaries and in the Athabasca River exceeded the CCME (2002) guidelines. However, comparison of their filtered versus unfiltered Hg analyses suggest particulate material of unidentified form carries the Hg that produces a bulls-eye pattern around the oil sands operations. The dissolved Hg within the snowpack and water samples are below CCME (2002) guidelines and do not form a bulls-eye pattern and is interpreted by Kelly et al. (2010) to be mostly of local origin. Our samples produce a similar pattern (Figure 2.3) to that of the dissolved Hg data of Kelly et al. (2010). The ecological importance or otherwise of the particulate-bound Hg within the snowpack has not been evaluated to date, which will be determined by the type of particulate material and how well it binds the Hg. Nevertheless, the thermal decomposition Hg analytical method used herein would dissolve all of this particulate material were it to enter the lake system. The lack of evidence for a similar Hg pattern to that reported by Kelly et al. (2010) suggests the particulate material is not yet a significant contributor to the lake Hg budgets. Unfortunately the unavailability of mass accumulation rates for the lakes studied hinders any further comparison.

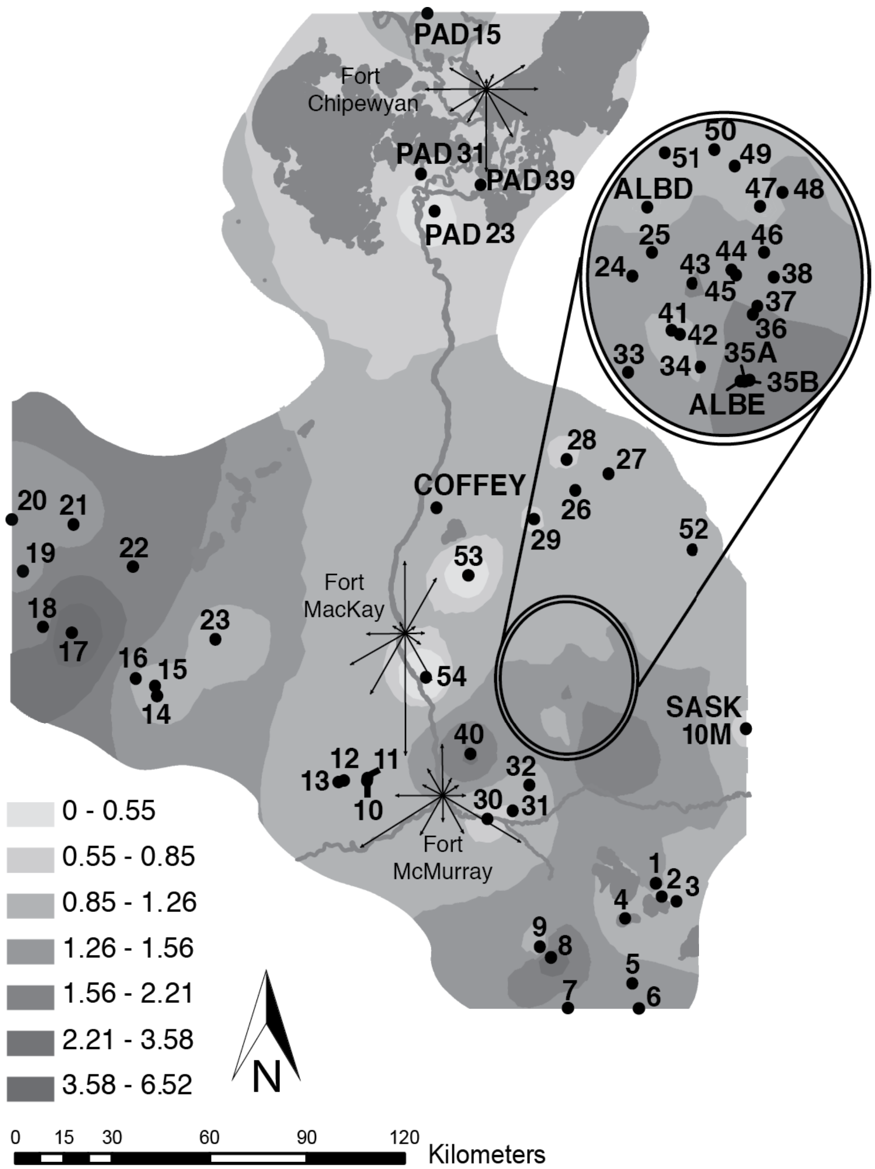

Figure 2.3: Spatial interpolation (ArcGIS inverse distance weighting) of mercury concentrations normalized to silt in lakes surrounding the Athabasca oil sands operation.

The thermal decomposition THg analytical method used herein can produce higher Hg concentrations than obtained with a strong-acid digestion procedure (Table 2.2 and contained references). Despite using the thermal decomposition THg analytical method the Hg values obtained here for the lake sediments surrounding the oil sands operations are within CCME (2002) guidelines and comparable to acid digested samples observed in the vicinity of coal-fired power plants in central Alberta (0.058-0.110 mg kg $^{-1}$, average 0.083 mg kg $^{-1}$; Sanei et al. 2010). In the National Geochemical Reconnaissance (NGR) program database of the Geological Survey of Canada (GSC), the mean background concentrations in Canadian lake and stream sediments are essentially identical at 0.074 mg kg^{-1} and 0.075 mg kg^{-1}, respectively (measured using an aqua regia digestion; Friske and Hornbrook 1991). However, Hg concentrations as high as 15.03 mg kg $^{-1}$ have been reported in the Great Lakes and of 0.987 mg kg $^{-1}$ in the Toronto Harbor, Ontario (Environment Canada 1997).

2.8.2 Lake Ecological Health Associated with THg Distribution

Thirty arcellacean species and strains were identified from 63 sediment-water interface samples. The arcellacean SDI ranged from 0.70-2.53 (average 1.73; Table 1). These values are typical of lacustrine transitional/intermediate environmental conditions, indicating a relatively healthy lake environment (Patterson and Kumar 2000b). A study by Neville et al. (2010b) of Arcellean communities in lakes across vegetation zones across Alberta found SDI values from 1.35-2.17 (average 1.65); with the average SDI value for lakes in the Boreal vegetation zone being 1.83, a value similar to the average SDI values in this study. The compositions of the arcellacean faunas observed are variably composed of Centropyxis aculeata (Ehrenberg 1832) strain "aculeate", Centropyxis aculeata strain "discoides", Centropyxis constricta (Ehrrenberg 1830) strain "aerophila", Difflugia oblonga (Ehrenberg 1832) strain "oblonga", Difflugia oblonga strain "tenuis", Difflugia protaeiformis (Ehrenberg 1830) strain "acuminata". A few of the lower SDI sites such as lake 53 are dominated by centropyxid arcellacea, but the majority of lakes contain mixed faunas of the tolerant and the sensitive species.

Inverse distance weighting of the arcellacean assemblages recovered from the lakes demonstrates that the highest diversity sites are located to the north in the Peace-Athabasca Delta, and to the west and southeast of the oil sands operation. Six sites characterized by lower SDI values (0.70-1.32; avg. 1.03) were observed to the northeast and west of the oil sands operations (Figure 2.4), and warrant further investigation in order to determine the cause of the observed ecological stress. For the most part though the SDI vs THg values found in this study showed no significant correlation ($r = 0.00161$; $n=63$, Pearson; Figure 2.4), and the spatial distribution of increased THg values did not correlate with the centropyxid/difflugiid-type arcellacean ratio, indicating that THg concentrations in the studied lakes are not controlling species diversity and therefore are not acting as a benthic arcellacean ecological stressor.

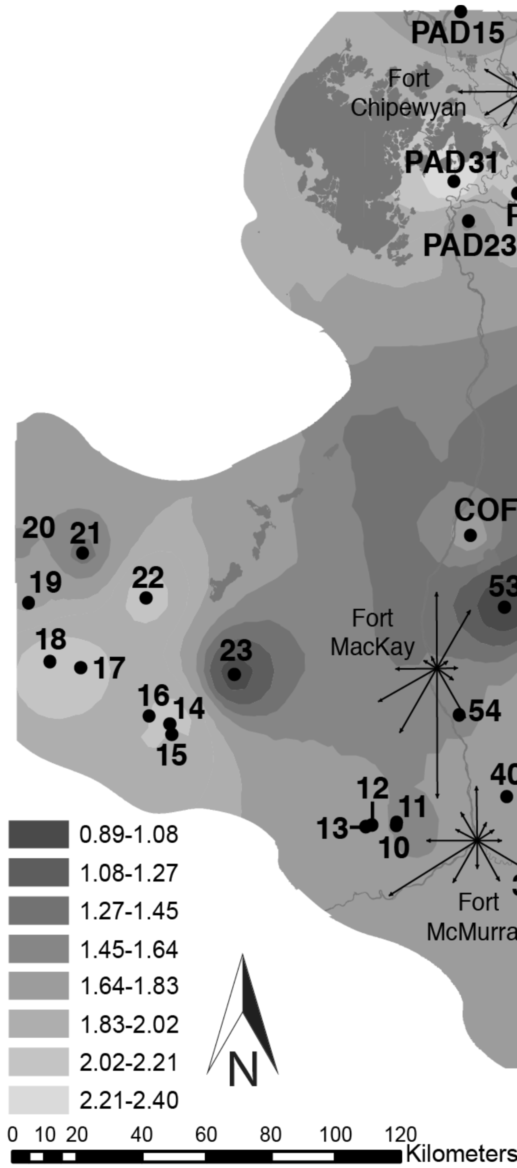

Figure 2.4: Spatial interpolation (ArcGIS inverse distance weighting) of the arcellacean species diversity index in lakes surrounding the Athabasca oil sands operation.

Factors controlling lake ecology in the oil sands development area are clearly complex and influenced by a number of variables other than THg concentrations at the sediment-water interface. Previous studies utilizing arcellaceans as indicators of Hg contamination have found that SDI values are a good indicator of an ecosystem's response to Hg concentrations when Hg values reach a concentration threshold and become an environmental stressor (Reinhardt et al. 1998). In addition, studies by Patterson et al. (1996) and Reinhardt et al. (1998) found that centropyxid-type arcellaceans can tolerate higher levels of Hg in comparison to the difflugiid-type arcellaceans. Similarly, Neville et al. (2011) found that centropyxids could also be used to indicate ecosystem health and remediation efforts in oil sands tailings ponds. A correlation between arcellacean assemblage makeup (centropyxid/difflugiid-type arcellacean ratio) and SDI would therefore be expected in the current study if Hg were an environmental stressor in these lakes.

2.9 Conclusions

This study investigated THg concentrations and Hg input pathways both airborne and waterborne in lakes surrounding the Athabasca Oil Sands in northeastern Alberta, Canada. Additionally the relationships between THg, organic matter, grain size, and lake ecology were also assessed.

Total mercury concentrations in surface sediments from the lakes studied were generally low, THg levels found in all but one of these lakes were below current CCME guidelines and similar to concentration in lakes in the vicinity of coal-fired plants in central Alberta. THg concentrations in lakes did not show an airborne or waterborne pattern of deposition, as values in lakes close to the operation were similar to values recorded in lakes farthest from the operation. THg was not statistically associated with organic matter as has been observed in other Canadian lakes but was most closely linked to the silt fraction within the grain size population.

Lake ecology was measured by environmentally sensitive Arcellacea (testate lobose amobae) communities and suggested no correlation between THg concentrations, arcellacean SDI and assemblage makeup. A few sites characterized by stressed faunas were observed but they did not overlap with areas of enriched THg. Average SDI values observed in the vicinity of the oil sands operation are similar to values from lakes across Alberta. While these findings indicate THg is not an arcellacean ecological stressor in this region, stressed arcellacean communities were observed to the northeast of the Fort MacKay area and warrant further examination.

2.10 Acknowledgements

This research was supported by Environment Canada’s CORES program, an NSERC Discover Grant to RTP, and by the NSERC Postgraduate Scholarship Program. We would like to thank members of the Paleontology Research Group at Carleton University, specifically Rebecca Montsion for her ArcGIS expertise and assistance in drafting figures. Hamed Sanei (GSC, Calgary) for the Rock Eval and Mike Parsons (GSC, Atlantic) for the Hg analysis. Both Peter Outridge (GSC, Ottawa) and Dr. Sanei provided information and insight concerning the behavior of Hg in the environment and Jennifer Galloway (GSC, Calgary) provided appreciated comments on an earlier draft of the manuscript. ESS contribution number: 19273.

3 Grain Size Distributions and Cyclic Sedimentation Processes in a Lower Athabasca Lake, Northeastern Alberta, Canada

3.1 Connection to Project

Prior to quantifying current impact related to the Athabasca oil sands operation an understanding of long-term environmental drivers was required. A core given the colloquial name ALE was collected from a lake situated ~40 km directly east of the main surface mining operations. Analysis of ALE contributed to the CORES research objectives by providing the paleolimnological, sedmentological, stratigraphic and chronostratigraphic framework for understanding the long-term history of lakes surrounding the oil sands operation.

This paper specifically investigates a means of interpreting the detailed hydrologic character of ALE. Given the high-resolution grain size data collected from this core it was possible to investigate stratigraphic structure changes in the data as well as annual input characteristics.

3.2 Abstract

Grain size anaysis of a high resolution dataset (701 samples), obtained by freeze coring a boreal lake (ALE) in northeastern Alberta, Canada, produced a spectral structure comprising 6 (D1-D6) persistent grain size log-normal distributions (in a range from <1 to ~250 μm) plus a seventh (D7) medium sand distribution present in only 5 samples. Initial modelling by automated parametric fitting algorithms was unsuccessful in that it produced best fit models that were inconsistent with the measured spectral structure. Constraining the modes of two of the distributions produced parametric model fits that were statistically strong and consistent with the spectral structure. Statistical analysis of the constrained solutions indicates that these models likely did extract independent grain size populations, and that these populations were responding to environmental controls around ALE. The boreal wetland geomorphic setting within which ALE is situated limits the processes that could have given rise to the grain size distributions. In this context surface overland flow overwhelmingly occurs during spring melt due to the combination of frozen substrates and high surface melt rates. At other times the wetlands act as a precipitation sink, strongly attenuating surface run-off and grain transport into the lake. ALE is small, with inconsequential fetch-limited wind waves, as demonstrated by the floating riparian fen that surrounds the shoreline. The three coarse distributions within the ALE grain size spectra are interpreted to reflect bedload transport during high discharge events that occur during spring melts (i.e. the intensity of the melt), whilst the finer suspended load material reflects the background spring-melt discharge (i.e. the volume of the spring melt). A ratio of coarse:fine fractions within

each ALE grain size spectrum is thus a reflection of how the spring melt occurred (intensity versus volume). The stratigraphic series of this ratio demonstrates abrupt oscillations of both high and low frequency, which is likely a reflection of climatic impacts on the way spring melt occurs in this region.

3.3 Introduction

A characterization of natural processes that influence variability within environmental systems is crucial for understanding the impacts and sensitivity of local environmental systems to changes and perturbations driven by external factors such-as climatic change. One of the main limitations to understanding the natural variability of any earth system is short instrumental records (Yu and Ito, 1999). To fill this gap there is an abundant array of potential proxy data that can help extend the record of natural environmental variability back beyond instrumental records. In each case the proxy data has two significant aspects that need to be understood in order to be useful for determining past environmental histories: 1) how well calibrated is the measured data and peleoenvironmental variable (or variables) for which it is used as an analogue; and 2) the temporal resolution of the of proxy data must be known (Kern et al., 2013). The first issue is one of quality: how good is the empirical and/or theoretical relationship between the variable and the feature being reconstructed? The second issue is one of resolution: how many samples were taken over what time span? The second issue is a general limitation of both dating (how well dated is the record?) and sampling (what are the limits to producing discreet sampling intervals from the material being used as a temporal record?).

Many proxy record is essentially a local-scale history. A determination of its regional and global significance requires multiple correlated records. Time-series analysis essentially bridges the local-regional-global scales by combining all records via a uniform timescale, and then attempting to define the underlying statistical structure within the data that is common to some or all of the records (Schulz and Mudelsee, 2002; Torrence and Compo, 1998). When successful it can be a powerful technique for identifying the main external drivers of observed variability (Blundell and Barber, 2005; Chambers et al., 1997; Hughes et al., 2000; Kern et al., 2013; Langdon et al., 2003; Wijmstra et al., 1984).

A current goal of proxy-data studies is to generate high-resolution (annual in some cases) time series for the last few thousand years (e.g. PAGES 2k Network such-as Mann et al., 2008; PAGES_2k_Consortium, 2013). High-resolution studies require large numbers of analyses, which for many investigations precludes labour-intensive analytical techniques. With the advent of laser particle analysers (Syvitski, 1991) and microtomes (e.g. Macumber et al., 2011) it is now possible to rapidly generate high-resolution grain size datasets from fine slices of unconsolidated sediment cores. However, the environmental processes represented by grain size data remains controversial (Dietze et al., 2012; Flemming, 2007; Le Roux and Rojas, 2007; Middleton, 1976; Weltje and Prins, 2007; Xiao et al., 2012). Less controversial is the contention that most grain size spectra are a composite of one or more grain size populations (Bartholdy et al., 2007; Dietze et al., 2013; Le Roux and Rojas, 2007; Qin et al., 2005; Sheridan et al., 1987; Xiao et al., 2012). However, the separate populations in grain size spectra commonly overlap, making visual identification difficult. Consequently the most common current methods for analyzing grain size spectra are statistical and include: 1) full deconvolution (e.g., Qin et al., 2005; Sheridan et al., 1987; Xiao et al., 2012); 2) end-member mixing analysis (EMMA, e.g., Dietze et al., 2012; Dietze et al., 2013; Ijmker et al., 2012; Weltje and Prins, 2007), and; 3) sediment trend analysis (e.g., Bartholomä and Flemming, 2007; Le Roux and Rojas, 2007; Poizot et al., 2008). The latter two methods are particularly suited to understanding the processes that link different grain size spectra and have been highly successful in linking sedimentary facies and transport-depositional processes. However, neither are well established for stratigraphic time-series analysis, where samples may include processes that are not well represented in the modern sedimentary facies. In such situations there is no empirical control over the artificial spectra generated in the analytical process (NB. this is not to say that these analytical methods would not be successful, and the use of EMMA on the dataset herein is being pursued with the aim of determining how best to utilize that analytical method for stratigraphic time-series datasets). In contrast, deconvolution via parametric curve fitting invokes the principle that the measured grain size spectra represents an amalgam of discreet populations, with the subsequent inference that each defined population represents a suite of grains that have a common set of erosional-depositional-transport processes. It is still a purely statistical technique and in the absence of measured process data its relationship to environmental processes is still interpretive Flemming, (2007) clearly identifies the subjective portions of all current grain size analytical methods). The most appropriate type of parametric curve-fitting approach has been debated at length (e.g. tanh, log-normal, log-hyperbolic, Weibull functions etc.; Bagnold and Barndorff-Nielsen, 1980; Barusseau, 2011; Hajek et al., 2010; Leys et al., 2005; Påsse, 1997; Sun et al., 2002), and it is likely that there is no single best parametric curve fitting approximation. Barusseau (2011) summarized the debate well by differentiating between the needs of grain size deconvolution via parametric curve fitting: 1) for disciplines such-as hydraulic engineering and coastal geomorphology, the grain size populations need to be deconvolved as accurately as possible because the defined population(s) will be used in subsequent models of sediment dynamics. Compounded errors need to be avoided and the choice of parametric function needs to be carefully examined and preferably tested against measured process data (Barusseau, 2011; Flemming, 2007; Molinaroli et al., 2009); 2) in studies such-as stratigraphic time-series and sedimentary facies analysis the data is relative between samples and consequently the parametric curve fits are relative and will likely contain less important internal and systematic errors. These studies often deal with ancient sediments and thus lack independent measured process data. Whilst the idea of incorporating process data into stratigraphic time-series analysis is an attractive concept, the complexities of real systems means interpreting relative grain size data in terms of hydraulic shear stress and sediment dynamics is generally not possible (see Flemming, 2007 for a discussion of just some of the error propogation involved in such computations).

Many current paleolimnological treatments of grain size data take one or more components of a grain size spectrum as the proxy data (e.g. median or mean grain size, percent clay or silt or sand, end member mixing proportions, etc; Chen et al., 2013; Dietze et al., 2012; Johnson and McCave, 2008; Wang et al., 2006; Weltje and

Prins, 2007). Such proxies are essentially summaries of the grain size spectra that are generally assumed to adequately represent the processes captured by the grain size data. In this study we deconvolve and peak-fit, using log-normal distributions, some of the grain size spectra within a high resolution lake sediment core from “ALE” a boreal lake in northern Alberta, Canada. The overall aim is to produce a conceptual process-based understanding of the stratigraphic grain size dataset that can then move forward to time-series analysis. The analytical chain utilized also demonstrates some of the analytical issues in applying such techniques, and in particular how the statistical representation of the ALE grain size data is strongly augmented by its integration into the geological context of the deposits. This analysis is then subsumed into the sedimentologic context of ALE to achieve a process-based interpretation of the grain size populations.

3.3.1 Study Site

3.3.1.1 Geological Setting

The lake core comes from a headwater lake in Northern Alberta, Canada (the lake has been given the colloquial name “ALE; Fig. 3.1). ALE is located ~40 km directly east of the main Athacasca Oil Sands surface mining operations (Fig. 3.1). The lake is situated on an ~495 mabsl terrace that is interpreted to be a glacial till terrace (Andriashek, 2003; Andriashek and Atkinson, 2007). The till overlies shale and argillaceaus limestone deposits of the Devonian Waterways Formation (NTS 74 D Surficial Geological Map, available from http://www.ags.gov.ab.ca/publications/publications.aspx). The thickness of

Quaternary strata is upwards of 100 m in the study area (Andriashek, 2003). ALE is probably a “kettle lake” which formed via stagnant ice melting (Andriashek, 2003; Mitchell and Prepas, 1990).

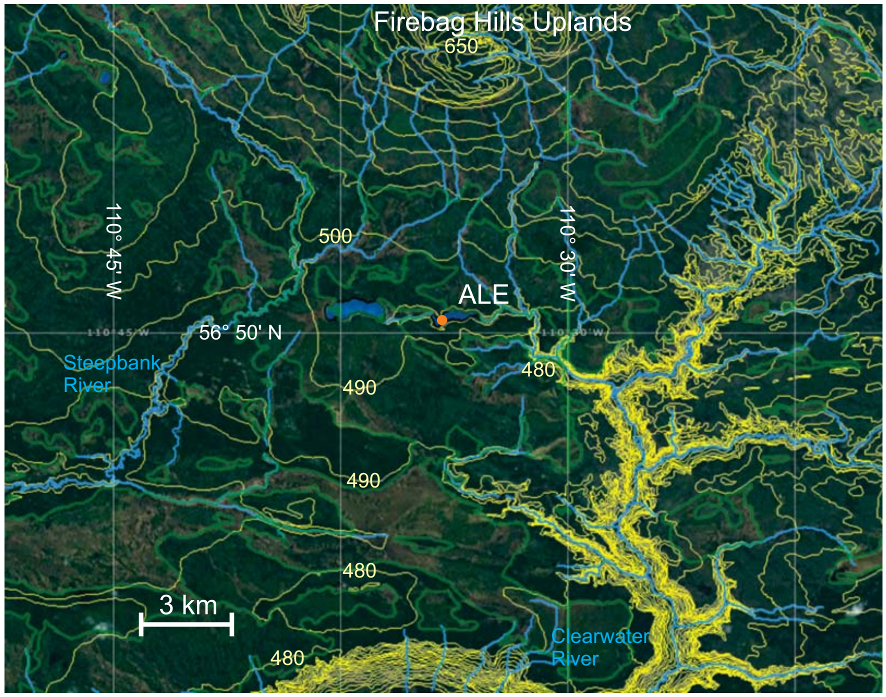

Figure 3.1: Location map A) Plan of ALE within the 495 mabsl terrace. Light green lines indicate mapped wetlands, which are abundant on the terrace and surround the western end of ALE. Yellow lines are 10 m spaced contours, blue lines are rivers. There is no significant human disturbance. “Canvec” map data downloaded from the Canada Centre for Mapping and Earth Observation, Department of Natural Resources Canada, NTS map sheet 074D15 (available free at http://geogratis.gc.ca/api/en/nrcan-rncan/ess-sst/9e555875-628f-4bb2-9c25-67e2b94252e9.html).

3.3.1.2 Geomorphic Setting of the Core Site

The glacial terrace hosts a scrubby, dense black spruce-tamarack forest that is typical of Canadian swamp vegetation communities (Warner and Rubec, 1997). ALE is a small lake whose shore is rimmed by a floating fen of riparian vegetation (Fig. 3.2A; Warner and Rubec, 1997). Lodgepole Pine (*Pinus contorta*) forest occurs in the northern to northeastern quadrant of the lake shore. ALE is ~1.6 km long in an east-west direction, and is <400 m wide in a north-south direction. The coring site was slightly east of a promontory located toward the western end of the lake. An echo-sounding transect from the south to the north shore shows that the lake deepens slowly through the coring site to a maximum of 4 m, then shallows slowly to the northern shore of the lake (i.e. there is perhaps a poorly defined, shallow-sided subaqueous channel to the north of the site). The southern margin of ALE is a flat, heavily vegetated wetland hinterland. The terrace containing ALE abuts to the north against the Firebag Hills Uplands (Andriashek, 2003), although all slopes are moderate to low (Fig. 3.1). The uplands are separated from the coring site firstly by a flat wetland, then a low angle lakebed slope and submarine channel. Both the wetland and the channel would inhibit bedload coarser-grained sediment from these uplands reaching the coring site.

Combined flow in lakes is generally generated via the coupling of inflow, outflow and wind. For some lakes it has been demonstrated that much of the non-wave current activity are secondary effects of the waves and inflow regimes themselves (e.g. reflected waves, coriolis circulation, Jin and Ji, 2004; Soulsby et al., 1993). ALE’s flat topography and limited seasonal run-off make it unlikely that combined flow is significant outside of the spring melt run-off period.

3.3.1.3 Hydrologic Setting of ALE

The closest hydrometric data to ALE comes from the Clearwater River above the Christina River hydrographic station, which is ~20 km downstream (west) of ALE. The terrace surrounding ALE is part of the headwaters to the Clearwater River, indicating this nearby streamflow data probably represents a good analog for the annual hydrologic situation around ALE (Figs. 3.1, 3.2A; data available for free download from Environment Canada's Wateroffice database at http://www.wateroffice.ec.gc.ca/graph/graph_e.html?stn=07CD005). The average long-term (46 year) hydrometric data indicates that the spring thaw generally generates the largest streamflow event within any single year (Fig. 3.2C, the 1990 annual daily streamflow in 3.2B). However, strong summer storms can generate equivalent streamflow events (Fig. 3.2B –1991). The onset of the spring thaw streamflow event generally occurs over 1 (rapid thaw) to 6 (slow thaw) weeks (Fig. 3.2B). However the discharge profile indicates that the high discharge event can take months to fully decay back to baseline conditions, suggesting that for most "typical" years significant and perhaps dominant amounts of the summer discharge volumes are residual from the spring melt.

Run-off-related geomorphological features are poorly defined across the terrace. There is a single small creek that flows into the lake at the westernmost end (Fig. 3.2A), although arial photographs indicate this creek meanders and is discontinuous within a belt of reed-horsetail aquatic riparian vegetation that joins

ALE to another, shallower lake some 2 km to the west. A few short discontinuous creek lines occur along both the north and south lake shores. These are all east of the coring site and presumably drain the terrace wetlands. The outlet for ALE occurs at the eastern end, but was not directly observed. There is no known human landscape disturbance within the watershed.

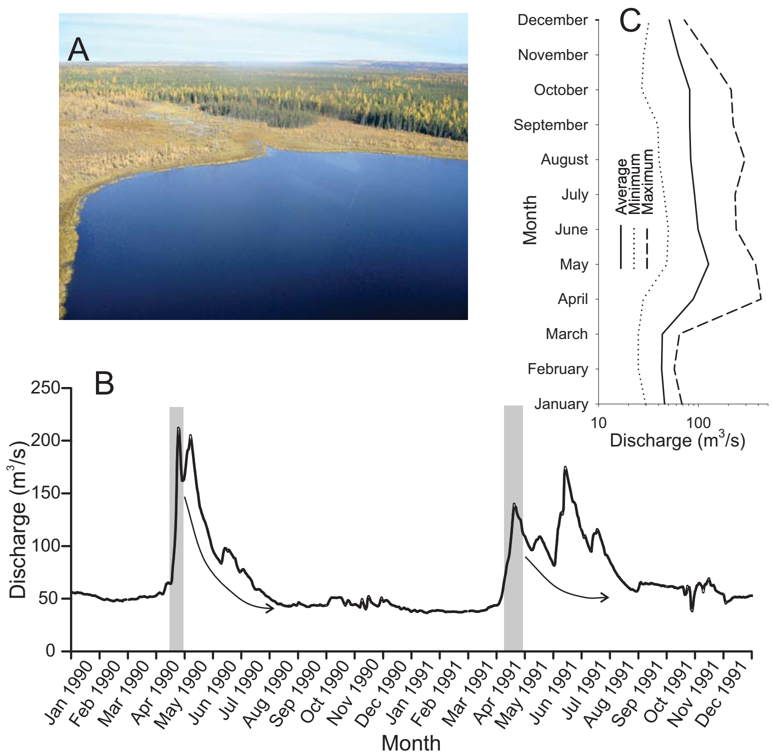

Figure 3.2: The sedimentological context of ALE. A) Photograph looking west northwestward to the western end of ALE. The lake is surrounded by a large glacial terrace dominated by scrubby, dense spruce-tamarack forest (the tamarack can be identified through its yellow-coloured, autumn leaves). The lake shore is rimmed by a floating fen of graminoids and horsetails (*Equisetum sp.*). The sole inlet creek entering ALE has built a small bay-head delta. The Firebag Hills Uplands are visible towards the top of the photo and represent the highest topography in the region, forming part of the headwaters for the Clearwater River. Photo courtesy of Dr. Jason Ahad. B) 1990-1991 daily streamflow hydrograph for the "Clearwater above Christina" hydrometric station, situated approximately 20 km down river from ALE. The 1990 year annual hydrographic profile has a single large spring melt peak and

minimal summer storm-related high discharge events (NB. the 1990 spring melt was above the average spring discharge of ~150 m^3/s; see inset panel C). The 1991 annual hydrograph has a small spring melt discharge and a large summer storm peak discharge. 1990 is a typical year, 1991 is atypical, in particular the very high summer storm peak (which is close to the historical high for June discharge at this hydrometric station). For both years the discharge profile indicates that high discharge events take some months to decay back to baseline flow. Grey boxes denote nival discharge period, curved arrows denote recession from peak to base flow conditions. C) compiled average, minimum and maximum streamflow data for the 46 year Christina hydrometric record. However, note from B that the timing of peak spring melt discharge can occur from April to June, which biases month-based long-term averages, maximums and minimums.

3.3.1.4 Climatic Setting

The northeastern region of Alberta is characterized by an sub-humid (precipitation < potential evapotranspiration) continental climate with warm summers and cold winters (Jiang et al., 2014). The majority of precipitation falls during the summer months, but, as for much of boreal Canada, the highest seasonal run-off occurs during the spring melt of the accumulated winter snowpack (Lyon et al., 2010; Lyon et al., 2012; Mwale et al., 2009). The prevailing wind direction is relatively consistent throughout the year, with winds predominantly coming from either the northwest or east. Wind speeds at 30 m height rarely exceed 8 m/s (data available from http://www.windatlas.ca/en/rose.php?field=EU&height=30&season=JJA&no=43&postal=T9H 5B4; see also Leahey and Hansen, 1982; Walmsley and Bagg, 1978)). Summer thunderstorms predominantly track further south (Brimelow and Reuter, 2005; Reuter and Nguyen, 1993), and could possibly be associated with greater wind speeds.

External climatic controls over precipitation are the same as those operating along the western coast of Canada, such as: 1) the jet stream and El Niño /La Niña cycle (ENSO, Oh et al., 2003), and; 2) global-scale teleconnections such as the Pacific Decadal Oscillation (PDO) and Atlantic Multidecadel Oscillation (AMO, McCabe et al., 2008; Oglesby et al., 2012; Whited et al. 2007). In general, during negative (positive) ENSO and PDO times the province of Alberta experiences winter precipitation below (above) normal (McCabe et al., 2008). This is interpreted to be due to the colder (warmer) waters occurring offshore western North America during negative (positive) ENSO and PDO phases. AMO cycles produce less (more) summer precipitation during positive (negative) phases in Alberta (Oglesby et al., 2012).

3.3.1.5 Conceptual ALE Sedimentological Context

The conceptual sedimentological framework for ALE is that of a lake embedded in a wetland landscape. This combines with a seasonal hydrology to limit the delivery of inorganic grains to the spring melt period via overland flow. To assess the significance of the distributions, and in particular the generally good magnitude-parameter correlations and generally poor position- and shape-parameter correlations, requires an understanding of the sedimentological context of ALE. Magnitude parameters are generally interpreted as a proxy for the sum of the process/processes that gave rise to that grain size distribution (Ashley, 1978; Kranck et al., 1996c; Middleton, 1976; Molinaroli et al., 2009; Syvitski, 1991; Tanner, 1983). The first-order factors controlling ALE sedimentology include: A) the hydrological regime controlling the run-off volume and intensity; B) the climatic regime, which primarily controls the distribution of water through the seasonal cycle; C) the landscape surrounding ALE, which controls the erosion-transport parameters; D) the wave-current action within the lake, which controls the internal distribution and/or redistribution of the grains entering the lake; E) the bioturbative mixing - being massive black gyttja, the ALE core is likely pervasively bioturbated; and F) the grain size distribution and mineralogy of the source regions, which controls what grains are available for erosion-transport-deposition. Specific grain size data for the source regions of ALE are limited to coarse size class data, which indicates all class sizes are available (Appendix 4 of Andriashek, 2003; see also McLaws, 1980). Since tills contain a wide variety of grain sizes it is highly unlikely that there is a deficiency in any particular grain size class within the source region for ALE.

Hydrology, seasonal climate, and landscape characteristics (A, B and C above) are known to be the major factors influencing the sedimentology of boreal environments (Carson et al., 1973; Fang et al., 2010; Gray et al., 2001; Jost et al., 2007; Laudon et al., 2004; Laudon et al., 2007; Lyon et al., 2012; McNamara et al., 2005; Metcalfe and Buttle, 1999; Redding and Devito, 2011; Redding and Devito, 2008). In modern boreal wetlands, discharge volume generally controls sediment delivery with a secondary control via run-off "intensity" (intensity is meant to reflect the rate of spring melt, which will impact the velocity of run-off). The ALE region hydrology is typical for Canadian boreal forests. In boreal wetland environments the seasonal hydrologic pattern is markedly partitioned into initial spring snow melt overland flow and summer groundwater flow (Fang et al., 2010; Nyberg et al., 2001; Pomeroy et al., 2007; Shook et al., 2013). Spring melt overland flow is magnified because frozen subsurface organic soils prevent or inhibit infiltration of the volume of water delivered/released over a relatively short timespan. In most years the spring melt volumes overwhelm the holding capacity of wetlands with or without a frozen subsurface (Carson et al., 1973; Gibson et al., 1993; Gray et al., 2001; Metcalfe and Buttle, 1999; Shook et al., 2013). In contrast, the summer-fall season is dominated by abundant growing-season evapotranspiration and ongoing subsurface flow.

During summer sub-humid boreal slope soils are mostly dry and the wetlands act as a sink for precipitation (Gibson et al., 1993; Kværner and Kløve, 2008; Lyon et al., 2012; McNamara et al., 2005; Quinton and Roulet, 1998; Redding and Devito, 2008). Nevertheless, summer thunderstorms are a prominent component of northern boreal summers and represent a potential mechanism for overwhelming the holding capacity of the wetland and thereby initiating surface run-off (Kværner and Kløve, 2008). Easterly winds greater than 15 m/s over the 1 km fetch could conceivably generate high frequency wind waves ~10 cm heigh (Hamilton and Mitchell, 1996; Walsh et al., 1989; Young and Verhagen, 1996). However, easterly winds of speeds above 8 m/s are rare for the area. Redding and Devito (2008) estimated that for northern Albertan hill slopes such-as those of the Firebag Hills Uplands near ALE, the return period for summer storms capable of generating > 1 mm of surface run-off (i.e. very minor flow) was ~25 years. The hydrologic dynamics of wetlands would likely extend this return periodicity significantly, and they would also further attenuate the volumes and velocities of run-off (ie. even anomalously large summer storm streamflow events such-as occurred in June 1991 (Fig. 3.2B) would probably not produce significant run-off due to the attenuating dynamics of a wetland system in this sub-humid climate). Overall it is highly likely that summer run-off to ALE is negligible for the majority of years. However, in those few years where summer run-off were to occur, the landscape surrounding ALE would likely preferentially capture bedload and thus skew the summer storm run-off sediment delivery to suspended load material. This is consistent with other case studies of lake high-frequency wind waves that indicated a lack of reworking the benthic sediments at 3.5 m water depth (Hofmann et al., 2008; Jin and Ji, 2004; Luettich et al., 1990; Soulsby et al., 1993).

The east-west orientation of ALE vs the predominantly northwest or east prevailing wind direction means most sediment delivery will be from the north and south margins, plus potentially via the inlet channel to the west. The stream channels entering ALE are all either well northeast (downstream and across the lakebed submarine channel) of the coring site, or discontinuous wetland channels. The single inlet channel to ALE, which is near the coring site and thus potentially an important sediment delivery system, is both discontinuous and embedded within extensive aquatic vegetation (reeds). It is more likely to be a sink rather than a conduit for bedload sediment particles. Overall, the lack of effective streams near the coring site means that sediment delivery via stream channels is likely an insignificant method of coarser-grained bedload sediment delivery to the ALE coring site (Fig. 3.1). Finer-grained suspended sediment to the coring site could likely have come from all the surrounding margins.

3.4 Methods

3.4.1 Sediment Collection

A 1.45 m freeze core was collected from ALE at 3.75 m water depth in September 2010 (latitude 56.87933º; longitude -110.5678º, Fig. 3.1). The coring location was chosen based on water depth, location within the lake and substrate type. The specially designed freeze corer has two aluminum metal faces approximately 15 cm wide by 2 m long (Macumber et al., 2011). The corer was filled with a dry ice-methanol mixture before being lowered into the water and sediment. The corer remained in the sediment for approximately 20 minutes to allow the sediments to freeze to the metal faces. The frozen sediment was removed from the corer and transported to Carleton University on wooden slabs in coolers on dry ice for slicing and analysis.

3.4.2 Grain Size Measurements

A purpose-built core microtome was used to section the ALE core at 1 mm resolution (Macumber et al., 2011). Grain size analysis was performed on every second slice (i.e. 2 mm resolution) starting with the surface sample (slice 1) to slice 1451 (n = 701 analyses). Sediment samples were initially digested in a heated water bath with 10% H_2O_2 to remove organics (van Hengstum et al., 2007; Murray, 2002; Donato, 2009). Digested samples were analyzed for grain size using a Beckman Coulter LS 13 320 Laser Diffraction Analyzer fitted with a Universal Liquid Medium (ULM) sample chamber. The samples were run at an obscuration level of 10% +/-3%, over a measurement range of 0.4 to 2000 µm. The laser diffraction data was converted to equivalent spherical grain size volume using the Fraunhofer diffraction model. Gradistat software (Blott and Pye, 2001) was used to extract the coarse-grained mode.

3.4.3 Grain Size Data Analysis

All grain size spectra were plotted to determine the basic structure of the grain size populations that may be present in ALE (Fig. 3.3), and to define spectra that depart from this structure (Fig. 3.4). Automated deconvolution was tried but found to be unreliable, primarily due to the non-uniqueness of solutions (see Results section as well as Xiao et al., 2012 for recent discussion). Consequently, deconvolution followed the following procedure:

1) All grain size spectra were examined to determine the general structure of the spectra, and to identify any spectra that do not conform to the general spectral structure (Fig. 3.4).
2) A subset of 50 samples was chosen for testing different deconvolution and peak fitting combinations. The samples chosen were spaced approximately every 200 mm down core, with at least 3 contiguous samples chosen for each 200 mm segment. The contiguous samples were chosen to capture the grain size spectral variability for that 200 mm portion of the core (Fig. 3.3). This method of selection ensured that the sample set included grain size spectra that were broadly representative of the core, and that the grain size variability was captured, including potential cyclic sedimentation processes, within each 200 mm portion of the core.
3) Subsequently, qualitative deconvolution of the spectra was optimized via trial and error, with the divergence from the basic spectral structure being used as the threshold for acceptance or rejection of different deconvolution models. Peak optimization modeling (or peak fitting) within the multimodal grain size spectra was done using PeakFit® software from SeaSolve Software Inc. (www.seasolve.com). Overall each deconvolution and subsequent peak optimisation step was closely similar to that used by other authors and is further detailed in steps 4-7 below (Ashley, 1978; Flemming, 2007; Qin et al., 2005; Sheridan et al., 1987; Sun et al., 2002; Xiao et al., 2012).

4) The peak fitting procedure adopted was to use the basic grain size spectral structure to determine the number of log-normal distributions (populations) within each multimodal grain size spectra, and their approximate modes. The spectral structure for each sample was examined via second order derivatives to aid the identification of unambiguous peaks (i.e. peaks with two downward-sloping sides), and abrupt changes in slope (inflection points) that are likely indicative of the existence of subordinate grain size populations within the spectra (cf. Bartholdy et al., 2007; Flemming, 2007; Qin et al., 2005; Xiao et al., 2012). For example, in the overall finest grain-sized spectra there is generally an unambiguous peak indicative of a small very fine sand-sized population (mode ~80-100 μm). In coarser-grained spectra this minor population can only be inferred on the basis of an inflection and/or shoulder and/or plateau in this region (compare Fig. 3.3A to 3.3D). Second-order derivative plots yield a strong peak in the very fine sand region, indicating the presence of a "hidden" distribution. Attempts at peak fitting without this log-normal population resulted in substantially poorer fit statistics (e.g. Fig. 3.3C, 3.3D), suggesting that this grain size range likely corresponds to a small and mostly hidden population.
5) The grain size spectral structure indicated 7 grain size populations, of which one (the medium sand population) is uncommon (only 5 samples) and does not overlap with the other distributions. Consequently it was not modelled in the peak fitting procedure (see Results section below, Figs. 3.3, 3.4). PeakFit was therefore given a predefined starting point of 6 log-normal distributions, each of which had an approximate mode (NB. using 3, 4, or 5 population models always resulted in

poorer fit statistics and a lack of consistency between sample optimisations). From this starting point PeakFit generated a least-squares-minimized model fit to the measured grain size spectra of the sample (these model solutions are termed "unconstrained" below). This starting configuration is that adopted by most authors attempting to deconvolute grain size spectra into log-normal distributions (Ashley, 1978; Sheridan et al., 1987; Xiao et al., 2012). PeakFit automatically models the log-normal functions to the measured data by using an iterative "peak sharpening" (derivative-based) algorithm (see PeakFit v4 Users Guide for additional for details). The peak fitting is iterative in that it derives a solution, then tests to see if any further "sharpening" produces better or worse least-squares criteria. The iterations were continued until the chi-squared goodness-of-fit criteria attained values unchanging in the 6^{th} decimal place. Once completed, the fit between the model and measured spectra were evaluated via correlation coefficient, Standard Error, and F-statistic goodness-of-fit measures (Figs 3.3, 3.4).

6) However, even using the predefined structure of point 4 provided only a few unconstrained model fits that were consistent with the basic structure of the grain size spectra (Fig 3.5B). To further constrain peak fitting solutions two more restrictions were imposed: A) All populations modelled by the peak fitting were required to have unambiguously identifiable peaks within at least 1% of all the grain size spectra. This constraint was required to prevent peak fitting from migrating modes from the initial approximated starting point to positions where no mode occurs in any of the grain size spectra. The most common distribution where this occurred was for the very fine sand population (~50% of sample solutions; see

point 3 above), but it also occurred in a few solutions for the 12-20 μm population. Unconstrained solution results commonly returned a best fit that included two log-normal distributions in the range 40-60 μm, with no very fine sand distribution (Fig. 3.5B). No measured spectra had two distinct modes or modes plus inflection points in the 40-60 μm size range. All spectra have either one parallel-sided unambiguous peak or a single large inflection in this size range. Consequently a two-population structure between 40 and 60 μm is inconsistent with the basic spectral structure. To maintain the relationship between the basic spectral structure and the model results the very fine sand mode was restricted to >80 μm, which forced the distinction between coarse silt and very fine sand-sized populations. Conversely, the low 1% threshold meant that the only unambiguous peak to be excluded from all the measured spectra was one measured at 35 μm in two contiguous samples (Fig. 3.4); and B) The most prevalent problem with virtually all unconstrained solutions was the tendency for PeakFit to generate one exceptionally large and one very small log-normal distribution in the 3-30 μm grain size range (Fig. 3.5B). This occurred irrespective of whether this region contained one or two unambiguous peaks. As detailed below, these solutions are considered sedimentologically unrealistic and poorly representative of the consistent bi-modal structure in this grain size range. Trial and error determined that the best method of creating a distinct separation between distributions 2 and 3 was to constrain the distribution 2 mode to the distribution 2 modal range present in those samples where unambiguous distribution 2 and 3 peaks occur (i.e. 5-6.5 μm; Fig. 3.3B & D). This constraint led to distribution 3 and 1 modes that were consistent with the inflection points for those distributions within that sample (Fig. 3.3). Alternative constraints for generating separation between distributions 2 and 3 were problematic; for example, using mode 3 as a constraint (i.e. as opposed to mode 2 above) resulted in relatively poor fitting for finer-grained samples, particularly with respect to distributions 2 and 4. This problem was likely caused by the definition of the mode size range for distribution 3 because unambiguous distribution 3 modes are only present in relatively coarser-grained samples (Fig. 3.3), which meant that the constraint was defined as a mode of 17 and 20 μm. This is likely an overestimate of the mode 3 size range for relatively finer-grained samples (Table 3.1), and consequently led to problematic model fits for such samples. Separating strongly overlapping distributions is not a problem restricted to PeakFit or to grain size data, and usually requires additional information to be successful (Bah et al., 2009; Flemming, 2007). Model solutions that utilize either of these extra constraints are termed "constrained" below.

7) From the model results the following statistics were generated for each of the 6 log-normal distributions within each model spectra: area, maximum amplitude, modal grain size, and the full-width at half the height of the maximum amplitude (FWHH, which is similar to the standard deviation of a distribution).

Table 3.1: Basic statistics for area, amplitude, mode, FWHH, amplitude/FWHH for the "constrained" model solutions.

	Units	Average	Minimum	Maximum	SD
D1 Area *	%	8.37	1.65	11.63	1.89
D2 Area *	%	29.57	7.61	44.13	8.16
D3 Area *	%	29.62	12.94	58.68	11.90
D4 Area *	%	18.42	3.77	31.51	8.94
D5 Area *	%	6.45	1.93	17.03	3.57
D6 Area *	%	7.56	2.38	16.83	3.66
D1 Amp	%	0.62	0.12	0.81	0.12
D2 Amp	%	2.07	0.59	2.90	0.47
D3 Amp	%	2.25	0.96	4.67	0.91
D4 Amp	%	1.50	0.32	2.70	0.76
D5 Amp	%	0.53	0.15	1.52	0.33
D6 Amp	%	0.63	0.19	1.45	0.33
D1 Mode	µm	1.07	0.89	1.37	0.12
D2 Mode	µm	6.13	5.56	6.50	0.27
D3 Mode	µm	16.46	12.30	20.80	2.30
D4 Mode	µm	45.47	35.42	49.54	2.93
D5 Mode	µm	86.29	80.15	101.40	5.86
D6 Mode	µm	145.03	130.20	183.57	11.71
D1 FWHH	µm	1.66	1.08	2.47	0.34
D2 FWHH	µm	11.55	6.60	17.27	2.22
D3 FWHH	µm	21.73	15.52	31.92	3.88
D4 FWHH	µm	29.67	16.63	51.67	7.74
D5 FWHH	µm	59.98	22.54	85.88	11.37
D6 FWHH	µm	64.73	48.71	136.44	13.27
Aspect Ratio 1 [t]	%	153%	121%	185%	17%
Aspect Ratio 2 [t]	%	189%	108%	267%	35%
Aspect Ratio 3 [t]	%	132%	102%	191%	17%
Aspect Ratio 4 [t]	%	65%	40%	117%	16%
Aspect Ratio 5 [t]	%	70%	26%	95%	12%
Aspect Ratio 6 [t]	%	44%	33%	74%	6%

SD = standard deviation

* An area calculation for these distributions has units of µm%, and here it is normalised against FWHH to render percentages comparable between the different distributions.

[t] Aspect ratio of these distributions = width per micron grain size ~ FWHH # ÷ Mode # where # = distribution number. Subsequently converted to percentages.

3.5 Results & Interpretation

3.5.1 Grain Size Spectral Structure - Results

The grain size spectra from ALE are exceptionally consistent in their overall structure (Fig. 3.3), which is:

1. From the finest grain size measured (0.4 μm) to ~ 3-4 μm there is a broad low amplitude shoulder or unambiguous peak (Fig. 3.3A).
2. Subsequently there is a large area of fine grain sizes between 3-4 μm and ~ 30 μm that either contains a single broad peak with a mode between 7 and 14 μm (Fig. 3.3A, 3.3C), or two clearly distinguished peaks with modes between ~5-6.5 μm and ~17-20 μm (Fig. 3.3B, 3.3D). The overall coarser-grained spectra tend to be those with two clearly distinguished peaks.
3. Between ~30 μm and ~120 μm there is generally a single peak centred around 50 μm. The peak is either approximately symmetric if it is of high amplitude (Fig. 3.3D), or it has unequal-sloped sides if of low amplitude (Fig. 3.3B). In some of the finest-grained spectra (i.e. spectra where the 3-30 μm area is relatively large), this peak can be reduced to an inflection beside that large finer-grained peak (Fig. 3.3A). In these very fine grained spectra a small distinct peak occurs at ~90-100 μm. However, in most spectra this peak is generally represented by either a broad plateau or shoulder in the ~70-120 μm grain size range (Fig. 3.3B-3.3D).
4. The coarsest grained peak that is common to all of these spectra occurs at ~150 μm. The finer-grained side of this peak is coincident with the ~70-120 μm plateau/shoulder and is generally a low-angle slope. The coarser-grained

side has an exponential decay slope in all spectra.

Within the entire grain size spectral data there are 8 spectra of three different types that deviate from the general structures above (Fig. 3.4). The most common difference (5 samples) is the presence of a broad, low-amplitude medium to coarse sand sized population (e.g. 237 mm sample type; Fig.3.4). The 237 mm sample has 7.7 % of its total grain size population in this peak, the other 4 samples have <1 % of their total population in this peak. Other than this medium sand peak, these 5 samples exhibit all the general spectral characteristics listed above. This medium sand distribution does not overlap any of the finer-grained distributions. Consequently it is both easily distinguished and too minor to have been included in the spectral deconvolution and peak fit modeling.

The 691 mm sample has virtually no sand, but otherwise follows the general structure above. The third deviation from the general structure is by two adjacent spectra (985 mm; Fig. 3.4 and 987 mm), which exhibit no fine silt peak but rather a single coarse silt peak at ~35 μm, a region where peaks are absent in all other spectra.

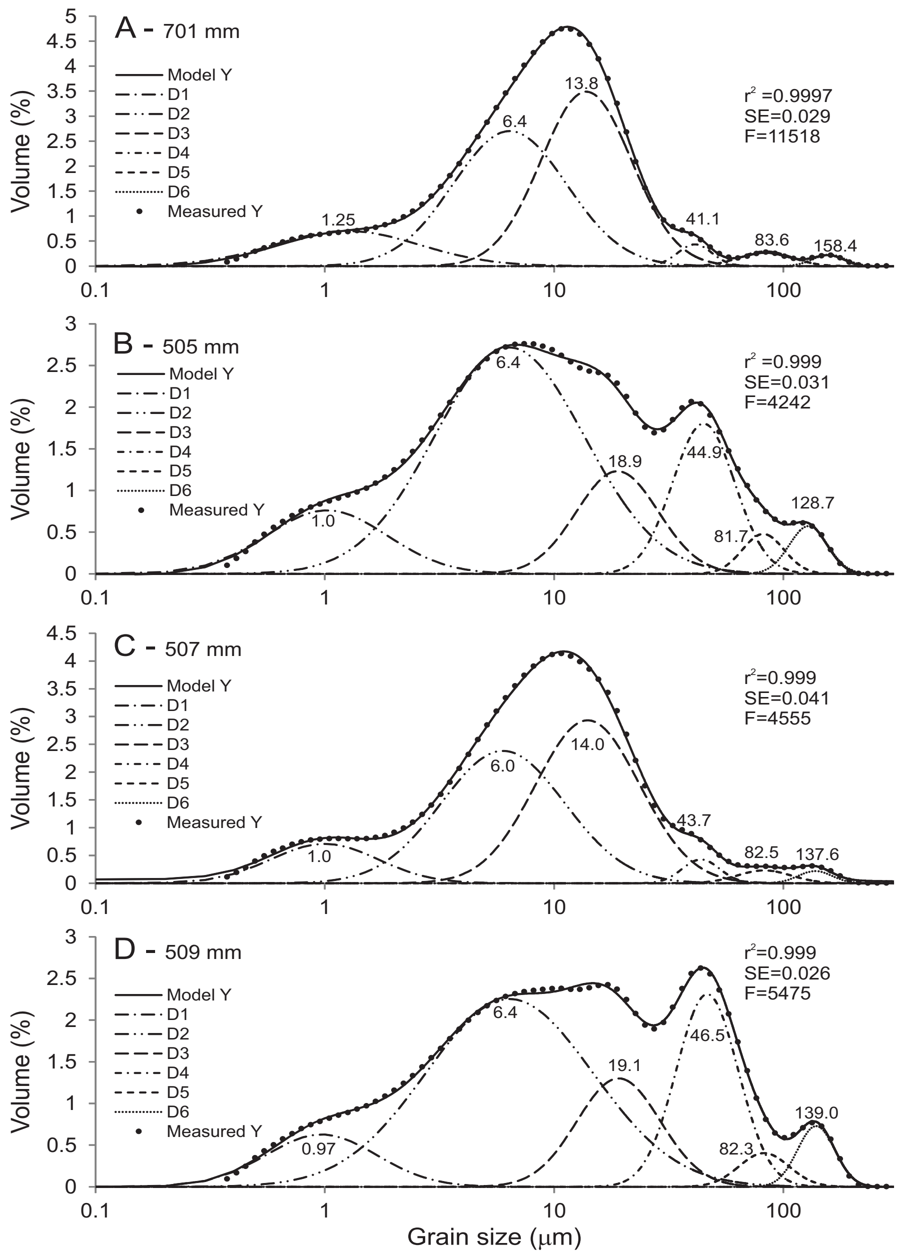

Figure 3.3: Constrained deconvolved and peak fitted grain size spectra for the ALE freeze core. In each panel the upper portion represents the actual distribution (dotted line) and its approximation (solid line) as the sum of the different log-normal distributions D1 to D6. Also noted are the modes of each peak, and the goodness-of-fit statistics (regression least squares correlation coefficient (r^2), standard error (SE),

and F-statistic respectively). A: This sample is one of the overall finest grain size distributions measured, with a single fine silt peak at ~11 μm. B-D: Overall medium- (B), fine- (C) and coarse-grained (D) distributions in three contiguous samples. Similar grain size spectral variation is present at all levels within the core, and is likely indicative of high-frequency cyclic sedimentation patterns. See text for detailed discussion.

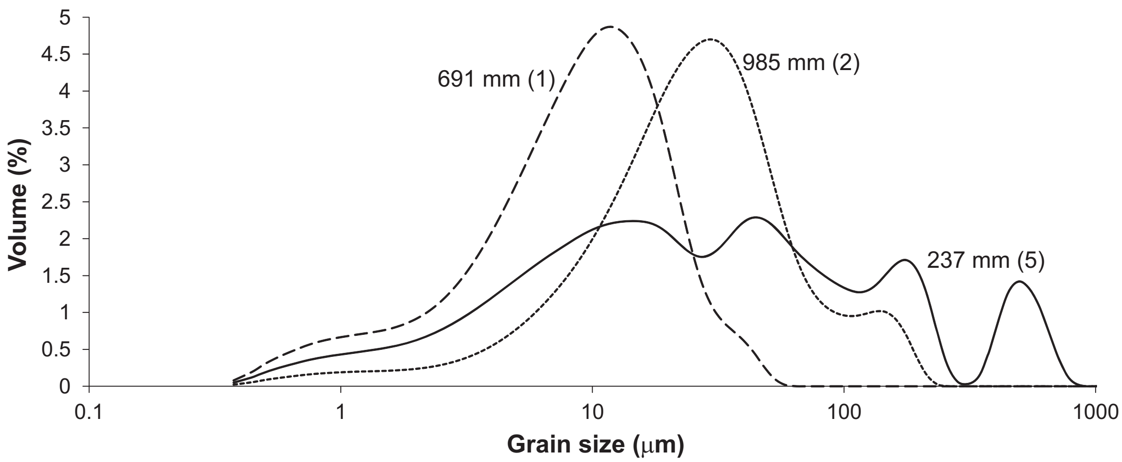

Figure 3.4: Spectra of the three types of atypical grain size spectra. The sample depth (in mm) refers to the core depth of the figured sample, whilst the bracketed number depicts how many of these type of spectra occur within the dataset.

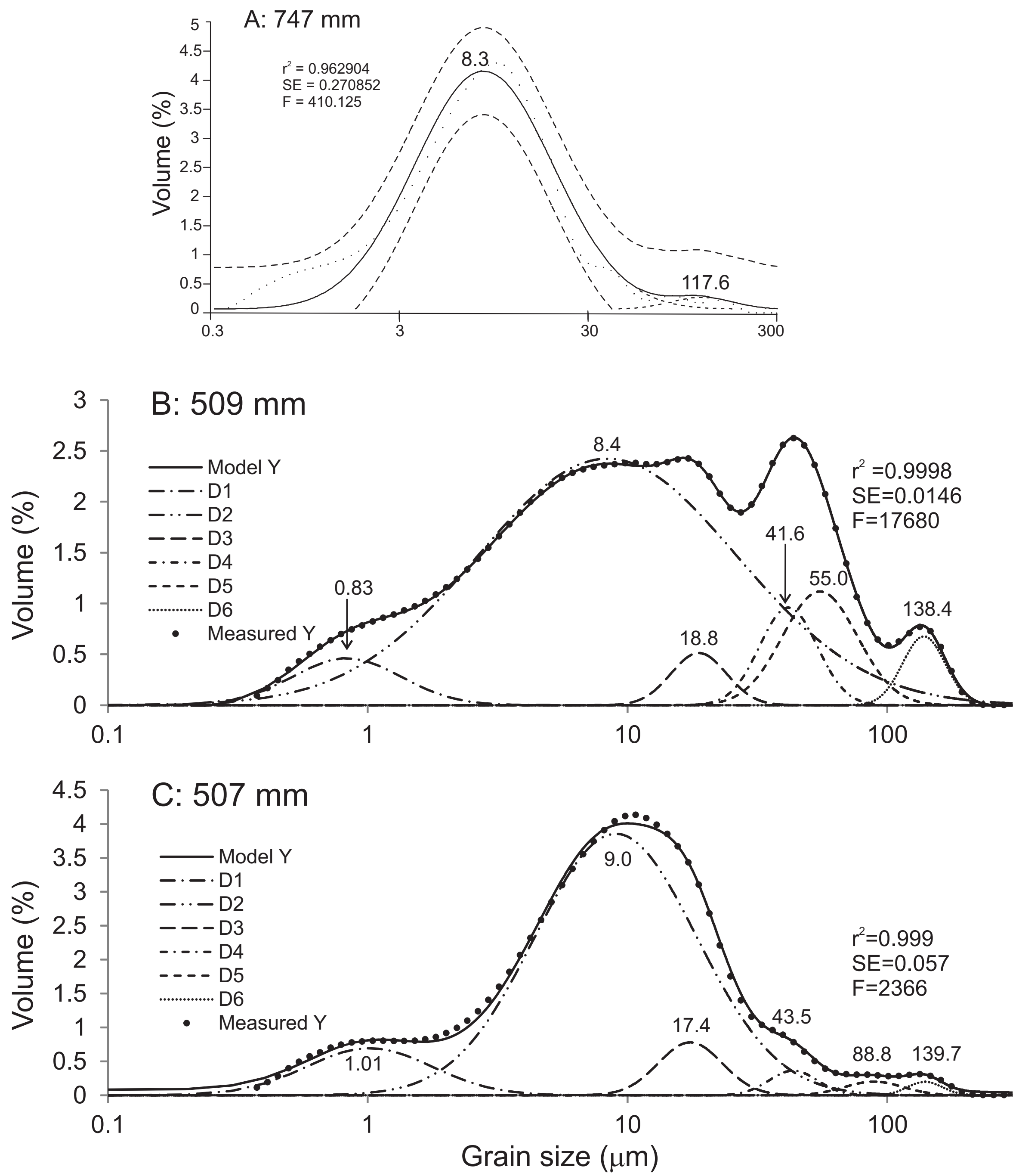

Figure 3.5: Examples of alternative deconvolutions of these spectra, which can be compared against the constrained solutions for the same samples in figure 3.3. A) Fully automated deconvolution and peak fitting. Only two distributions found, with

modes at 8.3 and 117.6 mm. Dotted line is the measured data, solid line is the summed model data for the two distributions (small dashes). Large dashed lines represent 99 percent confidence limits that includes all measured data points. Fit statistics are satisfactory, but not as excellent as for other solutions. B) Unconstrained model that produces a dominant very fine silt distribution 2 whose shoulders extend across the whole measured grain size range. The mode of this distribution is significantly coarser than that for unambiguous distribution 2 peaks (5-6.5 μm). The fine silt distribution 3 is highly subdued and thus does not well reflect the unambiguous fine silt peak present in this overall coarser-grained sample (i.e. this fit is poor for samples with unambiguous distribution 3 peaks, and is considered significantly worse for finer-grained samples that have a single peak in the 3-30 μm range). The peak fit places both distributions 4 and 5 into the 40-60 μm range, which is not representative of the basic structure of the spectra. C) An alternative to constraining mode 2 to 5-6.5 μm is to constrain mode 3 to 17-20 μm, the range it exhibits in samples with unambiguous distribution 3 peaks. In finer-grained samples this tends to generate a large distribution 2 with a mode 2 that is much coarser-grained than mode 2 in samples that have an unambiguous distribution 2 peak. Distribution 3 is reduced in size in such solutions, and overall this constraint leads to models that are similar to unconstrained models for this grain size range.

3.5.2 Grain Size Spectral Structure - Interpretation

Fully automated deconvolution and peak fitting of the grain size spectra yielded 2 to 4 log-normal distributions (Fig. 3.5A). These were statistically valid solutions in that they passed the fit criteria and the 95% confidence limits overlapped all measured data points (Fig. 3.5A). However these solutions do not adequately identify and model all the unambiguous peaks and inflection points within the spectra, but they do provide an objective baseline for exploring the data; i.e. this baseline was used as one comparator for the success or otherwise of subsequent models that incorporated different numbers of starting populations and constraints on distributions. Subsequent iterations from this starting point generated the 6-distribution unconstrained and constrained deconvolution models that are described below.

The deconvoluted spectral structure contained 7 discreet log-normal grain size distributions (the 6 illustrated in Fig. 3.3, plus the medium sand mode distributions within “237 mm type” sample shown in Fig. 3.4). The 6 distributions shown in Fig. 3.3 are termed D1 to D6, with: D1 = population with 1 μm mode; D2 = population with 5-6.5 μm mode; D3 = population with ~12-20 μm mode; D4 = population with ~45-55 μm mode; D5 = population with ~80-110 μm mode; and D6 = population with ~120-200 μm mode. Similarly, the modes are labeled M1 through M6. Distributions D1 and D6, with the finest and coarsest grain-size modes respectively, are easily distinguished in virtually all spectra. In between are 4 distributions, each with unambiguous peaks in >5 % of all spectra (the very fine sand population produces unambiguous peaks in 45 (6.4 %) samples, the other three distributions produce unambiguous peaks in > 45 samples).

The only unambiguous peak excluded from the data is that at 35 μm in two contiguous samples at 985 and 987 mm down core (0.3 % of samples; Fig. 3.4).

3.5.3 Unconstrained Peak Fitting – Results

Using the qualitative interpretation of 7 distributions, whittled to 6 via the exclusion of the rare medium sand distribution from the models (see Methods), unconstrained peak fitting generated lowest-error models that generally represented the 3-30 μm grain size range as having one large, dominant very fine silt distribution and one minor subordinate fine silt distribution (Fig. 3.5B). In a few cases the unconstrained model solutions were the reverse of the above; i.e. a large fine silt curve and a minor very fine silt curve.

Unconstrained models also generated two distributions in the 40-60 μm range, with no very fine sand distribution.

3.5.4 Unconstrained Peak Fitting – Interpretation

The spectra for relatively finer-grained samples generally only exhibit one peak between 3 and 30 μm, with non-symmetrical slopes (Fig. 3.3A, 3.3C). For coarser-grained spectra there are two unambiguous peaks with modes at ~5-6.5 μm and 17-20 μm (Fig. 3.3B, 3.3D). Both of these spectral characteristics indicate more than one distribution exists in this grain size range. However, unconstrained peak fitting models depict this range as having one dominant distribution that encompasses all of, or in some cases more than, the entire measured grain size range within the sample (generally D2>>D3). This solution is inconsistent with the bimodal spectral structure in this grain size range. Furthermore, there is a lack of consistency in unconstrained solutions as some models were the reverse of above, with a dominant fine silt and minor very fine silt distribution (i.e. D3>>D2). Overall the results indicate that unconstrained models might exhibit excellent fit statistics, but are likely a poor representation of the ALE populations for this grain size range.

Similarly to above, there is no evidence from the spectral structure that supports a peak fit model with two distributions in the 40-60 μm grain size range (Fig. 3.5B), but rather a consistent structure of a dominant coarse silt D4 and minor very fine sand D5. Such solutions are also considered unrepresentative of the ALE grain size populations.

3.5.5 Constrained Peak Fitting – Results

In the grain size range 3 - 30 μm the spectral structure contains either one (finer-grained samples) or two (coarser-grained samples) unambiguous peaks (Fig. 5.5), suggesting, as does the second derivative plot, that this range represents two strongly overlapping distributions (D2 and D3). In the absence of complementary data (e.g. process-based data) to separate D2 and D3 more accurately, unconstrained peak fitting tended to migrate mode 2 to improbable values whilst decreasing D3. Consequently the mode of D2 was constrained to 5-6.5 μm, the range it has in spectra where it is an unambiguous peak (Table 3.1). Similarly, to prevent automated peak fitting from migrating the mode of D5 to improbable values required constraint of mode 5 to grain size values >80 μm (see Methods; Table 3.1). These constraints illustrate the problems associated with deconvolving strongly overlapping distributions within a spectrum (Bah et al., 2009; Flemming, 2007). Solutions where these two constraints were imposed are termed “constrained solutions”.

As for unconstrained solutions, the fit parameters (r^2, SE, F-statistic) indicate the constrained model solutions are closely comparable to the measured spectra (Fig. 3.3). The impact of the constraints on the different model solutions can be further evaluated via the summary measures for each distribution within each sample; i.e. area, amplitude, mode and FWHH (Table 3.1; Table 3.2; Fig. 3.5). Comparison of the unconstrained versus constrained peak fitting models indicates the constraints generated a large change for very fine silt distribution D2 (i.e. poor, statistically insignificant correlations and regression slopes far from unity for all distribution summary measures; Table 3.1). The constrained solution transforms a very broad and high amplitude distribution into a substantially narrower, lower amplitude peak for D2 (for a visual comparison compare Fig 3.3D to Fig 3.5B). The influence of this constraint on the two nearby populations (D1 and D3) is also substantial, with these distributions having statistically significant but relatively low correlations, and regression slopes also relatively far from unity, especially for area (Table 3.2; comparative plots Figs. 3.3, 3.5).

The constraint imposed on D5 converts a small distribution into an even smaller, but wider (more poorly sorted) distribution (constrained area ~ 0.58 X unconstrained area and constrained FWHH ~ 1.2 X unconstrained FWHH; Table TT1; Fig. 3.3C vs Fig 3.5C or Fig 3.3D vs Fig 3.5B). However, since D5 was always a relatively small distribution this constraint did not generate the same degree of change as for the constraint on D2. For D5 area and amplitude the correlation coefficients and regression slopes indicate there is moderate agreement between the constrained and unconstrained solutions. D5 is also relatively small in comparison to adjacent distributions D4 and D6 (Table 3.1), and even though in some spectra it strongly overlaps D4 this constraint does not strongly impact either distribution. In particular, unconstrained versus constrained solutions for D6 are generally similar.

Area and peak amplitude are measures of the overall size of the distribution (Hartmann, 2007), and the basic statistics for the constrained peak fits indicate that D2, D3 and D4 are all major grain size populations in these spectra (Table 3.1). The mode and FWHH are measures that reflect the position and width respectively of each distribution within a spectrum (Hartmann, 2007). Hence the combined basic statistics (Table 3.1) represent the general spectral structure; i.e. strongly overlapping D2 and D3; weakly overlapping D3 and D4; strongly overlapping D4 and D5; D1 and D6 weakly overlapping D2 and D5 respectively; Figs 3.3, 3.4, 3.5). Both the FWHH and Aspect Ratio (mode-normalised FWHH) are measures of the distribution width and both demonstrate the generally poor sorting for D1-D3, and moderate sorting for D4-D6 (Table 3.3, Friedman, 1962).

Spearman rank correlation analysis of the area, amplitude, mode and FWHH measures for the constrained model solutions provide an indication of how these parameters co-vary across the sample suite (Table 3.3). There are two striking features of the correlation for area and amplitude, the size parameters of the distribution: A) area and amplitude for D1 to D3 are negatively correlated with those of D4 to D6; and B) area and amplitude for D4 to D6 are all strongly positively correlated with each other (Table 3.3A, 3.3B). D1-D3 exhibit no consistent cross-correlations with the most substantial correlation being a strong negative one between D2 and D3 areas. The position (mode) and width (FWHH) of most distributions are generally uncorrelated (Table 3.3C, 3.3D). A notable exception to this generalization is the positive correlation between mode and FWHH for D3 and D4.

Table 3.2: Pearson correlation coefficients (r^2) and regression slopes between unconstrained and constrained solutions for area, amplitude, mode and FWHH.

	D1	D2	D3	D4	D5	D6
Pearson Correlation Coefficient (r^2)						
Area	0.69*	0.17	0.50*	0.72*	0.79*	0.96*
Amplitude	0.77*	0.41*	0.67*	0.78*	0.65*	0.97*
Mode	0.73*	0.38	0.72*	0.58*	0.52*	0.97*
FWHH	0.67*	0.28	0.32	0.73*	0.47*	0.81*
Slope of regression equation						
Area	0.35	0.04	0.34	1.23	0.58	1.15
Amplitude	0.63	0.29	0.67	1.20	0.47	1.06
Mode	0.49	0.04	0.54	0.72	0.25	0.86
FWHH	0.96	0.63	0.29	0.67	1.20	0.47

* t-Test indicating that the Pearson r^2 values are significant at $P < 0.01$

Table 3.3: Spearman's correlation coefficients for log-normal distribution comparisons. Spearman's rank correlation coefficients are the numbers in the top-right half of the table, the corresponding statistical significance criteria are in the bottom left of the table; e.g. the correlation between peak 1 area and peak 4 area is -0.44 at a significance of P < 0.001.Numbers in bold italic are significant at the P < 0.01 level, whilst those in italics in 3.3A and 3.3B highlight the consistent negative correlation between peaks 1, 2, 3 and peaks 4, 5, 6.

3.3A: Area

	D1 Area	D2 Area	D3 Area	D4 Area	D5 Area	D6 Area
D1 Area	1.00	-0.23	0.23	***-0.44***	*-0.25*	*-0.29*
D2 Area	0.11	1.00	***-0.85***	*-0.07*	*-0.16*	*-0.21*
D3 Area	0.10	<0.001	1.00	*-0.32*	*-0.05*	*-0.19*
D4 Area	<0.001	0.61	0.02	1.00	***0.53***	***0.84***
D5 Area	0.08	0.26	0.73	<0.001	1.00	***0.70***
D6 Area	0.04	0.14	0.19	<0.001	<0.001	1.00

3.3B: Amplitude

	D1 Amp	D2 Amp	D3 Amp	D4 Amp	D5 Amp	D6 Amp
D1 Amp	1.00	***0.63***	-0.07	***-0.36***	***-0.40***	***-0.46***
D2 Amp	<0.001	1.00	-0.15	***-0.55***	***-0.53***	***-0.71***
D3 Amp	0.62	0.29	1.00	***-0.60***	*-0.34*	***-0.45***
D4 Amp	0.01	<0.001	<0.001	1.00	***0.61***	***0.84***
D5 Amp	<0.001	<0.001	0.02	<0.001	1.00	***0.73***
D6 Amp	<0.001	<0.001	<0.001	<0.001	<0.001	1.00

3.3C: Mode

	D1 Mode	D2 Mode	D3 Mode	D4 Mode	D5 Mode	D6 Mode
D1 Mode	1.00	0.04	-0.18	-0.03	0.15	0.31
D2 Mode	0.78	1.00	***0.48***	0.07	0.11	0.02
D3 Mode	0.22	<0.001	1.00	***0.48***	0.18	0.07
D4 Mode	0.85	0.62	<0.001	1.00	0.31	0.19
D5 Mode	0.29	0.45	0.21	0.03	1.00	0.32
D6 Mode	0.03	0.88	0.62	0.19	0.02	1.00

Table 3.3 cont.
3.3D: FWHH

	D1	D2	D3	D4	D5	D6
D1	1.00	***-0.74***	-0.16	0.04	0.14	0.42
D2	0.00	1.00	***0.43***	0.28	-0.08	-0.02
D3	0.27	0.00	1.00	***0.75***	-0.02	***0.40***
D4	0.81	0.05	0.00	1.00	-0.13	***0.51***
D5	0.32	0.60	0.89	0.38	1.00	0.30
D6	0.00	0.90	0.00	0.00	0.03	1.00

3.5.6 Constrained Peak Fitting – Interpretation

Constrained peak fitting is clearly important to the overall interpretation of the peak fitting results. Nonetheless, the constrained-unconstrained correlations (Table 3.2) indicate that the solutions for D4 and D6 are relatively robust irrespective of constraints. The rest of the distributions are variably influenced by the constraints imposed, with D2 impacted the most.

Log-normal distributions have long been recognized as an approximation of the individual grain size populations, and that each log-normal distribution essentially reflects the erosion-transport-depositional processes that controlled that population (Ashley, 1978; Flemming, 2007; Le Roux and Rojas, 2007; Middleton, 1976; Middleton, 1990; Xiao et al., 2012). The strong positive and negative correlations between area and amplitude indicate fundamental relationships at the scale level between all the populations within these spectra (Table 3.3). This is interpreted to indicate that the magnitudes of the different environmental processes are intimately linked. The position and shape parameters have long been recognized as a reflection of the hydraulic processes that govern the grain size populations (Hartmann, 2007; Kranck et al., 1996a; Kranck et al., 1996b; Middleton, 1976; Påsse, 1997; Sheridan et al., 1987). The general non-correlation, with a notable exception, of the position and shape parameters of these distributions indicates that the populations are not generally linked at the process level (Table 3.3). This separation suggests that the iterative deconvolution and peak fitting procedure used herein did successfully distinguish grain size populations that reflect different suites of erosion-transport-depositional processes, which will be discussed further below. Overall the area, amplitude, mode, and FWHH parameters of distributions are important evidence for understanding the relationships between the different parameters, but are generally not used in the study of grain size distributions.

3.5.7 Summary of Results

Given that the ALE grain size spectral structure is consistent throughout the entire core, the combined data suggests that the 7 log-normal distributions (6 persistent, one rare) represent a suite of independent grain size populations that were present throughout the time period represented by the core. These sedimentological populations were not inter-related at the process level, but that the magnitudes of these different populations were strongly inter-related.

The stratigraphic consistency of the spectral structure indicates that each spectrum is a mix of the same suite of six populations with the rare occurrence of the seventh. Consequently, the sample succession represents a time or depth sequence of these processes, and any changes in the relative magnitudes of the different distributions reflects a change in the environmental parameters that control magnitude (Fig. 3.6).

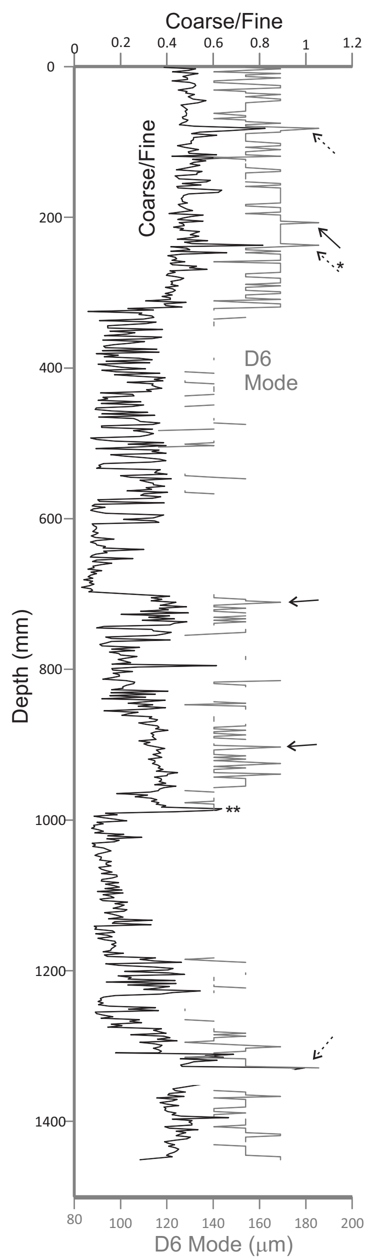

Figure 3.6: Coarse divided by fine ratio (>32 μm fraction:<32 μm fraction) and D6 mode plotted against depth for the ALE core. Dashed arrows denote examples where D6 mode and coarse:fine ratio both spike, whereas solid arrows depict samples where D6 mode spikes and troughs have no corresponding response from the coarse:fine

ratio. * = 237 mm sample; ** = the two anomalous “985” mm type distributions, which do not have anomalous D6 modes at 140 μm. Sections missing from the D6 Mode are due to Gradistat only consistently recognizing the D6 mode in predominantly coarser-grained spectra where D6 is larger. Note also that the resolution of the D6 Mode is coarse at ~14 μm.

3.6 Discussion

3.6.1 Spectral Deconvolution and Peak Fitting

As noted by many authors, there is no single solution when deconvolving and peak fitting strongly overlapping distributions within a spectrum (Ashley, 1978; Bagnold and Barndorff-Nielsen, 1980; Bah et al., 2009; Flemming, 2007; Middleton, 1990; Påsse, 1997; Sun et al., 2002; Weltje and Prins, 2007). The deconvolution of ALE grain size spectra into seven distributions was relatively straightforward due to the consistent stratigraphic spectral structure for all but 2 adjacent samples. Conversely, peak fitting D1 to D6 within each spectra was not straightforward. As demonstrated by the constrained and unconstrained peak fitting solutions there is a suite of statistically acceptable solutions for each ALE grain size spectrum (Dietze et al., 2012). The variability in the ALE peak fitting solutions is a reflection of the degree of overlap between neighbouring distributions (Bah et al., 2009; Xiao et al., 2012). The peak fitting solutions are most variable in the regions of greatest distributional overlap; i.e. in the D1-D3 and D4-D5 ranges (Figs. 3.3, 3.5). Conversely the greatest accuracy and least variability between solutions for ALE spectra is for distribution D6, due to minimal overlap with other distributions.

Most grain size deconvolution studies lack independent data for determining which peak fitting solution is best, as is the case for ALE. Consequently, choosing a preferred peak fit becomes a subjective judgment based upon a prioritization of the accuracy and importance of the different pieces of quantitative information within one or more spectra. The preferred solution is that which most accurately recreates the highest priority piece of quantitative information (Leys et al., 2005). For the overlapping D1-D3 and D4-D5 grain size ranges in the ALE spectra, the preferred solution was the one that produced the most unambiguous D2 and D5 modes. There is considerable sedimentological support for using the mode as the determining factor for anchoring population positions (Bah et al., 2009; Barusseau, 2011; Kranck et al., 1996b; Påsse, 1997; Sheridan et al., 1987 and the many references therein). There is also mathematical support for prioritizing the distributional mode as the most accurate quantitative information when deconvoluting grain size data (Hajek et al., 2010; Leys et al., 2005; Lwin, 2003; Weltje and Prins, 2007). Both of these lines of support highlight the mode as the single positioning parameter within both log-normal and other parametric curve-fitting approaches. In relation to peak fitting and the potential migration of modes to unrealistic values, the best summary we located is: "It is therefore especially important that centre (modes) values be constrained and not be permitted unlimited freedom of movement." (Seasolve, 2003, p. 6-44). As demonstrated herein, not constraining the modes during peak fitting can lead to significant mode migration that may or may not be sedimentologically realistic. Many grain size deconvolution and peak fitting studies do not constrain the modal position, although the capacity to constrain modes in EMMA is a notable exception (Dietze et al., 2012; Weltje and Prins, 2007).

Although not extensively tested, peak fitting models using log-hyperbolic functions were trialed. However, this served to further increase the potential diversity of acceptable solutions by adding an asymmetry variable into each distribution. As for unconstrained solutions, letting asymmetry vary widely generated unrealistic solutions. However, unlike log-normal distributions, there is no information for the ALE spectra that enable prioritization of the different potential values for the asymmetry. Consequently it was not possible to generate a framework for interpreting what were the most appropriate asymmetry values.

3.6.2 ALE Grain Size Distribution Interpretation

Associating grain size populations with specific processes is difficult and prone to error without specific process-based data. Nonetheless, some general observations can be useful for a conceptual understanding of what the analysis herein may represent. D1 is consistent with clay-sized suspended load material. The unique sedimentological properties of clay enable some confidence in its definition (Johnson and McCave, 2008; McCave et al., 1995; Xiao et al., 2012). D2 is likely inorganic long-term suspended load material (Chang et al., 2007; Chang et al., 2006; Law et al., 2008; Slattery and Burt, 1997). The D1 and D2 distributions could both have been influenced by dissociation of aggregated particles during laboratory analysis (McConnachie and Petticrew, 2006). The strong positive correlation between D1 and D2 amplitudes (but not areas) indicates there is some correspondence between the magnitudes of these two populations (Table 3.3). However, the strong negative correlation between D1 and D2 FWHH would suggest these populations do represent different suspension processes (e.g. potentially relatively buoyant clay flocs versus mineral grains in suspension via turbulence > settling velocity). D3 is the size range for "sortable silts", which have received considerable research attention (see Hamm and Dade, 2013 for a good summation). These are thought to be non-aggregated silt-sized grains that travel close to the bed under relatively low shear stress (Chang et al., 2007; Hamm and Dade, 2013; Johnson and McCave, 2008; Law et al., 2008; McCave et al., 1995; Molinaroli et al., 2009). Turbulence in the bed boundary layer keeps these particles in motion but they are not true saltating particles (McCave et al., 1995; Middleton, 1976). The moderate mode and FWHH correlations between D2 and D3 may indicate that a significant portion of the D2 grains were travelling as sortable silt-sized aggregates that were disaggregated post-deposition (Table 3.3), as has been observed elsewhere (Chang et al., 2006). D4 ranges to moderately well sorted, suggesting that these grains were influenced by a progressive sorting process (or processes). It is the most consistent of all the populations with a relatively narrow range of modes and FWHH's. The spectral low between D3 and D4 likely demarks the boundary between suspension and bedload sedimentology. Process-based studies indicate that the finest-grained bedload population is related to saltation processes (Ashley, 1978; Barusseau, 2011; Hamm and Dade, 2013; Law et al., 2008; Middleton, 1976; Sheridan et al., 1987; Singer and Anderson, 1984). D3 and D4 have significant positive correlations between position and shape parameters (mode and FWHH; Table 3.3C, 3.3D), suggesting the sedimentological processes controlling these two populations are at least partially related. This could be explained by benthic boundary layer turbulence, which strongly controls the transport and progressive sorting of both sortable silt and saltation. The ALE D4-D6 grain size populations are consistent with the data of Singer and Anderson (1984), who found four populations within the bedload that in order of increasing grain size were: 1) "intermittent suspension" (= sortable silt, which is not true bedload); 2) saltation; 3) finer-grained traction population, and; 4) coarser-grained traction population. Of these the relative magnitude of the true bedload populations varied, but for transported bedload sediment undergoing progressive sorting the relationship was saltation > coarser-grained traction population > finer-grained traction population. This is the same relationship we find for D4, D5, and D6 as confirmed by the strong positive correlations between these parameters (Tables 3.2; 3.3). In this context D5 and D6 both likely reflect traction processes (e.g. perhaps rolling versus sliding). Presumably D4-D6 were delivered via nepheloid layers generated during spring run-off (Best et al., 2005; Chambers and Eadie, 1981; Cockburn and Lamoureux, 2008b; Singer and Anderson, 1984).

Anomalous spectra can provide information about anomalous perturbations within the depositional system. The medium sand populations (237 mm type in Fig 3.4) likely represent rare, high energy events, perhaps something like a flash flood (i.e. mass flow) event whose velocity structure cannot be efficiently attenuated by the surrounding wetlands. Conversely, the extreme lack of fine sand in the 691 mm sample suggests that D4-D6 bedload material was essentially prevented from entering the lake, which could be achieved by an unfrozen wetland during spring melt. A low snowpack and/or warm winter and/or exceptionally slow thaw could provide the requisite conditions (NB. if summer surface run-off were to occur it could well have a grain size pattern heavily skewed towards fine material as seen in the 691 mm sample). That the samples on either side of both the 691 mm and 237 mm samples are standard samples that display no evidence of anomalous characteristics suggests a depth of bioturbation <4 mm at these levels within the core. The two spectra of 985 mm type are more difficult to characterize, but the shape of the spectra is quite peaked and is positioned at a grain size that is normally a low in other ALE spectra. These features indicate an element of reworking may have occurred in these samples, either of the shoreline with transport to the core site, or of the core site itself. The lack of this atypical spectral structure in the 983 and 989 mm samples suggests the depth of bioturbative reworking at this level of the core is of the order of <6 mm.

3.6.3 Grain Size Cycles in ALE

The above discussion indicates the ALE sedimentological system is relatively simple, and that its grain size processes are likely consistent with other boreal lakes embedded in wetland landscapes. Hydrological studies of such wetland systems and their entrained load demonstrate that melt volume is the key component, with melt intensity a significant modulating influence (Cockburn and Lamoureux, 2008a; Cockburn and Lamoureux, 2008b; Laudon et al., 2004; Laudon et al., 2007; Metcalfe and Buttle, 1999; Metcalfe and Buttle, 2001). Cockburn and Lamoureux (2008a) describe a process of melt water retention in snowpacks that when subsequently released generates accentuated and non-linear run-off velocities, volumes and sediment loads. McDonald and Lamoureux (2009) investigated the impacts on grain size of these melt processes and demonstrated that it is the high velocity nival melt events that generate the coarsest-grained sediment, although again the response is non-linear (see also McDonald et al., 2010). Overall what these studies demonstrate is that the spring melt is a heterogeneous period that is mostly comprised of recessional to base streamflow of relatively low discharge volume and velocity. This is punctuated by one or more short-lived high discharge events during the melt that is commonly driven by rain and/or high temperatures (see figure 5 of McDonald and Lamoureux, 2009). The hydrographic data from the Clearwater River suggests the ALE area has the same nival run-up to highest streamflow discharge, followed by recession to base streamflow, hydrographic profile (Fig. 3.2B). The consequences of these processes for the ALE grain size record are:

1) The finer-grained suspended load (D1-D3) populations are likely deposited throughout the spring thaw overland-flow period. This occurs throughout the nival run-up and through the earliest times of the recession, ceasing when wetland groundwater flow attenuates the overland flow. The correlations between the magnitude parameters of D1-D3 support such an over-riding control (Table 3.3). The sum of D1-D3 represents a proxy for the general spring thaw discharge volume into ALE, but since the data is in percent this cannot easily be converted to discharge volumes.
2) The coarser-grained bedload (D4 to D6) populations reflect the higher-energy events within the spring melt (i.e. spring thaw intensity), which generally occur during the earlier run-up portions of nival period (McDonald and Lamoureux, 2009; McDonald et al., 2010). Similarly, the D6 mode, which is not strongly influenced by overlapping distributions, can be automatically extracted from the spectra via Gradistat and also reflects higher discharge velocity events (i.e. spring thaw intensity). As a parameter of a single process, M6 will not be identical to the sum of D4-D6, which more reflects the intensity of the overall bedload transport during spring thaw. As in the case of the finer-grained D1-D3, the sum

of D4:D6 or M6 are relative measures of spring thaw intensity, and there is no way to know how to best convert them to absolute spring thaw intensity measures.

3) Changes in the ratio sum(D4 to D6):sum(D1 to D3) (i.e. bedload:suspended or coarse:fine ratio, delimited at 32 μm in spectral trough) reflect changes in the ratio of high discharge events to background normal discharge during spring melt; i.e. it is a proxy for the spring melt intensity vs background flow.

Figure 3.6 plots the coarse:fine ratio and M6 against depth for the ALE stratigraphic grain size dataset. Overall the core demonstrates that high (low) values of the coarse:fine ratio do correspond to high (low) values of the M6. There are departures from this generalization and the Pearson $r^2 = 0.55$ ($P<0.001$) indicates these two proxy parameters measure similar but not identical features of bedload transport during spring melt. There does not appear to be any section of the core where there is a consistent non-correspondence between these two proxies. Better extraction of M6 from the spectra would assist in clarifying the significance or otherwise of this proxy. Process studies aimed at quantifying these parameters could better clarify what each of these proxy data represent in absolute terms.

The ALE core grain size record indicates there are some strong long period oscillations (approximately every 350 mm down core) that are characterized by abrupt changes from high to low (or *vice versa*) coarse:fine ratios (Fig 3.6). These are matched by similar abrupt changes in M6. Superimposed upon these long period oscillations are high frequency cycles whose amplitudes are mostly, but not exclusively, high during times of generally low coarse:fine ratios (NB. Fig. 3.3B-

3.3D demonstrates three adjacent grain size spectra that represent one of these high amplitude and frequency cycles at ~500 mm down core). The analysis herein indicates the coarse:fine ratio reflects spring melt conditions, and consequently high (low) ratios reflect high (low) intensity spring melts in comparison to the background spring discharge. Therefore, Fig. 3.2C depicts relatively high intensity (1990, above average) and relatively low intensity (1991, below average) spring melts. The systematic variation of this spring melt proxy suggests that there is an overarching climatic control on the spring melt dynamics (e.g. Anderson, 2012; Campbell, 1998; Cockburn and Lamoureux, 2007; Dietze et al., 2013; Fisher, 2011; Holz et al., 2007). If so the climatic mechanisms that control the spring melt are clearly important for understanding the long-term environmental history of this area, and in particular the environmental risk that the large abrupt changes exhibited by the proxy data may pose to the region.

3.7 Conclusions

A high resolution grain size dataset (701 samples) has been obtained from a 1.45 m freeze core collected from a boreal lake (termed ALE) in northeastern Alberta, Canada. The grain size spectral structure is highly consistent throughout the core comprising 6 (D1-D6) persistent grain size distributions (in a range from <1 to ~250 μm) plus a seventh (D7) medium sand distribution present in only 5 samples. Deconvolution and peak fitting of a subset of the grain size spectra, using log-normal distributions, was accomplished in an iterative trial and error process. The results were qualitatively assessed against the general and consistent stratigraphic structure exhibited by the grain size spectra. In general, automated peak fitting using 6 log-normal distributions and without imposed constraints returned fit models that were inconsistent with the spectral structure and were rejected. The best fitting model and approach was found to be one where the modes of the very fine silt and very fine sand populations were constrained, thereby preventing migration of the equivalent distribution to positions that were inconsistent with the general spectral structure. As for the automated procedures, the constrained solutions also return excellent fit statistics. Most automated deconvolution and peak fitting procedures do not use constraints. This produces the best-possible fit solutions for each parametric model, but comes with the risk that the solutions violate the basic spectral structure exhibited by a dataset. For modelling grain size data there are commonly many statistically acceptable deconvolution and peak fitting solutions. In the absence of independent data to verify the best solution, which is the case for most stratigraphic grain size series, clear criteria for prioritizing which are the best solutions are required. In this study the basic spectral structure exhibited throughout the dataset and the modes were considered priority pieces of information. The deconvolution and peak fitting model solutions that best reflected these parameters were obtained by constraining the modes of two of the grain size distributions.

The constrained solutions produce clear and consistent positive correlations between the area and amplitude of the three coarser-grained distributions (D4 to D6) and consistent negative correlations between these distributions and the three finer-grained distributions (D1 to D3). This suggests that the magnitudes of these processes are related to overarching environmental controls. In contrast the position (mode) and shape (FWHH) parameters show few correlations, suggesting that the constrained fit method successfully extracted log-normal distributions that reflect individual grain size populations.

ALE is situated in a sub-humid, boreal, flat, wetland environment, which considerably constrains the potential variability of inorganic sediment transport-deposition processes. Independent studies across boreal wetland environments highlight the first order impact of snow melt in generating surface overland flow run-off, primarily due to a flat, frozen, impermeable subsurface and high melt volumes. In contrast, wetlands act as a precipitation sink during the summer growing season in these sub-humid climates. Thus the consistent stratigraphic grain size spectral structure, and the correlations between finer (D1-D3 suspended load) and coarser (D4-D6 bedload) populations, are due to a limited suite of sedimentological processes that are all linked to overland flow during spring snow melt. Conceptually the grain size spectra reflect both the intensity of spring melt (D4-D6 bedload delivery) and the volume of spring melt (D1 to D3 fine silt and clay suspended load delivery). Thus a ratio of coarser:finer grained fractions sum(D4 to D6):sum(D1 to D3) reflects the relationship between high discharge events associated with the spring melt and background discharge volume. The whole core record of the coarse:fine ratio demonstrates abrupt oscillations of both high and low frequency, which suggests that the spring melt in this region may be forced by climatic changes.

4 Solar driven abrupt changes in the El Niño/Southern Oscillation expression: influence on northern Alberta precipitation

4.1 Connection to Project

The detailed investigation of the grain size data from ALE (chapter 3, grain size distributions and cyclic sedimentation processes in a lower Athabasca lake, northeastern Alberta, Canada) revealed abrupt stratigraphic oscillations of both high and low frequency which indicated spring melt in this region was likely forced by climate change.

This paper investigates what, if any known climate drivers are influencing the hydrologic character of ALE. Our investigation revealed that sedimentary deposition in ALE is indeed influenced by known ocean-atmosphere cycles.

4.2 Abstract

Time-series analysis of high-resolution particle size measurements obtained from a lake sediment core from Northern Alberta Canada revealed that the succession of sedimentation displayed characteristics of self-organization following a power law relationship for core length segments of 2 mm (average ~2.6 yrs of deposition). Wavelet and spectral time-series analysis indicated that the statistically significant (at the 99% confidence level) archived sedimentary depositional cycles reflect El Niño Southern Oscillation (ENSO; 5-7 yrs) activity and longer timescale cycles operating at ~270-370 yrs. Grain size changes in the lake sediment core indicates changing transport energy so the high frequency cycles at ALE are linked capturing cyclic changes in hydrologic transport energy. We interpret El Niño yrs to be represented by a dry environmental signal, interpreted by a spike in fine-grained suspended load input while we infer La Niña yrs to be characterized by input of coarser bedload material during wetter times. The increase in fine sand during La Niña yrs is associated with increased winter precipitation and therefore higher discharge events that occur during spring melts.

The ~270-370 yr longer timescale cycle is evident by abrupt regime shifts in the coarse:fine grain size ratio. Periods of time with lower ratios of this proxy are inferred to represent less precipitation related to more El Niño-like conditions. This scenario postulates that the very low ratios represent a northward push of the southerly climatic regime, which is presumably controlled by the position of the jet stream that controls the air mass distribution in this locality on a Bond Solar cycle

timescale. Similar centennial cycles are observed in records from the equatorial Pacific, the northern Great Plains and Yukon.

The timing of the most recent ENSO expression shift to generally coarser grained input coincides with the onset of the Little Ice Age (LIA), suggesting a southward shift of the arctic air mass. The continuation of the high coarse:fine ratio to the present indicates the area is still under the climatic regime of the LIA.

4.3 Introduction

A principle goal of climate change studies is to understand the relationships between large-scale external forcing factors and local climate (PAGES_2k_Consortium, 2013; Stocker et al., 2013). For time-scales longer than the instrumental records and anthropogenic greenhouse gas emissions (i.e. > ~200 years), solar-cosmic ray and ocean-atmospheric forcing are generally considered to be dominant drivers of climate change (Solanki et al., 2004; Ma, 2009; Oglesby et al., 2012). Identification of these drivers and their impact on local or regional climate has required numerous investigations of different proxy data from a wide suite of localities (Cook et al., 2007), which was subsequently built into a global synthesis (Mann et al., 2008; PAGES_2k_Consortium, 2013). Furthermore, the PAGES Consortium has stressed the need for continuing research to address some of the substantial gaps in this database. One of the gaps is high resolution data from high latitudes, which at present is mainly derived from areally restricted ice core data (Fisher et al., 2008).

Here we present a ~1,870 cal yr BP grain size record for a boreal lake (colloquially named “ALE”) in northern Alberta. ALE is surrounded by wetland that imparts a marked seasonality to the sedimentary inputs to the lake. Spring run-off in boreal lakes typically bypasses the still-frozen wetlands commonly surrounding such lakes, whereas summer run-off is attenuated by the wetlands acting as a sink (Kværner and Kløve, 2008; Lyon et al., 2010; McNamara et al., 2005; Mwale et al., 2011; Nyberg et al., 2001). A detailed sedimentologic model for ALE indicates that the grain size proxy data measures both the relative intensity (rate of melt, which delivers the coarser-grained bedload) and relative volume (background run-off, which delivers mostly finer-grained suspended load) of the spring thaw of the winter snowpack (Neville et al., in prep). The intense skewing of run-off volumes and intensity to spring thaw times is a common feature of boreal wetland systems. The detailed sedimentologic model enables this high-resolution, local-scale, process-based record to be related to larger scale climate forcing factors in the region, as well as used to interpret abrupt changes in the record.

4.3.1 Regional Northern Albertan Winter-Spring Climate

Alberta’s winter precipitation is a product of the surrounding climate teleconnections. Analysis of instrumental records indicates that winter climate and precipitation is closely linked to the relative positions and intensities of the Aleutian Low (AL) and North Pacific High (NPH) pressure centers in the northern Pacific ocean, which are in turn controlled by large-scale climatic drivers, in particular the El Niño Southern Oscillation (ENSO) and the Pacific Decadel Oscillation (PDO) (Fig. 4.1, Shabbar et al., 1997; Mantua and Hare, 2002; Mann et al., 2005; Shabbar, 2006;

Asmerom et al., 2007; Velasco and Mendoza, 2008; Mwale et al., 2009; Barron and Anderson, 2011; Jiang et al., In Press). A relatively strong and eastward positioned AL occurs during warm phase PDO and positive phase ENSO times, and results in an overall drier climate and warmer winter in Alberta, and *vice versa*. Moisture delivered to Alberta mainly originates from the Pacific Ocean, Gulf of California, Gulf of Mexico, Arctic Ocean and Hudson Bay (Liu et al., 2004; Mwale et al., 2009). However, most models of instrumental precipitation and temperature records indicate that the boreal portion of northeastern Alberta is situated on the northern edge of the area of strong ENSO, PDO and PNA influence. The position of ALE with respect to the average jet stream location suggests that influence of northern artic-related air masses are also important (Fig. 4.1). Thus northern polar phenomenon could potentially impact the boreal system of northeastern Alberta (Mwale et al. 2009). While not well examined in instrumental records, potential climate drivers in this region include the Arctic Oscillation (also called the Northern Annular Mode – NAM), the North Atlantic Oscillation (Deng et al., 2013), and potentially the Atlantic Multidecadel Oscillation (AMO; McCabe et al., 2008).

Several studies investigate the cyclicity of the instrumental precipitation patterns across Canada (Shabbar et al., 1997; Zhang et al., 2000; Coulibaly, 2006), and southwestern (SW) Canada (Gobena and Gan, 2009) and identified three dominant oscillations (2–3 year, 3–6 year and 6–12 year) of seasonal precipitation. In the study region ENSO, PDO and the Pacific-North American oscillation (PNA), in positive (negative) phases generate dry (wet) Albertan climates and warm (cold) Albertan winters (Cayan et al. 1998, Shabbar et al. 1997, Yarnal and Diaz 1986, Coulibaly, 2006). Jiang et al. (In Press) demonstrated that eastern Pacific SST, which reflects the state of ENSO, PDO and PNA indices, could be used to predict Alberta's seasonal precipitation at a lead-time of one season.

These instrumental records are too short to accurately identify the long-term trends of these climate phenomena (Coulibaly and Burn, 2004). For example, the longer-term PDO record comes from tree-ring studies (Biondi et al., 2001). Furthermore, examination of longer-term climate from sedimentary records from Alberta and surrounding regions are mostly too low resolution to identify ENSO and the higher frequency PDO cycles. In particular, the Holocene history of ENSO is only defined for regions well removed from ALE. These include: 1) the El Junco Crater Lake record from the Galapagos Islands, which suggests an ENSO-related two-step (~3200 BP and ~2000 BP) increase in precipitation intensity and variability after ~4200 cal BP (Conroy et al., 2008); 2) the Laguna Pallcacocha record from Ecuador that broadly concurs with the El Junco record (Moy et al., 2002, Rodbell et al., 1999). The increased intensity and variability of ENSO in the late Holocene is inferred to be a by-product of changes in the boreal winter insolation, which generates enhanced heating of the Indo Pacific Warm Pool that then spreads eastwards forming enhanced El Niño events (Donders et al. 2008). This is supported by climate models that argue for insolation driven suppression of ENSO during the middle Holocene, after which ENSO has been increasing in both strength and variability (Clement et al., 2000).

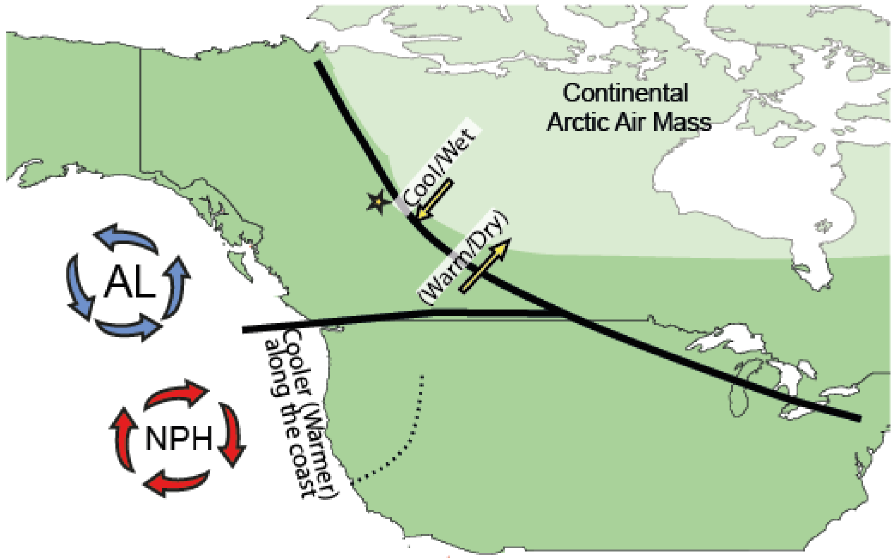

Figure 4.1: Map indicating the location of the study lake ALE in northeastern Alberta, Canada. Solid black line indicates the location of the jet stream during a La Niña phase (redrawn from Higgins et al., 2002). The yellow arrows indicate the movement of the jet stream during regime shifts and the consequent influence of the mix of air masses at the site. During El Niño the jet stream moves further northeast, and the southern arm moves further south (see Higgins et al 2002). During negative phase NAO it moves further south. AL and NPH indicate the general position of the Aleutian Low and North Pacific High during a La Niña phase. The AL is strengthened and/or located further to the east during a El Niño and weakened and/or located more to the west during a La Niña. The NPH behaves in a synchronized manner opposite to that of the AL (Barron and Anderson 2011). The brackets indicate the state of the ocean, the dashed arrow the water vapour transport vector across the Californian coast.

4.3.2 Geographic, Geological and Climatic Setting of the Core Site

The study lake (informally named "ALE") is a closed basin located on a highland plateau (~495 masl) approximately 40 km east of the Athabasca Oil Sands operation, Alberta, Canada. ALE sits within till sheets that were deposited by retreating glaciers, where holes or kettles were left in the landscape due to the melting ice (Mitchell and Prepas, 1990). The till overlies Cretaceous sandstones and shale of the McMurray Group, which in turn overlies Devonian Waterways Formation limestone and shale (Andriashek, 2003; NTS 74 D Surficial Geological Map, available from http://www.ags.gov.ab.ca/publications/publications.aspx).

The northeastern region of Alberta is characterized by a sub-humid continental climate with warm summers and cold winters. The aridity of the province is in part due to Alberta's location in the rain shadow of the Canadian Rocky Mountains, which blocks the moist westerly winds from the Pacific Ocean (Jiang et al., In Press). The majority of precipitation falls during the summer months, but, as for much of boreal Canada, the highest seasonal run-off occurs during the spring melt of the accumulated winter snowpack (Lyon et al., 2010; Lyon et al., 2012; Mwale et al., 2009).

4.4 Methods

4.4.1 Sediment Collection

A 1.45 m freeze core was collected from ALE (N56°52'42.0'' W110°34'5.3'') (Fig. 4.1) in September 2010. The coring location was chosen based on water depth, location with the lake and substrate type. The core was subsequently sliced at 1 mm resolution (for further details see Neville et al., in prep).

4.4.2 Grain Size Analysis

Samples were analyzed for grain-size distribution at 2 mm resolution starting with the surface sample (0-2 mm) down to the 1451 mm level of the core. This sub-sampling frequency resulted in an average Nyquist number of 5.3 (value range 0.20-18.47) years for the entire core and 4.6 (value range 0.92-18.47) years for the top 350 cm. The Nyquist number is two times the bandwidth in a time series, which is the lower limit required to produce alias-free signal sampling (Geerts et al., 2002).

Sediment samples were digested in a heated bath with 10% H_2O_2 to remove organics (van Hengstum et al., 2007; Murray, 2002; Donato, 2009). Digested samples were then analyzed using a Beckman Coulter LS 13 320 Laser Diffraction Analyzer fitted with a Universal Liquid Medium (ULM) sample chamber with a measurement range of 0.4 - 2000 µm. Samples for analysis were loaded into the instrument until an obscuration level of 10% +/-3% was attained. The Fraunhofer diffraction model was used to estimate grain sizes (van Hengstum et al., 2007; Murray, 2002; Donato, 2009).

A detailed hydrologic description of the processes acting on ALE is provided in Neville et al., (in prep). The results of this paper suggest that the coarse/fine grain size ratio (sum of the 33.01 µm - 948.34 µm fractions/ sum of the 0.3752 µm - 30.07 µm) is the best proxy for of the hydrologic character of ALE (Fig. 4.2 & 4.3).

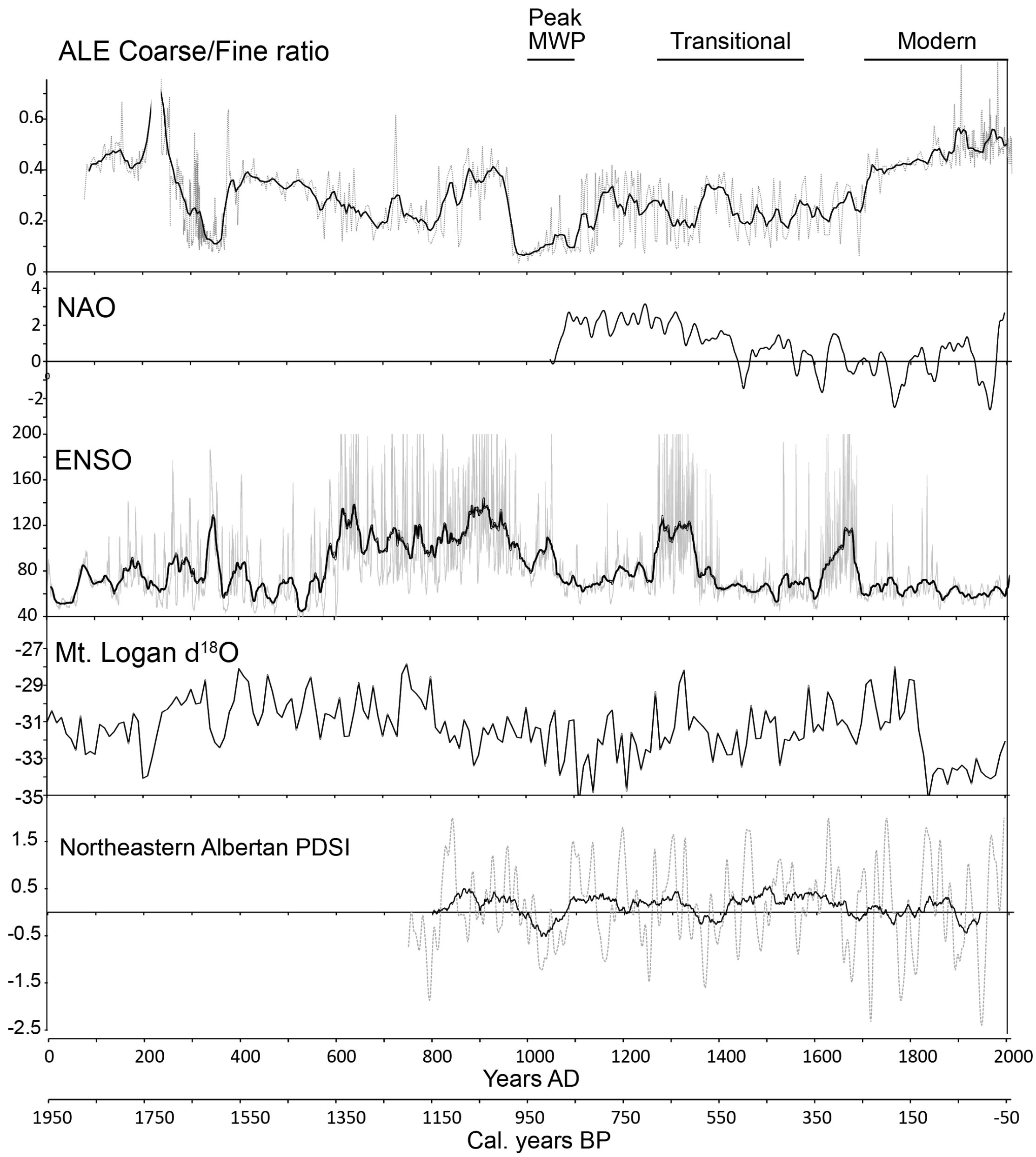

Figure 4.2: Stratigraphic comparison of ALE coarse:fine grain size ratio with Northern Pacific (SST) data (Trouet et al., 2009); a sediment core record, Laguna Pallcacocha, southern Ecuador (Moy et al., 2002); an isotope record, Mt. Logan, Yukon (Fisher, 2011; Fisher et al., 2008); and Palmer Drought Severity Index (PDSI), northeastern Alberta (Cook et al., 2007). The ALE stratigraphic diagram consists of a

grey line representing the annual data while the black line represents the 9 yr moving average. The ENSO stratigraphic diagram consists of a grey line representing the annual data while the black line represents the 20 yr moving average. The PDSI stratigraphic diagram consists of a grey line representing the annual data while the black line represents the 10 yr moving average.

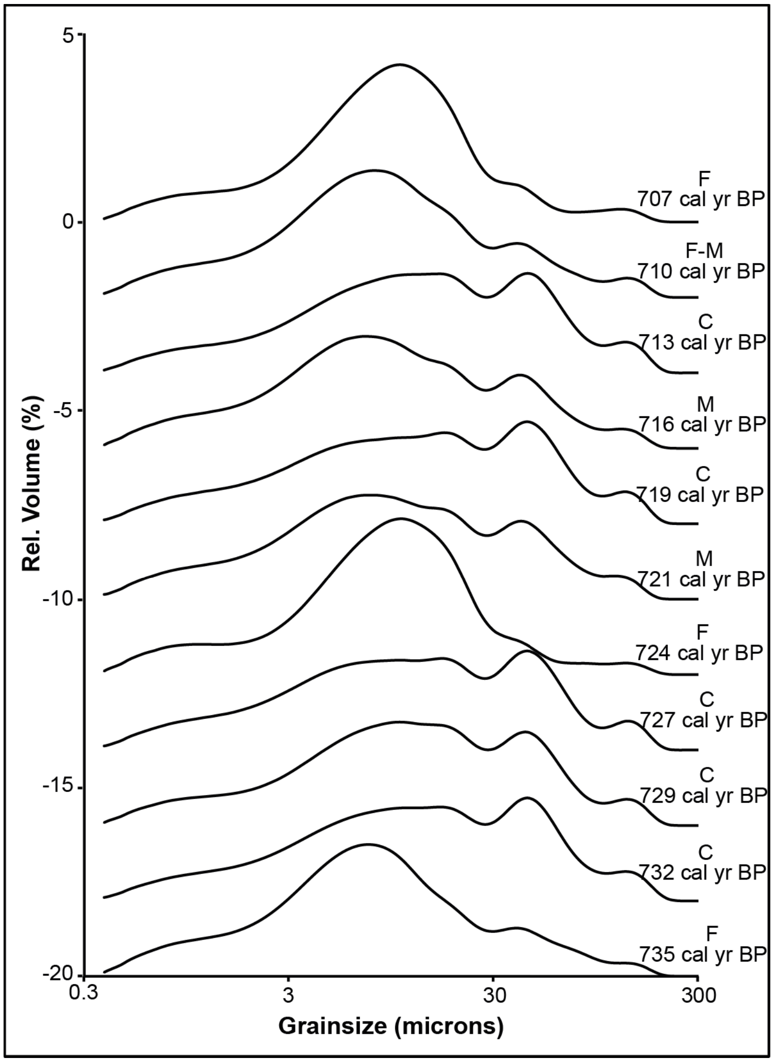

Figure 4.3: Stratigraphic grain size spectra stack for ALE spanning 742-765 yr BP. Note that the stack is comprised of cycles of relatively finer, medium and coarser grain size spectra (F, M, C respectively in the right hand annotation). Note that for most grain size spectra the clay and silt populations overlap considerably, and consequently there is no easily defined and constant grain size that defines these two populations. In contrast the fine sand population is relatively well defined as being above 100 microns.

4.4.3 Chronology

Glew cores were analyzed for ^{210}Pb geochronology at INRS Eau Terre Environment, Québec, Canada at a 0.5 cm resolution and bulk organic sub-samples from freeze cores were radiocarbon dated at the ^{14}CHRONO Centre, Queens University, Belfast, Ireland, UK (Appendix B). An age-depth model was produced using the 'classical' age-depth modeling software Clam (Blaauw, 2010) and the IntCal13 calibration curve (Reimer et al., 2013). The derived age-depth model indicates that the sediment record spans from 1,871 ± 29 cal yr BP to present (Fig. 4.2). The average sedimentation rate in the core was ~ 0.7 mm/yr.

4.4.4 Spectral and Wavelet Analysis

Spectral analysis and continuous wavelet analysis were applied to the coarse:fine ratio (Fig. 4.4). The spectral and wavelet analysis used the REDFIT procedure using the Lomb periodogram. It also used the more realistic null hypothesis of red (autocorrelated) noise for statistical testing (Schulz and Mudelsee 2002). Red-noise backgrounds can pose a particular problem during the analysis of palaeoclimate time series (Schwarzacher 1993). The statistical significance of the spectral peaks were tested using a parametric approach (90%, 95%, and 99% false-alarm levels). We used the Morlet wavelet (Torrence and Compo 1998), which is a sinusoid with a wavelength/period modulated by a Gaussian function. The analysis was carried out using the IDL software of Torrence and Compo (http://atoc.colorado.edu/research/wavelets/). The 99% significance level, using a red-noise (autoregressive lag1) background spectrum is shown on the wavelet plots.

Both spectral and wavelet analysis were used to observe the timing and position of cycles driven by environmental variables archived in sedimentary deposition in ALE. Spectral analysis is used to display the variance (or “power”) of frequencies (or cycle lengths), assuming stationarity of the signals, but all time information is lost (e.g., Davis, 1986). Wavelet analysis and the resulting scalogram have the benefit of visually displaying the position of cycles through time along the length of the core and give an idea of how shorter-length cycles are embedded within longer cycles through time (e.g., Patterson et al., 2004, 2005, 2007). Wavelet analysis can be used as a cyclostratigraphic method for detecting cycles in time series data by transforming information from the depth- or time-domain into the spectral domain using short filtering functions called “wavelets” (see Prokoph and Patterson, 2004a). Because sediment accumulation naturally varies through time, time series data from a sedimentary core inherently contains information on a uniform depth scale but on a non-uniform time scale. If the sedimentation rate is known for the core, or the time interval for the deposition of individual beds is known then cycles can be defined providing that sedimentation is truly being influenced by external (allocyclic) forces, such as the changing of seasons.

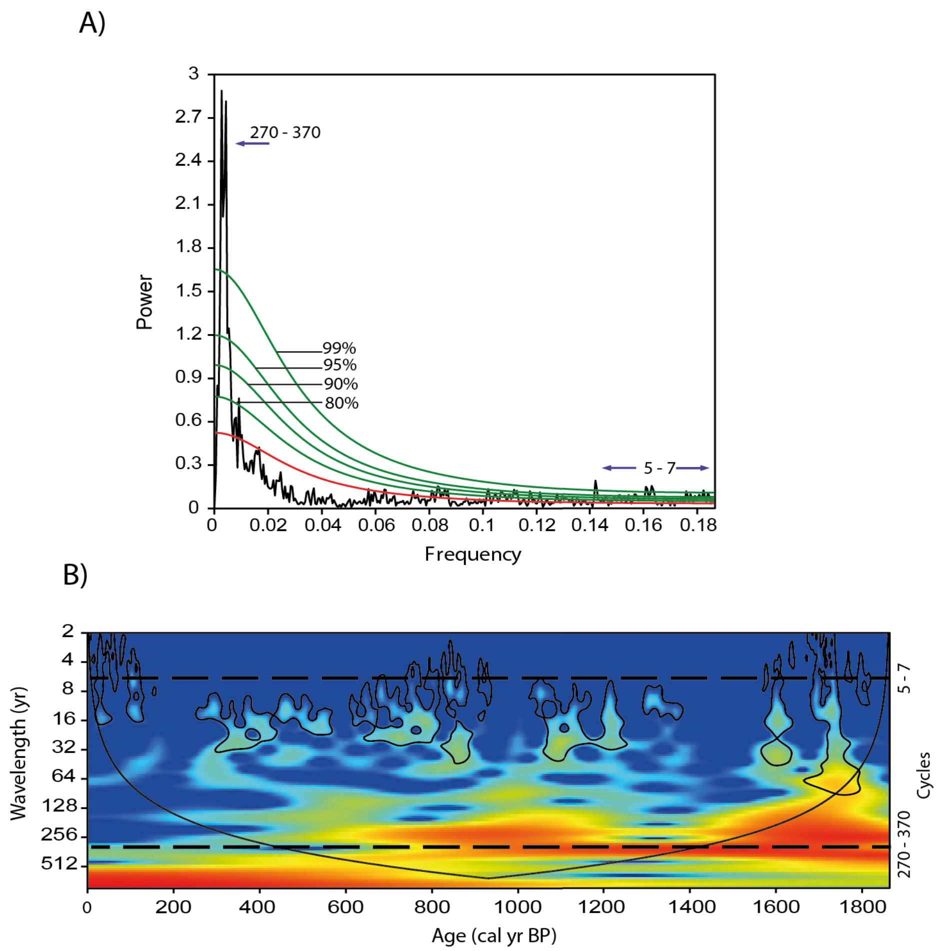

Figure 4.4: Spectral (A) and wavelet (B) analysis of the coarse:fine grain size ratio from ALE. Confidence intervals are labeled on the graph. All cycles labeled on the spectral analysis are 99% significant. The wavelet analysis spans 0-1,870 cal yrs BP. Wavelet coefficients are scaled to maximum amplitude for highlighting of local variability (which is low on top and high on bottom). The solid line represents the ‘cone of influence’ of edge effects. The dashed line indicates the corresponding Nyquist number.

4.5 Results

4.5.1 Chronostratigraphy

The age model is derived from seven ^{14}C dates (Fig. 4.5) illustrates that there are no outlying dates and that the sedimentation in the core spans the time period from 1,871 ± 29 yr BP to present (2010). There appears to be an old carbon offset of ~170 years between the ^{14}C and ^{210}Pb geochronologies. This offset was corrected and accounted for in the resulting model. The average deposition time in the core is ~13 yr/cm.

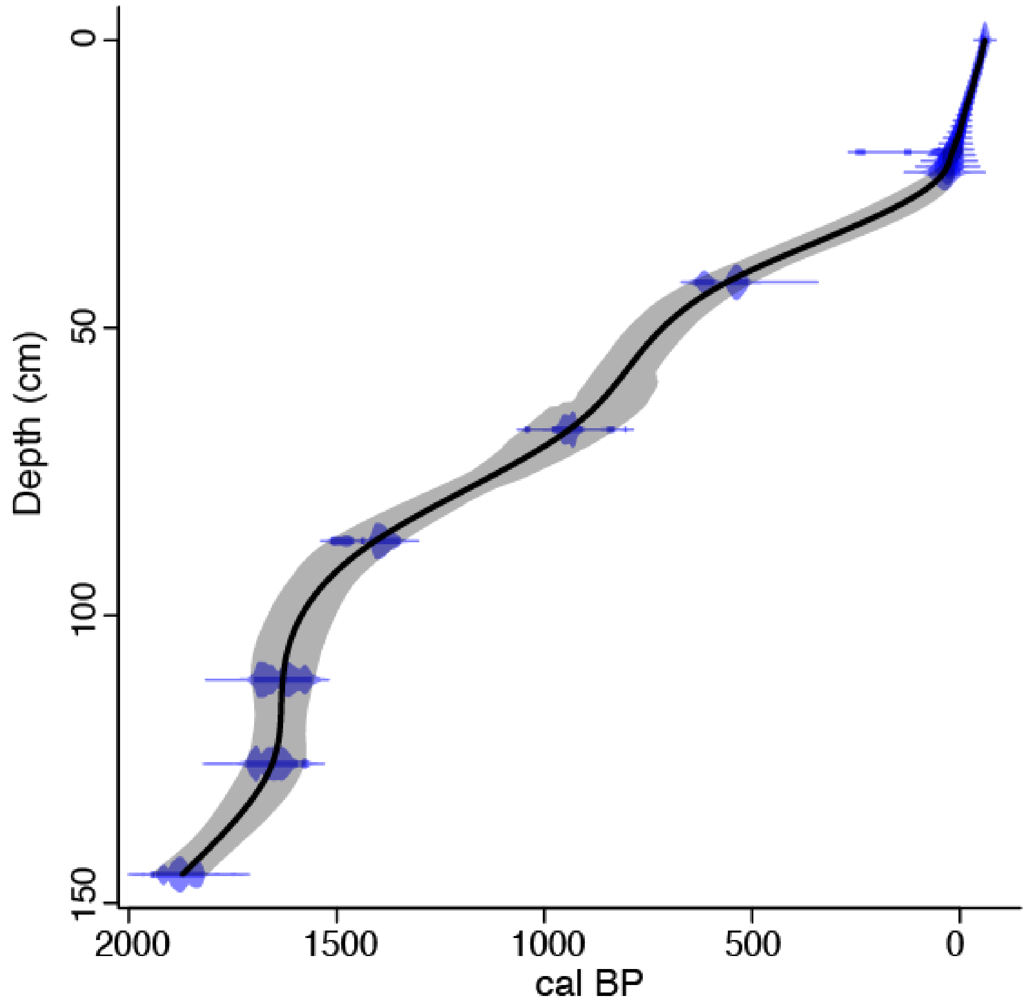

Figure 4.5: Age model for ALE spanning 1,871 ± 29 yr BP to present (2010). The age model was constructed using 7 ^{14}C taken throughout the core and ^{210}Pb dates taken at 0.5 cm resolution from 0 – 19 cm.

4.5.2 Grain Size Analysis

The grain size spectra from ALE are exceptionally consistent in terms of the overall stratigraphic structure of the data (Fig. 4.2 & 4.3), which is:

1. From the finest grain size measured (0.4 μm) to ~ 3-4 μm there is a broad low amplitude shoulder or unambiguous peak.
2. (A) Subsequently there is a large area of fine grain sizes between 3-4 μm and ~ 30 μm that either contains a single broad peak with a mode between 7 and 14 μm, or (B) two clearly distinguished peaks with modes between ~5-6.5 μm and ~17-20 μm. The overall coarser-grained spectra tend to be those with two clearly distinguished peaks.
3. Between ~30 μm and ~80 μm there is generally a single peak.
4. (A) In the overall coarsest-grained spectra a small distinct peak occurs at ~90-100 μm. (B) However, in most spectra this peak is generally represented by a broad plateau or shoulder in the ~70-120 μm grain size range.
5. The coarsest grained peak occurs at ~150 μm.

The composite time series of the coarse/fine ratio reveals (decadal and low centennial) high frequency cyclic distributional shifts (Fig. 4.4). A stack of individual spectra reveals that these high frequency shifts represent coarser-grained to finer-grained cycles (Fig. 4.3), approximately one cycle every ~4 samples for the time period in figure 4.2. There are also major and rapid shifts within the data, as a result of these shifts the coarse-fine ratio exhibits an average shift ~ 0.334 throughout the core (Fig. 4.2). These occur every ~270-370 yrs throughout the length of the core from: 1871-1650 cal yr BP the average ratio is 0.45; from 1650-1350 cal yr BP the ratio is finer with an average of 0.21; from 1350-951 cal yr BP the spectra shifts back to overall coarse (average 0.30); from 951- 271 cal yr BP the regime shifts back to fine (average 0.224) and to coarse (average 0.451) from 271 cal yr BP to present. The high frequency cycles are generally of significantly higher amplitude during times when the coarse-fine ratio is low (Fig. 4.2).

4.5.3 Spectral and Wavelet Analysis

The spectral Lomb periodograms and wavelet analysis of the ALE coarse:fine grain size ratio produced strong, high frequency (99% confidence) cyclicities at ca. 5-7 yrs and ca. 270-370 yrs (Fig. 4.4). Both cycles wax and wane throughout the core. The ca. 5-7 yr cycle is strongest from the bottom of the core to ca. 1600 cal yr BP, ca. 1300 cal yr BP to ca. 700 cal yr BP, 180 to present (Fig. 4.4). The ca. 270-370 yr cycle is strong from the bottom of the core (ca. ~ 1,870 yrs) and fades out within the last ca. ~ 400 yrs.

4.6 Discussion

4.6.1 Nature of Cyclic Sedimentation

Although bioturbation is often considered as a major concern when conducting the high-resolution studies, the consistent sedimentation structure archived in ALE suggests little influence of bioturbation at this site (Fig. 4.3)

Spectral and wavelet analyses were used to identify (statistically significant (99% confidence interval) cycles within the grain size archive, and to observe how these varied in temporal position throughout the ALE record (Fig. 4.4). The ca. 5-7 yr cycle fades in and out throughout the core, with the cyclic signal being present at times of both coarser and finer-grained sedimentation (as measured by the coarse-fine ratio, Fig. 4.4A). The ca. 5-7 yr cyclicity is temporally consistent with the periodicity of the well documented ca. 2-~8 yr ENSO frequency (Minobe, 1997, 1999; Mantua and Hare, 2002; Patterson et al., 2007; Anderson et al., 2011; Barron and Anderson, 2011; Oglesby et al., 2012). Nevertheless, ENSO cycles have been recorded by Beaubien and Freeland (2000) in central Alberta and Patterson et al. (2007) in coastal British Columbia in sedimentary archives.

The strength of the ca. 270-370 yr frequency cycle varies, but the cycle persists throughout the core (Fig. 4.4B). Cycles at this frequency have been well documented on the Pacific coast and at more continental locations. Patterson et al. (2004a, 2007) documented a 250-300 yr periodicity in sediment colour in laminated marine sediments and late Holocene fish records preserved in sediments of coastal BC, Canada, which they attributed to changes in terrigenous sediment supply and precipitation. Another coastal study from the northeast Pacific by Galloway et al. (2013) describes a ca. 380 yr cycle in primary productivity and hydrology. Campbell (1998) observed a ca. 350 yr cycle at Pine Lake in southern Alberta, and attributed the signal to changes in relative moisture conditions, primarily a function of precipitation and evaporation. Sediment records from the Elk Lake on the northern Great Plains (northwestern Minnesota) document a ca. 420 yr cycle, which was interpreted as an indicator of eolian activity and drought (Dean, 1997). Significant ~400 yr periodicities have also been found in proxy paleoclimate records at Moon Lake in eastern North Dakota (Yu and Ito, 1999). At a global scale the above-mentioned cycles are consistent with periodicities of ca. ~300-400 yrs documented in planktic foraminiferal assemblage changes in sediments from the Gulf of Mexico (Poore et al., 2003). Cycles of this frequency fit within the Bond sun spot cyclicity of ~200-500 and 1,000-1,500 yrs (Bond et al., 2001), suggests an ultimate solar driver for the centennial periodicity observed in ALE

4.6.2 Hydrologic Influence of ENSO on ALE

Understanding the influence of ENSO on northern Boreal lakes requires an understanding of the sedimentological context of ALE. Many studies demonstrate that spring melt hydrology, in combination with landscape characteristics, are commonly the major factors influencing the sedimentology of Boreal lakes (Carson et al., 1973; Fang et al., 2010; Gray et al., 2001; Jost et al., 2007; Laudon et al., 2004; Laudon et al., 2007; Lyon et al., 2012; McNamara et al., 2005; Metcalfe and Buttle, 1999; Redding and Devito, 2011; Redding and Devito, 2008). Neville et al (in prep) demonstrate that the ALE grain size spectra are primarily a function of spring melt run-off, particularly the intensity of run-off (i.e. the rate of spring melt), which controls the input of coarse detritus to ALE.

In the United States and western Canada ENSO is represented by conditions that influence winter atmospheric flow across the eastern North Pacific and North America. El Niño conditions cause a milder than normal winters with relatively warmer temperatures and less precipitation, while La Niña conditions are associated with increased storminess and relatively colder temperatures. Grain size changes in a lake sediment core indicate changing transport energy (Conroy et al., 2008) and the high frequency cycles at ALE are likely capturing cyclic changes in hydrologic transport energy (Fig. 4.3). The coarser-grained spectra in figure 4.3 are inferred to represent more intense spring melt conditions, that resulted in relatively higher coarse:fine ratios. The finer-grained spectra represent the opposite. In northeastern Alberta more intense spring melts are likely associated with relatively larger (wet winters) snowpacks and faster transitions from winter to summer. Based on instrumental records, larger snowpacks in Alberta are related to La Niña conditions due to the increased precipitation associated with cooler and wetter La Niña periods, and because the warm El Niño winters incorporate multiple thaws that decrease snowpack accumulation (Mwale et al., 2009; Jiang et al., In Press). The colder La Niña winters could potentially also result in a more rapid rate of transition from winter to spring, because the effect of the AL, the main driver of winter climate during El Niño years, deteriorates rapidly during late winter (Barron and Anderson, 2011; Galloway et al., 2013), resulting in a relatively faster transition out of La Niña winters in comparison to those of El Niño phases. The high frequency coarse:fine ratio cycles are inferred to represent ENSO cycles where La Niña phases are represented in coarser-grained samples and El Niño phases in finer-grained samples (Fig. 4.3).

4.6.3 Solar Driven Cyclic Expression of ENSO Activity

The ALE core grain size record indicates there are some strong long period oscillations (approximately every 350 mm down core; Figs. 4.2 & 4.4) that are characterized by abrupt changes from high to low (or *vice versa*) coarse:fine ratios (Fig. 4.2). However, the average low coarse:fine ratios are from times outside of the instrumental record, and hence there is no historical evidence for what these very low coarse:fine ratio samples represent. Extending the argument from the previous section, low ratios should reflect very low intensity run-off conditions, something akin to minimal snowpacks and/or very slow spring thaws. The abrupt and large shifts in this ratio at frequencies of ca. 270-370 years is associated with an increase in the amplitude of high frequency cycles from the very low ratios to ratios representative of modern conditions. We suggest the low ratios are related to low intensity spring melt conditions influenced by warm, dry winters that have multiple small thaws and consequently limited snowpack buildup (El Niño-like condtions). Such conditions are those of modern southern Alberta during positive phase PDO, PNA and El Niño years (Jiang et al., 2014). In southern Alberta ENSO is much more strongly represented today than in the past (e.g. mid Holocene), and conditions more typical of the central boreal regions of the present (Fig. 4.1). Consequently the times of low ratios are attributed here to this area transitioning into a climatic regime that oscillates from more southern Alberta-like (low coarse:fine ratios) to the modern mix of arctic and southern airmasses. This scenario suggests that the low ratios represent a northward push of the southerly climatic regime, which we infer to be reflected in the position of the jet stream that controls the air mass distribution in this locality (Fig. 4.1). The long period of very low coarse:fine ratios, from ca. 270-950 cal yr BP, spans the MCA (Medieavel Climate Anomoly; Mann et al., 2009; Trouet et al., 2009), indicating that the postulated scenario is of a northward displaced jet stream consistent with well recognized global climate shifts. If so, then the abrupt transition at ca. 270 cal yr BP into modern ratios reflects the areas move into and through the LIA, during which time the modern mean jet stream position was reached.

Studies from as far south as the equatorial Pacific (Moy et al., 2002; Conroy et al., 2008) to as far north as the Yukon (Anderson et al., 2005, 2007; Fisher et al., 2008) and others in between (summarized in Barron and Anderson, 2011) have shown changes in ENSO expression through the Holocene (Fig. 4.2). Barron and Anderson (2011) show that intervals through the late Holocene become progressively more El Niño-like and attribute such changes in ENSO expression to an AL intensification and/or more eastward position, a more southerly positioned NPH, and increased fall and winter SSTs along the California margin, that manifested as, for example, increased winter precipitation in Alaska-Yukon and the southwest U.S, and decreased winter precipitation in the Pacific Northwest.

The ca. 270-370 yr cycle preserved in the grain size record of ALE is consistent with climate proxy data elsewhere in Alberta and along the Pacific coast (Fig. 4.2). Such records include the NAO (North Atlantic Oscillation) record of Northern Pacific sea surface temperature (SST) (Trouet et al., 2009); a sediment core record of ENSO from Laguna Pallcacocha, southern Ecuador (Moy et al., 2002); an isotope record of ENSO from Mt. Logan, Yukon (Fisher, 2011; Fisher et al., 2008); and locally, the Palmer Drought Severity Index (PDSI) from northeastern Alberta (Cook et al., 2007). Our data mirrors closely the NAO and ENSO records, with all records showing the same low amplitude fluctuations such as that at 900 cal yrs BP (Fig. 4.2). When the continental records are placed beside the ALE and records from the Pacific the timing of the ca. 270-370 yr shifts do line up with the ENSO expression shifts recorded in ALE (Fig. 4.2).

Lower resolution studies by authors investigating spectral cycles from continental North American sites all show similar wet-dry ca. ~400 yr cycles. These sites include Elk Lake, Minnesota, which records a ca. ~ 400 yr cycle (Dean 1997); Pickerel Lake, South Dakota, recording a ~ 400 yr cycle (Dean and Schwalb 2000); Moon Lake, North Dakota, recording a ~ 400 yr cycle (Laird et al., 1996); Rice Lake, North Dakota, recording a ~ 400 yr cycle (Yu and Ito 1999) and Pine Lake, Alberta, recording a ca. 280-440 yr cycle (Campbell et al., 1998). The ca. 400 yr wet-dry cycles observed in these records have been attributed to solar forcing (Yu and Ito 1999, 2000; Dean and Schwalb 2000). Solar activities, as indicated by cosmogenic isotopes (^{14}C, ^{10}Be), show a fundamental periodicity at ca. ~400 years (Stuiver and Braziunas 1989) and are consistent in periodicity length to the Bond solar cycles (Bond et al., 2001).

The centennial-scale resolution of these studies preclude identification of ENSO cyclicities (ie. 100 yr resolution, Dean, (1997); ~17 yr resolution, Campbell et al., (1998); ~25 yr resolution, Yu and Ito, (1999)).

North American precipitation patterns are typically associated with ENSO (Shabber et al., 1997); El Niño-related precipitation patterns typically produce dry conditions at the study site but wet conditions at both higher and lower latitudes and the opposite pattern exists during La Niña conditions (Fig 4.1; Barron and Anderson, 2011). The compiled stratigraphic records suggest that when ALE and Pine Lake (another Albertan site) are experiencing wet (dry) conditions the sites to the south

(Rice Lake, Elk Lake, Caster Lake, El Junco Crater Lake, Laguna Pallcacocha) and to the north (Jellybean Lake) are experiencing dry (wet) conditions. This information gives an indication of the location of the ENSO-related precipitation transition. The transitions through the wet and dry conditions are less clear cut at Jellybean Lake compared to other sites likely because moister conditions at Jellybean Lake are further complicated by the St. Elias Mountains (Anderson et al., 2005).

The timing of the most recent ENSO expression shift (ca. 270 cal yr BP; Fig. 4.2) coincides with the onset of the Little Ice Age (LIA) (~350-100 cal yrs BP; Fritz et al., 2000; Paulsen et al., 2003; Anderson et al., 2011). Considering only the northern hemisphere experienced the LIA (Fritz et al., 2000; Paulsen et al., 2003; Anderson et al., 2011) it is plausible that the ALE record of a southward shift of the arctic air mass during this climatic event could have been a mechanism for this late Holocene cooling event. This agrees with Anderson et al. (2011), who suggest that early LIA glacial advances were related to more westerly storm trajectories, which entrain cooler air masses (i.e. a move of the jet stream southward and consequently on-average cooler-wetter winters and bigger snowpacks around ALE). The data from ALE suggests the cooler-wetter winters in this area of north-eastern Alberta are due to a period of sustained stronger influence from arctic air masses associated with southern movement of the jet stream.

4.7 Conclusions

The ca. 1,870 cal yr BP decadal-scale resolution spectral analysis of grain size data from the ALE core collected from northern Alberta, Canada records ca. 5-7 yr

ENSO cycle and longer ca. ~270-370 yr that correlates to the Bond solar cycle which is expressed locally as a shift in expression of the ENSO anomaly. The stratigraphic grain size spectra from ALE records the hydrologic shifts associated with ESNO activity as a decrease in wintertime precipitation associated with El Niño influenced winters and increased precipitation associated with La Niña, which creates increased freshet and therefore coarse grained input into the basin.

The ca. ~270-370 yr long-term cycle which in addition to ALE is archived in sites from the equatorial Pacific, northern Great Plains and the Yukon, represents an expression shift in ENSO. The abrupt and large shifts in the grain size record are associated with movement of the jet stream causing generally wetter or dryer conditions. Low intensity spring melt could be produced through warm, dry winters that have multiple small thaws, and consequently, limited snowpack buildup. Such conditions are those of modern southern Alberta during positive phase PDO, PNA and El Niño years. This scenario postulates that the very low ratios represent a northward push of the southerly climatic regime, which is presumably reflected in a more northward position of the jet stream that controls the air mass distribution at this locality.

Furthermore, the MWP falls within a cycle recorded by ALE as being characterized by low coarse grain input and therefore low precipitation. An abrupt transition from these conditions to more modern higher precipitation conditions coincides with the timing of the LIA.

Understanding the regularity with which climate cycles have changed will help in predicting the timing of future climate variability. Our data suggests that current climate in northern Alberta is highly influenced by a long-term cycle allowing for some climate consistency for the past few decades. Historical data archived within the core suggests that northern Alberta may soon be returning to a phase of lower precipitation El Niño like conditions.

4.8 Acknowledgments

This research was supported by the Earth Science Sector of Natural Resources Canada - CORES Project (Coal & Oil sands Resources Environmental Sustainability) under the framework of the Environmental Geoscience Program, an NSERC Discover Grant to R.T.Patterson, and an NSERC Postgraduate Scholarship to L.A. Neville.

We thank the CORES team, specifically Dr. Jason Ahad and Josué Jautzy for their assistance in the field.

5 The Ecological Response of Lacustrine Protists to Climate Cycles in Northern Alberta, Canada

5.1 Connection to Project

Based on the evidence presented in the previous two chapters (chapter 3, grain size distributions and cyclic sedimentation processes in a lower Athabasca lake, northeastern Alberta, Canada; chapter 4, Solar driven abrupt changes in the El Niño/Southern Oscillation expression influences Northern Alberta) it is clear that lakes in the vicinity of the Athabasca oil sands operations are influenced by various cyclic climate phenomena. Given that the CORES program is attempting to assess ecological change related to the oil sands development we first needed to identify if any ecological changes in boreal lakes can be related to climate anomalies. If so, we also needed to identify how changes are manifested in the paleoecological record. In this paper we were not only able to interpret the above but were also able to identify stressors causing the changes and to link the changes to predictable climate anomalies.

This data can now be used as a template in future shorter-term investigations specifically of oil sands ecological stress.

5.2 Abstract

The paleoecological record from a northern Canadian lake records a benthic stress-induced ecological response to the El Niño Southern Oscillation (ENSO) and Pacific Decadal Oscillation (PDO). Arcellacea (testate lobose amoebae) and grain size preserved in a freeze core obtained from an upland lake in Northeastern Alberta, Canada were used to reconstruct climate and associated benthic response since 1875 A.D. Arcellacea are benthic protists that are excellent proxy indicators of benthic ecology, whilst grain size data are indicative of physical aspects of the benthic environment and catchment hydrology. Relationships between arcellacean family groupings of difflugiid-type arcellaceans, which are typically known as healthy environmental indicators, and centropyxid-type arcellaceans, which are opportunistic and found in all but the most highly stressed environments, were compared to instrumental climate indices. Wavelet analysis identified strong ca. 2-9 year ENSO frequencies in both difflugiid and centropyxid arcellacean groupings and a weaker ca. 60 year PDO frequency in only the difflugiid population. The ENSO phenomenon in the tropical Pacific Ocean produces the largest interannual variation in climate across western Canada and in the study region has been associated with fluctuations in winter precipitation and temperature. Correlation analysis of arcellacean populations, Nino 3.4 and PDO instrumental data revealed that the ecologically sensitive difflugiid-type arcellaceans produced a negative relationship with the climate proxies and the opposite relationship was produced with the opportunistic centropyxids. The difflugiid population decreased in response to El Niño events and positive PDO conditions, which are characteristic of decreased precipitation and therefore nutrient input to boreal lakes. The relationship between arcellaceans and climate

anomalies shows that climate driven variations in nutrient input stress benthic boreal ecology.

5.3 Key words

Arcellacea, Ecology, Grain size, El Niño Southern Oscillation, Pacific Decadal Oscillation, boreal, Canada

5.4 Introduction

Natural climatic variation operates over long- to short-timescales and is an important controlling factor in ecosystem dynamics, making climate characterization a critical component of climate and environmental change studies (Solanki et al., 2004). Evaluating the sensitivity of lake hydrology and ecosystems to imposed perturbations such-as climate transitions is necessary for characterizing ecosystem responses to future climate changes (Kern et al., 2013).

Many climate drivers are cyclic and have recognizable patterns in instrumental and proxy datasets from a variety of terrestrial and marine records (Stuiver and Braziunas, 1989, 1993; Beer et al., 1990, 2000; Damon and Sonett, 1991; Solanki et al., 2004). Time-series analyses of many of these proxy datasets has revealed millennial-, centennial- and decadal-scale cycle periodicities that can be correlated to known ocean-atmosphere cycles (Wijmstra et al., 1984; Barber et al., 1994; Chambers et al., 1997; Hughes et al., 2000; Chambers and Blackford, 2001; Langdon et al., 2003; Blundell and Barber, 2005; Borgmark, 2005; Swindles et al., 2007a; Gray et al., 2010; Incarbona et al., 2010; Di Rita, 2011; Kern et al., 2013; Galloway et al., 2013; Patterson et al., 2013).

Although we are gaining a relatively good understanding of climate cycles, few studies have attempted to determine the relationships between these cycles and environmental dynamics such as hydrology and local ecology, particularly for high northern latitudes (e.g. Incarbona et al., 2010; Di Rita, 2011; Kern et al., 2013; Patterson et al., 2013). Notable recent studies include: Kern et al. (2013), who associated solar forcing with environmental changes reflected in pollen, dinoflagellate cysts and ostracod abundance; Galloway et al. (2013), who found a number of significant periodicities in diatom abundances, biogenic silica and grain size data; and Patterson et al. (2013), who invoked a top-down/bottom-up solar forcing mechanism to explain an ca. 11-year cycle in primary productivity in a sediment record from the NE Pacific (see also Veizer, 2005; Gray et al., 2010.

Lake sediments can also archive high-resolution information, including the response of lacustrine environmental systems to climate events and cycles. Here we present the ecological response of a high-latitude northern lake in Alberta, Canada to regional climate anomalies.

5.4.1 Regional Climate

Several cyclic phenomena impact the climate of western Canada, including: the El Niño Southern Oscillation (ENSO) (Minobe, 1997, 1999; Mantua and Hare, 2002; Patterson et al., 2007; Anderson et al., 2011; Barron et al., 2011; Oglesby et al., 2012); the longer-lived Pacific Decadal Oscillation (PDO) (Minobe, 1997, 1999; Mantua and Hare, 2002; Patterson et al., 2007; Anderson et al., 2011; Barron et al., 2011; Oglesby et al., 2012; Galloway et al., 2013); and the Aleutian Low pressure system (AL)

(Christoforou and Hameed, 1997; Oglesby et al., 2012). The AL has been inferred to be the modulating “pacemaker” of ENSO and PDO events in this region (Mann et al., 2005; Asmerom et al., 2007; Velasco and Mendoza, 2008; Barron et al., 2011) and may itself be influenced by solar variability (Christoforou and Hameed, 1997). Identification of ENSO variations at 2-8 year frequencies and corresponding winter Pacific storm tracks has led to a better understanding of spatial North American precipitation patterns (Anderson et al., 2011). The PDO is a long-lived pattern of North Pacific sea surface temperature variability that has been identified in the North Pacific at >20°N and oscillates in two general periodicities: one from 15-25 yrs and one from 50-70 yrs (Minobe, 1997, 1999; Mantua and Hare, 2002). A warm or positive PDO phase occurs when sea level pressures are below average over the North Pacific, the western North Pacific becomes cool whilst part of the northeastern Pacific warms (Barron et al., 2011). The opposite pattern characterizes a cool or negative PDO phase (Barron and Anderson, 2011). Positive PDO and El Niño phases induce similar temperature and precipitation anomalies in North America, while negative PDO phases are more similar to La Niña-like climate patterns (Mantua et al., 1997; Papineau, 2001). During a positive PDO and/or El Niño phase, increased winter precipitation occurs in the southwestern US and along the southeastern Alaskan coast, whereas decreased winter precipitation occurs in the northwestern US and southwestern Canada (Barron et al., 2011). These precipitation patterns are largely reversed during negative PDO and/or La Niña phases (Barron and Anderson 2011). The winter precipitation patterns are thought to result from the relative strengths and positions of the two main air pressure phenomena of the North Pacific. The Aleutian Low (AL) is strengthened and/or located further to the east during a positive ENSO or PDO phase and weakened and/or located more to the west during a negative ENSO or PDO. The North Pacific High (NPH) behaves in a synchronized manner with an opposite phase to that of the AL. It becomes weaker and shifted more to the south in the summer during a positive ENSO or PDO phase and is strengthened and shifted more to the north during a negative ENSO or PDO (Barron et al., 2011).

5.4.2 Study Area

The study lake (informally named "ALE") is a small upland kettle lake located approximately 40 km east of Athabasca Oil Sands mining operations within the Athabasca river basin (Fig. 5.1). Andriashek and Atkinson (2007) reported that the basin is underlain by thick (>10 m) "hummock moraine" till, which is derived from the surrounding Albertan bedrock of sandstone, siltstone, shale, coal, and limestone. The watershed is considered to be an erosional remnant left by retreating glaciers. The vegetation communities within the watershed are typical for northern boreal Alberta, being comprised of low coniferous spruce-cedar or wetland tamarack-spruce-heath communities.

ALE has no human settlements or roads within the watershed. Sedimentological grain size fluctuations and changes in arcellacean assemblages can thus be viewed as the result of ecosystem perturbations and cycles, perhaps linked to regional scale climate forcing (e.g. Campbell, 1998; Campbell et al. 1998; Yu and Ito, 1999; Beaudien and Freeland, 2000; Oh et al. 2003; Whited et al., 2007; Kern et al., 2013; Patterson et al., 2004; 2007; 2013). A detailed hydrologic description of the processes acting on ALE is provided in Neville et al., (in prep; see chapter 3).

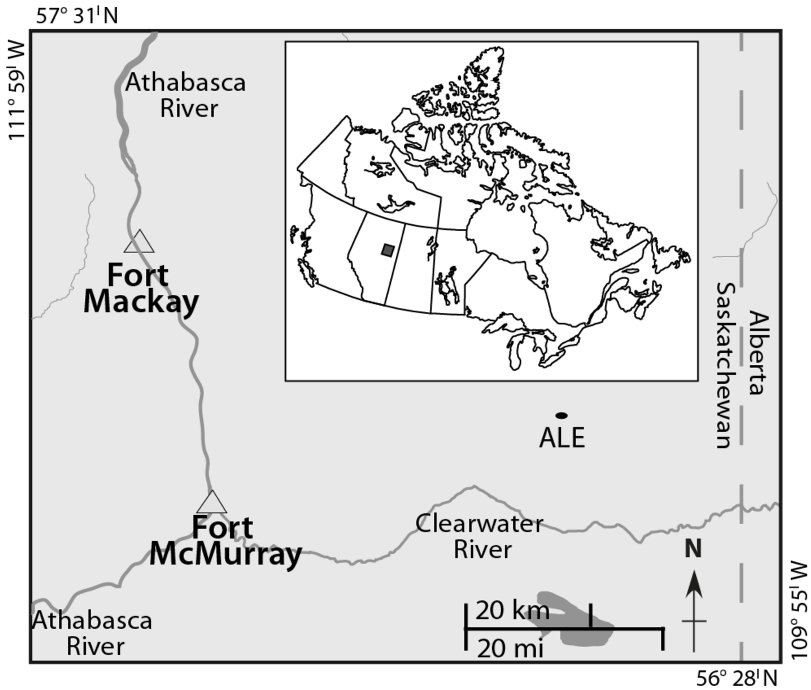

Figure 5.1: Map indicating the location of the study lake ALE in northeastern Alberta, Canada.

5.4.3 Hydrologic Setting of ALE

The terrace surrounding ALE is part of the headwaters to the Clearwater River. There is a single small creek that flows into the lake at the westernmost end (Chapter 3, although arial photographs indicate this creek meanders and is discontinuous within a belt of reed-horsetail aquatic riparian vegetation that joins ALE to another, shallower lake some 2 km to the west. A few short discontinuous creek lines occur east of the coring site along both the north and south lake shores and presumably drain the terrace wetlands. The upland geography characterizing the area results in sediment and nutrient inputs into ALE being derived from within the small watershed catchment (Mitchell and Prepas, 1990).

5.4.4 Climatic Setting of ALE

The northeastern region of Alberta is characterized by a sub-humid continental climate with warm summers and cold winters. The aridity is in part due to the provinces location in the rain shadow of the Canadian Rocky Mountains, which block the moist westerly winds from the Pacific Ocean (Jiang et al., 2013). The majority of precipitation falls during the summer months, but, as for much of boreal Canada, the highest seasonal run-off occurs during the spring melt of the accumulated winter snowpack (Lyon et al., 2010; Lyon et al., 2012; Mwale et al., 2009). The prevailing wind direction is relatively consistent throughout the year, with winds predominantly coming from either the northwest or east.

Key sources of moisture to Alberta mainly originate from the Pacific Ocean, Gulf of California, Gulf of Mexico, Arctic Ocean and Hudson Bay (Liu et al., 2004; Mwale et al., 2009). External climatic controls over precipitation appear to be related to the same factors that influence the western coast of Canada; such as the jet stream and El Niño /La Nino cycle (ENSO, Oh et al., 2003); and global-scale teleconnections such as the Pacific Decadal Oscillation (PDO) and Atlantic Multidecadel Oscillation (AMO, McCabe et al., 2008; Oglesby et al., 2012; Whited et al. 2007). In general, during negative (positive) ENSO and PDO times the province of Alberta experiences winter precipitation below (above) normal (McCabe et al., 2008). This is interpreted to be due to the colder (warmer) waters occurring offshore western North America during negative (positive) ENSO and PDO phases. AMO cycles produce less (more) summer precipitation during positive (negative) phases in Alberta (Oglesby et al., 2012). The exact northern reach of these climate anomalies in and how they influence boreal lake ecology is uncertain (Mwale et al., 2009).

5.4.5 Ecological Indicators

Arcellacea, informally described as thecamoebians, rhizopods, testaceans and testate amoebae (Mitchell et al. 2008), are primarily benthic protists that constitute an important component of the sediment/water interface and epibenthic community within the microbial trophic level in lakes and wetlands (Patterson et al. 1985; Collins et al. 1990; Patterson and Kumar 2000; Beyens and Meisterfeld 2001; Neville et al. 2010b; Roe, et al. 2010; Elliott et al. 2012). Arcellacean species and strains are characterized by simple sac-like tests comprised of pseudo-chitinous material that is variably agglutinated in different species (Scott et al. 2001; Patterson and Kumar 2002). The tests are particularly resistant to decay, even under low pH conditions, making them particularly useful in paleolimnological studies (Patterson and Kumar 2002). Arcellaceans are primary consumers that are categorized as lower trophic level organisms. This trophic position, coupled with generation times that can be measured in days, means that the measured assemblages are potentially sensitive indicators of changes in either primary production and/or higher trophic levels within lake ecosystems (Vadeboncoeur et al., 2002; Wilkinson et al., 2008; Wilkinson et al., 2010). Their utility as sensitive indicators of lake microbial ecology has been demonstrated through studies that use them as: 1) proxies for environmental change through whole assemblage responses to pollutant inputs (Reinhardt et al., 1998; Neville et al., 2010b & 2011; Patterson et al., 2012), and; 2) indicators of natural environmental change over time (Patterson 1987; McCarthy et al. 1995; Asioli et al. 1996; Patterson, et al. 2002; Boudreau et al. 2005; Patterson et al. 2012a; Watchorn et al. 2012). Several studies have indicated that species within the arcellacean families Centropyxidae and Difflugiidae are particularly useful for recognizing contrasting degrees of sensitivity to ecological stress, with most difflugiid taxa exhibiting higher sensitivity and lower tolerance to stress, and centropyxid taxa being generalists that appear to thrive in all but the most highly stressed environments (Patterson et al. 1996; Reinhardt et al. 1998; Kauppila et al. 2006; Kumar and Patterson 2000; Escobar, et al. 2008; Kihlmanm and Kauppila 2009, 2010, 2012; Roe et al., 2010; Neville et al. 2010, 2011; Patterson et al. 2013).

5.5 Methods

5.5.1 Sediment Collection

A 1.45 m freeze core was collected from ALE (N56°52'42.0'' W110°34'5.3''; Fig. 5.1) in September 2010 using a custom built 2.0 m long freeze coring device with two metal faces, both 15 cm in width. The frozen sediment was removed from the corer and transported frozen to Carleton University for logging, subsampling and subsequent analysis. The sediments in the ALE core were predominantly comprised of greyish-brown, weakly consolidated organic matter and silt. A custom-designed freeze core microtome (Macumber et al., 2010) was used to slice the ALE core at 1 mm resolution.

5.5.2 Chronology

The top 30.5 cm of core were analyzed for ^{210}Pb geochronology at INRS Eau Terre Environment, Québec, Canada (Jautzy et al., 2013). The ^{210}Pb chronology of Jautzy et al. (2013) has low error bars until a depth of 250 mm, which equates to the year 1902 A.D. In order to extend the ^{210}Pb chronology back to 349 mm, which represents the start of the high resolution arcellacean collection data, a smoothed exponential spline parametric equation was fitted to the 0-250 mm portion of the ^{210}Pb age-depth curve (Blaauw, 2010) (Fig. 5.2). The 0.996 Pearson correlation coefficient between the ^{210}Pb ages and the exponential function ages over the 0-250 mm interval indicates the function is a good approximation to the ^{210}Pb age-depth model. The exponential equation was used to determine the ages of the samples between 250 and 349 mm.

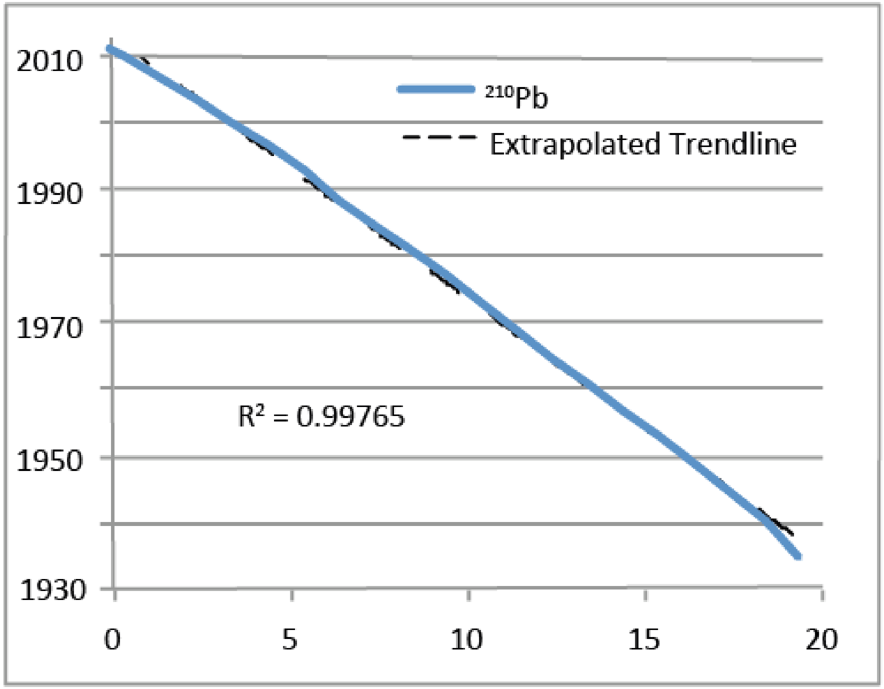

Figure 5.2: Exponential spline used to create age model. Spline created using ^{210}Pb dates and associated depth. Figure shows extrapolation for the collected dates. The extrapolation was used to calculate dates for samples examined beyond the ^{210}Pb dates collected.

5.5.3 Grain Size Analysis

The core was sectioned into 1 mm thick sediment slices and subsequently analyzed for grain-size distribution at a 2 mm resolution, starting with the surface sample (1 mm) down to the 349 mm level of the core. This sub-sampling frequency resulted in an average Nyquist number of 1.7 (value range 1.5 - 2.4) years for the top 349 mm. The Nyquist number is two times the bandwidth in a time series, which is the lower limit required to produce alias-free signal sampling (Geerts et al., 2002). Sediment samples were digested in a heated bath with 10% H_2O_2 to remove organics (van Hengstum et al., 2007; Murray, 2002; Donato, 2009). Digested samples were then analyzed using a Beckman Coulter LS 13 320 Laser Diffraction Analyzer fitted with a Universal Liquid Medium (ULM) sample chamber with a measurement range of 0.4 - 2000 µm. Samples for analysis were loaded into the instrument until an obscuration level of 10% +/-3% was attained. The Fraunhofer diffraction model was used to estimate grain sizes (van Hengstum et al., 2007; Murray, 2002; Donato, 2009).

See Neville et al., (in prep; see chapter 3) for a detailed hydrologic description of the processes acting on ALE. The results of that paper suggest that the coarse/fine grain size ratio (33.01 µm + 948.34 µm / 0.3752 µm + 30.07 µm) is a suitable summary measure of the hydrologic character of ALE, where spring thaw is the main parameter influencing the physical hydrological input.

5.5.4 Arcellacea Analysis

Samples for micropaleontological analysis were comprised of 1 mm thick sediment slices. Within the top 349 mm of core 113 samples were analyzed (Fig 5.3).

Overall the sub-sampling for arcellacean enumeration produced a Nyquist range between 1-5 years with an average of 2 years. Samples were sieved, first with a 250 µm sieve to remove coarse organic debris and then with a 37 µm sieve to remove fine organic material and mineral detritus. The retained 37-250 µm fraction was subdivided into aliquots for quantitative analysis using a wet splitter (Scott and Hermelin 1993). The wet aliquots were examined under an Olympus SZH10 dissecting binocular microscope (40-80X magnification), and identification of arcellaceans followed standard reference keys (e.g. Medioli and Scott 1983; Kumar and Dalby 1998). Arcellacean data was center log ratio transformed to avoid the statistical artifacts of closure (Atkinson, 1986).

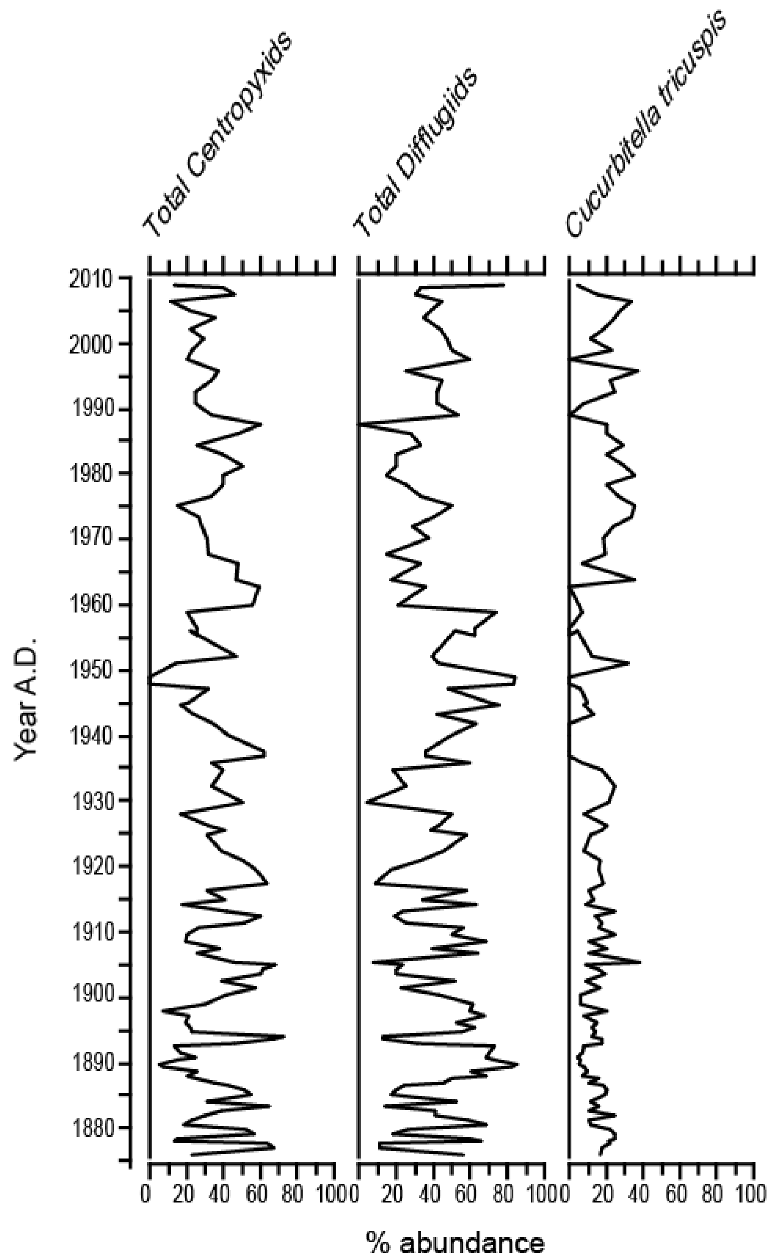

Figure 5.3: Stratigraphic diagram of ALE the total groupings of total centropyxid, total difflugiid and *C. tricuspis* arcellacean abundance. Note the generally invers relationship between the total centropyxid, total difflugiid groupings while *C. tricuspis* in most cases tends to act independently but shares some similarities with the total difflugiids.

5.5.5 *Spearman's Analysis*

A spearman's correlation analysis (Larson and Farber, 2006) was conducted on the grain size ratio, arcellacean populations and instrumental and tree-ring derived climate proxies (Table 5.1). The climate proxies used include Niño 3.4 (representing ENSO activity; Trenberth, 1997), and both instrumental (Mantua et al., 1997) and tree ring PDO data (Biondi et al., 2001).

Table 5.1: Spearman's rank correlation coefficient analysis of the 9 year moving averages of the arcellacean groupings (total centropyxids and total difflugiids) and *Cucurbitella tricuspis*, the coarse:fine grain size ratio and climate variables (Niño 3.4 (Trenberth, 1997), instrumental PDO data (Mantua et al., 1997) and tree ring PDO data (Biondi et al., 1997); data available at http://www.esrl.noaa.gov/psd/data/climateindices/list/). The annual Nino 3.4 data is labeled with a Y, the Nino 3.4 data is also collated into seasonal groupings of September - November (labeled SON), December - February (labeled DJF), March – May (labeled MAM) and June – August (labeled JJA). Note the inverse relationship between the arcellacean species groupings of centropyxids and difflugiids and the climate proxies. Bolded numbers are significant at the P < 0.001 level, numbers in bold italic are significant at the P < 0.01 level.

	C. tricuspis	Total centropyxids	Total difflugiids	PDO instrumental	PDO tree ring	Nino3.4 Y	Nino3.4 SON	Nino3.4 DJF	Nino3.4 MAM	Nino3.4 JJA	coarse:fine ratio
C. tricuspis	1										
Total centropyxids	***0.2286***	1									
Total difflugiids	**-0.6688**	**-0.6568**	1								
PDO instrumental	0.08	**0.3471**	**-0.3418**	1							
PDO tree ring	***0.2698***	0.2394	**-0.2731**	**0.6607**	1						
Nino3.4 Y	0.1712	**0.3439**	**-0.3794**	**0.5597**	0.0182	1					
Nino3.4 OND	**0.2901**	**0.3315**	**-0.433**	**0.4235**	0.0172	**0.9142**	1				
Nino3.4 JFM	0.0583	**0.4041**	**-0.3651**	**0.6485**	0.0853	**0.8697**	**0.6567**	1			
Nino3.4 AMJ	0.0156	0.2238	-0.2226	**0.5819**	0.0073	**0.9032**	**0.7044**	**0.8473**	1		
Nino3.4 JAS	***0.2653***	***0.2806***	**-0.3537**	**0.37**	-0.0274	**0.9209**	**0.9149**	**0.6565**	**0.7818**	1	
coarse:fine ratio	0.0117	**-0.3112**	0.0821	**-0.4803**	0.0182	0.0387	0.0268	0.0123	0.087	0.0332	1

5.5.6 Spectral and Wavelet Analyses

Spectral (Fig. 5.4) and wavelet (Fig. 5.5) analyses were performed on two compilations of arcellacean data representing different environmental tolerances (total centropyxids and total difflugiids). Spectral analysis was used to display the variance (or "power") according to frequencies (or cycle periodicities). This methodology assumes that signals are continuous throughout and consequently relative time information is lost (e.g., Davis, 1986). In contrast, wavelet analysis can be used as a cyclostratigraphic method for detecting cycles in time series data by transforming information from the depth- or time-domain into the spectral domain using short filtering functions called **"**wavelets**"** (see Prokoph and Patterson, 2004a). Wavelet analysis and the resulting scalogram have the benefit of visually displaying the position of cycles through time along the length of the core, and in comparison to spectral analysis examines the role of shorter period cycles embedded within longer period cycles through the time series (e.g., Patterson et al., 2004, 2007).

Spectral analysis was carried out using the REDFIT procedure to determine the Lomb periodogram (Schulz and Mudelsee 2002). Interpolation of a time series to even intervals alters the statistical properties of the time series by increasing autocorrelation and reducing the standard deviation. The REDFIT procedure works on non-evenly spaced time series and permits statistical testing using the more realistic null hypothesis of red (autocorrelated) noise (Schulz and Mudelsee 2002). This analytical method is particularly suitable for the analysis of non-evenly spaced paleoclimate time series because red-noise backgrounds can pose problems

(Schwarzacher 1993). The statistical significance of the spectral peaks was tested using a parametric approach (80%, 90%, 95%, and 99% false-alarm levels).

The wavelet analysis was generated using the Morlet wavelet function. This analysis uses a sinusoid with a wavelength/period modulated by a Gaussian function (Torrence and Compo 1998) using the IDL software of Torrence and Compo (http://atoc.colorado.edu/research/wavelets/). The REDFIT periodogram was used to govern the generation and interpretation of the wavelet analyses, which uses input time series interpolated to even intervals. Continuous wavelet analysis (as per (Torrence and Compo 1998)) was applied to the arcellacean assemblage data (Fig. 5.5). Spectral Lomb periodograms were determined for all species with many demonstrating distinct temporal trends and cycles.

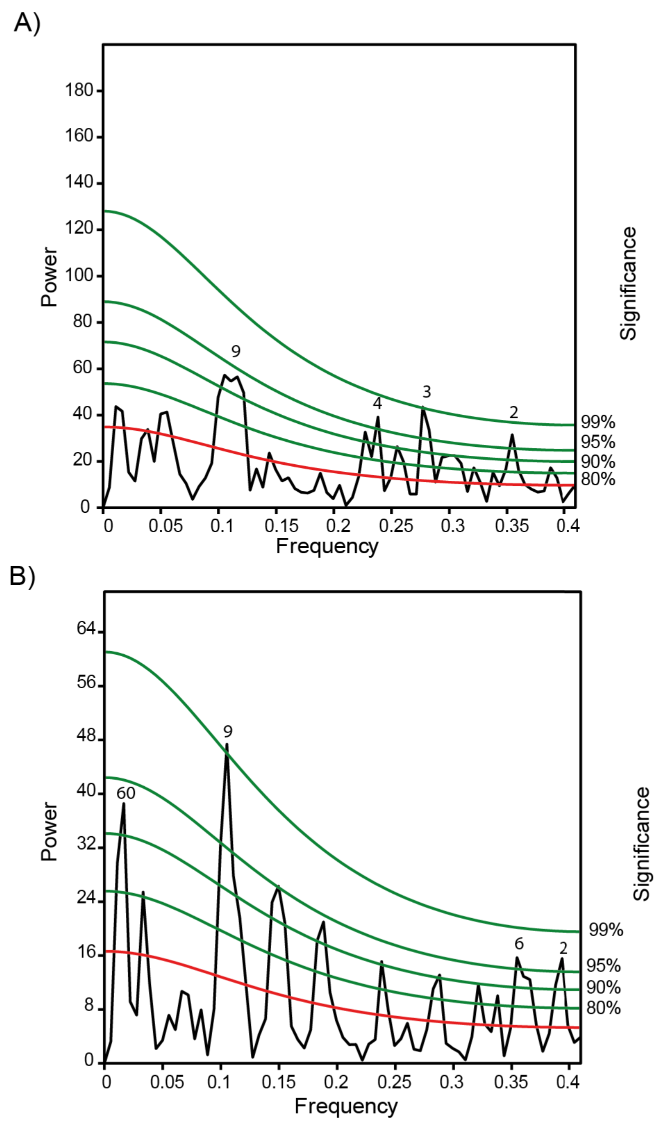

Figure 5.4: Spectral analysis of total centropyxids (A) and total difflugiids (B). Peaks exceeding confidence limits for red noise were determined using REDFIT analysis and are labeled in cal. yrs.

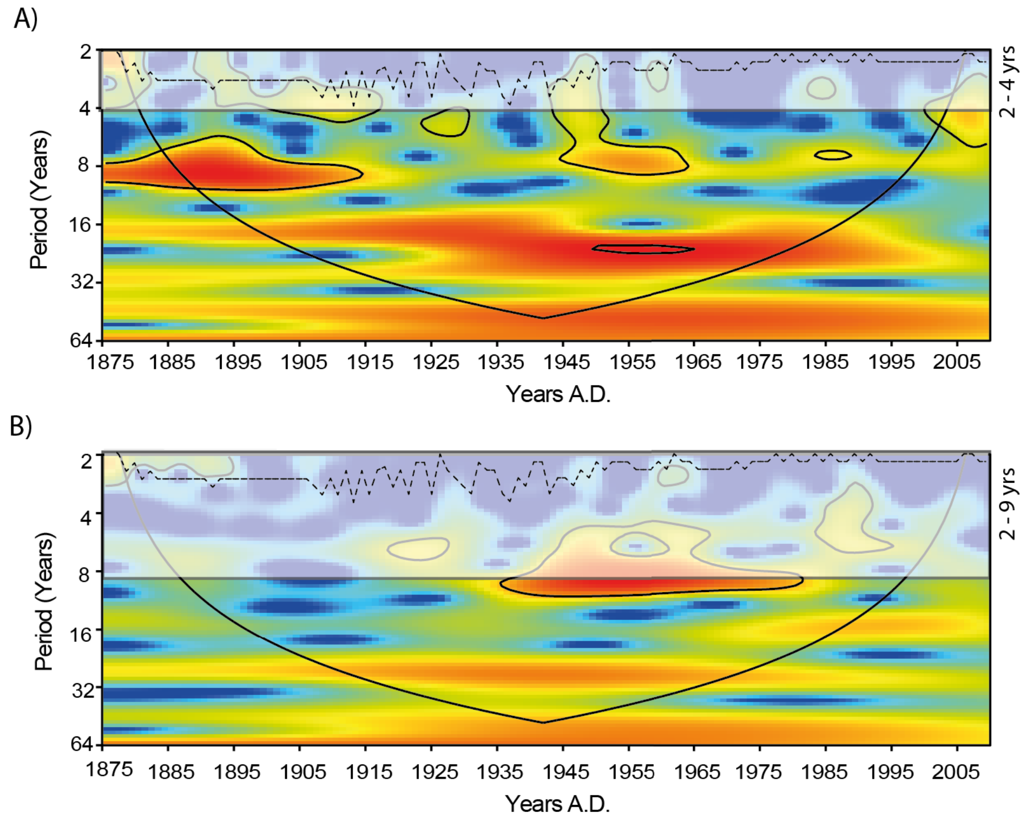

Figure 5.5: Wavelet analysis of total centropyxids (A) and total difflugiids (B). The wavelet analysis spans ca. 1875 – 2010 A.D. Wavelet coefficients are scaled to maximum amplitude for highlighting of local variability (which is low on top and high on bottom). The solid line depicting a cone within the figures represents the 'cone of influence', which indicates edge effects may be influencing the results. Black lines depict cyclic intervals significant at the 95% level as identified by spectral analysis (Fig 5.3). The lighter (shaded) areas indicate main cycle periodicities. Dotted line depicts the Nyquist interval through the core. Cycles identified by wavelet analysis that are above this line are too high frequency to be reliably detected in the data.

5.6 Results

Twenty-seven arcellacean species and strains were identified in the core samples collected from ALE (Appendix B). Arcellacean populations of environmental significance were grouped by family. The total centropyxid grouping is composed of 5 centropyxid-type arcellaceans and the total difflugiid grouping is composed of 14 difflugiid-type arcellaceans (Appendix B). The arcellacean Shannon Diversity index (SDI) (Shannon et al., 1948) ranged from 0.69-2.49, with an average of 2.0.

The spectral Lomb periodograms and wavelet analysis of arcellacean faunal variation from the ALE core proxy data delineated highly significant (95-99% confidence limit) cycles in both arcellacean proxy groupings (Fig. 5.5). A cycle band of ca. 2-4 years was identified in the total centropyxids and a cycle band of ca. 2-9 years in the total difflugiids. The total difflugiid grouping also contained a 90% confidence limit cycle of ca. 60 years (Fig. 5.4). While spectral analysis can identify cycle frequencies, wavelet analysis demonstrates that the observed cycles display relatively consistent structure through the ALE core (i.e. the cycle amplitudes wax and wane throughout the core time series – that the Lomb periodogram picks-up these cycles as “continuous” indicates these frequencies are strongly represented within the core; Fig. 5.5).

Spearman’s rank correlation coefficient analysis produced opposite polarity relationships between the arcellacean groupings and measured climate variables. A positive relationship exists between total centropyxids and the Nino 3.4 and the PDO proxies (ρ=0.34 and ρ=0.35 respectively; Table 5.1) and a negative relationship between total difflugiids and the Nino 3.4 and the PDO proxies (ρ=-0.38 and ρ=-0.34 respectively; Table 5.1). A stronger correlation exists between the arcellacean groupings with the instrumental PDO data then the tree ring data. A breakdown of the Nino 3.4 data into monthly groupings shows weaker negative and positive relationships between the arcellacean groupings and Nino 3.4 during the spring (April, May, June) and summer (July, August, September) months. Positive correlations of ρ=0.27 and ρ=0.29 (Table 5.1) exists between the arcellacean *Cucurbitela tricuspis* and Nino 3.4 summer and fall data.

Spearman's rank correlation coefficient (ρ) between the coarse:fine normalized grain size fraction, a parameter shown to represent hydrologic process-related changes in ALE (see chapter 3) and the instrumental PDO data produced a strong negative relationship (ρ=-0.48), while no relationship exists between the coarse:fine ratio and ENSO (ρ=0.04).

A visual comparison of the arcellacean and climate proxy data demonstrates the Spearman's correlations above. For example the total centropyxid record mirrors that of the climate proxies, with total difflugiids exhibiting an inverse relationship to the climate proxies (Fig. 5.6). For example, during El Niño events the Nino3.4 climate proxy is positive and the arcellacean community is centropyxid dominated (Fig. 5.6).

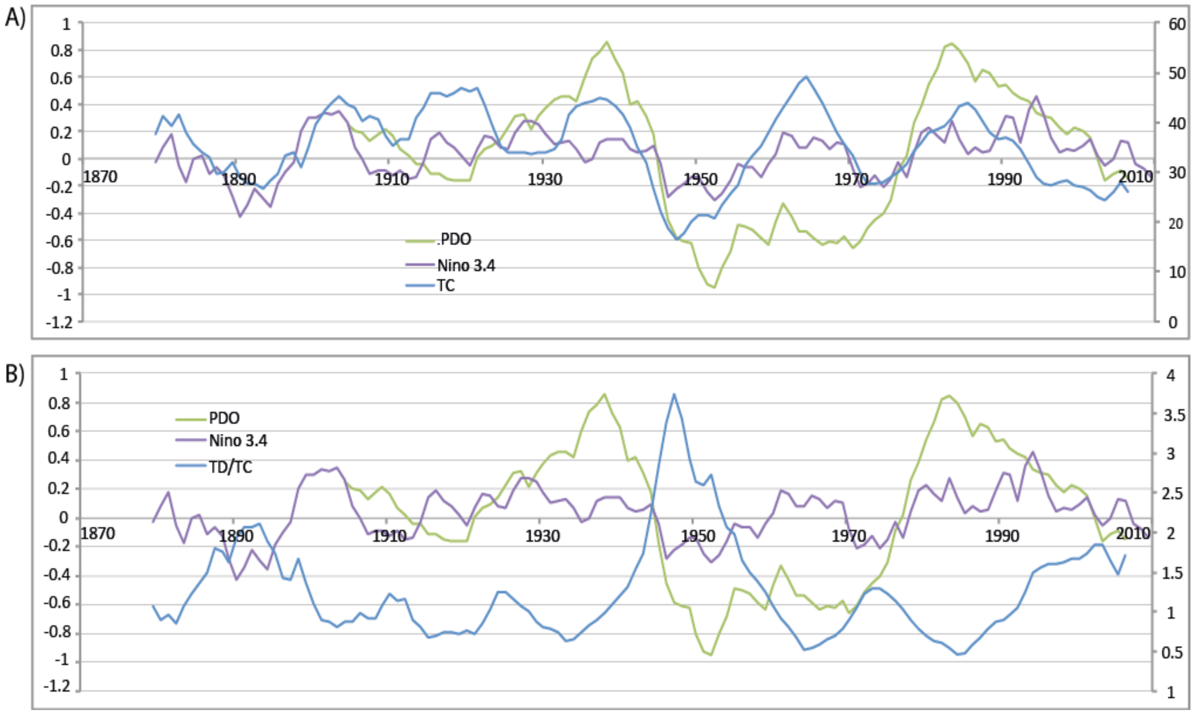

Figure 5.6: Graph depicting the relationships between the arcellacean groupings (total centropyxids and total difflugiids) and the climate proxies (Nino 3.4; Trenberth, 1997 and instrumental PDO; Mantua et al., 1997). Data is plotted with a 9 year moving average.

5.7 Discussion

5.7.1 ALE Hydrologic Link to Climate Cycles

Changes in sediment input in the ALE core are cyclic (see chapter 3) and correlate to well-known cycle periodicities exhibited by ocean-atmosphere teleconnections that impact climate at local, regional and global-scales (Minobe, 1997, 1999; Mantua and Hare, 2002; Patterson et al., 2007; Anderson et al., 2011; Barron et al., 2011; Oglesby et al., 2012; Galloway et al., 2013). Neville et al. (in prep; see chapter 3) observed a 3-8 year cycle that correlates to ENSO activity (Meehl et al., 2009; Gray et al., 2010) and 16-25 year cycles that were attributed to the lower limit oscillation of the PDO (15-25 years) (Minobe, 1997, 1999; Mantua and Hare, 2002). Grain-size fluctuations in the ALE core are interpreted to be largely a reflection of the hydrological conditions at the time of deposition, which is primarily a function of the local hydrological cycle, in particular the spring thaw run-off period (Campbell et al. 1998; see chapter 3), therefore changes in the ALE grain size coarse:fine ratio is a proxy of accumulated winter precipitation. Precipitation in Alberta has been liked to ENSO and PDO activity (Jiang et al., 2013). In general, during negative (positive) ENSO and PDO phases the province of Alberta experiences winter precipitation below (above) normal (McCabe et al., 2008).

Spearman's rank correlation analysis of the coarse:fine grain size ratio proxy described by Neville et al. (in prep; see chapter 3) with PDO produced a strong negative relationship (Table 5.1). Given the hydraulic character of this lake, the negative relationship between the grain size ratio and PDO implies that grain size input at the study site is related to climate anomalies that decreased spring thaw input during positive PDO phases (and by extension El Niño conditions) and vice versa. The precipitation trends related to PDO at this site are consistent with the phase relationships between precipitation and PDO anomalies in the southern parts of Alberta (Mwale et al., 2009).

5.7.2 Comparison of Arcellacean Populations in ALE to other Boreal Lakes

Arcellaceans, which are known indicators of environmental changes (Patterson et al., 1996; Reinhardt et al., 1998; Kauppila et al., 2006; Kumar and Patterson 2000; Escobar, et al., 2008; Kihlmanm and Kauppila 2009, 2010, 2012; Roe et al., 2010; Neville et al., 2010, 2011; Patterson et al., 2012b), were used to investigate if ecological changes are associated with climate anomalies in ALE. ALE contained a diverse (average SDI = 2.0) arcellacean fauna. The arcellacean SDI values from the ALE core are typical of lacustrine transitional/intermediate environmental conditions, indicating a relatively healthy lake environment (Patterson and Kumar 2000b). These values are similar to values from a study by Neville et al. (2010b) of arcellacean communities in lakes across vegetation zones in Alberta, where SDI values ranged 1.35-2.17 (average 1.65), with an average SDI value for lakes in the boreal vegetation zone of 1.83, a value similar to that of this study. The similarity of these values suggests that ALE contains a fauna similar to other boreal lakes, allowing us to make generalizations between lakes.

5.7.3 Climate Cycles Observed in the Arcellacean Data

Like the sediment record from ALE, changes in arcellacean populations are also cyclic (Fig. 5.3 & 5.4) and the cycles observed all correlate to well-known periodicities exhibited by ocean-atmosphere teleconnections (Minobe, 1997, 1999; Mantua and Hare, 2002; Patterson et al., 2007; Anderson et al., 2011; Barron et al., 2011; Oglesby et al., 2012; Galloway et al., 2013). Both arcellacean groupings contain strong (95-99% confidence limit) cycles operating at the ENSO frequency (2-8 years) (Barron et al., 2011). Total difflugiids record a longer cycle (2-8 years) in comparison to the 2-4 year cycle recorded by the total centropyxids. Difflugiids may be operating over this increased bandwidth because they are environmentally sensitive taxa that will be more sensitive and thus impacted by smaller sized fluctuations in climate forcing; i.e. they are acting as first responders to climate-induced change (Patterson et al. 1996; Reinhardt et al. 1998; Kauppila et al. 2006; Kumar and Patterson 2000; Escobar, et al. 2008; Kihlmanm and Kauppila 2009, 2010, 2012; Roe et al., 2010; Neville et al. 2010, 2011; Patterson et al. 2013). As the stress conditions persist the opportunistic centropyxids (Patterson et al. 1996; Reinhardt et al. 1998; Kauppila et al. 2006; Kumar and Patterson 2000; Escobar, et al. 2008; Kihlmanm and Kauppila 2009, 2010, 2012; Roe et al., 2010; Neville et al. 2010, 2011; Patterson et al. 2013) respond by filing the niche opened by the decrease in difflugiids (Neville et al., 2010; 2011; Patterson et al., 2013). For the same environmental sensitivity reason noted above, the longer 60 year cycle operating at the upper PDO limit (50-70 years) (Barron et al., 2011; Oglesby et al., 2012; Galloway et al., 2013) is only observed in the total difflugiids. The environmental changes related to this longer cycle must not change benthic conditions to a degree that significantly decreases the difflugiids and thus allows the centropyxid populations to expand.

This is the first study of recent lacustrine sediments to show benthic ecologic cyclicity operating at short-term known climate periodicities. Kern et al., (2013) however, did describe a similar ecological response documented by rapid changes in dinoflagellates between oligotrophic and eutrophic conditions to Gleissberg-band solar forcing in lacustrine sediments from the Miocene. They associated the change in ecologic conditions to solar forced changes in source area, which affected runoff, and therefore nutrient input to the lake. The lower-resolution sampling employed in the Kern et al (2013) study ~13.7 years per sample made it impossible for them to recognize the shorter climate cycles archived in ALE.

5.7.4 Response of Arcellaceans to Climate Cycles

Several studies have indicated that many species within the arcellacean family Difflugiidae are sensitive to ecological stress, often related to temperature, substrate type or nutrient availability, while Centropyxidae taxa thrive in all but the most highly stressed environments (Patterson et al. 1996; Reinhardt et al. 1998; Kauppila et al. 2006; Kumar and Patterson 2000; Escobar et al. 2008; Kihlmanm and Kauppila 2009, 2010, 2012; Roe et al. 2010; Neville et al. 2010, 2011; Patterson et al. 2013). For an indication of the overall ecological changes archived in ALE we grouped the arcellacean species observed by the families Centropyxidae and Difflugiidae (total centropyxids (n=5) and total difflugiids (n=14)). Correlation analysis of the arcellacean data with the climate proxies shows opposite polarity correlations between (inverse relationships) the arcellacean groupings and the climate proxies. Such correlations suggest specific ecological relationships with the different phases of the climate anomalies (ie. positive and negative) (Table 5.1; Fig. 5.6). The negative relationship between total difflugiids (higher sensitivity, lower tolerance species) and ENSO and PDO events suggests that this population favors La Niña and negative PDO conditions (wetter and cooler). El Niño and positive PDO conditions (drier and warmer) form a positive relationship with the opportunistic centropyxids. The observed specific ecological connections related to ENSO and PDO cycle phases suggest climate anomalies influence benthic ecological changes in boreal lakes.

5.7.5 Environmental Factors Influencing Arcellacean Populations

The opposite polarity correlations between the different proxies suggests that climate anomalies such as ENSO and PDO influence northern boreal lake ecology. The ecological nature of a particular boreal lake depends not only on its physical setting, but also on what enters it from its surroundings (Schindler, 1997; Schindler and Curtis 1997). Water enters boreal lakes from the drainage basin, carrying soil particles, organic matter and dissolved substances, including nutrients such as phosphorus and nitrogen. Input also enters some boreal lakes through groundwater (Crosby et al., 1990; Schindler et al., 1997). Boreal lakes are highly productive and consume high concentrations of nutrients, so the primary productivity of these lakes is dependent upon the concentrations of nutrients entering the lake (Schindler, 1997; Schindler et al., 1996a; Schindler et al., 1996b). Schindler et al., 1996 have shown that in boreal regions decreased precipitation leads to decreased run-off and groundwater flow, which decreases nutrient levels and has shown to be a significant stressor to benthic ecology. In ALE the relationship between input and the hydrologic conditions can be inferred due to its relatively simple setting. ALE sits on a low topographic relief terrace, is surrounded by dense, spruce-tamarack wetland vegetation and connects to another shallow lake some 2 km west through a small inlet channel. The channel likely delivers little input; therefore the vast majority of input to ALE is through groundwater advection through the surrounding wetlands and overland input that is especially active during freshet (Chapter 3).

In ALE a decrease in the environmentally sensitive difflugiids is associated with positive ENSO (El Niño) and positive PDO conditions (Table 5.1; Fig 5.6). ENSO and PDO activity in western and central Canada are both manifested by a decrease in wintertime precipitation associated with El Niño and increased precipitation associated with La Niña (Barron and Anderson 2011). A decrease in precipitation at the study site directly correlates to a decrease in runoff and therefore input to the lake. Arcellaceans are primary consumers (Patterson et al. 1985; Collins et al. 1990; Patterson and Kumar 2000; Beyens and Meisterfeld 2001; Mitchell et al., 2008; Neville et al. 2010b; Roe, et al. 2010; Elliott et al. 2012), mainly consuming nutrient depended food sources such as other protists, fungi, organic matter and micro-metazoa such as rotifer (Gilbert et al., 2000; Mitchell et al., 2008). The lack of nutrients creates a system intolerable to difflugiids, decreasing the populations and allowing for an increase in the opportunistic centropyxid type arcellaceans. This is consistent with observations by others that opportunistic arcellacean species such-as centropyxids are abundant during times of unfavorable environmental conditions associated with low nutrient availability (Collins et al. 1990; McCarthy et al. 1995; Asioli et al. 1996; Beyens and Meisterfeld 2001; Scott et al. 2001; Neville et al. 2010b).

The weaker correlations between the arcellacean groupings and the Nino 3.4 data during the spring and summer months (Table 5.1) is attributed to increased input during these months. During the spring and summer nutrients enter the lake with spring freshet (Lyon et al., 2010; Lyon et al., 2012; Mwale et al., 2009) and through increased precipitation (spring (AMJ) average precipitation = 36 mm, summer (JAS) average precipitation = 53 mm, in comparison to the annual average of 24 mm; Alberta Agriculture and Rural Development and Environment and Sustainable Resource Development, 2014). Despite the weaker overall correlations between the arcellacean groupings with the summer months the summer is when the strong correlation between the arcellacean *Curcurbitella tricuspis* develops (Table 5.1). This species is most common in mesotrophic and eutrophic lakes and ponds where it has a symbiotic relationship with Spirogyra algae (Medioli and Scott, 1983; Medioli et al., 1987; Patterson et al., 1985; Schönborn, 1984). *Curcurbitella tricuspis* abundance in ALE can be considered as a proxy for algal productivity so more eutrophic conditions. The strong positive relationship between *C. tricuspis* and the summer and fall months (Table 5.1) suggests this is when algal production is highest in the study region. Natural algal growth in uninhabited boreal lakes such as ALE are associated with increased temperature and nutrient availability. The increased precipitation during the spring and summer provides nutrients and the increased temperature during the summer (average temperature = 17 °C compared to the annual average of 0.7 °C; Alberta Agriculture and Rural Development and Environment and Sustainable Resource Development, 2014) triggers growth.

The benthic arcellacean ecological data from ALE suggests that ecological pressure is applied to Northern Albertan lakes during climatic cycles, which for this lake can be linked to ENSO and PDO. Given: 1) the impact of precipitation on the watershed hydrologic cycle; 2) the strong links between arcellacean assemblages and nutrient input; and 3) the external climate forcing mechanisms in the area primarily impact winter snowpack accumulation; it is clear that the cyclical variations observed in the arcellacean community from ALE are directly related to local precipitation and nutrient input, which is in turn a response to external ocean-atmosphere dynamics.

5.8 Conclusions

The ALE core collected from northern Alberta, Canada archives evidence of ENSO and PDO activity. Correlation analysis with grain size data shows that the influence of ENSO and PDO at the study locality is characteristic of its influence in southern Alberta, which is decreased precipitation during El Niño and positive PDO conditions and increased precipitation during La Niña and negative PDO conditions.

Spectral analysis of arcellacean (testate lobose amoebae) community shifts also recorded strong signals temporally constant with ENSO and PDO cycles. Correlation analysis of arcellacean groups characteristic of different environmental conditions with ENSO and PDO data produced opposite polarity correlations. A negative relationship between total difflugiids (higher sensitivity, lower tolerance species), and a positive relationship with total centropyxids (generalists, higher tolerance species) exists with the climate proxies investigated. The opposite polarity relationship produced suggests specific ecological relationships with the phases of the climate anomalies. Total difflugiids favor La Niña and negative PDO conditions (wetter and cooler) and total centropyxids favor El Niño and positive PDO conditions (drier and warmer). The hydrologic character of ALE and most boreal lakes suggests that changes in precipitation and therefore input to the lake is the environmental factor connecting benthic ecology to climate anomalies.

5.9 Acknowledgments

This research was supported by the Earth Science Sector of Natural Resources Canada - CORES Project (Coal & Oil sands Resources Environmental Sustainability) under the framework of the Environmental Geoscience Program, an NSERC Discover Grant to R.T.Patterson, and an NSERC Postgraduate Scholarship to L.A. Neville. We thank the CORES team, specifically Dr. Jason Ahad and Josué Jautzy for their assistance in the field.

6 Arcellanean Taxonomy

6.1 Higher Taxonomic Levels: Phylogeny

Arcellacea, also known as thecamoebians (Patterson and Kumar 2002) or testate lobose amoebae (Mitchell et al. 2008) are a polyphyletic assemblage mainly composed of two major, unrelated taxonomic groups of mostly heterotrophic unicellular eukaryotes (Meisterfeld 2002a, b; Wylezich et al. 2002). These groups have been divided based on pseudopod morphology. The first group has lobose pseudopodia (order Arcellinida), and the second group with filose pseudopodia is represented mainly by the order Euglyphida. Some arcellacea possessing anastomosing networks of reticulopodia, and traditionally classified in the phylum Granuloreticulosea (Bovee 1985), have recently been placed among arcellacea with filose pseudopodia (Meisterfeld 2002b). The phylogenetic position of Arcellinida and Euglyphida, among Amoebozoa and Cercozoa, respectively, has been established based on ribosomal DNA sequences (Cavalier-Smith and Chao 1997; Meisterfeld 2002a, b; Wylezich et al. 2002; Nikolaev et al. 2005). However, DNA sequences are available only for a small number of taxa and therefore the higher-level taxonomy of both orders still rests largely on morphological characters.

Perhaps because of the uncertainty around their phylogeny, many different names have been used to describe these organisms: thecamoebians, rhizopods, testate amoebae, testaceans, and arcellaceans (Mitchell et al. 2008). Some of these names implicitly suggest a taxonomic affiliation and others are umbrella terms incorporating a wide phylogenetic range. For example, the term arcellaceans implies relationships to the order Arcellinida or the genus Arcella. Rhizopods on the other hand are not restricted and may include naked amoebae. Mitchell et al. (2008) suggested that the terms testaceans or testate amoebae be preferred as they are unambiguous. We have adopted the term arcellaceans because we primarily deal with lobose pseudopodia type amoebas, which are typical of lacustrine environments (Cavalier-Smith and Chao 1997; Meisterfeld 2002a, b; Nikolaev et al. 2005; Wylezich et al. 2002; Michell et al., 2008; Patterson et al., in prep)

6.2 Lower Taxonomic Levels: Genera and Species

The taxonomy of arcellaceans at lower taxonomic levels is also largely unresolved and primarily based on morphology (Lee et al. 2000; Patterson 1996). There are no recent updated complete monographs or even species lists of the approximately 2000 described species (Charman et al., 2000; Mitchell et al., 2008). Common original monographs used for identification include Leidy, (1874), (1897); Cash and Wailes (1915); Chardez (1969); Corbet (1973); Deflandre (1928), (1929), (1936); Grospietsch (1958), (1964); Ogden (1983); Ogden and Hedley (1980); Penard (1902); Schönborn (1965).

The proliferation of species descriptions has resulted in considerable taxonomic confusion surrounding the group. These difficulties arise from most systematic work on the group being focused on creating new species of regional interest (see discussions in Medioli and Scott, 1983; Medioli et al., 1987; Ogden and Hedley, 1980; Tolonen, 1986; Bobrov et al., 1999; Charman et al., 2000). Primarily adopted by Arcellinida researchers, infraspecific level (Medioli et al., 1987; Asioli et al., 1996; Reinhardt et al., 1998; Kumar and Patterson, 2000) classification is quite useful for delineating large populations and has been successfully used for subdividing arcellaceans, into ecophenotypes without describing new species (Kumar and Dalby, 1998). Infraspecific strains separate species based on slight morphological distinctions and can be useful in creating distinctions between geographic distributions and ecologic requirements (Patterson and Kumar, 2002). A similar systematic re-examination has not been carried out on the taxa characterizing soils and peatlands (Mitchell et al., 2008).

Recent studies have indicated that species within the arcellacean families Centropyxidae and Difflugiidae are particularly useful for recognizing contrasting degrees of sensitivity to ecological stress, with most difflugiid taxa exhibiting higher sensitivity and lower tolerance to stress, and centropyxid taxa being generalists that appear to thrive in all but the most highly stressed environments (Patterson et al. 1996; Reinhardt et al. 1998; Kauppila et al. 2006; Kumar and Patterson 2000; Escobar, et al. 2008; Kihlmanm and Kauppila 2009, 2010, 2012; Roe et al., 2010; Neville et al. 2010, 2011; Patterson et al. 2012b). A study by Neville et al., 2011 shows that grouping difflugiids and centropyxids then comparing the ratio of the groups gives an excellent generalization of ecosystem health and addresses the over splitting species issue. This method was utilized in chapters 2 (relationship between ecological indicators (arcellacea), total mercury concentrations and grain size in lakes within the Athabasca oil sands region, alberta) and 5 (the ecological response of protists to the El Niño Southern Oscillation and the Pacific Decadal Oscillation in Northern Alberta) herein.

6.3 Abbreviated Systematics of Arcellacea Common to this Study

Subkingdom Protozoa

Phylum Amoebozoa Lühe 1913

Superclass Rhizopoda Dujardin, 1861

Class Lobosa Carpenter, 1861

Order Arcellinida (Kent, 1880)

Superfamily Arcellacea Ehrenberg, 1830

Family Difflugidae Stein, 1859

Genus *Difflugia* Leclerc *in* Lamarck 1816

Difflugia amphora Wallich, 1864

Difflugia bacillariarum Perty, 1849

Difflugia bidens Penard, 1902

Difflugia corona Wallich, 1864

Difflugia fragosa Hampel, 1898

Difflugia globulus (Ehrenberg, 1838)

Difflugia oblonga Ehrenberg, 1832

Difflugia protaeiformis Lamarck, 1816

Difflugia urceolata Carter, 1864

Genus *Lagenodifflugia* n. gen (Leidy, 1874)

Lagenodifflugia ? cf. *vas* (Leidy, 1874)

Genus *Lesquereusia* Schlumberger, 1845

Lesquereusia spiralis (Ehrenberg, 1840)

Genus *Pontigulasia* Rhumbler, 1895

Pontigulasia compressa (Carter, 1864)

Family Centropyxididae Deflandre, 1953

Genus *Centropyxis* Stein, 1859

Centropyxis aculeata (Ehrenberg, 1832)

Centropyxis constricta (Ehrenberg, 1843)

Family Arcellidae Ehrenberg, 1830

Genus *Arcella* Ehrenberg, 1830

Arcella vulgaris Ehrenberg, 1830

Family Hyalospheniidae Schulze, 1877

Genus *Heleopera* Leidy, 1879

Heleopera sphagni (Leidy, 1874)

Genus *Cucurbitella* Penard, 1902

Cucurbitella tricuspis (Carter, 1856)

6.3.1 Family Difflugidae Stein, 1859

This family is essentially that of Deflandre (1953), Loeblich and Tappan (1964) and Ogden and Hedley (1980). Tests usually with axial symmetry, elongated, ovoid, globose or rarely depressed, sometimes with slight lateral compression. Aperture terminal; test made of hard organic matter and entirely covered with siliceous xenosomes and possibly idiosomes of highly varied, mineral and/or biological origin (quartz grains, diatom frustules, etc.). In some genera, an internal diaphragm with one or two (rarely more) openings separates the main part of the test from a narrower neck. The aperture is located at the end of the neck.

6.3.1.1 Genus Difflugia Leclerc in Lamarck 1816

Type species: *Difflugia protaeiformis* Lamarck, 1816, pl. 1, Figs. 15-20

Diagnosis: Test simple, without an internal diaphragm; sack-like, either globular or more or less elongated, rarely depressed. Aperture circular, lobated or crenulated; simple or complicated by constrictions; either at the end of a more or less complicated collar or opening directly into the test.

Difflugia corona Wallich, 1864

Fig. 6.1 n

Difflugia corona Wallich, 1864, in Medioli and Scott, 1983, pl. 1, figs. 9-14.

Diagnosis: Shell subspherical, ovoid to spheroid, circular in transversal cross section. Fundus furnished with a variable number of spines (1 to 10 or more); mouth central, roughly circular but crenulated by 6 to 20 regular indentations forming a thin collar. Test composed of angular quartz grains of varied sizes. Spines delicate and very easily broken, composed of the same material used to construct the test. Although highly variable in size and shape, *D. corona* is a distinctive and easily recognized species. *D. corona* is easily differentiated from xenosomic specimens of *C. tricuspis* because the former usually has a much higher number of apertural indentations (minimum of 6) than the latter (maximum of 6 clear indentations, sometimes more but in that case the indentations are irregular and poorly defined).

Diffiugia oblonga Ehrenberg, 1832

Fig. 6.1 o-r

Difflugia oblonga Ehrenberg, 1832, p. 90

Difflugia oblonga Ehrenberg in Medioli and Scott, 1983, pl. 2, figs. 1-27

Diagnosis: Test extremely variable in shape and size, pyriform to compressed to flask-shaped. In cross section rounded to compressed. Fundus rounded to subacute or expanded into one to three blunt, rounded conical processes. Neck subcylindrical, more or less long, gradually narrowed toward the oral end. Aperture terminal, circular to slightly oval. Test made of sand particles sometimes mixed with a variable amount of diatom frustules which, if large, can partly or completely obscure the overall shape of the specimen. The test ranges from 60 to 580 µm in length, 40 to 240 µm in width, 16 to 120 µm in apertural diameter. Differs from *D. prolaeiformis* by often being compressed and by lacking the acute spinal process that is so characteristic of that species.

Difflugia protaeiformis Lamarck, 1816

Fig. 6.1 s-t

Difflugia protaeiformis Lamarck, 1816, p. 95

Difflugia protaeiformis Lamarck in Medioli and Scott, 1983, pl. 1,. figs 15-20

Lectotypes: Designated by Loeblich and Tappan, 1964, p. C35, as being the specimen illustrated on pl. 17, fig. 5, of Leclerc, 1816

Diagnosis: Test shape extremely variable; amphora like to elongate oval, cylindroconical, pyriform. Fundus more or less tapering, acute, either acuminate or prolonged into one or more blunt spine processes. The test blends into these processes with smooth curves. Neck long, short or absent. Aperture large, terminal, subcircular.

Test composed of quartz grains of variable size and abundance, at times mixed with variable amounts of diatom frustules that, when abundant can completely obscure the shape of the test. Generalized dimensions: length from 84 to 520 µm, width from 36 to 184 µm, diameter of aperture from 24 to 100 µm.

Difflugia urceolata Carter, 1864

Fig. 6.1 u

Difllugia urceolata Carter, 1864, p. 27, pl. 1. fig. 7. Leidy. 1879. p. 106. pl. 14. figs. 1,2,5-10.14; pl. 16, fig. 33; pl. 19, fig. 27

Difflugia urceolata Carter, 1864 in Medioli and Scott, 1983, pl. 3, figs. 1-23; pl. 4, figs. 1-4

Diagnosis: Test spheroid to ovate; general appearance amphora-like to cauldron-like. Fundus rounded to acuminate, at times contains blunt protuberances. Neck short, sometimes curved or straight collar of variable shape and size. Mouth wide, circular, terminal. Test xenosomic, usually composed of sand grains of variable coarseness. Differs from *D. corona* with which it could be confused due to both possessing a pronounced collar but unlike *D. corona, D. urceolata* lacks apertural crenulation.

6.3.1.2 Genus Lagenodifflugia n. gen (Leidy, 1874)

Type species: Difflugia vas Leidy, 1874, pl. 2, fig. 11

Diagnosis: Difflugiids with overall elongated, roughly pyriform tests divided into a bulbous main part and a neck. The main part and the neck are separated by an internal diaphragm pierced by a single, central, usually large orifice. The external side of the test is normally marked by a continuous constriction corresponding to the internal diaphragm. Aperture at the extremity of the neck.

Lagenodifflugia ? cf. *vas* (Leidy, 1874)

Fig. 6.1 v

Difflugia vas Leidy, 1874, p. 155

Lagenodifflugia vas (Leidy, 1874) Medioli and Scott, 1983

Diagnosis: Main part of the test usually ovoid, with the neck arising from its narrower extremity and with a wide fundus. Neck usually slightly higher than wide, with the shape of a cone truncated by the aperture and the constriction. Constriction not always conspicuous: some specimens have an almost continuous, pyriform outline from the fundus to the aperture. The constriction is sometimes more or less hidden by xenosomes; only sand grains have been reported as xenosomes.

6.3.1.3 Genus Lesquereusia Schlumberger, 1845

Type species: *Lesquereusia spiralis* (Ehrenberg, 1840), pl. 2, figs. 18, 19

Diagnosis: Difflugiids with roughly pyriform tests divided into a bulbous main part and a neck. The neck does not protrude from the body but follows the contours of the body. Test composed of quartz grains of variable size and abundance, at times mixed with variable amounts of diatom frustules.

Lesquereusia spiralis (Ehrenberg, 1840)

Fig. 6.1 w

Lesquereusia spiralis (Ehrenberg, 1840), pl. 2, figs. 18, 19

Difflugia spiralis Ehrenberg, 1840, p. 199

Lesquereusia spiralis (Ehrenberg) Schlumberger, 1845, p. 225

Lesquereusia spiralis (Ehrenberg) in Scott and Medioli, 1985

Diagnosis: Main part of the test usually ovoid, with the neck extending from its narrower extremity and with a wide fundus, but remaining attached to the body. The normally short neck follows the contours of the body. The constriction is sometimes more or less hidden by xenosomes; only sand grains have been reported as xenosomes.

6.3.1.4 Genus Pontigulasia Rhumbler, 1895

Type species: *Pontigulasia compressa* Rhumbler,

Diagnosis: Test ovoid to pyrifonn, aperture rounded and resting on a more or less elongated neck. The main characteristic of the genus is a constriction of the base of the neck marking the position where a perforated, internal diaphragm often extends across the neck. Such an internal diaphragm is seldom present in fossilized forms. At times a bent neck, combined with the constriction, simulates a spiral arrangement. Test composed of agglutinated foreign particles.

Pontigulasia compressa (Carter, 1864)

Fig. 6.1 x-y

Pontigulasia ? cf. compressa (Carter, 1864)

Difflugia compressa Carter, 1864, p. 22, pl. 1, figs 5, 6

Pontigulasia compressa (Carter, 1864) in Rhumbler, 1895, p.105, pl. 4, Figs. 13a, b

Pontigulasia compressa (Carter, 1864) in Medioli and Scott, 1983, pl. 6, figs. 5–14

Diagnosis: Test usually large, rounded to pyriform, laterally compressed. Neck well defined, tapering regularly towards the narrow aperture. Aperture truncated, rounded or broadly elliptical in cross section. The area between the neck and the test is marked usually by a clearly visible constriction (which may not be visible when diatoms are agglutinated in the test). This constriction marks the position of a doubly perforated internal diaphragm, which is often missing in fossil forms. The test appears to be composed of minute quartz grains arranged so as to give a rough appearance to the main part of the test; the neck is usually smoother.

6.3.2 Family Centropyxididae Deflandre, 1953

6.3.2.1 Genus Centropyxis Stein, 1859

Type species: *Arcella aculeata* Ehrenberg, 1830

Diagnosis: Tests are bilaterally symmetrical and with distinct ventral, dorsal, posterior, anterior, right and left sides. The anterior angle (defined as the angle between the tangent to the dorsal side and the apertural side) can, exceptionally, be close to 90 degrees, but usually it varies between approximately 60 and 15 degrees. The dorso-posterior curved area, which is the part of the test further away from the aperture, and which joins the anterior and posterior slopes, is the fundus. The fundus migrates in response to the changes in geometry experienced by the test. A variable number of more or less conical spines are sometimes present at the posterolateral margins. The test is composed of organic material; often, but not always, more or less completely covered with agglutinated mineral particles of various nature. A variable number of conical spines are sometimes present at the lateral margin (which represents the fundus migrated to a marginal position).

Centropyxis aculeata (Ehrenberg, 1832)

Fig. 6.1 b-e

Cemropyxis aculeala (Ehrenberg). Stein, 1859. p. 43. Leidy, 1879, p. 180, pl. 31, figs. 1-32, 35; pl. 32, figs. 29-34,37

Centropyxis aculeata (Ehrenberg, 1832) in Medioli and Scott, 1983, pl. 7, figs. 10-19

Diagnosis: Test depressed; although quite variable it can be described as beret-shaped; in dorsal view, usually large and more or less circular; anterior slope large, with small (mostly 15 to 40 degrees) anterior angle; posterior slope ill-defined, practically absent, fusing into the fundus, the latter being quite posterior. Height:length ratio usually low (mostly 0.4 to 0.5). Aperture subcentral, usually slightly anterior, invaginated. Spines not always present; when present, mostly concentrated along the posterior and postero-lateral margins. Test basically organic, mature specimens usually covered with somewhat loose, amorphous, siliceous particles, in most cases completely covering the membrane.

Centropyxis constricta (Ehrenberg, 1843)

Fig. 6.1 f-j

Ditllugia constricta (Ehrenberg). Leidy, 1879, p. 120, pl. 18, figs. 8; Penard, 1890, p. 148. pl. 5, figs. 1-16; Penard, 1902, p. 298

Centropyxis aculeata (Ehrenberg, 1832) in Medioli and Scott, 1983, pl. 7, figs. 1-9

Diagnosis: Test much less depressed than in *C. aculeata* and usually elliptical in dorsal view, with a profile usually raised posteriorly. Anterior angle larger than in *C. aculeata* (mostly 40 to 65 degrees) and posterior angle normally well defined. Fundus raised in uppermost position. Ventral side often relatively small, with invaginated aperture in antero-marginal position. The degree of invagination of the mouth varies. Height:length ratio usually 0.5 to 1.1. The fundus often carries two or more spines. Test largely organic, often completely covered with mineral particles of various nature.

6.3.3 Family Arcellidae Ehrenberg, 1830

6.3.3.1 Genus Arcella Ehrenberg, 1830

Type species: *Arcella vulgaris* Ehrenberg, 1832

Diagnosis: *Arcella* species have more or less umbrella-shaped shells with a central invaginated aperture from where lobopodia, finger-like pseudopods, emerge. In dorsal view the shell ranges from circular or broad elliptical up to an irregular square shape. In lateral view the test varies from flattened to spherical. Most species have hemispherical shells. The aperture is normally circular and in some species elliptical, in many species surrounded by a tube and/or a ring of pores. The test is completely composed of organic material, and is transparent in young *Arcella*, but browns while aging due to the progressive deposition of iron and manganese compounds. In the building process organic granules are arranged in a single layer and cemented together, resulting in a hexagonal honeycomb like structure. Contrary to other genera, no sand grains or other foreign bodies are incorporated during test construction.

Discussion: *Arcella* is one of the largest and most common genera. Over 50 species, subspecies and varieties have been described, but many descriptions are not adequate or based on artificial criteria.

Arcella vulgaris Ehrenberg, 1830

Fig. 6.1 a

Arcella vulgaris Ehrenberg, 1830, p. 40, pl. 1, fig. 6

Arcella vulgaris Ehrenberg, 1830, Reinhardt et al., 1998, pl. 1, fig 3

Diagnosis: The test is completely organic, composed of box-like building units arranged in a single layer and cemented together resulting in an areolar surface. Young *arcellas* are colourless as they age they become browner.

6.3.4 Family Hyalospheniidae Schulze, 1877

6.3.4.1 Genus Cucurbitella Penard, 1902

Type species: Cucurbitella mespiliformis Penard, 1902, pl. 3, figs. 8, 9

Diagnosis: Shell ovoid, with distinct apertural collar. Body constructed of small to medium, angular mineral grains. Organic cement seldom visible as surface structure. Collar with 3-12 lobes, composed of small mineral grains. Internal aperture a diaphragm with a circular or lobed opening on a level with main body wall.

Cucurbitella tricuspis (Carter, 1856)

Fig. 6.1 k-l

Difflugia tricuspis Carter, 1856, p. 221, fig. 80.

Cucurbitella tricuspis (Carter) Medioli, et al., 1987, p. 42, pls. 1-4, figs. 1, 4

Diagnosis: Test of variable shape, from subspherical to oval, without a neck. Aperture usually deeply indented by three to six (or more) lobes; these lobes are rounded to somewhat angular and usually regularly distributed around a center (the degree of regularity, however, tends to decrease as the number of lobes increases). In fossil samples the test is often composed of fine, agglutinated quartz grains, and is more or less smooth in overall appearance; rarely the test is composed wholly or partly of diatoms but in most cases the test is wholly autogenous which is what puts this species outside the genus *Difflugia*. *C. tricuspis* differs from *D. corona* because the latter normally has more than six indentations in the aperture.

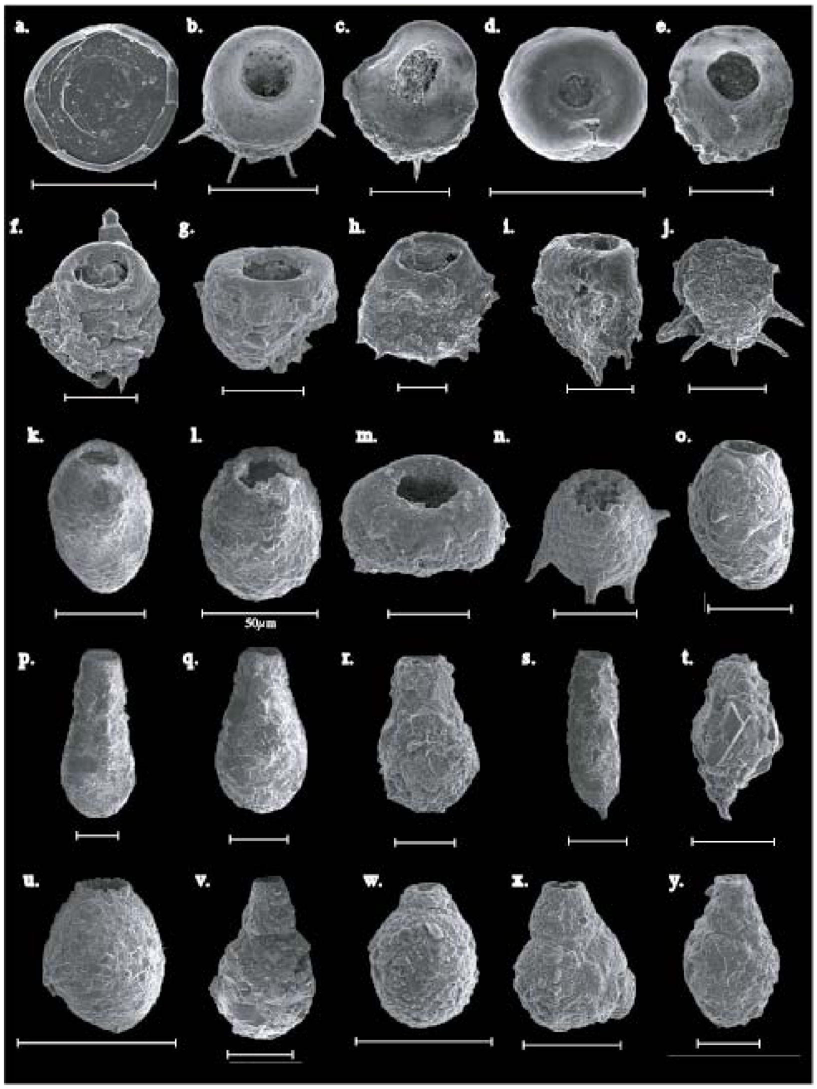

Figure 6.1: a – f. Scanning electron micrographs of selected arcellacean tests observed in this study. (a) *Arcella vulgaris* Ehrenberg 1830, ventral view. (b, c) *Centropyxis aculeata* (Ehrenberg 1832) strain "aculeata" b. specimen with multiple spines, c. specimen with only single spine. (d, e) *Centropyxis aculeata* (Ehrenberg 1832) strain "discoides", ventral view. (f, g) *Centropyxis constricta* (Ehrenberg 1843) strain "aerophila", obique view. (h, i) *Centropyxis constricta* (Ehrenberg 1843) strain "constricta", h. obique view, i. side view. (j) *Centropyxis constricta* (Ehrenberg 1843) strain "spinosa" dorsal view. (k, l) *Cucurbitella tricuspis* (Carter 1856), side views. (m) *Cyclopyxis kahli* (Deflandre 1929), side/ventral view showing aperture. (n)

Difflugia corona Wallich 1864, side view showing aperture. (o) *Difflugia oblonga* Penard 1902 strain “glans”, side view. (p) *Difflugia oblonga* Ehrenberg, 1832 strain “oblonga”, side view. (q, r) *Difflugia oblonga* Ehrenberg 1832 strain “tenuis”, side views, r. more coarsely agglutinated. (s) *Difflugia protaeiformis* Lamark 1816 strain “claviformis”, side view. (t) *Difflugia protaeiformis* Lamark 1816 strain “amphoralis”. *Difflugia urceolata* Carter, 1864, strain “urceolata”, side view. (v) *Lagenodifflugia vas* Leidy, 1874, side view showing typical constriction around base of neck. (w) Lesqueresia spiralis (Ehrenberg, 1840), side view with the neck curling toward the viewer. (x, y) *Pontigulasia compressa* (Carter 1864), side view of compressed test showing typical v-shaped depression at the base of neck

7 Conclusions

The research conducted in this study focused on the spatio-temporal ecological/paleoecological aspects of the CORES research. The overall aim of CORES was to firstly determine a reliable method for discriminating anthropogenic from natural contaminant sources, and secondly to determine what ecological impacts, if any, can be attributed to metal or organic contaminants emanating from the Athabasca oil sands operations in Alberta, Canada.

Our multi-proxy study consisted of lake surface sediments (collected in 2010) and cores (collected in 2011) from two transects selected in order to mimic probable contaminant transport routes, one waterborne transect and one airborne transect. We therefore aimed to interpret the paleoenvironmental character/histories of the lakes selected. By doing so we contributed to the CORES research objectives by providing the paleoecological, paleolimnological, sedimentological, stratigraphic, and chronostratigraphic framework for understanding contaminant input, via different pathways, into lakes around the oil sands operations. This study also provided new knowledge on arcellacean ecology and paleoecology by furthering our understanding of the environmental interaction and response of these organisms.

7.1 Summary of Key Elements Derived From this Thesis

1. Total mercury (THg) concentrations in surface sediments from the lakes surrounding the Athabasca oil sands were generally low, THg levels found in all but one of these lakes were below current Canadian Sediment Quality

Guidelines for the Protection of Aquatic Life, interm sediment quality guidelines (ISQG) (CCME, 2002) and similar to concentrations in lakes in the vicinity of coal-fired plants in central Alberta.

2. THg concentrations in lakes did not show an airborne or waterborne pattern of deposition, as values in lakes close to the operation were similar to values recorded in lakes farthest from the operation.
3. There was no correlation between THg concentrations, arcellacean species diversity or assemblage makeup. A few sites characterized by stressed faunas were observed but they did not overlap with areas of enriched THg.
4. Species diversity values observed in the vicinity of the oil sands operation are similar to values from lakes across Alberta, however stressed arcellacean communities were observed to the northeast of Fort MacKay.
5. In the ALE grain size record there was a consistent positive correlation between the area and amplitudes of the coarser-grained distributions and consistent negative correlations between these parameters and the finer-grained distributions suggesting the magnitudes of the processes driving coarse-grained versus fine-grained distributions in ALE are related to overarching environmental controls.
6. Changes in the hydrologic character of ALE are linked to the variability of discharge during snow melt, whereby relatively higher energy discharge events (bedload delivery) punctuate the generally lower energy background run-off (fine silt and clay delivery).

7. The ratio of coarser:finer grained fractions in ALE reflects the relationship between spring melt high discharge and background discharge. The whole core record of the coarse:fine ratio demonstrates abrupt oscillations of both high and low frequency, which indicates the spring melt in this region is likely forced by climate change.
8. Archived sedimentary depositional cycles reflect ENSO (5-7 yrs) activity and longer timescale cycles operating at ~270-370 yrs.
9. El Niño yrs record a dry environmental signal represented by a spike in fine-grained suspended load input while La Niña yrs are characterized by input of coarser bedload material. The increase in fine sand during La Niña yrs is associated with increased winter precipitation and therefore higher discharge events that occur during spring melts.
10. The ~270-370 yr longer timescale cycle is archived by abrupt shifts in the coarse:fine grain size ratio. Similar cycles are observed in records from the equatorial Pacific, the northern Great Plains, Yukon and northeastern Pacific.
11. The regime shifts presumably reflected in the position of the jet stream that controls air mass distribution in this locality. Lower coarse:fine ratios represent less precipitation related to more El Niño-like conditions. This scenario postulates that the very low ratios represent a northward push of the southerly climatic regime.
12. The timing of the most recent ENSO expression shift to generally coarser grained input coincides with the onset of the Little Ice Age (LIA), suggesting a southward shift of the arctic air mass. The continuation of the high

coarse:fine ratio to the present indicates the area is still under the climatic regime of the LIA.

13. A strong 2-9 yr ENSO frequency signal is present in both arcellacean groupings (total difflugiids and total centropyxids) and a weaker 60-year PDO frequency in only the difflugiid population. Therefore ALE records a benthic stress induced ecological response to ENSO and PDO.
14. Difflugiid-type arcellaceans display a negative relationship with the climate proxies and the opposite relationship was produced with centropyxids. The difflugiid population decreased in response to El Niño and positive PDO conditions, which are characteristic of decreased precipitation and therefore overland runoff and associated nutrient input to boreal lakes.
15. The relationship between arcellaceans and climate anomalies shows that climate driven variations likely influence nutrient input that in turn stresses or promotes benthic ecology.

7.2 Potential Areas of Future Work

Additions to the work completed for this thesis would further assist in achieving the goals of the CORES program by further discriminating if any ecological impacts are associated with anthropogenic contamination related to the Athabasca oil sands.

Below summarizes potential valuable additions to the work completed:

1. A detailed comparison of past ecological and environmental conditions with post oil sands operation conditions.

- To make this comparison one could apply our new understanding of how to interpret hydrologic changes and the influence of these changes on ecology to fully characterize changes in core geochemistry.

2. An examination of the potential cause/s of the ecological stress as represented by low species diversities observed to the northeast of Fort MacKay (details outlined in chapter 2).
    - A full geochemical analysis is now available for the lakes investigated.

In addition to the above-mentioned study continuations additional cores were collected as part of the CORES program. In some cases analysis was started on these cores but detailed interpretations were not included in this thesis project.

1. Complete a detailed down core interpretation of the arcellacean faunas in the Glew cores from the Athabasca Delta to determine if any ecological stress exists post oil sands development.
2. Construct a flood reconstruction of the Athabasca Delta using the Glew cores and compare these results to the dry environmental cycles identified in this thesis.
3. Construct a flood reconstruction of the Athabasca River using the Coffey Lake freeze core and compare these results to the dry/wet cycles identified in this thesis.
4. Develop and apply a transfer function for the lakes in the Athabasca region. The transfer function would link arcellacean communities to environmental variables (ex. T, S, pH, DO, nutrients) that are impacted directly or indirectly

by environmental controls. The transfer function can be generated by calibrating modern lake chemistries against the limnological attributes. All required data was collected as part of this project. The transfer function can then be applied as a quantitative assessor of lake paleoecology.

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Appendices

Appendix A - Arcellacean Data

A1 Arcellacean Data - Surface Samples

Sample	Sask 10M	Salina	Albt D	ALE	Coffey	PAD 31	PAD 39	PAD 23	PAD 15	1	2	3	4	5	6	7	8	9	10	11	12	13
Absolute Value	308	403	451	388	351	380	327	396	370	138	108	180	186	351	102	117	222	234	126	72	138	258
Probable Error	11.9	10.4	9.9	10.6	11.2	10.7	11.6	10.5	10.9	17.8	20.2	15.6	15.4	11.2	20.7	19.4	14.1	13.7	18.7	24.7	17.8	13.0
Arcella gibbosa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.6	23.1	0.0	0.0	0.0	4.2	0.0	0.0
Arcella megastoma	0.0	0.0	7.8	2.1	17.7	0.0	2.4	4.0	0.0	2.2	0.0	0.0	0.0	0.9	11.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Arcella vulgaris	13.6	44.4	8.2	14.4	34.8	6.3	0.0	42.4	1.1	13.0	2.8	10.0	9.7	0.0	0.0	30.8	0.0	2.6	2.4	0.0	0.0	0.0
Centropyxis aculeata "aculeate"	5.5	1.0	11.1	4.1	17.1	8.4	1.2	4.3	2.2	8.7	5.6	15.0	0.0	0.0	2.9	0.0	0.0	15.4	19.0	20.8	4.3	4.7
Centropyxis aculeata "discoides"	31.8	21.1	10.6	12.4	12.0	8.4	4.3	8.6	4.3	4.3	11.1	5.0	0.0	0.0	8.8	23.1	0.0	2.6	4.8	4.2	8.7	7.0
Centropyxis constricta "aerophila"	17.2	18.4	0.0	6.4	2.3	8.4	0.6	6.1	3.5	17.4	5.6	10.0	19.4	0.0	0.0	15.4	5.4	7.7	0.0	0.0	4.3	2.3
Centropyxis constricta "constricta"	2.9	3.5	6.9	0.0	0.0	0.0	0.6	5.8	2.2	0.0	2.8	0.0	6.5	0.0	2.9	0.0	5.4	0.0	2.4	8.3	17.4	0.0
Centropyxis constricta "spinosa"	0.0	3.5	6.2	0.0	0.0	4.2	0.6	0.0	0.0	2.2	2.8	0.0	0.0	0.0	2.9	0.0	0.0	2.6	0.0	0.0	0.0	0.0
Cucurbitella tricuspis	0.0	5.2	9.5	30.9	12.3	8.7	8.6	26.5	54.1	2.2	0.0	15.0	6.5	4.3	11.8	0.0	24.3	0.0	2.4	25.0	17.4	11.6
Cyclopyxis kahli	0.0	0.0	0.0	3.1	0.0	0.0	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia amphora	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia bidens	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia corona	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.8	0.0	19.0	4.2	13.0	1.2
Difflugia globula	1.3	1.2	5.3	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia oblonga "bryophila"	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia oblonga "distenda"	0.0	0.0	0.0	6.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia oblonga "glans"	4.5	1.2	7.5	16.0	0.0	14.5	12.8	2.3	9.7	6.5	27.8	25.0	6.5	1.7	2.9	0.0	16.2	0.0	0.0	0.0	4.3	7.0
Difflugia oblonga "lanceolata"	2.6	0.0	0.0	0.0	0.0	8.4	22.6	0.0	1.1	2.2	0.0	0.0	0.0	36.8	8.8	0.0	0.0	12.8	4.8	0.0	0.0	0.0
Difflugia oblonga "linearis"	0.0	0.0	5.1	0.0	0.0	2.1	19.0	0.0	0.0	0.0	0.0	0.0	0.0	38.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia oblonga "oblonga"	1.6	0.0	0.0	1.0	0.0	6.3	15.0	0.0	0.0	15.2	22.2	5.0	9.7	0.0	20.6	0.0	21.6	43.6	11.9	20.8	21.7	47.7
Difflugia oblonga "tenuis"	5.5	0.0	6.9	2.1	1.7	4.5	1.8	0.0	3.2	15.2	8.3	10.0	29.0	2.6	0.0	0.0	2.7	5.1	16.7	8.3	0.0	14.0
Difflugia protaeiformis "acuminata"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6	0.0	6.5	14.5	2.9	0.0	5.4	2.6	2.4	0.0	0.0	0.0
Difflugia protaeiformis "amphoralis"	1.3	0.5	0.0	0.0	0.0	6.3	0.6	0.0	7.8	10.9	5.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5
Difflugia protaeiformis "claviformis"	3.6	0.0	5.5	0.0	0.0	11.3	1.8	0.0	5.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia urceloata "elongata"	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.4	0.0	0.0	0.0	0.0	0.0
Difflugia urceolata "urceolata"	5.8	0.0	9.3	1.0	1.1	0.0	1.5	0.0	1.1	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	2.4	4.2	0.0	0.0
Lagenodifflugia vas	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.9	0.0	8.7	0.0
Lesquereusia spiralis	1.3	0.0	0.0	0.0	1.1	0.0	0.0	0.0	2.2	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	2.6	0.0	0.0	0.0	1.2
Nebella collaris	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pontigulasia compressa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7	2.7	2.6	0.0	0.0	0.0	0.0

Arcellacean Data - Surface Samples cont.

Sample	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35A	35B	36	37	38
Absolute Value	272	288	390	126	360	350	207	180	306	102	123	348	138	120	63	90	144	98	114	168	156	252	216	144	63	138
Probable Error	12.7	12.3	10.6	18.7	11.0	11.2	14.6	15.6	12.0	20.7	18.9	11.2	17.8	19.1	26.4	22.1	17.5	21.2	19.6	16.2	16.8	13.2	14.3	17.5	26.4	17.8
Arcella gibbosa	0.0	0.0	1.5	4.8	0.6	0.0	0.0	0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.0
Arcella megastoma	2.9	0.0	0.0	0.0	3.9	1.4	0.0	0.0	1.0	0.0	2.4	7.8	0.0	0.0	0.0	0.0	25.0	2.0	10.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Arcella vulgaris	0.0	2.1	0.0	9.5	0.6	0.0	2.9	6.7	0.0	8.8	2.4	7.8	8.7	6.7	0.0	0.0	25.0	2.0	5.3	7.1	0.0	2.4	0.0	2.1	0.0	8.7
Centropyxis aculeata "aculeate"	5.9	10.4	0.0	0.0	4.4	1.4	5.8	0.0	2.9	2.9	7.3	38.8	17.4	16.7	0.0	53.3	12.5	0.0	26.3	21.4	0.0	0.0	0.0	2.1	0.0	0.0
Centropyxis aculeata "discoides"	4.4	2.1	3.1	9.5	2.8	2.9	7.2	1.7	5.9	2.9	39.0	25.0	56.5	60.0	19.0	20.0	0.0	6.1	5.3	39.3	7.7	2.4	8.3	6.3	0.0	8.7
Centropyxis constricta "aerophila"	10.3	8.3	3.1	9.5	18.3	0.0	8.7	0.0	3.9	0.0	2.4	1.7	4.3	8.3	0.0	0.0	12.5	0.0	0.0	10.7	0.0	2.4	0.0	0.0	0.0	8.7
Centropyxis constricta "constricta"	1.5	4.2	10.8	4.8	0.0	5.7	4.3	1.7	2.0	0.0	0.0	0.9	0.0	6.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.1	0.0	0.0	0.0	4.3
Centropyxis constricta "spinosa"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6	0.0	0.0	0.0	2.1	0.0	0.0
Cucurbitella tricuspis	4.4	22.9	3.1	14.3	7.2	5.7	49.3	10.0	7.8	0.0	7.3	6.9	4.3	0.0	14.3	0.0	0.0	0.0	5.3	0.0	15.4	14.3	8.3	0.0	14.3	4.3
Cyclopyxis kahli	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia amphora	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia bidens	0.0	0.0	3.1	4.8	2.2	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3
Difflugia corona	0.0	0.0	0.0	0.0	2.8	1.4	2.9	0.0	0.0	0.0	12.2	7.8	0.0	0.0	0.0	0.0	0.0	4.1	0.0	0.0	0.0	0.0	4.2	0.0	0.0	0.0
Difflugia globula	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia oblonga "bryophila"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia oblonga "distenda"	0.0	2.1	0.0	0.0	0.6	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia oblonga "glans"	7.4	8.3	7.7	14.3	2.2	5.7	0.0	1.7	17.6	2.9	4.9	0.0	0.0	0.0	4.8	6.7	0.0	4.1	5.3	3.6	11.5	0.0	12.5	8.3	14.3	4.3
Difflugia oblonga "lanceolata"	1.5	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia oblonga "linearis"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia oblonga "oblonga"	41.2	14.6	33.8	23.8	21.7	51.4	2.9	23.3	22.5	61.8	0.0	0.9	0.0	0.0	4.8	0.0	0.0	10.2	21.1	14.3	30.8	57.1	16.7	47.9	71.4	30.4
Difflugia oblonga "tenuis"	0.0	8.3	20.0	0.0	5.0	5.7	0.0	41.7	15.7	8.8	14.6	0.0	8.7	1.7	47.6	20.0	12.5	40.8	21.1	0.0	15.4	4.8	50.0	4.2	0.0	8.7
Difflugia protaeiformis "acuminata"	11.8	8.3	7.7	0.0	20.0	8.6	0.0	1.7	0.0	5.9	0.0	0.9	0.0	0.0	0.0	0.0	12.5	0.0	0.0	0.0	19.2	0.0	0.0	20.8	0.0	8.7
Difflugia protaeiformis "amphoralis"	1.5	2.1	0.0	0.0	0.0	0.0	14.5	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia protaeiformis "claviformis"	0.0	0.0	0.0	0.0	1.7	0.0	0.0	0.0	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia urceloata "elongata"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia urceolata "urceolata"	1.5	0.0	3.1	4.8	1.1	0.0	0.0	3.3	0.0	0.0	2.4	0.9	0.0	0.0	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.7
Lagenodifflugia vas	0.0	6.3	0.0	0.0	1.7	5.7	0.0	0.0	7.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.5	0.0	0.0	0.0	7.1	0.0	0.0	0.0	0.0
Lesquereusia spiralis	0.0	0.0	1.5	0.0	0.6	0.0	0.0	0.0	2.9	2.9	2.4	0.0	0.0	0.0	4.8	0.0	0.0	4.1	0.0	0.0	0.0	0.0	0.0	4.2	0.0	0.0
Nebella collaris	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pontigulasia compressa	5.9	0.0	1.5	0.0	2.8	0.0	0.0	1.7	3.9	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0

Arcellacean Data - Surface Samples cont.

Sample	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
Absolute Value	60	84	138	66	204	216	156	156	106	240	126	225	90	165	292	132
Probable Error	27.0	22.9	17.8	25.8	14.7	14.3	16.8	16.8	20.3	13.5	18.7	14.0	22.1	16.3	12.3	18.2
Arcella gibbosa	0.0	7.1	0.0	0.0	0.0	5.6	17.3	0.0	0.0	0.0	7.1	8.0	0.0	0.0	0.0	0.0
Arcella megastoma	0.0	0.0	17.4	0.0	0.0	0.0	0.0	0.0	1.9	0.0	14.3	8.0	0.0	12.7	2.7	0.0
Arcella vulgaris	0.0	14.3	8.7	9.1	0.0	5.6	63.5	3.8	1.9	2.5	7.1	8.0	10.0	21.8	1.4	4.5
Centropyxis aculeata "aculeate"	0.0	28.6	13.0	18.2	10.8	11.1	0.0	0.0	32.1	2.5	0.0	0.0	10.0	0.0	75.3	9.1
Centropyxis aculeata "discoides"	0.0	28.6	4.3	18.2	4.9	0.0	1.9	0.0	11.3	5.0	14.3	32.0	30.0	0.0	20.5	36.4
Centropyxis constricta "aerophila"	0.0	7.1	8.7	0.0	1.0	0.0	0.0	0.0	0.0	7.5	0.0	0.0	0.0	0.0	0.0	22.7
Centropyxis constricta "constricta"	0.0	0.0	0.0	0.0	2.9	0.0	0.0	15.4	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0
Centropyxis constricta "spinosa"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0
Cucurbitella tricuspis	0.0	0.0	0.0	27.3	3.9	5.6	11.5	11.5	1.9	2.5	7.1	12.0	10.0	0.0	0.0	0.0
Cyclopyxis kahli	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.0	40.0	0.0	0.0	0.0
Difflugia amphora	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.5	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia bidens	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia corona	0.0	0.0	4.3	0.0	8.8	0.0	0.0	0.0	7.5	0.0	0.0	0.0	0.0	1.8	0.0	0.0
Difflugia globula	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia oblonga "bryophila"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia oblonga "distenda"	0.0	0.0	0.0	0.0	2.9	0.0	0.0	3.8	0.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0
Difflugia oblonga "glans"	10.0	0.0	4.3	0.0	12.7	0.0	0.0	3.8	0.0	0.0	21.4	4.0	0.0	21.8	0.0	18.2
Difflugia oblonga "lanceolata"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia oblonga "linearis"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia oblonga "oblonga"	30.0	7.1	26.1	9.1	22.5	8.3	3.8	19.2	18.9	40.0	14.3	8.0	0.0	10.9	0.0	0.0
Difflugia oblonga "tenuis"	40.0	0.0	8.7	9.1	10.8	19.4	0.0	3.8	18.9	20.0	14.3	0.0	0.0	5.5	0.0	0.0
Difflugia protaeiformis "acuminata"	20.0	0.0	0.0	9.1	1.0	22.2	1.9	23.1	3.8	7.5	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia protaeiformis "amphoralis"	0.0	7.1	4.3	0.0	1.0	0.0	0.0	3.8	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia protaeiformis "claviformis"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia urceloata "elongata"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia urceolata "urceolata"	0.0	0.0	0.0	0.0	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.9	0.0	4.5
Lagenodifflugia vas	0.0	0.0	0.0	0.0	5.9	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lesquereusia spiralis	0.0	0.0	0.0	0.0	5.9	8.3	0.0	7.7	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0
Nebella collaris	0.0	0.0	0.0	0.0	0.0	5.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pontigulasia compressa	0.0	0.0	0.0	0.0	1.0	8.3	0.0	0.0	0.0	2.5	0.0	0.0	0.0	10.9	0.0	4.5

A2 Arcellacean Data - ALE

Sample	1	3	5	7	11	15	19	23	27	31	35	39	43	47	51	55	59	63	67	71	75	79	83	87	91	95
Absolute Value	112	96	78	108	108	120	198	102	156	30	48	54	72	72	90	30	150	162	90	60	120	126	90	120	90	126
Probable Error	19.8	21.4	23.7	20.2	20.2	19.1	14.9	20.7	16.8	38.2	30.2	28.5	24.7	24.7	22.1	38.2	17.1	16.5	22.1	27.0	19.1	18.7	22.1	19.1	22.1	18.7
Arcella gibbosa	0.9	12.5	7.7	0.0	5.6	5.0	15.2	5.9	3.8	0.0	0.0	0.0	0.0	16.7	6.7	0.0	0.0	0.0	6.7	0.0	5.0	4.8	0.0	0.0	0.0	4.8
Arcella megastoma	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Arcella vulgaris	2.7	6.3	0.0	11.1	5.6	0.0	0.0	5.9	0.0	20.0	0.0	0.0	8.3	8.3	6.7	20.0	4.0	11.1	13.3	0.0	5.0	9.5	6.7	0.0	0.0	14.3
Centropyxis aculeata "aculeata"	4.5	6.3	15.4	5.6	0.0	10.0	12.1	0.0	3.8	20.0	0.0	11.1	8.3	0.0	26.7	20.0	8.0	3.7	6.7	0.0	10.0	0.0	0.0	10.0	0.0	0.0
Centropyxis aculeata "discoides"	0.0	12.5	15.4	0.0	22.2	5.0	6.1	11.8	7.7	0.0	0.0	0.0	8.3	0.0	0.0	20.0	8.0	7.4	6.7	40.0	10.0	9.5	13.3	0.0	6.7	9.5
Centropyxis constricta "aerophila"	7.1	6.3	7.7	0.0	0.0	5.0	3.0	5.9	3.8	0.0	12.5	22.2	8.3	8.3	0.0	0.0	12.0	14.8	20.0	10.0	10.0	19.0	20.0	5.0	0.0	14.3
Centropyxis constricta "constricta"	1.8	12.5	7.7	0.0	0.0	15.0	0.0	5.9	7.7	0.0	25.0	0.0	0.0	16.7	6.7	20.0	20.0	0.0	6.7	0.0	10.0	9.5	0.0	0.0	13.3	4.8
Centropyxis constricta "spinosa"	0.0	0.0	0.0	5.6	0.0	0.0	0.0	5.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.7	0.0
Cucurbitella tricuspis	4.5	6.3	15.4	33.3	27.8	25.0	18.2	11.8	23.1	0.0	37.5	22.2	25.0	8.3	0.0	20.0	20.0	29.6	20.0	30.0	35.0	19.0	26.7	35.0	33.3	23.8
Cyclopyxis kahli	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	7.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diffugia amphora	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia bidens	0.0	6.3	0.0	0.0	0.0	0.0	3.0	5.9	3.8	0.0	0.0	0.0	0.0	0.0	13.3	0.0	0.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0
Difflugia corona	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.8
Difflugia distenda	10.7	6.3	0.0	11.1	16.7	10.0	6.1	0.0	3.8	0.0	12.5	0.0	0.0	0.0	6.7	0.0	4.0	3.7	13.3	0.0	0.0	9.5	0.0	10.0	0.0	0.0
Difflugia oblonga "glans"	35.7	6.3	7.7	16.7	11.1	10.0	6.1	5.9	15.4	20.0	0.0	33.3	8.3	25.0	13.3	0.0	12.0	7.4	0.0	10.0	10.0	0.0	6.7	10.0	13.3	4.8
Difflugia oblonga "lanceolata"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia oblonga "linearis"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia oblonga "oblonga"	10.7	6.3	23.1	11.1	5.6	10.0	18.2	11.8	0.0	40.0	12.5	0.0	25.0	8.3	13.3	0.0	8.0	7.4	0.0	0.0	0.0	9.5	13.3	20.0	26.7	9.5
Difflugia oblonga "tenuis"	8.9	0.0	0.0	0.0	0.0	5.0	0.0	0.0	3.8	0.0	0.0	0.0	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.8
Difflugia oblonga "triagularis"	0.0	0.0	0.0	0.0	0.0	0.0	9.1	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia protaeiformis "acuminata"	3.6	12.5	0.0	5.6	0.0	0.0	3.0	5.9	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	0.0	0.0	0.0	9.5	0.0	0.0	0.0	4.8
Difflugia protaeiformis "amphoralis"	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia protaeiformis "claviformis"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia urceolata "urceolata"	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lagenodifflugia vas	0.9	0.0	0.0	0.0	5.6	0.0	0.0	0.0	0.0	0.0	0.0	11.1	0.0	8.3	0.0	0.0	0.0	0.0	0.0	10.0	0.0	0.0	13.3	10.0	0.0	0.0
Lesquereusia spiralis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pontigulasia compressa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.6	7.7	0.0	0.0	0.0	0.0	0.0	6.7	0.0	0.0	0.0	6.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Arcellacean Data - ALE cont.

Sample	100	106	110	116	119	126	129	136	138	146	149	157	159	166	169	173	178	186	189	193	199	206	210	217	219	225
Absolute Value	144	270	135	265	110	263	150	160	115	180	105	166	155	247	190	132	70	146	135	120	36	85	60	231	130	173
Probable Error	17.5	5.9	13.1	5.9	12.6	5.9	12.1	7.6	11.7	7.2	20.4	7.5	10.9	6.1	10.5	8.4	10.3	8.0	10.0	8.8	34.9	10.5	9.5	6.4	9.3	7.3
Arcella gibbosa	0.0	5.0	7.4	0.0	0.0	0.0	0.0	12.2	17.4	0.0	8.6	0.0	9.7	0.0	13.2	0.0	7.1	0.0	0.0	0.0	8.3	0.0	8.3	0.0	0.0	7.8
Arcella megastoma	8.3	27.0	0.0	0.0	0.0	17.5	0.0	0.0	0.0	0.0	0.0	13.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.8	0.0	15.4	0.0	0.0	0.0	0.0
Arcella vulgaris	4.2	1.5	3.7	0.0	4.5	0.0	0.0	0.0	4.3	0.6	2.9	3.6	3.2	0.4	7.9	2.3	0.0	2.1	0.0	3.3	8.3	8.3	16.7	3.9	0.0	0.0
Centropyxis aculeata "aculeata"	6.3	16.7	11.1	0.0	9.1	10.3	0.0	11.9	0.0	0.0	2.9	0.0	9.7	0.0	0.0	0.0	7.1	12.4	3.7	7.5	8.3	24.9	0.0	18.2	7.7	11.0
Centropyxis aculeata "discoides"	2.1	8.1	0.0	0.0	27.3	24.3	6.7	0.0	13.0	0.0	0.0	0.0	9.7	0.0	7.9	0.0	21.4	37.1	14.8	25.8	8.3	14.2	8.3	12.1	7.7	12.1
Centropyxis constricta "aerophila"	16.7	0.0	18.5	25.5	9.1	21.1	13.3	14.1	0.0	38.4	8.6	0.0	3.2	0.0	5.3	12.5	7.1	12.4	14.8	6.3	8.3	10.7	8.3	9.8	7.7	7.8
Centropyxis constricta "constricta"	4.2	7.2	18.5	20.4	4.5	0.0	0.0	0.0	8.7	8.4	2.9	0.0	6.5	16.4	10.5	19.3	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7	7.8
Centropyxis constricta "spinosa"	2.1	0.0	0.0	1.1	9.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	0.0	0.0	3.4	0.0	0.0	0.0	0.0	8.3	0.0	0.0	0.0	0.0	0.0
Cucurbitella tricuspis	18.8	19.4	7.4	35.7	0.0	5.7	6.7	0.0	4.3	12.5	31.4	0.0	6.5	7.9	13.2	0.0	0.0	0.0	7.4	17.5	25.0	21.3	8.3	17.6	11.5	7.8
Cyclopyxis kahli	2.1	0.0	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	1.7
Diffugia amphora	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.3	0.0	0.0
Difflugia bidens	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia corona	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3	3.3	2.9	0.0	6.5	7.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7	1.7
Difflugia distenda	6.3	0.0	11.1	0.0	0.0	0.0	13.3	0.0	4.3	0.0	0.0	17.2	3.2	0.0	0.0	0.0	14.3	24.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6
Difflugia oblonga "glans"	10.4	6.7	3.7	8.3	0.0	0.0	6.7	9.4	4.3	0.0	8.6	57.8	16.1	0.0	23.7	13.6	7.1	0.0	3.7	5.0	0.0	0.0	25.0	0.0	15.4	7.5
Difflugia oblonga "lanceolata"	2.1	0.0	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.5	5.2
Difflugia oblonga "linearis"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	4.3
Difflugia oblonga "oblonga"	4.2	8.3	7.4	9.1	4.5	10.3	26.7	31.9	13.0	5.8	14.3	8.1	16.1	23.7	10.5	17.0	28.6	11.3	11.1	6.3	25.0	5.3	16.7	5.9	0.0	10.4
Difflugia oblonga "tenuis"	2.1	0.0	0.0	0.0	4.5	0.0	3.3	0.0	0.0	0.0	11.4	0.0	3.2	11.5	2.6	14.8	0.0	0.0	7.4	0.0	0.0	0.0	8.3	0.0	0.0	2.6
Difflugia oblonga "triagularis"	2.1	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia protaeiformis "acuminata"	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	0.0	0.0	12.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.3	0.0	0.0
Difflugia protaeiformis "amphoralis"	4.2	0.0	0.0	0.0	0.0	6.8	6.7	0.0	13.0	18.4	2.9	0.0	0.0	12.8	2.6	0.0	0.0	0.0	22.2	7.5	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia protaeiformis "claviformis"	0.0	0.0	3.7	0.0	0.0	0.0	0.0	12.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	0.0	0.0	0.0	0.0	0.0	3.8	3.5
Difflugia urceolata "urceolata"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lagenodifflugia vas	0.0	0.0	0.0	0.0	4.5	0.0	10.0	0.0	4.3	12.5	0.0	0.0	3.2	0.0	0.0	0.0	0.0	0.0	3.7	0.0	0.0	0.0	0.0	0.0	3.8	2.6
Lesquereusia spiralis	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pontigulasia compressa	0.0	0.0	3.7	0.0	13.6	4.0	3.3	8.4	8.7	0.0	0.0	0.0	0.0	7.3	2.6	0.0	0.0	0.0	7.4	0.0	0.0	0.0	0.0	0.0	7.7	3.5

Arcellacean Data - ALE cont.

Sample	229	233	238	241	245	247	250	252	254	256	258	262	265	267	270	271	273	275	278	281	284	287	290	292	295	297
Absolute Value	90	121	55	205	184	101	180	127	174	77	100	143	167	94	65	82	150	130	115	110	146	143	75	158	141	106
Probable Error	9.1	8.8	8.9	6.7	7.1	9.6	15.6	8.6	7.3	11.0	8.5	8.1	7.5	9.9	8.3	10.7	7.9	8.5	8.2	9.2	8.0	8.1	8.0	7.7	8.1	9.4
Arcella gibbosa	0.0	8.7	9.1	0.0	4.9	0.0	0.0	0.0	0.0	0.0	5.0	0.0	0.9	0.0	7.7	0.0	2.0	0.0	0.0	0.0	7.2	0.0	13.3	0.0	9.6	0.0
Arcella megastoma	0.0	0.0	0.0	0.0	1.6	4.0	0.0	0.8	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.7	0.0
Arcella vulgaris	0.0	0.0	0.0	0.5	5.4	5.9	10.0	5.5	5.2	1.3	0.0	0.7	0.6	0.0	0.0	0.0	0.0	0.0	0.0	2.7	0.7	2.1	0.0	3.8	2.8	2.8
Centropyxis aculeata "aculeata"	22.2	5.8	0.0	1.5	0.8	1.5	1.7	18.9	10.3	5.2	5.0	6.3	2.4	10.6	7.7	26.8	18.1	21.5	8.7	19.1	12.3	7.0	0.0	3.8	4.3	2.8
Centropyxis aculeata "discoides"	11.1	14.9	18.2	2.0	9.8	5.9	18.3	15.0	14.4	3.9	10.0	4.2	9.6	9.6	15.4	22.0	20.1	20.8	4.3	20.0	8.2	2.8	6.7	6.3	6.4	6.6
Centropyxis constricta "aerophila"	11.1	28.6	45.5	12.5	13.1	7.4	13.3	13.0	8.6	11.8	5.0	3.1	13.5	1.6	23.1	11.0	10.0	10.4	8.7	12.3	4.1	3.2	0.0	4.7	3.2	7.1
Centropyxis constricta "constricta"	5.6	7.5	0.0	15.4	11.4	3.0	1.7	13.0	10.3	5.9	0.0	6.3	12.6	3.2	0.0	7.3	12.0	6.9	17.4	6.8	13.4	16.8	0.0	6.6	5.3	5.7
Centropyxis constricta "spinosa"	0.0	0.0	0.0	0.0	4.9	0.0	6.7	0.0	7.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	3.1	1.1	0.0	0.0	0.0	0.0
Cucurbitella tricuspis	16.7	16.2	18.2	10.3	13.1	8.9	25.0	14.2	17.2	15.7	25.0	10.5	20.7	11.2	38.5	9.1	16.1	19.6	8.7	16.4	6.2	6.3	20.0	7.6	14.9	12.8
Cyclopyxis kahli	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0
Diffugia amphora	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	0.0	0.0
Difflugia bidens	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia corona	0.0	0.0	0.0	2.9	1.6	0.0	0.0	0.0	0.0	0.0	0.0	3.1	0.0	1.6	0.0	0.0	0.0	0.0	4.3	0.0	2.1	0.0	0.0	3.8	1.1	0.0
Difflugia distenda	5.6	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.0
Difflugia oblonga "glans"	5.6	0.8	0.0	11.7	8.7	4.0	5.0	3.1	2.3	9.2	5.0	7.0	1.8	12.8	7.7	3.7	2.7	2.3	13.0	3.6	4.8	7.0	6.7	8.2	5.0	20.9
Difflugia oblonga "lanceolata"	0.0	0.0	0.0	0.7	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	0.0	0.0
Difflugia oblonga "linearis"	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0
Difflugia oblonga "oblonga"	16.7	13.7	9.1	12.5	12.3	31.2	8.3	13.0	12.1	33.3	20.0	18.9	9.0	20.7	0.0	12.8	8.0	10.4	13.0	8.2	15.4	13.7	26.7	17.1	13.8	15.6
Difflugia oblonga "tenuis"	5.6	2.5	0.0	10.3	9.0	20.8	3.3	3.5	0.9	3.9	5.0	17.8	18.9	20.7	0.0	7.3	6.0	8.1	13.0	10.9	5.1	16.8	6.7	17.1	12.8	22.7
Difflugia oblonga "triagularis"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0
Difflugia protaeiformis "acuminata"	0.0	0.0	0.0	8.8	2.5	1.5	1.7	0.0	0.0	0.0	0.0	16.8	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.4	0.0	5.7	5.3	2.8
Difflugia protaeiformis "amphoralis"	0.0	0.0	0.0	5.9	0.8	0.0	3.3	0.0	7.8	0.0	15.0	5.2	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.2	6.3	13.3	0.0	5.3	0.0
Difflugia protaeiformis "claviformis"	0.0	0.0	0.0	4.4	0.0	0.0	0.0	0.0	0.0	7.8	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	4.3	0.0	2.1	6.3	0.0	3.8	0.0	0.0
Difflugia urceolata "urceolata"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lagenodifflugia vas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	0.0
Lesquereusia spiralis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pontigulasia compressa	0.0	0.0	0.0	0.0	0.0	3.0	1.7	0.0	2.6	0.0	5.0	0.0	1.8	6.4	0.0	0.0	1.0	0.0	4.3	0.0	5.1	2.1	6.7	3.8	2.1	0.0

Arcellacean Data - ALE cont.

Sample	299	301	302	304	305	307	309	310	312	313	315	317	318	320	321	323	325	327	329	333	335	337	339	341	343	344
Absolute Value	171	83	155	217	168	169	220	117	108	128	127	101	160	101	118	194	174	180	155	102	123	81	83	91	88	94
Probable Error	16.0	10.6	7.8	6.6	7.4	7.4	7.8	8.9	9.3	8.5	8.6	9.6	7.7	9.6	8.9	6.9	7.3	7.6	7.8	9.6	8.7	10.8	10.6	10.1	10.3	9.9
Arcella gibbosa	1.8	0.0	0.0	0.7	0.0	0.0	2.3	0.0	0.0	0.0	1.2	0.0	3.1	0.0	0.0	1.5	0.0	2.8	0.0	0.0	4.9	0.0	0.0	0.0	0.0	0.0
Arcella megastoma	0.0	0.0	0.0	1.8	1.8	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	3.4	1.5	2.3	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Arcella vulgaris	5.3	1.2	1.9	2.8	4.5	5.3	0.0	5.1	3.7	2.4	3.2	4.0	6.3	7.0	10.2	5.2	5.2	2.8	4.5	3.9	2.4	1.2	0.0	0.0	1.1	0.0
Centropyxis aculeata "aculeata"	7.0	1.2	16.2	9.7	4.2	5.9	2.3	10.3	2.8	3.1	0.8	1.0	6.3	12.9	16.1	12.4	15.5	2.8	20.1	12.7	7.3	7.5	7.2	9.9	3.4	0.0
Centropyxis aculeata "discoides"	3.5	21.7	20.1	15.7	0.6	1.8	0.0	1.3	2.8	3.1	4.7	8.9	9.4	11.9	13.6	12.4	10.9	5.6	13.6	5.9	2.4	0.0	15.7	27.6	4.6	6.4
Centropyxis constricta "aerophila"	8.8	23.5	16.5	11.1	2.7	3.6	9.1	1.3	0.0	0.0	5.9	4.5	6.3	3.0	10.2	8.5	13.8	13.9	18.4	4.4	6.1	7.5	14.5	9.9	3.4	3.2
Centropyxis constricta "constricta"	3.5	25.3	10.7	9.0	6.3	5.3	13.6	2.6	0.0	1.2	13.0	5.9	3.1	7.5	2.5	15.5	12.9	8.3	12.6	7.4	7.3	3.7	9.0	5.0	3.4	3.2
Centropyxis constricta "spinosa"	0.0	0.0	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	2.3	1.7	0.0	0.0	0.0	0.0	0.0	5.4	3.3	0.0	0.0
Cucurbitella tricuspis	14.0	12.7	17.5	17.3	8.0	7.1	4.5	6.4	5.6	8.2	9.5	7.4	15.6	10.4	19.1	20.1	19.8	11.1	15.5	25.0	11.0	11.2	21.7	24.9	24.0	20.7
Cyclopyxis kahli	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	0.0
Diffugia amphora	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	3.7	0.0	0.0	0.0	0.0
Difflugia bidens	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia corona	3.5	0.0	0.0	0.0	0.0	0.0	0.0	3.8	2.8	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	4.8
Difflugia distenda	3.5	0.0	0.0	4.2	0.0	0.0	11.4	0.0	0.0	0.0	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	0.0	0.0	0.0	0.0	0.0	8.0
Difflugia oblonga "glans"	7.0	3.6	4.5	2.8	4.2	7.1	9.1	5.1	22.3	26.7	16.6	31.2	6.3	17.9	5.9	2.1	5.7	11.1	5.8	15.7	15.5	7.5	12.0	4.4	24.0	13.8
Difflugia oblonga "lanceolata"	0.0	0.0	0.0	0.0	0.0	1.8	0.0	3.8	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.0	1.6
Difflugia oblonga "linearis"	0.0	0.0	0.0	0.0	0.0	1.8	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia oblonga "oblonga"	17.5	5.4	6.8	15.2	20.5	18.7	29.5	21.8	25.1	29.4	24.9	23.8	31.3	19.4	10.2	8.5	7.8	19.4	5.8	10.3	14.7	33.5	12.7	8.3	24.0	12.8
Difflugia oblonga "tenuis"	3.5	5.4	1.9	3.5	17.9	12.5	4.5	15.4	26.5	14.1	9.5	10.4	6.3	7.5	8.9	7.0	4.3	11.1	2.9	2.9	9.8	16.8	0.0	1.7	3.4	11.2
Difflugia oblonga "triagularis"	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia protaeiformis "acuminata"	5.3	0.0	0.0	2.1	15.2	13.4	4.5	11.5	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	4.9	3.7	1.8	0.0	0.0	9.6
Difflugia protaeiformis "amphoralis"	8.8	0.0	0.0	0.0	5.4	6.2	2.3	6.4	0.0	0.0	1.2	3.0	6.3	1.5	0.0	2.3	0.0	5.6	0.0	2.9	2.4	0.0	0.0	0.0	1.7	0.0
Difflugia protaeiformis "claviformis"	0.0	0.0	0.0	0.0	5.4	0.9	0.0	3.8	5.6	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia urceolata "urceolata"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lagenodifflugia vas	5.3	0.0	0.0	4.2	0.0	3.6	2.3	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	0.0	0.0	1.7	3.2
Lesquereusia spiralis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pontigulasia compressa	0.0	0.0	0.0	0.0	3.6	2.7	4.5	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	5.6	0.0	0.0	4.9	0.0	0.0	1.7	3.4	1.6

Arcellacean Data - ALE cont.

Sample	345	347	349	399	449	499	549	599	649	699	749	799	849	899	949	999	1049	1099	1149	1199	1249	1299	1349	1368
Absolute Value	123	127	201	153	249	344	306	356	292	396	356	333	528	352	318	321	327	336	387	300	288	303	438	288
Probable Error	8.7	8.6	14.8	16.9	13.3	11.3	12.0	11.1	12.3	10.5	11.1	11.5	9.1	11.2	11.7	11.7	11.6	11.4	10.6	12.1	12.3	12.0	10.0	12.3
Arcella gibbosa	0.0	0.0	1.5	0.0	2.4	3.5	0.0	0.0	0.0	0.0	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Arcella megastoma	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	0.0	0.0	0.0	0.0	5.6	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0
Arcella vulgaris	2.4	3.1	3.0	0.0	0.0	3.5	2.0	0.0	2.7	6.8	0.0	0.0	1.7	2.3	0.0	2.8	0.0	0.0	0.0	3.0	8.3	5.0	8.2	6.3
Centropyxis aculeata "aculeata"	13.1	15.0	3.0	9.8	0.0	7.0	4.6	3.4	0.0	2.3	0.0	0.0	1.7	0.0	3.8	0.0	3.7	3.6	2.3	0.0	4.2	6.9	0.0	8.3
Centropyxis aculeata "discoides"	14.7	17.3	3.0	3.9	0.0	0.0	7.8	5.6	8.2	6.8	0.0	0.0	1.7	2.3	0.0	0.0	0.0	0.0	2.3	3.0	8.3	3.0	8.2	10.4
Centropyxis constricta "aerophila"	17.1	13.0	11.9	13.7	3.6	0.0	7.8	3.4	5.5	7.6	0.0	2.7	2.3	4.5	0.0	5.6	1.8	7.1	4.7	9.0	4.2	5.9	0.0	18.8
Centropyxis constricta "constricta"	17.1	20.1	4.5	7.8	0.0	8.1	2.0	0.0	0.0	6.1	6.7	2.7	5.1	9.1	1.9	0.0	11.0	7.1	7.0	3.0	4.2	7.9	0.0	6.3
Centropyxis constricta "spinosa"	1.2	1.2	0.0	0.0	0.0	3.5	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	1.9	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0
Cucurbitella tricuspis	22.0	17.7	16.4	9.8	18.1	10.5	5.9	0.0	16.4	20.5	19.1	0.0	6.8	6.8	17.0	14.0	13.8	10.7	16.3	15.0	16.7	8.9	16.4	12.5
Cyclopyxis kahli	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6	0.0	0.0	0.0	0.0	0.0	0.0
Diffugia amphora	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	0.0	5.3	1.1	0.0	0.0	0.0	1.9	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia bidens	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia corona	0.0	0.0	1.5	0.0	0.0	0.0	3.9	0.0	9.6	0.0	0.0	0.0	5.1	4.5	0.0	2.8	3.7	7.1	4.7	3.0	0.0	0.0	0.0	0.0
Difflugia distenda	0.0	0.0	3.0	5.9	8.4	0.0	0.0	3.4	0.0	2.3	2.2	0.0	0.0	6.8	0.0	2.8	1.8	0.0	0.0	0.0	4.2	5.9	0.0	0.0
Difflugia oblonga "glans"	2.4	1.2	11.9	3.9	6.0	10.5	5.9	3.4	8.2	0.0	20.2	5.4	5.1	0.0	3.8	11.2	11.0	3.6	11.6	12.0	12.5	20.8	12.3	6.3
Difflugia oblonga "lanceolata"	0.0	0.0	0.0	0.0	2.4	0.0	2.0	0.0	0.0	0.0	0.0	0.0	1.7	0.0	0.0	5.6	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0
Difflugia oblonga "linearis"	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia oblonga "oblonga"	6.1	8.3	16.4	33.3	27.7	17.4	27.5	40.4	24.7	22.7	20.2	62.2	47.7	20.5	34.0	22.4	41.3	25.0	23.3	27.0	16.7	17.8	28.8	18.8
Difflugia oblonga "tenuis"	3.7	2.4	7.5	2.0	0.0	10.5	2.0	3.4	0.0	7.6	12.4	5.4	6.8	15.9	15.1	8.4	3.7	21.4	9.3	4.0	8.3	7.9	0.0	12.5
Difflugia oblonga "triagularis"	0.0	0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia protaeiformis "acuminata"	0.0	0.0	7.5	3.9	7.2	3.5	2.0	7.9	5.5	0.0	1.1	0.0	5.7	2.3	7.5	7.5	0.0	0.0	4.7	6.0	4.2	0.0	0.0	0.0
Difflugia protaeiformis "amphoralis"	0.0	0.0	1.5	0.0	4.8	9.3	13.7	0.0	6.8	2.3	1.1	0.0	0.0	4.5	1.9	5.6	2.8	7.1	2.3	2.0	0.0	0.0	12.3	0.0
Difflugia protaeiformis "claviformis"	0.0	0.0	0.0	0.0	9.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difflugia urceolata "urceolata"	0.0	0.0	0.0	0.0	0.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lagenodifflugia vas	0.0	0.0	1.5	3.9	3.6	3.5	3.9	13.5	9.6	0.0	7.9	10.8	6.8	4.5	7.5	5.6	3.7	3.6	2.3	3.0	4.2	6.9	13.7	0.0
Lesquereusia spiralis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.4	0.0	2.3	0.0	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pontigulasia compressa	0.0	0.0	6.0	0.0	3.6	5.8	9.2	0.0	2.7	3.0	4.5	8.1	1.7	6.8	1.9	0.0	0.0	0.0	4.7	10.0	4.2	0.0	0.0	0.0

Appendix B - Dating

B1 Radiocarbon Dates - ALE

Depth (cm)	Unmodeled (BP)		Error	Modeled (BP)	
	From	To	±	From	To
18.9	299	-4	28	301	-2
42.1	724	561	38	722	561
67.7	1229	1010	29	1230	1013
87.1	1692	1537	23	1690	1533
111.2	1893	1737	25	1877	1738
125.8	1925	1820	24	1926	1827
145.1	2143	1995	31	2143	1992

B2 210 Pb Dates - ALE

Depth (cm)	σ (Error)	Date
0	-	2010.70
1	-	2009.22
2	-	2006.09
3	-	2002.92
4	-	1999.66
5	0.20	1996.23
6	0.45	1992.39
7	0.74	1987.95
8	1.00	1984.25
9	1.28	1980.52
10	1.59	1976.80
11	1.98	1972.63
12	2.42	1968.50
13	2.92	1964.39
14	3.47	1960.40
15	4.14	1956.14
16	4.77	1952.63
17	5.55	1948.69
18	6.63	1944.12
19	7.82	1939.54
20	9.49	1934.12
21	11.18	1929.45
22	13.33	1924.33
23	15.29	1920.30
24	19.22	1913.44
25	24.39	1906.22
26	31.64	1898.28
27	40.63	1890.56
28	58.12	1879.39
29	74.99	1871.40
30	134.32	1853.04
31	166.71	1846.33

32	206.46	1839.67
33	986.87	1789.73

Appendix C - Grain Size Data

C1 Grain Size Data - ALE

Depth	Size fraction (microns)																											
	0.38	0.41	0.45	0.50	0.54	0.60	0.66	0.72	0.79	0.87	0.95	1.05	1.15	1.26	1.38	1.52	1.67	1.83	2.01	2.21	2.42	2.66	2.92	3.21	3.52	3.86	4.24	4.66
1	0.10	0.17	0.25	0.36	0.45	0.53	0.61	0.68	0.75	0.81	0.85	0.90	0.94	0.98	1.02	1.06	1.10	1.15	1.20	1.26	1.33	1.41	1.49	1.58	1.67	1.77	1.86	1.95
3	0.09	0.16	0.24	0.34	0.43	0.50	0.57	0.63	0.69	0.74	0.78	0.81	0.85	0.88	0.91	0.93	0.97	1.00	1.05	1.10	1.15	1.22	1.29	1.36	1.45	1.53	1.61	1.70
5	0.09	0.17	0.25	0.35	0.44	0.52	0.59	0.66	0.73	0.78	0.82	0.87	0.90	0.94	0.97	1.01	1.04	1.09	1.13	1.18	1.24	1.30	1.36	1.43	1.51	1.58	1.65	1.72
7	0.10	0.18	0.26	0.38	0.47	0.55	0.63	0.70	0.77	0.82	0.86	0.90	0.94	0.97	1.00	1.03	1.06	1.10	1.14	1.19	1.24	1.30	1.37	1.45	1.53	1.62	1.70	1.78
9	0.09	0.15	0.23	0.32	0.40	0.47	0.54	0.60	0.66	0.70	0.74	0.78	0.81	0.84	0.87	0.90	0.94	0.98	1.03	1.08	1.14	1.21	1.29	1.37	1.45	1.53	1.61	1.69
11	0.10	0.17	0.25	0.36	0.45	0.52	0.59	0.66	0.72	0.78	0.82	0.85	0.89	0.92	0.95	0.98	1.02	1.06	1.11	1.16	1.22	1.28	1.36	1.44	1.52	1.60	1.68	1.76
13	0.10	0.17	0.26	0.37	0.46	0.54	0.61	0.68	0.74	0.80	0.84	0.87	0.91	0.93	0.96	0.98	1.01	1.04	1.07	1.11	1.15	1.20	1.26	1.33	1.40	1.48	1.56	1.64
15	0.08	0.15	0.22	0.31	0.39	0.46	0.52	0.59	0.64	0.69	0.74	0.78	0.81	0.85	0.88	0.92	0.96	1.01	1.06	1.12	1.18	1.25	1.33	1.42	1.51	1.60	1.69	1.78
17	0.09	0.16	0.23	0.33	0.41	0.49	0.56	0.62	0.68	0.74	0.78	0.82	0.86	0.89	0.92	0.96	0.99	1.03	1.08	1.13	1.18	1.25	1.32	1.40	1.48	1.56	1.65	1.74
19	0.09	0.15	0.23	0.33	0.41	0.48	0.55	0.62	0.68	0.73	0.78	0.82	0.86	0.90	0.93	0.97	1.01	1.05	1.10	1.15	1.22	1.29	1.37	1.45	1.54	1.64	1.74	1.84
21	0.09	0.16	0.24	0.34	0.42	0.49	0.56	0.62	0.67	0.72	0.75	0.78	0.81	0.84	0.86	0.89	0.93	0.97	1.02	1.08	1.14	1.21	1.29	1.38	1.47	1.56	1.65	1.74
23	0.08	0.14	0.21	0.30	0.38	0.45	0.51	0.57	0.63	0.67	0.72	0.75	0.79	0.82	0.85	0.88	0.92	0.96	1.00	1.05	1.10	1.16	1.23	1.30	1.37	1.46	1.54	1.62
25	0.09	0.16	0.24	0.34	0.42	0.50	0.56	0.63	0.69	0.74	0.78	0.82	0.85	0.88	0.91	0.95	0.98	1.02	1.07	1.12	1.18	1.24	1.31	1.39	1.47	1.55	1.63	1.71
28	0.09	0.16	0.23	0.33	0.41	0.48	0.55	0.62	0.68	0.73	0.77	0.81	0.85	0.88	0.92	0.95	0.99	1.04	1.08	1.14	1.20	1.26	1.33	1.41	1.49	1.57	1.65	1.73
31	0.09	0.17	0.24	0.35	0.44	0.52	0.59	0.66	0.73	0.78	0.83	0.87	0.92	0.95	0.98	1.02	1.05	1.09	1.13	1.18	1.23	1.29	1.36	1.43	1.50	1.58	1.66	1.74
33	0.09	0.16	0.23	0.33	0.41	0.49	0.55	0.62	0.68	0.73	0.78	0.82	0.86	0.89	0.92	0.96	0.99	1.03	1.08	1.13	1.19	1.25	1.32	1.39	1.47	1.55	1.64	1.72
35	0.09	0.16	0.23	0.33	0.42	0.49	0.56	0.63	0.69	0.74	0.79	0.83	0.87	0.90	0.94	0.97	1.01	1.06	1.11	1.16	1.22	1.29	1.37	1.44	1.53	1.61	1.69	1.77
37	0.08	0.15	0.22	0.31	0.39	0.46	0.52	0.59	0.64	0.69	0.73	0.77	0.81	0.84	0.87	0.90	0.93	0.97	1.01	1.06	1.12	1.17	1.24	1.31	1.39	1.47	1.55	1.64
40	0.09	0.16	0.23	0.33	0.42	0.49	0.56	0.63	0.69	0.74	0.79	0.83	0.86	0.90	0.93	0.97	1.01	1.05	1.10	1.15	1.21	1.27	1.34	1.42	1.50	1.58	1.66	1.74
43	0.09	0.15	0.23	0.32	0.40	0.48	0.55	0.61	0.67	0.73	0.77	0.81	0.85	0.89	0.92	0.95	0.99	1.03	1.07	1.12	1.18	1.23	1.30	1.37	1.44	1.52	1.59	1.67
45	0.08	0.14	0.21	0.30	0.37	0.44	0.50	0.56	0.62	0.67	0.71	0.74	0.78	0.82	0.85	0.88	0.92	0.96	1.01	1.06	1.12	1.18	1.25	1.33	1.40	1.48	1.56	1.64
48	0.09	0.15	0.23	0.32	0.40	0.48	0.54	0.61	0.67	0.72	0.76	0.80	0.83	0.87	0.90	0.93	0.97	1.01	1.06	1.11	1.17	1.23	1.29	1.37	1.44	1.52	1.59	1.67
51	0.09	0.16	0.23	0.33	0.42	0.49	0.56	0.62	0.68	0.73	0.77	0.80	0.84	0.87	0.90	0.93	0.97	1.02	1.07	1.13	1.20	1.27	1.36	1.45	1.55	1.65	1.74	1.84
54	0.09	0.17	0.24	0.35	0.43	0.51	0.58	0.65	0.70	0.75	0.79	0.83	0.86	0.89	0.92	0.95	0.99	1.03	1.08	1.13	1.19	1.26	1.34	1.42	1.51	1.60	1.69	1.78
57	0.09	0.15	0.23	0.32	0.41	0.48	0.55	0.62	0.68	0.73	0.77	0.81	0.85	0.88	0.92	0.95	0.99	1.03	1.08	1.13	1.19	1.25	1.32	1.40	1.48	1.57	1.65	1.73
59	0.09	0.17	0.24	0.35	0.44	0.52	0.59	0.67	0.73	0.79	0.84	0.88	0.92	0.96	0.99	1.03	1.06	1.10	1.15	1.19	1.24	1.30	1.36	1.43	1.50	1.57	1.65	1.72
62	0.09	0.16	0.24	0.34	0.43	0.51	0.58	0.65	0.71	0.77	0.81	0.86	0.90	0.93	0.96	0.99	1.03	1.07	1.11	1.15	1.20	1.25	1.31	1.38	1.45	1.52	1.60	1.67
65	0.09	0.16	0.24	0.34	0.42	0.50	0.57	0.64	0.70	0.76	0.81	0.85	0.89	0.93	0.97	1.00	1.05	1.09	1.14	1.19	1.25	1.31	1.38	1.45	1.52	1.60	1.67	1.74
67	0.09	0.16	0.23	0.33	0.41	0.49	0.56	0.62	0.68	0.73	0.77	0.81	0.84	0.87	0.90	0.94	0.97	1.01	1.06	1.11	1.18	1.25	1.32	1.41	1.50	1.59	1.68	1.78
69	0.09	0.16	0.23	0.33	0.42	0.49	0.56	0.63	0.69	0.73	0.78	0.81	0.85	0.88	0.91	0.94	0.98	1.02	1.06	1.12	1.18	1.25	1.32	1.40	1.49	1.58	1.67	1.76
71	0.09	0.16	0.23	0.34	0.42	0.50	0.57	0.64	0.70	0.76	0.80	0.85	0.89	0.93	0.96	1.00	1.04	1.09	1.13	1.19	1.24	1.31	1.37	1.44	1.52	1.59	1.67	1.74
73	0.09	0.16	0.24	0.34	0.43	0.50	0.57	0.64	0.71	0.76	0.81	0.85	0.89	0.92	0.96	0.99	1.03	1.07	1.12	1.17	1.23	1.29	1.36	1.43	1.51	1.59	1.67	1.75
75	0.09	0.16	0.24	0.34	0.42	0.50	0.57	0.64	0.70	0.75	0.79	0.83	0.86	0.90	0.93	0.96	1.00	1.05	1.10	1.15	1.22	1.29	1.37	1.45	1.54	1.63	1.72	1.81
77	0.09	0.17	0.25	0.35	0.44	0.52	0.60	0.67	0.74	0.79	0.84	0.89	0.93	0.97	1.01	1.05	1.10	1.14	1.19	1.25	1.31	1.37	1.44	1.52	1.59	1.66	1.74	1.80
79	0.08	0.14	0.21	0.30	0.37	0.44	0.50	0.56	0.62	0.67	0.71	0.74	0.78	0.81	0.85	0.88	0.92	0.96	1.01	1.06	1.12	1.19	1.26	1.34	1.42	1.50	1.59	1.67
82	0.07	0.13	0.19	0.27	0.33	0.39	0.44	0.49	0.54	0.58	0.61	0.63	0.66	0.68	0.70	0.73	0.76	0.79	0.83	0.87	0.92	0.97	1.03	1.10	1.17	1.24	1.31	1.38
85	0.07	0.13	0.19	0.28	0.35	0.41	0.47	0.52	0.58	0.62	0.66	0.69	0.73	0.76	0.79	0.82	0.85	0.89	0.94	0.98	1.04	1.09	1.16	1.22	1.29	1.36	1.43	1.50
87	0.07	0.13	0.20	0.28	0.35	0.41	0.47	0.53	0.58	0.62	0.66	0.69	0.73	0.76	0.79	0.83	0.87	0.91	0.96	1.02	1.08	1.15	1.22	1.30	1.39	1.47	1.55	1.63
89	0.09	0.16	0.24	0.34	0.43	0.51	0.58	0.65	0.71	0.76	0.80	0.84	0.88	0.92	0.96	0.99	1.04	1.08	1.14	1.20	1.26	1.32	1.39	1.47	1.54	1.61	1.67	1.73
91	0.07	0.12	0.17	0.25	0.31	0.36	0.41	0.46	0.50	0.54	0.57	0.60	0.63	0.66	0.68	0.71	0.75	0.79	0.83	0.88	0.95	1.01	1.09	1.17	1.26	1.35	1.44	1.53
94	0.09	0.15	0.23	0.32	0.40	0.48	0.54	0.61	0.66	0.71	0.75	0.79	0.83	0.86	0.90	0.93	0.97	1.02	1.07	1.13	1.19	1.26	1.33	1.41	1.49	1.58	1.65	1.73
97	0.09	0.16	0.23	0.34	0.42	0.50	0.57	0.64	0.70	0.75	0.80	0.84	0.88	0.91	0.95	0.98	1.02	1.06	1.10	1.15	1.20	1.25	1.31	1.38	1.44	1.51	1.58	1.65
99	0.10	0.17	0.25	0.35	0.44	0.52	0.60	0.67	0.73	0.78	0.83	0.87	0.91	0.94	0.98	1.01	1.05	1.09	1.13	1.18	1.24	1.30	1.36	1.43	1.50	1.57	1.63	1.70
102	0.09	0.15	0.23	0.32	0.40	0.47	0.54	0.60	0.66	0.70	0.74	0.77	0.81	0.84	0.86	0.89	0.92	0.96	1.01	1.06	1.11	1.18	1.25	1.33	1.41	1.49	1.58	1.66

Grain Size Data - ALE cont.

Depth	Size fraction (microns)																										
	0.38	**0.41**	**0.45**	**0.50**	**0.54**	**0.60**	**0.66**	**0.72**	**0.79**	**0.87**	**0.95**	**1.05**	**1.15**	**1.26**	**1.38**	**1.52**	**1.67**	**1.83**	**2.01**	**2.21**	**2.42**	**2.66**	**2.92**	**3.21**	**3.52**	**3.86**	**4.24**
1	0.10	0.17	0.25	0.36	0.45	0.53	0.61	0.68	0.75	0.81	0.85	0.90	0.94	0.98	1.02	1.06	1.10	1.15	1.20	1.26	1.33	1.41	1.49	1.58	1.67	1.77	1.86
3	0.09	0.16	0.24	0.34	0.43	0.50	0.57	0.63	0.69	0.74	0.78	0.81	0.85	0.88	0.91	0.93	0.97	1.00	1.05	1.10	1.15	1.22	1.29	1.36	1.45	1.53	1.61
5	0.09	0.17	0.25	0.35	0.44	0.52	0.59	0.66	0.73	0.78	0.82	0.87	0.90	0.94	0.97	1.01	1.04	1.09	1.13	1.18	1.24	1.30	1.36	1.43	1.51	1.58	1.65
7	0.10	0.18	0.26	0.38	0.47	0.55	0.63	0.70	0.77	0.82	0.86	0.90	0.94	0.97	1.00	1.03	1.06	1.10	1.14	1.19	1.24	1.30	1.37	1.45	1.53	1.62	1.70
9	0.09	0.15	0.23	0.32	0.40	0.47	0.54	0.60	0.66	0.70	0.74	0.78	0.81	0.84	0.87	0.90	0.94	0.98	1.03	1.08	1.14	1.21	1.29	1.37	1.45	1.53	1.61
11	0.10	0.17	0.25	0.36	0.45	0.52	0.59	0.66	0.72	0.78	0.82	0.85	0.89	0.92	0.95	0.98	1.02	1.06	1.11	1.16	1.22	1.28	1.36	1.44	1.52	1.60	1.68
13	0.10	0.17	0.26	0.37	0.46	0.54	0.61	0.68	0.74	0.80	0.84	0.87	0.91	0.93	0.96	0.98	1.01	1.04	1.07	1.11	1.15	1.20	1.26	1.33	1.40	1.48	1.56
15	0.08	0.15	0.22	0.31	0.39	0.46	0.52	0.59	0.64	0.69	0.74	0.78	0.81	0.85	0.88	0.92	0.96	1.01	1.06	1.12	1.18	1.25	1.33	1.42	1.51	1.60	1.69
17	0.09	0.16	0.23	0.33	0.41	0.49	0.56	0.62	0.68	0.74	0.78	0.82	0.86	0.89	0.92	0.96	0.99	1.03	1.08	1.13	1.18	1.25	1.32	1.40	1.48	1.56	1.65
19	0.09	0.15	0.23	0.33	0.41	0.48	0.55	0.62	0.68	0.73	0.78	0.82	0.86	0.90	0.93	0.97	1.01	1.05	1.10	1.15	1.22	1.29	1.37	1.45	1.54	1.64	1.74
21	0.09	0.16	0.24	0.34	0.42	0.49	0.56	0.62	0.67	0.72	0.75	0.78	0.81	0.84	0.86	0.89	0.93	0.97	1.02	1.08	1.14	1.21	1.29	1.38	1.47	1.56	1.65
23	0.08	0.14	0.21	0.30	0.38	0.45	0.51	0.57	0.63	0.67	0.72	0.75	0.79	0.82	0.85	0.88	0.92	0.96	1.00	1.05	1.10	1.16	1.23	1.30	1.37	1.46	1.54
25	0.09	0.16	0.24	0.34	0.42	0.50	0.56	0.63	0.69	0.74	0.78	0.82	0.85	0.88	0.91	0.95	0.98	1.02	1.07	1.12	1.18	1.24	1.31	1.39	1.47	1.55	1.63
28	0.09	0.16	0.23	0.33	0.41	0.48	0.55	0.62	0.68	0.73	0.77	0.81	0.85	0.88	0.92	0.95	0.99	1.04	1.08	1.14	1.20	1.26	1.33	1.41	1.49	1.57	1.65
31	0.09	0.17	0.24	0.35	0.44	0.52	0.59	0.66	0.73	0.78	0.83	0.87	0.92	0.95	0.98	1.02	1.05	1.09	1.13	1.18	1.23	1.29	1.36	1.43	1.50	1.58	1.66
33	0.09	0.16	0.23	0.33	0.41	0.49	0.55	0.62	0.68	0.73	0.78	0.82	0.86	0.89	0.92	0.96	0.99	1.03	1.08	1.13	1.19	1.25	1.32	1.39	1.47	1.55	1.64
35	0.09	0.16	0.23	0.33	0.42	0.49	0.56	0.63	0.69	0.74	0.79	0.83	0.87	0.90	0.94	0.97	1.01	1.06	1.11	1.16	1.22	1.29	1.37	1.44	1.53	1.61	1.69
37	0.08	0.15	0.22	0.31	0.39	0.46	0.52	0.59	0.64	0.69	0.73	0.77	0.81	0.84	0.87	0.90	0.93	0.97	1.01	1.06	1.12	1.17	1.24	1.31	1.39	1.47	1.55
40	0.09	0.16	0.23	0.33	0.42	0.49	0.56	0.63	0.69	0.74	0.79	0.83	0.86	0.90	0.93	0.97	1.01	1.05	1.10	1.15	1.21	1.27	1.34	1.42	1.50	1.58	1.66
43	0.09	0.15	0.23	0.32	0.40	0.48	0.55	0.61	0.67	0.73	0.77	0.81	0.85	0.89	0.92	0.95	0.99	1.03	1.07	1.12	1.18	1.23	1.30	1.37	1.44	1.52	1.59
45	0.08	0.14	0.21	0.30	0.37	0.44	0.50	0.56	0.62	0.67	0.71	0.74	0.78	0.82	0.85	0.88	0.92	0.96	1.01	1.06	1.12	1.18	1.25	1.33	1.40	1.48	1.56
48	0.09	0.15	0.23	0.32	0.40	0.48	0.54	0.61	0.67	0.72	0.76	0.80	0.83	0.87	0.90	0.93	0.97	1.01	1.06	1.11	1.17	1.23	1.29	1.37	1.44	1.52	1.59
51	0.09	0.16	0.23	0.33	0.42	0.49	0.56	0.62	0.68	0.73	0.77	0.80	0.84	0.87	0.90	0.93	0.97	1.02	1.07	1.13	1.20	1.27	1.36	1.45	1.55	1.65	1.74
54	0.09	0.17	0.24	0.35	0.43	0.51	0.58	0.65	0.70	0.75	0.79	0.83	0.86	0.89	0.92	0.95	0.99	1.03	1.08	1.13	1.19	1.26	1.34	1.42	1.51	1.60	1.69
57	0.09	0.15	0.23	0.32	0.41	0.48	0.55	0.62	0.68	0.73	0.77	0.81	0.85	0.88	0.92	0.95	0.99	1.03	1.08	1.13	1.19	1.25	1.32	1.40	1.48	1.57	1.65
59	0.09	0.17	0.24	0.35	0.44	0.52	0.59	0.67	0.73	0.79	0.84	0.88	0.92	0.96	0.99	1.03	1.06	1.10	1.15	1.19	1.24	1.30	1.36	1.43	1.50	1.57	1.65
62	0.09	0.16	0.24	0.34	0.43	0.51	0.58	0.65	0.71	0.77	0.81	0.86	0.90	0.93	0.96	0.99	1.03	1.07	1.11	1.15	1.20	1.25	1.31	1.38	1.45	1.52	1.60
65	0.09	0.16	0.24	0.34	0.42	0.50	0.57	0.64	0.70	0.76	0.81	0.85	0.89	0.93	0.97	1.00	1.05	1.09	1.14	1.19	1.25	1.31	1.38	1.45	1.52	1.60	1.67
67	0.09	0.16	0.23	0.33	0.41	0.49	0.56	0.62	0.68	0.73	0.77	0.81	0.84	0.87	0.90	0.94	0.97	1.01	1.06	1.11	1.18	1.25	1.32	1.41	1.50	1.59	1.68
69	0.09	0.16	0.23	0.33	0.42	0.49	0.56	0.63	0.69	0.73	0.78	0.81	0.85	0.88	0.91	0.94	0.98	1.02	1.06	1.12	1.18	1.25	1.32	1.40	1.49	1.58	1.67
71	0.09	0.16	0.23	0.34	0.42	0.50	0.57	0.64	0.70	0.76	0.80	0.85	0.89	0.93	0.96	1.00	1.04	1.09	1.13	1.19	1.24	1.31	1.37	1.44	1.52	1.59	1.67
73	0.09	0.16	0.24	0.34	0.43	0.50	0.57	0.64	0.71	0.76	0.81	0.85	0.89	0.92	0.96	0.99	1.03	1.07	1.12	1.17	1.23	1.29	1.36	1.43	1.51	1.59	1.67
75	0.09	0.16	0.24	0.34	0.42	0.50	0.57	0.64	0.70	0.75	0.79	0.83	0.86	0.90	0.93	0.96	1.00	1.05	1.10	1.15	1.22	1.29	1.37	1.45	1.54	1.63	1.72
77	0.09	0.17	0.25	0.35	0.44	0.52	0.60	0.67	0.74	0.79	0.84	0.89	0.93	0.97	1.01	1.05	1.10	1.14	1.19	1.25	1.31	1.37	1.44	1.52	1.59	1.66	1.74
79	0.08	0.14	0.21	0.30	0.37	0.44	0.50	0.56	0.62	0.67	0.71	0.74	0.78	0.81	0.85	0.88	0.92	0.96	1.01	1.06	1.12	1.19	1.26	1.34	1.42	1.50	1.59
82	0.07	0.13	0.19	0.27	0.33	0.39	0.44	0.49	0.54	0.58	0.61	0.63	0.66	0.68	0.70	0.73	0.76	0.79	0.83	0.87	0.92	0.97	1.03	1.10	1.17	1.24	1.31

Grain Size Data - ALE cont.

Depth	4.66	5.11	5.61	6.16	6.76	7.42	8.15	8.94	9.82	10.78	11.83	12.99	14.26	15.65	17.18	18.86	20.71	22.73	24.95	27.39	30.07	33.01	36.24
1	1.95	2.04	2.12	2.20	2.27	2.33	2.39	2.45	2.49	2.50	2.49	2.45	2.40	2.34	2.27	2.15	2.00	1.83	1.69	1.65	1.73	1.91	2.14
3	1.70	1.77	1.85	1.91	1.98	2.03	2.10	2.16	2.21	2.23	2.24	2.23	2.22	2.21	2.19	2.13	2.01	1.87	1.76	1.73	1.82	2.01	2.25
5	1.72	1.79	1.86	1.92	1.98	2.04	2.10	2.16	2.22	2.26	2.26	2.25	2.23	2.20	2.17	2.10	1.99	1.85	1.73	1.69	1.77	1.97	2.27
7	1.78	1.86	1.93	2.00	2.07	2.14	2.22	2.31	2.39	2.43	2.43	2.40	2.37	2.34	2.31	2.25	2.13	1.99	1.86	1.82	1.89	2.07	2.33
9	1.69	1.77	1.84	1.91	1.97	2.04	2.10	2.17	2.23	2.27	2.28	2.27	2.25	2.24	2.21	2.14	2.01	1.85	1.73	1.69	1.80	2.03	2.35
11	1.76	1.83	1.90	1.96	2.01	2.07	2.13	2.19	2.24	2.27	2.26	2.23	2.21	2.20	2.17	2.10	1.98	1.81	1.67	1.62	1.68	1.87	2.15
13	1.64	1.72	1.81	1.89	1.97	2.06	2.17	2.29	2.39	2.45	2.46	2.44	2.40	2.37	2.32	2.23	2.08	1.93	1.82	1.83	1.96	2.21	2.50
15	1.78	1.87	1.95	2.03	2.10	2.17	2.24	2.30	2.34	2.37	2.38	2.35	2.32	2.27	2.22	2.13	2.01	1.88	1.76	1.73	1.81	2.00	2.25
17	1.74	1.82	1.91	1.99	2.07	2.14	2.22	2.29	2.34	2.38	2.39	2.37	2.33	2.28	2.21	2.12	1.98	1.83	1.71	1.67	1.76	1.98	2.28
19	1.84	1.94	2.04	2.13	2.22	2.31	2.39	2.46	2.52	2.55	2.55	2.52	2.46	2.40	2.32	2.21	2.07	1.92	1.80	1.76	1.83	2.02	2.29
21	1.74	1.82	1.89	1.95	2.01	2.08	2.15	2.22	2.29	2.33	2.35	2.34	2.34	2.32	2.27	2.17	2.03	1.88	1.80	1.83	1.96	2.19	2.43
23	1.62	1.71	1.80	1.88	1.97	2.05	2.13	2.22	2.30	2.35	2.38	2.39	2.38	2.36	2.32	2.24	2.13	2.00	1.89	1.87	1.96	2.15	2.42
25	1.71	1.79	1.86	1.92	1.98	2.05	2.11	2.17	2.23	2.25	2.25	2.23	2.20	2.17	2.13	2.06	1.95	1.81	1.71	1.69	1.78	1.99	2.26
28	1.73	1.80	1.87	1.94	2.01	2.07	2.13	2.20	2.25	2.28	2.28	2.26	2.24	2.21	2.16	2.08	1.96	1.82	1.72	1.71	1.82	2.06	2.36
31	1.74	1.82	1.90	1.98	2.06	2.13	2.21	2.28	2.35	2.40	2.42	2.41	2.39	2.37	2.32	2.23	2.09	1.91	1.77	1.73	1.83	2.07	2.40
33	1.72	1.81	1.89	1.97	2.05	2.12	2.19	2.26	2.32	2.36	2.37	2.35	2.33	2.29	2.24	2.15	2.03	1.88	1.77	1.74	1.84	2.06	2.37
35	1.77	1.85	1.93	2.00	2.06	2.12	2.18	2.24	2.29	2.31	2.32	2.30	2.28	2.26	2.22	2.15	2.03	1.87	1.74	1.69	1.77	1.98	2.27
37	1.64	1.72	1.80	1.89	1.96	2.04	2.12	2.20	2.27	2.32	2.34	2.35	2.33	2.32	2.28	2.21	2.10	1.98	1.88	1.88	1.99	2.22	2.51
40	1.74	1.82	1.90	1.97	2.04	2.10	2.16	2.22	2.27	2.31	2.31	2.29	2.26	2.23	2.19	2.11	1.99	1.86	1.75	1.73	1.84	2.08	2.39
43	1.67	1.75	1.82	1.89	1.96	2.03	2.09	2.16	2.22	2.26	2.28	2.28	2.27	2.25	2.21	2.15	2.05	1.92	1.83	1.81	1.91	2.14	2.44
45	1.64	1.72	1.79	1.87	1.93	2.00	2.06	2.13	2.18	2.22	2.23	2.22	2.20	2.18	2.15	2.08	1.98	1.86	1.76	1.75	1.85	2.06	2.34
48	1.67	1.74	1.81	1.87	1.94	2.00	2.06	2.12	2.18	2.22	2.23	2.23	2.22	2.21	2.19	2.13	2.02	1.89	1.79	1.77	1.87	2.09	2.39
51	1.84	1.93	2.02	2.10	2.17	2.24	2.30	2.36	2.40	2.42	2.40	2.37	2.34	2.30	2.25	2.16	2.02	1.84	1.70	1.66	1.76	1.99	2.30
54	1.78	1.87	1.95	2.03	2.10	2.17	2.24	2.30	2.35	2.38	2.37	2.34	2.31	2.28	2.23	2.15	2.01	1.84	1.71	1.67	1.77	2.01	2.33
57	1.73	1.82	1.90	1.98	2.05	2.12	2.19	2.26	2.32	2.36	2.37	2.36	2.33	2.30	2.25	2.16	2.02	1.86	1.74	1.71	1.82	2.05	2.36
59	1.72	1.79	1.86	1.92	1.99	2.05	2.11	2.17	2.23	2.27	2.29	2.28	2.27	2.25	2.21	2.15	2.04	1.90	1.78	1.75	1.83	2.05	2.36
62	1.67	1.75	1.83	1.90	1.98	2.05	2.13	2.20	2.27	2.32	2.34	2.33	2.31	2.28	2.24	2.17	2.06	1.93	1.83	1.82	1.93	2.16	2.46
65	1.74	1.81	1.88	1.95	2.01	2.08	2.14	2.20	2.26	2.30	2.31	2.29	2.27	2.24	2.20	2.12	2.00	1.85	1.73	1.70	1.80	2.04	2.36
67	1.78	1.87	1.95	2.04	2.12	2.19	2.26	2.33	2.39	2.43	2.43	2.41	2.39	2.35	2.30	2.20	2.05	1.88	1.75	1.72	1.82	2.05	2.34
69	1.76	1.85	1.93	2.01	2.08	2.15	2.23	2.30	2.35	2.39	2.39	2.38	2.36	2.34	2.30	2.22	2.08	1.92	1.80	1.78	1.89	2.13	2.44
71	1.74	1.81	1.88	1.95	2.01	2.06	2.12	2.18	2.23	2.27	2.27	2.26	2.24	2.23	2.19	2.12	2.00	1.85	1.73	1.70	1.81	2.05	2.39
73	1.75	1.82	1.90	1.97	2.03	2.09	2.16	2.22	2.27	2.30	2.31	2.29	2.27	2.23	2.19	2.11	1.99	1.85	1.74	1.73	1.84	2.07	2.38
75	1.81	1.89	1.97	2.04	2.11	2.17	2.23	2.29	2.33	2.36	2.36	2.34	2.31	2.29	2.25	2.17	2.03	1.88	1.75	1.73	1.83	2.05	2.34
77	1.80	1.87	1.93	1.99	2.04	2.09	2.14	2.19	2.24	2.27	2.28	2.28	2.26	2.24	2.21	2.13	2.01	1.86	1.74	1.71	1.82	2.05	2.35
79	1.67	1.75	1.83	1.91	1.98	2.05	2.12	2.19	2.25	2.29	2.32	2.33	2.32	2.31	2.29	2.23	2.14	2.03	1.94	1.92	2.01	2.21	2.47
82	1.38	1.44	1.50	1.56	1.61	1.67	1.72	1.78	1.84	1.88	1.90	1.91	1.92	1.93	1.93	1.89	1.81	1.71	1.64	1.64	1.74	1.94	2.18

Grain Size Data - ALE cont.

Depth	39.78	43.67	47.94	52.63	57.77	63.42	69.62	76.43	83.90	92.10	101.10	110.99	121.84	133.75	146.82	161.18	176.94	194.23	213.22	234.07	256.95
1	2.35	2.46	2.44	2.28	2.02	1.70	1.37	1.07	0.82	0.67	0.62	0.69	0.84	1.03	1.12	1.04	0.78	0.43	0.16	0.03	0.00
3	2.48	2.62	2.66	2.59	2.42	2.18	1.89	1.57	1.24	0.94	0.75	0.70	0.83	1.09	1.36	1.49	1.36	1.00	0.57	0.25	0.09
5	2.58	2.81	2.87	2.73	2.41	1.97	1.53	1.17	0.95	0.87	0.90	1.01	1.15	1.28	1.33	1.23	0.99	0.64	0.31	0.09	0.02
7	2.60	2.82	2.92	2.87	2.64	2.24	1.71	1.13	0.68	0.44	0.42	0.59	0.87	1.09	1.08	0.78	0.38	0.10	0.01	0.00	0.00
9	2.67	2.89	2.94	2.82	2.53	2.16	1.78	1.43	1.15	0.95	0.84	0.84	0.95	1.14	1.33	1.38	1.21	0.84	0.43	0.14	0.02
11	2.44	2.66	2.76	2.70	2.47	2.10	1.65	1.19	0.83	0.65	0.65	0.87	1.24	1.61	1.77	1.60	1.16	0.61	0.21	0.04	0.00
13	2.74	2.84	2.80	2.64	2.39	2.09	1.77	1.42	1.08	0.82	0.70	0.76	0.95	1.17	1.22	1.01	0.59	0.22	0.04	0.00	0.00
15	2.51	2.69	2.73	2.61	2.36	2.03	1.69	1.37	1.11	0.92	0.81	0.80	0.88	1.04	1.19	1.24	1.11	0.82	0.46	0.18	0.04
17	2.59	2.81	2.88	2.75	2.46	2.05	1.62	1.23	0.94	0.77	0.73	0.79	0.95	1.13	1.27	1.26	1.07	0.75	0.39	0.13	0.02
19	2.58	2.79	2.87	2.76	2.46	2.02	1.51	1.05	0.72	0.57	0.58	0.73	0.94	1.08	1.06	0.85	0.53	0.23	0.06	0.01	0.00
21	2.64	2.77	2.80	2.73	2.55	2.24	1.82	1.35	0.93	0.70	0.70	0.92	1.27	1.54	1.53	1.20	0.68	0.25	0.05	0.00	0.00
23	2.69	2.88	2.94	2.83	2.57	2.19	1.75	1.32	0.98	0.78	0.72	0.80	0.97	1.17	1.30	1.28	1.09	0.78	0.43	0.16	0.03
25	2.53	2.73	2.81	2.74	2.53	2.19	1.77	1.33	0.93	0.66	0.54	0.57	0.74	1.01	1.26	1.40	1.35	1.14	0.82	0.50	0.26
28	2.66	2.85	2.89	2.77	2.51	2.15	1.77	1.40	1.08	0.85	0.73	0.74	0.87	1.08	1.27	1.32	1.14	0.79	0.40	0.13	0.02
31	2.73	2.95	2.99	2.82	2.49	2.07	1.64	1.28	1.02	0.86	0.81	0.85	0.92	0.96	0.89	0.69	0.40	0.15	0.03	0.00	0.00
33	2.69	2.92	2.99	2.88	2.60	2.20	1.77	1.37	1.04	0.81	0.70	0.72	0.85	1.02	1.13	1.08	0.84	0.48	0.18	0.03	0.00
35	2.56	2.77	2.82	2.71	2.44	2.09	1.71	1.37	1.10	0.90	0.80	0.81	0.92	1.09	1.21	1.17	0.93	0.55	0.22	0.04	0.00
37	2.79	2.97	2.99	2.84	2.55	2.18	1.79	1.44	1.14	0.90	0.75	0.69	0.73	0.87	1.05	1.15	1.08	0.84	0.48	0.19	0.04
40	2.69	2.89	2.92	2.78	2.49	2.12	1.73	1.38	1.10	0.89	0.78	0.77	0.86	1.01	1.14	1.14	0.95	0.58	0.24	0.05	0.00
43	2.75	2.98	3.04	2.93	2.64	2.23	1.79	1.38	1.07	0.86	0.76	0.76	0.86	1.00	1.11	1.11	0.95	0.66	0.34	0.12	0.02
45	2.61	2.79	2.83	2.70	2.42	2.05	1.66	1.31	1.07	0.93	0.89	0.94	1.03	1.15	1.24	1.27	1.21	1.07	0.87	0.65	0.46
48	2.70	2.92	3.01	2.91	2.65	2.28	1.86	1.47	1.15	0.94	0.84	0.86	0.99	1.16	1.27	1.24	1.02	0.65	0.30	0.08	0.01
51	2.60	2.80	2.82	2.66	2.35	1.96	1.56	1.21	0.95	0.79	0.72	0.76	0.87	1.03	1.14	1.12	0.94	0.62	0.30	0.09	0.01
54	2.63	2.83	2.85	2.69	2.39	2.01	1.63	1.31	1.07	0.92	0.84	0.83	0.88	0.97	1.04	1.02	0.87	0.61	0.32	0.11	0.02
57	2.68	2.90	2.95	2.82	2.52	2.12	1.70	1.32	1.03	0.86	0.80	0.84	0.96	1.10	1.17	1.09	0.84	0.48	0.19	0.04	0.00
59	2.68	2.91	2.96	2.82	2.51	2.09	1.65	1.28	1.01	0.86	0.82	0.88	1.00	1.11	1.13	1.00	0.72	0.38	0.13	0.02	0.00
62	2.77	2.99	3.05	2.92	2.64	2.24	1.80	1.39	1.05	0.85	0.77	0.82	0.94	1.05	1.05	0.88	0.55	0.24	0.06	0.01	0.00
65	2.66	2.87	2.90	2.74	2.44	2.06	1.68	1.33	1.06	0.89	0.82	0.86	0.98	1.14	1.21	1.11	0.82	0.45	0.16	0.03	0.00
67	2.62	2.79	2.79	2.63	2.33	1.96	1.60	1.28	1.04	0.87	0.78	0.78	0.87	1.01	1.13	1.11	0.92	0.59	0.26	0.07	0.01
69	2.72	2.90	2.92	2.77	2.48	2.12	1.74	1.39	1.10	0.90	0.82	0.83	0.92	1.01	1.00	0.85	0.56	0.26	0.07	0.01	0.00
71	2.72	2.94	2.98	2.82	2.51	2.10	1.69	1.33	1.06	0.89	0.82	0.84	0.95	1.08	1.15	1.08	0.83	0.48	0.18	0.03	0.00
73	2.67	2.86	2.89	2.76	2.48	2.12	1.73	1.38	1.09	0.87	0.76	0.76	0.86	1.02	1.13	1.10	0.88	0.53	0.21	0.04	0.00
75	2.62	2.79	2.81	2.67	2.40	2.05	1.68	1.33	1.04	0.82	0.70	0.68	0.78	0.95	1.09	1.10	0.91	0.58	0.25	0.06	0.01
77	2.64	2.82	2.83	2.68	2.41	2.05	1.69	1.35	1.06	0.84	0.73	0.73	0.82	0.96	1.03	0.96	0.70	0.38	0.13	0.02	0.00
79	2.72	2.90	2.95	2.85	2.60	2.24	1.84	1.45	1.12	0.89	0.78	0.78	0.89	1.05	1.16	1.15	0.96	0.64	0.31	0.10	0.02
82	2.41	2.57	2.63	2.58	2.44	2.26	2.07	1.88	1.71	1.57	1.48	1.46	1.52	1.67	1.89	2.09	2.18	2.08	1.78	1.32	0.84

Grain Size Data - ALE cont.

Depth	282.07	309.64	339.92	373.15	409.63	449.67	493.63	541.89	594.87	653.03	716.87	786.95	863.88	948.34
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.13	0.07	0.05	0.04	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45	0.31	0.20	0.12	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
82	0.42	0.15	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Grain Size Data - ALE cont.

Depth	Size fraction (microns)																										
	0.38	**0.41**	**0.45**	**0.50**	**0.54**	**0.60**	**0.66**	**0.72**	**0.79**	**0.87**	**0.95**	**1.05**	**1.15**	**1.26**	**1.38**	**1.52**	**1.67**	**1.83**	**2.01**	**2.21**	**2.42**	**2.66**	**2.92**	**3.21**	**3.52**	**3.86**	**4.24**
85	0.07	0.13	0.19	0.28	0.35	0.41	0.47	0.52	0.58	0.62	0.66	0.69	0.73	0.76	0.79	0.82	0.85	0.89	0.94	0.98	1.04	1.09	1.16	1.22	1.29	1.36	1.43
87	0.07	0.13	0.20	0.28	0.35	0.41	0.47	0.53	0.58	0.62	0.66	0.69	0.73	0.76	0.79	0.83	0.87	0.91	0.96	1.02	1.08	1.15	1.22	1.30	1.39	1.47	1.55
89	0.09	0.16	0.24	0.34	0.43	0.51	0.58	0.65	0.71	0.76	0.80	0.84	0.88	0.92	0.96	0.99	1.04	1.08	1.14	1.20	1.26	1.32	1.39	1.47	1.54	1.61	1.67
91	0.07	0.12	0.17	0.25	0.31	0.36	0.41	0.46	0.50	0.54	0.57	0.60	0.63	0.66	0.68	0.71	0.75	0.79	0.83	0.88	0.95	1.01	1.09	1.17	1.26	1.35	1.44
94	0.09	0.15	0.23	0.32	0.40	0.48	0.54	0.61	0.66	0.71	0.75	0.79	0.83	0.86	0.90	0.93	0.97	1.02	1.07	1.13	1.19	1.26	1.33	1.41	1.49	1.58	1.65
97	0.09	0.16	0.23	0.34	0.42	0.50	0.57	0.64	0.70	0.75	0.80	0.84	0.88	0.91	0.95	0.98	1.02	1.06	1.10	1.15	1.20	1.25	1.31	1.38	1.44	1.51	1.58
99	0.10	0.17	0.25	0.35	0.44	0.52	0.60	0.67	0.73	0.78	0.83	0.87	0.91	0.94	0.98	1.01	1.05	1.09	1.13	1.18	1.24	1.30	1.36	1.43	1.50	1.57	1.63
102	0.09	0.15	0.23	0.32	0.40	0.47	0.54	0.60	0.66	0.70	0.74	0.77	0.81	0.84	0.86	0.89	0.92	0.96	1.01	1.06	1.11	1.18	1.25	1.33	1.41	1.49	1.58
105	0.09	0.16	0.24	0.34	0.43	0.50	0.57	0.64	0.70	0.74	0.78	0.82	0.85	0.88	0.91	0.94	0.97	1.02	1.07	1.12	1.19	1.26	1.34	1.43	1.52	1.62	1.72
107	0.09	0.16	0.23	0.33	0.41	0.49	0.56	0.62	0.68	0.73	0.78	0.82	0.86	0.89	0.93	0.97	1.01	1.05	1.11	1.16	1.23	1.30	1.37	1.45	1.53	1.62	1.70
110	0.09	0.16	0.23	0.33	0.41	0.48	0.55	0.61	0.67	0.72	0.76	0.80	0.83	0.86	0.89	0.93	0.96	1.00	1.05	1.10	1.16	1.23	1.29	1.37	1.44	1.52	1.59
113	0.08	0.14	0.21	0.30	0.38	0.45	0.51	0.57	0.62	0.67	0.71	0.74	0.78	0.81	0.84	0.87	0.91	0.96	1.01	1.06	1.13	1.20	1.28	1.37	1.45	1.54	1.64
115	0.09	0.16	0.23	0.34	0.42	0.50	0.57	0.64	0.70	0.75	0.80	0.84	0.88	0.92	0.95	0.99	1.03	1.08	1.13	1.18	1.24	1.30	1.37	1.44	1.51	1.58	1.66
117	0.08	0.14	0.20	0.29	0.36	0.43	0.49	0.55	0.60	0.65	0.68	0.72	0.75	0.78	0.81	0.83	0.87	0.90	0.94	0.98	1.03	1.09	1.15	1.21	1.28	1.36	1.43
119	0.09	0.16	0.24	0.33	0.42	0.49	0.56	0.62	0.68	0.72	0.76	0.80	0.83	0.86	0.89	0.92	0.96	1.01	1.06	1.12	1.19	1.27	1.36	1.46	1.57	1.67	1.78
121	0.07	0.12	0.18	0.26	0.32	0.38	0.43	0.48	0.53	0.56	0.59	0.62	0.64	0.67	0.69	0.71	0.74	0.78	0.82	0.87	0.92	0.98	1.05	1.12	1.20	1.28	1.36
123	0.09	0.15	0.22	0.32	0.40	0.47	0.54	0.61	0.66	0.71	0.76	0.80	0.84	0.87	0.91	0.94	0.98	1.03	1.08	1.13	1.19	1.26	1.33	1.40	1.48	1.56	1.63
125	0.08	0.13	0.20	0.28	0.36	0.42	0.48	0.54	0.59	0.64	0.68	0.71	0.75	0.78	0.82	0.85	0.89	0.93	0.98	1.03	1.09	1.15	1.22	1.29	1.37	1.45	1.52
127	0.08	0.15	0.22	0.31	0.39	0.46	0.53	0.59	0.65	0.70	0.75	0.79	0.83	0.87	0.90	0.94	0.99	1.04	1.10	1.16	1.22	1.30	1.37	1.46	1.54	1.62	1.70
129	0.09	0.16	0.23	0.33	0.41	0.48	0.55	0.62	0.68	0.72	0.77	0.80	0.84	0.87	0.91	0.94	0.98	1.03	1.08	1.13	1.20	1.27	1.34	1.42	1.51	1.59	1.67
131	0.08	0.14	0.21	0.30	0.38	0.45	0.51	0.58	0.63	0.68	0.72	0.76	0.80	0.84	0.87	0.91	0.95	1.00	1.05	1.10	1.17	1.23	1.31	1.38	1.46	1.54	1.62
134	0.08	0.14	0.21	0.30	0.38	0.44	0.50	0.56	0.61	0.65	0.68	0.71	0.73	0.76	0.78	0.81	0.84	0.89	0.94	0.99	1.06	1.14	1.22	1.32	1.41	1.52	1.62
137	0.09	0.16	0.23	0.33	0.41	0.48	0.55	0.61	0.67	0.72	0.76	0.80	0.84	0.88	0.91	0.95	1.00	1.05	1.11	1.18	1.26	1.34	1.43	1.52	1.62	1.72	1.81
139	0.08	0.14	0.21	0.30	0.38	0.44	0.50	0.55	0.60	0.64	0.67	0.69	0.72	0.74	0.77	0.79	0.83	0.87	0.92	0.98	1.05	1.13	1.22	1.31	1.42	1.52	1.63
141	0.08	0.15	0.22	0.31	0.39	0.46	0.52	0.58	0.63	0.68	0.71	0.75	0.78	0.81	0.84	0.87	0.90	0.95	1.00	1.06	1.12	1.20	1.28	1.36	1.45	1.54	1.63
143	0.08	0.15	0.22	0.31	0.39	0.45	0.52	0.58	0.63	0.68	0.72	0.76	0.80	0.83	0.87	0.91	0.95	1.00	1.05	1.12	1.18	1.26	1.34	1.42	1.50	1.58	1.66
145	0.09	0.16	0.24	0.35	0.43	0.51	0.58	0.64	0.70	0.75	0.79	0.83	0.86	0.89	0.93	0.96	1.00	1.05	1.11	1.18	1.25	1.33	1.42	1.51	1.61	1.71	1.80
147	0.10	0.17	0.26	0.37	0.46	0.54	0.61	0.68	0.75	0.80	0.85	0.89	0.92	0.96	1.00	1.03	1.07	1.12	1.17	1.23	1.29	1.36	1.43	1.51	1.59	1.67	1.74
149	0.09	0.15	0.23	0.32	0.40	0.47	0.54	0.60	0.66	0.71	0.75	0.78	0.82	0.86	0.89	0.93	0.98	1.03	1.09	1.16	1.24	1.32	1.42	1.51	1.61	1.71	1.80
151	0.07	0.12	0.18	0.26	0.32	0.38	0.43	0.48	0.52	0.56	0.59	0.62	0.65	0.68	0.71	0.75	0.79	0.84	0.90	0.97	1.05	1.14	1.23	1.33	1.44	1.54	1.64
153	0.06	0.11	0.17	0.24	0.30	0.35	0.40	0.45	0.49	0.52	0.55	0.57	0.60	0.62	0.65	0.68	0.72	0.77	0.83	0.89	0.97	1.06	1.16	1.26	1.37	1.49	1.61
155	0.08	0.15	0.21	0.30	0.38	0.45	0.51	0.56	0.61	0.65	0.69	0.72	0.75	0.78	0.81	0.84	0.88	0.93	0.99	1.06	1.14	1.23	1.33	1.43	1.55	1.66	1.77
157	0.08	0.15	0.22	0.32	0.40	0.47	0.53	0.60	0.66	0.71	0.75	0.79	0.83	0.87	0.90	0.94	0.98	1.03	1.09	1.14	1.21	1.28	1.35	1.43	1.50	1.57	1.64
159	0.08	0.15	0.22	0.31	0.39	0.46	0.52	0.58	0.63	0.67	0.71	0.74	0.76	0.79	0.82	0.85	0.89	0.94	1.00	1.07	1.15	1.24	1.34	1.44	1.55	1.67	1.78
161	0.07	0.12	0.18	0.26	0.32	0.38	0.44	0.49	0.54	0.58	0.62	0.66	0.70	0.73	0.77	0.82	0.87	0.93	1.00	1.07	1.16	1.25	1.36	1.46	1.58	1.69	1.81
164	0.07	0.12	0.18	0.26	0.32	0.38	0.43	0.49	0.53	0.57	0.61	0.64	0.68	0.71	0.75	0.79	0.83	0.89	0.94	1.01	1.08	1.16	1.25	1.34	1.42	1.51	1.59

Grain Size Data - ALE cont.

Depth	4.66	5.11	5.61	6.16	6.76	7.42	8.15	8.94	9.82	10.78	11.83	12.99	14.26	15.65	17.18	18.86	20.71	22.73	24.95	27.39	30.07	33.01	36.24
85	1.50	1.57	1.63	1.69	1.75	1.81	1.86	1.92	1.98	2.02	2.05	2.07	2.08	2.08	2.07	2.03	1.96	1.86	1.79	1.79	1.89	2.08	2.32
87	1.63	1.70	1.78	1.84	1.91	1.97	2.03	2.09	2.16	2.21	2.25	2.28	2.32	2.35	2.36	2.34	2.25	2.14	2.04	2.02	2.12	2.32	2.58
89	1.73	1.78	1.83	1.87	1.91	1.95	2.00	2.06	2.12	2.17	2.19	2.20	2.20	2.20	2.18	2.10	1.98	1.85	1.76	1.78	1.92	2.17	2.46
91	1.53	1.63	1.71	1.80	1.88	1.96	2.04	2.12	2.19	2.24	2.28	2.30	2.31	2.32	2.32	2.27	2.19	2.09	2.02	2.02	2.12	2.31	2.55
94	1.73	1.80	1.86	1.92	1.97	2.02	2.07	2.13	2.18	2.21	2.23	2.23	2.23	2.23	2.21	2.15	2.03	1.90	1.81	1.81	1.93	2.17	2.46
97	1.65	1.71	1.78	1.84	1.89	1.95	2.02	2.08	2.15	2.20	2.23	2.24	2.24	2.24	2.22	2.16	2.06	1.94	1.86	1.87	1.98	2.19	2.46
99	1.70	1.76	1.82	1.87	1.91	1.96	2.02	2.08	2.13	2.17	2.19	2.20	2.20	2.19	2.17	2.10	1.99	1.87	1.80	1.82	1.95	2.18	2.45
102	1.66	1.75	1.83	1.90	1.97	2.05	2.12	2.19	2.26	2.31	2.34	2.35	2.35	2.35	2.33	2.27	2.15	2.02	1.91	1.89	2.00	2.22	2.50
105	1.81	1.90	1.98	2.06	2.13	2.20	2.27	2.33	2.39	2.42	2.43	2.43	2.41	2.39	2.35	2.26	2.12	1.95	1.82	1.78	1.87	2.07	2.32
107	1.77	1.85	1.92	1.98	2.04	2.09	2.14	2.20	2.25	2.28	2.30	2.30	2.29	2.28	2.25	2.17	2.05	1.91	1.82	1.81	1.92	2.14	2.40
110	1.67	1.73	1.79	1.85	1.90	1.95	2.01	2.06	2.12	2.16	2.18	2.20	2.21	2.22	2.21	2.16	2.05	1.93	1.83	1.83	1.95	2.18	2.46
113	1.72	1.81	1.89	1.96	2.03	2.10	2.17	2.23	2.29	2.34	2.36	2.37	2.38	2.37	2.35	2.28	2.17	2.04	1.94	1.92	2.01	2.20	2.43
115	1.72	1.79	1.85	1.91	1.97	2.02	2.07	2.13	2.19	2.23	2.25	2.25	2.25	2.24	2.21	2.13	2.01	1.88	1.79	1.79	1.90	2.13	2.41
117	1.50	1.57	1.65	1.72	1.78	1.85	1.92	1.99	2.06	2.11	2.15	2.17	2.19	2.20	2.20	2.17	2.09	2.00	1.94	1.97	2.11	2.35	2.64
119	1.88	1.98	2.07	2.16	2.24	2.31	2.38	2.45	2.50	2.53	2.53	2.51	2.49	2.45	2.39	2.29	2.12	1.93	1.77	1.71	1.77	1.96	2.21
121	1.44	1.52	1.60	1.67	1.74	1.80	1.87	1.94	2.01	2.07	2.11	2.14	2.17	2.21	2.23	2.21	2.15	2.06	2.00	2.02	2.14	2.37	2.66
123	1.71	1.78	1.84	1.90	1.96	2.01	2.07	2.12	2.17	2.21	2.23	2.24	2.25	2.25	2.24	2.19	2.09	1.96	1.85	1.83	1.92	2.13	2.42
125	1.60	1.67	1.74	1.80	1.87	1.93	1.99	2.05	2.11	2.16	2.19	2.22	2.24	2.26	2.27	2.24	2.17	2.07	1.98	1.96	2.05	2.25	2.53
127	1.77	1.84	1.90	1.95	2.00	2.04	2.08	2.12	2.15	2.17	2.18	2.18	2.18	2.18	2.17	2.12	2.02	1.89	1.78	1.74	1.83	2.03	2.30
129	1.75	1.82	1.89	1.95	2.01	2.06	2.11	2.16	2.21	2.24	2.25	2.25	2.25	2.24	2.21	2.14	2.03	1.91	1.81	1.81	1.91	2.11	2.38
131	1.69	1.76	1.82	1.88	1.93	1.98	2.03	2.08	2.13	2.16	2.18	2.19	2.20	2.20	2.19	2.14	2.05	1.93	1.84	1.83	1.93	2.15	2.44
134	1.72	1.82	1.91	2.00	2.08	2.16	2.24	2.31	2.38	2.42	2.45	2.45	2.46	2.46	2.43	2.35	2.22	2.05	1.92	1.88	1.96	2.14	2.38
137	1.89	1.97	2.04	2.11	2.16	2.21	2.25	2.30	2.33	2.35	2.36	2.35	2.34	2.33	2.30	2.22	2.09	1.93	1.81	1.77	1.84	2.02	2.25
139	1.73	1.82	1.91	1.99	2.06	2.13	2.19	2.25	2.30	2.33	2.33	2.33	2.31	2.30	2.25	2.16	2.01	1.84	1.70	1.66	1.72	1.89	2.09
141	1.71	1.78	1.85	1.92	1.97	2.02	2.07	2.12	2.17	2.20	2.22	2.24	2.25	2.27	2.26	2.21	2.11	1.98	1.88	1.87	1.97	2.18	2.45
143	1.73	1.79	1.84	1.89	1.94	1.97	2.01	2.06	2.10	2.14	2.16	2.18	2.21	2.23	2.22	2.18	2.08	1.96	1.88	1.88	1.98	2.19	2.44
145	1.88	1.96	2.03	2.09	2.15	2.20	2.24	2.29	2.33	2.36	2.37	2.36	2.36	2.36	2.33	2.25	2.11	1.93	1.79	1.75	1.82	2.01	2.25
147	1.81	1.87	1.92	1.97	2.01	2.05	2.10	2.15	2.20	2.24	2.27	2.29	2.30	2.31	2.30	2.23	2.11	1.95	1.83	1.80	1.90	2.11	2.38
149	1.89	1.98	2.05	2.11	2.16	2.21	2.25	2.29	2.32	2.34	2.34	2.32	2.31	2.30	2.28	2.21	2.09	1.93	1.79	1.75	1.82	2.02	2.28
151	1.73	1.82	1.90	1.97	2.03	2.08	2.12	2.16	2.20	2.22	2.22	2.22	2.22	2.23	2.21	2.16	2.05	1.91	1.79	1.75	1.82	1.99	2.22
153	1.72	1.83	1.93	2.03	2.12	2.19	2.26	2.32	2.37	2.40	2.40	2.39	2.38	2.36	2.32	2.24	2.11	1.96	1.83	1.77	1.81	1.95	2.14
155	1.87	1.97	2.06	2.14	2.21	2.27	2.32	2.37	2.41	2.43	2.43	2.42	2.41	2.40	2.36	2.27	2.13	1.95	1.79	1.72	1.77	1.92	2.14
157	1.70	1.76	1.81	1.85	1.89	1.92	1.96	2.00	2.05	2.09	2.12	2.14	2.17	2.20	2.20	2.16	2.05	1.90	1.77	1.71	1.78	1.96	2.23
159	1.88	1.99	2.08	2.16	2.23	2.30	2.36	2.41	2.46	2.48	2.49	2.49	2.48	2.47	2.43	2.33	2.17	1.98	1.81	1.74	1.79	1.95	2.17
161	1.92	2.03	2.13	2.22	2.30	2.37	2.43	2.48	2.52	2.54	2.54	2.52	2.48	2.44	2.37	2.28	2.14	1.99	1.85	1.79	1.82	1.93	2.09
164	1.67	1.73	1.79	1.84	1.88	1.91	1.94	1.97	2.00	2.02	2.04	2.05	2.07	2.09	2.10	2.07	1.99	1.89	1.80	1.79	1.87	2.03	2.24

Grain Size Data - ALE cont.

Depth	39.78	43.67	47.94	52.63	57.77	63.42	69.62	76.43	83.90	92.10	101.10	110.99	121.84	133.75	146.82	161.18	176.94	194.23	213.22	234.07	256.95
85	2.56	2.73	2.81	2.77	2.65	2.46	2.24	2.00	1.75	1.53	1.35	1.25	1.26	1.36	1.50	1.58	1.49	1.22	0.81	0.40	0.13
87	2.82	2.95	2.96	2.82	2.59	2.31	2.00	1.69	1.38	1.09	0.86	0.74	0.75	0.87	1.03	1.11	1.01	0.74	0.40	0.14	0.03
89	2.72	2.87	2.89	2.77	2.56	2.27	1.94	1.57	1.21	0.91	0.75	0.75	0.90	1.11	1.23	1.14	0.82	0.43	0.14	0.02	0.00
91	2.76	2.89	2.91	2.82	2.64	2.42	2.19	1.95	1.71	1.47	1.28	1.16	1.14	1.19	1.25	1.21	1.02	0.71	0.37	0.13	0.02
94	2.73	2.89	2.91	2.79	2.55	2.23	1.89	1.56	1.28	1.07	0.96	0.97	1.07	1.17	1.17	1.00	0.69	0.34	0.11	0.02	0.00
97	2.71	2.88	2.93	2.84	2.64	2.34	1.97	1.57	1.20	0.92	0.78	0.79	0.93	1.11	1.20	1.09	0.80	0.43	0.15	0.03	0.00
99	2.72	2.91	2.99	2.95	2.77	2.47	2.05	1.56	1.08	0.72	0.56	0.59	0.79	1.04	1.19	1.11	0.81	0.42	0.14	0.02	0.00
102	2.76	2.92	2.94	2.79	2.51	2.15	1.76	1.41	1.13	0.92	0.79	0.75	0.78	0.88	0.98	1.03	0.96	0.76	0.46	0.19	0.04
105	2.54	2.67	2.67	2.52	2.27	1.96	1.62	1.29	1.01	0.80	0.69	0.68	0.77	0.92	1.05	1.06	0.90	0.61	0.30	0.09	0.01
107	2.65	2.81	2.83	2.72	2.47	2.14	1.75	1.36	1.02	0.79	0.71	0.78	0.96	1.16	1.23	1.09	0.76	0.39	0.13	0.02	0.00
110	2.71	2.87	2.89	2.78	2.57	2.29	1.98	1.65	1.34	1.07	0.88	0.79	0.81	0.93	1.08	1.14	1.04	0.79	0.46	0.19	0.05
113	2.64	2.77	2.80	2.72	2.55	2.29	1.96	1.58	1.19	0.88	0.72	0.73	0.89	1.10	1.21	1.09	0.76	0.38	0.11	0.02	0.00
115	2.68	2.87	2.93	2.85	2.63	2.31	1.92	1.50	1.11	0.82	0.68	0.68	0.81	1.00	1.13	1.09	0.85	0.50	0.20	0.04	0.00
117	2.92	3.11	3.15	3.05	2.80	2.46	2.08	1.70	1.38	1.15	1.02	1.00	1.07	1.19	1.27	1.25	1.07	0.77	0.42	0.16	0.03
119	2.44	2.58	2.59	2.45	2.19	1.86	1.51	1.20	0.95	0.79	0.71	0.70	0.76	0.86	0.94	0.94	0.85	0.65	0.38	0.15	0.03
121	2.93	3.11	3.17	3.09	2.89	2.62	2.31	2.01	1.75	1.55	1.43	1.39	1.41	1.45	1.41	1.23	0.92	0.52	0.21	0.04	0.00
123	2.71	2.91	2.96	2.84	2.55	2.17	1.75	1.38	1.10	0.95	0.91	0.97	1.08	1.18	1.19	1.07	0.82	0.49	0.21	0.05	0.01
125	2.81	3.01	3.07	2.96	2.69	2.31	1.90	1.54	1.28	1.12	1.06	1.07	1.11	1.16	1.16	1.08	0.91	0.66	0.37	0.15	0.03
127	2.58	2.77	2.81	2.69	2.41	2.03	1.63	1.27	1.02	0.89	0.88	0.96	1.08	1.21	1.28	1.26	1.12	0.88	0.57	0.27	0.08
129	2.63	2.80	2.85	2.76	2.54	2.20	1.80	1.40	1.06	0.84	0.78	0.85	1.03	1.22	1.30	1.18	0.89	0.50	0.19	0.04	0.00
131	2.73	2.94	3.01	2.91	2.66	2.30	1.88	1.49	1.19	1.00	0.93	0.97	1.07	1.18	1.21	1.13	0.91	0.62	0.32	0.11	0.02
134	2.59	2.71	2.69	2.55	2.32	2.03	1.73	1.45	1.22	1.04	0.95	0.93	0.99	1.08	1.15	1.10	0.92	0.63	0.33	0.11	0.02
137	2.45	2.56	2.56	2.43	2.21	1.91	1.59	1.27	0.98	0.77	0.66	0.69	0.83	1.03	1.19	1.20	0.99	0.64	0.29	0.08	0.01
139	2.28	2.38	2.38	2.28	2.12	1.92	1.72	1.52	1.36	1.23	1.16	1.18	1.30	1.49	1.66	1.71	1.55	1.19	0.73	0.32	0.09
141	2.69	2.83	2.84	2.72	2.48	2.19	1.88	1.59	1.34	1.15	1.04	1.01	1.04	1.12	1.15	1.08	0.88	0.58	0.29	0.09	0.01
143	2.67	2.82	2.85	2.75	2.54	2.25	1.90	1.55	1.24	1.00	0.89	0.91	1.05	1.22	1.31	1.22	0.95	0.56	0.23	0.05	0.01
145	2.46	2.56	2.54	2.38	2.12	1.82	1.51	1.22	0.98	0.83	0.77	0.82	0.95	1.12	1.20	1.13	0.88	0.52	0.21	0.05	0.01
147	2.62	2.77	2.77	2.61	2.34	1.97	1.59	1.22	0.94	0.77	0.73	0.81	0.97	1.11	1.12	0.95	0.63	0.30	0.09	0.01	0.00
149	2.53	2.69	2.70	2.57	2.31	1.97	1.61	1.28	1.01	0.86	0.82	0.90	1.05	1.18	1.19	1.02	0.70	0.35	0.12	0.02	0.00
151	2.44	2.58	2.60	2.50	2.31	2.07	1.81	1.59	1.42	1.32	1.29	1.32	1.41	1.51	1.58	1.54	1.36	1.05	0.67	0.32	0.10
153	2.33	2.44	2.45	2.35	2.17	1.94	1.71	1.52	1.38	1.30	1.28	1.29	1.32	1.37	1.41	1.41	1.33	1.14	0.87	0.57	0.32
155	2.35	2.48	2.48	2.36	2.13	1.85	1.57	1.33	1.15	1.03	0.97	0.96	0.99	1.06	1.12	1.14	1.05	0.84	0.55	0.26	0.08
157	2.50	2.70	2.75	2.64	2.39	2.04	1.67	1.36	1.14	1.03	1.01	1.05	1.13	1.21	1.27	1.28	1.20	1.01	0.73	0.43	0.22
159	2.38	2.50	2.50	2.36	2.12	1.84	1.55	1.30	1.11	0.98	0.90	0.88	0.90	0.96	1.02	1.02	0.92	0.71	0.43	0.18	0.04
161	2.24	2.33	2.32	2.21	2.02	1.80	1.57	1.36	1.20	1.07	0.99	0.95	0.96	1.01	1.07	1.09	1.02	0.82	0.54	0.26	0.08
164	2.44	2.57	2.60	2.53	2.38	2.18	1.96	1.74	1.55	1.40	1.31	1.27	1.30	1.37	1.45	1.48	1.40	1.21	0.93	0.64	0.40

Grain Size Data - ALE cont.

Depth	282.07	309.64	339.92	373.15	409.63	449.67	493.63	541.89	594.87	653.03	716.87	786.95	863.88	948.34
85	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
102	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
107	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
113	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
117	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
119	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
121	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
123	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
127	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
129	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
131	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
134	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
137	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
139	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
141	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
143	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
145	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
147	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
149	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
151	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
153	0.17	0.09	0.06	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
155	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
157	0.11	0.09	0.08	0.06	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
159	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
161	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
164	0.24	0.14	0.08	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Grain Size Data - ALE cont.

Depth	Size fraction (microns)																										
	0.38	**0.41**	**0.45**	**0.50**	**0.54**	**0.60**	**0.66**	**0.72**	**0.79**	**0.87**	**0.95**	**1.05**	**1.15**	**1.26**	**1.38**	**1.52**	**1.67**	**1.83**	**2.01**	**2.21**	**2.42**	**2.66**	**2.92**	**3.21**	**3.52**	**3.86**	**4.24**
167	0.06	0.11	0.17	0.24	0.30	0.35	0.40	0.45	0.49	0.52	0.55	0.58	0.61	0.64	0.67	0.70	0.74	0.79	0.85	0.92	1.00	1.08	1.18	1.28	1.38	1.49	1.60
169	0.08	0.15	0.22	0.31	0.39	0.46	0.52	0.59	0.64	0.68	0.72	0.76	0.79	0.83	0.87	0.90	0.95	1.01	1.07	1.14	1.22	1.31	1.40	1.50	1.60	1.70	1.79
171	0.08	0.15	0.22	0.31	0.39	0.45	0.51	0.57	0.62	0.66	0.69	0.72	0.75	0.78	0.81	0.84	0.89	0.94	1.00	1.07	1.15	1.24	1.34	1.44	1.56	1.67	1.78
173	0.08	0.14	0.20	0.29	0.36	0.42	0.48	0.53	0.58	0.62	0.65	0.68	0.70	0.73	0.76	0.79	0.83	0.88	0.94	1.01	1.09	1.18	1.29	1.40	1.52	1.64	1.76
175	0.07	0.12	0.18	0.26	0.32	0.38	0.43	0.48	0.52	0.55	0.57	0.60	0.62	0.64	0.67	0.70	0.73	0.78	0.84	0.91	0.99	1.08	1.19	1.31	1.45	1.58	1.72
177	0.08	0.14	0.20	0.28	0.35	0.42	0.47	0.52	0.57	0.61	0.64	0.67	0.69	0.72	0.75	0.78	0.82	0.87	0.93	1.00	1.08	1.18	1.28	1.40	1.52	1.64	1.76
179	0.09	0.15	0.22	0.32	0.40	0.47	0.53	0.59	0.64	0.69	0.72	0.75	0.78	0.81	0.84	0.88	0.92	0.97	1.03	1.10	1.17	1.26	1.35	1.46	1.56	1.66	1.76
181	0.08	0.13	0.20	0.28	0.35	0.41	0.46	0.52	0.56	0.60	0.63	0.66	0.68	0.71	0.74	0.77	0.82	0.87	0.93	1.00	1.09	1.18	1.29	1.40	1.52	1.64	1.76
183	0.07	0.12	0.18	0.25	0.32	0.37	0.42	0.47	0.52	0.55	0.58	0.61	0.64	0.67	0.70	0.74	0.78	0.83	0.89	0.96	1.04	1.13	1.24	1.35	1.47	1.60	1.73
185	0.06	0.11	0.16	0.23	0.29	0.34	0.39	0.43	0.47	0.50	0.52	0.55	0.57	0.59	0.62	0.65	0.68	0.73	0.78	0.85	0.92	1.01	1.12	1.23	1.36	1.49	1.63
187	0.06	0.11	0.16	0.22	0.28	0.32	0.37	0.41	0.44	0.47	0.49	0.51	0.53	0.55	0.57	0.59	0.62	0.66	0.70	0.76	0.83	0.92	1.01	1.12	1.25	1.38	1.52
189	0.08	0.15	0.22	0.31	0.38	0.45	0.51	0.57	0.62	0.67	0.70	0.73	0.77	0.80	0.83	0.86	0.90	0.95	1.01	1.07	1.15	1.23	1.32	1.42	1.52	1.62	1.71
191	0.06	0.11	0.17	0.24	0.30	0.35	0.40	0.44	0.48	0.52	0.54	0.57	0.59	0.62	0.65	0.68	0.72	0.76	0.82	0.88	0.96	1.05	1.15	1.26	1.37	1.50	1.62
193	0.07	0.13	0.19	0.27	0.34	0.40	0.45	0.50	0.55	0.59	0.62	0.65	0.68	0.71	0.74	0.77	0.81	0.87	0.93	1.00	1.08	1.17	1.28	1.39	1.50	1.63	1.75
195	0.07	0.13	0.19	0.27	0.34	0.40	0.45	0.50	0.54	0.58	0.61	0.63	0.65	0.67	0.70	0.73	0.76	0.81	0.86	0.93	1.01	1.10	1.21	1.32	1.45	1.59	1.72
197	0.08	0.14	0.20	0.29	0.36	0.43	0.49	0.54	0.59	0.64	0.67	0.70	0.74	0.77	0.80	0.83	0.87	0.92	0.97	1.04	1.11	1.18	1.27	1.35	1.44	1.54	1.62
199	0.07	0.12	0.18	0.25	0.31	0.37	0.42	0.46	0.50	0.54	0.56	0.59	0.61	0.64	0.66	0.69	0.73	0.77	0.83	0.90	0.97	1.06	1.17	1.28	1.40	1.52	1.65
201	0.07	0.12	0.17	0.25	0.31	0.36	0.41	0.46	0.49	0.52	0.55	0.57	0.59	0.62	0.64	0.66	0.70	0.74	0.80	0.86	0.94	1.03	1.13	1.25	1.37	1.51	1.64
203	0.07	0.13	0.18	0.26	0.33	0.38	0.43	0.48	0.52	0.55	0.58	0.60	0.62	0.65	0.67	0.70	0.73	0.78	0.84	0.90	0.99	1.08	1.19	1.31	1.44	1.57	1.71
205	0.06	0.11	0.17	0.24	0.30	0.35	0.40	0.45	0.48	0.52	0.55	0.57	0.60	0.62	0.65	0.68	0.72	0.77	0.83	0.89	0.97	1.06	1.16	1.26	1.38	1.49	1.61
207	0.06	0.11	0.17	0.24	0.30	0.35	0.39	0.43	0.47	0.50	0.52	0.54	0.56	0.58	0.60	0.63	0.66	0.70	0.75	0.81	0.89	0.98	1.08	1.20	1.32	1.46	1.61
209	0.06	0.11	0.16	0.23	0.28	0.33	0.37	0.41	0.45	0.48	0.50	0.52	0.54	0.56	0.58	0.60	0.63	0.67	0.72	0.79	0.86	0.95	1.05	1.17	1.29	1.43	1.57
211	0.06	0.10	0.15	0.21	0.26	0.31	0.35	0.39	0.42	0.45	0.47	0.48	0.50	0.52	0.53	0.55	0.58	0.61	0.66	0.71	0.78	0.86	0.95	1.06	1.18	1.32	1.46
213	0.06	0.11	0.17	0.24	0.30	0.35	0.39	0.44	0.47	0.50	0.53	0.55	0.57	0.59	0.61	0.63	0.66	0.70	0.75	0.81	0.89	0.97	1.08	1.19	1.32	1.46	1.61
215	0.07	0.12	0.17	0.24	0.30	0.36	0.40	0.45	0.49	0.52	0.54	0.56	0.58	0.60	0.63	0.65	0.69	0.73	0.79	0.85	0.93	1.02	1.12	1.24	1.37	1.50	1.64
217	0.07	0.12	0.18	0.25	0.31	0.37	0.42	0.46	0.50	0.54	0.56	0.59	0.61	0.63	0.66	0.69	0.73	0.77	0.83	0.89	0.97	1.06	1.17	1.29	1.41	1.54	1.68
219	0.06	0.10	0.15	0.21	0.26	0.30	0.34	0.38	0.42	0.44	0.47	0.49	0.51	0.53	0.56	0.58	0.62	0.66	0.71	0.78	0.85	0.94	1.04	1.15	1.27	1.40	1.53
221	0.07	0.12	0.18	0.25	0.31	0.37	0.42	0.47	0.51	0.54	0.57	0.60	0.63	0.66	0.70	0.73	0.78	0.83	0.89	0.96	1.04	1.14	1.24	1.35	1.46	1.58	1.69
223	0.07	0.12	0.18	0.25	0.32	0.37	0.42	0.47	0.52	0.55	0.59	0.61	0.64	0.67	0.70	0.73	0.77	0.82	0.88	0.94	1.02	1.11	1.21	1.31	1.43	1.54	1.66
225	0.05	0.10	0.14	0.20	0.25	0.30	0.33	0.37	0.40	0.43	0.45	0.47	0.49	0.51	0.53	0.55	0.58	0.62	0.67	0.73	0.80	0.88	0.98	1.09	1.21	1.34	1.48
227	0.06	0.11	0.16	0.22	0.28	0.32	0.37	0.41	0.45	0.47	0.50	0.52	0.54	0.57	0.59	0.62	0.65	0.70	0.75	0.81	0.89	0.98	1.08	1.19	1.31	1.44	1.57
229	0.07	0.12	0.18	0.26	0.32	0.38	0.43	0.48	0.52	0.55	0.58	0.60	0.62	0.64	0.67	0.70	0.73	0.78	0.83	0.90	0.98	1.07	1.18	1.29	1.42	1.55	1.69
231	0.07	0.12	0.18	0.25	0.31	0.37	0.42	0.47	0.51	0.55	0.58	0.61	0.64	0.67	0.70	0.74	0.78	0.83	0.88	0.95	1.03	1.11	1.20	1.30	1.40	1.50	1.60
233	0.06	0.11	0.16	0.22	0.28	0.33	0.37	0.41	0.45	0.48	0.51	0.53	0.55	0.57	0.60	0.62	0.66	0.70	0.76	0.82	0.89	0.98	1.08	1.20	1.32	1.45	1.59
235	0.05	0.10	0.14	0.20	0.25	0.30	0.33	0.37	0.40	0.43	0.45	0.47	0.49	0.50	0.52	0.54	0.57	0.61	0.65	0.71	0.78	0.86	0.95	1.06	1.18	1.32	1.46
237	0.05	0.09	0.13	0.19	0.23	0.27	0.31	0.34	0.37	0.40	0.42	0.44	0.46	0.48	0.50	0.52	0.55	0.59	0.63	0.68	0.74	0.81	0.89	0.97	1.07	1.17	1.27

Grain Size Data - ALE cont.

Depth	4.66	5.11	5.61	6.16	6.76	7.42	8.15	8.94	9.82	10.78	11.83	12.99	14.26	15.65	17.18	18.86	20.71	22.73	24.95	27.39	30.07	33.01	36.24
167	1.70	1.79	1.88	1.96	2.02	2.08	2.13	2.17	2.20	2.21	2.21	2.20	2.19	2.18	2.16	2.11	2.02	1.90	1.80	1.77	1.82	1.96	2.15
169	1.87	1.94	2.01	2.05	2.09	2.12	2.15	2.17	2.20	2.21	2.21	2.21	2.22	2.23	2.22	2.15	2.04	1.89	1.77	1.73	1.80	1.96	2.16
171	1.88	1.98	2.07	2.14	2.20	2.26	2.31	2.35	2.39	2.40	2.40	2.39	2.38	2.36	2.33	2.24	2.10	1.92	1.77	1.70	1.76	1.93	2.16
173	1.87	1.98	2.09	2.18	2.26	2.33	2.39	2.45	2.49	2.51	2.51	2.49	2.47	2.44	2.39	2.29	2.13	1.94	1.78	1.71	1.75	1.90	2.09
175	1.86	2.00	2.13	2.26	2.37	2.47	2.56	2.64	2.69	2.72	2.72	2.69	2.64	2.59	2.50	2.38	2.20	1.99	1.82	1.72	1.74	1.86	2.04
177	1.88	1.99	2.10	2.19	2.27	2.35	2.41	2.47	2.51	2.53	2.52	2.50	2.48	2.46	2.41	2.32	2.16	1.97	1.80	1.71	1.74	1.88	2.08
179	1.86	1.94	2.02	2.08	2.14	2.19	2.24	2.28	2.32	2.35	2.36	2.36	2.37	2.39	2.37	2.30	2.16	1.97	1.81	1.74	1.80	1.97	2.22
181	1.87	1.98	2.08	2.17	2.24	2.30	2.36	2.40	2.44	2.45	2.44	2.42	2.40	2.39	2.35	2.27	2.13	1.95	1.79	1.71	1.75	1.90	2.11
183	1.86	1.98	2.11	2.22	2.33	2.42	2.51	2.59	2.64	2.68	2.69	2.67	2.64	2.59	2.52	2.41	2.25	2.07	1.90	1.81	1.83	1.96	2.15
185	1.77	1.91	2.06	2.19	2.33	2.45	2.56	2.67	2.76	2.82	2.85	2.85	2.83	2.78	2.70	2.57	2.39	2.17	1.98	1.86	1.84	1.92	2.06
187	1.67	1.82	1.98	2.13	2.28	2.43	2.56	2.70	2.81	2.90	2.95	2.97	2.96	2.92	2.84	2.69	2.48	2.24	2.01	1.87	1.84	1.91	2.04
189	1.80	1.89	1.97	2.03	2.09	2.14	2.19	2.24	2.29	2.32	2.34	2.35	2.37	2.39	2.38	2.31	2.18	2.01	1.85	1.78	1.84	2.00	2.23
191	1.75	1.87	1.99	2.11	2.21	2.31	2.40	2.48	2.55	2.59	2.61	2.61	2.59	2.56	2.51	2.40	2.24	2.06	1.89	1.81	1.83	1.94	2.10
193	1.87	1.98	2.09	2.18	2.27	2.35	2.42	2.48	2.53	2.56	2.57	2.56	2.55	2.54	2.50	2.40	2.24	2.05	1.88	1.79	1.82	1.96	2.16
195	1.86	2.00	2.13	2.26	2.38	2.49	2.59	2.68	2.76	2.81	2.83	2.83	2.82	2.79	2.73	2.60	2.40	2.16	1.95	1.82	1.81	1.92	2.08
197	1.70	1.78	1.84	1.90	1.95	1.99	2.03	2.08	2.12	2.15	2.17	2.20	2.22	2.26	2.27	2.25	2.16	2.01	1.88	1.81	1.86	2.04	2.29
199	1.78	1.90	2.02	2.13	2.23	2.32	2.40	2.48	2.54	2.58	2.60	2.59	2.58	2.55	2.50	2.39	2.22	2.02	1.85	1.76	1.78	1.89	2.06
201	1.78	1.91	2.05	2.17	2.29	2.40	2.51	2.60	2.68	2.73	2.76	2.76	2.74	2.70	2.64	2.51	2.33	2.11	1.92	1.81	1.82	1.92	2.08
203	1.86	1.99	2.13	2.25	2.37	2.48	2.58	2.66	2.73	2.77	2.77	2.76	2.72	2.67	2.59	2.45	2.26	2.04	1.85	1.74	1.75	1.86	2.02
205	1.73	1.84	1.94	2.04	2.13	2.21	2.29	2.35	2.40	2.44	2.45	2.45	2.43	2.41	2.37	2.28	2.14	1.99	1.85	1.79	1.83	1.95	2.11
207	1.76	1.91	2.06	2.20	2.35	2.48	2.61	2.72	2.82	2.89	2.93	2.93	2.90	2.86	2.77	2.62	2.40	2.16	1.94	1.80	1.78	1.87	2.01
209	1.72	1.87	2.02	2.17	2.31	2.45	2.57	2.69	2.79	2.87	2.91	2.91	2.89	2.85	2.76	2.61	2.41	2.17	1.97	1.84	1.82	1.90	2.03
211	1.61	1.77	1.93	2.09	2.25	2.41	2.57	2.72	2.85	2.96	3.04	3.08	3.08	3.05	2.96	2.80	2.58	2.31	2.06	1.89	1.83	1.87	1.97
213	1.76	1.92	2.07	2.23	2.38	2.52	2.66	2.78	2.89	2.97	3.02	3.03	3.01	2.96	2.87	2.70	2.47	2.21	1.97	1.82	1.79	1.86	2.00
215	1.78	1.92	2.05	2.18	2.31	2.42	2.53	2.62	2.70	2.76	2.78	2.78	2.76	2.72	2.65	2.52	2.33	2.10	1.91	1.80	1.80	1.91	2.08
217	1.82	1.96	2.09	2.22	2.34	2.45	2.55	2.64	2.71	2.75	2.77	2.76	2.73	2.68	2.60	2.47	2.29	2.07	1.89	1.79	1.80	1.91	2.08
219	1.67	1.81	1.94	2.08	2.21	2.33	2.44	2.54	2.62	2.68	2.71	2.72	2.70	2.65	2.58	2.46	2.30	2.11	1.95	1.85	1.85	1.94	2.08
221	1.81	1.91	2.01	2.10	2.18	2.25	2.31	2.36	2.40	2.43	2.44	2.43	2.42	2.40	2.37	2.29	2.16	2.00	1.86	1.79	1.83	1.97	2.16
223	1.78	1.90	2.01	2.11	2.20	2.29	2.36	2.43	2.49	2.53	2.55	2.54	2.53	2.51	2.45	2.35	2.20	2.02	1.86	1.77	1.80	1.93	2.11
225	1.62	1.76	1.91	2.05	2.19	2.33	2.45	2.57	2.67	2.75	2.79	2.81	2.79	2.75	2.68	2.55	2.38	2.19	2.02	1.92	1.91	1.99	2.11
227	1.71	1.85	1.99	2.12	2.25	2.37	2.48	2.58	2.67	2.73	2.77	2.77	2.76	2.72	2.64	2.51	2.33	2.13	1.95	1.84	1.84	1.92	2.06
229	1.82	1.96	2.09	2.21	2.33	2.44	2.54	2.63	2.70	2.75	2.77	2.77	2.75	2.72	2.65	2.52	2.33	2.11	1.92	1.81	1.82	1.93	2.10
231	1.70	1.79	1.87	1.95	2.02	2.08	2.13	2.19	2.23	2.27	2.29	2.30	2.31	2.31	2.30	2.24	2.12	1.98	1.87	1.83	1.90	2.06	2.26
233	1.73	1.88	2.02	2.16	2.30	2.43	2.55	2.66	2.76	2.82	2.86	2.86	2.84	2.78	2.69	2.55	2.36	2.15	1.96	1.84	1.82	1.91	2.04
235	1.60	1.76	1.91	2.07	2.22	2.37	2.52	2.66	2.78	2.88	2.94	2.96	2.96	2.91	2.83	2.68	2.48	2.25	2.04	1.91	1.87	1.93	2.04
237	1.37	1.48	1.58	1.68	1.77	1.87	1.95	2.04	2.11	2.17	2.21	2.23	2.24	2.23	2.20	2.14	2.03	1.90	1.79	1.75	1.80	1.92	2.08

Grain Size Data - ALE cont.

Depth	39.78	43.67	47.94	52.63	57.77	63.42	69.62	76.43	83.90	92.10	101.10	110.99	121.84	133.75	146.82	161.18	176.94	194.23	213.22	234.07	256.95
167	2.33	2.44	2.46	2.38	2.22	2.03	1.83	1.66	1.52	1.42	1.36	1.35	1.39	1.47	1.56	1.61	1.53	1.30	0.97	0.62	0.35
169	2.33	2.43	2.43	2.33	2.16	1.94	1.72	1.49	1.28	1.10	0.97	0.93	0.98	1.12	1.28	1.35	1.25	0.96	0.58	0.25	0.07
171	2.38	2.50	2.49	2.36	2.13	1.86	1.60	1.38	1.19	1.05	0.95	0.90	0.91	0.98	1.08	1.15	1.10	0.90	0.61	0.31	0.10
173	2.28	2.38	2.37	2.25	2.05	1.81	1.57	1.35	1.17	1.03	0.94	0.91	0.95	1.04	1.16	1.24	1.20	1.01	0.72	0.38	0.14
175	2.21	2.30	2.29	2.18	1.98	1.75	1.52	1.32	1.17	1.07	1.01	1.01	1.04	1.11	1.19	1.22	1.16	0.97	0.68	0.36	0.13
177	2.27	2.38	2.37	2.24	2.02	1.77	1.52	1.32	1.17	1.06	1.00	0.98	1.00	1.06	1.13	1.18	1.14	0.97	0.71	0.40	0.16
179	2.45	2.59	2.59	2.45	2.20	1.90	1.60	1.33	1.14	1.01	0.93	0.90	0.92	0.96	1.02	1.03	0.97	0.79	0.52	0.25	0.07
181	2.31	2.42	2.41	2.28	2.06	1.81	1.57	1.37	1.23	1.14	1.09	1.08	1.10	1.15	1.21	1.24	1.16	0.97	0.69	0.37	0.14
183	2.34	2.47	2.48	2.37	2.16	1.90	1.62	1.38	1.18	1.05	1.00	1.01	1.08	1.16	1.16	1.05	0.80	0.47	0.20	0.04	0.00
185	2.21	2.29	2.29	2.19	2.02	1.80	1.58	1.38	1.22	1.11	1.05	1.04	1.08	1.15	1.20	1.18	1.05	0.80	0.49	0.22	0.06
187	2.16	2.23	2.20	2.09	1.91	1.71	1.52	1.36	1.24	1.16	1.10	1.07	1.07	1.10	1.15	1.18	1.16	1.02	0.79	0.50	0.26
189	2.45	2.58	2.58	2.45	2.21	1.92	1.62	1.36	1.16	1.02	0.94	0.94	0.99	1.08	1.18	1.20	1.09	0.85	0.53	0.24	0.07
191	2.25	2.32	2.29	2.15	1.96	1.74	1.53	1.36	1.24	1.16	1.13	1.13	1.15	1.20	1.24	1.24	1.16	1.00	0.78	0.55	0.38
193	2.33	2.42	2.39	2.23	2.00	1.73	1.48	1.27	1.12	1.02	0.98	0.98	1.03	1.09	1.16	1.16	1.06	0.85	0.55	0.27	0.08
195	2.24	2.31	2.27	2.13	1.91	1.66	1.41	1.19	1.02	0.90	0.85	0.86	0.94	1.04	1.11	1.09	0.93	0.66	0.36	0.13	0.02
197	2.56	2.74	2.78	2.65	2.40	2.08	1.77	1.52	1.34	1.22	1.14	1.09	1.07	1.12	1.21	1.28	1.25	1.06	0.71	0.34	0.10
199	2.21	2.29	2.26	2.15	1.99	1.81	1.65	1.52	1.41	1.30	1.21	1.14	1.13	1.18	1.26	1.31	1.26	1.07	0.77	0.43	0.18
201	2.21	2.27	2.23	2.11	1.94	1.76	1.60	1.45	1.32	1.20	1.10	1.05	1.07	1.16	1.28	1.31	1.19	0.91	0.53	0.22	0.05
203	2.17	2.24	2.21	2.09	1.92	1.73	1.56	1.41	1.27	1.15	1.05	0.98	0.97	1.02	1.10	1.15	1.09	0.90	0.61	0.30	0.10
205	2.26	2.34	2.32	2.23	2.09	1.93	1.78	1.64	1.50	1.38	1.26	1.19	1.19	1.27	1.39	1.47	1.44	1.24	0.90	0.52	0.23
207	2.14	2.20	2.15	2.00	1.81	1.60	1.42	1.28	1.16	1.07	0.99	0.94	0.93	0.97	1.05	1.12	1.13	1.05	0.88	0.64	0.41
209	2.16	2.21	2.18	2.07	1.91	1.73	1.58	1.44	1.32	1.20	1.10	1.03	1.03	1.10	1.21	1.28	1.24	1.05	0.74	0.39	0.14
211	2.07	2.11	2.08	1.98	1.83	1.68	1.53	1.41	1.31	1.21	1.13	1.08	1.08	1.13	1.21	1.27	1.25	1.11	0.85	0.55	0.29
213	2.13	2.19	2.16	2.04	1.86	1.66	1.47	1.30	1.16	1.04	0.96	0.91	0.92	0.98	1.07	1.12	1.08	0.90	0.63	0.34	0.14
215	2.22	2.28	2.25	2.12	1.94	1.75	1.58	1.43	1.30	1.18	1.09	1.05	1.07	1.15	1.26	1.30	1.19	0.93	0.58	0.26	0.07
217	2.25	2.34	2.32	2.20	2.01	1.79	1.57	1.38	1.22	1.09	1.00	0.96	0.97	1.04	1.12	1.16	1.10	0.89	0.58	0.27	0.08
219	2.21	2.29	2.28	2.19	2.03	1.85	1.67	1.52	1.41	1.34	1.30	1.30	1.32	1.38	1.43	1.44	1.34	1.11	0.79	0.45	0.20
221	2.34	2.44	2.43	2.33	2.14	1.92	1.69	1.47	1.29	1.16	1.08	1.06	1.13	1.24	1.36	1.41	1.31	1.06	0.71	0.36	0.12
223	2.27	2.37	2.35	2.23	2.04	1.81	1.58	1.37	1.21	1.08	1.00	0.97	0.99	1.06	1.13	1.16	1.11	0.96	0.76	0.56	0.41
225	2.23	2.28	2.26	2.17	2.04	1.90	1.77	1.64	1.52	1.38	1.26	1.19	1.19	1.28	1.41	1.48	1.40	1.14	0.76	0.38	0.13
227	2.19	2.26	2.24	2.14	1.99	1.82	1.65	1.49	1.34	1.20	1.10	1.05	1.06	1.15	1.26	1.35	1.32	1.15	0.86	0.53	0.24
229	2.25	2.32	2.29	2.15	1.96	1.74	1.53	1.35	1.19	1.06	0.95	0.89	0.89	0.97	1.07	1.14	1.09	0.90	0.61	0.31	0.11
231	2.44	2.53	2.51	2.39	2.22	2.02	1.85	1.69	1.55	1.41	1.28	1.20	1.19	1.27	1.40	1.47	1.40	1.14	0.75	0.37	0.12
233	2.18	2.26	2.25	2.15	1.98	1.80	1.62	1.46	1.32	1.19	1.08	1.02	1.01	1.09	1.21	1.28	1.23	1.01	0.68	0.34	0.11
235	2.14	2.19	2.16	2.06	1.92	1.76	1.63	1.52	1.43	1.35	1.27	1.23	1.24	1.32	1.42	1.46	1.35	1.08	0.70	0.34	0.11
237	2.22	2.29	2.26	2.16	2.02	1.86	1.72	1.60	1.50	1.41	1.33	1.28	1.29	1.37	1.52	1.66	1.71	1.58	1.25	0.75	0.29

Grain Size Data - ALE cont.

Depth	282.07	309.64	339.92	373.15	409.63	449.67	493.63	541.89	594.87	653.03	716.87	786.95	863.88	948.34
167	0.19	0.12	0.08	0.05	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
169	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
171	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
173	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
175	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
177	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
179	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
181	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
183	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
185	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
187	0.10	0.04	0.02	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
189	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
191	0.27	0.22	0.17	0.11	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
193	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
195	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
197	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
199	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
201	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
203	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
205	0.07	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
207	0.23	0.10	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
209	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
211	0.12	0.04	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
213	0.04	0.02	0.02	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
215	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
217	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
219	0.08	0.04	0.03	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
221	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
223	0.31	0.25	0.19	0.12	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
225	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
227	0.08	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
229	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
231	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
233	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
235	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
237	0.07	0.03	0.11	0.42	0.88	1.27	1.42	1.33	1.09	0.73	0.36	0.10	0.02	0.00

Grain Size Data - ALE cont.

Depth	Size fraction (microns)																									
	0.38	**0.41**	**0.45**	**0.50**	**0.54**	**0.60**	**0.66**	**0.72**	**0.79**	**0.87**	**0.95**	**1.05**	**1.15**	**1.26**	**1.38**	**1.52**	**1.67**	**1.83**	**2.01**	**2.21**	**2.42**	**2.66**	**2.92**	**3.21**	**3.52**	**3.86**	**4.24**
239	0.07	0.12	0.18	0.26	0.32	0.38	0.43	0.48	0.52	0.55	0.58	0.61	0.63	0.66	0.68	0.71	0.75	0.79	0.85	0.92	1.00	1.09	1.19	1.31	1.43	1.57	1.71
241	0.07	0.13	0.20	0.28	0.35	0.41	0.46	0.51	0.56	0.60	0.63	0.66	0.69	0.71	0.74	0.78	0.82	0.87	0.93	1.00	1.08	1.17	1.27	1.38	1.49	1.61	1.72
243	0.07	0.12	0.17	0.25	0.31	0.36	0.41	0.45	0.49	0.52	0.55	0.57	0.60	0.62	0.64	0.67	0.71	0.75	0.81	0.88	0.95	1.04	1.14	1.25	1.37	1.50	1.63
245	0.07	0.12	0.17	0.24	0.30	0.35	0.40	0.45	0.48	0.51	0.54	0.56	0.58	0.60	0.62	0.64	0.68	0.72	0.77	0.83	0.90	0.99	1.08	1.20	1.32	1.45	1.59
247	0.06	0.11	0.16	0.23	0.28	0.33	0.38	0.42	0.46	0.50	0.53	0.55	0.58	0.61	0.64	0.67	0.71	0.76	0.82	0.88	0.96	1.04	1.12	1.22	1.31	1.41	1.51
249	0.08	0.14	0.21	0.29	0.37	0.43	0.49	0.54	0.59	0.63	0.67	0.70	0.73	0.76	0.79	0.83	0.87	0.92	0.98	1.05	1.12	1.21	1.31	1.41	1.52	1.63	1.74
251	0.08	0.14	0.21	0.29	0.37	0.43	0.48	0.54	0.58	0.62	0.65	0.68	0.70	0.73	0.76	0.79	0.83	0.88	0.93	1.01	1.09	1.18	1.29	1.40	1.53	1.66	1.78
253	0.07	0.13	0.19	0.27	0.34	0.40	0.45	0.50	0.55	0.58	0.61	0.64	0.66	0.69	0.71	0.74	0.78	0.83	0.89	0.95	1.03	1.13	1.23	1.35	1.47	1.60	1.72
255	0.08	0.14	0.21	0.30	0.37	0.44	0.50	0.55	0.60	0.64	0.68	0.71	0.74	0.77	0.80	0.83	0.87	0.93	0.99	1.06	1.14	1.24	1.34	1.45	1.56	1.68	1.79
257	0.08	0.14	0.21	0.29	0.37	0.43	0.49	0.54	0.59	0.62	0.65	0.68	0.71	0.73	0.76	0.79	0.83	0.88	0.93	1.00	1.08	1.17	1.27	1.38	1.50	1.62	1.74
259	0.09	0.16	0.23	0.33	0.41	0.48	0.55	0.62	0.67	0.72	0.77	0.81	0.84	0.88	0.92	0.95	1.00	1.04	1.10	1.15	1.22	1.29	1.37	1.44	1.52	1.60	1.68
261	0.07	0.13	0.19	0.27	0.33	0.39	0.44	0.49	0.53	0.56	0.59	0.61	0.63	0.66	0.68	0.71	0.74	0.79	0.84	0.91	0.99	1.08	1.18	1.30	1.42	1.55	1.69
263	0.07	0.13	0.19	0.27	0.33	0.39	0.44	0.49	0.53	0.56	0.59	0.61	0.64	0.66	0.68	0.71	0.74	0.78	0.84	0.90	0.98	1.06	1.16	1.28	1.40	1.52	1.65
265	0.07	0.12	0.18	0.25	0.31	0.37	0.42	0.48	0.52	0.57	0.60	0.64	0.68	0.71	0.75	0.79	0.84	0.89	0.95	1.02	1.09	1.17	1.26	1.35	1.45	1.54	1.64
267	0.07	0.12	0.17	0.25	0.31	0.36	0.41	0.46	0.50	0.54	0.57	0.59	0.62	0.65	0.67	0.70	0.74	0.79	0.84	0.90	0.98	1.06	1.15	1.25	1.36	1.47	1.59
269	0.07	0.12	0.17	0.24	0.31	0.36	0.41	0.46	0.51	0.54	0.58	0.61	0.64	0.68	0.71	0.75	0.79	0.84	0.90	0.96	1.04	1.12	1.21	1.30	1.40	1.50	1.60
271	0.06	0.11	0.16	0.23	0.29	0.34	0.38	0.42	0.46	0.49	0.51	0.53	0.55	0.57	0.59	0.61	0.64	0.67	0.72	0.77	0.84	0.92	1.02	1.12	1.24	1.37	1.51
273	0.06	0.10	0.15	0.22	0.27	0.32	0.36	0.41	0.44	0.48	0.50	0.53	0.55	0.58	0.61	0.64	0.68	0.72	0.78	0.84	0.92	1.00	1.10	1.22	1.34	1.47	1.60
275	0.06	0.11	0.16	0.23	0.29	0.34	0.39	0.43	0.47	0.50	0.53	0.55	0.58	0.60	0.63	0.66	0.69	0.74	0.79	0.86	0.94	1.03	1.13	1.24	1.37	1.50	1.64
277	0.06	0.11	0.16	0.23	0.29	0.34	0.39	0.43	0.48	0.51	0.54	0.57	0.60	0.63	0.66	0.69	0.73	0.78	0.83	0.90	0.98	1.07	1.16	1.27	1.39	1.52	1.65
279	0.07	0.13	0.19	0.27	0.34	0.40	0.46	0.52	0.56	0.61	0.65	0.68	0.72	0.75	0.79	0.83	0.88	0.94	1.00	1.07	1.15	1.24	1.33	1.43	1.54	1.64	1.75
281	0.07	0.13	0.19	0.27	0.34	0.39	0.44	0.50	0.54	0.57	0.60	0.63	0.66	0.68	0.71	0.74	0.78	0.83	0.89	0.95	1.03	1.12	1.22	1.33	1.45	1.57	1.68
283	0.07	0.12	0.17	0.25	0.31	0.36	0.41	0.46	0.50	0.54	0.57	0.59	0.62	0.65	0.68	0.71	0.75	0.79	0.84	0.91	0.98	1.06	1.16	1.26	1.37	1.48	1.60
285	0.07	0.12	0.17	0.25	0.31	0.36	0.41	0.46	0.50	0.53	0.56	0.58	0.61	0.63	0.66	0.69	0.73	0.77	0.83	0.90	0.97	1.06	1.16	1.27	1.39	1.52	1.65
287	0.06	0.11	0.17	0.24	0.30	0.35	0.39	0.44	0.48	0.51	0.54	0.56	0.58	0.60	0.63	0.65	0.69	0.73	0.78	0.84	0.91	1.00	1.09	1.20	1.32	1.44	1.57
289	0.08	0.13	0.20	0.28	0.35	0.41	0.46	0.52	0.56	0.60	0.63	0.66	0.68	0.71	0.74	0.77	0.81	0.86	0.91	0.98	1.06	1.15	1.25	1.36	1.48	1.60	1.72
291	0.07	0.13	0.19	0.26	0.33	0.39	0.44	0.49	0.53	0.56	0.59	0.62	0.65	0.67	0.70	0.73	0.77	0.82	0.88	0.95	1.03	1.12	1.22	1.33	1.45	1.58	1.70
293	0.06	0.11	0.17	0.24	0.30	0.35	0.39	0.44	0.48	0.51	0.53	0.55	0.57	0.59	0.61	0.63	0.66	0.70	0.74	0.80	0.87	0.96	1.06	1.17	1.29	1.43	1.57
295	0.07	0.12	0.18	0.25	0.32	0.37	0.42	0.47	0.51	0.54	0.57	0.59	0.62	0.64	0.67	0.69	0.73	0.78	0.83	0.90	0.98	1.07	1.17	1.28	1.40	1.53	1.66
297	0.07	0.13	0.19	0.27	0.33	0.39	0.44	0.49	0.53	0.57	0.60	0.62	0.65	0.67	0.70	0.73	0.76	0.81	0.86	0.93	1.00	1.09	1.19	1.30	1.42	1.54	1.67
299	0.07	0.12	0.18	0.26	0.33	0.38	0.43	0.48	0.52	0.55	0.58	0.60	0.63	0.65	0.67	0.70	0.74	0.78	0.83	0.90	0.97	1.06	1.16	1.27	1.39	1.52	1.65
301	0.06	0.11	0.16	0.23	0.28	0.33	0.37	0.42	0.45	0.48	0.50	0.52	0.53	0.55	0.56	0.58	0.61	0.64	0.68	0.74	0.80	0.88	0.98	1.09	1.21	1.34	1.48
303	0.07	0.12	0.18	0.26	0.32	0.38	0.43	0.47	0.51	0.55	0.57	0.60	0.62	0.65	0.67	0.70	0.73	0.78	0.83	0.89	0.97	1.06	1.16	1.27	1.39	1.52	1.64
305	0.06	0.11	0.16	0.23	0.29	0.33	0.38	0.42	0.45	0.48	0.50	0.52	0.53	0.54	0.56	0.57	0.60	0.63	0.67	0.72	0.78	0.86	0.95	1.06	1.17	1.30	1.45
307	0.06	0.10	0.15	0.22	0.27	0.31	0.36	0.40	0.43	0.46	0.48	0.50	0.51	0.53	0.55	0.57	0.60	0.63	0.68	0.73	0.80	0.88	0.97	1.08	1.20	1.33	1.47
309	0.06	0.11	0.16	0.22	0.28	0.32	0.36	0.40	0.44	0.47	0.49	0.50	0.52	0.54	0.56	0.58	0.60	0.64	0.69	0.74	0.81	0.89	0.99	1.10	1.22	1.36	1.50

Grain Size Data - ALE cont.

Depth	4.66	5.11	5.61	6.16	6.76	7.42	8.15	8.94	9.82	10.78	11.83	12.99	14.26	15.65	17.18	18.86	20.71	22.73	24.95	27.39	30.07	33.01	36.24
239	1.84	1.98	2.12	2.25	2.38	2.49	2.60	2.70	2.78	2.84	2.87	2.87	2.85	2.80	2.72	2.59	2.39	2.16	1.95	1.82	1.80	1.89	2.04
241	1.83	1.94	2.03	2.12	2.20	2.26	2.33	2.38	2.43	2.45	2.46	2.46	2.46	2.46	2.42	2.34	2.19	2.00	1.84	1.76	1.80	1.94	2.15
243	1.75	1.88	2.00	2.11	2.22	2.31	2.40	2.49	2.56	2.61	2.64	2.64	2.64	2.62	2.57	2.47	2.30	2.11	1.93	1.83	1.83	1.94	2.11
245	1.74	1.89	2.03	2.18	2.32	2.46	2.60	2.73	2.84	2.94	3.00	3.03	3.04	3.02	2.95	2.81	2.60	2.34	2.09	1.93	1.87	1.93	2.05
247	1.60	1.69	1.77	1.85	1.91	1.97	2.03	2.08	2.13	2.16	2.19	2.20	2.22	2.24	2.24	2.20	2.10	1.97	1.85	1.79	1.83	1.95	2.14
249	1.84	1.94	2.02	2.10	2.17	2.24	2.29	2.35	2.40	2.43	2.45	2.47	2.48	2.49	2.48	2.40	2.25	2.06	1.88	1.79	1.81	1.96	2.17
251	1.91	2.03	2.15	2.25	2.35	2.43	2.52	2.59	2.65	2.69	2.71	2.71	2.71	2.70	2.65	2.54	2.35	2.12	1.92	1.80	1.80	1.91	2.08
253	1.85	1.98	2.10	2.21	2.31	2.41	2.49	2.58	2.64	2.69	2.71	2.71	2.70	2.67	2.62	2.51	2.33	2.11	1.91	1.79	1.78	1.89	2.06
255	1.90	2.00	2.09	2.17	2.24	2.30	2.36	2.41	2.46	2.49	2.50	2.50	2.50	2.50	2.47	2.39	2.23	2.03	1.84	1.75	1.78	1.94	2.15
257	1.86	1.97	2.08	2.18	2.26	2.34	2.42	2.49	2.56	2.60	2.63	2.64	2.65	2.66	2.63	2.54	2.38	2.17	1.98	1.87	1.88	2.00	2.18
259	1.75	1.81	1.87	1.92	1.96	2.01	2.05	2.11	2.16	2.20	2.24	2.27	2.31	2.34	2.35	2.31	2.21	2.08	1.96	1.93	2.02	2.21	2.46
261	1.83	1.96	2.09	2.22	2.34	2.45	2.56	2.66	2.75	2.81	2.85	2.86	2.86	2.83	2.78	2.66	2.46	2.23	2.01	1.88	1.86	1.95	2.10
263	1.79	1.92	2.04	2.16	2.28	2.39	2.49	2.60	2.69	2.76	2.80	2.83	2.84	2.84	2.80	2.69	2.51	2.28	2.07	1.94	1.92	2.02	2.17
265	1.73	1.81	1.89	1.96	2.02	2.08	2.13	2.18	2.23	2.27	2.30	2.32	2.34	2.36	2.37	2.33	2.25	2.13	2.03	1.99	2.04	2.17	2.35
267	1.70	1.81	1.92	2.02	2.12	2.21	2.30	2.38	2.45	2.52	2.56	2.59	2.62	2.63	2.61	2.54	2.40	2.23	2.06	1.97	1.97	2.08	2.24
269	1.69	1.78	1.87	1.95	2.01	2.08	2.13	2.18	2.23	2.26	2.28	2.30	2.31	2.31	2.30	2.25	2.15	2.03	1.91	1.85	1.88	1.99	2.15
271	1.65	1.79	1.94	2.09	2.24	2.39	2.53	2.68	2.81	2.93	3.03	3.10	3.15	3.16	3.13	3.02	2.83	2.58	2.33	2.15	2.06	2.07	2.14
273	1.74	1.89	2.03	2.17	2.31	2.44	2.57	2.68	2.79	2.87	2.93	2.95	2.95	2.92	2.85	2.73	2.55	2.33	2.13	1.99	1.95	2.01	2.14
275	1.79	1.93	2.08	2.22	2.36	2.49	2.62	2.73	2.84	2.92	2.97	3.00	3.00	2.97	2.91	2.79	2.60	2.37	2.15	2.01	1.97	2.04	2.17
277	1.78	1.92	2.06	2.19	2.32	2.45	2.57	2.69	2.79	2.88	2.94	2.98	2.99	2.97	2.92	2.80	2.62	2.40	2.19	2.06	2.02	2.08	2.21
279	1.85	1.94	2.03	2.11	2.18	2.24	2.30	2.36	2.41	2.45	2.49	2.51	2.53	2.55	2.54	2.47	2.34	2.17	2.02	1.94	1.96	2.10	2.28
281	1.80	1.91	2.01	2.10	2.19	2.27	2.34	2.41	2.47	2.51	2.54	2.55	2.57	2.58	2.57	2.49	2.34	2.15	1.98	1.90	1.93	2.07	2.25
283	1.72	1.83	1.95	2.06	2.16	2.26	2.36	2.46	2.55	2.62	2.68	2.72	2.75	2.76	2.74	2.66	2.51	2.32	2.15	2.05	2.05	2.14	2.28
285	1.78	1.91	2.04	2.16	2.28	2.40	2.50	2.61	2.71	2.78	2.84	2.87	2.89	2.89	2.85	2.75	2.58	2.35	2.15	2.02	2.01	2.09	2.24
287	1.71	1.85	1.98	2.12	2.25	2.38	2.51	2.63	2.75	2.84	2.91	2.96	2.99	2.99	2.95	2.84	2.65	2.42	2.20	2.06	2.02	2.08	2.20
289	1.84	1.96	2.07	2.17	2.26	2.35	2.43	2.51	2.58	2.63	2.66	2.69	2.70	2.71	2.69	2.60	2.45	2.25	2.06	1.95	1.96	2.07	2.25
291	1.82	1.94	2.05	2.15	2.25	2.34	2.42	2.49	2.56	2.60	2.63	2.65	2.66	2.66	2.63	2.55	2.39	2.20	2.01	1.91	1.92	2.04	2.22
293	1.72	1.87	2.02	2.18	2.33	2.48	2.62	2.76	2.89	3.00	3.08	3.13	3.16	3.15	3.09	2.96	2.75	2.49	2.23	2.05	1.98	2.01	2.12
295	1.79	1.92	2.05	2.17	2.29	2.40	2.50	2.60	2.69	2.76	2.81	2.83	2.85	2.84	2.80	2.70	2.52	2.30	2.10	1.97	1.95	2.05	2.20
297	1.79	1.91	2.03	2.14	2.24	2.34	2.43	2.52	2.60	2.66	2.70	2.73	2.75	2.75	2.73	2.63	2.47	2.26	2.07	1.96	1.97	2.09	2.26
299	1.78	1.91	2.04	2.16	2.28	2.39	2.50	2.60	2.69	2.76	2.81	2.83	2.85	2.85	2.81	2.70	2.52	2.29	2.08	1.95	1.93	2.03	2.18
301	1.64	1.79	1.96	2.12	2.29	2.45	2.62	2.78	2.93	3.07	3.18	3.25	3.30	3.31	3.26	3.13	2.91	2.64	2.36	2.15	2.05	2.05	2.11
303	1.77	1.90	2.03	2.15	2.27	2.38	2.49	2.59	2.68	2.76	2.81	2.85	2.87	2.87	2.83	2.73	2.55	2.32	2.11	1.98	1.96	2.05	2.20
305	1.60	1.75	1.92	2.09	2.26	2.43	2.60	2.78	2.95	3.10	3.23	3.32	3.39	3.42	3.39	3.27	3.06	2.77	2.48	2.25	2.12	2.09	2.13
307	1.62	1.78	1.94	2.10	2.26	2.42	2.58	2.74	2.89	3.02	3.13	3.20	3.25	3.25	3.20	3.07	2.86	2.59	2.33	2.13	2.05	2.07	2.15
309	1.65	1.81	1.97	2.13	2.29	2.45	2.61	2.76	2.91	3.03	3.12	3.19	3.22	3.21	3.15	3.01	2.79	2.52	2.26	2.07	1.99	2.02	2.11

Grain Size Data - ALE cont.

Depth	39.78	43.67	47.94	52.63	57.77	63.42	69.62	76.43	83.90	92.10	101.10	110.99	121.84	133.75	146.82	161.18	176.94	194.23	213.22	234.07	256.95
239	2.20	2.29	2.27	2.16	1.97	1.73	1.50	1.28	1.09	0.95	0.87	0.85	0.90	0.99	1.07	1.08	0.97	0.73	0.41	0.16	0.03
241	2.34	2.45	2.45	2.33	2.12	1.87	1.62	1.40	1.24	1.13	1.07	1.06	1.10	1.18	1.24	1.24	1.10	0.85	0.53	0.25	0.07
243	2.27	2.36	2.35	2.25	2.07	1.86	1.66	1.48	1.34	1.24	1.18	1.16	1.19	1.26	1.33	1.32	1.18	0.90	0.54	0.23	0.05
245	2.18	2.25	2.22	2.09	1.89	1.66	1.44	1.26	1.11	1.00	0.93	0.90	0.93	1.00	1.07	1.09	0.99	0.77	0.46	0.19	0.04
247	2.32	2.45	2.47	2.38	2.21	2.00	1.80	1.64	1.54	1.49	1.48	1.48	1.49	1.49	1.50	1.48	1.42	1.31	1.13	0.92	0.68
249	2.36	2.47	2.44	2.29	2.04	1.76	1.50	1.30	1.15	1.05	0.99	0.95	0.95	1.00	1.08	1.13	1.08	0.91	0.63	0.33	0.11
251	2.23	2.31	2.26	2.10	1.86	1.59	1.35	1.16	1.03	0.94	0.88	0.86	0.88	0.93	1.00	1.02	0.95	0.75	0.46	0.20	0.05
253	2.21	2.29	2.26	2.11	1.89	1.65	1.43	1.25	1.12	1.02	0.94	0.91	0.92	0.99	1.10	1.17	1.13	0.94	0.65	0.33	0.11
255	2.36	2.46	2.43	2.27	2.02	1.75	1.51	1.32	1.18	1.06	0.96	0.90	0.89	0.94	1.03	1.07	0.99	0.77	0.45	0.18	0.03
257	2.34	2.41	2.35	2.17	1.92	1.66	1.43	1.25	1.12	1.01	0.93	0.87	0.86	0.90	0.97	1.00	0.93	0.74	0.44	0.18	0.04
259	2.69	2.81	2.79	2.61	2.32	1.99	1.66	1.38	1.17	1.03	0.96	0.97	1.04	1.10	1.08	0.93	0.64	0.33	0.11	0.02	0.00
261	2.25	2.31	2.26	2.10	1.88	1.64	1.42	1.25	1.12	1.01	0.93	0.90	0.91	0.97	1.04	1.05	0.94	0.70	0.39	0.15	0.03
263	2.31	2.36	2.30	2.14	1.92	1.68	1.46	1.28	1.13	1.01	0.90	0.84	0.84	0.90	0.99	1.04	0.97	0.76	0.47	0.20	0.05
265	2.52	2.61	2.61	2.50	2.31	2.06	1.81	1.56	1.35	1.18	1.07	1.03	1.06	1.15	1.24	1.25	1.12	0.85	0.50	0.20	0.05
267	2.40	2.49	2.48	2.35	2.15	1.91	1.68	1.48	1.31	1.17	1.06	1.01	1.03	1.11	1.22	1.26	1.16	0.90	0.52	0.21	0.04
269	2.32	2.44	2.48	2.43	2.31	2.13	1.93	1.73	1.54	1.38	1.27	1.22	1.24	1.33	1.42	1.46	1.36	1.11	0.73	0.36	0.11
271	2.22	2.24	2.18	2.03	1.84	1.62	1.42	1.24	1.09	0.97	0.89	0.87	0.91	1.01	1.11	1.12	0.99	0.73	0.40	0.15	0.03
273	2.27	2.34	2.30	2.16	1.93	1.66	1.42	1.22	1.07	0.96	0.89	0.85	0.84	0.88	0.94	1.00	0.99	0.87	0.67	0.42	0.23
275	2.29	2.35	2.31	2.15	1.93	1.67	1.42	1.20	1.03	0.90	0.83	0.83	0.88	0.97	1.03	1.00	0.84	0.58	0.30	0.10	0.02
277	2.33	2.39	2.35	2.19	1.97	1.70	1.44	1.21	1.02	0.88	0.80	0.78	0.81	0.88	0.92	0.89	0.75	0.52	0.27	0.09	0.02
279	2.46	2.54	2.51	2.35	2.12	1.84	1.57	1.33	1.12	0.97	0.89	0.88	0.94	1.04	1.10	1.03	0.82	0.50	0.21	0.05	0.01
281	2.41	2.49	2.44	2.29	2.08	1.84	1.61	1.41	1.24	1.09	0.97	0.91	0.91	0.98	1.07	1.13	1.06	0.86	0.57	0.28	0.09
283	2.40	2.45	2.39	2.24	2.04	1.82	1.61	1.41	1.22	1.05	0.93	0.87	0.90	1.00	1.11	1.15	1.03	0.77	0.43	0.16	0.03
285	2.36	2.41	2.34	2.18	1.95	1.71	1.48	1.28	1.10	0.95	0.84	0.79	0.82	0.91	1.00	1.01	0.88	0.63	0.34	0.12	0.02
287	2.31	2.35	2.29	2.14	1.93	1.71	1.50	1.31	1.14	1.00	0.89	0.84	0.88	0.97	1.07	1.08	0.95	0.68	0.36	0.13	0.02
289	2.41	2.49	2.45	2.29	2.04	1.76	1.50	1.26	1.07	0.93	0.84	0.81	0.85	0.92	0.97	0.94	0.77	0.52	0.25	0.08	0.01
291	2.38	2.46	2.42	2.25	2.00	1.74	1.50	1.32	1.18	1.08	0.99	0.93	0.90	0.92	0.97	1.00	0.96	0.80	0.55	0.27	0.09
293	2.23	2.27	2.22	2.07	1.85	1.61	1.39	1.20	1.06	0.95	0.88	0.86	0.88	0.94	0.98	0.95	0.81	0.57	0.30	0.11	0.02
295	2.35	2.42	2.38	2.23	1.99	1.73	1.48	1.26	1.08	0.96	0.89	0.88	0.92	1.00	1.05	1.02	0.87	0.62	0.33	0.12	0.02
297	2.42	2.50	2.45	2.29	2.05	1.78	1.52	1.29	1.12	0.99	0.91	0.89	0.92	0.99	1.04	1.00	0.85	0.59	0.31	0.11	0.02
299	2.32	2.38	2.33	2.17	1.94	1.68	1.43	1.23	1.06	0.95	0.87	0.83	0.85	0.90	0.97	1.00	0.94	0.77	0.50	0.25	0.09
301	2.17	2.18	2.11	1.95	1.75	1.54	1.34	1.18	1.04	0.94	0.86	0.83	0.85	0.91	0.99	1.02	0.95	0.75	0.46	0.20	0.04
303	2.33	2.39	2.34	2.19	1.98	1.74	1.50	1.29	1.11	0.98	0.90	0.89	0.95	1.03	1.09	1.03	0.84	0.56	0.27	0.09	0.01
305	2.17	2.16	2.08	1.92	1.72	1.51	1.32	1.16	1.03	0.93	0.85	0.82	0.84	0.91	0.98	0.98	0.86	0.62	0.33	0.12	0.02
307	2.24	2.28	2.23	2.10	1.91	1.68	1.47	1.27	1.10	0.97	0.90	0.89	0.94	1.03	1.09	1.06	0.89	0.62	0.32	0.11	0.02
309	2.20	2.24	2.20	2.07	1.88	1.67	1.46	1.28	1.12	0.99	0.90	0.85	0.85	0.89	0.96	1.00	0.95	0.79	0.53	0.27	0.09

Grain Size Data - ALE cont.

Depth	282.07	309.64	339.92	373.15	409.63	449.67	493.63	541.89	594.87	653.03	716.87	786.95	863.88	948.34
239	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
241	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
243	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
245	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
247	0.46	0.28	0.13	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
249	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
251	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
253	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
255	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
257	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
259	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
261	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
263	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
265	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
267	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
269	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
271	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
273	0.11	0.06	0.05	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
275	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
277	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
279	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
281	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
285	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
287	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
289	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
291	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
293	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
297	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
299	0.04	0.03	0.03	0.03	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
301	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
303	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
305	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
307	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
309	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Grain Size Data - ALE cont.

Depth	Size fraction (microns)																										
	0.38	0.41	0.45	0.50	0.54	0.60	0.66	0.72	0.79	0.87	0.95	1.05	1.15	1.26	1.38	1.52	1.67	1.83	2.01	2.21	2.42	2.66	2.92	3.21	3.52	3.86	4.24
311	0.11	0.20	0.29	0.42	0.52	0.61	0.69	0.77	0.85	0.90	0.95	1.00	1.04	1.08	1.13	1.17	1.22	1.28	1.35	1.42	1.51	1.60	1.69	1.79	1.89	1.98	2.07
313	0.06	0.10	0.15	0.21	0.26	0.31	0.35	0.39	0.43	0.46	0.48	0.51	0.53	0.55	0.58	0.61	0.64	0.68	0.73	0.79	0.87	0.95	1.04	1.15	1.26	1.39	1.52
315	0.06	0.10	0.15	0.21	0.26	0.31	0.35	0.39	0.42	0.45	0.47	0.48	0.50	0.52	0.54	0.56	0.58	0.62	0.66	0.72	0.79	0.87	0.97	1.08	1.21	1.35	1.50
317	0.06	0.10	0.15	0.21	0.26	0.30	0.34	0.38	0.41	0.44	0.46	0.47	0.49	0.50	0.52	0.54	0.57	0.60	0.64	0.70	0.76	0.85	0.94	1.05	1.18	1.32	1.47
319	0.07	0.12	0.18	0.26	0.32	0.37	0.42	0.47	0.51	0.55	0.57	0.60	0.62	0.65	0.67	0.70	0.73	0.77	0.82	0.89	0.96	1.04	1.13	1.24	1.35	1.47	1.59
321	0.09	0.17	0.25	0.35	0.44	0.52	0.59	0.66	0.72	0.77	0.82	0.86	0.91	0.95	1.00	1.06	1.13	1.22	1.31	1.43	1.55	1.69	1.85	2.01	2.17	2.34	2.49
323	0.09	0.16	0.24	0.34	0.42	0.49	0.56	0.63	0.69	0.74	0.78	0.82	0.86	0.90	0.94	0.98	1.04	1.10	1.17	1.25	1.35	1.45	1.56	1.68	1.79	1.91	2.02
325	0.09	0.17	0.25	0.35	0.44	0.51	0.58	0.65	0.70	0.75	0.79	0.82	0.86	0.89	0.93	0.97	1.03	1.10	1.18	1.29	1.42	1.57	1.74	1.94	2.15	2.38	2.62
327	0.10	0.18	0.26	0.37	0.47	0.55	0.62	0.69	0.75	0.80	0.85	0.88	0.92	0.96	1.00	1.04	1.10	1.16	1.24	1.32	1.42	1.53	1.65	1.77	1.89	2.01	2.13
329	0.10	0.18	0.26	0.37	0.46	0.54	0.62	0.69	0.75	0.80	0.84	0.87	0.91	0.95	0.99	1.03	1.09	1.15	1.23	1.32	1.42	1.53	1.65	1.77	1.90	2.03	2.15
331	0.09	0.16	0.24	0.34	0.43	0.50	0.57	0.64	0.69	0.74	0.78	0.82	0.86	0.90	0.94	0.99	1.04	1.11	1.19	1.29	1.39	1.50	1.62	1.75	1.88	2.00	2.12
333	0.09	0.16	0.23	0.33	0.41	0.48	0.54	0.61	0.66	0.70	0.74	0.77	0.80	0.83	0.87	0.91	0.96	1.02	1.09	1.18	1.27	1.38	1.50	1.63	1.76	1.90	2.02
335	0.10	0.17	0.25	0.35	0.44	0.51	0.58	0.65	0.70	0.74	0.78	0.81	0.84	0.87	0.91	0.95	1.00	1.06	1.13	1.22	1.32	1.44	1.56	1.70	1.84	1.97	2.11
337	0.09	0.16	0.23	0.33	0.41	0.48	0.54	0.60	0.65	0.69	0.72	0.75	0.78	0.81	0.84	0.88	0.93	1.00	1.08	1.18	1.30	1.45	1.62	1.81	2.02	2.25	2.48
339	0.08	0.13	0.20	0.28	0.35	0.41	0.47	0.52	0.57	0.60	0.64	0.67	0.69	0.72	0.75	0.79	0.83	0.89	0.95	1.03	1.12	1.23	1.34	1.47	1.61	1.75	1.89
341	0.08	0.14	0.21	0.30	0.37	0.43	0.48	0.54	0.58	0.62	0.64	0.67	0.69	0.72	0.75	0.78	0.82	0.87	0.94	1.02	1.12	1.23	1.36	1.50	1.65	1.81	1.97
344	0.12	0.22	0.33	0.46	0.58	0.68	0.77	0.86	0.94	1.01	1.06	1.12	1.17	1.22	1.28	1.34	1.42	1.51	1.61	1.73	1.87	2.02	2.18	2.35	2.51	2.67	2.82
347	0.09	0.16	0.23	0.33	0.42	0.49	0.56	0.63	0.68	0.74	0.78	0.83	0.87	0.92	0.97	1.04	1.11	1.19	1.29	1.41	1.53	1.68	1.83	1.99	2.16	2.33	2.49
349	0.08	0.14	0.21	0.29	0.37	0.43	0.49	0.55	0.60	0.64	0.68	0.71	0.75	0.79	0.83	0.87	0.92	0.99	1.06	1.14	1.24	1.34	1.46	1.58	1.70	1.82	1.94
351	0.09	0.15	0.22	0.32	0.40	0.47	0.53	0.59	0.65	0.69	0.73	0.77	0.81	0.84	0.89	0.93	1.00	1.07	1.16	1.27	1.40	1.54	1.71	1.89	2.09	2.29	2.50
353	0.11	0.19	0.28	0.39	0.49	0.57	0.64	0.72	0.78	0.82	0.86	0.90	0.93	0.97	1.00	1.04	1.09	1.16	1.24	1.33	1.43	1.55	1.67	1.81	1.94	2.08	2.20
355	0.10	0.18	0.27	0.39	0.48	0.56	0.64	0.71	0.77	0.83	0.87	0.91	0.95	0.99	1.04	1.09	1.16	1.24	1.33	1.44	1.57	1.71	1.86	2.02	2.18	2.34	2.49
357	0.10	0.17	0.25	0.35	0.44	0.51	0.58	0.64	0.70	0.74	0.77	0.80	0.83	0.86	0.89	0.93	0.99	1.06	1.15	1.26	1.39	1.55	1.72	1.92	2.13	2.35	2.58
359	0.08	0.15	0.22	0.31	0.38	0.45	0.51	0.57	0.62	0.66	0.70	0.73	0.77	0.80	0.84	0.88	0.93	0.99	1.06	1.14	1.23	1.34	1.45	1.57	1.69	1.81	1.93
361	0.09	0.17	0.25	0.35	0.44	0.52	0.58	0.65	0.71	0.76	0.81	0.85	0.89	0.93	0.97	1.01	1.07	1.13	1.21	1.29	1.39	1.49	1.60	1.72	1.83	1.95	2.05
363	0.09	0.16	0.24	0.34	0.43	0.50	0.56	0.63	0.68	0.72	0.75	0.79	0.82	0.85	0.89	0.94	1.01	1.09	1.19	1.31	1.46	1.63	1.82	2.03	2.26	2.50	2.73
365	0.11	0.19	0.28	0.39	0.49	0.58	0.66	0.73	0.80	0.86	0.91	0.95	0.99	1.04	1.08	1.13	1.18	1.25	1.32	1.40	1.49	1.59	1.70	1.81	1.92	2.02	2.11
367	0.10	0.17	0.25	0.36	0.45	0.53	0.61	0.68	0.75	0.81	0.87	0.92	0.98	1.03	1.09	1.16	1.23	1.31	1.40	1.50	1.60	1.72	1.84	1.97	2.09	2.21	2.32
369	0.10	0.18	0.27	0.38	0.48	0.56	0.64	0.71	0.77	0.82	0.87	0.91	0.95	0.99	1.04	1.10	1.17	1.25	1.35	1.47	1.61	1.77	1.94	2.12	2.31	2.50	2.69
371	0.10	0.17	0.25	0.36	0.45	0.53	0.60	0.67	0.73	0.78	0.82	0.85	0.89	0.93	0.97	1.01	1.07	1.14	1.23	1.33	1.46	1.60	1.76	1.95	2.14	2.35	2.56
373	0.09	0.16	0.23	0.33	0.42	0.49	0.56	0.62	0.68	0.72	0.76	0.80	0.83	0.86	0.90	0.94	1.00	1.06	1.14	1.24	1.36	1.49	1.65	1.83	2.02	2.23	2.45
375	0.09	0.16	0.23	0.33	0.41	0.48	0.55	0.61	0.67	0.72	0.76	0.81	0.85	0.89	0.93	0.98	1.03	1.09	1.17	1.25	1.34	1.44	1.55	1.66	1.78	1.89	1.99
377	0.10	0.18	0.27	0.38	0.48	0.56	0.63	0.71	0.77	0.82	0.87	0.91	0.95	0.99	1.04	1.09	1.15	1.23	1.32	1.43	1.56	1.71	1.88	2.06	2.26	2.45	2.65
379	0.10	0.17	0.25	0.36	0.44	0.52	0.59	0.66	0.72	0.76	0.80	0.84	0.88	0.91	0.95	0.99	1.04	1.11	1.18	1.26	1.35	1.45	1.56	1.67	1.79	1.89	2.00
381	0.09	0.17	0.24	0.35	0.43	0.51	0.58	0.65	0.71	0.75	0.80	0.84	0.88	0.92	0.97	1.02	1.09	1.16	1.26	1.37	1.51	1.66	1.84	2.03	2.23	2.45	2.67
383	0.10	0.18	0.27	0.38	0.48	0.56	0.64	0.72	0.78	0.84	0.89	0.93	0.98	1.03	1.08	1.14	1.21	1.30	1.40	1.51	1.64	1.79	1.95	2.12	2.29	2.46	2.62

Grain Size Data - ALE cont.

Depth	4.66	5.11	5.61	6.16	6.76	7.42	8.15	8.94	9.82	10.78	11.83	12.99	14.26	15.65	17.18	18.86	20.71	22.73	24.95	27.39	30.07	33.01	36.24
311	2.14	2.20	2.25	2.28	2.30	2.31	2.33	2.35	2.37	2.37	2.37	2.38	2.40	2.43	2.43	2.36	2.19	1.99	1.83	1.77	1.85	2.04	2.27
313	1.65	1.79	1.93	2.07	2.20	2.33	2.46	2.58	2.69	2.78	2.84	2.88	2.89	2.87	2.82	2.71	2.53	2.32	2.12	1.99	1.97	2.05	2.20
315	1.66	1.83	2.00	2.18	2.35	2.53	2.71	2.88	3.04	3.18	3.29	3.36	3.39	3.38	3.30	3.13	2.88	2.57	2.27	2.05	1.95	1.96	2.04
317	1.64	1.81	1.98	2.17	2.35	2.53	2.71	2.89	3.05	3.20	3.31	3.38	3.40	3.38	3.30	3.13	2.87	2.57	2.27	2.05	1.94	1.94	2.02
319	1.71	1.83	1.95	2.06	2.17	2.28	2.38	2.47	2.56	2.63	2.68	2.72	2.74	2.75	2.72	2.63	2.48	2.28	2.10	2.00	2.02	2.15	2.34
321	2.63	2.76	2.86	2.94	3.00	3.02	3.02	3.00	2.95	2.86	2.74	2.61	2.48	2.37	2.26	2.12	1.93	1.74	1.57	1.49	1.51	1.61	1.74
323	2.13	2.22	2.29	2.36	2.41	2.45	2.48	2.50	2.51	2.51	2.49	2.47	2.46	2.46	2.44	2.37	2.24	2.06	1.92	1.86	1.93	2.12	2.35
325	2.87	3.11	3.35	3.57	3.78	3.97	4.12	4.24	4.30	4.29	4.20	4.03	3.79	3.51	3.16	2.75	2.27	1.77	1.33	1.00	0.80	0.71	0.67
327	2.23	2.32	2.39	2.45	2.49	2.52	2.54	2.56	2.57	2.56	2.54	2.52	2.52	2.52	2.50	2.42	2.27	2.08	1.93	1.87	1.93	2.07	2.23
329	2.25	2.35	2.43	2.49	2.54	2.57	2.60	2.62	2.64	2.63	2.61	2.59	2.59	2.59	2.57	2.48	2.30	2.08	1.91	1.84	1.90	2.05	2.23
331	2.22	2.30	2.38	2.43	2.46	2.48	2.50	2.50	2.50	2.48	2.45	2.43	2.42	2.42	2.39	2.31	2.15	1.96	1.82	1.78	1.87	2.05	2.25
333	2.14	2.25	2.34	2.42	2.48	2.52	2.56	2.58	2.59	2.59	2.56	2.53	2.51	2.50	2.47	2.40	2.25	2.08	1.94	1.89	1.97	2.15	2.36
335	2.23	2.34	2.44	2.51	2.57	2.61	2.65	2.67	2.68	2.67	2.64	2.61	2.59	2.59	2.57	2.48	2.32	2.11	1.94	1.85	1.90	2.05	2.24
337	2.72	2.96	3.19	3.40	3.60	3.77	3.91	4.01	4.06	4.04	3.94	3.77	3.56	3.31	3.01	2.67	2.28	1.88	1.54	1.30	1.18	1.14	1.13
339	2.03	2.17	2.30	2.41	2.52	2.61	2.69	2.76	2.80	2.82	2.81	2.78	2.74	2.70	2.63	2.52	2.37	2.19	2.04	1.98	2.02	2.16	2.35
341	2.13	2.28	2.43	2.56	2.68	2.79	2.88	2.96	3.01	3.03	3.01	2.96	2.90	2.84	2.74	2.59	2.38	2.14	1.94	1.84	1.86	1.98	2.14
344	2.94	3.04	3.11	3.15	3.16	3.14	3.09	3.02	2.93	2.79	2.63	2.48	2.36	2.27	2.17	2.02	1.82	1.57	1.36	1.23	1.20	1.24	1.29
347	2.65	2.80	2.94	3.06	3.17	3.26	3.34	3.41	3.45	3.44	3.39	3.31	3.20	3.06	2.87	2.62	2.29	1.94	1.63	1.42	1.31	1.27	1.26
349	2.05	2.15	2.24	2.31	2.37	2.42	2.46	2.49	2.51	2.52	2.51	2.50	2.50	2.50	2.49	2.42	2.30	2.13	1.99	1.93	1.99	2.16	2.39
351	2.71	2.91	3.11	3.28	3.43	3.56	3.65	3.71	3.72	3.67	3.55	3.38	3.17	2.94	2.69	2.39	2.06	1.73	1.45	1.26	1.18	1.18	1.20
353	2.31	2.40	2.47	2.52	2.55	2.57	2.59	2.60	2.60	2.59	2.57	2.56	2.58	2.61	2.61	2.53	2.36	2.15	1.99	1.93	2.01	2.19	2.38
355	2.62	2.73	2.81	2.87	2.90	2.91	2.90	2.86	2.80	2.72	2.62	2.52	2.44	2.38	2.32	2.21	2.04	1.84	1.67	1.59	1.62	1.73	1.86
357	2.81	3.02	3.22	3.40	3.56	3.68	3.77	3.82	3.82	3.75	3.61	3.43	3.21	2.98	2.72	2.42	2.07	1.72	1.42	1.22	1.13	1.12	1.13
359	2.03	2.13	2.21	2.29	2.34	2.39	2.42	2.46	2.48	2.49	2.49	2.49	2.50	2.51	2.51	2.45	2.33	2.17	2.04	1.99	2.07	2.25	2.47
361	2.14	2.21	2.27	2.32	2.35	2.37	2.39	2.41	2.42	2.42	2.42	2.42	2.44	2.47	2.47	2.41	2.26	2.08	1.93	1.88	1.97	2.16	2.38
363	2.97	3.19	3.39	3.56	3.70	3.80	3.87	3.88	3.84	3.72	3.53	3.29	3.03	2.77	2.52	2.24	1.93	1.63	1.37	1.20	1.13	1.14	1.16
365	2.19	2.26	2.31	2.35	2.37	2.38	2.40	2.41	2.42	2.42	2.41	2.40	2.41	2.43	2.43	2.37	2.22	2.03	1.87	1.80	1.85	2.00	2.17
367	2.41	2.49	2.55	2.59	2.62	2.63	2.62	2.61	2.59	2.55	2.50	2.45	2.42	2.40	2.39	2.35	2.26	2.15	2.05	2.01	2.02	2.08	2.12
369	2.85	3.00	3.12	3.22	3.27	3.30	3.30	3.26	3.18	3.06	2.89	2.71	2.55	2.43	2.30	2.15	1.95	1.72	1.51	1.38	1.35	1.39	1.44
371	2.76	2.96	3.15	3.31	3.45	3.57	3.65	3.70	3.70	3.64	3.51	3.34	3.14	2.93	2.71	2.45	2.14	1.82	1.53	1.33	1.22	1.20	1.21
373	2.66	2.88	3.09	3.29	3.47	3.62	3.75	3.85	3.90	3.87	3.78	3.62	3.41	3.16	2.87	2.53	2.14	1.74	1.40	1.17	1.07	1.06	1.09
375	2.09	2.18	2.25	2.32	2.36	2.40	2.43	2.45	2.46	2.47	2.45	2.44	2.43	2.44	2.43	2.37	2.25	2.09	1.94	1.88	1.93	2.09	2.30
377	2.85	3.03	3.19	3.33	3.45	3.54	3.60	3.62	3.60	3.53	3.39	3.21	3.02	2.83	2.62	2.36	2.04	1.70	1.41	1.21	1.12	1.12	1.14
379	2.08	2.16	2.22	2.27	2.30	2.32	2.34	2.36	2.37	2.38	2.37	2.38	2.40	2.43	2.44	2.38	2.23	2.03	1.85	1.78	1.85	2.05	2.31
381	2.89	3.10	3.30	3.48	3.63	3.76	3.86	3.91	3.91	3.85	3.72	3.53	3.30	3.05	2.77	2.45	2.10	1.75	1.45	1.23	1.11	1.06	1.04
383	2.77	2.90	3.00	3.08	3.13	3.15	3.14	3.10	3.03	2.92	2.77	2.62	2.47	2.34	2.21	2.07	1.90	1.71	1.54	1.45	1.44	1.50	1.60

Grain Size Data - ALE cont.

Depth	39.78	43.67	47.94	52.63	57.77	63.42	69.62	76.43	83.90	92.10	101.10	110.99	121.84	133.75	146.82	161.18	176.94	194.23	213.22	234.07	256.95
311	2.44	2.47	2.35	2.09	1.75	1.40	1.08	0.81	0.63	0.55	0.55	0.61	0.68	0.68	0.58	0.37	0.16	0.04	0.00	0.00	0.00
313	2.35	2.45	2.45	2.34	2.15	1.90	1.64	1.40	1.21	1.09	1.05	1.10	1.20	1.32	1.36	1.26	1.00	0.63	0.30	0.09	0.01
315	2.12	2.16	2.10	1.96	1.77	1.56	1.37	1.20	1.06	0.95	0.88	0.84	0.84	0.89	0.95	0.96	0.90	0.72	0.46	0.22	0.06
317	2.10	2.13	2.09	1.96	1.77	1.57	1.37	1.19	1.03	0.91	0.83	0.81	0.86	0.97	1.10	1.14	1.04	0.80	0.47	0.20	0.05
319	2.52	2.62	2.60	2.45	2.21	1.91	1.61	1.34	1.12	0.97	0.88	0.85	0.89	0.96	1.02	1.03	0.92	0.71	0.43	0.19	0.05
321	1.84	1.84	1.76	1.59	1.37	1.14	0.91	0.69	0.53	0.44	0.44	0.50	0.59	0.63	0.56	0.38	0.18	0.05	0.01	0.00	0.00
323	2.56	2.65	2.59	2.37	2.05	1.66	1.26	0.91	0.64	0.49	0.47	0.54	0.65	0.71	0.65	0.47	0.24	0.08	0.01	0.00	0.00
325	0.63	0.54	0.41	0.27	0.17	0.12	0.11	0.12	0.12	0.11	0.11	0.14	0.19	0.27	0.32	0.30	0.20	0.09	0.02	0.00	0.00
327	2.32	2.29	2.13	1.89	1.61	1.35	1.12	0.91	0.73	0.58	0.48	0.45	0.48	0.53	0.53	0.45	0.28	0.11	0.02	0.00	0.00
329	2.34	2.30	2.12	1.85	1.54	1.25	1.01	0.82	0.67	0.56	0.51	0.50	0.52	0.53	0.47	0.33	0.17	0.05	0.01	0.00	0.00
331	2.37	2.37	2.24	2.04	1.81	1.57	1.33	1.07	0.79	0.55	0.43	0.44	0.57	0.76	0.87	0.79	0.53	0.24	0.06	0.01	0.00
333	2.51	2.54	2.42	2.19	1.90	1.59	1.30	1.02	0.77	0.59	0.50	0.51	0.59	0.69	0.72	0.62	0.39	0.17	0.04	0.00	0.00
335	2.38	2.41	2.29	2.05	1.73	1.40	1.08	0.81	0.63	0.53	0.52	0.57	0.64	0.65	0.55	0.35	0.15	0.03	0.00	0.00	0.00
337	1.09	0.98	0.83	0.66	0.52	0.41	0.35	0.30	0.26	0.23	0.22	0.25	0.31	0.35	0.35	0.27	0.15	0.06	0.01	0.00	0.00
339	2.50	2.56	2.48	2.28	1.97	1.61	1.25	0.93	0.69	0.58	0.58	0.68	0.81	0.87	0.79	0.58	0.31	0.11	0.02	0.00	0.00
341	2.25	2.26	2.15	1.94	1.68	1.41	1.17	0.97	0.80	0.70	0.66	0.67	0.72	0.73	0.66	0.49	0.28	0.10	0.02	0.00	0.00
344	1.29	1.20	1.06	0.90	0.75	0.63	0.52	0.41	0.31	0.25	0.26	0.33	0.45	0.54	0.54	0.40	0.20	0.06	0.01	0.00	0.00
347	1.21	1.11	0.96	0.81	0.68	0.60	0.54	0.48	0.42	0.37	0.35	0.38	0.45	0.51	0.51	0.41	0.23	0.09	0.02	0.00	0.00
349	2.58	2.67	2.61	2.41	2.10	1.73	1.37	1.05	0.80	0.66	0.61	0.66	0.76	0.85	0.83	0.69	0.44	0.20	0.05	0.01	0.00
351	1.20	1.14	1.03	0.92	0.83	0.77	0.73	0.68	0.60	0.51	0.44	0.42	0.43	0.45	0.41	0.29	0.15	0.04	0.01	0.00	0.00
353	2.50	2.49	2.35	2.10	1.79	1.44	1.07	0.67	0.34	0.15	0.12	0.16	0.23	0.27	0.24	0.16	0.07	0.02	0.00	0.00	0.00
355	1.94	1.91	1.77	1.58	1.35	1.13	0.92	0.71	0.52	0.38	0.33	0.36	0.43	0.50	0.49	0.36	0.18	0.05	0.01	0.00	0.00
357	1.10	1.01	0.88	0.74	0.64	0.59	0.56	0.53	0.49	0.43	0.37	0.34	0.35	0.37	0.35	0.28	0.16	0.06	0.01	0.00	0.00
359	2.64	2.68	2.56	2.32	2.01	1.69	1.40	1.14	0.92	0.74	0.63	0.61	0.66	0.73	0.74	0.63	0.39	0.16	0.03	0.00	0.00
361	2.53	2.55	2.42	2.17	1.88	1.59	1.33	1.10	0.89	0.72	0.60	0.55	0.54	0.56	0.52	0.40	0.23	0.08	0.02	0.00	0.00
363	1.13	1.03	0.87	0.71	0.59	0.52	0.50	0.50	0.47	0.41	0.33	0.27	0.25	0.27	0.30	0.28	0.19	0.09	0.02	0.00	0.00
365	2.29	2.28	2.14	1.90	1.63	1.38	1.17	1.01	0.87	0.75	0.66	0.62	0.61	0.60	0.54	0.40	0.22	0.08	0.01	0.00	0.00
367	2.11	2.00	1.81	1.59	1.36	1.15	0.98	0.81	0.65	0.51	0.40	0.35	0.34	0.35	0.33	0.26	0.15	0.05	0.01	0.00	0.00
369	1.45	1.38	1.24	1.07	0.93	0.83	0.75	0.68	0.60	0.50	0.41	0.36	0.34	0.34	0.33	0.26	0.16	0.06	0.01	0.00	0.00
371	1.18	1.08	0.92	0.74	0.60	0.50	0.46	0.45	0.44	0.41	0.38	0.35	0.33	0.32	0.29	0.23	0.14	0.05	0.01	0.00	0.00
373	1.10	1.05	0.93	0.79	0.67	0.59	0.54	0.52	0.50	0.47	0.43	0.42	0.41	0.41	0.37	0.28	0.16	0.06	0.01	0.00	0.00
375	2.48	2.55	2.46	2.24	1.92	1.57	1.24	0.97	0.78	0.70	0.70	0.78	0.87	0.89	0.79	0.56	0.29	0.10	0.02	0.00	0.00
377	1.12	1.03	0.87	0.70	0.56	0.48	0.43	0.40	0.38	0.34	0.31	0.31	0.34	0.38	0.38	0.31	0.19	0.07	0.01	0.00	0.00
379	2.55	2.66	2.62	2.41	2.10	1.73	1.37	1.06	0.82	0.67	0.63	0.68	0.75	0.79	0.71	0.52	0.27	0.09	0.02	0.00	0.00
381	0.99	0.87	0.70	0.52	0.37	0.27	0.23	0.22	0.23	0.25	0.27	0.29	0.32	0.33	0.30	0.23	0.13	0.05	0.01	0.00	0.00
383	1.67	1.65	1.54	1.35	1.12	0.90	0.71	0.56	0.47	0.42	0.41	0.43	0.44	0.42	0.36	0.25	0.12	0.04	0.01	0.00	0.00

Grain Size Data - ALE cont.

Depth	282.07	309.64	339.92	373.15	409.63	449.67	493.63	541.89	594.87	653.03	716.87	786.95	863.88	948.34
311	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
313	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
315	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
317	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
319	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
321	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
323	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
325	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
327	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
329	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
331	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
333	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
335	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
337	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
339	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
341	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
344	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
347	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
349	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
351	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
353	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
355	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
357	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
359	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
361	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
363	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
365	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
367	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
369	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
371	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
373	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
375	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
377	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
379	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
381	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
383	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Grain Size Data - ALE cont.

Depth	Size fraction (microns)																										
	0.38	**0.41**	**0.45**	**0.50**	**0.54**	**0.60**	**0.66**	**0.72**	**0.79**	**0.87**	**0.95**	**1.05**	**1.15**	**1.26**	**1.38**	**1.52**	**1.67**	**1.83**	**2.01**	**2.21**	**2.42**	**2.66**	**2.92**	**3.21**	**3.52**	**3.86**	**4.24**
385	0.08	0.15	0.22	0.31	0.39	0.45	0.51	0.57	0.63	0.67	0.70	0.73	0.77	0.79	0.83	0.86	0.91	0.97	1.04	1.12	1.22	1.35	1.49	1.65	1.83	2.02	2.22
387	0.10	0.17	0.25	0.36	0.45	0.52	0.59	0.66	0.72	0.77	0.81	0.85	0.88	0.92	0.96	1.01	1.06	1.13	1.21	1.30	1.41	1.52	1.65	1.79	1.93	2.06	2.19
389	0.09	0.16	0.23	0.33	0.41	0.48	0.55	0.61	0.67	0.72	0.76	0.79	0.83	0.87	0.91	0.95	1.00	1.06	1.13	1.20	1.30	1.40	1.50	1.62	1.74	1.86	1.98
391	0.10	0.17	0.25	0.36	0.44	0.52	0.59	0.65	0.71	0.75	0.78	0.81	0.83	0.85	0.87	0.89	0.93	0.97	1.03	1.10	1.20	1.32	1.46	1.63	1.82	2.03	2.26
393	0.10	0.17	0.26	0.37	0.46	0.54	0.62	0.69	0.76	0.82	0.86	0.91	0.95	1.00	1.04	1.08	1.13	1.19	1.25	1.32	1.40	1.49	1.58	1.68	1.77	1.87	1.96
395	0.11	0.19	0.28	0.39	0.49	0.57	0.64	0.71	0.77	0.81	0.85	0.89	0.92	0.96	1.00	1.05	1.11	1.20	1.31	1.43	1.59	1.76	1.96	2.18	2.41	2.65	2.89
397	0.10	0.18	0.26	0.38	0.47	0.55	0.62	0.68	0.74	0.79	0.83	0.86	0.90	0.93	0.98	1.03	1.10	1.19	1.29	1.42	1.57	1.74	1.93	2.14	2.35	2.58	2.80
399	0.09	0.16	0.24	0.34	0.42	0.50	0.56	0.62	0.67	0.71	0.75	0.78	0.81	0.84	0.87	0.91	0.96	1.03	1.12	1.22	1.34	1.48	1.64	1.82	2.01	2.20	2.40
401	0.09	0.17	0.25	0.35	0.44	0.51	0.58	0.65	0.70	0.75	0.79	0.83	0.86	0.90	0.93	0.98	1.03	1.09	1.16	1.24	1.34	1.44	1.56	1.68	1.80	1.93	2.05
403	0.11	0.19	0.28	0.40	0.49	0.57	0.64	0.71	0.76	0.80	0.83	0.86	0.88	0.91	0.94	0.97	1.02	1.09	1.18	1.29	1.42	1.57	1.74	1.94	2.14	2.35	2.56
405	0.09	0.17	0.25	0.35	0.44	0.51	0.58	0.64	0.69	0.73	0.77	0.79	0.82	0.84	0.86	0.89	0.93	0.98	1.05	1.13	1.24	1.36	1.51	1.67	1.85	2.04	2.23
407	0.09	0.15	0.23	0.32	0.40	0.47	0.53	0.60	0.65	0.69	0.73	0.76	0.80	0.83	0.86	0.90	0.95	1.00	1.07	1.14	1.23	1.32	1.43	1.54	1.66	1.77	1.89
409	0.10	0.17	0.26	0.36	0.45	0.53	0.59	0.66	0.71	0.75	0.79	0.82	0.85	0.87	0.91	0.95	1.00	1.07	1.16	1.26	1.39	1.54	1.70	1.89	2.09	2.30	2.50
411	0.11	0.19	0.28	0.40	0.50	0.59	0.66	0.74	0.81	0.86	0.91	0.95	0.99	1.02	1.06	1.11	1.16	1.22	1.29	1.38	1.47	1.57	1.68	1.80	1.92	2.03	2.14
413	0.09	0.16	0.24	0.34	0.42	0.50	0.56	0.63	0.69	0.73	0.77	0.81	0.84	0.87	0.91	0.94	0.99	1.04	1.10	1.17	1.24	1.33	1.42	1.52	1.62	1.72	1.81
415	0.09	0.17	0.24	0.35	0.43	0.51	0.58	0.65	0.71	0.75	0.80	0.84	0.88	0.91	0.95	1.00	1.05	1.12	1.19	1.27	1.37	1.47	1.58	1.69	1.81	1.92	2.02
417	0.09	0.16	0.24	0.34	0.42	0.49	0.56	0.63	0.68	0.73	0.77	0.81	0.85	0.88	0.92	0.96	1.01	1.07	1.14	1.22	1.31	1.40	1.51	1.61	1.72	1.83	1.93
419	0.10	0.18	0.26	0.37	0.45	0.53	0.60	0.66	0.72	0.76	0.80	0.83	0.86	0.90	0.94	0.98	1.04	1.12	1.21	1.32	1.45	1.59	1.75	1.91	2.09	2.26	2.43
421	0.08	0.14	0.21	0.30	0.37	0.44	0.50	0.56	0.61	0.65	0.68	0.71	0.75	0.78	0.81	0.85	0.90	0.96	1.03	1.11	1.21	1.32	1.43	1.56	1.69	1.83	1.97
423	0.09	0.16	0.24	0.34	0.43	0.50	0.57	0.64	0.69	0.74	0.78	0.82	0.85	0.89	0.93	0.97	1.02	1.08	1.15	1.24	1.33	1.43	1.54	1.66	1.78	1.90	2.01
425	0.09	0.16	0.24	0.34	0.42	0.49	0.55	0.61	0.67	0.71	0.74	0.77	0.80	0.83	0.86	0.89	0.94	0.99	1.05	1.13	1.21	1.31	1.42	1.54	1.65	1.78	1.89
427	0.09	0.17	0.24	0.35	0.43	0.51	0.58	0.65	0.70	0.75	0.79	0.83	0.86	0.90	0.93	0.97	1.02	1.08	1.14	1.21	1.30	1.39	1.48	1.58	1.68	1.78	1.87
429	0.10	0.17	0.25	0.36	0.44	0.52	0.58	0.65	0.70	0.74	0.77	0.80	0.83	0.86	0.89	0.92	0.97	1.03	1.10	1.18	1.28	1.40	1.52	1.66	1.80	1.94	2.07
431	0.08	0.15	0.22	0.32	0.39	0.46	0.52	0.59	0.64	0.68	0.72	0.75	0.79	0.82	0.86	0.90	0.95	1.01	1.08	1.17	1.26	1.37	1.49	1.61	1.74	1.87	2.00
433	0.09	0.16	0.23	0.33	0.42	0.49	0.55	0.61	0.67	0.71	0.74	0.77	0.80	0.83	0.86	0.90	0.95	1.01	1.08	1.17	1.29	1.42	1.57	1.74	1.92	2.13	2.34
435	0.09	0.16	0.24	0.33	0.42	0.49	0.55	0.61	0.66	0.70	0.74	0.77	0.80	0.83	0.86	0.90	0.95	1.02	1.10	1.19	1.30	1.43	1.58	1.74	1.90	2.07	2.24
437	0.08	0.14	0.21	0.30	0.38	0.45	0.51	0.58	0.63	0.68	0.73	0.78	0.82	0.87	0.92	0.97	1.03	1.11	1.19	1.28	1.39	1.51	1.64	1.77	1.92	2.06	2.21
439	0.09	0.16	0.24	0.34	0.42	0.49	0.56	0.62	0.68	0.72	0.75	0.78	0.81	0.84	0.87	0.91	0.96	1.02	1.10	1.20	1.31	1.45	1.61	1.79	1.98	2.19	2.41
441	0.09	0.16	0.24	0.34	0.42	0.49	0.55	0.62	0.67	0.71	0.75	0.78	0.81	0.84	0.88	0.92	0.97	1.04	1.13	1.23	1.35	1.50	1.66	1.84	2.04	2.24	2.46
443	0.09	0.16	0.23	0.33	0.41	0.48	0.54	0.60	0.65	0.69	0.73	0.75	0.78	0.81	0.85	0.89	0.94	1.01	1.10	1.21	1.34	1.50	1.68	1.88	2.10	2.33	2.57
445	0.10	0.17	0.25	0.35	0.44	0.52	0.59	0.65	0.71	0.76	0.81	0.84	0.89	0.93	0.97	1.02	1.08	1.16	1.24	1.34	1.45	1.58	1.71	1.85	1.99	2.13	2.25
447	0.08	0.14	0.21	0.30	0.37	0.43	0.49	0.55	0.59	0.63	0.66	0.69	0.72	0.74	0.77	0.81	0.86	0.92	0.99	1.09	1.20	1.33	1.49	1.67	1.86	2.08	2.31
449	0.09	0.17	0.25	0.35	0.44	0.51	0.58	0.65	0.70	0.75	0.79	0.83	0.86	0.90	0.93	0.98	1.03	1.10	1.18	1.27	1.37	1.49	1.62	1.75	1.89	2.03	2.17
451	0.11	0.19	0.28	0.40	0.50	0.59	0.66	0.74	0.80	0.85	0.89	0.93	0.96	1.00	1.04	1.08	1.14	1.20	1.28	1.38	1.48	1.60	1.73	1.87	2.01	2.14	2.27
453	0.09	0.15	0.23	0.32	0.40	0.47	0.53	0.59	0.64	0.68	0.71	0.73	0.76	0.78	0.81	0.84	0.88	0.94	1.01	1.10	1.22	1.35	1.51	1.69	1.89	2.11	2.35
455	0.09	0.16	0.23	0.33	0.41	0.48	0.55	0.61	0.65	0.69	0.72	0.75	0.77	0.79	0.82	0.84	0.89	0.94	1.01	1.10	1.21	1.34	1.50	1.68	1.88	2.10	2.34

Grain Size Data - ALE cont.

Depth	4.66	5.11	5.61	6.16	6.76	7.42	8.15	8.94	9.82	10.78	11.83	12.99	14.26	15.65	17.18	18.86	20.71	22.73	24.95	27.39	30.07	33.01	36.24
385	2.43	2.65	2.87	3.08	3.29	3.48	3.66	3.82	3.94	4.00	4.01	3.95	3.81	3.62	3.35	2.99	2.57	2.13	1.73	1.42	1.24	1.15	1.12
387	2.31	2.42	2.51	2.58	2.64	2.67	2.70	2.71	2.70	2.68	2.63	2.59	2.55	2.53	2.48	2.39	2.23	2.04	1.87	1.80	1.85	1.99	2.16
389	2.09	2.19	2.28	2.36	2.42	2.48	2.52	2.56	2.58	2.59	2.59	2.58	2.57	2.57	2.54	2.47	2.33	2.15	1.99	1.91	1.93	2.05	2.21
391	2.49	2.74	2.98	3.21	3.43	3.63	3.80	3.94	4.02	4.03	3.97	3.82	3.62	3.36	3.06	2.69	2.27	1.84	1.46	1.18	1.02	0.96	0.95
393	2.04	2.11	2.18	2.23	2.28	2.31	2.35	2.38	2.41	2.44	2.46	2.47	2.49	2.52	2.52	2.46	2.33	2.17	2.02	1.95	1.99	2.12	2.31
395	3.12	3.32	3.51	3.66	3.77	3.84	3.87	3.85	3.76	3.60	3.38	3.12	2.86	2.61	2.38	2.12	1.83	1.53	1.27	1.09	1.01	1.01	1.03
397	3.00	3.19	3.35	3.48	3.58	3.64	3.65	3.62	3.53	3.38	3.17	2.93	2.69	2.47	2.26	2.03	1.76	1.49	1.25	1.11	1.05	1.07	1.11
399	2.59	2.77	2.94	3.08	3.20	3.29	3.36	3.39	3.38	3.32	3.21	3.06	2.90	2.74	2.56	2.34	2.08	1.80	1.56	1.42	1.40	1.47	1.56
401	2.16	2.26	2.35	2.42	2.48	2.53	2.57	2.61	2.64	2.65	2.64	2.63	2.62	2.62	2.60	2.51	2.35	2.13	1.94	1.84	1.87	2.00	2.17
403	2.76	2.95	3.12	3.27	3.39	3.49	3.57	3.62	3.63	3.60	3.53	3.42	3.30	3.15	2.96	2.69	2.34	1.94	1.56	1.29	1.13	1.09	1.09
405	2.43	2.63	2.82	2.99	3.15	3.29	3.41	3.51	3.56	3.57	3.52	3.43	3.31	3.15	2.94	2.68	2.35	2.00	1.68	1.46	1.34	1.31	1.32
407	1.99	2.09	2.18	2.26	2.32	2.38	2.43	2.47	2.51	2.53	2.54	2.54	2.54	2.55	2.54	2.48	2.35	2.19	2.05	1.99	2.06	2.23	2.44
409	2.71	2.90	3.07	3.23	3.35	3.45	3.51	3.54	3.52	3.44	3.30	3.13	2.95	2.76	2.57	2.33	2.04	1.73	1.47	1.30	1.25	1.28	1.35
411	2.23	2.31	2.38	2.43	2.47	2.50	2.52	2.55	2.56	2.57	2.56	2.55	2.55	2.57	2.55	2.46	2.29	2.07	1.88	1.79	1.82	1.96	2.13
413	1.90	1.98	2.05	2.11	2.16	2.21	2.25	2.30	2.35	2.39	2.42	2.44	2.48	2.52	2.54	2.49	2.38	2.21	2.07	2.02	2.08	2.26	2.47
415	2.11	2.19	2.26	2.31	2.35	2.37	2.39	2.41	2.42	2.42	2.41	2.40	2.41	2.43	2.43	2.38	2.26	2.11	1.97	1.92	1.99	2.18	2.42
417	2.01	2.09	2.16	2.21	2.25	2.28	2.30	2.33	2.35	2.36	2.36	2.37	2.39	2.41	2.42	2.38	2.27	2.12	1.99	1.95	2.03	2.22	2.47
419	2.59	2.72	2.84	2.93	2.99	3.03	3.04	3.03	2.99	2.92	2.81	2.70	2.61	2.53	2.45	2.31	2.11	1.87	1.66	1.55	1.58	1.70	1.86
421	2.10	2.22	2.34	2.44	2.53	2.61	2.67	2.72	2.75	2.76	2.74	2.70	2.66	2.62	2.56	2.47	2.32	2.14	1.98	1.89	1.91	2.05	2.24
423	2.12	2.21	2.29	2.35	2.40	2.44	2.47	2.49	2.51	2.52	2.51	2.50	2.50	2.51	2.50	2.45	2.32	2.15	1.99	1.91	1.96	2.12	2.33
425	2.00	2.10	2.20	2.28	2.35	2.41	2.46	2.52	2.57	2.60	2.61	2.62	2.64	2.65	2.64	2.56	2.41	2.22	2.05	1.98	2.02	2.18	2.37
427	1.95	2.03	2.09	2.14	2.18	2.21	2.25	2.29	2.33	2.36	2.38	2.41	2.44	2.49	2.50	2.46	2.34	2.19	2.07	2.04	2.13	2.32	2.54
429	2.20	2.31	2.41	2.49	2.55	2.60	2.64	2.67	2.68	2.67	2.64	2.61	2.59	2.58	2.55	2.45	2.29	2.08	1.91	1.84	1.90	2.05	2.22
431	2.12	2.23	2.33	2.42	2.49	2.55	2.59	2.63	2.65	2.65	2.63	2.61	2.58	2.56	2.53	2.46	2.34	2.18	2.04	1.97	2.01	2.16	2.37
433	2.55	2.77	2.99	3.19	3.39	3.57	3.74	3.88	3.98	4.01	3.98	3.89	3.73	3.53	3.25	2.90	2.47	2.02	1.63	1.34	1.18	1.11	1.09
435	2.41	2.56	2.70	2.82	2.92	2.99	3.04	3.07	3.06	3.02	2.94	2.83	2.73	2.63	2.53	2.38	2.20	2.00	1.83	1.74	1.77	1.87	2.00
437	2.35	2.48	2.60	2.70	2.80	2.87	2.92	2.96	2.97	2.95	2.90	2.82	2.73	2.62	2.50	2.37	2.21	2.04	1.90	1.83	1.84	1.93	2.05
439	2.63	2.85	3.07	3.27	3.45	3.62	3.75	3.86	3.92	3.91	3.84	3.71	3.52	3.30	3.02	2.69	2.30	1.90	1.55	1.30	1.17	1.13	1.13
441	2.67	2.88	3.08	3.26	3.42	3.55	3.66	3.73	3.76	3.72	3.62	3.47	3.28	3.06	2.81	2.52	2.19	1.84	1.54	1.33	1.23	1.22	1.24
443	2.82	3.06	3.29	3.51	3.71	3.87	4.00	4.10	4.13	4.09	3.96	3.77	3.53	3.25	2.93	2.56	2.15	1.73	1.38	1.13	1.00	0.96	0.97
445	2.37	2.47	2.55	2.61	2.65	2.67	2.67	2.67	2.64	2.60	2.53	2.47	2.43	2.40	2.36	2.29	2.15	1.97	1.82	1.76	1.81	1.96	2.14
447	2.54	2.78	3.02	3.26	3.48	3.69	3.87	4.03	4.14	4.19	4.16	4.06	3.88	3.65	3.34	2.95	2.50	2.03	1.60	1.28	1.10	1.02	1.00
449	2.29	2.40	2.49	2.56	2.62	2.65	2.67	2.68	2.67	2.64	2.59	2.54	2.49	2.46	2.42	2.33	2.19	2.01	1.87	1.82	1.87	2.02	2.18
451	2.38	2.47	2.55	2.60	2.64	2.66	2.67	2.67	2.66	2.64	2.60	2.56	2.54	2.54	2.51	2.42	2.25	2.04	1.86	1.77	1.81	1.94	2.10
453	2.59	2.83	3.08	3.31	3.54	3.74	3.93	4.08	4.19	4.23	4.19	4.08	3.90	3.67	3.37	2.99	2.55	2.08	1.66	1.35	1.16	1.07	1.02
455	2.58	2.83	3.08	3.33	3.56	3.77	3.97	4.13	4.25	4.30	4.26	4.15	3.97	3.73	3.42	3.02	2.54	2.04	1.59	1.26	1.05	0.96	0.91

Grain Size Data - ALE cont.

Depth	39.78	43.67	47.94	52.63	57.77	63.42	69.62	76.43	83.90	92.10	101.10	110.99	121.84	133.75	146.82	161.18	176.94	194.23	213.22	234.07	256.95
385	1.07	0.98	0.85	0.71	0.59	0.52	0.49	0.49	0.48	0.45	0.41	0.38	0.38	0.39	0.39	0.33	0.21	0.09	0.02	0.00	0.00
387	2.28	2.29	2.15	1.91	1.61	1.31	1.03	0.80	0.61	0.49	0.43	0.44	0.50	0.54	0.52	0.42	0.24	0.09	0.02	0.00	0.00
389	2.33	2.36	2.27	2.08	1.83	1.56	1.31	1.09	0.91	0.77	0.69	0.67	0.69	0.70	0.66	0.53	0.32	0.13	0.03	0.00	0.00
391	0.94	0.90	0.84	0.77	0.71	0.69	0.67	0.65	0.61	0.56	0.50	0.47	0.46	0.45	0.41	0.31	0.17	0.07	0.01	0.00	0.00
393	2.46	2.50	2.41	2.20	1.90	1.57	1.26	0.98	0.76	0.62	0.56	0.57	0.60	0.61	0.53	0.38	0.20	0.06	0.01	0.00	0.00
395	1.01	0.93	0.77	0.59	0.44	0.35	0.30	0.29	0.30	0.30	0.30	0.31	0.33	0.34	0.32	0.26	0.15	0.06	0.01	0.00	0.00
397	1.11	1.04	0.92	0.80	0.69	0.62	0.57	0.52	0.47	0.44	0.44	0.50	0.58	0.63	0.61	0.47	0.27	0.10	0.02	0.00	0.00
399	1.62	1.59	1.47	1.30	1.13	0.99	0.87	0.76	0.67	0.58	0.52	0.49	0.50	0.51	0.46	0.35	0.19	0.07	0.01	0.00	0.00
401	2.30	2.32	2.18	1.93	1.61	1.29	1.03	0.84	0.74	0.70	0.71	0.75	0.78	0.75	0.64	0.45	0.24	0.08	0.01	0.00	0.00
403	1.09	1.02	0.90	0.74	0.59	0.49	0.44	0.41	0.39	0.36	0.34	0.33	0.32	0.32	0.30	0.24	0.14	0.05	0.01	0.00	0.00
405	1.31	1.26	1.15	1.03	0.92	0.84	0.79	0.74	0.68	0.62	0.58	0.57	0.57	0.56	0.49	0.36	0.19	0.07	0.01	0.00	0.00
407	2.62	2.69	2.60	2.38	2.06	1.70	1.35	1.05	0.82	0.67	0.60	0.62	0.69	0.74	0.70	0.55	0.32	0.12	0.02	0.00	0.00
409	1.39	1.35	1.24	1.09	0.94	0.83	0.74	0.67	0.61	0.54	0.48	0.45	0.44	0.44	0.40	0.31	0.18	0.07	0.01	0.00	0.00
411	2.26	2.28	2.14	1.90	1.59	1.28	1.00	0.79	0.64	0.55	0.51	0.51	0.53	0.52	0.45	0.32	0.16	0.05	0.01	0.00	0.00
413	2.65	2.70	2.61	2.38	2.06	1.72	1.40	1.13	0.92	0.79	0.74	0.76	0.81	0.84	0.79	0.62	0.36	0.14	0.03	0.00	0.00
415	2.63	2.73	2.66	2.43	2.08	1.67	1.29	0.97	0.75	0.63	0.59	0.60	0.61	0.57	0.46	0.28	0.11	0.02	0.00	0.00	0.00
417	2.67	2.76	2.68	2.45	2.11	1.73	1.38	1.09	0.89	0.76	0.72	0.73	0.75	0.75	0.66	0.48	0.26	0.09	0.02	0.00	0.00
419	1.97	1.95	1.80	1.55	1.26	1.00	0.80	0.66	0.57	0.52	0.50	0.51	0.52	0.50	0.43	0.31	0.16	0.05	0.01	0.00	0.00
421	2.43	2.52	2.48	2.27	1.94	1.52	1.11	0.77	0.58	0.53	0.62	0.79	0.95	0.98	0.82	0.52	0.23	0.06	0.01	0.00	0.00
423	2.52	2.59	2.50	2.25	1.90	1.52	1.17	0.90	0.71	0.60	0.55	0.56	0.59	0.62	0.61	0.52	0.35	0.16	0.04	0.01	0.00
425	2.53	2.56	2.46	2.22	1.91	1.58	1.29	1.04	0.86	0.74	0.68	0.67	0.69	0.69	0.63	0.49	0.29	0.12	0.02	0.00	0.00
427	2.69	2.71	2.57	2.30	1.97	1.62	1.30	1.04	0.84	0.71	0.65	0.66	0.72	0.78	0.77	0.64	0.40	0.17	0.03	0.00	0.00
429	2.34	2.34	2.20	1.96	1.68	1.41	1.17	0.97	0.81	0.68	0.59	0.57	0.59	0.61	0.60	0.50	0.33	0.15	0.04	0.01	0.00
431	2.55	2.64	2.58	2.35	1.98	1.54	1.11	0.75	0.54	0.45	0.49	0.60	0.71	0.75	0.65	0.44	0.21	0.06	0.01	0.00	0.00
433	1.03	0.92	0.76	0.60	0.47	0.40	0.39	0.40	0.41	0.41	0.40	0.39	0.38	0.36	0.31	0.23	0.13	0.04	0.01	0.00	0.00
435	2.08	2.05	1.90	1.67	1.41	1.16	0.96	0.79	0.66	0.56	0.50	0.47	0.47	0.48	0.45	0.36	0.22	0.09	0.02	0.00	0.00
437	2.13	2.13	2.02	1.80	1.52	1.23	0.97	0.77	0.62	0.52	0.48	0.46	0.47	0.45	0.40	0.31	0.17	0.07	0.01	0.00	0.00
439	1.11	1.03	0.90	0.75	0.62	0.53	0.49	0.46	0.44	0.41	0.38	0.35	0.34	0.32	0.29	0.22	0.12	0.05	0.01	0.00	0.00
441	1.23	1.17	1.05	0.90	0.77	0.67	0.61	0.56	0.52	0.47	0.43	0.41	0.39	0.37	0.31	0.21	0.10	0.03	0.00	0.00	0.00
443	0.95	0.87	0.74	0.60	0.49	0.43	0.41	0.41	0.39	0.35	0.30	0.26	0.24	0.25	0.26	0.23	0.16	0.07	0.01	0.00	0.00
445	2.28	2.30	2.18	1.94	1.63	1.30	1.00	0.77	0.62	0.55	0.55	0.61	0.66	0.66	0.56	0.38	0.19	0.06	0.01	0.00	0.00
447	0.98	0.93	0.84	0.74	0.64	0.57	0.52	0.46	0.40	0.34	0.31	0.31	0.33	0.35	0.32	0.23	0.12	0.04	0.01	0.00	0.00
449	2.29	2.29	2.16	1.94	1.67	1.42	1.18	0.98	0.81	0.66	0.57	0.53	0.54	0.55	0.52	0.41	0.24	0.09	0.02	0.00	0.00
451	2.20	2.17	2.02	1.76	1.45	1.15	0.89	0.69	0.56	0.48	0.46	0.47	0.49	0.48	0.39	0.24	0.10	0.02	0.00	0.00	0.00
453	0.96	0.85	0.70	0.54	0.41	0.34	0.30	0.29	0.29	0.28	0.28	0.28	0.28	0.28	0.24	0.17	0.08	0.03	0.00	0.00	0.00
455	0.86	0.77	0.63	0.48	0.37	0.30	0.27	0.27	0.28	0.28	0.29	0.30	0.32	0.33	0.29	0.21	0.11	0.04	0.01	0.00	0.00

Grain Size Data - ALE cont.

Depth	282.07	309.64	339.92	373.15	409.63	449.67	493.63	541.89	594.87	653.03	716.87	786.95	863.88	948.34
385	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
387	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
389	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
391	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
393	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
395	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
397	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
399	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
401	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
403	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
405	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
407	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
409	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
411	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
413	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
415	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
417	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
419	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
421	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
423	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
425	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
427	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
429	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
431	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
433	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
435	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
437	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
439	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
441	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
443	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
445	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
447	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
449	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
451	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
453	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
455	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Grain Size Data - ALE cont.

Depth	Size fraction (microns)																										
	0.38	**0.41**	**0.45**	**0.50**	**0.54**	**0.60**	**0.66**	**0.72**	**0.79**	**0.87**	**0.95**	**1.05**	**1.15**	**1.26**	**1.38**	**1.52**	**1.67**	**1.83**	**2.01**	**2.21**	**2.42**	**2.66**	**2.92**	**3.21**	**3.52**	**3.86**	**4.24**
457	0.09	0.15	0.23	0.32	0.40	0.47	0.53	0.59	0.64	0.68	0.71	0.73	0.76	0.78	0.81	0.84	0.88	0.93	1.00	1.08	1.18	1.30	1.43	1.59	1.76	1.94	2.13
459	0.10	0.18	0.26	0.37	0.47	0.55	0.62	0.69	0.76	0.81	0.85	0.89	0.93	0.96	1.00	1.05	1.10	1.16	1.23	1.32	1.41	1.51	1.63	1.74	1.86	1.98	2.09
461	0.08	0.14	0.20	0.29	0.36	0.42	0.47	0.53	0.57	0.60	0.63	0.66	0.68	0.70	0.72	0.75	0.79	0.85	0.91	1.00	1.10	1.23	1.38	1.55	1.74	1.95	2.18
463	0.10	0.17	0.26	0.36	0.45	0.53	0.59	0.66	0.71	0.74	0.77	0.79	0.81	0.83	0.85	0.87	0.90	0.94	1.00	1.08	1.17	1.27	1.39	1.52	1.67	1.81	1.95
465	0.09	0.16	0.24	0.34	0.43	0.50	0.57	0.63	0.69	0.73	0.77	0.80	0.82	0.85	0.88	0.91	0.95	1.01	1.08	1.17	1.28	1.41	1.56	1.73	1.93	2.14	2.37
467	0.10	0.18	0.26	0.37	0.46	0.54	0.60	0.67	0.73	0.77	0.80	0.83	0.87	0.90	0.93	0.97	1.02	1.09	1.17	1.27	1.38	1.51	1.65	1.81	1.97	2.13	2.29
469	0.09	0.17	0.24	0.35	0.43	0.50	0.56	0.62	0.66	0.70	0.72	0.73	0.75	0.76	0.77	0.79	0.82	0.86	0.92	0.99	1.09	1.20	1.33	1.48	1.64	1.81	1.99
471	0.10	0.19	0.27	0.39	0.48	0.57	0.65	0.72	0.79	0.84	0.89	0.93	0.97	1.01	1.06	1.11	1.17	1.24	1.32	1.42	1.52	1.64	1.76	1.89	2.02	2.14	2.25
473	0.08	0.15	0.22	0.31	0.39	0.46	0.52	0.58	0.64	0.68	0.72	0.76	0.79	0.83	0.86	0.90	0.95	1.01	1.08	1.15	1.24	1.34	1.45	1.56	1.67	1.79	1.91
475	0.08	0.15	0.22	0.31	0.38	0.45	0.51	0.57	0.63	0.67	0.71	0.74	0.78	0.81	0.85	0.89	0.94	1.00	1.08	1.16	1.25	1.36	1.47	1.60	1.72	1.85	1.98
477	0.09	0.16	0.24	0.34	0.43	0.50	0.57	0.63	0.68	0.72	0.75	0.78	0.81	0.84	0.86	0.90	0.95	1.01	1.10	1.20	1.32	1.47	1.65	1.85	2.06	2.30	2.55
479	0.08	0.14	0.20	0.29	0.36	0.43	0.48	0.54	0.59	0.63	0.66	0.69	0.71	0.72	0.74	0.75	0.77	0.79	0.83	0.87	0.94	1.02	1.12	1.25	1.40	1.59	1.79
481	0.09	0.17	0.25	0.35	0.43	0.51	0.57	0.63	0.68	0.72	0.75	0.77	0.80	0.82	0.84	0.87	0.90	0.95	1.01	1.09	1.18	1.29	1.41	1.54	1.69	1.83	1.97
483	0.10	0.18	0.26	0.37	0.46	0.55	0.62	0.69	0.76	0.81	0.86	0.90	0.95	1.00	1.04	1.10	1.16	1.24	1.33	1.43	1.54	1.66	1.79	1.92	2.05	2.18	2.30
485	0.11	0.19	0.27	0.39	0.49	0.57	0.65	0.72	0.78	0.83	0.87	0.91	0.95	0.98	1.02	1.06	1.11	1.16	1.23	1.31	1.40	1.50	1.60	1.72	1.83	1.94	2.04
487	0.09	0.17	0.25	0.35	0.44	0.51	0.58	0.65	0.71	0.76	0.80	0.83	0.87	0.91	0.95	0.99	1.04	1.10	1.17	1.25	1.34	1.44	1.55	1.66	1.77	1.89	1.99
489	0.10	0.18	0.26	0.37	0.47	0.55	0.62	0.69	0.75	0.80	0.84	0.87	0.91	0.95	0.98	1.02	1.07	1.13	1.20	1.28	1.37	1.47	1.58	1.70	1.81	1.93	2.03
491	0.11	0.19	0.28	0.40	0.49	0.58	0.66	0.73	0.80	0.85	0.90	0.94	0.98	1.03	1.07	1.12	1.17	1.24	1.32	1.41	1.51	1.62	1.74	1.86	1.97	2.09	2.19
493	0.09	0.16	0.23	0.33	0.41	0.48	0.54	0.61	0.66	0.70	0.74	0.77	0.81	0.84	0.89	0.94	1.00	1.07	1.16	1.27	1.40	1.55	1.72	1.91	2.10	2.31	2.52
495	0.09	0.17	0.25	0.35	0.43	0.51	0.57	0.63	0.68	0.72	0.74	0.76	0.78	0.80	0.82	0.84	0.88	0.93	1.00	1.09	1.20	1.34	1.51	1.70	1.91	2.14	2.39
497	0.10	0.19	0.27	0.39	0.48	0.56	0.64	0.71	0.76	0.81	0.85	0.88	0.92	0.95	0.99	1.04	1.10	1.18	1.28	1.40	1.53	1.69	1.87	2.06	2.26	2.46	2.65
499	0.08	0.14	0.21	0.30	0.38	0.44	0.50	0.55	0.60	0.64	0.67	0.70	0.73	0.75	0.78	0.81	0.85	0.91	0.97	1.04	1.13	1.23	1.34	1.46	1.58	1.71	1.83
501	0.11	0.19	0.28	0.40	0.49	0.58	0.65	0.72	0.78	0.83	0.87	0.90	0.94	0.98	1.02	1.07	1.13	1.21	1.30	1.41	1.54	1.69	1.85	2.02	2.20	2.36	2.52
503	0.09	0.17	0.24	0.35	0.43	0.51	0.57	0.64	0.70	0.74	0.78	0.82	0.86	0.89	0.92	0.96	1.01	1.07	1.13	1.21	1.29	1.39	1.49	1.60	1.70	1.80	1.90
505	0.10	0.18	0.27	0.38	0.47	0.56	0.63	0.70	0.75	0.80	0.84	0.87	0.91	0.94	0.98	1.03	1.09	1.16	1.25	1.35	1.47	1.60	1.75	1.90	2.06	2.21	2.35
507	0.11	0.19	0.28	0.40	0.49	0.57	0.63	0.70	0.74	0.77	0.79	0.80	0.80	0.80	0.80	0.80	0.82	0.86	0.91	0.99	1.10	1.24	1.40	1.60	1.82	2.06	2.32
509	0.09	0.17	0.24	0.35	0.43	0.50	0.57	0.64	0.70	0.74	0.78	0.82	0.86	0.89	0.93	0.97	1.02	1.09	1.16	1.24	1.33	1.44	1.55	1.66	1.78	1.89	2.00
511	0.09	0.16	0.24	0.34	0.42	0.49	0.55	0.61	0.66	0.69	0.72	0.74	0.76	0.78	0.80	0.83	0.86	0.91	0.96	1.04	1.13	1.23	1.35	1.48	1.62	1.77	1.92
513	0.08	0.15	0.21	0.30	0.38	0.45	0.51	0.56	0.62	0.66	0.69	0.73	0.76	0.79	0.83	0.87	0.91	0.97	1.04	1.11	1.20	1.30	1.41	1.52	1.64	1.75	1.87
515	0.11	0.20	0.30	0.43	0.53	0.62	0.70	0.78	0.84	0.89	0.93	0.97	1.01	1.04	1.08	1.13	1.20	1.28	1.38	1.51	1.65	1.82	2.01	2.21	2.42	2.63	2.84
517	0.10	0.17	0.25	0.36	0.45	0.52	0.59	0.65	0.70	0.74	0.77	0.79	0.82	0.84	0.87	0.90	0.95	1.01	1.09	1.19	1.31	1.45	1.61	1.79	1.97	2.17	2.37
519	0.11	0.19	0.28	0.40	0.50	0.58	0.66	0.74	0.80	0.85	0.90	0.94	0.98	1.01	1.05	1.10	1.15	1.22	1.30	1.39	1.49	1.61	1.73	1.85	1.98	2.10	2.21
521	0.10	0.18	0.26	0.37	0.46	0.54	0.61	0.68	0.73	0.78	0.82	0.85	0.88	0.91	0.94	0.98	1.03	1.09	1.15	1.23	1.33	1.43	1.54	1.65	1.77	1.88	1.98
523	0.09	0.16	0.23	0.33	0.41	0.48	0.55	0.62	0.68	0.72	0.77	0.81	0.85	0.89	0.93	0.98	1.03	1.09	1.16	1.24	1.33	1.42	1.52	1.63	1.73	1.83	1.92
525	0.09	0.17	0.25	0.35	0.44	0.52	0.59	0.65	0.71	0.76	0.80	0.84	0.88	0.92	0.96	1.00	1.06	1.13	1.21	1.30	1.41	1.52	1.64	1.77	1.90	2.03	2.14
527	0.10	0.18	0.26	0.37	0.45	0.53	0.60	0.67	0.72	0.76	0.80	0.82	0.85	0.87	0.90	0.93	0.98	1.04	1.12	1.21	1.33	1.47	1.64	1.83	2.04	2.26	2.49

Grain Size Data - ALE cont.

Depth	4.66	5.11	5.61	6.16	6.76	7.42	8.15	8.94	9.82	10.78	11.83	12.99	14.26	15.65	17.18	18.86	20.71	22.73	24.95	27.39	30.07	33.01	36.24
457	2.33	2.53	2.74	2.93	3.12	3.30	3.47	3.62	3.73	3.81	3.82	3.77	3.68	3.52	3.30	2.99	2.60	2.18	1.80	1.52	1.36	1.30	1.30
459	2.18	2.27	2.33	2.39	2.42	2.44	2.46	2.47	2.47	2.46	2.44	2.42	2.42	2.43	2.43	2.37	2.25	2.08	1.93	1.86	1.92	2.08	2.28
461	2.42	2.66	2.91	3.16	3.40	3.62	3.83	4.01	4.15	4.23	4.24	4.17	4.02	3.81	3.52	3.15	2.71	2.24	1.81	1.49	1.30	1.20	1.16
463	2.09	2.21	2.32	2.42	2.49	2.54	2.59	2.62	2.64	2.63	2.60	2.58	2.57	2.57	2.55	2.48	2.32	2.13	1.95	1.85	1.88	2.01	2.19
465	2.60	2.84	3.07	3.30	3.52	3.72	3.89	4.03	4.12	4.15	4.09	3.96	3.76	3.50	3.18	2.80	2.35	1.88	1.47	1.18	1.02	0.97	0.97
467	2.43	2.57	2.68	2.77	2.84	2.89	2.91	2.92	2.91	2.85	2.77	2.69	2.61	2.54	2.46	2.33	2.14	1.91	1.73	1.64	1.67	1.79	1.95
469	2.16	2.33	2.49	2.64	2.77	2.89	2.99	3.07	3.13	3.15	3.14	3.11	3.06	2.99	2.88	2.71	2.46	2.17	1.91	1.75	1.72	1.79	1.92
471	2.35	2.43	2.49	2.53	2.55	2.55	2.54	2.53	2.51	2.47	2.42	2.39	2.37	2.37	2.35	2.28	2.13	1.94	1.77	1.71	1.77	1.94	2.15
473	2.01	2.11	2.20	2.28	2.35	2.40	2.45	2.49	2.52	2.53	2.53	2.53	2.52	2.52	2.50	2.45	2.33	2.18	2.04	1.99	2.05	2.21	2.44
475	2.10	2.21	2.30	2.39	2.46	2.52	2.56	2.60	2.62	2.62	2.61	2.59	2.57	2.55	2.53	2.46	2.35	2.21	2.09	2.04	2.10	2.24	2.41
477	2.79	3.04	3.28	3.50	3.70	3.87	4.01	4.10	4.12	4.07	3.93	3.71	3.44	3.13	2.78	2.40	1.99	1.59	1.25	1.02	0.92	0.91	0.95
479	2.02	2.28	2.55	2.83	3.12	3.41	3.69	3.97	4.21	4.40	4.51	4.54	4.48	4.32	4.04	3.66	3.18	2.64	2.12	1.69	1.38	1.18	1.05
481	2.11	2.24	2.35	2.45	2.52	2.58	2.63	2.66	2.68	2.67	2.64	2.61	2.59	2.57	2.55	2.47	2.33	2.15	1.99	1.91	1.94	2.08	2.26
483	2.41	2.50	2.57	2.62	2.65	2.66	2.67	2.66	2.63	2.60	2.55	2.50	2.47	2.46	2.44	2.36	2.22	2.02	1.84	1.75	1.78	1.92	2.12
485	2.13	2.21	2.27	2.32	2.36	2.38	2.40	2.42	2.44	2.45	2.45	2.46	2.48	2.53	2.54	2.49	2.35	2.16	1.98	1.91	1.97	2.14	2.36
487	2.09	2.18	2.25	2.31	2.35	2.39	2.42	2.44	2.46	2.47	2.47	2.47	2.48	2.50	2.50	2.44	2.30	2.12	1.96	1.89	1.94	2.10	2.30
489	2.13	2.21	2.28	2.33	2.37	2.40	2.43	2.46	2.48	2.49	2.49	2.49	2.51	2.54	2.54	2.48	2.33	2.13	1.96	1.88	1.94	2.10	2.30
491	2.28	2.35	2.41	2.44	2.47	2.47	2.48	2.48	2.48	2.47	2.46	2.45	2.46	2.48	2.48	2.41	2.25	2.04	1.84	1.74	1.77	1.92	2.12
493	2.74	2.94	3.15	3.35	3.53	3.70	3.86	3.99	4.10	4.15	4.14	4.06	3.92	3.72	3.44	3.05	2.56	2.04	1.55	1.18	0.96	0.85	0.80
495	2.64	2.89	3.14	3.37	3.59	3.78	3.95	4.08	4.16	4.17	4.10	3.97	3.79	3.57	3.28	2.92	2.48	2.02	1.61	1.31	1.13	1.05	1.01
497	2.84	3.00	3.14	3.25	3.32	3.36	3.36	3.33	3.26	3.13	2.96	2.77	2.61	2.47	2.32	2.15	1.93	1.68	1.47	1.34	1.31	1.36	1.42
499	1.95	2.07	2.17	2.26	2.34	2.41	2.48	2.53	2.58	2.60	2.61	2.61	2.62	2.63	2.62	2.55	2.42	2.24	2.08	2.01	2.05	2.20	2.40
501	2.66	2.78	2.88	2.93	2.97	2.97	2.95	2.90	2.82	2.71	2.58	2.46	2.36	2.30	2.24	2.13	1.96	1.76	1.60	1.54	1.59	1.73	1.87
503	1.98	2.05	2.11	2.16	2.19	2.22	2.23	2.26	2.28	2.29	2.29	2.31	2.34	2.39	2.42	2.39	2.28	2.13	2.01	1.97	2.05	2.24	2.45
505	2.47	2.58	2.67	2.72	2.75	2.76	2.76	2.73	2.69	2.62	2.54	2.47	2.43	2.41	2.38	2.29	2.13	1.93	1.76	1.69	1.73	1.85	1.99
507	2.58	2.85	3.10	3.34	3.55	3.74	3.91	4.04	4.11	4.13	4.09	3.99	3.85	3.67	3.43	3.10	2.68	2.21	1.75	1.40	1.16	1.03	0.96
509	2.09	2.17	2.23	2.28	2.32	2.34	2.36	2.37	2.38	2.38	2.37	2.37	2.39	2.41	2.42	2.37	2.25	2.08	1.94	1.89	1.97	2.15	2.38
511	2.06	2.19	2.32	2.43	2.52	2.59	2.65	2.70	2.73	2.74	2.72	2.69	2.67	2.66	2.64	2.57	2.43	2.25	2.09	2.01	2.03	2.15	2.31
513	1.97	2.07	2.16	2.23	2.29	2.35	2.39	2.42	2.45	2.46	2.47	2.46	2.47	2.48	2.48	2.44	2.33	2.19	2.07	2.03	2.09	2.26	2.47
515	3.02	3.19	3.32	3.42	3.48	3.49	3.46	3.39	3.26	3.07	2.84	2.60	2.38	2.19	2.02	1.85	1.66	1.47	1.31	1.21	1.19	1.22	1.27
517	2.56	2.74	2.90	3.04	3.16	3.25	3.31	3.33	3.32	3.25	3.13	2.99	2.84	2.69	2.52	2.32	2.06	1.79	1.57	1.45	1.44	1.52	1.64
519	2.31	2.39	2.44	2.48	2.50	2.50	2.49	2.48	2.46	2.42	2.38	2.35	2.34	2.34	2.33	2.26	2.11	1.91	1.75	1.70	1.76	1.93	2.13
521	2.07	2.15	2.21	2.25	2.27	2.29	2.30	2.31	2.32	2.32	2.32	2.33	2.36	2.41	2.44	2.40	2.27	2.09	1.94	1.90	1.99	2.19	2.43
523	2.01	2.08	2.13	2.18	2.21	2.23	2.24	2.26	2.26	2.26	2.26	2.26	2.28	2.32	2.34	2.32	2.25	2.14	2.05	2.03	2.11	2.29	2.50
525	2.24	2.33	2.40	2.45	2.48	2.49	2.49	2.48	2.46	2.43	2.38	2.35	2.34	2.34	2.34	2.30	2.19	2.04	1.90	1.84	1.89	2.05	2.27
527	2.73	2.96	3.18	3.38	3.57	3.72	3.84	3.92	3.95	3.90	3.77	3.58	3.35	3.09	2.80	2.46	2.08	1.70	1.37	1.16	1.06	1.05	1.07

Grain Size Data - ALE cont.

Depth	39.78	43.67	47.94	52.63	57.77	63.42	69.62	76.43	83.90	92.10	101.10	110.99	121.84	133.75	146.82	161.18	176.94	194.23	213.22	234.07	256.95
457	1.28	1.20	1.08	0.94	0.82	0.72	0.66	0.61	0.57	0.53	0.50	0.50	0.50	0.48	0.42	0.30	0.16	0.06	0.01	0.00	0.00
459	2.44	2.49	2.40	2.17	1.86	1.52	1.19	0.90	0.69	0.56	0.51	0.55	0.60	0.63	0.56	0.39	0.20	0.06	0.01	0.00	0.00
461	1.12	1.03	0.88	0.73	0.59	0.49	0.43	0.40	0.37	0.35	0.33	0.32	0.32	0.32	0.28	0.20	0.11	0.04	0.01	0.00	0.00
463	2.34	2.38	2.29	2.08	1.81	1.52	1.26	1.03	0.84	0.70	0.62	0.62	0.68	0.77	0.82	0.76	0.59	0.34	0.13	0.02	0.00
465	0.96	0.90	0.78	0.63	0.49	0.40	0.35	0.33	0.32	0.30	0.29	0.29	0.31	0.34	0.35	0.30	0.19	0.08	0.02	0.00	0.00
467	2.05	2.05	1.93	1.72	1.49	1.25	1.05	0.87	0.72	0.59	0.51	0.48	0.47	0.48	0.44	0.35	0.20	0.08	0.01	0.00	0.00
469	2.03	2.06	1.97	1.79	1.57	1.33	1.10	0.91	0.74	0.63	0.57	0.57	0.60	0.61	0.56	0.42	0.24	0.09	0.02	0.00	0.00
471	2.31	2.35	2.24	2.00	1.69	1.36	1.06	0.80	0.60	0.47	0.43	0.45	0.51	0.56	0.53	0.41	0.23	0.08	0.01	0.00	0.00
473	2.63	2.73	2.68	2.47	2.15	1.76	1.36	1.01	0.75	0.60	0.56	0.61	0.69	0.74	0.68	0.50	0.27	0.09	0.02	0.00	0.00
475	2.54	2.56	2.44	2.19	1.87	1.52	1.20	0.91	0.69	0.55	0.49	0.51	0.60	0.70	0.72	0.62	0.39	0.16	0.03	0.00	0.00
477	0.97	0.93	0.83	0.70	0.60	0.54	0.51	0.50	0.48	0.44	0.39	0.36	0.34	0.33	0.31	0.26	0.16	0.06	0.01	0.00	0.00
479	0.96	0.88	0.78	0.67	0.59	0.53	0.49	0.46	0.42	0.38	0.35	0.34	0.35	0.35	0.33	0.25	0.15	0.06	0.01	0.00	0.00
481	2.42	2.47	2.39	2.18	1.89	1.56	1.25	0.99	0.80	0.69	0.65	0.67	0.71	0.72	0.64	0.48	0.27	0.10	0.02	0.00	0.00
483	2.28	2.30	2.16	1.88	1.52	1.15	0.85	0.65	0.53	0.49	0.49	0.50	0.50	0.44	0.34	0.20	0.08	0.02	0.00	0.00	0.00
485	2.54	2.57	2.44	2.16	1.79	1.41	1.07	0.82	0.65	0.56	0.54	0.56	0.57	0.55	0.46	0.30	0.14	0.04	0.01	0.00	0.00
487	2.47	2.52	2.43	2.19	1.87	1.52	1.20	0.94	0.76	0.67	0.64	0.67	0.73	0.75	0.70	0.55	0.33	0.13	0.03	0.00	0.00
489	2.46	2.49	2.37	2.11	1.77	1.41	1.08	0.81	0.62	0.52	0.49	0.53	0.60	0.67	0.67	0.57	0.39	0.19	0.06	0.01	0.00
491	2.28	2.31	2.19	1.93	1.60	1.26	0.95	0.73	0.59	0.52	0.52	0.57	0.62	0.63	0.56	0.42	0.23	0.09	0.02	0.00	0.00
493	0.74	0.64	0.50	0.35	0.24	0.18	0.16	0.17	0.19	0.21	0.21	0.22	0.24	0.26	0.26	0.22	0.14	0.06	0.01	0.00	0.00
495	0.97	0.86	0.71	0.54	0.40	0.31	0.27	0.26	0.27	0.28	0.30	0.32	0.34	0.33	0.28	0.19	0.09	0.03	0.00	0.00	0.00
497	1.43	1.38	1.25	1.10	0.94	0.81	0.71	0.61	0.52	0.45	0.42	0.44	0.48	0.51	0.48	0.38	0.21	0.08	0.01	0.00	0.00
499	2.57	2.64	2.58	2.39	2.10	1.77	1.45	1.16	0.93	0.79	0.72	0.74	0.79	0.82	0.75	0.59	0.34	0.13	0.03	0.00	0.00
501	1.94	1.90	1.74	1.52	1.29	1.08	0.90	0.75	0.63	0.54	0.50	0.49	0.51	0.50	0.45	0.32	0.17	0.06	0.01	0.00	0.00
503	2.64	2.71	2.63	2.44	2.15	1.81	1.47	1.17	0.93	0.78	0.73	0.76	0.82	0.85	0.77	0.58	0.32	0.12	0.02	0.00	0.00
505	2.07	2.04	1.90	1.70	1.47	1.26	1.06	0.88	0.75	0.65	0.61	0.61	0.61	0.57	0.47	0.29	0.12	0.03	0.00	0.00	0.00
507	0.89	0.78	0.64	0.50	0.39	0.33	0.31	0.30	0.30	0.29	0.28	0.28	0.30	0.31	0.28	0.22	0.13	0.05	0.01	0.00	0.00
509	2.56	2.62	2.55	2.36	2.07	1.74	1.39	1.06	0.81	0.64	0.59	0.62	0.71	0.77	0.73	0.57	0.33	0.13	0.02	0.00	0.00
511	2.44	2.47	2.38	2.17	1.88	1.57	1.26	0.99	0.77	0.64	0.59	0.61	0.66	0.69	0.65	0.51	0.30	0.12	0.02	0.00	0.00
513	2.65	2.73	2.65	2.44	2.12	1.76	1.43	1.15	0.94	0.81	0.74	0.73	0.76	0.78	0.73	0.60	0.39	0.18	0.05	0.01	0.00
515	1.28	1.23	1.13	1.02	0.91	0.83	0.75	0.67	0.58	0.48	0.40	0.36	0.35	0.35	0.33	0.26	0.16	0.06	0.01	0.00	0.00
517	1.71	1.69	1.58	1.41	1.22	1.06	0.92	0.81	0.70	0.60	0.53	0.49	0.48	0.48	0.44	0.35	0.21	0.08	0.02	0.00	0.00
519	2.28	2.30	2.18	1.96	1.67	1.38	1.12	0.91	0.75	0.67	0.64	0.66	0.68	0.67	0.57	0.39	0.20	0.06	0.01	0.00	0.00
521	2.62	2.67	2.57	2.34	2.03	1.69	1.37	1.10	0.88	0.74	0.68	0.69	0.72	0.73	0.65	0.47	0.25	0.09	0.02	0.00	0.00
523	2.68	2.75	2.69	2.50	2.20	1.86	1.52	1.21	0.96	0.80	0.71	0.69	0.71	0.72	0.65	0.50	0.29	0.11	0.02	0.00	0.00
525	2.46	2.55	2.49	2.27	1.95	1.57	1.21	0.92	0.72	0.61	0.58	0.61	0.65	0.65	0.57	0.40	0.21	0.07	0.01	0.00	0.00
527	1.07	1.00	0.88	0.74	0.63	0.57	0.54	0.53	0.50	0.45	0.40	0.35	0.33	0.32	0.30	0.25	0.15	0.06	0.01	0.00	0.00

Grain Size Data - ALE cont.

Depth	282.07	309.64	339.92	373.15	409.63	449.67	493.63	541.89	594.87	653.03	716.87	786.95	863.88	948.34
457	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
459	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
461	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
463	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
465	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
467	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
469	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
471	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
473	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
475	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
477	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
479	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
481	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
483	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
485	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
487	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
489	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
491	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
493	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
495	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
497	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
499	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
501	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
503	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
505	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
507	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
509	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
511	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
513	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
515	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
517	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
519	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
521	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
523	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
525	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
527	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Grain Size Data - ALE cont.

Depth	**Size fraction (microns)**																										
	0.38	**0.41**	**0.45**	**0.50**	**0.54**	**0.60**	**0.66**	**0.72**	**0.79**	**0.87**	**0.95**	**1.05**	**1.15**	**1.26**	**1.38**	**1.52**	**1.67**	**1.83**	**2.01**	**2.21**	**2.42**	**2.66**	**2.92**	**3.21**	**3.52**	**3.86**	**4.24**
529	0.09	0.15	0.23	0.32	0.40	0.47	0.53	0.59	0.64	0.68	0.71	0.74	0.77	0.79	0.82	0.85	0.90	0.95	1.02	1.11	1.22	1.35	1.50	1.67	1.86	2.07	2.30
531	0.08	0.14	0.21	0.30	0.37	0.44	0.49	0.54	0.59	0.62	0.65	0.67	0.69	0.71	0.74	0.77	0.82	0.89	0.97	1.07	1.20	1.35	1.53	1.73	1.96	2.20	2.46
533	0.11	0.19	0.28	0.40	0.50	0.58	0.66	0.73	0.78	0.82	0.85	0.87	0.88	0.89	0.89	0.91	0.93	0.97	1.02	1.10	1.21	1.34	1.51	1.70	1.93	2.18	2.44
535	0.09	0.16	0.23	0.33	0.41	0.48	0.55	0.61	0.66	0.70	0.73	0.76	0.78	0.81	0.83	0.86	0.90	0.95	1.00	1.08	1.16	1.25	1.36	1.48	1.60	1.73	1.85
537	0.09	0.16	0.24	0.34	0.42	0.49	0.55	0.62	0.67	0.72	0.75	0.79	0.82	0.85	0.89	0.92	0.97	1.03	1.09	1.17	1.26	1.36	1.47	1.59	1.71	1.83	1.94
539	0.09	0.16	0.24	0.34	0.43	0.50	0.56	0.63	0.68	0.72	0.76	0.79	0.82	0.84	0.87	0.91	0.95	1.00	1.07	1.14	1.23	1.33	1.44	1.56	1.68	1.80	1.92
541	0.09	0.16	0.24	0.34	0.43	0.50	0.57	0.63	0.69	0.74	0.77	0.81	0.84	0.88	0.91	0.95	0.99	1.05	1.11	1.19	1.27	1.36	1.46	1.57	1.68	1.78	1.88
543	0.10	0.18	0.26	0.37	0.46	0.54	0.61	0.68	0.74	0.79	0.83	0.87	0.91	0.94	0.98	1.02	1.07	1.14	1.22	1.31	1.42	1.55	1.69	1.85	2.02	2.19	2.36
545	0.10	0.19	0.27	0.38	0.48	0.55	0.62	0.68	0.73	0.77	0.79	0.81	0.83	0.84	0.86	0.89	0.93	0.98	1.06	1.15	1.27	1.41	1.57	1.74	1.93	2.12	2.31
547	0.08	0.15	0.22	0.31	0.38	0.45	0.50	0.56	0.61	0.64	0.67	0.70	0.72	0.75	0.77	0.80	0.84	0.89	0.95	1.01	1.10	1.19	1.29	1.40	1.52	1.64	1.75
549	0.10	0.19	0.27	0.39	0.49	0.57	0.65	0.72	0.78	0.83	0.88	0.92	0.96	1.00	1.04	1.09	1.14	1.21	1.29	1.38	1.48	1.59	1.71	1.83	1.96	2.08	2.18
551	0.11	0.20	0.29	0.42	0.52	0.61	0.69	0.77	0.83	0.89	0.93	0.97	1.00	1.04	1.08	1.12	1.17	1.23	1.30	1.38	1.47	1.57	1.68	1.80	1.91	2.02	2.11
553	0.10	0.17	0.25	0.35	0.44	0.52	0.59	0.65	0.71	0.76	0.80	0.84	0.87	0.91	0.95	0.99	1.04	1.10	1.17	1.25	1.33	1.43	1.54	1.65	1.76	1.86	1.96
555	0.09	0.16	0.23	0.33	0.41	0.48	0.54	0.60	0.66	0.70	0.74	0.77	0.81	0.84	0.88	0.92	0.97	1.03	1.10	1.19	1.28	1.39	1.50	1.62	1.75	1.88	2.00
557	0.08	0.15	0.22	0.31	0.39	0.46	0.52	0.58	0.63	0.67	0.70	0.73	0.76	0.79	0.82	0.85	0.89	0.95	1.01	1.09	1.17	1.27	1.38	1.50	1.62	1.74	1.86
559	0.09	0.16	0.24	0.34	0.43	0.50	0.57	0.63	0.69	0.73	0.77	0.81	0.85	0.88	0.92	0.97	1.02	1.09	1.17	1.25	1.35	1.46	1.58	1.71	1.84	1.96	2.08
561	0.09	0.16	0.24	0.34	0.43	0.50	0.56	0.62	0.68	0.72	0.75	0.78	0.80	0.83	0.86	0.89	0.93	0.98	1.04	1.12	1.21	1.31	1.43	1.55	1.69	1.82	1.96
563	0.11	0.20	0.29	0.41	0.51	0.60	0.67	0.75	0.81	0.87	0.91	0.96	1.00	1.05	1.10	1.16	1.24	1.33	1.43	1.55	1.69	1.83	1.98	2.13	2.27	2.41	2.52
565	0.09	0.15	0.23	0.32	0.40	0.47	0.54	0.60	0.65	0.69	0.73	0.76	0.80	0.83	0.86	0.89	0.93	0.98	1.04	1.11	1.19	1.28	1.38	1.48	1.59	1.70	1.80
567	0.10	0.19	0.27	0.39	0.48	0.56	0.63	0.69	0.74	0.78	0.80	0.82	0.84	0.86	0.88	0.90	0.94	0.99	1.06	1.15	1.26	1.39	1.53	1.69	1.86	2.03	2.20
569	0.10	0.19	0.27	0.39	0.49	0.57	0.65	0.72	0.79	0.85	0.90	0.95	1.00	1.05	1.10	1.16	1.23	1.31	1.40	1.50	1.60	1.71	1.82	1.93	2.04	2.13	2.21
571	0.09	0.16	0.24	0.34	0.43	0.50	0.57	0.63	0.69	0.73	0.77	0.80	0.84	0.87	0.90	0.94	0.98	1.04	1.10	1.18	1.26	1.35	1.45	1.56	1.67	1.77	1.88
573	0.09	0.17	0.24	0.35	0.43	0.50	0.56	0.62	0.67	0.71	0.74	0.77	0.79	0.81	0.84	0.87	0.92	0.97	1.04	1.12	1.22	1.33	1.46	1.59	1.73	1.87	2.01
575	0.08	0.15	0.22	0.31	0.39	0.45	0.51	0.57	0.61	0.65	0.68	0.70	0.73	0.75	0.78	0.81	0.86	0.92	1.00	1.11	1.23	1.38	1.55	1.75	1.98	2.22	2.47
577	0.07	0.13	0.19	0.28	0.35	0.41	0.47	0.52	0.57	0.61	0.64	0.67	0.69	0.71	0.72	0.74	0.76	0.78	0.82	0.86	0.92	1.00	1.10	1.23	1.38	1.57	1.78
579	0.10	0.17	0.25	0.36	0.45	0.52	0.59	0.66	0.72	0.76	0.80	0.84	0.87	0.90	0.94	0.98	1.02	1.08	1.15	1.22	1.30	1.40	1.50	1.60	1.71	1.81	1.90
581	0.09	0.16	0.24	0.34	0.43	0.51	0.57	0.64	0.70	0.74	0.78	0.81	0.85	0.88	0.91	0.95	1.00	1.06	1.13	1.23	1.34	1.48	1.64	1.82	2.02	2.24	2.47
583	0.10	0.17	0.25	0.35	0.44	0.52	0.58	0.65	0.70	0.75	0.78	0.81	0.84	0.87	0.90	0.93	0.98	1.03	1.11	1.20	1.32	1.46	1.63	1.82	2.03	2.26	2.50
585	0.12	0.22	0.32	0.45	0.56	0.65	0.73	0.80	0.86	0.90	0.92	0.94	0.96	0.98	1.00	1.03	1.08	1.14	1.23	1.35	1.49	1.65	1.84	2.05	2.28	2.50	2.72
587	0.09	0.16	0.23	0.33	0.41	0.47	0.54	0.60	0.65	0.69	0.72	0.75	0.78	0.81	0.84	0.87	0.91	0.97	1.04	1.13	1.24	1.38	1.54	1.72	1.92	2.14	2.38
589	0.09	0.16	0.23	0.33	0.41	0.48	0.54	0.60	0.65	0.69	0.73	0.75	0.78	0.81	0.84	0.87	0.92	0.98	1.06	1.16	1.28	1.43	1.60	1.79	2.01	2.25	2.51
591	0.09	0.17	0.24	0.35	0.43	0.51	0.58	0.64	0.70	0.74	0.77	0.80	0.82	0.83	0.85	0.86	0.89	0.92	0.96	1.02	1.11	1.21	1.34	1.49	1.67	1.88	2.10
593	0.11	0.20	0.29	0.41	0.52	0.60	0.68	0.75	0.80	0.84	0.87	0.89	0.90	0.91	0.91	0.92	0.94	0.97	1.02	1.09	1.18	1.31	1.46	1.63	1.83	2.06	2.29
595	0.09	0.16	0.24	0.34	0.43	0.50	0.57	0.63	0.69	0.73	0.77	0.80	0.83	0.86	0.89	0.93	0.98	1.03	1.10	1.17	1.26	1.36	1.47	1.58	1.70	1.82	1.93
595	0.09	0.17	0.24	0.34	0.43	0.50	0.56	0.63	0.68	0.72	0.75	0.78	0.80	0.83	0.85	0.88	0.92	0.97	1.04	1.11	1.19	1.29	1.40	1.52	1.64	1.76	1.88
599	0.09	0.16	0.23	0.33	0.41	0.48	0.54	0.60	0.66	0.70	0.73	0.76	0.78	0.81	0.84	0.87	0.91	0.96	1.02	1.10	1.19	1.29	1.40	1.52	1.65	1.78	1.91

Grain Size Data - ALE cont.

Depth	4.66	5.11	5.61	6.16	6.76	7.42	8.15	8.94	9.82	10.78	11.83	12.99	14.26	15.65	17.18	18.86	20.71	22.73	24.95	27.39	30.07	33.01	36.24
529	2.53	2.77	3.01	3.25	3.47	3.68	3.88	4.05	4.17	4.23	4.20	4.10	3.93	3.68	3.36	2.96	2.49	1.99	1.55	1.23	1.05	0.98	0.96
531	2.73	2.99	3.25	3.50	3.72	3.92	4.09	4.21	4.27	4.25	4.14	3.95	3.70	3.40	3.05	2.66	2.22	1.79	1.43	1.19	1.07	1.06	1.09
533	2.72	3.00	3.27	3.52	3.75	3.94	4.09	4.19	4.22	4.16	4.01	3.79	3.53	3.24	2.92	2.57	2.18	1.78	1.43	1.18	1.03	0.97	0.95
535	1.97	2.08	2.18	2.27	2.34	2.41	2.47	2.53	2.57	2.59	2.60	2.59	2.60	2.61	2.59	2.52	2.38	2.20	2.05	1.98	2.04	2.19	2.38
537	2.05	2.15	2.23	2.30	2.36	2.40	2.44	2.48	2.50	2.51	2.51	2.51	2.52	2.53	2.53	2.47	2.35	2.18	2.03	1.97	2.03	2.18	2.36
539	2.03	2.13	2.22	2.29	2.35	2.41	2.45	2.50	2.53	2.55	2.56	2.56	2.58	2.61	2.61	2.56	2.42	2.24	2.08	2.00	2.05	2.20	2.40
541	1.97	2.05	2.11	2.16	2.20	2.23	2.26	2.28	2.30	2.32	2.32	2.34	2.36	2.40	2.43	2.39	2.29	2.13	2.00	1.95	2.02	2.22	2.46
543	2.53	2.69	2.83	2.96	3.06	3.14	3.20	3.23	3.23	3.19	3.10	2.98	2.85	2.72	2.57	2.38	2.13	1.86	1.62	1.47	1.44	1.51	1.62
545	2.48	2.64	2.78	2.89	2.98	3.03	3.06	3.06	3.04	2.97	2.88	2.78	2.70	2.64	2.57	2.44	2.22	1.97	1.74	1.62	1.63	1.76	1.93
547	1.87	1.97	2.07	2.15	2.23	2.29	2.35	2.41	2.46	2.49	2.51	2.53	2.56	2.58	2.59	2.53	2.41	2.25	2.12	2.07	2.14	2.31	2.51
549	2.28	2.36	2.41	2.45	2.47	2.48	2.49	2.50	2.50	2.48	2.47	2.46	2.48	2.51	2.51	2.44	2.28	2.06	1.87	1.79	1.84	2.00	2.20
551	2.19	2.26	2.31	2.34	2.36	2.37	2.37	2.38	2.39	2.39	2.38	2.38	2.41	2.44	2.44	2.35	2.18	1.96	1.78	1.71	1.77	1.93	2.13
553	2.05	2.13	2.19	2.24	2.28	2.31	2.34	2.37	2.40	2.43	2.44	2.46	2.50	2.55	2.57	2.52	2.39	2.21	2.07	2.02	2.08	2.24	2.43
555	2.11	2.21	2.30	2.37	2.43	2.47	2.51	2.54	2.56	2.57	2.56	2.55	2.56	2.56	2.55	2.47	2.32	2.13	1.97	1.91	1.97	2.14	2.36
557	1.98	2.08	2.18	2.26	2.32	2.38	2.43	2.47	2.50	2.52	2.52	2.51	2.53	2.54	2.54	2.48	2.35	2.18	2.03	1.97	2.05	2.23	2.46
559	2.19	2.28	2.36	2.42	2.47	2.50	2.53	2.55	2.56	2.56	2.55	2.54	2.55	2.57	2.58	2.52	2.38	2.18	2.01	1.92	1.95	2.11	2.31
561	2.08	2.20	2.30	2.39	2.47	2.52	2.57	2.60	2.62	2.62	2.60	2.59	2.58	2.59	2.59	2.54	2.43	2.26	2.10	2.01	2.02	2.14	2.31
563	2.61	2.67	2.72	2.73	2.72	2.70	2.67	2.64	2.60	2.55	2.49	2.45	2.43	2.43	2.39	2.28	2.08	1.82	1.61	1.50	1.53	1.66	1.82
565	1.90	1.99	2.07	2.14	2.20	2.25	2.30	2.35	2.39	2.41	2.43	2.45	2.48	2.51	2.53	2.49	2.38	2.23	2.09	2.04	2.11	2.29	2.52
567	2.35	2.49	2.60	2.69	2.75	2.78	2.79	2.78	2.74	2.68	2.60	2.52	2.47	2.44	2.41	2.32	2.17	1.97	1.80	1.71	1.74	1.87	2.04
569	2.27	2.32	2.35	2.36	2.36	2.36	2.36	2.38	2.39	2.39	2.40	2.41	2.44	2.48	2.47	2.38	2.19	1.97	1.79	1.73	1.81	1.98	2.18
571	1.97	2.05	2.13	2.19	2.24	2.28	2.32	2.37	2.40	2.43	2.45	2.47	2.50	2.54	2.55	2.50	2.37	2.19	2.05	2.00	2.06	2.22	2.40
573	2.13	2.24	2.33	2.40	2.46	2.49	2.52	2.54	2.54	2.54	2.52	2.51	2.52	2.55	2.57	2.53	2.42	2.26	2.11	2.03	2.07	2.21	2.39
575	2.74	3.00	3.26	3.51	3.74	3.95	4.12	4.25	4.31	4.30	4.19	4.00	3.75	3.44	3.09	2.68	2.22	1.77	1.39	1.13	1.01	0.98	0.99
577	2.02	2.28	2.57	2.87	3.18	3.49	3.81	4.10	4.37	4.58	4.70	4.73	4.65	4.45	4.14	3.70	3.16	2.57	2.01	1.55	1.22	1.03	0.91
579	1.99	2.06	2.12	2.17	2.20	2.23	2.25	2.28	2.30	2.32	2.33	2.34	2.38	2.43	2.45	2.40	2.27	2.09	1.94	1.89	1.97	2.18	2.43
581	2.71	2.96	3.20	3.43	3.64	3.84	4.00	4.13	4.20	4.20	4.11	3.94	3.72	3.45	3.12	2.72	2.27	1.80	1.39	1.09	0.93	0.88	0.88
583	2.75	3.01	3.26	3.50	3.73	3.93	4.10	4.23	4.31	4.31	4.21	4.04	3.79	3.49	3.13	2.71	2.24	1.76	1.34	1.04	0.88	0.83	0.83
585	2.93	3.11	3.26	3.38	3.46	3.51	3.52	3.49	3.42	3.30	3.14	2.98	2.84	2.71	2.58	2.37	2.08	1.73	1.41	1.18	1.08	1.09	1.16
587	2.63	2.88	3.13	3.38	3.61	3.83	4.02	4.18	4.29	4.33	4.29	4.17	3.97	3.71	3.38	2.97	2.50	2.00	1.55	1.22	1.02	0.93	0.90
589	2.77	3.04	3.31	3.57	3.81	4.03	4.22	4.37	4.46	4.48	4.40	4.22	3.97	3.65	3.26	2.80	2.28	1.75	1.28	0.94	0.75	0.68	0.68
591	2.35	2.61	2.87	3.14	3.40	3.64	3.87	4.07	4.23	4.31	4.32	4.24	4.10	3.88	3.58	3.20	2.73	2.22	1.75	1.38	1.13	1.00	0.94
593	2.54	2.78	3.02	3.23	3.43	3.59	3.73	3.82	3.85	3.82	3.72	3.57	3.39	3.20	2.97	2.69	2.33	1.94	1.57	1.30	1.14	1.10	1.11
595	2.04	2.13	2.21	2.28	2.33	2.37	2.41	2.44	2.46	2.47	2.46	2.45	2.46	2.48	2.48	2.42	2.28	2.09	1.92	1.85	1.90	2.07	2.29
595	1.98	2.08	2.17	2.24	2.30	2.34	2.38	2.42	2.45	2.46	2.46	2.46	2.48	2.51	2.51	2.46	2.34	2.16	2.01	1.95	2.01	2.18	2.40
599	2.03	2.15	2.26	2.35	2.43	2.50	2.56	2.61	2.65	2.67	2.67	2.66	2.66	2.67	2.65	2.58	2.44	2.25	2.07	1.99	2.02	2.17	2.36

Grain Size Data - ALE cont.

Depth	39.78	43.67	47.94	52.63	57.77	63.42	69.62	76.43	83.90	92.10	101.10	110.99	121.84	133.75	146.82	161.18	176.94	194.23	213.22	234.07	256.95
529	0.94	0.87	0.75	0.62	0.51	0.44	0.41	0.41	0.42	0.41	0.39	0.37	0.34	0.30	0.25	0.17	0.09	0.03	0.01	0.00	0.00
531	1.08	1.01	0.88	0.72	0.58	0.48	0.42	0.40	0.39	0.39	0.39	0.38	0.34	0.29	0.21	0.11	0.04	0.01	0.00	0.00	0.00
533	0.91	0.82	0.70	0.57	0.46	0.40	0.36	0.34	0.30	0.27	0.24	0.23	0.26	0.29	0.30	0.25	0.16	0.06	0.01	0.00	0.00
535	2.53	2.57	2.48	2.28	2.01	1.71	1.43	1.17	0.94	0.78	0.67	0.64	0.67	0.70	0.69	0.59	0.40	0.19	0.06	0.01	0.00
537	2.50	2.53	2.41	2.18	1.89	1.59	1.32	1.09	0.90	0.76	0.66	0.63	0.65	0.69	0.69	0.59	0.38	0.17	0.04	0.00	0.00
539	2.57	2.61	2.50	2.26	1.94	1.59	1.29	1.04	0.87	0.76	0.70	0.68	0.66	0.61	0.51	0.35	0.18	0.06	0.01	0.00	0.00
541	2.68	2.78	2.72	2.50	2.18	1.80	1.45	1.15	0.94	0.82	0.78	0.80	0.83	0.82	0.71	0.52	0.28	0.10	0.02	0.00	0.00
543	1.69	1.69	1.57	1.38	1.15	0.92	0.73	0.59	0.51	0.48	0.49	0.52	0.54	0.52	0.42	0.26	0.11	0.02	0.00	0.00	0.00
545	2.06	2.07	1.93	1.68	1.37	1.07	0.81	0.62	0.50	0.45	0.46	0.52	0.59	0.62	0.54	0.38	0.19	0.06	0.01	0.00	0.00
547	2.68	2.75	2.66	2.45	2.15	1.82	1.49	1.22	1.00	0.84	0.75	0.72	0.75	0.80	0.81	0.74	0.57	0.33	0.13	0.03	0.00
549	2.34	2.34	2.19	1.92	1.58	1.25	0.97	0.76	0.63	0.56	0.54	0.57	0.59	0.58	0.50	0.35	0.19	0.06	0.01	0.00	0.00
551	2.28	2.31	2.21	2.00	1.73	1.45	1.19	0.96	0.78	0.68	0.65	0.67	0.71	0.71	0.61	0.43	0.22	0.07	0.01	0.00	0.00
553	2.55	2.53	2.37	2.09	1.75	1.42	1.14	0.93	0.79	0.72	0.69	0.71	0.74	0.74	0.67	0.51	0.29	0.11	0.02	0.00	0.00
555	2.52	2.56	2.45	2.21	1.89	1.55	1.24	0.99	0.80	0.69	0.64	0.65	0.68	0.69	0.61	0.46	0.26	0.10	0.02	0.00	0.00
557	2.65	2.71	2.63	2.40	2.10	1.76	1.45	1.17	0.94	0.78	0.68	0.66	0.70	0.74	0.73	0.61	0.39	0.18	0.04	0.01	0.00
559	2.47	2.50	2.38	2.13	1.79	1.43	1.12	0.87	0.69	0.59	0.55	0.55	0.57	0.56	0.49	0.36	0.19	0.06	0.01	0.00	0.00
561	2.44	2.48	2.37	2.15	1.84	1.52	1.22	0.98	0.81	0.70	0.65	0.65	0.68	0.67	0.60	0.45	0.26	0.10	0.02	0.00	0.00
563	1.92	1.90	1.75	1.51	1.25	1.00	0.81	0.66	0.57	0.52	0.51	0.53	0.56	0.55	0.48	0.35	0.18	0.06	0.01	0.00	0.00
565	2.72	2.81	2.74	2.53	2.20	1.81	1.44	1.12	0.90	0.79	0.79	0.85	0.90	0.87	0.72	0.46	0.21	0.06	0.01	0.00	0.00
567	2.17	2.20	2.12	1.94	1.71	1.47	1.22	0.98	0.78	0.64	0.58	0.61	0.67	0.71	0.65	0.47	0.24	0.08	0.01	0.00	0.00
569	2.31	2.29	2.14	1.89	1.61	1.33	1.08	0.86	0.67	0.54	0.47	0.49	0.55	0.60	0.57	0.44	0.24	0.09	0.01	0.00	0.00
571	2.54	2.56	2.45	2.24	1.97	1.68	1.40	1.15	0.93	0.76	0.66	0.65	0.69	0.75	0.75	0.65	0.44	0.22	0.07	0.01	0.00
573	2.54	2.57	2.45	2.21	1.89	1.55	1.22	0.95	0.74	0.61	0.57	0.60	0.66	0.69	0.62	0.45	0.23	0.08	0.01	0.00	0.00
575	0.98	0.90	0.76	0.60	0.47	0.38	0.34	0.32	0.30	0.28	0.27	0.29	0.32	0.34	0.32	0.24	0.13	0.04	0.01	0.00	0.00
577	0.83	0.76	0.67	0.58	0.52	0.48	0.46	0.45	0.43	0.42	0.42	0.43	0.43	0.41	0.34	0.21	0.09	0.02	0.00	0.00	0.00
579	2.65	2.74	2.66	2.43	2.09	1.71	1.35	1.05	0.85	0.75	0.75	0.82	0.89	0.90	0.78	0.56	0.29	0.10	0.02	0.00	0.00
581	0.86	0.79	0.66	0.50	0.36	0.27	0.23	0.23	0.25	0.27	0.30	0.32	0.33	0.33	0.29	0.21	0.12	0.04	0.01	0.00	0.00
583	0.82	0.75	0.61	0.45	0.29	0.19	0.14	0.14	0.16	0.19	0.23	0.26	0.30	0.32	0.30	0.24	0.14	0.06	0.01	0.00	0.00
585	1.20	1.17	1.04	0.85	0.66	0.50	0.41	0.36	0.35	0.36	0.39	0.42	0.44	0.44	0.39	0.29	0.16	0.06	0.01	0.00	0.00
587	0.86	0.77	0.61	0.42	0.27	0.17	0.14	0.15	0.19	0.22	0.25	0.27	0.30	0.32	0.31	0.27	0.17	0.08	0.02	0.00	0.00
589	0.67	0.62	0.51	0.37	0.25	0.17	0.14	0.16	0.20	0.24	0.28	0.31	0.33	0.33	0.30	0.23	0.14	0.05	0.01	0.00	0.00
591	0.88	0.78	0.64	0.49	0.36	0.28	0.25	0.25	0.27	0.31	0.35	0.39	0.43	0.44	0.40	0.31	0.18	0.07	0.01	0.00	0.00
593	1.11	1.07	0.96	0.81	0.67	0.56	0.49	0.45	0.43	0.43	0.42	0.43	0.45	0.45	0.41	0.33	0.19	0.08	0.02	0.00	0.00
595	2.49	2.57	2.51	2.29	1.98	1.64	1.31	1.04	0.86	0.78	0.78	0.84	0.91	0.92	0.82	0.61	0.34	0.13	0.02	0.00	0.00
595	2.58	2.64	2.57	2.36	2.07	1.74	1.43	1.17	0.95	0.81	0.73	0.73	0.76	0.79	0.75	0.60	0.38	0.17	0.05	0.01	0.00
599	2.52	2.56	2.45	2.21	1.88	1.52	1.18	0.91	0.73	0.64	0.62	0.67	0.72	0.74	0.66	0.49	0.27	0.10	0.02	0.00	0.00

Grain Size Data - ALE cont.

Depth	282.07	309.64	339.92	373.15	409.63	449.67	493.63	541.89	594.87	653.03	716.87	786.95	863.88	948.34
529	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
531	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
533	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
535	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
537	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
539	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
541	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
543	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
545	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
547	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
549	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
551	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
553	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
555	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
557	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
559	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
561	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
563	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
565	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
567	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
569	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
571	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
573	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
575	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
577	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
579	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
581	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
583	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
585	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
587	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
589	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
591	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
593	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
595	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
595	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
599	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Grain Size Data - ALE cont.

Depth	Size fraction (microns)																										
	0.38	**0.41**	**0.45**	**0.50**	**0.54**	**0.60**	**0.66**	**0.72**	**0.79**	**0.87**	**0.95**	**1.05**	**1.15**	**1.26**	**1.38**	**1.52**	**1.67**	**1.83**	**2.01**	**2.21**	**2.42**	**2.66**	**2.92**	**3.21**	**3.52**	**3.86**	**4.24**
601	0.10	0.17	0.26	0.36	0.45	0.53	0.60	0.67	0.73	0.78	0.82	0.85	0.89	0.92	0.96	1.00	1.05	1.11	1.19	1.29	1.40	1.52	1.66	1.82	1.98	2.15	2.32
603	0.10	0.17	0.25	0.36	0.44	0.52	0.59	0.65	0.71	0.75	0.79	0.82	0.86	0.89	0.92	0.95	1.00	1.05	1.12	1.19	1.28	1.37	1.48	1.60	1.71	1.83	1.94
605	0.09	0.16	0.24	0.34	0.42	0.50	0.56	0.63	0.68	0.72	0.76	0.79	0.82	0.85	0.88	0.91	0.96	1.01	1.08	1.15	1.24	1.34	1.44	1.56	1.68	1.80	1.91
607	0.08	0.15	0.22	0.31	0.38	0.45	0.51	0.56	0.61	0.64	0.67	0.69	0.71	0.74	0.76	0.79	0.84	0.90	0.98	1.08	1.20	1.35	1.52	1.72	1.94	2.18	2.44
609	0.08	0.15	0.22	0.31	0.39	0.46	0.52	0.58	0.63	0.67	0.71	0.74	0.77	0.80	0.84	0.88	0.93	0.99	1.07	1.16	1.28	1.41	1.57	1.75	1.95	2.17	2.41
611	0.09	0.16	0.23	0.33	0.41	0.48	0.54	0.59	0.64	0.67	0.70	0.72	0.74	0.76	0.78	0.82	0.86	0.93	1.01	1.11	1.24	1.40	1.58	1.79	2.02	2.27	2.53
613	0.08	0.14	0.21	0.30	0.37	0.43	0.48	0.54	0.58	0.61	0.63	0.65	0.67	0.68	0.69	0.70	0.73	0.76	0.81	0.87	0.95	1.06	1.18	1.34	1.51	1.72	1.94
615	0.08	0.14	0.20	0.29	0.36	0.42	0.47	0.52	0.56	0.60	0.62	0.64	0.66	0.69	0.71	0.75	0.80	0.86	0.95	1.05	1.18	1.34	1.53	1.74	1.97	2.23	2.51
617	0.08	0.14	0.20	0.29	0.36	0.42	0.48	0.54	0.58	0.62	0.64	0.67	0.68	0.69	0.70	0.71	0.73	0.75	0.79	0.84	0.91	1.00	1.12	1.26	1.44	1.65	1.89
619	0.07	0.13	0.19	0.27	0.33	0.39	0.44	0.48	0.52	0.54	0.57	0.58	0.60	0.62	0.64	0.67	0.71	0.76	0.84	0.93	1.06	1.20	1.38	1.58	1.80	2.05	2.32
621	0.09	0.16	0.24	0.35	0.43	0.51	0.57	0.64	0.69	0.74	0.78	0.81	0.84	0.87	0.91	0.95	1.00	1.06	1.14	1.24	1.37	1.52	1.69	1.88	2.10	2.34	2.58
623	0.07	0.12	0.18	0.26	0.32	0.38	0.43	0.48	0.52	0.56	0.59	0.62	0.66	0.69	0.73	0.78	0.84	0.92	1.01	1.12	1.25	1.41	1.59	1.79	2.01	2.25	2.51
625	0.09	0.16	0.24	0.34	0.42	0.49	0.56	0.62	0.68	0.72	0.76	0.80	0.84	0.88	0.92	0.98	1.05	1.13	1.23	1.36	1.50	1.68	1.87	2.08	2.31	2.55	2.79
627	0.12	0.21	0.31	0.44	0.55	0.65	0.74	0.82	0.90	0.95	1.01	1.05	1.10	1.14	1.19	1.25	1.32	1.40	1.50	1.62	1.76	1.91	2.07	2.24	2.42	2.59	2.75
629	0.09	0.17	0.24	0.35	0.43	0.50	0.57	0.63	0.68	0.72	0.75	0.77	0.80	0.82	0.85	0.88	0.93	1.00	1.08	1.19	1.32	1.48	1.66	1.87	2.10	2.35	2.61
631	0.10	0.17	0.25	0.36	0.45	0.53	0.61	0.68	0.74	0.79	0.84	0.88	0.92	0.96	1.01	1.06	1.12	1.20	1.29	1.40	1.53	1.68	1.85	2.03	2.24	2.45	2.67
633	0.09	0.17	0.24	0.35	0.43	0.50	0.57	0.63	0.69	0.73	0.76	0.79	0.82	0.84	0.87	0.90	0.95	1.01	1.09	1.19	1.30	1.45	1.61	1.81	2.02	2.25	2.50
635	0.08	0.15	0.22	0.31	0.38	0.44	0.50	0.55	0.59	0.63	0.65	0.67	0.70	0.72	0.74	0.78	0.83	0.89	0.98	1.09	1.22	1.38	1.57	1.78	2.02	2.28	2.55
637	0.10	0.17	0.25	0.36	0.45	0.52	0.59	0.65	0.70	0.74	0.76	0.78	0.80	0.82	0.85	0.88	0.92	0.98	1.06	1.16	1.29	1.44	1.62	1.83	2.06	2.31	2.56
639	0.10	0.17	0.25	0.36	0.44	0.52	0.58	0.64	0.69	0.73	0.76	0.78	0.81	0.83	0.85	0.88	0.92	0.97	1.05	1.14	1.26	1.40	1.56	1.75	1.96	2.19	2.43
641	0.11	0.19	0.28	0.40	0.50	0.59	0.66	0.73	0.80	0.85	0.88	0.92	0.95	0.99	1.02	1.07	1.12	1.18	1.26	1.35	1.45	1.56	1.68	1.81	1.94	2.06	2.16
643	0.08	0.15	0.22	0.31	0.38	0.45	0.51	0.56	0.61	0.64	0.67	0.69	0.71	0.74	0.76	0.80	0.84	0.90	0.98	1.07	1.20	1.34	1.51	1.70	1.92	2.15	2.40
645	0.09	0.15	0.23	0.32	0.40	0.47	0.53	0.59	0.64	0.67	0.70	0.73	0.75	0.77	0.79	0.82	0.86	0.91	0.98	1.07	1.18	1.31	1.47	1.65	1.85	2.08	2.32
647	0.10	0.17	0.25	0.35	0.44	0.51	0.57	0.63	0.67	0.71	0.73	0.75	0.77	0.78	0.81	0.84	0.89	0.96	1.05	1.17	1.31	1.49	1.71	1.95	2.22	2.50	2.80
649	0.10	0.17	0.26	0.37	0.46	0.54	0.61	0.69	0.75	0.80	0.84	0.87	0.89	0.91	0.93	0.95	0.97	1.00	1.05	1.10	1.18	1.28	1.40	1.55	1.73	1.93	2.16
651	0.08	0.14	0.21	0.29	0.36	0.43	0.48	0.54	0.58	0.62	0.65	0.67	0.70	0.72	0.74	0.77	0.81	0.85	0.92	1.00	1.11	1.23	1.39	1.57	1.77	2.01	2.26
653	0.11	0.20	0.29	0.42	0.52	0.61	0.69	0.77	0.83	0.89	0.93	0.98	1.02	1.06	1.11	1.16	1.23	1.31	1.40	1.51	1.63	1.77	1.91	2.06	2.21	2.35	2.47
655	0.09	0.17	0.24	0.35	0.43	0.50	0.57	0.63	0.69	0.73	0.76	0.79	0.83	0.86	0.89	0.93	0.99	1.06	1.14	1.25	1.38	1.53	1.70	1.89	2.10	2.33	2.56
657	0.10	0.17	0.25	0.36	0.44	0.52	0.59	0.65	0.71	0.76	0.79	0.83	0.86	0.90	0.93	0.98	1.04	1.11	1.21	1.32	1.46	1.62	1.81	2.01	2.24	2.48	2.73
659	0.10	0.18	0.27	0.38	0.47	0.55	0.62	0.68	0.74	0.77	0.80	0.82	0.85	0.87	0.89	0.92	0.97	1.04	1.12	1.23	1.37	1.53	1.71	1.92	2.14	2.38	2.61
661	0.08	0.15	0.22	0.31	0.38	0.44	0.50	0.55	0.60	0.63	0.66	0.68	0.70	0.72	0.75	0.78	0.83	0.89	0.97	1.07	1.20	1.35	1.53	1.73	1.96	2.20	2.46
663	0.11	0.19	0.28	0.40	0.50	0.58	0.66	0.73	0.78	0.83	0.86	0.89	0.92	0.95	0.97	1.01	1.06	1.12	1.21	1.31	1.44	1.60	1.78	1.99	2.21	2.45	2.69
665	0.07	0.13	0.20	0.28	0.35	0.41	0.46	0.51	0.56	0.59	0.62	0.64	0.66	0.68	0.70	0.72	0.75	0.79	0.84	0.90	0.99	1.09	1.22	1.37	1.54	1.74	1.96
667	0.09	0.16	0.23	0.33	0.41	0.48	0.54	0.60	0.65	0.69	0.72	0.74	0.77	0.79	0.82	0.85	0.90	0.96	1.04	1.15	1.28	1.44	1.62	1.83	2.07	2.33	2.60
669	0.09	0.16	0.24	0.34	0.42	0.49	0.56	0.62	0.67	0.71	0.74	0.76	0.79	0.81	0.83	0.86	0.90	0.95	1.02	1.11	1.21	1.35	1.50	1.68	1.88	2.10	2.34
671	0.08	0.15	0.22	0.31	0.38	0.45	0.51	0.56	0.61	0.65	0.68	0.71	0.74	0.77	0.81	0.86	0.92	0.99	1.09	1.21	1.35	1.52	1.71	1.93	2.16	2.41	2.68

Grain Size Data - ALE cont.

Depth	4.66	5.11	5.61	6.16	6.76	7.42	8.15	8.94	9.82	10.78	11.83	12.99	14.26	15.65	17.18	18.86	20.71	22.73	24.95	27.39	30.07	33.01	36.24
601	2.48	2.62	2.76	2.87	2.97	3.04	3.10	3.13	3.14	3.11	3.05	2.97	2.88	2.78	2.65	2.47	2.22	1.94	1.69	1.52	1.47	1.51	1.60
603	2.05	2.14	2.22	2.29	2.34	2.39	2.43	2.46	2.49	2.50	2.50	2.50	2.52	2.54	2.55	2.48	2.34	2.16	2.00	1.94	2.00	2.16	2.37
605	2.01	2.11	2.19	2.26	2.32	2.36	2.40	2.44	2.47	2.49	2.49	2.49	2.51	2.54	2.55	2.50	2.37	2.20	2.04	1.97	2.02	2.18	2.39
607	2.71	2.99	3.26	3.53	3.78	4.01	4.21	4.37	4.48	4.50	4.43	4.27	4.03	3.73	3.35	2.90	2.39	1.88	1.44	1.13	0.95	0.88	0.85
609	2.65	2.89	3.14	3.37	3.60	3.81	4.00	4.15	4.26	4.31	4.27	4.15	3.96	3.71	3.39	2.98	2.50	2.00	1.55	1.22	1.02	0.93	0.89
611	2.79	3.06	3.32	3.56	3.78	3.96	4.12	4.23	4.28	4.24	4.12	3.92	3.67	3.39	3.06	2.68	2.25	1.81	1.43	1.17	1.03	1.00	1.01
613	2.18	2.44	2.71	2.99	3.27	3.54	3.81	4.06	4.28	4.45	4.54	4.56	4.49	4.34	4.08	3.71	3.22	2.68	2.14	1.70	1.37	1.17	1.04
615	2.79	3.07	3.35	3.63	3.88	4.10	4.29	4.43	4.50	4.49	4.38	4.18	3.89	3.55	3.15	2.70	2.23	1.78	1.40	1.14	1.00	0.96	0.96
617	2.15	2.44	2.75	3.07	3.39	3.71	4.02	4.31	4.56	4.74	4.83	4.82	4.72	4.51	4.18	3.74	3.19	2.58	2.00	1.52	1.17	0.95	0.82
619	2.61	2.90	3.19	3.47	3.75	4.00	4.23	4.42	4.54	4.59	4.54	4.38	4.14	3.82	3.43	2.96	2.44	1.92	1.47	1.16	0.98	0.92	0.92
621	2.84	3.09	3.33	3.55	3.75	3.92	4.06	4.15	4.18	4.13	4.00	3.80	3.55	3.28	2.96	2.58	2.15	1.69	1.29	1.00	0.84	0.80	0.81
623	2.77	3.04	3.31	3.57	3.81	4.04	4.24	4.39	4.50	4.53	4.47	4.32	4.08	3.76	3.35	2.89	2.39	1.90	1.48	1.17	0.99	0.90	0.87
625	3.04	3.27	3.48	3.68	3.85	3.98	4.06	4.10	4.08	3.98	3.79	3.55	3.25	2.94	2.61	2.26	1.89	1.54	1.25	1.05	0.96	0.94	0.95
627	2.89	3.00	3.09	3.14	3.16	3.15	3.10	3.02	2.90	2.75	2.58	2.41	2.27	2.17	2.08	1.98	1.83	1.65	1.47	1.35	1.31	1.34	1.40
629	2.88	3.14	3.39	3.63	3.84	4.02	4.16	4.25	4.27	4.21	4.05	3.82	3.53	3.21	2.85	2.45	2.02	1.59	1.24	1.01	0.90	0.88	0.90
631	2.89	3.11	3.32	3.51	3.69	3.84	3.96	4.06	4.10	4.07	3.96	3.78	3.56	3.29	2.96	2.58	2.13	1.67	1.27	0.99	0.85	0.81	0.82
633	2.75	3.00	3.25	3.49	3.71	3.91	4.07	4.19	4.25	4.23	4.11	3.91	3.66	3.36	3.01	2.62	2.18	1.75	1.37	1.11	0.97	0.93	0.94
635	2.83	3.11	3.38	3.64	3.88	4.09	4.26	4.38	4.43	4.40	4.26	4.04	3.74	3.39	3.00	2.56	2.10	1.66	1.30	1.06	0.94	0.92	0.92
637	2.82	3.08	3.33	3.55	3.74	3.90	4.02	4.08	4.07	3.97	3.78	3.52	3.22	2.91	2.58	2.23	1.86	1.51	1.23	1.06	1.00	1.02	1.07
639	2.68	2.92	3.16	3.39	3.60	3.78	3.94	4.05	4.10	4.08	3.97	3.78	3.54	3.27	2.94	2.55	2.11	1.67	1.30	1.07	0.97	0.97	1.02
641	2.26	2.33	2.39	2.42	2.44	2.44	2.44	2.44	2.43	2.41	2.39	2.38	2.40	2.44	2.45	2.38	2.22	2.03	1.88	1.84	1.93	2.12	2.33
643	2.66	2.92	3.18	3.42	3.65	3.85	4.03	4.16	4.23	4.22	4.12	3.93	3.68	3.37	3.01	2.59	2.15	1.72	1.37	1.14	1.03	1.01	1.03
645	2.57	2.82	3.07	3.31	3.53	3.73	3.90	4.03	4.10	4.10	4.02	3.85	3.62	3.33	3.01	2.63	2.22	1.80	1.43	1.18	1.04	1.00	1.02
647	3.11	3.40	3.68	3.94	4.16	4.33	4.45	4.49	4.45	4.30	4.03	3.68	3.28	2.87	2.46	2.05	1.65	1.28	1.00	0.83	0.78	0.80	0.85
649	2.41	2.66	2.93	3.19	3.45	3.69	3.91	4.10	4.23	4.30	4.29	4.19	4.04	3.83	3.56	3.20	2.75	2.26	1.80	1.43	1.19	1.04	0.94
651	2.53	2.81	3.10	3.39	3.68	3.95	4.20	4.42	4.59	4.69	4.69	4.60	4.40	4.10	3.71	3.22	2.67	2.10	1.59	1.20	0.96	0.83	0.76
653	2.58	2.66	2.72	2.74	2.74	2.72	2.69	2.64	2.57	2.48	2.39	2.31	2.26	2.24	2.20	2.10	1.94	1.74	1.58	1.51	1.56	1.69	1.83
655	2.79	3.02	3.24	3.45	3.63	3.79	3.92	4.02	4.06	4.04	3.94	3.78	3.57	3.32	3.02	2.66	2.24	1.79	1.41	1.13	0.98	0.93	0.93
657	2.98	3.23	3.45	3.66	3.84	3.98	4.09	4.15	4.14	4.05	3.89	3.66	3.39	3.11	2.80	2.44	2.04	1.63	1.28	1.04	0.92	0.89	0.89
659	2.84	3.06	3.25	3.42	3.55	3.65	3.70	3.71	3.67	3.55	3.38	3.16	2.94	2.72	2.48	2.22	1.90	1.57	1.28	1.08	0.99	0.99	1.03
661	2.72	2.99	3.25	3.49	3.72	3.92	4.09	4.21	4.27	4.25	4.13	3.93	3.67	3.36	3.01	2.61	2.19	1.77	1.43	1.21	1.11	1.09	1.11
663	2.93	3.17	3.39	3.59	3.76	3.90	4.00	4.05	4.05	3.97	3.81	3.60	3.36	3.11	2.82	2.48	2.09	1.67	1.29	1.03	0.88	0.83	0.81
665	2.20	2.45	2.72	3.00	3.28	3.56	3.84	4.11	4.35	4.55	4.67	4.71	4.65	4.49	4.21	3.80	3.26	2.65	2.05	1.56	1.21	1.01	0.89
667	2.88	3.17	3.45	3.73	3.98	4.21	4.39	4.54	4.61	4.60	4.48	4.26	3.96	3.59	3.16	2.67	2.14	1.64	1.21	0.91	0.73	0.66	0.63
669	2.58	2.82	3.07	3.31	3.53	3.73	3.90	4.04	4.12	4.14	4.07	3.92	3.70	3.44	3.11	2.73	2.31	1.89	1.52	1.25	1.11	1.05	1.04
671	2.94	3.20	3.46	3.69	3.91	4.09	4.24	4.34	4.37	4.33	4.20	3.98	3.70	3.38	3.01	2.60	2.16	1.73	1.36	1.10	0.96	0.89	0.86

Grain Size Data - ALE cont.

Depth	39.78	43.67	47.94	52.63	57.77	63.42	69.62	76.43	83.90	92.10	101.10	110.99	121.84	133.75	146.82	161.18	176.94	194.23	213.22	234.07	256.95
601	1.65	1.63	1.52	1.34	1.15	0.96	0.80	0.67	0.57	0.51	0.49	0.52	0.57	0.61	0.58	0.47	0.28	0.11	0.02	0.00	0.00
603	2.53	2.56	2.46	2.22	1.91	1.56	1.24	0.96	0.77	0.66	0.64	0.69	0.75	0.76	0.68	0.50	0.27	0.10	0.02	0.00	0.00
605	2.55	2.60	2.51	2.27	1.95	1.60	1.27	1.01	0.82	0.72	0.70	0.75	0.82	0.84	0.76	0.56	0.31	0.12	0.02	0.00	0.00
607	0.81	0.71	0.56	0.40	0.28	0.21	0.19	0.21	0.24	0.26	0.28	0.30	0.30	0.29	0.24	0.15	0.07	0.02	0.00	0.00	0.00
609	0.85	0.75	0.61	0.46	0.34	0.27	0.25	0.26	0.27	0.27	0.28	0.28	0.27	0.25	0.21	0.13	0.05	0.01	0.00	0.00	0.00
611	1.00	0.91	0.76	0.58	0.41	0.29	0.23	0.21	0.21	0.24	0.29	0.33	0.36	0.36	0.29	0.18	0.08	0.02	0.00	0.00	0.00
613	0.94	0.82	0.68	0.52	0.39	0.30	0.26	0.26	0.27	0.28	0.30	0.31	0.32	0.32	0.28	0.20	0.11	0.04	0.01	0.00	0.00
615	0.94	0.86	0.72	0.54	0.38	0.26	0.19	0.17	0.17	0.19	0.21	0.24	0.28	0.31	0.31	0.26	0.17	0.07	0.01	0.00	0.00
617	0.73	0.63	0.51	0.39	0.29	0.24	0.22	0.23	0.25	0.28	0.30	0.32	0.33	0.32	0.27	0.19	0.10	0.03	0.01	0.00	0.00
619	0.92	0.87	0.76	0.62	0.50	0.41	0.37	0.36	0.37	0.39	0.41	0.41	0.39	0.34	0.25	0.14	0.05	0.01	0.00	0.00	0.00
621	0.82	0.78	0.68	0.54	0.42	0.33	0.28	0.26	0.25	0.26	0.29	0.33	0.37	0.38	0.34	0.25	0.13	0.05	0.01	0.00	0.00
623	0.83	0.75	0.62	0.47	0.34	0.25	0.19	0.17	0.16	0.15	0.13	0.14	0.15	0.19	0.21	0.20	0.14	0.06	0.01	0.00	0.00
625	0.93	0.84	0.69	0.53	0.40	0.32	0.30	0.30	0.29	0.26	0.21	0.17	0.17	0.20	0.24	0.25	0.20	0.11	0.03	0.00	0.00
627	1.42	1.37	1.24	1.07	0.89	0.75	0.64	0.56	0.51	0.47	0.45	0.46	0.48	0.49	0.46	0.36	0.21	0.08	0.02	0.00	0.00
629	0.90	0.83	0.70	0.56	0.44	0.37	0.34	0.34	0.34	0.32	0.30	0.29	0.29	0.29	0.26	0.20	0.12	0.04	0.01	0.00	0.00
631	0.80	0.72	0.58	0.42	0.29	0.21	0.18	0.18	0.19	0.20	0.20	0.20	0.20	0.20	0.18	0.13	0.07	0.02	0.00	0.00	0.00
633	0.92	0.85	0.71	0.56	0.42	0.33	0.29	0.27	0.28	0.30	0.32	0.33	0.33	0.30	0.23	0.14	0.06	0.01	0.00	0.00	0.00
635	0.89	0.81	0.68	0.55	0.45	0.40	0.39	0.39	0.37	0.34	0.31	0.30	0.29	0.29	0.27	0.20	0.11	0.04	0.01	0.00	0.00
637	1.08	1.02	0.91	0.79	0.70	0.65	0.64	0.63	0.59	0.52	0.44	0.38	0.34	0.33	0.31	0.24	0.14	0.05	0.01	0.00	0.00
639	1.03	0.97	0.84	0.70	0.59	0.52	0.50	0.50	0.48	0.45	0.41	0.39	0.39	0.40	0.38	0.31	0.19	0.07	0.01	0.00	0.00
641	2.44	2.40	2.19	1.88	1.54	1.25	1.04	0.90	0.81	0.75	0.69	0.65	0.60	0.54	0.45	0.32	0.17	0.06	0.01	0.00	0.00
643	1.02	0.96	0.85	0.75	0.67	0.64	0.63	0.61	0.56	0.48	0.39	0.33	0.31	0.31	0.30	0.24	0.15	0.06	0.01	0.00	0.00
645	1.03	0.99	0.91	0.80	0.72	0.67	0.65	0.64	0.62	0.58	0.53	0.49	0.47	0.44	0.38	0.28	0.15	0.05	0.01	0.00	0.00
647	0.85	0.77	0.63	0.47	0.36	0.31	0.33	0.38	0.41	0.41	0.36	0.31	0.28	0.29	0.29	0.27	0.18	0.08	0.02	0.00	0.00
649	0.83	0.69	0.52	0.37	0.26	0.22	0.22	0.24	0.26	0.25	0.22	0.20	0.20	0.20	0.19	0.14	0.08	0.03	0.00	0.00	0.00
651	0.70	0.60	0.46	0.33	0.23	0.20	0.20	0.23	0.24	0.22	0.17	0.15	0.16	0.20	0.25	0.27	0.20	0.10	0.02	0.00	0.00
653	1.90	1.86	1.72	1.52	1.32	1.16	1.03	0.91	0.78	0.64	0.53	0.49	0.52	0.58	0.61	0.55	0.35	0.15	0.03	0.00	0.00
655	0.90	0.82	0.68	0.53	0.42	0.36	0.35	0.37	0.39	0.38	0.34	0.30	0.27	0.26	0.23	0.19	0.11	0.04	0.01	0.00	0.00
657	0.84	0.74	0.57	0.42	0.31	0.27	0.28	0.30	0.29	0.24	0.17	0.12	0.12	0.16	0.22	0.24	0.18	0.08	0.02	0.00	0.00
659	1.05	1.04	0.98	0.92	0.87	0.86	0.87	0.85	0.79	0.69	0.58	0.50	0.46	0.45	0.41	0.32	0.18	0.07	0.01	0.00	0.00
661	1.10	1.01	0.85	0.68	0.54	0.46	0.43	0.42	0.40	0.36	0.30	0.26	0.25	0.26	0.28	0.26	0.18	0.08	0.02	0.00	0.00
663	0.76	0.66	0.51	0.37	0.29	0.26	0.29	0.32	0.34	0.31	0.26	0.23	0.23	0.25	0.27	0.25	0.17	0.07	0.02	0.00	0.00
665	0.81	0.72	0.60	0.48	0.37	0.31	0.28	0.28	0.28	0.26	0.24	0.23	0.23	0.25	0.25	0.22	0.14	0.06	0.01	0.00	0.00
667	0.59	0.50	0.37	0.25	0.18	0.15	0.17	0.21	0.23	0.22	0.19	0.16	0.16	0.19	0.23	0.24	0.18	0.09	0.03	0.00	0.00
669	1.01	0.94	0.83	0.70	0.60	0.54	0.52	0.51	0.50	0.47	0.42	0.37	0.32	0.28	0.22	0.15	0.08	0.03	0.00	0.00	0.00
671	0.81	0.69	0.53	0.37	0.25	0.18	0.17	0.18	0.20	0.21	0.20	0.19	0.20	0.21	0.22	0.21	0.14	0.06	0.01	0.00	0.00

Grain Size Data - ALE cont.

Depth	282.07	309.64	339.92	373.15	409.63	449.67	493.63	541.89	594.87	653.03	716.87	786.95	863.88	948.34
601	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
603	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
605	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
607	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
609	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
611	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
613	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
615	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
617	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
619	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
621	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
625	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
629	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
631	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
633	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
635	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
637	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
639	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
641	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
643	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
645	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
647	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
649	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
651	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
653	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
655	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
657	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
659	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
661	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
663	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
665	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
667	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
669	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
671	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Grain Size Data - ALE cont.

Depth	**Size fraction (microns)**																										
	0.38	**0.41**	**0.45**	**0.50**	**0.54**	**0.60**	**0.66**	**0.72**	**0.79**	**0.87**	**0.95**	**1.05**	**1.15**	**1.26**	**1.38**	**1.52**	**1.67**	**1.83**	**2.01**	**2.21**	**2.42**	**2.66**	**2.92**	**3.21**	**3.52**	**3.86**	**4.24**
673	0.08	0.15	0.22	0.31	0.38	0.45	0.51	0.56	0.61	0.64	0.67	0.70	0.72	0.74	0.77	0.80	0.84	0.89	0.96	1.05	1.16	1.30	1.46	1.64	1.85	2.08	2.32
675	0.09	0.17	0.25	0.35	0.44	0.51	0.58	0.64	0.70	0.74	0.77	0.79	0.81	0.82	0.83	0.85	0.87	0.90	0.95	1.01	1.09	1.20	1.33	1.49	1.68	1.89	2.12
677	0.08	0.14	0.21	0.29	0.37	0.43	0.49	0.54	0.59	0.63	0.66	0.68	0.70	0.71	0.72	0.74	0.76	0.79	0.83	0.88	0.96	1.05	1.17	1.32	1.49	1.69	1.92
679	0.09	0.16	0.24	0.34	0.42	0.49	0.56	0.62	0.67	0.71	0.75	0.78	0.81	0.84	0.87	0.92	0.97	1.05	1.14	1.25	1.39	1.55	1.73	1.93	2.16	2.40	2.64
681	0.09	0.16	0.23	0.32	0.40	0.47	0.53	0.58	0.63	0.67	0.69	0.72	0.75	0.77	0.81	0.85	0.91	0.99	1.08	1.21	1.36	1.54	1.74	1.98	2.24	2.51	2.80
683	0.08	0.15	0.22	0.32	0.39	0.46	0.52	0.57	0.62	0.65	0.68	0.70	0.71	0.73	0.75	0.77	0.80	0.85	0.91	1.00	1.10	1.23	1.39	1.58	1.79	2.02	2.28
685	0.08	0.14	0.20	0.28	0.35	0.41	0.46	0.51	0.55	0.59	0.61	0.63	0.65	0.67	0.70	0.73	0.77	0.83	0.90	1.00	1.12	1.26	1.43	1.63	1.85	2.09	2.35
687	0.09	0.16	0.24	0.34	0.42	0.50	0.56	0.63	0.68	0.72	0.76	0.79	0.83	0.86	0.90	0.94	1.00	1.08	1.17	1.28	1.42	1.58	1.76	1.96	2.18	2.41	2.65
689	0.08	0.14	0.20	0.29	0.36	0.42	0.48	0.54	0.58	0.62	0.64	0.66	0.68	0.69	0.70	0.71	0.72	0.75	0.78	0.82	0.88	0.97	1.07	1.20	1.36	1.54	1.75
691	0.08	0.14	0.21	0.30	0.37	0.43	0.49	0.55	0.59	0.63	0.65	0.68	0.70	0.72	0.74	0.77	0.81	0.86	0.92	1.00	1.11	1.24	1.39	1.57	1.78	2.01	2.26
693	0.09	0.16	0.23	0.33	0.41	0.48	0.55	0.61	0.66	0.70	0.74	0.77	0.81	0.84	0.88	0.93	0.99	1.07	1.16	1.28	1.41	1.58	1.76	1.97	2.19	2.43	2.68
695	0.08	0.15	0.22	0.31	0.39	0.45	0.51	0.57	0.62	0.66	0.69	0.72	0.75	0.78	0.81	0.85	0.90	0.97	1.05	1.15	1.28	1.43	1.60	1.80	2.01	2.25	2.50
697	0.08	0.14	0.21	0.29	0.36	0.42	0.48	0.53	0.57	0.60	0.63	0.65	0.67	0.69	0.71	0.73	0.77	0.83	0.89	0.98	1.10	1.23	1.40	1.59	1.81	2.05	2.31
701	0.07	0.12	0.17	0.25	0.31	0.36	0.40	0.45	0.48	0.51	0.53	0.55	0.57	0.59	0.61	0.63	0.67	0.71	0.77	0.84	0.93	1.04	1.17	1.31	1.47	1.64	1.82
703	0.08	0.14	0.20	0.29	0.36	0.42	0.48	0.53	0.58	0.62	0.66	0.69	0.72	0.75	0.78	0.82	0.86	0.91	0.97	1.04	1.13	1.22	1.32	1.42	1.54	1.65	1.76
705	0.06	0.11	0.16	0.23	0.29	0.34	0.39	0.44	0.48	0.52	0.55	0.59	0.62	0.64	0.67	0.70	0.74	0.78	0.83	0.88	0.95	1.03	1.11	1.21	1.32	1.45	1.58
707	0.07	0.13	0.18	0.26	0.33	0.38	0.43	0.48	0.52	0.55	0.57	0.60	0.62	0.64	0.67	0.69	0.73	0.78	0.83	0.90	0.98	1.08	1.18	1.30	1.43	1.56	1.69
709	0.06	0.11	0.16	0.23	0.28	0.33	0.38	0.42	0.46	0.49	0.51	0.53	0.55	0.57	0.59	0.61	0.64	0.67	0.72	0.77	0.84	0.92	1.01	1.12	1.24	1.38	1.52
711	0.06	0.10	0.15	0.21	0.27	0.31	0.36	0.40	0.44	0.47	0.49	0.51	0.53	0.55	0.57	0.59	0.62	0.65	0.69	0.74	0.79	0.86	0.94	1.03	1.13	1.24	1.36
713	0.07	0.12	0.18	0.26	0.32	0.38	0.43	0.47	0.51	0.54	0.57	0.59	0.61	0.62	0.64	0.66	0.69	0.73	0.78	0.84	0.91	0.99	1.08	1.18	1.30	1.42	1.54
715	0.07	0.13	0.19	0.27	0.34	0.40	0.45	0.51	0.55	0.59	0.62	0.65	0.68	0.71	0.74	0.77	0.81	0.85	0.91	0.97	1.05	1.14	1.23	1.34	1.45	1.57	1.69
717	0.06	0.10	0.15	0.21	0.27	0.32	0.36	0.41	0.46	0.50	0.54	0.58	0.62	0.65	0.69	0.73	0.78	0.82	0.88	0.94	1.00	1.08	1.16	1.25	1.35	1.45	1.56
719	0.06	0.11	0.17	0.24	0.29	0.35	0.39	0.44	0.48	0.51	0.54	0.56	0.59	0.61	0.63	0.66	0.70	0.74	0.79	0.85	0.92	1.01	1.10	1.21	1.33	1.45	1.59
721	0.07	0.12	0.18	0.26	0.32	0.38	0.43	0.47	0.51	0.55	0.57	0.59	0.62	0.64	0.66	0.69	0.72	0.77	0.82	0.89	0.97	1.07	1.17	1.29	1.41	1.55	1.68
723	0.07	0.13	0.19	0.28	0.35	0.41	0.46	0.52	0.57	0.61	0.64	0.67	0.70	0.73	0.76	0.79	0.82	0.87	0.92	0.98	1.06	1.15	1.25	1.37	1.50	1.64	1.79
725	0.08	0.14	0.20	0.28	0.35	0.42	0.47	0.53	0.57	0.61	0.64	0.67	0.70	0.72	0.75	0.78	0.82	0.87	0.92	0.99	1.06	1.14	1.23	1.32	1.42	1.51	1.61
727	0.07	0.13	0.19	0.28	0.34	0.41	0.46	0.52	0.57	0.61	0.65	0.69	0.72	0.75	0.78	0.82	0.86	0.91	0.97	1.03	1.11	1.21	1.32	1.44	1.58	1.73	1.90
729	0.07	0.12	0.18	0.25	0.32	0.37	0.42	0.47	0.51	0.54	0.56	0.59	0.61	0.63	0.66	0.68	0.72	0.76	0.81	0.88	0.95	1.04	1.14	1.24	1.36	1.48	1.61
731	0.07	0.13	0.19	0.28	0.34	0.40	0.46	0.51	0.55	0.58	0.61	0.64	0.66	0.68	0.71	0.74	0.78	0.83	0.90	0.97	1.07	1.17	1.29	1.42	1.57	1.72	1.87
733	0.07	0.12	0.17	0.25	0.31	0.36	0.41	0.46	0.49	0.52	0.55	0.57	0.59	0.61	0.64	0.66	0.70	0.74	0.79	0.85	0.93	1.01	1.11	1.22	1.33	1.46	1.58
735	0.08	0.15	0.22	0.31	0.38	0.45	0.51	0.56	0.61	0.65	0.68	0.70	0.73	0.76	0.80	0.84	0.89	0.95	1.03	1.12	1.23	1.36	1.49	1.64	1.80	1.96	2.12
737	0.08	0.14	0.21	0.30	0.37	0.43	0.49	0.55	0.60	0.63	0.66	0.69	0.72	0.74	0.77	0.80	0.83	0.87	0.92	0.98	1.05	1.12	1.21	1.30	1.40	1.49	1.59
739	0.08	0.14	0.20	0.29	0.36	0.43	0.48	0.54	0.58	0.62	0.65	0.68	0.70	0.73	0.75	0.78	0.82	0.86	0.91	0.98	1.05	1.13	1.22	1.32	1.43	1.54	1.64
741	0.08	0.15	0.21	0.30	0.38	0.44	0.50	0.56	0.60	0.64	0.67	0.69	0.72	0.74	0.77	0.80	0.84	0.88	0.94	1.00	1.08	1.17	1.27	1.37	1.49	1.60	1.71
743	0.08	0.15	0.22	0.32	0.40	0.47	0.53	0.60	0.65	0.70	0.74	0.77	0.80	0.83	0.86	0.90	0.94	0.99	1.05	1.12	1.21	1.31	1.44	1.59	1.75	1.94	2.14
745	0.10	0.18	0.26	0.38	0.47	0.56	0.64	0.72	0.79	0.85	0.90	0.95	0.99	1.04	1.08	1.13	1.18	1.24	1.32	1.40	1.49	1.60	1.72	1.86	2.01	2.17	2.33

Grain Size Data - ALE cont.

Depth	4.66	5.11	5.61	6.16	6.76	7.42	8.15	8.94	9.82	10.78	11.83	12.99	14.26	15.65	17.18	18.86	20.71	22.73	24.95	27.39	30.07	33.01	36.24
673	2.57	2.84	3.10	3.36	3.61	3.84	4.05	4.23	4.36	4.42	4.39	4.27	4.07	3.79	3.44	3.00	2.49	1.96	1.49	1.14	0.94	0.85	0.81
675	2.37	2.64	2.92	3.20	3.47	3.74	4.00	4.22	4.40	4.52	4.55	4.49	4.34	4.11	3.79	3.37	2.87	2.33	1.82	1.39	1.10	0.91	0.80
677	2.17	2.45	2.74	3.05	3.36	3.67	3.98	4.28	4.54	4.75	4.89	4.92	4.85	4.67	4.35	3.91	3.34	2.71	2.09	1.57	1.19	0.94	0.78
679	2.89	3.13	3.37	3.59	3.79	3.96	4.09	4.19	4.23	4.19	4.07	3.87	3.63	3.34	3.00	2.61	2.16	1.71	1.32	1.04	0.89	0.83	0.82
681	3.09	3.39	3.67	3.93	4.17	4.37	4.53	4.63	4.67	4.60	4.43	4.17	3.84	3.46	3.04	2.57	2.06	1.58	1.17	0.88	0.72	0.65	0.62
683	2.55	2.82	3.11	3.39	3.66	3.91	4.14	4.34	4.48	4.55	4.53	4.42	4.22	3.93	3.57	3.13	2.62	2.10	1.63	1.27	1.03	0.89	0.80
685	2.63	2.91	3.20	3.49	3.76	4.02	4.25	4.45	4.60	4.67	4.66	4.54	4.33	4.04	3.65	3.18	2.65	2.10	1.61	1.24	1.00	0.86	0.77
687	2.90	3.14	3.36	3.57	3.76	3.92	4.04	4.13	4.16	4.11	3.98	3.78	3.53	3.24	2.91	2.53	2.12	1.70	1.34	1.09	0.95	0.89	0.86
689	1.99	2.25	2.53	2.82	3.13	3.45	3.77	4.08	4.38	4.65	4.85	4.96	4.98	4.88	4.64	4.25	3.71	3.07	2.43	1.86	1.42	1.09	0.86
691	2.53	2.82	3.11	3.41	3.70	3.98	4.25	4.50	4.70	4.83	4.87	4.82	4.67	4.42	4.06	3.58	3.01	2.39	1.82	1.37	1.07	0.88	0.75
693	2.94	3.18	3.42	3.65	3.85	4.02	4.16	4.26	4.30	4.26	4.13	3.92	3.65	3.34	2.98	2.57	2.11	1.65	1.26	1.00	0.85	0.80	0.78
695	2.76	3.02	3.27	3.52	3.75	3.96	4.14	4.29	4.38	4.40	4.33	4.18	3.96	3.67	3.30	2.85	2.34	1.82	1.37	1.04	0.85	0.78	0.75
697	2.59	2.87	3.17	3.46	3.75	4.02	4.27	4.48	4.65	4.74	4.74	4.63	4.43	4.14	3.75	3.25	2.68	2.09	1.56	1.16	0.92	0.79	0.72
701	2.00	2.19	2.38	2.57	2.74	2.91	3.06	3.20	3.30	3.38	3.40	3.39	3.34	3.25	3.13	2.94	2.70	2.42	2.18	2.03	1.99	2.04	2.13
703	1.86	1.96	2.05	2.13	2.20	2.27	2.33	2.39	2.45	2.49	2.53	2.56	2.60	2.64	2.64	2.59	2.46	2.30	2.16	2.11	2.17	2.33	2.52
705	1.72	1.87	2.02	2.18	2.34	2.51	2.67	2.84	3.00	3.14	3.25	3.33	3.37	3.36	3.29	3.15	2.92	2.64	2.38	2.19	2.11	2.14	2.21
707	1.83	1.96	2.09	2.22	2.33	2.44	2.55	2.66	2.75	2.82	2.88	2.92	2.95	2.96	2.94	2.85	2.69	2.49	2.30	2.19	2.18	2.28	2.43
709	1.67	1.83	2.00	2.17	2.34	2.52	2.70	2.87	3.04	3.19	3.32	3.41	3.46	3.48	3.43	3.31	3.10	2.84	2.58	2.38	2.28	2.26	2.29
711	1.48	1.61	1.75	1.89	2.04	2.19	2.34	2.50	2.66	2.81	2.95	3.07	3.17	3.23	3.25	3.19	3.04	2.84	2.62	2.44	2.36	2.35	2.39
713	1.67	1.80	1.92	2.05	2.17	2.29	2.41	2.53	2.65	2.76	2.84	2.91	2.98	3.02	3.02	2.95	2.81	2.62	2.45	2.35	2.36	2.45	2.57
715	1.81	1.92	2.04	2.15	2.26	2.36	2.46	2.57	2.66	2.74	2.81	2.86	2.90	2.93	2.92	2.84	2.69	2.50	2.33	2.24	2.26	2.36	2.50
717	1.67	1.78	1.90	2.02	2.13	2.25	2.36	2.46	2.56	2.64	2.70	2.73	2.74	2.71	2.64	2.53	2.39	2.23	2.08	1.98	1.96	2.02	2.13
719	1.73	1.87	2.01	2.16	2.30	2.44	2.58	2.73	2.86	2.98	3.07	3.15	3.19	3.21	3.18	3.07	2.87	2.63	2.39	2.22	2.16	2.19	2.27
721	1.82	1.95	2.08	2.20	2.32	2.42	2.52	2.62	2.70	2.76	2.80	2.82	2.83	2.83	2.80	2.72	2.57	2.38	2.22	2.14	2.17	2.30	2.47
723	1.95	2.12	2.28	2.45	2.62	2.78	2.94	3.09	3.21	3.31	3.37	3.39	3.35	3.27	3.13	2.91	2.62	2.29	1.98	1.76	1.66	1.68	1.77
725	1.70	1.78	1.86	1.93	1.99	2.05	2.11	2.18	2.24	2.30	2.35	2.40	2.46	2.52	2.55	2.52	2.42	2.28	2.17	2.15	2.25	2.44	2.67
727	2.08	2.26	2.45	2.65	2.84	3.03	3.22	3.40	3.56	3.69	3.76	3.78	3.74	3.64	3.45	3.17	2.79	2.36	1.98	1.70	1.55	1.52	1.55
729	1.74	1.87	1.99	2.11	2.23	2.34	2.45	2.56	2.65	2.74	2.80	2.85	2.89	2.91	2.89	2.82	2.67	2.49	2.33	2.25	2.26	2.37	2.52
731	2.03	2.18	2.32	2.46	2.58	2.69	2.79	2.88	2.95	2.98	2.99	2.97	2.95	2.91	2.84	2.73	2.55	2.35	2.17	2.07	2.08	2.19	2.33
733	1.71	1.84	1.96	2.08	2.20	2.31	2.42	2.52	2.62	2.70	2.77	2.82	2.86	2.88	2.87	2.80	2.66	2.48	2.32	2.23	2.26	2.38	2.55
735	2.27	2.41	2.54	2.64	2.74	2.81	2.86	2.90	2.91	2.89	2.85	2.79	2.73	2.68	2.62	2.50	2.33	2.12	1.94	1.86	1.90	2.04	2.22
737	1.68	1.77	1.85	1.92	1.99	2.06	2.12	2.19	2.25	2.31	2.36	2.42	2.47	2.53	2.56	2.53	2.44	2.30	2.19	2.16	2.25	2.43	2.66
739	1.75	1.85	1.94	2.03	2.10	2.18	2.25	2.33	2.40	2.46	2.52	2.58	2.64	2.69	2.72	2.68	2.57	2.42	2.29	2.23	2.29	2.45	2.64
741	1.82	1.92	2.02	2.10	2.18	2.25	2.32	2.39	2.45	2.50	2.53	2.56	2.60	2.65	2.66	2.62	2.52	2.37	2.24	2.19	2.26	2.41	2.60
743	2.35	2.57	2.80	3.02	3.24	3.45	3.65	3.83	3.97	4.05	4.07	4.01	3.89	3.69	3.42	3.06	2.62	2.15	1.73	1.41	1.22	1.15	1.13
745	2.50	2.67	2.84	3.01	3.16	3.31	3.45	3.59	3.69	3.75	3.76	3.72	3.63	3.49	3.28	2.97	2.57	2.11	1.69	1.37	1.18	1.08	1.01

Grain Size Data - ALE cont.

Depth	39.78	43.67	47.94	52.63	57.77	63.42	69.62	76.43	83.90	92.10	101.10	110.99	121.84	133.75	146.82	161.18	176.94	194.23	213.22	234.07	256.95
673	0.78	0.70	0.59	0.49	0.42	0.39	0.40	0.42	0.41	0.37	0.31	0.28	0.29	0.31	0.33	0.30	0.21	0.10	0.02	0.00	0.00
675	0.70	0.59	0.44	0.30	0.20	0.15	0.15	0.19	0.24	0.27	0.28	0.26	0.24	0.23	0.21	0.17	0.11	0.04	0.01	0.00	0.00
677	0.66	0.53	0.37	0.22	0.12	0.07	0.07	0.10	0.16	0.21	0.24	0.25	0.25	0.23	0.21	0.16	0.09	0.03	0.01	0.00	0.00
679	0.78	0.69	0.56	0.41	0.30	0.23	0.22	0.23	0.25	0.28	0.29	0.31	0.32	0.31	0.27	0.20	0.11	0.04	0.01	0.00	0.00
681	0.57	0.46	0.32	0.17	0.07	0.03	0.02	0.02	0.04	0.06	0.09	0.13	0.17	0.19	0.18	0.13	0.07	0.02	0.00	0.00	0.00
683	0.72	0.61	0.49	0.38	0.31	0.28	0.27	0.27	0.26	0.24	0.23	0.24	0.28	0.30	0.30	0.25	0.15	0.06	0.01	0.00	0.00
685	0.69	0.58	0.44	0.31	0.22	0.18	0.17	0.18	0.18	0.17	0.17	0.17	0.20	0.23	0.25	0.22	0.14	0.06	0.01	0.00	0.00
687	0.80	0.69	0.56	0.44	0.36	0.34	0.34	0.34	0.31	0.25	0.19	0.17	0.19	0.25	0.29	0.27	0.18	0.08	0.02	0.00	0.00
689	0.67	0.51	0.35	0.23	0.16	0.14	0.15	0.18	0.20	0.20	0.20	0.21	0.23	0.26	0.26	0.21	0.12	0.05	0.01	0.00	0.00
691	0.62	0.47	0.27	0.11	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
693	0.73	0.62	0.47	0.33	0.24	0.22	0.24	0.28	0.30	0.28	0.22	0.18	0.17	0.20	0.22	0.22	0.15	0.07	0.01	0.00	0.00
695	0.71	0.63	0.51	0.39	0.32	0.29	0.31	0.34	0.34	0.31	0.26	0.22	0.22	0.24	0.26	0.23	0.15	0.07	0.01	0.00	0.00
697	0.64	0.53	0.38	0.25	0.17	0.16	0.20	0.25	0.28	0.25	0.20	0.15	0.14	0.17	0.21	0.22	0.16	0.08	0.02	0.00	0.00
701	2.19	2.17	2.05	1.85	1.61	1.36	1.14	0.94	0.78	0.66	0.59	0.58	0.59	0.60	0.54	0.40	0.22	0.08	0.01	0.00	0.00
703	2.68	2.72	2.63	2.42	2.13	1.82	1.53	1.25	1.02	0.84	0.73	0.72	0.78	0.85	0.84	0.70	0.43	0.18	0.04	0.00	0.00
705	2.28	2.27	2.16	1.96	1.72	1.45	1.21	1.01	0.84	0.72	0.66	0.68	0.75	0.81	0.80	0.67	0.43	0.19	0.04	0.00	0.00
707	2.54	2.56	2.45	2.22	1.94	1.64	1.37	1.14	0.95	0.80	0.70	0.66	0.68	0.73	0.75	0.68	0.51	0.29	0.11	0.02	0.00
709	2.30	2.25	2.11	1.90	1.66	1.42	1.22	1.04	0.89	0.77	0.68	0.65	0.67	0.71	0.72	0.63	0.46	0.25	0.09	0.01	0.00
711	2.42	2.39	2.28	2.09	1.85	1.62	1.42	1.25	1.11	0.99	0.89	0.82	0.80	0.85	0.93	0.97	0.92	0.76	0.52	0.29	0.15
713	2.65	2.64	2.50	2.26	1.97	1.68	1.42	1.20	1.02	0.87	0.76	0.71	0.73	0.78	0.83	0.79	0.63	0.37	0.14	0.03	0.00
715	2.60	2.59	2.46	2.23	1.94	1.65	1.38	1.15	0.96	0.81	0.72	0.70	0.71	0.72	0.66	0.52	0.30	0.12	0.02	0.00	0.00
717	2.25	2.33	2.35	2.28	2.15	1.97	1.77	1.57	1.38	1.22	1.12	1.07	1.08	1.10	1.07	0.93	0.69	0.39	0.15	0.03	0.00
719	2.33	2.31	2.20	2.02	1.80	1.59	1.40	1.23	1.06	0.92	0.80	0.74	0.76	0.80	0.81	0.73	0.53	0.28	0.10	0.02	0.00
721	2.61	2.64	2.55	2.35	2.08	1.80	1.53	1.29	1.08	0.92	0.81	0.77	0.79	0.82	0.79	0.66	0.42	0.19	0.04	0.01	0.00
723	1.88	1.93	1.89	1.77	1.59	1.38	1.18	1.00	0.86	0.74	0.66	0.63	0.64	0.66	0.65	0.58	0.43	0.24	0.09	0.02	0.00
725	2.84	2.90	2.81	2.60	2.33	2.03	1.74	1.48	1.25	1.04	0.88	0.79	0.80	0.88	0.96	0.95	0.79	0.51	0.23	0.06	0.01
727	1.57	1.53	1.42	1.25	1.07	0.92	0.80	0.70	0.60	0.51	0.45	0.44	0.48	0.53	0.55	0.48	0.30	0.13	0.03	0.00	0.00
729	2.63	2.66	2.57	2.36	2.09	1.78	1.47	1.20	0.97	0.80	0.71	0.71	0.78	0.87	0.89	0.79	0.58	0.31	0.11	0.02	0.00
731	2.44	2.45	2.33	2.11	1.82	1.50	1.20	0.94	0.74	0.61	0.57	0.59	0.63	0.64	0.57	0.41	0.21	0.07	0.01	0.00	0.00
733	2.69	2.73	2.66	2.46	2.18	1.87	1.55	1.26	1.02	0.84	0.73	0.71	0.76	0.85	0.89	0.83	0.65	0.39	0.16	0.03	0.00
735	2.35	2.36	2.22	1.96	1.64	1.32	1.05	0.83	0.68	0.58	0.53	0.53	0.55	0.56	0.52	0.40	0.23	0.09	0.02	0.00	0.00
737	2.84	2.91	2.83	2.62	2.32	1.98	1.65	1.35	1.11	0.92	0.81	0.78	0.82	0.92	0.99	0.97	0.82	0.56	0.28	0.09	0.02
739	2.79	2.83	2.73	2.50	2.19	1.84	1.51	1.24	1.02	0.88	0.82	0.83	0.87	0.90	0.83	0.66	0.40	0.17	0.04	0.00	0.00
741	2.75	2.78	2.67	2.45	2.13	1.79	1.46	1.17	0.94	0.78	0.70	0.69	0.75	0.81	0.81	0.70	0.50	0.26	0.09	0.02	0.00
743	1.12	1.06	0.94	0.80	0.65	0.54	0.46	0.40	0.36	0.35	0.35	0.38	0.41	0.42	0.37	0.26	0.13	0.04	0.01	0.00	0.00
745	0.92	0.77	0.58	0.39	0.27	0.23	0.25	0.31	0.36	0.38	0.35	0.32	0.32	0.33	0.35	0.32	0.22	0.10	0.02	0.00	0.00

Grain Size Data - ALE cont.

Depth	282.07	309.64	339.92	373.15	409.63	449.67	493.63	541.89	594.87	653.03	716.87	786.95	863.88	948.34
673	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
675	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
677	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
679	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
681	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
683	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
685	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
687	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
689	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
691	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
693	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
695	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
697	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
701	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
703	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
705	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
707	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
709	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
711	0.11	0.11	0.11	0.08	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
713	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
715	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
717	0.00	0.00	0.00	0.00	0.00	0.02	0.07	0.17	0.29	0.40	0.37	0.22	0.05	0.01
719	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
721	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
723	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
725	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
727	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
729	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
731	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
733	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
735	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
737	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
739	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
741	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
743	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
745	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Grain Size Data - ALE cont.

Depth	Size fraction (microns)																										
	0.38	**0.41**	**0.45**	**0.50**	**0.54**	**0.60**	**0.66**	**0.72**	**0.79**	**0.87**	**0.95**	**1.05**	**1.15**	**1.26**	**1.38**	**1.52**	**1.67**	**1.83**	**2.01**	**2.21**	**2.42**	**2.66**	**2.92**	**3.21**	**3.52**	**3.86**	**4.24**
747	0.06	0.11	0.17	0.24	0.30	0.35	0.40	0.44	0.48	0.51	0.54	0.56	0.58	0.60	0.62	0.64	0.67	0.71	0.76	0.81	0.88	0.97	1.07	1.18	1.31	1.45	1.61
749	0.06	0.11	0.16	0.23	0.29	0.34	0.38	0.43	0.46	0.49	0.51	0.53	0.55	0.57	0.59	0.61	0.65	0.68	0.73	0.79	0.87	0.96	1.06	1.18	1.31	1.46	1.61
751	0.07	0.13	0.20	0.28	0.35	0.41	0.46	0.51	0.55	0.59	0.61	0.64	0.66	0.69	0.71	0.74	0.77	0.82	0.87	0.94	1.02	1.11	1.21	1.33	1.45	1.57	1.70
753	0.08	0.15	0.21	0.31	0.38	0.45	0.51	0.56	0.61	0.65	0.68	0.71	0.74	0.77	0.80	0.84	0.88	0.94	1.00	1.08	1.16	1.26	1.37	1.48	1.61	1.73	1.85
755	0.08	0.14	0.20	0.29	0.36	0.42	0.47	0.53	0.57	0.61	0.64	0.66	0.69	0.72	0.75	0.78	0.82	0.88	0.94	1.02	1.11	1.22	1.33	1.46	1.60	1.74	1.88
757	0.06	0.11	0.16	0.23	0.29	0.34	0.39	0.43	0.47	0.49	0.52	0.53	0.55	0.56	0.58	0.59	0.62	0.65	0.69	0.74	0.81	0.90	1.01	1.14	1.30	1.47	1.67
759	0.07	0.13	0.19	0.28	0.35	0.41	0.47	0.52	0.57	0.61	0.64	0.67	0.70	0.73	0.75	0.78	0.82	0.86	0.92	0.98	1.06	1.16	1.27	1.40	1.54	1.70	1.88
761	0.07	0.13	0.20	0.28	0.35	0.41	0.46	0.52	0.56	0.60	0.64	0.67	0.70	0.73	0.76	0.80	0.85	0.90	0.97	1.04	1.13	1.22	1.33	1.44	1.56	1.68	1.81
763	0.07	0.12	0.17	0.25	0.31	0.36	0.41	0.46	0.50	0.53	0.56	0.58	0.60	0.62	0.63	0.65	0.68	0.72	0.76	0.82	0.90	0.99	1.11	1.24	1.40	1.57	1.77
765	0.08	0.14	0.20	0.29	0.36	0.43	0.49	0.55	0.61	0.65	0.69	0.73	0.76	0.79	0.82	0.84	0.88	0.91	0.95	1.00	1.06	1.13	1.22	1.32	1.44	1.58	1.73
767	0.07	0.13	0.19	0.27	0.34	0.40	0.46	0.52	0.57	0.62	0.66	0.70	0.74	0.78	0.82	0.86	0.90	0.96	1.02	1.09	1.17	1.27	1.38	1.50	1.65	1.81	1.98
769	0.07	0.13	0.19	0.27	0.34	0.40	0.46	0.52	0.56	0.60	0.64	0.67	0.70	0.72	0.75	0.77	0.81	0.84	0.89	0.95	1.02	1.11	1.21	1.34	1.48	1.64	1.83
771	0.07	0.12	0.18	0.25	0.31	0.37	0.42	0.47	0.52	0.56	0.59	0.62	0.64	0.67	0.69	0.71	0.74	0.77	0.81	0.86	0.92	0.99	1.07	1.17	1.28	1.41	1.54
773	0.07	0.13	0.19	0.27	0.34	0.40	0.45	0.50	0.55	0.59	0.62	0.64	0.67	0.69	0.72	0.75	0.78	0.83	0.89	0.96	1.05	1.15	1.28	1.42	1.58	1.76	1.96
775	0.07	0.12	0.17	0.25	0.31	0.37	0.42	0.48	0.53	0.57	0.61	0.65	0.68	0.72	0.76	0.79	0.84	0.88	0.94	1.00	1.07	1.15	1.24	1.35	1.46	1.58	1.72
777	0.09	0.15	0.23	0.33	0.41	0.48	0.55	0.62	0.68	0.74	0.79	0.83	0.87	0.92	0.96	1.00	1.05	1.10	1.17	1.24	1.32	1.42	1.53	1.65	1.78	1.93	2.08
779	0.09	0.15	0.23	0.32	0.40	0.47	0.54	0.60	0.66	0.71	0.75	0.78	0.82	0.85	0.89	0.92	0.97	1.03	1.09	1.17	1.26	1.36	1.48	1.61	1.76	1.91	2.07
781	0.07	0.13	0.19	0.27	0.34	0.39	0.45	0.50	0.54	0.57	0.60	0.62	0.64	0.67	0.69	0.72	0.76	0.82	0.88	0.96	1.07	1.19	1.33	1.48	1.66	1.86	2.06
783	0.06	0.11	0.17	0.24	0.29	0.35	0.39	0.44	0.47	0.50	0.53	0.55	0.57	0.58	0.59	0.61	0.63	0.66	0.69	0.74	0.79	0.87	0.96	1.06	1.19	1.33	1.49
785	0.09	0.15	0.23	0.33	0.41	0.49	0.56	0.63	0.69	0.74	0.79	0.84	0.89	0.93	0.97	1.02	1.07	1.13	1.20	1.27	1.36	1.45	1.56	1.67	1.80	1.93	2.06
787	0.10	0.18	0.26	0.37	0.47	0.55	0.63	0.71	0.78	0.83	0.88	0.93	0.98	1.02	1.07	1.11	1.17	1.23	1.30	1.39	1.48	1.59	1.70	1.83	1.96	2.10	2.24
789	0.07	0.12	0.18	0.25	0.31	0.36	0.41	0.45	0.49	0.52	0.54	0.56	0.58	0.60	0.61	0.64	0.67	0.71	0.77	0.84	0.93	1.04	1.17	1.32	1.49	1.67	1.87
791	0.06	0.11	0.17	0.24	0.30	0.35	0.39	0.44	0.47	0.50	0.53	0.55	0.57	0.59	0.61	0.64	0.67	0.72	0.77	0.84	0.93	1.03	1.16	1.30	1.46	1.64	1.83
793	0.08	0.14	0.20	0.29	0.36	0.43	0.48	0.54	0.59	0.63	0.67	0.70	0.73	0.76	0.79	0.82	0.86	0.90	0.96	1.03	1.11	1.21	1.32	1.46	1.60	1.77	1.95
795	0.06	0.11	0.16	0.23	0.29	0.34	0.38	0.43	0.47	0.50	0.52	0.54	0.56	0.58	0.60	0.62	0.65	0.69	0.74	0.79	0.86	0.93	1.02	1.12	1.23	1.34	1.46
797	0.08	0.14	0.21	0.30	0.37	0.43	0.48	0.54	0.58	0.61	0.64	0.66	0.69	0.71	0.74	0.77	0.82	0.87	0.95	1.04	1.14	1.27	1.41	1.57	1.74	1.93	2.11
799	0.09	0.16	0.24	0.34	0.42	0.49	0.56	0.63	0.69	0.74	0.78	0.82	0.86	0.90	0.94	0.98	1.03	1.09	1.17	1.26	1.36	1.48	1.61	1.77	1.93	2.11	2.29
801	0.07	0.13	0.19	0.27	0.34	0.40	0.45	0.51	0.55	0.59	0.62	0.65	0.68	0.70	0.73	0.76	0.79	0.84	0.89	0.96	1.05	1.15	1.26	1.40	1.55	1.73	1.91
803	0.09	0.17	0.25	0.35	0.45	0.53	0.60	0.68	0.75	0.80	0.86	0.91	0.96	1.00	1.05	1.10	1.16	1.22	1.30	1.38	1.47	1.56	1.67	1.79	1.91	2.03	2.15
805	0.06	0.11	0.16	0.23	0.28	0.33	0.38	0.42	0.46	0.49	0.51	0.53	0.55	0.56	0.58	0.60	0.62	0.65	0.69	0.74	0.81	0.89	0.99	1.11	1.25	1.41	1.59
807	0.06	0.12	0.17	0.24	0.30	0.35	0.39	0.44	0.47	0.50	0.52	0.54	0.55	0.57	0.58	0.60	0.64	0.68	0.73	0.80	0.89	1.00	1.13	1.28	1.45	1.64	1.85
809	0.07	0.12	0.18	0.26	0.32	0.37	0.42	0.47	0.50	0.53	0.56	0.58	0.59	0.61	0.63	0.66	0.70	0.74	0.80	0.88	0.98	1.09	1.23	1.39	1.57	1.76	1.97
811	0.09	0.16	0.23	0.33	0.42	0.49	0.56	0.63	0.69	0.74	0.78	0.82	0.86	0.90	0.94	0.98	1.03	1.09	1.15	1.23	1.32	1.43	1.55	1.68	1.83	1.99	2.16
813	0.08	0.15	0.21	0.31	0.38	0.45	0.52	0.58	0.63	0.68	0.72	0.75	0.78	0.81	0.84	0.88	0.92	0.96	1.02	1.09	1.17	1.27	1.39	1.52	1.68	1.84	2.03
815	0.08	0.14	0.21	0.30	0.37	0.44	0.50	0.56	0.61	0.65	0.69	0.72	0.75	0.78	0.81	0.84	0.88	0.93	0.99	1.06	1.14	1.24	1.36	1.49	1.64	1.81	1.98
817	0.07	0.13	0.20	0.28	0.35	0.40	0.46	0.51	0.55	0.58	0.61	0.63	0.66	0.68	0.71	0.74	0.78	0.83	0.90	0.99	1.09	1.21	1.34	1.50	1.66	1.84	2.02

Grain Size Data - ALE cont.

Depth	4.66	5.11	5.61	6.16	6.76	7.42	8.15	8.94	9.82	10.78	11.83	12.99	14.26	15.65	17.18	18.86	20.71	22.73	24.95	27.39	30.07	33.01	36.24
747	1.77	1.94	2.12	2.30	2.48	2.66	2.84	3.01	3.16	3.29	3.38	3.42	3.42	3.37	3.26	3.06	2.79	2.48	2.19	1.98	1.89	1.90	1.97
749	1.77	1.94	2.12	2.29	2.47	2.64	2.81	2.97	3.12	3.24	3.32	3.37	3.37	3.34	3.26	3.09	2.85	2.56	2.28	2.09	2.00	2.02	2.10
751	1.82	1.94	2.06	2.16	2.26	2.35	2.43	2.51	2.58	2.63	2.65	2.67	2.69	2.71	2.70	2.63	2.50	2.33	2.19	2.12	2.17	2.32	2.51
753	1.96	2.07	2.16	2.25	2.32	2.38	2.43	2.48	2.52	2.54	2.54	2.54	2.55	2.57	2.57	2.51	2.39	2.22	2.07	2.00	2.06	2.21	2.42
755	2.02	2.15	2.27	2.38	2.48	2.57	2.64	2.70	2.75	2.78	2.78	2.76	2.75	2.74	2.70	2.62	2.48	2.29	2.12	2.03	2.06	2.19	2.38
757	1.89	2.13	2.38	2.65	2.92	3.20	3.49	3.77	4.04	4.28	4.47	4.59	4.64	4.58	4.41	4.11	3.67	3.13	2.57	2.08	1.70	1.44	1.28
759	2.07	2.27	2.48	2.69	2.90	3.12	3.33	3.54	3.73	3.88	3.99	4.05	4.04	3.95	3.78	3.49	3.10	2.64	2.19	1.83	1.59	1.46	1.42
761	1.92	2.03	2.13	2.23	2.31	2.38	2.44	2.49	2.53	2.56	2.56	2.56	2.55	2.54	2.52	2.45	2.33	2.19	2.06	2.02	2.07	2.23	2.42
763	1.98	2.21	2.45	2.70	2.96	3.22	3.48	3.72	3.95	4.15	4.29	4.36	4.35	4.25	4.04	3.71	3.26	2.75	2.23	1.80	1.51	1.34	1.27
765	1.90	2.09	2.29	2.51	2.73	2.97	3.21	3.46	3.71	3.93	4.12	4.25	4.32	4.31	4.18	3.91	3.49	2.97	2.42	1.92	1.54	1.28	1.10
767	2.17	2.37	2.58	2.80	3.02	3.25	3.47	3.69	3.90	4.07	4.20	4.27	4.27	4.17	3.97	3.66	3.23	2.73	2.21	1.76	1.42	1.20	1.05
769	2.02	2.24	2.47	2.71	2.96	3.21	3.47	3.73	3.97	4.19	4.35	4.45	4.47	4.40	4.21	3.87	3.40	2.83	2.25	1.75	1.37	1.12	0.97
771	1.70	1.86	2.03	2.21	2.40	2.59	2.79	2.99	3.19	3.37	3.52	3.63	3.70	3.71	3.64	3.46	3.19	2.83	2.45	2.12	1.88	1.74	1.68
773	2.17	2.38	2.61	2.84	3.06	3.28	3.50	3.69	3.86	3.99	4.06	4.06	4.00	3.85	3.62	3.30	2.90	2.46	2.04	1.69	1.46	1.32	1.25
775	1.86	2.01	2.17	2.34	2.51	2.69	2.87	3.06	3.24	3.40	3.52	3.61	3.64	3.61	3.50	3.28	2.96	2.58	2.20	1.88	1.67	1.55	1.50
777	2.24	2.41	2.58	2.75	2.91	3.08	3.24	3.39	3.52	3.62	3.68	3.68	3.64	3.54	3.37	3.11	2.76	2.35	1.96	1.65	1.44	1.32	1.26
779	2.24	2.41	2.57	2.73	2.89	3.04	3.18	3.31	3.42	3.49	3.52	3.51	3.45	3.36	3.20	2.94	2.58	2.19	1.84	1.61	1.51	1.52	1.57
781	2.27	2.49	2.71	2.92	3.12	3.31	3.49	3.63	3.75	3.81	3.81	3.75	3.62	3.45	3.20	2.89	2.53	2.15	1.83	1.61	1.51	1.51	1.55
783	1.67	1.86	2.06	2.28	2.50	2.73	2.96	3.19	3.42	3.62	3.79	3.90	3.96	3.94	3.83	3.60	3.27	2.86	2.44	2.09	1.85	1.73	1.69
785	2.19	2.33	2.46	2.59	2.71	2.82	2.94	3.04	3.13	3.19	3.22	3.20	3.16	3.08	2.94	2.73	2.43	2.11	1.81	1.59	1.48	1.45	1.46
787	2.38	2.51	2.63	2.74	2.84	2.93	3.02	3.09	3.14	3.16	3.14	3.10	3.04	2.96	2.83	2.62	2.33	2.01	1.72	1.52	1.42	1.41	1.41
789	2.09	2.31	2.54	2.77	2.99	3.21	3.42	3.61	3.77	3.88	3.93	3.92	3.84	3.69	3.46	3.15	2.75	2.34	1.97	1.70	1.56	1.52	1.54
791	2.03	2.24	2.45	2.67	2.89	3.09	3.29	3.48	3.63	3.75	3.81	3.80	3.74	3.62	3.42	3.13	2.76	2.37	2.01	1.75	1.62	1.59	1.62
793	2.14	2.34	2.55	2.76	2.97	3.18	3.38	3.57	3.74	3.88	3.96	3.97	3.92	3.80	3.60	3.29	2.89	2.45	2.02	1.68	1.45	1.33	1.28
795	1.57	1.69	1.81	1.91	2.02	2.11	2.20	2.28	2.34	2.39	2.41	2.41	2.40	2.38	2.34	2.27	2.17	2.05	1.97	1.95	2.03	2.20	2.41
797	2.29	2.47	2.64	2.79	2.93	3.04	3.14	3.20	3.23	3.21	3.15	3.05	2.93	2.81	2.66	2.48	2.26	2.03	1.84	1.75	1.77	1.87	2.01
799	2.47	2.66	2.84	3.01	3.17	3.31	3.44	3.54	3.61	3.62	3.58	3.48	3.34	3.16	2.93	2.63	2.28	1.92	1.61	1.39	1.28	1.26	1.26
801	2.11	2.32	2.54	2.76	2.98	3.20	3.42	3.63	3.82	3.96	4.06	4.08	4.05	3.93	3.71	3.39	2.96	2.48	2.02	1.66	1.42	1.30	1.23
803	2.27	2.38	2.48	2.58	2.66	2.73	2.80	2.86	2.90	2.91	2.89	2.85	2.80	2.73	2.61	2.42	2.17	1.90	1.68	1.55	1.53	1.58	1.64
805	1.79	2.01	2.24	2.48	2.74	3.00	3.27	3.54	3.80	4.04	4.24	4.39	4.46	4.45	4.33	4.08	3.69	3.22	2.71	2.24	1.86	1.58	1.38
807	2.07	2.30	2.54	2.78	3.02	3.26	3.48	3.69	3.87	4.01	4.09	4.09	4.03	3.89	3.67	3.35	2.95	2.52	2.13	1.84	1.69	1.65	1.69
809	2.19	2.42	2.66	2.89	3.12	3.33	3.53	3.72	3.86	3.96	4.00	3.96	3.85	3.68	3.43	3.09	2.69	2.26	1.89	1.63	1.50	1.48	1.51
811	2.33	2.50	2.67	2.84	2.99	3.15	3.29	3.42	3.52	3.59	3.60	3.57	3.50	3.38	3.18	2.91	2.55	2.16	1.80	1.54	1.39	1.33	1.31
813	2.22	2.43	2.64	2.85	3.07	3.29	3.50	3.70	3.88	4.02	4.10	4.11	4.06	3.93	3.71	3.38	2.95	2.46	2.00	1.64	1.39	1.24	1.14
815	2.16	2.35	2.54	2.72	2.90	3.08	3.24	3.39	3.50	3.57	3.59	3.55	3.46	3.31	3.10	2.81	2.47	2.11	1.79	1.58	1.46	1.43	1.42
817	2.21	2.39	2.57	2.74	2.90	3.04	3.16	3.26	3.32	3.35	3.33	3.26	3.17	3.05	2.89	2.69	2.44	2.18	1.96	1.84	1.84	1.93	2.05

Grain Size Data - ALE cont.

Depth	39.78	43.67	47.94	52.63	57.77	63.42	69.62	76.43	83.90	92.10	101.10	110.99	121.84	133.75	146.82	161.18	176.94	194.23	213.22	234.07	256.95
747	2.04	2.05	1.97	1.82	1.62	1.41	1.22	1.06	0.92	0.81	0.73	0.70	0.72	0.79	0.85	0.85	0.74	0.54	0.29	0.11	0.02
749	2.17	2.17	2.09	1.93	1.72	1.49	1.27	1.07	0.90	0.77	0.69	0.67	0.71	0.79	0.84	0.80	0.65	0.41	0.18	0.05	0.01
751	2.67	2.71	2.62	2.39	2.07	1.73	1.41	1.14	0.93	0.79	0.72	0.70	0.75	0.82	0.87	0.84	0.70	0.48	0.24	0.08	0.01
753	2.59	2.65	2.57	2.34	2.03	1.68	1.35	1.07	0.87	0.77	0.75	0.81	0.89	0.94	0.87	0.68	0.39	0.15	0.03	0.00	0.00
755	2.54	2.61	2.53	2.30	1.97	1.59	1.23	0.94	0.76	0.69	0.71	0.78	0.83	0.79	0.63	0.39	0.17	0.04	0.00	0.00	0.00
757	1.17	1.07	0.95	0.81	0.66	0.53	0.43	0.35	0.30	0.29	0.32	0.39	0.47	0.51	0.46	0.33	0.16	0.05	0.01	0.00	0.00
759	1.38	1.29	1.15	0.97	0.79	0.64	0.54	0.48	0.42	0.37	0.34	0.34	0.38	0.45	0.50	0.46	0.32	0.15	0.04	0.00	0.00
761	2.60	2.67	2.62	2.44	2.18	1.87	1.57	1.29	1.06	0.89	0.77	0.73	0.75	0.79	0.79	0.70	0.51	0.28	0.10	0.02	0.00
763	1.24	1.20	1.10	0.97	0.82	0.69	0.60	0.54	0.52	0.50	0.49	0.49	0.49	0.48	0.44	0.34	0.20	0.08	0.02	0.00	0.00
765	0.97	0.85	0.72	0.61	0.53	0.50	0.50	0.52	0.52	0.50	0.46	0.43	0.44	0.48	0.51	0.48	0.38	0.22	0.08	0.02	0.00
767	0.95	0.85	0.73	0.60	0.48	0.39	0.33	0.30	0.29	0.29	0.30	0.33	0.37	0.42	0.41	0.34	0.21	0.09	0.02	0.00	0.00
769	0.86	0.77	0.67	0.57	0.50	0.46	0.47	0.48	0.49	0.47	0.43	0.41	0.40	0.42	0.42	0.37	0.26	0.13	0.04	0.01	0.00
771	1.67	1.66	1.63	1.58	1.52	1.45	1.37	1.27	1.14	0.99	0.84	0.72	0.64	0.60	0.56	0.46	0.31	0.15	0.04	0.01	0.00
773	1.20	1.13	1.03	0.93	0.83	0.77	0.73	0.72	0.70	0.65	0.59	0.53	0.46	0.39	0.31	0.22	0.12	0.04	0.01	0.00	0.00
775	1.49	1.47	1.44	1.40	1.36	1.33	1.28	1.20	1.08	0.91	0.75	0.63	0.57	0.57	0.59	0.57	0.48	0.31	0.14	0.04	0.01
777	1.21	1.13	1.02	0.89	0.78	0.69	0.63	0.59	0.55	0.50	0.46	0.43	0.42	0.41	0.37	0.29	0.17	0.07	0.01	0.00	0.00
779	1.58	1.49	1.30	1.07	0.84	0.68	0.60	0.57	0.57	0.57	0.57	0.57	0.58	0.58	0.55	0.46	0.29	0.12	0.03	0.00	0.00
781	1.57	1.52	1.40	1.23	1.05	0.90	0.79	0.70	0.63	0.57	0.53	0.51	0.52	0.52	0.48	0.38	0.22	0.09	0.02	0.00	0.00
783	1.69	1.67	1.61	1.52	1.41	1.30	1.19	1.10	0.99	0.86	0.74	0.65	0.60	0.60	0.60	0.56	0.44	0.26	0.11	0.02	0.00
785	1.46	1.42	1.35	1.26	1.18	1.10	1.02	0.92	0.79	0.66	0.57	0.55	0.61	0.70	0.74	0.66	0.44	0.19	0.04	0.00	0.00
787	1.38	1.29	1.15	1.01	0.91	0.84	0.80	0.75	0.68	0.59	0.53	0.51	0.55	0.60	0.60	0.51	0.32	0.13	0.03	0.00	0.00
789	1.55	1.50	1.41	1.28	1.16	1.05	0.96	0.88	0.80	0.72	0.67	0.64	0.62	0.58	0.48	0.33	0.17	0.06	0.01	0.00	0.00
791	1.64	1.61	1.51	1.38	1.23	1.10	0.99	0.90	0.83	0.78	0.76	0.77	0.78	0.74	0.62	0.43	0.22	0.07	0.01	0.00	0.00
793	1.23	1.16	1.04	0.90	0.77	0.67	0.62	0.59	0.57	0.54	0.50	0.47	0.47	0.49	0.49	0.43	0.30	0.14	0.04	0.00	0.00
795	2.61	2.75	2.80	2.76	2.65	2.48	2.29	2.08	1.88	1.71	1.57	1.49	1.45	1.40	1.28	1.04	0.72	0.37	0.13	0.02	0.00
797	2.10	2.10	1.98	1.77	1.51	1.25	1.02	0.83	0.70	0.61	0.58	0.59	0.62	0.62	0.56	0.43	0.24	0.09	0.02	0.00	0.00
799	1.24	1.16	1.04	0.92	0.83	0.78	0.75	0.71	0.65	0.57	0.50	0.46	0.45	0.45	0.41	0.31	0.17	0.06	0.01	0.00	0.00
801	1.18	1.09	0.98	0.86	0.77	0.72	0.70	0.69	0.66	0.61	0.55	0.52	0.52	0.53	0.51	0.44	0.29	0.13	0.03	0.00	0.00
803	1.66	1.61	1.51	1.40	1.31	1.25	1.19	1.10	0.96	0.80	0.66	0.59	0.59	0.63	0.63	0.54	0.34	0.14	0.03	0.00	0.00
805	1.23	1.09	0.96	0.85	0.77	0.72	0.70	0.69	0.68	0.66	0.62	0.58	0.54	0.48	0.39	0.27	0.14	0.05	0.01	0.00	0.00
807	1.72	1.69	1.57	1.36	1.12	0.89	0.71	0.58	0.50	0.46	0.44	0.43	0.41	0.37	0.30	0.20	0.10	0.03	0.00	0.00	0.00
809	1.52	1.47	1.33	1.15	0.96	0.81	0.71	0.64	0.60	0.56	0.54	0.54	0.56	0.57	0.54	0.44	0.27	0.11	0.02	0.00	0.00
811	1.27	1.19	1.06	0.93	0.82	0.74	0.69	0.64	0.58	0.52	0.48	0.47	0.49	0.49	0.44	0.32	0.18	0.06	0.01	0.00	0.00
813	1.04	0.91	0.75	0.61	0.50	0.45	0.44	0.44	0.42	0.38	0.34	0.32	0.35	0.40	0.44	0.40	0.27	0.12	0.03	0.00	0.00
815	1.40	1.33	1.24	1.14	1.08	1.05	1.04	1.01	0.92	0.77	0.60	0.49	0.46	0.51	0.60	0.65	0.58	0.39	0.18	0.04	0.01
817	2.12	2.10	1.96	1.72	1.45	1.18	0.94	0.76	0.63	0.55	0.53	0.54	0.57	0.57	0.50	0.36	0.19	0.06	0.01	0.00	0.00

Grain Size Data - ALE cont.

Depth	282.07	309.64	339.92	373.15	409.63	449.67	493.63	541.89	594.87	653.03	716.87	786.95	863.88	948.34
747	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
749	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
751	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
753	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
755	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
757	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
759	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
761	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
763	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
765	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
767	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
769	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
771	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
773	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
775	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
777	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
779	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
781	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
783	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
785	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
787	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
789	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
791	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
793	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
795	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
797	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
799	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
801	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
803	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
805	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
807	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
809	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
811	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
813	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
815	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
817	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Grain Size Data - ALE cont.

Depth	Size fraction (microns)																									
	0.38	**0.41**	**0.45**	**0.50**	**0.54**	**0.60**	**0.66**	**0.72**	**0.79**	**0.87**	**0.95**	**1.05**	**1.15**	**1.26**	**1.38**	**1.52**	**1.67**	**1.83**	**2.01**	**2.21**	**2.42**	**2.66**	**2.92**	**3.21**	**3.52**	**3.86**	**4.24**
819	0.07	0.13	0.19	0.27	0.33	0.39	0.44	0.49	0.54	0.57	0.60	0.62	0.65	0.67	0.69	0.72	0.76	0.80	0.85	0.92	1.01	1.11	1.23	1.36	1.52	1.68	1.87
821	0.09	0.16	0.23	0.33	0.41	0.48	0.55	0.62	0.68	0.73	0.77	0.81	0.85	0.89	0.93	0.97	1.02	1.08	1.15	1.23	1.32	1.43	1.55	1.68	1.82	1.96	2.12
823	0.10	0.18	0.27	0.38	0.48	0.57	0.65	0.73	0.80	0.86	0.91	0.97	1.02	1.07	1.12	1.18	1.24	1.31	1.40	1.49	1.59	1.71	1.83	1.96	2.09	2.22	2.35
825	0.07	0.13	0.19	0.27	0.34	0.40	0.45	0.50	0.54	0.58	0.61	0.63	0.66	0.68	0.70	0.73	0.77	0.81	0.87	0.94	1.03	1.14	1.26	1.41	1.57	1.75	1.94
827	0.08	0.14	0.20	0.28	0.35	0.42	0.47	0.53	0.57	0.61	0.64	0.67	0.69	0.72	0.74	0.77	0.80	0.84	0.90	0.97	1.05	1.15	1.28	1.42	1.58	1.76	1.95
829	0.08	0.14	0.20	0.29	0.36	0.42	0.47	0.53	0.57	0.61	0.64	0.66	0.69	0.71	0.74	0.77	0.81	0.87	0.93	1.01	1.10	1.20	1.32	1.44	1.58	1.72	1.85
831	0.08	0.14	0.20	0.29	0.36	0.42	0.48	0.53	0.58	0.62	0.65	0.67	0.70	0.73	0.75	0.78	0.82	0.88	0.94	1.02	1.13	1.25	1.39	1.55	1.73	1.92	2.13
833	0.09	0.15	0.23	0.32	0.40	0.47	0.53	0.59	0.64	0.67	0.71	0.73	0.76	0.79	0.81	0.85	0.89	0.95	1.02	1.10	1.20	1.31	1.43	1.57	1.71	1.86	2.00
835	0.10	0.18	0.26	0.37	0.47	0.55	0.63	0.70	0.77	0.83	0.87	0.92	0.96	1.00	1.04	1.08	1.13	1.19	1.26	1.34	1.43	1.54	1.66	1.80	1.94	2.10	2.26
837	0.08	0.14	0.21	0.29	0.37	0.43	0.48	0.54	0.58	0.62	0.65	0.67	0.70	0.72	0.75	0.79	0.83	0.89	0.95	1.04	1.14	1.25	1.39	1.53	1.69	1.86	2.02
839	0.11	0.19	0.28	0.40	0.50	0.59	0.67	0.75	0.81	0.87	0.91	0.95	0.99	1.03	1.07	1.11	1.16	1.23	1.31	1.41	1.52	1.66	1.81	1.98	2.16	2.35	2.53
841	0.07	0.12	0.18	0.26	0.32	0.38	0.43	0.48	0.52	0.56	0.59	0.62	0.65	0.68	0.71	0.75	0.79	0.85	0.91	0.99	1.08	1.18	1.30	1.42	1.56	1.70	1.85
843	0.08	0.14	0.20	0.29	0.36	0.42	0.47	0.53	0.57	0.61	0.64	0.67	0.69	0.72	0.75	0.78	0.83	0.88	0.95	1.03	1.12	1.23	1.36	1.50	1.65	1.81	1.97
845	0.08	0.13	0.20	0.28	0.35	0.41	0.46	0.51	0.55	0.59	0.61	0.63	0.65	0.67	0.69	0.72	0.75	0.80	0.86	0.93	1.03	1.14	1.27	1.42	1.58	1.77	1.96
847	0.06	0.11	0.17	0.24	0.30	0.35	0.39	0.44	0.48	0.50	0.53	0.55	0.57	0.59	0.61	0.63	0.66	0.70	0.76	0.82	0.91	1.00	1.12	1.25	1.40	1.56	1.73
849	0.07	0.13	0.19	0.26	0.33	0.39	0.44	0.49	0.53	0.56	0.59	0.62	0.64	0.67	0.69	0.72	0.76	0.81	0.87	0.94	1.03	1.13	1.25	1.38	1.52	1.67	1.83
851	0.05	0.09	0.14	0.19	0.24	0.28	0.32	0.35	0.38	0.40	0.42	0.44	0.45	0.46	0.48	0.49	0.52	0.55	0.59	0.64	0.70	0.78	0.87	0.97	1.09	1.23	1.38
853	0.04	0.08	0.12	0.17	0.21	0.24	0.27	0.30	0.33	0.34	0.36	0.37	0.38	0.38	0.39	0.40	0.41	0.43	0.45	0.49	0.53	0.59	0.67	0.76	0.86	0.99	1.13
855	0.07	0.13	0.19	0.27	0.33	0.39	0.44	0.49	0.54	0.57	0.59	0.62	0.64	0.65	0.67	0.69	0.72	0.76	0.81	0.88	0.96	1.06	1.18	1.32	1.48	1.66	1.85
857	0.05	0.09	0.13	0.19	0.24	0.28	0.31	0.35	0.38	0.40	0.42	0.43	0.44	0.45	0.46	0.48	0.50	0.52	0.56	0.61	0.67	0.74	0.83	0.94	1.07	1.21	1.37
859	0.08	0.14	0.21	0.30	0.38	0.44	0.50	0.55	0.60	0.63	0.66	0.68	0.70	0.72	0.74	0.76	0.79	0.83	0.88	0.95	1.03	1.13	1.24	1.37	1.52	1.68	1.85
861	0.11	0.19	0.27	0.39	0.49	0.57	0.65	0.73	0.79	0.84	0.88	0.91	0.94	0.97	0.99	1.02	1.05	1.10	1.15	1.22	1.30	1.40	1.52	1.66	1.81	1.97	2.14
863	0.05	0.08	0.12	0.17	0.21	0.25	0.28	0.32	0.34	0.36	0.38	0.39	0.40	0.41	0.42	0.43	0.45	0.47	0.50	0.54	0.60	0.66	0.74	0.84	0.95	1.07	1.22
865	0.06	0.10	0.15	0.21	0.26	0.30	0.34	0.38	0.41	0.43	0.45	0.46	0.48	0.49	0.51	0.53	0.55	0.59	0.63	0.69	0.76	0.85	0.96	1.08	1.22	1.38	1.54
867	0.05	0.08	0.12	0.17	0.21	0.25	0.28	0.31	0.34	0.36	0.37	0.39	0.40	0.41	0.42	0.43	0.45	0.47	0.50	0.54	0.60	0.66	0.74	0.84	0.95	1.07	1.21
869	0.04	0.06	0.10	0.14	0.17	0.20	0.22	0.25	0.27	0.29	0.30	0.31	0.31	0.32	0.33	0.33	0.34	0.36	0.38	0.41	0.45	0.50	0.56	0.63	0.73	0.84	0.96
871	0.04	0.07	0.10	0.15	0.18	0.21	0.24	0.27	0.29	0.30	0.32	0.32	0.33	0.34	0.34	0.35	0.36	0.38	0.40	0.43	0.48	0.53	0.60	0.69	0.79	0.91	1.05
873	0.05	0.08	0.12	0.18	0.22	0.26	0.29	0.32	0.35	0.37	0.38	0.40	0.41	0.42	0.43	0.45	0.47	0.49	0.53	0.58	0.64	0.71	0.80	0.91	1.03	1.17	1.33
875	0.05	0.08	0.12	0.17	0.22	0.25	0.29	0.32	0.34	0.36	0.38	0.39	0.40	0.41	0.42	0.43	0.45	0.48	0.51	0.55	0.61	0.68	0.76	0.86	0.98	1.11	1.26
877	0.04	0.07	0.11	0.16	0.19	0.23	0.26	0.29	0.31	0.33	0.35	0.36	0.37	0.38	0.39	0.40	0.41	0.43	0.46	0.50	0.55	0.60	0.68	0.76	0.87	0.98	1.12
879	0.04	0.08	0.12	0.17	0.21	0.24	0.27	0.30	0.33	0.35	0.36	0.37	0.38	0.39	0.40	0.41	0.42	0.44	0.47	0.51	0.55	0.61	0.69	0.78	0.88	1.01	1.15
881	0.04	0.07	0.10	0.15	0.18	0.21	0.24	0.27	0.29	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.40	0.43	0.46	0.50	0.56	0.62	0.70	0.79	0.90	1.02
883	0.04	0.07	0.10	0.15	0.18	0.21	0.24	0.27	0.29	0.31	0.32	0.34	0.35	0.35	0.36	0.37	0.38	0.40	0.43	0.46	0.50	0.56	0.63	0.71	0.81	0.92	1.05
885	0.04	0.07	0.10	0.15	0.18	0.22	0.24	0.27	0.29	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.40	0.43	0.47	0.51	0.57	0.65	0.73	0.83	0.95	1.09
887	0.05	0.08	0.13	0.18	0.22	0.26	0.29	0.33	0.35	0.37	0.39	0.40	0.41	0.42	0.43	0.45	0.47	0.49	0.52	0.57	0.62	0.70	0.78	0.88	1.00	1.14	1.29
889	0.04	0.06	0.10	0.14	0.17	0.20	0.22	0.25	0.27	0.29	0.30	0.31	0.32	0.33	0.33	0.34	0.36	0.37	0.40	0.43	0.47	0.52	0.59	0.67	0.76	0.87	0.99

Grain Size Data - ALE cont.

Depth	4.66	5.11	5.61	6.16	6.76	7.42	8.15	8.94	9.82	10.78	11.83	12.99	14.26	15.65	17.18	18.86	20.71	22.73	24.95	27.39	30.07	33.01	36.24
819	2.06	2.25	2.45	2.65	2.85	3.03	3.21	3.37	3.51	3.60	3.64	3.61	3.53	3.39	3.19	2.91	2.56	2.19	1.86	1.64	1.55	1.57	1.65
821	2.27	2.42	2.57	2.71	2.84	2.96	3.08	3.17	3.25	3.29	3.28	3.23	3.15	3.04	2.87	2.63	2.33	1.99	1.70	1.51	1.42	1.42	1.45
823	2.47	2.59	2.69	2.77	2.84	2.90	2.95	2.98	3.00	2.97	2.92	2.84	2.75	2.65	2.52	2.31	2.05	1.76	1.51	1.36	1.33	1.37	1.44
825	2.14	2.35	2.57	2.78	3.00	3.20	3.39	3.57	3.71	3.81	3.84	3.82	3.72	3.56	3.33	3.01	2.63	2.22	1.86	1.61	1.49	1.47	1.51
827	2.16	2.38	2.61	2.84	3.07	3.29	3.51	3.72	3.90	4.03	4.11	4.11	4.03	3.88	3.63	3.28	2.83	2.35	1.90	1.55	1.35	1.26	1.24
829	1.99	2.11	2.23	2.34	2.43	2.50	2.56	2.61	2.64	2.64	2.62	2.59	2.55	2.52	2.48	2.40	2.27	2.11	1.98	1.93	1.99	2.16	2.38
831	2.35	2.58	2.80	3.03	3.24	3.44	3.63	3.79	3.91	3.98	3.98	3.90	3.76	3.56	3.29	2.94	2.53	2.11	1.76	1.52	1.43	1.46	1.52
833	2.14	2.26	2.37	2.47	2.55	2.61	2.66	2.69	2.70	2.69	2.65	2.60	2.56	2.52	2.47	2.38	2.23	2.06	1.91	1.86	1.92	2.09	2.29
835	2.42	2.58	2.74	2.88	3.02	3.15	3.26	3.36	3.43	3.46	3.44	3.38	3.28	3.14	2.96	2.71	2.39	2.04	1.73	1.51	1.40	1.38	1.39
837	2.19	2.35	2.50	2.64	2.77	2.87	2.96	3.02	3.06	3.06	3.01	2.94	2.85	2.75	2.64	2.48	2.27	2.04	1.86	1.77	1.80	1.95	2.15
839	2.72	2.90	3.07	3.22	3.34	3.45	3.53	3.58	3.60	3.56	3.46	3.33	3.17	3.00	2.78	2.51	2.16	1.79	1.45	1.23	1.11	1.09	1.10
841	1.99	2.13	2.27	2.39	2.51	2.61	2.69	2.75	2.79	2.81	2.79	2.74	2.68	2.60	2.50	2.38	2.23	2.08	1.96	1.93	2.00	2.16	2.36
843	2.13	2.29	2.45	2.59	2.73	2.84	2.95	3.04	3.10	3.13	3.11	3.05	2.98	2.88	2.75	2.56	2.31	2.05	1.84	1.74	1.77	1.89	2.05
845	2.16	2.37	2.57	2.77	2.97	3.15	3.32	3.47	3.58	3.65	3.66	3.61	3.52	3.38	3.18	2.91	2.56	2.19	1.86	1.63	1.53	1.54	1.60
847	1.91	2.10	2.28	2.47	2.64	2.81	2.97	3.10	3.22	3.29	3.32	3.30	3.23	3.14	2.99	2.79	2.54	2.28	2.05	1.92	1.90	1.99	2.12
849	2.00	2.17	2.34	2.50	2.67	2.83	2.98	3.12	3.25	3.35	3.40	3.41	3.39	3.32	3.19	2.98	2.70	2.39	2.10	1.91	1.83	1.85	1.91
851	1.53	1.70	1.88	2.06	2.24	2.43	2.62	2.81	2.99	3.15	3.29	3.40	3.47	3.50	3.46	3.34	3.14	2.88	2.61	2.41	2.32	2.33	2.40
853	1.29	1.46	1.65	1.86	2.08	2.31	2.56	2.82	3.09	3.36	3.62	3.85	4.06	4.21	4.29	4.27	4.13	3.89	3.57	3.24	2.93	2.68	2.47
855	2.06	2.27	2.50	2.73	2.97	3.20	3.43	3.66	3.87	4.05	4.19	4.27	4.30	4.26	4.13	3.88	3.51	3.03	2.53	2.05	1.67	1.39	1.19
857	1.55	1.74	1.95	2.16	2.39	2.63	2.87	3.11	3.36	3.59	3.79	3.96	4.07	4.12	4.09	3.95	3.69	3.34	2.96	2.61	2.34	2.17	2.07
859	2.03	2.21	2.39	2.56	2.74	2.90	3.06	3.21	3.35	3.46	3.53	3.56	3.56	3.52	3.41	3.20	2.90	2.53	2.16	1.86	1.67	1.58	1.55
861	2.31	2.48	2.64	2.79	2.92	3.03	3.14	3.22	3.27	3.27	3.22	3.14	3.05	2.94	2.80	2.60	2.32	2.01	1.73	1.53	1.45	1.46	1.51
863	1.38	1.55	1.74	1.94	2.15	2.37	2.60	2.83	3.07	3.31	3.53	3.72	3.88	3.99	4.02	3.96	3.80	3.54	3.24	2.95	2.72	2.56	2.46
865	1.72	1.91	2.11	2.31	2.52	2.72	2.91	3.10	3.28	3.43	3.54	3.60	3.62	3.59	3.49	3.31	3.05	2.73	2.43	2.21	2.11	2.12	2.21
867	1.37	1.54	1.72	1.91	2.12	2.33	2.55	2.78	3.01	3.23	3.44	3.62	3.77	3.87	3.90	3.84	3.68	3.44	3.16	2.90	2.71	2.59	2.52
869	1.11	1.27	1.45	1.64	1.85	2.08	2.33	2.59	2.87	3.16	3.44	3.72	3.98	4.20	4.35	4.42	4.38	4.24	4.01	3.73	3.44	3.17	2.91
871	1.20	1.37	1.57	1.77	2.00	2.24	2.49	2.77	3.05	3.35	3.64	3.92	4.18	4.40	4.56	4.63	4.59	4.43	4.18	3.86	3.51	3.14	2.77
873	1.50	1.68	1.88	2.08	2.30	2.52	2.75	2.99	3.22	3.45	3.64	3.81	3.93	4.00	3.99	3.88	3.67	3.36	3.02	2.70	2.46	2.31	2.22
875	1.43	1.60	1.80	2.00	2.21	2.43	2.66	2.89	3.12	3.34	3.53	3.69	3.81	3.87	3.85	3.74	3.52	3.23	2.90	2.61	2.41	2.31	2.27
877	1.27	1.43	1.61	1.81	2.02	2.24	2.47	2.71	2.96	3.21	3.45	3.66	3.85	3.98	4.05	4.02	3.89	3.66	3.37	3.09	2.85	2.68	2.56
879	1.30	1.47	1.66	1.87	2.08	2.31	2.55	2.80	3.06	3.31	3.55	3.76	3.93	4.05	4.09	4.03	3.85	3.57	3.24	2.91	2.65	2.47	2.36
881	1.16	1.31	1.48	1.65	1.85	2.05	2.27	2.50	2.75	3.00	3.24	3.48	3.69	3.87	3.99	4.04	3.99	3.85	3.65	3.43	3.23	3.04	2.88
883	1.20	1.37	1.55	1.75	1.96	2.19	2.43	2.68	2.95	3.22	3.48	3.73	3.95	4.12	4.23	4.24	4.14	3.94	3.66	3.35	3.07	2.82	2.61
885	1.24	1.40	1.58	1.77	1.98	2.20	2.43	2.68	2.93	3.20	3.45	3.70	3.92	4.11	4.24	4.28	4.23	4.07	3.84	3.57	3.30	3.04	2.80
887	1.46	1.64	1.83	2.03	2.25	2.47	2.69	2.93	3.15	3.37	3.56	3.72	3.83	3.89	3.87	3.76	3.54	3.24	2.91	2.63	2.44	2.34	2.31
889	1.14	1.29	1.47	1.66	1.87	2.09	2.33	2.59	2.86	3.15	3.43	3.71	3.98	4.21	4.38	4.46	4.44	4.30	4.07	3.79	3.48	3.18	2.90

Grain Size Data - ALE cont.

Depth	39.78	43.67	47.94	52.63	57.77	63.42	69.62	76.43	83.90	92.10	101.10	110.99	121.84	133.75	146.82	161.18	176.94	194.23	213.22	234.07	256.95
819	1.73	1.73	1.65	1.49	1.31	1.14	1.01	0.92	0.85	0.77	0.70	0.65	0.63	0.64	0.64	0.58	0.44	0.25	0.09	0.02	0.00
821	1.46	1.41	1.31	1.21	1.14	1.10	1.09	1.06	0.97	0.83	0.68	0.58	0.55	0.57	0.58	0.51	0.33	0.14	0.03	0.00	0.00
823	1.45	1.39	1.26	1.11	1.00	0.93	0.91	0.89	0.84	0.74	0.62	0.54	0.52	0.55	0.58	0.54	0.41	0.22	0.07	0.01	0.00
825	1.55	1.52	1.42	1.27	1.10	0.95	0.84	0.76	0.71	0.67	0.65	0.63	0.61	0.58	0.50	0.38	0.22	0.08	0.02	0.00	0.00
827	1.23	1.18	1.09	0.96	0.83	0.73	0.66	0.61	0.56	0.52	0.48	0.47	0.48	0.48	0.45	0.35	0.21	0.08	0.02	0.00	0.00
829	2.57	2.67	2.63	2.45	2.18	1.88	1.59	1.34	1.14	0.99	0.90	0.85	0.82	0.76	0.65	0.47	0.26	0.10	0.02	0.00	0.00
831	1.55	1.48	1.30	1.06	0.83	0.65	0.54	0.48	0.45	0.40	0.35	0.30	0.28	0.28	0.28	0.24	0.16	0.07	0.01	0.00	0.00
833	2.45	2.50	2.40	2.19	1.91	1.61	1.35	1.13	0.95	0.82	0.72	0.68	0.67	0.66	0.61	0.48	0.28	0.11	0.02	0.00	0.00
835	1.37	1.27	1.10	0.90	0.74	0.63	0.59	0.58	0.57	0.52	0.44	0.36	0.31	0.29	0.30	0.28	0.20	0.10	0.02	0.00	0.00
837	2.31	2.36	2.27	2.05	1.76	1.45	1.18	0.97	0.81	0.71	0.65	0.63	0.61	0.58	0.49	0.35	0.19	0.06	0.01	0.00	0.00
839	1.07	0.98	0.83	0.67	0.54	0.47	0.44	0.44	0.43	0.40	0.36	0.34	0.34	0.34	0.33	0.27	0.17	0.07	0.01	0.00	0.00
841	2.53	2.61	2.58	2.44	2.22	1.95	1.67	1.39	1.14	0.93	0.80	0.73	0.70	0.67	0.58	0.42	0.23	0.08	0.01	0.00	0.00
843	2.15	2.15	2.04	1.84	1.61	1.39	1.20	1.03	0.87	0.75	0.67	0.65	0.68	0.72	0.69	0.57	0.35	0.14	0.03	0.00	0.00
845	1.66	1.64	1.53	1.37	1.18	1.01	0.88	0.78	0.71	0.64	0.58	0.54	0.53	0.56	0.59	0.58	0.49	0.33	0.16	0.05	0.01
847	2.25	2.29	2.22	2.06	1.82	1.56	1.30	1.08	0.92	0.82	0.79	0.81	0.84	0.83	0.72	0.52	0.28	0.10	0.02	0.00	0.00
849	1.95	1.91	1.79	1.61	1.41	1.23	1.08	0.95	0.84	0.73	0.64	0.58	0.57	0.58	0.60	0.56	0.45	0.27	0.11	0.02	0.00
851	2.48	2.50	2.42	2.24	1.98	1.70	1.43	1.20	1.01	0.87	0.77	0.73	0.73	0.78	0.80	0.75	0.60	0.36	0.15	0.03	0.00
853	2.28	2.09	1.87	1.65	1.42	1.22	1.04	0.91	0.80	0.71	0.65	0.62	0.63	0.66	0.66	0.60	0.45	0.25	0.09	0.02	0.00
855	1.04	0.90	0.77	0.65	0.56	0.50	0.47	0.46	0.46	0.45	0.44	0.44	0.44	0.42	0.37	0.28	0.15	0.06	0.01	0.00	0.00
857	2.00	1.91	1.77	1.58	1.37	1.17	0.99	0.85	0.75	0.67	0.61	0.59	0.59	0.61	0.61	0.55	0.41	0.23	0.09	0.02	0.00
859	1.54	1.51	1.44	1.35	1.25	1.16	1.08	0.99	0.89	0.77	0.65	0.57	0.54	0.53	0.51	0.43	0.29	0.13	0.03	0.00	0.00
861	1.53	1.49	1.38	1.24	1.10	0.98	0.90	0.82	0.74	0.63	0.53	0.45	0.42	0.42	0.43	0.41	0.32	0.19	0.07	0.01	0.00
863	2.37	2.26	2.09	1.86	1.61	1.36	1.15	0.98	0.85	0.76	0.71	0.70	0.71	0.71	0.68	0.58	0.40	0.20	0.06	0.01	0.00
865	2.29	2.31	2.22	2.02	1.75	1.45	1.18	0.96	0.80	0.70	0.66	0.67	0.71	0.73	0.69	0.55	0.33	0.14	0.03	0.00	0.00
867	2.45	2.35	2.19	1.96	1.70	1.44	1.22	1.04	0.90	0.80	0.74	0.71	0.73	0.76	0.75	0.68	0.51	0.29	0.11	0.02	0.00
869	2.65	2.38	2.09	1.79	1.50	1.24	1.04	0.90	0.80	0.74	0.70	0.70	0.72	0.73	0.69	0.58	0.40	0.20	0.06	0.01	0.00
871	2.40	2.01	1.64	1.30	1.02	0.81	0.68	0.62	0.58	0.56	0.53	0.51	0.52	0.56	0.60	0.60	0.50	0.32	0.13	0.03	0.00
873	2.16	2.07	1.93	1.74	1.51	1.29	1.10	0.95	0.82	0.73	0.66	0.62	0.64	0.68	0.71	0.66	0.52	0.31	0.12	0.02	0.00
875	2.26	2.21	2.10	1.92	1.70	1.48	1.28	1.12	0.98	0.87	0.78	0.73	0.73	0.78	0.82	0.79	0.65	0.42	0.19	0.05	0.01
877	2.46	2.33	2.16	1.94	1.70	1.45	1.24	1.08	0.94	0.85	0.79	0.77	0.79	0.81	0.79	0.67	0.47	0.24	0.08	0.01	0.00
879	2.29	2.20	2.07	1.88	1.66	1.44	1.23	1.07	0.94	0.84	0.78	0.75	0.77	0.79	0.79	0.71	0.54	0.31	0.12	0.02	0.00
881	2.70	2.50	2.25	1.97	1.69	1.44	1.24	1.09	0.98	0.90	0.84	0.82	0.83	0.85	0.86	0.79	0.62	0.36	0.14	0.03	0.00
883	2.43	2.25	2.04	1.81	1.57	1.33	1.13	0.97	0.86	0.78	0.73	0.72	0.74	0.77	0.77	0.69	0.52	0.29	0.11	0.02	0.00
885	2.55	2.29	2.00	1.71	1.43	1.19	1.00	0.85	0.75	0.68	0.65	0.65	0.67	0.69	0.67	0.58	0.41	0.21	0.07	0.01	0.00
887	2.30	2.25	2.13	1.93	1.69	1.43	1.20	1.01	0.87	0.77	0.71	0.69	0.71	0.75	0.77	0.70	0.55	0.32	0.13	0.02	0.00
889	2.62	2.33	2.04	1.74	1.45	1.20	1.00	0.86	0.76	0.69	0.66	0.66	0.68	0.69	0.65	0.53	0.34	0.16	0.04	0.01	0.00

Grain Size Data - ALE cont.

Depth	282.07	309.64	339.92	373.15	409.63	449.67	493.63	541.89	594.87	653.03	716.87	786.95	863.88	948.34
819	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
821	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
823	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
825	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
827	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
829	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
831	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
833	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
835	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
837	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
839	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
841	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
843	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
845	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
847	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
849	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
851	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
853	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
855	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
857	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
859	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
861	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
863	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
865	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
867	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
869	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
871	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
873	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
875	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
877	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
879	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
881	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
883	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
885	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
887	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
889	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Grain Size Data - ALE cont.

Depth	Size fraction (microns)																										
	0.38	**0.41**	**0.45**	**0.50**	**0.54**	**0.60**	**0.66**	**0.72**	**0.79**	**0.87**	**0.95**	**1.05**	**1.15**	**1.26**	**1.38**	**1.52**	**1.67**	**1.83**	**2.01**	**2.21**	**2.42**	**2.66**	**2.92**	**3.21**	**3.52**	**3.86**	**4.24**
891	0.04	0.07	0.10	0.15	0.18	0.22	0.24	0.27	0.29	0.31	0.32	0.34	0.34	0.35	0.36	0.37	0.38	0.40	0.42	0.45	0.50	0.56	0.63	0.71	0.81	0.93	1.07
893	0.04	0.07	0.10	0.14	0.17	0.20	0.23	0.26	0.28	0.30	0.31	0.33	0.34	0.35	0.36	0.37	0.39	0.41	0.45	0.49	0.54	0.60	0.68	0.77	0.88	1.01	1.15
895	0.04	0.08	0.11	0.16	0.20	0.24	0.27	0.30	0.32	0.34	0.36	0.37	0.38	0.38	0.39	0.40	0.42	0.44	0.47	0.50	0.56	0.62	0.70	0.80	0.92	1.05	1.21
897	0.03	0.06	0.09	0.13	0.16	0.19	0.22	0.24	0.26	0.27	0.29	0.30	0.30	0.31	0.31	0.32	0.33	0.34	0.36	0.39	0.43	0.48	0.54	0.62	0.71	0.83	0.96
899	0.05	0.08	0.12	0.17	0.21	0.25	0.28	0.32	0.34	0.36	0.38	0.39	0.40	0.41	0.42	0.43	0.45	0.47	0.50	0.54	0.60	0.67	0.75	0.86	0.98	1.11	1.27
901	0.04	0.07	0.10	0.14	0.18	0.21	0.24	0.26	0.29	0.30	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.40	0.42	0.46	0.50	0.56	0.63	0.71	0.81	0.92	1.06
903	0.04	0.08	0.11	0.16	0.20	0.23	0.26	0.29	0.32	0.34	0.35	0.36	0.37	0.38	0.39	0.40	0.42	0.44	0.46	0.50	0.55	0.61	0.68	0.77	0.87	0.99	1.13
905	0.03	0.06	0.09	0.13	0.16	0.18	0.21	0.23	0.25	0.27	0.28	0.29	0.30	0.30	0.31	0.32	0.33	0.34	0.36	0.39	0.42	0.47	0.52	0.59	0.67	0.77	0.88
907	0.03	0.06	0.09	0.13	0.16	0.19	0.21	0.23	0.25	0.27	0.28	0.29	0.30	0.30	0.31	0.32	0.33	0.34	0.36	0.39	0.42	0.47	0.53	0.60	0.69	0.79	0.91
909	0.04	0.07	0.11	0.15	0.19	0.23	0.26	0.28	0.31	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.40	0.42	0.45	0.48	0.52	0.58	0.65	0.73	0.83	0.94	1.07
911	0.05	0.08	0.12	0.17	0.21	0.25	0.28	0.31	0.33	0.35	0.37	0.38	0.39	0.40	0.41	0.42	0.43	0.45	0.48	0.52	0.57	0.63	0.71	0.80	0.91	1.03	1.17
913	0.04	0.07	0.10	0.15	0.18	0.21	0.24	0.27	0.29	0.31	0.32	0.33	0.34	0.34	0.35	0.35	0.37	0.38	0.40	0.43	0.47	0.53	0.59	0.67	0.76	0.88	1.01
915	0.04	0.06	0.09	0.13	0.17	0.20	0.22	0.25	0.27	0.28	0.30	0.31	0.31	0.32	0.33	0.33	0.34	0.36	0.38	0.41	0.45	0.49	0.56	0.63	0.72	0.83	0.95
917	0.03	0.06	0.09	0.12	0.15	0.18	0.20	0.23	0.24	0.26	0.27	0.28	0.28	0.29	0.29	0.30	0.30	0.31	0.33	0.35	0.38	0.42	0.48	0.54	0.62	0.72	0.83
919	0.04	0.08	0.12	0.17	0.21	0.24	0.28	0.31	0.33	0.35	0.37	0.39	0.40	0.41	0.42	0.44	0.46	0.49	0.52	0.57	0.62	0.69	0.78	0.88	0.99	1.13	1.27
921	0.04	0.07	0.10	0.14	0.18	0.21	0.24	0.26	0.28	0.30	0.31	0.32	0.33	0.34	0.35	0.35	0.36	0.38	0.40	0.43	0.48	0.53	0.59	0.67	0.77	0.88	1.01
923	0.04	0.07	0.10	0.14	0.18	0.21	0.24	0.26	0.28	0.30	0.31	0.33	0.33	0.34	0.35	0.36	0.37	0.39	0.41	0.44	0.48	0.53	0.60	0.68	0.77	0.88	1.01
925	0.04	0.07	0.10	0.15	0.18	0.22	0.24	0.27	0.29	0.31	0.33	0.34	0.35	0.35	0.36	0.37	0.38	0.40	0.42	0.45	0.49	0.55	0.61	0.69	0.79	0.91	1.04
927	0.04	0.08	0.12	0.17	0.21	0.25	0.28	0.31	0.34	0.36	0.38	0.39	0.40	0.41	0.42	0.44	0.46	0.48	0.51	0.55	0.60	0.67	0.75	0.84	0.95	1.08	1.22
929	0.03	0.06	0.09	0.13	0.16	0.19	0.21	0.23	0.25	0.27	0.28	0.29	0.30	0.30	0.31	0.32	0.33	0.35	0.37	0.40	0.43	0.48	0.55	0.62	0.71	0.82	0.95
931	0.04	0.07	0.10	0.14	0.17	0.20	0.23	0.26	0.28	0.29	0.31	0.32	0.32	0.33	0.34	0.34	0.35	0.37	0.39	0.42	0.45	0.50	0.56	0.64	0.73	0.84	0.96
933	0.04	0.06	0.10	0.14	0.17	0.20	0.22	0.25	0.27	0.29	0.30	0.31	0.32	0.32	0.33	0.34	0.35	0.36	0.38	0.41	0.45	0.50	0.56	0.63	0.72	0.83	0.95
935	0.04	0.07	0.10	0.14	0.18	0.21	0.24	0.27	0.29	0.31	0.32	0.33	0.34	0.35	0.35	0.36	0.38	0.39	0.42	0.45	0.49	0.54	0.60	0.68	0.77	0.88	1.01
937	0.03	0.05	0.08	0.11	0.14	0.16	0.18	0.20	0.22	0.23	0.24	0.25	0.26	0.26	0.27	0.27	0.28	0.29	0.31	0.33	0.36	0.40	0.45	0.50	0.58	0.66	0.76
939	0.04	0.06	0.09	0.13	0.16	0.19	0.22	0.24	0.26	0.28	0.29	0.30	0.31	0.31	0.32	0.33	0.34	0.35	0.37	0.40	0.43	0.48	0.53	0.61	0.69	0.79	0.91
941	0.03	0.06	0.09	0.13	0.16	0.19	0.21	0.23	0.25	0.27	0.28	0.29	0.30	0.30	0.31	0.31	0.32	0.34	0.35	0.38	0.41	0.45	0.51	0.58	0.66	0.76	0.87
943	0.04	0.07	0.10	0.14	0.17	0.20	0.23	0.26	0.28	0.30	0.31	0.32	0.33	0.33	0.34	0.35	0.36	0.38	0.40	0.43	0.47	0.52	0.58	0.66	0.75	0.86	0.99
945	0.04	0.08	0.11	0.16	0.20	0.23	0.26	0.29	0.32	0.34	0.35	0.37	0.38	0.39	0.40	0.41	0.42	0.44	0.47	0.50	0.55	0.60	0.67	0.76	0.86	0.98	1.11
947	0.05	0.08	0.12	0.17	0.21	0.25	0.28	0.31	0.34	0.36	0.38	0.39	0.40	0.41	0.42	0.44	0.45	0.48	0.51	0.55	0.60	0.67	0.75	0.84	0.95	1.08	1.22
949	0.06	0.10	0.15	0.21	0.26	0.30	0.34	0.38	0.41	0.43	0.45	0.46	0.47	0.49	0.50	0.52	0.54	0.58	0.62	0.68	0.75	0.83	0.94	1.06	1.20	1.35	1.51
951	0.05	0.09	0.13	0.18	0.23	0.27	0.30	0.34	0.36	0.39	0.40	0.42	0.43	0.44	0.45	0.47	0.49	0.51	0.55	0.60	0.66	0.73	0.82	0.93	1.05	1.19	1.35
953	0.05	0.09	0.13	0.18	0.23	0.27	0.30	0.33	0.36	0.38	0.40	0.41	0.42	0.43	0.44	0.46	0.47	0.50	0.53	0.58	0.63	0.71	0.79	0.90	1.02	1.16	1.32
955	0.05	0.10	0.14	0.20	0.25	0.29	0.33	0.37	0.40	0.42	0.44	0.45	0.47	0.48	0.50	0.52	0.54	0.58	0.62	0.67	0.74	0.82	0.91	1.02	1.14	1.28	1.43
957	0.06	0.11	0.17	0.24	0.30	0.35	0.39	0.43	0.47	0.49	0.52	0.53	0.55	0.57	0.59	0.61	0.64	0.69	0.74	0.81	0.89	0.99	1.10	1.23	1.37	1.53	1.69
959	0.05	0.08	0.13	0.18	0.22	0.26	0.29	0.33	0.35	0.37	0.39	0.40	0.42	0.43	0.44	0.45	0.47	0.50	0.53	0.57	0.63	0.70	0.79	0.89	1.01	1.14	1.29
961	0.05	0.09	0.13	0.19	0.23	0.27	0.31	0.34	0.37	0.39	0.40	0.42	0.43	0.44	0.45	0.46	0.48	0.50	0.53	0.58	0.63	0.70	0.79	0.89	1.02	1.15	1.31

Grain Size Data - ALE cont.

Depth	4.66	5.11	5.61	6.16	6.76	7.42	8.15	8.94	9.82	10.78	11.83	12.99	14.26	15.65	17.18	18.86	20.71	22.73	24.95	27.39	30.07	33.01	36.24
891	1.22	1.39	1.58	1.78	2.00	2.23	2.48	2.73	3.00	3.27	3.54	3.78	3.99	4.15	4.24	4.24	4.12	3.90	3.61	3.29	3.00	2.76	2.56
893	1.30	1.48	1.66	1.87	2.08	2.30	2.54	2.78	3.03	3.27	3.51	3.72	3.90	4.02	4.08	4.06	3.93	3.72	3.45	3.15	2.86	2.61	2.41
895	1.38	1.57	1.78	2.01	2.25	2.50	2.76	3.04	3.32	3.59	3.85	4.07	4.24	4.35	4.37	4.28	4.06	3.74	3.35	2.96	2.62	2.37	2.18
897	1.10	1.27	1.45	1.66	1.88	2.11	2.37	2.64	2.93	3.23	3.53	3.83	4.10	4.33	4.49	4.57	4.54	4.39	4.14	3.83	3.50	3.16	2.83
899	1.44	1.63	1.84	2.06	2.29	2.53	2.78	3.03	3.29	3.53	3.75	3.94	4.07	4.15	4.13	4.01	3.78	3.46	3.09	2.75	2.49	2.32	2.22
901	1.21	1.37	1.55	1.75	1.96	2.19	2.43	2.69	2.96	3.24	3.51	3.77	4.01	4.22	4.35	4.40	4.35	4.19	3.94	3.66	3.36	3.08	2.80
903	1.29	1.46	1.65	1.85	2.06	2.29	2.53	2.77	3.03	3.29	3.53	3.74	3.91	4.04	4.08	4.02	3.85	3.58	3.26	2.95	2.70	2.51	2.39
905	1.01	1.16	1.32	1.50	1.69	1.90	2.13	2.38	2.64	2.92	3.21	3.50	3.77	4.03	4.24	4.38	4.43	4.39	4.26	4.07	3.84	3.58	3.29
907	1.05	1.20	1.37	1.56	1.77	2.00	2.24	2.50	2.79	3.08	3.38	3.68	3.96	4.21	4.40	4.52	4.53	4.43	4.24	3.98	3.70	3.40	3.09
909	1.21	1.37	1.55	1.74	1.94	2.16	2.39	2.63	2.89	3.15	3.40	3.64	3.85	4.02	4.12	4.14	4.05	3.86	3.60	3.31	3.04	2.81	2.61
911	1.32	1.49	1.67	1.87	2.07	2.29	2.51	2.74	2.98	3.21	3.43	3.62	3.78	3.88	3.93	3.87	3.72	3.47	3.18	2.90	2.67	2.51	2.41
913	1.15	1.31	1.49	1.69	1.90	2.13	2.37	2.63	2.90	3.18	3.46	3.73	3.98	4.18	4.33	4.39	4.34	4.18	3.93	3.64	3.33	3.05	2.78
915	1.09	1.25	1.43	1.62	1.83	2.05	2.29	2.55	2.82	3.11	3.40	3.68	3.94	4.16	4.33	4.41	4.39	4.25	4.03	3.74	3.42	3.11	2.82
917	0.95	1.10	1.26	1.44	1.64	1.86	2.09	2.35	2.62	2.92	3.23	3.54	3.84	4.13	4.38	4.55	4.64	4.62	4.50	4.30	4.03	3.71	3.36
919	1.44	1.61	1.80	2.01	2.22	2.44	2.67	2.90	3.14	3.37	3.58	3.76	3.91	4.00	4.02	3.94	3.77	3.51	3.19	2.89	2.62	2.43	2.29
921	1.15	1.31	1.49	1.68	1.89	2.12	2.35	2.61	2.88	3.15	3.42	3.68	3.93	4.13	4.28	4.34	4.30	4.15	3.93	3.66	3.38	3.11	2.85
923	1.15	1.31	1.49	1.68	1.89	2.11	2.35	2.60	2.87	3.15	3.42	3.69	3.93	4.13	4.28	4.34	4.30	4.15	3.92	3.63	3.33	3.04	2.77
925	1.19	1.35	1.54	1.74	1.95	2.18	2.43	2.69	2.96	3.24	3.52	3.78	4.01	4.20	4.31	4.34	4.24	4.04	3.76	3.43	3.12	2.83	2.59
927	1.38	1.55	1.73	1.93	2.14	2.36	2.59	2.82	3.06	3.28	3.49	3.67	3.81	3.90	3.91	3.82	3.64	3.36	3.05	2.76	2.54	2.39	2.32
929	1.09	1.25	1.42	1.61	1.82	2.05	2.29	2.54	2.81	3.09	3.38	3.65	3.90	4.12	4.29	4.37	4.35	4.24	4.03	3.76	3.46	3.16	2.88
931	1.10	1.25	1.43	1.62	1.82	2.04	2.28	2.54	2.81	3.09	3.37	3.65	3.91	4.13	4.29	4.37	4.35	4.22	4.00	3.72	3.43	3.15	2.88
933	1.08	1.24	1.41	1.60	1.80	2.02	2.25	2.50	2.77	3.05	3.32	3.59	3.84	4.06	4.22	4.30	4.27	4.15	3.93	3.67	3.39	3.12	2.87
935	1.15	1.31	1.49	1.68	1.89	2.11	2.35	2.60	2.87	3.14	3.42	3.68	3.92	4.12	4.26	4.32	4.26	4.09	3.84	3.54	3.25	2.97	2.73
937	0.87	1.00	1.14	1.30	1.47	1.66	1.87	2.09	2.34	2.61	2.90	3.19	3.50	3.81	4.09	4.35	4.54	4.66	4.69	4.65	4.52	4.30	3.98
939	1.05	1.20	1.37	1.55	1.75	1.97	2.21	2.46	2.73	3.01	3.29	3.57	3.82	4.05	4.21	4.29	4.27	4.14	3.92	3.64	3.34	3.06	2.80
941	1.00	1.15	1.31	1.49	1.69	1.90	2.13	2.39	2.66	2.94	3.24	3.53	3.81	4.06	4.26	4.39	4.42	4.33	4.15	3.89	3.59	3.28	2.98
943	1.13	1.30	1.47	1.67	1.88	2.11	2.35	2.61	2.88	3.16	3.44	3.72	3.97	4.18	4.33	4.39	4.35	4.20	3.96	3.66	3.34	3.03	2.75
945	1.26	1.43	1.61	1.80	2.01	2.23	2.47	2.71	2.97	3.22	3.46	3.68	3.86	3.99	4.04	4.00	3.85	3.59	3.27	2.96	2.68	2.48	2.35
947	1.38	1.55	1.73	1.93	2.14	2.35	2.57	2.80	3.03	3.25	3.45	3.62	3.75	3.82	3.82	3.73	3.55	3.28	2.97	2.69	2.49	2.37	2.33
949	1.69	1.88	2.07	2.27	2.47	2.66	2.85	3.03	3.20	3.33	3.43	3.48	3.48	3.43	3.32	3.14	2.88	2.58	2.30	2.11	2.03	2.07	2.17
951	1.52	1.70	1.89	2.10	2.31	2.52	2.74	2.95	3.16	3.34	3.49	3.60	3.65	3.63	3.54	3.35	3.07	2.74	2.42	2.17	2.03	2.00	2.06
953	1.49	1.68	1.88	2.09	2.32	2.54	2.78	3.01	3.24	3.46	3.64	3.77	3.86	3.88	3.81	3.64	3.37	3.02	2.67	2.38	2.19	2.11	2.11
955	1.59	1.75	1.93	2.11	2.29	2.47	2.64	2.81	2.97	3.11	3.21	3.27	3.29	3.26	3.17	3.01	2.76	2.48	2.22	2.04	1.99	2.05	2.18
957	1.85	2.02	2.18	2.34	2.50	2.64	2.77	2.89	2.98	3.05	3.08	3.07	3.05	3.00	2.91	2.76	2.55	2.31	2.10	1.99	1.99	2.11	2.28
959	1.46	1.64	1.83	2.03	2.24	2.46	2.68	2.90	3.12	3.32	3.50	3.64	3.74	3.78	3.74	3.62	3.40	3.10	2.79	2.52	2.33	2.25	2.24
961	1.48	1.66	1.86	2.07	2.29	2.51	2.74	2.96	3.19	3.39	3.57	3.70	3.78	3.80	3.74	3.57	3.31	2.98	2.64	2.36	2.19	2.13	2.15

Grain Size Data - ALE cont.

Depth	39.78	43.67	47.94	52.63	57.77	63.42	69.62	76.43	83.90	92.10	101.10	110.99	121.84	133.75	146.82	161.18	176.94	194.23	213.22	234.07	256.95
891	2.39	2.22	2.03	1.81	1.58	1.35	1.16	1.00	0.88	0.78	0.72	0.70	0.72	0.75	0.74	0.64	0.46	0.25	0.09	0.02	0.00
893	2.24	2.08	1.92	1.74	1.55	1.37	1.20	1.07	0.95	0.86	0.80	0.79	0.83	0.89	0.90	0.81	0.60	0.33	0.12	0.02	0.00
895	2.04	1.91	1.76	1.58	1.38	1.20	1.03	0.89	0.77	0.68	0.62	0.60	0.62	0.64	0.62	0.51	0.32	0.13	0.03	0.00	0.00
897	2.52	2.21	1.90	1.61	1.36	1.15	0.99	0.87	0.78	0.70	0.63	0.58	0.57	0.60	0.63	0.60	0.49	0.30	0.12	0.02	0.00
899	2.14	2.06	1.92	1.74	1.52	1.31	1.11	0.95	0.82	0.72	0.65	0.63	0.64	0.66	0.63	0.53	0.35	0.17	0.05	0.01	0.00
901	2.53	2.25	1.95	1.65	1.37	1.14	0.95	0.81	0.72	0.66	0.64	0.66	0.69	0.70	0.64	0.49	0.29	0.11	0.02	0.00	0.00
903	2.29	2.17	2.01	1.81	1.61	1.41	1.24	1.10	0.98	0.86	0.75	0.68	0.67	0.72	0.78	0.80	0.72	0.53	0.29	0.10	0.02
905	2.97	2.61	2.22	1.85	1.52	1.25	1.05	0.92	0.82	0.76	0.71	0.69	0.71	0.74	0.75	0.69	0.54	0.31	0.12	0.02	0.00
907	2.77	2.42	2.07	1.73	1.41	1.16	0.98	0.86	0.79	0.73	0.70	0.68	0.68	0.69	0.67	0.58	0.43	0.23	0.09	0.02	0.00
909	2.43	2.25	2.05	1.83	1.61	1.40	1.22	1.08	0.96	0.86	0.79	0.76	0.77	0.79	0.79	0.70	0.53	0.30	0.11	0.02	0.00
911	2.33	2.24	2.11	1.94	1.74	1.54	1.36	1.19	1.05	0.93	0.85	0.80	0.80	0.82	0.82	0.73	0.55	0.31	0.12	0.02	0.00
913	2.53	2.27	2.00	1.73	1.47	1.25	1.07	0.94	0.83	0.75	0.68	0.65	0.66	0.68	0.67	0.60	0.44	0.24	0.09	0.02	0.00
915	2.53	2.26	1.99	1.73	1.49	1.29	1.12	0.99	0.88	0.80	0.75	0.73	0.74	0.78	0.78	0.70	0.54	0.31	0.12	0.02	0.00
917	2.97	2.57	2.17	1.80	1.47	1.22	1.03	0.90	0.81	0.75	0.70	0.68	0.69	0.70	0.67	0.58	0.40	0.21	0.07	0.01	0.00
919	2.19	2.08	1.94	1.77	1.57	1.36	1.17	1.00	0.86	0.75	0.68	0.65	0.67	0.70	0.70	0.62	0.47	0.26	0.10	0.02	0.00
921	2.59	2.32	2.03	1.74	1.46	1.23	1.04	0.90	0.81	0.74	0.71	0.70	0.72	0.73	0.71	0.62	0.45	0.24	0.08	0.01	0.00
923	2.50	2.23	1.97	1.72	1.48	1.28	1.12	0.99	0.87	0.76	0.67	0.62	0.62	0.66	0.71	0.69	0.57	0.37	0.17	0.05	0.01
925	2.38	2.17	1.95	1.72	1.49	1.28	1.09	0.94	0.83	0.73	0.65	0.59	0.58	0.61	0.66	0.68	0.62	0.48	0.28	0.11	0.02
927	2.27	2.21	2.11	1.95	1.75	1.53	1.33	1.15	0.99	0.86	0.76	0.70	0.70	0.74	0.77	0.73	0.60	0.40	0.19	0.06	0.01
929	2.61	2.36	2.10	1.85	1.61	1.39	1.19	1.03	0.90	0.81	0.76	0.76	0.79	0.81	0.77	0.63	0.41	0.18	0.05	0.01	0.00
931	2.62	2.35	2.06	1.78	1.50	1.26	1.07	0.94	0.84	0.77	0.73	0.72	0.74	0.77	0.77	0.70	0.53	0.31	0.12	0.02	0.00
933	2.63	2.39	2.14	1.88	1.63	1.41	1.22	1.07	0.96	0.87	0.80	0.77	0.77	0.78	0.77	0.69	0.52	0.30	0.12	0.02	0.00
935	2.50	2.28	2.04	1.79	1.55	1.32	1.14	0.99	0.88	0.79	0.73	0.70	0.71	0.74	0.74	0.67	0.51	0.29	0.11	0.02	0.00
937	3.58	3.11	2.59	2.09	1.64	1.27	1.01	0.84	0.74	0.69	0.67	0.68	0.72	0.75	0.73	0.64	0.47	0.25	0.09	0.02	0.00
939	2.55	2.31	2.07	1.82	1.59	1.38	1.20	1.07	0.97	0.88	0.81	0.76	0.74	0.76	0.81	0.85	0.82	0.69	0.47	0.23	0.07
941	2.68	2.40	2.13	1.86	1.62	1.42	1.24	1.11	1.00	0.91	0.84	0.81	0.81	0.84	0.85	0.77	0.59	0.34	0.13	0.03	0.00
943	2.49	2.24	2.00	1.76	1.54	1.33	1.15	1.00	0.88	0.79	0.72	0.71	0.72	0.73	0.69	0.58	0.39	0.19	0.06	0.01	0.00
945	2.26	2.18	2.08	1.95	1.78	1.58	1.38	1.19	1.03	0.90	0.81	0.78	0.80	0.84	0.86	0.80	0.63	0.38	0.16	0.04	0.00
947	2.33	2.32	2.26	2.14	1.96	1.73	1.48	1.24	1.03	0.86	0.74	0.69	0.70	0.74	0.75	0.70	0.55	0.33	0.13	0.03	0.00
949	2.27	2.32	2.27	2.13	1.93	1.69	1.45	1.22	1.01	0.85	0.75	0.72	0.76	0.82	0.82	0.72	0.50	0.26	0.09	0.01	0.00
951	2.14	2.19	2.16	2.06	1.89	1.69	1.47	1.28	1.11	0.98	0.90	0.88	0.92	0.99	1.03	0.97	0.78	0.50	0.23	0.07	0.01
953	2.14	2.14	2.08	1.94	1.75	1.54	1.33	1.15	0.99	0.87	0.78	0.74	0.74	0.77	0.77	0.72	0.57	0.35	0.16	0.04	0.01
955	2.31	2.38	2.35	2.23	2.02	1.78	1.54	1.32	1.13	1.00	0.92	0.90	0.95	1.04	1.12	1.10	0.95	0.68	0.38	0.15	0.03
957	2.44	2.50	2.45	2.28	2.03	1.76	1.48	1.24	1.04	0.90	0.82	0.80	0.82	0.84	0.80	0.65	0.43	0.20	0.06	0.01	0.00
959	2.26	2.26	2.20	2.07	1.88	1.66	1.44	1.24	1.08	0.94	0.84	0.78	0.75	0.75	0.72	0.64	0.49	0.28	0.11	0.02	0.00
961	2.21	2.23	2.19	2.06	1.87	1.66	1.44	1.24	1.08	0.96	0.89	0.87	0.88	0.87	0.79	0.61	0.37	0.15	0.03	0.00	0.00

Grain Size Data - ALE cont.

Depth	282.07	309.64	339.92	373.15	409.63	449.67	493.63	541.89	594.87	653.03	716.87	786.95	863.88	948.34
891	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
893	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
895	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
897	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
899	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
901	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
903	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
905	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
907	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
909	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
911	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
913	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
915	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
917	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
919	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
923	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
925	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
927	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
929	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
931	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
933	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
935	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
937	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
939	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
941	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
943	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
945	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
947	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
949	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
951	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
953	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
955	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
957	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
959	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
961	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Grain Size Data - ALE cont.

Depth	Size fraction (microns)																										
	0.38	**0.41**	**0.45**	**0.50**	**0.54**	**0.60**	**0.66**	**0.72**	**0.79**	**0.87**	**0.95**	**1.05**	**1.15**	**1.26**	**1.38**	**1.52**	**1.67**	**1.83**	**2.01**	**2.21**	**2.42**	**2.66**	**2.92**	**3.21**	**3.52**	**3.86**	**4.24**
963	0.04	0.08	0.11	0.16	0.20	0.23	0.26	0.30	0.32	0.34	0.35	0.37	0.38	0.39	0.40	0.41	0.42	0.45	0.48	0.51	0.56	0.63	0.71	0.80	0.91	1.04	1.19
965	0.08	0.14	0.20	0.29	0.36	0.42	0.47	0.53	0.57	0.61	0.64	0.66	0.69	0.71	0.74	0.76	0.80	0.85	0.91	0.98	1.08	1.19	1.33	1.48	1.66	1.86	2.07
967	0.04	0.08	0.11	0.16	0.20	0.23	0.26	0.29	0.32	0.33	0.35	0.36	0.37	0.38	0.38	0.39	0.41	0.43	0.46	0.50	0.55	0.61	0.69	0.78	0.89	1.02	1.17
969	0.04	0.08	0.12	0.17	0.21	0.25	0.28	0.31	0.33	0.35	0.37	0.38	0.39	0.40	0.41	0.42	0.43	0.46	0.49	0.53	0.59	0.66	0.75	0.85	0.98	1.13	1.29
971	0.04	0.08	0.11	0.16	0.20	0.24	0.27	0.30	0.32	0.34	0.36	0.37	0.38	0.39	0.39	0.40	0.42	0.44	0.46	0.50	0.54	0.60	0.68	0.77	0.87	1.00	1.14
973	0.04	0.07	0.11	0.15	0.19	0.22	0.25	0.28	0.31	0.32	0.34	0.35	0.36	0.37	0.37	0.38	0.40	0.41	0.44	0.47	0.52	0.57	0.64	0.72	0.82	0.94	1.07
975	0.04	0.08	0.12	0.16	0.20	0.24	0.27	0.30	0.32	0.34	0.36	0.37	0.38	0.38	0.39	0.40	0.41	0.43	0.46	0.50	0.54	0.60	0.68	0.77	0.88	1.00	1.14
977	0.04	0.06	0.10	0.14	0.17	0.20	0.23	0.25	0.27	0.29	0.30	0.31	0.32	0.32	0.33	0.34	0.35	0.36	0.38	0.40	0.44	0.48	0.54	0.61	0.70	0.80	0.92
979	0.04	0.07	0.10	0.14	0.18	0.21	0.24	0.26	0.28	0.30	0.31	0.32	0.33	0.34	0.34	0.35	0.36	0.38	0.40	0.43	0.46	0.51	0.57	0.65	0.73	0.84	0.96
981	0.04	0.07	0.10	0.14	0.17	0.20	0.23	0.25	0.27	0.29	0.30	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.40	0.42	0.46	0.51	0.57	0.64	0.73	0.83	0.95
983	0.04	0.07	0.10	0.14	0.18	0.21	0.24	0.26	0.28	0.30	0.31	0.32	0.33	0.34	0.35	0.35	0.37	0.38	0.40	0.43	0.47	0.52	0.59	0.66	0.76	0.87	0.99
985	0.02	0.04	0.06	0.08	0.11	0.12	0.14	0.16	0.17	0.18	0.19	0.19	0.20	0.20	0.21	0.21	0.22	0.23	0.24	0.26	0.28	0.31	0.35	0.40	0.45	0.52	0.60
987	0.02	0.04	0.06	0.08	0.10	0.12	0.13	0.15	0.16	0.17	0.18	0.19	0.19	0.19	0.20	0.20	0.20	0.21	0.22	0.24	0.26	0.29	0.32	0.37	0.42	0.49	0.56
989	0.07	0.13	0.19	0.26	0.33	0.38	0.43	0.48	0.52	0.55	0.57	0.59	0.61	0.63	0.65	0.68	0.72	0.77	0.83	0.90	1.00	1.10	1.23	1.37	1.52	1.68	1.84
991	0.09	0.15	0.23	0.32	0.40	0.46	0.52	0.58	0.62	0.66	0.68	0.70	0.72	0.74	0.76	0.79	0.84	0.89	0.97	1.06	1.18	1.33	1.50	1.69	1.90	2.13	2.38
993	0.08	0.14	0.20	0.29	0.36	0.42	0.47	0.52	0.56	0.59	0.61	0.62	0.63	0.63	0.63	0.63	0.64	0.65	0.68	0.73	0.79	0.88	0.99	1.13	1.29	1.48	1.69
995	0.07	0.12	0.18	0.25	0.31	0.37	0.42	0.47	0.51	0.55	0.58	0.60	0.62	0.64	0.65	0.66	0.68	0.70	0.73	0.78	0.83	0.91	1.00	1.12	1.26	1.42	1.62
997	0.09	0.16	0.23	0.33	0.41	0.48	0.54	0.60	0.66	0.70	0.73	0.75	0.78	0.80	0.82	0.85	0.89	0.94	1.00	1.08	1.18	1.31	1.45	1.62	1.81	2.02	2.25
999	0.08	0.15	0.21	0.30	0.38	0.44	0.50	0.55	0.59	0.63	0.66	0.68	0.70	0.73	0.76	0.79	0.84	0.91	1.00	1.10	1.23	1.38	1.55	1.75	1.96	2.19	2.42
1001	0.07	0.13	0.19	0.27	0.34	0.40	0.45	0.51	0.55	0.59	0.62	0.65	0.68	0.70	0.74	0.77	0.82	0.87	0.95	1.03	1.14	1.26	1.40	1.56	1.73	1.92	2.12
1003	0.08	0.14	0.21	0.30	0.37	0.44	0.50	0.55	0.60	0.64	0.67	0.69	0.71	0.72	0.73	0.74	0.76	0.78	0.81	0.86	0.92	0.99	1.09	1.22	1.37	1.54	1.74
1005	0.08	0.14	0.20	0.29	0.36	0.42	0.47	0.52	0.57	0.60	0.62	0.64	0.66	0.67	0.68	0.70	0.72	0.75	0.80	0.86	0.93	1.03	1.15	1.29	1.46	1.65	1.86
1007	0.08	0.15	0.22	0.31	0.38	0.45	0.51	0.57	0.61	0.65	0.68	0.71	0.74	0.77	0.80	0.84	0.89	0.95	1.04	1.14	1.27	1.42	1.60	1.80	2.02	2.26	2.51
1009	0.08	0.15	0.22	0.31	0.38	0.45	0.51	0.57	0.62	0.66	0.69	0.72	0.75	0.79	0.82	0.86	0.92	0.99	1.07	1.18	1.30	1.45	1.62	1.81	2.03	2.25	2.49
1011	0.08	0.14	0.21	0.30	0.37	0.44	0.50	0.56	0.60	0.64	0.68	0.71	0.74	0.77	0.80	0.84	0.90	0.97	1.05	1.15	1.28	1.42	1.59	1.78	1.99	2.22	2.46
1013	0.08	0.13	0.20	0.28	0.35	0.41	0.46	0.51	0.55	0.58	0.60	0.62	0.64	0.66	0.68	0.71	0.76	0.81	0.89	0.98	1.10	1.24	1.40	1.60	1.81	2.05	2.31
1015	0.08	0.14	0.20	0.28	0.35	0.41	0.46	0.51	0.54	0.57	0.59	0.61	0.63	0.64	0.67	0.70	0.75	0.82	0.91	1.02	1.16	1.33	1.53	1.75	1.99	2.26	2.54
1017	0.08	0.14	0.21	0.30	0.37	0.43	0.49	0.54	0.59	0.62	0.65	0.67	0.69	0.71	0.74	0.77	0.81	0.87	0.94	1.03	1.14	1.28	1.44	1.62	1.83	2.05	2.30
1019	0.07	0.12	0.18	0.26	0.32	0.38	0.43	0.48	0.52	0.56	0.59	0.61	0.63	0.65	0.67	0.70	0.73	0.77	0.83	0.90	0.98	1.09	1.21	1.36	1.53	1.71	1.92
1021	0.07	0.12	0.18	0.26	0.32	0.37	0.42	0.46	0.50	0.53	0.55	0.57	0.59	0.61	0.64	0.68	0.73	0.79	0.87	0.97	1.10	1.25	1.42	1.62	1.83	2.07	2.32
1023	0.06	0.11	0.17	0.24	0.30	0.35	0.40	0.45	0.49	0.53	0.55	0.58	0.60	0.61	0.63	0.64	0.66	0.68	0.71	0.75	0.80	0.86	0.93	1.03	1.13	1.26	1.40
1025	0.07	0.13	0.19	0.27	0.33	0.39	0.44	0.49	0.54	0.57	0.60	0.63	0.65	0.68	0.70	0.73	0.76	0.81	0.87	0.94	1.04	1.15	1.28	1.44	1.61	1.81	2.02
1027	0.06	0.11	0.17	0.24	0.30	0.35	0.39	0.44	0.48	0.51	0.53	0.56	0.58	0.60	0.63	0.66	0.70	0.76	0.82	0.91	1.01	1.13	1.28	1.44	1.63	1.83	2.05
1029	0.08	0.14	0.21	0.30	0.38	0.44	0.50	0.56	0.61	0.64	0.67	0.70	0.72	0.74	0.75	0.78	0.81	0.85	0.90	0.97	1.06	1.17	1.30	1.46	1.63	1.83	2.04
1031	0.06	0.11	0.17	0.24	0.30	0.35	0.39	0.43	0.47	0.50	0.52	0.54	0.56	0.58	0.60	0.63	0.67	0.72	0.79	0.88	0.99	1.13	1.29	1.47	1.68	1.92	2.18
1033	0.07	0.12	0.17	0.25	0.31	0.36	0.41	0.46	0.50	0.54	0.56	0.58	0.60	0.62	0.63	0.64	0.66	0.69	0.72	0.76	0.82	0.90	0.99	1.11	1.25	1.42	1.61

Grain Size Data - ALE cont.

Depth	4.66	5.11	5.61	6.16	6.76	7.42	8.15	8.94	9.82	10.78	11.83	12.99	14.26	15.65	17.18	18.86	20.71	22.73	24.95	27.39	30.07	33.01	36.24
963	1.35	1.53	1.72	1.93	2.15	2.39	2.63	2.88	3.14	3.39	3.63	3.84	4.00	4.11	4.14	4.07	3.89	3.62	3.28	2.95	2.66	2.45	2.30
965	2.29	2.52	2.75	2.98	3.21	3.42	3.62	3.79	3.92	3.99	4.00	3.92	3.78	3.57	3.28	2.91	2.47	2.01	1.59	1.29	1.13	1.09	1.12
967	1.34	1.52	1.73	1.94	2.17	2.41	2.67	2.93	3.20	3.47	3.71	3.93	4.10	4.21	4.24	4.16	3.96	3.65	3.28	2.92	2.62	2.40	2.26
969	1.48	1.68	1.90	2.13	2.38	2.64	2.91	3.18	3.46	3.72	3.96	4.15	4.29	4.36	4.33	4.18	3.91	3.54	3.13	2.73	2.41	2.19	2.05
971	1.30	1.47	1.66	1.87	2.09	2.33	2.57	2.83	3.09	3.36	3.60	3.82	4.01	4.14	4.19	4.14	3.97	3.70	3.37	3.03	2.73	2.51	2.35
973	1.22	1.39	1.57	1.77	1.99	2.22	2.46	2.71	2.98	3.24	3.50	3.74	3.95	4.10	4.19	4.17	4.04	3.80	3.49	3.17	2.88	2.65	2.49
975	1.30	1.48	1.67	1.88	2.10	2.34	2.58	2.84	3.11	3.37	3.61	3.83	4.01	4.14	4.18	4.12	3.94	3.66	3.32	2.98	2.70	2.49	2.36
977	1.05	1.20	1.37	1.56	1.76	1.97	2.21	2.47	2.74	3.03	3.32	3.61	3.88	4.13	4.33	4.45	4.46	4.37	4.18	3.92	3.62	3.31	3.00
979	1.10	1.25	1.43	1.61	1.82	2.04	2.28	2.53	2.81	3.09	3.38	3.66	3.92	4.15	4.32	4.41	4.40	4.27	4.05	3.77	3.47	3.17	2.89
981	1.08	1.23	1.39	1.57	1.76	1.97	2.20	2.44	2.69	2.96	3.23	3.50	3.75	3.97	4.14	4.24	4.25	4.15	3.97	3.74	3.48	3.23	2.97
983	1.13	1.29	1.46	1.65	1.86	2.08	2.31	2.56	2.83	3.10	3.37	3.63	3.87	4.07	4.21	4.25	4.19	4.02	3.77	3.47	3.18	2.91	2.68
985	0.70	0.80	0.92	1.05	1.20	1.36	1.54	1.73	1.95	2.19	2.44	2.72	3.01	3.32	3.62	3.92	4.18	4.40	4.57	4.67	4.70	4.63	4.44
987	0.65	0.76	0.88	1.01	1.15	1.31	1.49	1.70	1.92	2.17	2.44	2.74	3.06	3.39	3.73	4.07	4.37	4.63	4.82	4.93	4.93	4.82	4.58
989	2.00	2.16	2.31	2.44	2.56	2.66	2.75	2.81	2.84	2.82	2.77	2.69	2.60	2.50	2.38	2.23	2.05	1.87	1.73	1.68	1.75	1.92	2.14
991	2.62	2.87	3.12	3.35	3.56	3.74	3.89	4.00	4.06	4.04	3.94	3.76	3.54	3.28	2.99	2.65	2.27	1.89	1.56	1.35	1.25	1.23	1.25
993	1.93	2.18	2.45	2.72	3.00	3.27	3.53	3.78	3.99	4.16	4.25	4.27	4.22	4.09	3.86	3.54	3.11	2.62	2.11	1.67	1.33	1.10	0.96
995	1.84	2.08	2.35	2.63	2.94	3.25	3.58	3.91	4.23	4.53	4.78	4.96	5.04	5.01	4.84	4.49	3.98	3.35	2.68	2.06	1.56	1.21	0.97
997	2.48	2.71	2.94	3.16	3.37	3.56	3.73	3.87	3.97	4.02	4.00	3.92	3.79	3.60	3.35	3.00	2.58	2.11	1.68	1.36	1.16	1.07	1.04
999	2.65	2.88	3.10	3.29	3.46	3.60	3.71	3.77	3.78	3.73	3.61	3.44	3.23	3.01	2.76	2.46	2.13	1.79	1.51	1.33	1.26	1.28	1.33
1001	2.33	2.54	2.75	2.95	3.14	3.31	3.47	3.60	3.70	3.74	3.71	3.62	3.47	3.27	3.00	2.66	2.25	1.83	1.46	1.21	1.09	1.08	1.15
1003	1.96	2.20	2.47	2.75	3.04	3.34	3.65	3.96	4.25	4.51	4.71	4.82	4.83	4.73	4.47	4.05	3.47	2.80	2.13	1.57	1.17	0.93	0.80
1005	2.09	2.34	2.60	2.87	3.14	3.41	3.68	3.94	4.17	4.36	4.48	4.52	4.48	4.34	4.09	3.70	3.18	2.60	2.02	1.55	1.22	1.04	0.96
1007	2.77	3.03	3.29	3.53	3.76	3.96	4.13	4.26	4.34	4.35	4.28	4.13	3.91	3.63	3.28	2.85	2.35	1.83	1.37	1.02	0.81	0.71	0.67
1009	2.74	2.98	3.23	3.46	3.68	3.88	4.06	4.20	4.29	4.31	4.25	4.11	3.90	3.63	3.28	2.84	2.33	1.81	1.35	1.02	0.84	0.79	0.79
1011	2.70	2.95	3.19	3.42	3.64	3.84	4.01	4.16	4.26	4.31	4.28	4.19	4.03	3.81	3.50	3.10	2.61	2.07	1.56	1.18	0.95	0.84	0.80
1013	2.57	2.84	3.12	3.39	3.64	3.88	4.09	4.27	4.40	4.46	4.44	4.33	4.14	3.88	3.53	3.09	2.57	2.01	1.50	1.10	0.86	0.75	0.72
1015	2.82	3.10	3.37	3.63	3.86	4.06	4.22	4.33	4.37	4.33	4.20	3.98	3.70	3.36	2.97	2.53	2.06	1.59	1.19	0.92	0.78	0.75	0.78
1017	2.55	2.81	3.07	3.34	3.59	3.82	4.04	4.23	4.38	4.46	4.46	4.38	4.21	3.97	3.63	3.18	2.64	2.07	1.56	1.18	0.95	0.86	0.83
1019	2.13	2.36	2.59	2.82	3.05	3.28	3.49	3.68	3.83	3.94	3.99	3.97	3.87	3.70	3.44	3.08	2.64	2.15	1.70	1.34	1.11	1.01	1.00
1021	2.58	2.84	3.10	3.36	3.60	3.82	4.02	4.18	4.29	4.34	4.31	4.19	3.98	3.69	3.31	2.85	2.33	1.78	1.29	0.92	0.70	0.60	0.58
1023	1.56	1.73	1.92	2.13	2.35	2.58	2.82	3.07	3.32	3.56	3.76	3.92	4.01	4.02	3.92	3.68	3.32	2.87	2.39	1.95	1.63	1.43	1.34
1025	2.24	2.48	2.72	2.97	3.21	3.44	3.66	3.87	4.04	4.17	4.24	4.23	4.16	4.01	3.76	3.40	2.94	2.42	1.90	1.46	1.15	0.96	0.86
1027	2.28	2.52	2.77	3.01	3.25	3.48	3.69	3.88	4.03	4.12	4.15	4.09	3.95	3.73	3.41	3.00	2.51	2.00	1.53	1.18	0.98	0.90	0.91
1029	2.26	2.49	2.73	2.96	3.19	3.41	3.62	3.80	3.94	4.03	4.05	4.00	3.87	3.66	3.37	2.99	2.53	2.05	1.62	1.30	1.11	1.03	1.02
1031	2.45	2.74	3.04	3.34	3.64	3.93	4.20	4.45	4.65	4.80	4.86	4.82	4.68	4.43	4.06	3.56	2.96	2.31	1.69	1.18	0.82	0.61	0.51
1033	1.83	2.07	2.33	2.61	2.91	3.22	3.54	3.87	4.19	4.49	4.73	4.91	4.99	4.97	4.80	4.48	4.00	3.40	2.75	2.15	1.65	1.28	1.02

Grain Size Data - ALE cont.

Depth	39.78	43.67	47.94	52.63	57.77	63.42	69.62	76.43	83.90	92.10	101.10	110.99	121.84	133.75	146.82	161.18	176.94	194.23	213.22	234.07	256.95
963	2.20	2.11	2.00	1.84	1.65	1.43	1.22	1.03	0.86	0.75	0.69	0.69	0.73	0.77	0.74	0.60	0.38	0.16	0.04	0.00	0.00
965	1.17	1.19	1.17	1.12	1.06	1.00	0.94	0.87	0.79	0.71	0.63	0.58	0.55	0.51	0.43	0.31	0.17	0.06	0.01	0.00	0.00
967	2.16	2.06	1.94	1.77	1.57	1.35	1.15	0.98	0.84	0.74	0.67	0.65	0.66	0.69	0.69	0.61	0.46	0.26	0.10	0.02	0.00
969	1.97	1.90	1.79	1.63	1.43	1.21	1.00	0.82	0.69	0.62	0.60	0.61	0.63	0.60	0.51	0.36	0.19	0.07	0.01	0.00	0.00
971	2.23	2.12	1.98	1.82	1.63	1.44	1.25	1.08	0.93	0.81	0.73	0.71	0.72	0.73	0.70	0.58	0.39	0.19	0.06	0.01	0.00
973	2.36	2.25	2.11	1.95	1.75	1.53	1.32	1.12	0.95	0.83	0.75	0.73	0.75	0.77	0.73	0.60	0.39	0.18	0.05	0.01	0.00
975	2.26	2.16	2.03	1.86	1.66	1.45	1.25	1.06	0.91	0.79	0.72	0.69	0.71	0.72	0.69	0.57	0.39	0.19	0.06	0.01	0.00
977	2.70	2.40	2.10	1.81	1.55	1.32	1.14	1.00	0.89	0.80	0.75	0.73	0.73	0.73	0.67	0.54	0.34	0.15	0.04	0.00	0.00
979	2.62	2.35	2.08	1.81	1.54	1.31	1.11	0.95	0.82	0.74	0.69	0.69	0.71	0.73	0.71	0.59	0.39	0.19	0.06	0.01	0.00
981	2.72	2.47	2.21	1.94	1.69	1.45	1.26	1.09	0.96	0.86	0.79	0.77	0.78	0.80	0.78	0.68	0.49	0.26	0.09	0.02	0.00
983	2.48	2.29	2.11	1.91	1.71	1.52	1.34	1.18	1.03	0.91	0.81	0.76	0.75	0.76	0.74	0.64	0.47	0.26	0.10	0.02	0.00
985	4.15	3.74	3.25	2.74	2.24	1.81	1.48	1.24	1.09	1.00	0.96	0.95	0.98	1.02	1.00	0.90	0.69	0.40	0.15	0.03	0.00
987	4.22	3.74	3.19	2.62	2.09	1.64	1.30	1.08	0.96	0.90	0.90	0.92	0.97	1.01	1.00	0.89	0.68	0.39	0.15	0.03	0.00
989	2.34	2.47	2.50	2.45	2.33	2.17	1.98	1.77	1.56	1.35	1.18	1.05	0.94	0.82	0.66	0.44	0.22	0.08	0.01	0.00	0.00
991	1.23	1.14	0.98	0.78	0.62	0.50	0.44	0.42	0.42	0.42	0.42	0.43	0.42	0.41	0.36	0.27	0.15	0.05	0.01	0.00	0.00
993	0.89	0.85	0.83	0.83	0.86	0.92	0.98	1.02	1.03	0.99	0.93	0.86	0.77	0.67	0.53	0.35	0.18	0.06	0.01	0.00	0.00
995	0.81	0.68	0.56	0.45	0.35	0.28	0.24	0.21	0.21	0.21	0.23	0.27	0.30	0.31	0.27	0.18	0.09	0.02	0.00	0.00	0.00
997	1.01	0.94	0.84	0.73	0.64	0.59	0.56	0.53	0.49	0.44	0.39	0.36	0.36	0.36	0.34	0.27	0.16	0.06	0.01	0.00	0.00
999	1.35	1.30	1.18	1.03	0.91	0.84	0.80	0.77	0.70	0.58	0.46	0.38	0.36	0.39	0.43	0.41	0.31	0.16	0.05	0.01	0.00
1001	1.22	1.27	1.28	1.27	1.27	1.28	1.29	1.27	1.19	1.06	0.91	0.77	0.66	0.56	0.44	0.30	0.15	0.05	0.01	0.00	0.00
1003	0.73	0.66	0.58	0.49	0.43	0.41	0.42	0.45	0.47	0.46	0.42	0.37	0.34	0.31	0.28	0.22	0.13	0.05	0.01	0.00	0.00
1005	0.92	0.87	0.79	0.71	0.63	0.59	0.58	0.58	0.57	0.52	0.44	0.37	0.33	0.32	0.31	0.28	0.19	0.09	0.02	0.00	0.00
1007	0.62	0.55	0.45	0.36	0.32	0.33	0.38	0.42	0.43	0.38	0.30	0.25	0.25	0.29	0.34	0.34	0.24	0.11	0.02	0.00	0.00
1009	0.79	0.72	0.58	0.42	0.29	0.23	0.24	0.29	0.35	0.37	0.36	0.33	0.31	0.31	0.32	0.29	0.20	0.09	0.02	0.00	0.00
1011	0.77	0.69	0.55	0.40	0.27	0.21	0.21	0.24	0.28	0.28	0.25	0.21	0.18	0.18	0.20	0.20	0.15	0.07	0.02	0.00	0.00
1013	0.73	0.72	0.67	0.61	0.54	0.50	0.49	0.50	0.50	0.49	0.47	0.44	0.41	0.36	0.28	0.19	0.09	0.03	0.00	0.00	0.00
1015	0.83	0.85	0.83	0.79	0.74	0.71	0.69	0.66	0.62	0.56	0.51	0.47	0.44	0.39	0.31	0.19	0.08	0.02	0.00	0.00	0.00
1017	0.81	0.74	0.64	0.52	0.42	0.36	0.34	0.34	0.35	0.35	0.34	0.32	0.30	0.26	0.20	0.12	0.05	0.01	0.00	0.00	0.00
1019	1.04	1.11	1.16	1.21	1.25	1.28	1.30	1.27	1.21	1.10	0.97	0.83	0.69	0.53	0.37	0.20	0.08	0.01	0.00	0.00	0.00
1021	0.60	0.63	0.64	0.65	0.69	0.75	0.83	0.89	0.91	0.87	0.80	0.73	0.66	0.60	0.52	0.39	0.23	0.09	0.02	0.00	0.00
1023	1.34	1.39	1.46	1.54	1.61	1.66	1.66	1.59	1.45	1.28	1.09	0.94	0.82	0.71	0.57	0.39	0.21	0.07	0.01	0.00	0.00
1025	0.81	0.76	0.72	0.68	0.67	0.68	0.71	0.73	0.72	0.69	0.63	0.59	0.56	0.52	0.46	0.35	0.20	0.08	0.02	0.00	0.00
1027	0.97	1.02	1.06	1.08	1.10	1.13	1.14	1.12	1.05	0.93	0.80	0.69	0.61	0.56	0.49	0.37	0.22	0.09	0.02	0.00	0.00
1029	1.03	1.02	0.99	0.94	0.90	0.88	0.88	0.86	0.81	0.74	0.66	0.61	0.58	0.56	0.51	0.40	0.24	0.09	0.02	0.00	0.00
1031	0.45	0.41	0.36	0.31	0.29	0.31	0.36	0.42	0.47	0.47	0.44	0.40	0.36	0.33	0.29	0.23	0.14	0.06	0.01	0.00	0.00
1033	0.83	0.68	0.55	0.45	0.37	0.33	0.31	0.31	0.30	0.28	0.26	0.25	0.26	0.26	0.25	0.19	0.11	0.04	0.01	0.00	0.00

Grain Size Data - ALE cont.

Depth	282.07	309.64	339.92	373.15	409.63	449.67	493.63	541.89	594.87	653.03	716.87	786.95	863.88	948.34
963	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
965	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
967	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
969	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
971	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
973	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
975	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
977	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
979	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
981	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
985	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
987	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
989	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
991	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
993	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
995	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
997	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
999	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1007	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1009	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1015	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1017	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1027	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Grain Size Data - ALE cont.

Depth	Size fraction (microns)																									
	0.38	**0.41**	**0.45**	**0.50**	**0.54**	**0.60**	**0.66**	**0.72**	**0.79**	**0.87**	**0.95**	**1.05**	**1.15**	**1.26**	**1.38**	**1.52**	**1.67**	**1.83**	**2.01**	**2.21**	**2.42**	**2.66**	**2.92**	**3.21**	**3.52**	**3.86**	**4.24**
1035	0.06	0.12	0.17	0.24	0.30	0.36	0.41	0.46	0.50	0.53	0.56	0.58	0.60	0.61	0.62	0.63	0.65	0.67	0.70	0.74	0.79	0.85	0.93	1.03	1.16	1.30	1.47
1037	0.06	0.12	0.17	0.24	0.30	0.35	0.40	0.44	0.48	0.50	0.53	0.55	0.56	0.58	0.60	0.63	0.66	0.71	0.77	0.85	0.95	1.08	1.22	1.40	1.59	1.81	2.05
1039	0.09	0.17	0.25	0.35	0.43	0.50	0.57	0.62	0.67	0.71	0.73	0.76	0.79	0.82	0.86	0.92	0.99	1.09	1.22	1.37	1.54	1.75	1.98	2.24	2.50	2.78	3.04
1041	0.07	0.12	0.18	0.26	0.32	0.37	0.42	0.46	0.49	0.52	0.54	0.56	0.57	0.59	0.61	0.63	0.67	0.71	0.78	0.86	0.97	1.10	1.26	1.44	1.65	1.89	2.14
1043	0.08	0.15	0.22	0.31	0.39	0.45	0.51	0.56	0.61	0.64	0.67	0.69	0.70	0.72	0.74	0.76	0.79	0.84	0.90	0.99	1.09	1.22	1.38	1.57	1.78	2.01	2.27
1045	0.08	0.14	0.21	0.29	0.37	0.43	0.49	0.55	0.60	0.64	0.67	0.69	0.71	0.73	0.74	0.76	0.78	0.81	0.84	0.89	0.95	1.03	1.14	1.26	1.41	1.58	1.78
1047	0.07	0.13	0.19	0.27	0.33	0.39	0.44	0.49	0.53	0.56	0.58	0.60	0.63	0.65	0.67	0.70	0.74	0.80	0.87	0.96	1.07	1.21	1.37	1.55	1.76	1.99	2.24
1049	0.09	0.15	0.22	0.32	0.40	0.46	0.52	0.57	0.62	0.65	0.68	0.70	0.73	0.75	0.78	0.82	0.88	0.95	1.04	1.15	1.30	1.46	1.66	1.88	2.12	2.37	2.64
1051	0.07	0.13	0.19	0.27	0.34	0.40	0.46	0.51	0.55	0.59	0.62	0.64	0.66	0.68	0.70	0.72	0.75	0.79	0.84	0.91	0.99	1.09	1.21	1.34	1.51	1.69	1.89
1053	0.07	0.12	0.17	0.25	0.31	0.36	0.41	0.46	0.50	0.53	0.56	0.58	0.61	0.62	0.64	0.67	0.70	0.74	0.79	0.85	0.93	1.03	1.14	1.28	1.44	1.62	1.82
1055	0.07	0.13	0.19	0.27	0.34	0.40	0.46	0.51	0.56	0.60	0.63	0.65	0.67	0.68	0.69	0.70	0.72	0.74	0.77	0.81	0.86	0.93	1.03	1.15	1.29	1.46	1.65
1057	0.07	0.13	0.19	0.28	0.35	0.41	0.46	0.52	0.56	0.60	0.63	0.66	0.69	0.72	0.75	0.79	0.83	0.88	0.95	1.03	1.13	1.25	1.38	1.54	1.72	1.91	2.12
1059	0.08	0.14	0.21	0.30	0.38	0.44	0.50	0.56	0.61	0.65	0.68	0.70	0.73	0.74	0.76	0.77	0.79	0.82	0.86	0.91	0.98	1.07	1.18	1.32	1.48	1.66	1.87
1061	0.10	0.17	0.26	0.37	0.46	0.54	0.61	0.68	0.74	0.79	0.83	0.87	0.90	0.92	0.94	0.97	1.00	1.03	1.08	1.14	1.22	1.32	1.45	1.59	1.76	1.95	2.16
1063	0.09	0.15	0.22	0.32	0.39	0.46	0.52	0.58	0.63	0.67	0.70	0.73	0.76	0.78	0.81	0.85	0.90	0.97	1.05	1.15	1.27	1.41	1.58	1.77	1.98	2.21	2.44
1065	0.09	0.15	0.22	0.32	0.40	0.46	0.53	0.58	0.63	0.67	0.71	0.74	0.77	0.80	0.83	0.88	0.93	1.01	1.09	1.20	1.33	1.49	1.67	1.86	2.08	2.31	2.55
1067	0.09	0.15	0.23	0.32	0.40	0.47	0.53	0.60	0.65	0.69	0.73	0.76	0.79	0.82	0.86	0.90	0.95	1.01	1.09	1.19	1.31	1.45	1.60	1.78	1.98	2.19	2.40
1069	0.09	0.16	0.24	0.35	0.43	0.51	0.57	0.64	0.69	0.74	0.78	0.81	0.84	0.87	0.90	0.94	0.98	1.04	1.11	1.20	1.30	1.43	1.57	1.73	1.91	2.10	2.30
1071	0.08	0.14	0.21	0.30	0.37	0.44	0.49	0.55	0.59	0.63	0.66	0.69	0.71	0.74	0.76	0.80	0.85	0.91	0.98	1.08	1.20	1.34	1.50	1.69	1.90	2.13	2.38
1073	0.08	0.15	0.22	0.32	0.40	0.47	0.53	0.60	0.65	0.70	0.73	0.76	0.79	0.81	0.83	0.85	0.88	0.91	0.95	1.00	1.07	1.15	1.27	1.40	1.56	1.75	1.95
1075	0.09	0.16	0.23	0.33	0.41	0.49	0.55	0.62	0.68	0.73	0.77	0.80	0.84	0.86	0.89	0.92	0.95	0.99	1.03	1.09	1.16	1.25	1.36	1.49	1.64	1.80	1.99
1077	0.09	0.16	0.23	0.33	0.42	0.50	0.57	0.63	0.69	0.74	0.78	0.82	0.85	0.87	0.89	0.91	0.93	0.96	0.99	1.04	1.10	1.18	1.27	1.39	1.54	1.71	1.90
1079	0.09	0.15	0.22	0.32	0.39	0.46	0.52	0.57	0.62	0.65	0.68	0.71	0.73	0.75	0.78	0.82	0.87	0.93	1.02	1.13	1.26	1.43	1.62	1.83	2.07	2.33	2.60
1081	0.09	0.17	0.24	0.35	0.43	0.51	0.58	0.64	0.70	0.75	0.78	0.82	0.85	0.87	0.90	0.93	0.97	1.03	1.10	1.18	1.29	1.42	1.58	1.76	1.97	2.19	2.44
1083	0.10	0.17	0.25	0.36	0.45	0.53	0.60	0.67	0.73	0.78	0.82	0.85	0.89	0.91	0.94	0.97	1.01	1.06	1.12	1.20	1.29	1.40	1.53	1.68	1.84	2.02	2.21
1085	0.12	0.22	0.32	0.46	0.57	0.67	0.76	0.84	0.91	0.97	1.02	1.05	1.09	1.13	1.16	1.20	1.25	1.32	1.41	1.51	1.64	1.80	1.97	2.17	2.39	2.62	2.85
1087	0.10	0.18	0.26	0.37	0.46	0.54	0.61	0.67	0.73	0.77	0.80	0.82	0.85	0.87	0.90	0.94	0.99	1.05	1.14	1.24	1.36	1.51	1.67	1.86	2.05	2.25	2.46
1089	0.11	0.20	0.29	0.41	0.52	0.60	0.68	0.75	0.82	0.86	0.90	0.94	0.97	1.00	1.03	1.07	1.13	1.20	1.29	1.40	1.53	1.69	1.86	2.06	2.26	2.47	2.67
1091	0.13	0.23	0.34	0.48	0.60	0.70	0.78	0.87	0.93	0.98	1.02	1.04	1.07	1.09	1.11	1.14	1.19	1.26	1.34	1.46	1.60	1.77	1.97	2.19	2.43	2.68	2.92
1093	0.13	0.23	0.33	0.47	0.59	0.69	0.77	0.86	0.93	0.98	1.02	1.05	1.09	1.12	1.15	1.19	1.25	1.32	1.42	1.54	1.68	1.85	2.03	2.24	2.46	2.68	2.88
1095	0.10	0.18	0.26	0.37	0.46	0.54	0.61	0.68	0.73	0.78	0.81	0.84	0.86	0.88	0.90	0.92	0.94	0.98	1.03	1.10	1.19	1.31	1.45	1.62	1.82	2.04	2.28
1097	0.14	0.25	0.37	0.52	0.65	0.76	0.86	0.95	1.04	1.11	1.17	1.24	1.30	1.37	1.46	1.55	1.66	1.79	1.93	2.09	2.26	2.44	2.61	2.78	2.92	3.03	3.10
1099	0.11	0.19	0.28	0.39	0.49	0.57	0.64	0.70	0.75	0.79	0.82	0.84	0.86	0.88	0.91	0.95	1.00	1.08	1.18	1.30	1.46	1.64	1.85	2.08	2.33	2.59	2.85
1101	0.13	0.22	0.33	0.47	0.59	0.69	0.79	0.88	0.96	1.03	1.08	1.12	1.16	1.19	1.21	1.24	1.27	1.32	1.37	1.44	1.53	1.65	1.79	1.95	2.14	2.35	2.57
1103	0.11	0.20	0.29	0.41	0.51	0.60	0.67	0.74	0.80	0.85	0.88	0.91	0.95	0.99	1.04	1.09	1.17	1.27	1.40	1.55	1.72	1.91	2.13	2.36	2.59	2.82	3.03
1105	0.10	0.18	0.26	0.37	0.46	0.54	0.60	0.67	0.71	0.75	0.77	0.79	0.81	0.83	0.85	0.88	0.93	0.99	1.08	1.19	1.33	1.49	1.68	1.89	2.11	2.35	2.60

Grain Size Data - ALE cont.

Depth	4.66	5.11	5.61	6.16	6.76	7.42	8.15	8.94	9.82	10.78	11.83	12.99	14.26	15.65	17.18	18.86	20.71	22.73	24.95	27.39	30.07	33.01	36.24
1035	1.67	1.88	2.13	2.39	2.68	2.99	3.32	3.67	4.03	4.39	4.72	5.00	5.21	5.30	5.23	4.98	4.52	3.90	3.18	2.48	1.88	1.41	1.06
1037	2.31	2.58	2.86	3.14	3.42	3.69	3.95	4.18	4.37	4.51	4.56	4.53	4.40	4.18	3.85	3.40	2.86	2.28	1.74	1.33	1.07	0.95	0.91
1039	3.29	3.52	3.72	3.87	3.97	4.02	4.02	3.95	3.81	3.58	3.27	2.94	2.62	2.33	2.06	1.78	1.47	1.17	0.92	0.78	0.75	0.81	0.90
1041	2.41	2.68	2.97	3.25	3.52	3.77	4.00	4.20	4.35	4.42	4.40	4.28	4.07	3.79	3.42	2.95	2.42	1.87	1.40	1.07	0.88	0.82	0.84
1043	2.53	2.80	3.06	3.32	3.56	3.78	3.97	4.13	4.23	4.25	4.19	4.06	3.85	3.59	3.26	2.86	2.38	1.88	1.45	1.13	0.95	0.89	0.90
1045	1.99	2.23	2.48	2.75	3.02	3.30	3.58	3.86	4.12	4.34	4.50	4.59	4.60	4.51	4.30	3.95	3.47	2.89	2.31	1.80	1.42	1.17	1.02
1047	2.50	2.77	3.04	3.31	3.58	3.83	4.06	4.27	4.44	4.54	4.57	4.52	4.38	4.15	3.82	3.38	2.83	2.22	1.65	1.20	0.90	0.73	0.66
1049	2.91	3.17	3.43	3.66	3.87	4.04	4.18	4.26	4.27	4.20	4.03	3.78	3.48	3.14	2.77	2.35	1.90	1.46	1.09	0.86	0.76	0.76	0.80
1051	2.10	2.33	2.58	2.83	3.08	3.34	3.60	3.85	4.08	4.27	4.41	4.48	4.47	4.37	4.15	3.80	3.32	2.76	2.19	1.70	1.33	1.10	0.96
1053	2.05	2.28	2.53	2.80	3.07	3.34	3.62	3.89	4.15	4.37	4.54	4.64	4.65	4.57	4.37	4.02	3.54	2.95	2.35	1.81	1.39	1.11	0.94
1055	1.87	2.11	2.37	2.65	2.93	3.21	3.50	3.77	4.02	4.22	4.35	4.40	4.37	4.25	4.03	3.69	3.25	2.74	2.23	1.79	1.46	1.23	1.10
1057	2.34	2.57	2.80	3.03	3.26	3.49	3.69	3.88	4.04	4.14	4.18	4.14	4.02	3.83	3.55	3.17	2.71	2.20	1.74	1.38	1.15	1.05	1.02
1059	2.09	2.33	2.58	2.84	3.10	3.36	3.61	3.84	4.04	4.19	4.27	4.28	4.21	4.06	3.82	3.47	3.02	2.52	2.03	1.62	1.33	1.16	1.06
1061	2.38	2.61	2.84	3.07	3.28	3.48	3.65	3.78	3.87	3.88	3.81	3.67	3.48	3.24	2.95	2.61	2.21	1.81	1.46	1.22	1.09	1.05	1.07
1063	2.69	2.93	3.18	3.41	3.63	3.82	3.99	4.13	4.21	4.23	4.15	4.00	3.79	3.51	3.17	2.75	2.27	1.78	1.36	1.07	0.91	0.87	0.88
1065	2.80	3.04	3.27	3.49	3.69	3.86	4.00	4.09	4.13	4.10	3.98	3.78	3.53	3.23	2.89	2.49	2.05	1.62	1.26	1.03	0.93	0.93	0.97
1067	2.62	2.84	3.06	3.26	3.45	3.62	3.76	3.87	3.94	3.94	3.87	3.73	3.53	3.30	3.00	2.63	2.21	1.79	1.42	1.17	1.05	1.03	1.05
1069	2.51	2.71	2.92	3.11	3.28	3.44	3.59	3.70	3.77	3.78	3.72	3.60	3.43	3.21	2.94	2.59	2.17	1.74	1.37	1.11	0.98	0.96	0.99
1071	2.63	2.89	3.14	3.39	3.63	3.84	4.03	4.18	4.28	4.30	4.23	4.08	3.85	3.56	3.19	2.76	2.27	1.77	1.35	1.06	0.91	0.88	0.91
1073	2.18	2.43	2.68	2.94	3.20	3.44	3.67	3.87	4.01	4.09	4.07	3.96	3.76	3.50	3.16	2.76	2.32	1.88	1.49	1.22	1.07	1.03	1.05
1075	2.18	2.39	2.61	2.83	3.05	3.27	3.47	3.66	3.82	3.92	3.95	3.89	3.76	3.54	3.23	2.81	2.33	1.85	1.44	1.17	1.04	1.04	1.10
1077	2.11	2.34	2.58	2.83	3.09	3.33	3.58	3.80	3.99	4.12	4.16	4.12	3.99	3.76	3.43	3.00	2.49	1.96	1.50	1.18	1.00	0.95	0.98
1079	2.87	3.14	3.41	3.65	3.87	4.05	4.19	4.28	4.30	4.23	4.06	3.80	3.49	3.14	2.76	2.34	1.90	1.47	1.12	0.90	0.81	0.82	0.88
1081	2.69	2.95	3.21	3.46	3.69	3.90	4.07	4.19	4.25	4.22	4.09	3.86	3.56	3.20	2.80	2.37	1.92	1.50	1.18	0.98	0.90	0.92	0.98
1083	2.41	2.62	2.82	3.01	3.20	3.37	3.51	3.63	3.71	3.72	3.65	3.51	3.30	3.04	2.73	2.36	1.95	1.57	1.26	1.08	1.04	1.09	1.18
1085	3.08	3.29	3.48	3.63	3.74	3.80	3.80	3.74	3.59	3.34	3.02	2.67	2.34	2.08	1.87	1.67	1.45	1.23	1.04	0.93	0.91	0.96	1.02
1087	2.65	2.84	3.01	3.16	3.29	3.40	3.48	3.53	3.55	3.51	3.43	3.30	3.15	2.97	2.75	2.46	2.11	1.73	1.40	1.17	1.07	1.07	1.12
1089	2.87	3.04	3.19	3.31	3.39	3.43	3.43	3.38	3.28	3.12	2.91	2.68	2.46	2.26	2.07	1.86	1.63	1.38	1.18	1.06	1.03	1.08	1.15
1091	3.15	3.35	3.52	3.65	3.72	3.73	3.69	3.59	3.41	3.17	2.87	2.58	2.33	2.14	1.99	1.83	1.63	1.39	1.18	1.04	0.98	1.01	1.06
1093	3.07	3.22	3.33	3.39	3.40	3.35	3.25	3.09	2.88	2.61	2.32	2.07	1.89	1.79	1.72	1.64	1.49	1.31	1.13	1.03	1.03	1.11	1.22
1095	2.53	2.80	3.06	3.32	3.56	3.78	3.97	4.12	4.22	4.23	4.16	4.01	3.81	3.56	3.25	2.87	2.42	1.94	1.50	1.17	0.96	0.86	0.82
1097	3.12	3.09	3.01	2.88	2.72	2.54	2.36	2.18	2.01	1.85	1.72	1.65	1.65	1.68	1.67	1.57	1.37	1.15	1.00	0.96	1.04	1.18	1.32
1099	3.10	3.32	3.53	3.69	3.82	3.90	3.93	3.91	3.82	3.66	3.42	3.15	2.88	2.61	2.34	2.05	1.73	1.41	1.15	0.99	0.94	0.96	1.01
1101	2.80	3.03	3.24	3.43	3.57	3.67	3.72	3.69	3.57	3.34	3.03	2.68	2.36	2.09	1.88	1.69	1.50	1.31	1.16	1.07	1.07	1.12	1.18
1103	3.22	3.38	3.49	3.56	3.59	3.56	3.49	3.38	3.21	2.98	2.71	2.45	2.22	2.03	1.86	1.67	1.44	1.21	1.02	0.94	0.96	1.05	1.17
1105	2.84	3.06	3.28	3.47	3.63	3.76	3.86	3.92	3.92	3.87	3.75	3.59	3.39	3.17	2.91	2.59	2.21	1.81	1.46	1.22	1.09	1.06	1.06

Grain Size Data - ALE cont.

Depth	39.78	43.67	47.94	52.63	57.77	63.42	69.62	76.43	83.90	92.10	101.10	110.99	121.84	133.75	146.82	161.18	176.94	194.23	213.22	234.07	256.95
1035	0.81	0.61	0.45	0.32	0.23	0.18	0.17	0.18	0.20	0.21	0.23	0.24	0.26	0.27	0.25	0.19	0.10	0.04	0.01	0.00	0.00
1037	0.89	0.84	0.76	0.65	0.57	0.53	0.55	0.58	0.59	0.56	0.50	0.44	0.41	0.40	0.39	0.34	0.22	0.10	0.02	0.00	0.00
1039	0.94	0.90	0.81	0.70	0.63	0.63	0.68	0.74	0.75	0.70	0.60	0.50	0.45	0.43	0.43	0.39	0.27	0.12	0.03	0.00	0.00
1041	0.86	0.86	0.83	0.79	0.78	0.80	0.84	0.87	0.87	0.82	0.76	0.69	0.64	0.57	0.47	0.33	0.18	0.06	0.01	0.00	0.00
1043	0.91	0.88	0.82	0.73	0.66	0.62	0.60	0.59	0.57	0.55	0.54	0.54	0.53	0.50	0.42	0.28	0.14	0.04	0.01	0.00	0.00
1045	0.90	0.80	0.68	0.56	0.45	0.37	0.33	0.30	0.30	0.31	0.33	0.37	0.41	0.41	0.35	0.23	0.11	0.03	0.00	0.00	0.00
1047	0.62	0.58	0.51	0.45	0.40	0.40	0.43	0.47	0.50	0.50	0.47	0.42	0.37	0.31	0.23	0.14	0.06	0.01	0.00	0.00	0.00
1049	0.82	0.79	0.71	0.62	0.57	0.56	0.58	0.60	0.59	0.52	0.42	0.33	0.29	0.30	0.32	0.33	0.28	0.18	0.07	0.01	0.00
1051	0.87	0.79	0.70	0.63	0.58	0.56	0.57	0.57	0.56	0.52	0.47	0.41	0.36	0.31	0.24	0.14	0.06	0.01	0.00	0.00	0.00
1053	0.83	0.75	0.67	0.60	0.54	0.51	0.51	0.51	0.49	0.46	0.41	0.36	0.32	0.29	0.25	0.18	0.10	0.04	0.01	0.00	0.00
1055	1.01	0.95	0.90	0.87	0.86	0.86	0.86	0.84	0.79	0.70	0.60	0.53	0.47	0.42	0.35	0.26	0.14	0.05	0.01	0.00	0.00
1057	1.02	0.99	0.92	0.82	0.72	0.64	0.60	0.57	0.54	0.50	0.46	0.43	0.41	0.41	0.38	0.32	0.19	0.08	0.02	0.00	0.00
1059	0.99	0.93	0.84	0.75	0.69	0.64	0.62	0.61	0.59	0.56	0.53	0.50	0.47	0.43	0.35	0.24	0.12	0.04	0.01	0.00	0.00
1061	1.08	1.06	1.00	0.94	0.89	0.86	0.83	0.79	0.73	0.64	0.56	0.51	0.47	0.43	0.37	0.26	0.13	0.04	0.01	0.00	0.00
1063	0.87	0.82	0.72	0.61	0.53	0.48	0.47	0.46	0.44	0.39	0.35	0.33	0.33	0.33	0.31	0.24	0.14	0.05	0.01	0.00	0.00
1065	0.99	0.94	0.84	0.72	0.62	0.55	0.52	0.50	0.47	0.41	0.34	0.30	0.28	0.29	0.29	0.25	0.16	0.07	0.01	0.00	0.00
1067	1.04	0.97	0.85	0.72	0.61	0.55	0.53	0.54	0.54	0.53	0.51	0.50	0.50	0.48	0.43	0.32	0.18	0.07	0.01	0.00	0.00
1069	1.01	1.01	0.96	0.92	0.88	0.88	0.87	0.86	0.80	0.73	0.65	0.59	0.55	0.51	0.42	0.29	0.14	0.04	0.01	0.00	0.00
1071	0.95	0.94	0.88	0.79	0.69	0.62	0.56	0.52	0.48	0.44	0.40	0.37	0.35	0.31	0.24	0.15	0.06	0.01	0.00	0.00	0.00
1073	1.08	1.09	1.07	1.04	1.01	0.99	0.96	0.91	0.84	0.75	0.68	0.64	0.62	0.59	0.51	0.38	0.21	0.08	0.01	0.00	0.00
1075	1.17	1.19	1.16	1.11	1.06	1.01	0.98	0.93	0.87	0.79	0.72	0.66	0.60	0.52	0.40	0.24	0.10	0.02	0.00	0.00	0.00
1077	1.03	1.05	1.03	0.99	0.94	0.90	0.86	0.82	0.76	0.70	0.64	0.60	0.56	0.50	0.41	0.27	0.14	0.04	0.01	0.00	0.00
1079	0.92	0.91	0.85	0.75	0.67	0.62	0.58	0.55	0.52	0.48	0.44	0.41	0.39	0.34	0.27	0.17	0.07	0.01	0.00	0.00	0.00
1081	1.00	0.97	0.87	0.75	0.63	0.54	0.48	0.43	0.38	0.34	0.32	0.32	0.34	0.36	0.34	0.27	0.15	0.06	0.01	0.00	0.00
1083	1.25	1.26	1.20	1.13	1.06	1.00	0.96	0.91	0.83	0.75	0.67	0.61	0.58	0.54	0.47	0.34	0.19	0.07	0.01	0.00	0.00
1085	1.06	1.02	0.92	0.82	0.73	0.68	0.66	0.62	0.57	0.49	0.41	0.36	0.35	0.35	0.34	0.28	0.17	0.07	0.01	0.00	0.00
1087	1.15	1.13	1.07	0.98	0.92	0.88	0.86	0.83	0.77	0.68	0.59	0.53	0.50	0.48	0.43	0.33	0.19	0.07	0.01	0.00	0.00
1089	1.21	1.21	1.18	1.13	1.09	1.07	1.04	0.98	0.87	0.73	0.61	0.53	0.52	0.54	0.53	0.44	0.28	0.12	0.02	0.00	0.00
1091	1.08	1.03	0.94	0.83	0.73	0.66	0.61	0.55	0.49	0.41	0.34	0.32	0.33	0.36	0.37	0.32	0.20	0.08	0.02	0.00	0.00
1093	1.30	1.33	1.30	1.25	1.20	1.17	1.14	1.06	0.93	0.76	0.61	0.52	0.48	0.48	0.46	0.38	0.24	0.10	0.02	0.00	0.00
1095	0.78	0.72	0.62	0.53	0.47	0.45	0.46	0.46	0.43	0.37	0.31	0.27	0.27	0.30	0.33	0.30	0.21	0.10	0.03	0.00	0.00
1097	1.39	1.37	1.31	1.25	1.21	1.19	1.15	1.06	0.91	0.74	0.62	0.56	0.55	0.55	0.49	0.34	0.17	0.05	0.01	0.00	0.00
1099	1.02	0.96	0.85	0.74	0.65	0.61	0.58	0.55	0.50	0.43	0.36	0.33	0.33	0.36	0.35	0.29	0.18	0.07	0.01	0.00	0.00
1101	1.21	1.18	1.10	1.02	0.94	0.88	0.82	0.74	0.63	0.50	0.41	0.36	0.35	0.36	0.34	0.27	0.16	0.06	0.01	0.00	0.00
1103	1.23	1.22	1.15	1.06	0.98	0.93	0.88	0.80	0.68	0.54	0.43	0.38	0.39	0.44	0.47	0.41	0.27	0.11	0.02	0.00	0.00
1105	1.03	0.93	0.77	0.61	0.48	0.42	0.41	0.42	0.41	0.37	0.31	0.27	0.26	0.28	0.31	0.29	0.19	0.09	0.02	0.00	0.00

Grain Size Data - ALE cont.

Depth	282.07	309.64	339.92	373.15	409.63	449.67	493.63	541.89	594.87	653.03	716.87	786.95	863.88	948.34
1035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1045	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1049	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1051	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1067	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1069	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1075	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1085	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1087	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1091	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1093	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1095	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1097	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1099	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1101	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1103	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Grain Size Data - ALE cont.

Depth	Size fraction (microns)																										
	0.38	**0.41**	**0.45**	**0.50**	**0.54**	**0.60**	**0.66**	**0.72**	**0.79**	**0.87**	**0.95**	**1.05**	**1.15**	**1.26**	**1.38**	**1.52**	**1.67**	**1.83**	**2.01**	**2.21**	**2.42**	**2.66**	**2.92**	**3.21**	**3.52**	**3.86**	**4.24**
1107	0.11	0.20	0.29	0.41	0.51	0.60	0.68	0.75	0.81	0.85	0.88	0.90	0.93	0.95	0.97	0.99	1.03	1.09	1.16	1.26	1.37	1.52	1.68	1.87	2.08	2.30	2.53
1109	0.11	0.20	0.29	0.42	0.53	0.62	0.70	0.79	0.86	0.93	0.98	1.03	1.08	1.13	1.18	1.24	1.31	1.39	1.48	1.59	1.72	1.86	2.01	2.18	2.36	2.53	2.70
1111	0.10	0.17	0.26	0.36	0.45	0.53	0.60	0.67	0.73	0.78	0.82	0.86	0.90	0.94	0.98	1.03	1.09	1.16	1.25	1.35	1.48	1.62	1.77	1.94	2.12	2.31	2.49
1113	0.11	0.19	0.29	0.41	0.51	0.60	0.68	0.76	0.82	0.88	0.93	0.97	1.01	1.04	1.08	1.13	1.18	1.25	1.33	1.43	1.55	1.69	1.84	2.01	2.20	2.39	2.58
1115	0.09	0.15	0.23	0.32	0.40	0.47	0.54	0.60	0.65	0.70	0.74	0.77	0.81	0.85	0.90	0.95	1.01	1.09	1.18	1.29	1.42	1.57	1.73	1.91	2.10	2.29	2.48
1117	0.08	0.15	0.22	0.31	0.38	0.45	0.50	0.56	0.60	0.64	0.67	0.70	0.73	0.75	0.79	0.83	0.89	0.96	1.05	1.16	1.29	1.45	1.63	1.82	2.03	2.25	2.48
1119	0.09	0.17	0.25	0.35	0.43	0.50	0.57	0.63	0.67	0.71	0.73	0.75	0.77	0.79	0.81	0.83	0.87	0.93	1.00	1.09	1.21	1.34	1.51	1.69	1.89	2.11	2.33
1121	0.12	0.21	0.31	0.44	0.55	0.64	0.72	0.79	0.85	0.90	0.93	0.95	0.97	0.98	0.99	1.00	1.03	1.07	1.13	1.22	1.33	1.46	1.63	1.82	2.04	2.27	2.52
1123	0.09	0.15	0.23	0.32	0.40	0.47	0.53	0.60	0.65	0.69	0.73	0.77	0.81	0.85	0.90	0.96	1.03	1.13	1.24	1.38	1.53	1.72	1.92	2.13	2.36	2.59	2.83
1125	0.11	0.19	0.28	0.40	0.50	0.58	0.66	0.73	0.79	0.84	0.88	0.92	0.95	0.98	1.01	1.05	1.10	1.16	1.25	1.35	1.47	1.61	1.78	1.96	2.16	2.38	2.59
1127	0.13	0.23	0.34	0.49	0.61	0.71	0.80	0.89	0.96	1.02	1.06	1.09	1.13	1.16	1.20	1.24	1.29	1.36	1.45	1.56	1.70	1.85	2.03	2.22	2.42	2.63	2.83
1129	0.12	0.20	0.30	0.43	0.54	0.63	0.72	0.81	0.88	0.95	1.00	1.05	1.09	1.13	1.17	1.21	1.26	1.31	1.38	1.45	1.54	1.64	1.75	1.88	2.02	2.16	2.31
1131	0.12	0.22	0.32	0.46	0.57	0.67	0.76	0.85	0.93	1.00	1.06	1.11	1.16	1.22	1.28	1.34	1.42	1.51	1.62	1.74	1.88	2.02	2.18	2.35	2.51	2.67	2.81
1133	0.09	0.16	0.24	0.34	0.42	0.49	0.56	0.62	0.67	0.71	0.74	0.77	0.80	0.83	0.86	0.91	0.96	1.03	1.11	1.21	1.33	1.46	1.60	1.76	1.92	2.08	2.23
1135	0.10	0.18	0.26	0.37	0.46	0.53	0.60	0.66	0.71	0.75	0.78	0.80	0.82	0.84	0.87	0.90	0.94	1.00	1.08	1.18	1.30	1.45	1.62	1.81	2.02	2.24	2.47
1137	0.09	0.15	0.22	0.32	0.40	0.47	0.53	0.59	0.65	0.69	0.72	0.75	0.77	0.80	0.81	0.84	0.87	0.90	0.95	1.02	1.10	1.21	1.34	1.50	1.68	1.89	2.12
1139	0.07	0.13	0.20	0.28	0.34	0.40	0.45	0.50	0.54	0.57	0.60	0.62	0.64	0.65	0.68	0.71	0.75	0.80	0.87	0.95	1.06	1.19	1.34	1.51	1.70	1.90	2.11
1141	0.11	0.19	0.28	0.40	0.50	0.58	0.65	0.72	0.78	0.83	0.86	0.89	0.92	0.94	0.97	1.01	1.05	1.12	1.20	1.30	1.43	1.59	1.77	1.97	2.20	2.44	2.70
1143	0.10	0.17	0.25	0.36	0.45	0.52	0.58	0.64	0.69	0.73	0.75	0.76	0.78	0.78	0.79	0.81	0.83	0.87	0.93	1.01	1.11	1.24	1.39	1.57	1.78	2.00	2.25
1145	0.09	0.16	0.24	0.34	0.42	0.48	0.54	0.60	0.65	0.68	0.71	0.73	0.75	0.77	0.80	0.84	0.89	0.96	1.05	1.17	1.31	1.48	1.68	1.91	2.16	2.43	2.70
1147	0.11	0.19	0.28	0.40	0.49	0.58	0.65	0.71	0.77	0.81	0.83	0.85	0.86	0.87	0.88	0.90	0.93	0.97	1.03	1.11	1.21	1.35	1.51	1.69	1.90	2.13	2.37
1149	0.10	0.18	0.27	0.38	0.47	0.54	0.61	0.68	0.73	0.77	0.80	0.82	0.84	0.86	0.88	0.91	0.96	1.02	1.10	1.20	1.32	1.48	1.65	1.86	2.08	2.32	2.56
1151	0.11	0.19	0.28	0.40	0.49	0.58	0.65	0.72	0.78	0.82	0.85	0.87	0.89	0.90	0.92	0.93	0.96	1.00	1.05	1.13	1.22	1.35	1.50	1.67	1.87	2.09	2.33
1153	0.09	0.17	0.25	0.35	0.44	0.51	0.58	0.64	0.69	0.73	0.76	0.79	0.81	0.83	0.86	0.89	0.93	0.98	1.05	1.15	1.26	1.40	1.56	1.75	1.96	2.18	2.42
1155	0.10	0.18	0.26	0.37	0.46	0.54	0.60	0.66	0.71	0.75	0.77	0.79	0.80	0.81	0.82	0.83	0.86	0.90	0.97	1.05	1.16	1.29	1.45	1.64	1.85	2.09	2.33
1157	0.10	0.18	0.26	0.38	0.47	0.54	0.61	0.68	0.73	0.77	0.79	0.81	0.83	0.84	0.85	0.86	0.88	0.92	0.97	1.04	1.13	1.26	1.40	1.58	1.78	2.00	2.24
1159	0.11	0.20	0.30	0.42	0.52	0.61	0.69	0.76	0.83	0.87	0.91	0.93	0.95	0.97	0.99	1.01	1.04	1.09	1.15	1.23	1.34	1.47	1.63	1.81	2.02	2.25	2.49
1161	0.09	0.15	0.23	0.32	0.40	0.47	0.53	0.59	0.65	0.69	0.72	0.75	0.78	0.81	0.84	0.88	0.92	0.98	1.06	1.15	1.27	1.40	1.55	1.73	1.92	2.13	2.34
1163	0.11	0.19	0.28	0.39	0.48	0.56	0.63	0.69	0.74	0.78	0.80	0.82	0.84	0.85	0.86	0.89	0.92	0.98	1.05	1.15	1.27	1.41	1.59	1.78	2.00	2.22	2.45
1165	0.09	0.16	0.23	0.33	0.42	0.49	0.55	0.62	0.67	0.71	0.74	0.77	0.80	0.82	0.84	0.87	0.91	0.96	1.03	1.11	1.21	1.33	1.48	1.65	1.83	2.04	2.26
1167	0.11	0.20	0.29	0.42	0.52	0.60	0.68	0.75	0.81	0.85	0.88	0.90	0.92	0.94	0.95	0.97	1.01	1.06	1.13	1.22	1.33	1.47	1.64	1.83	2.03	2.25	2.47
1169	0.10	0.18	0.27	0.38	0.47	0.55	0.62	0.69	0.74	0.79	0.82	0.85	0.87	0.89	0.91	0.94	0.98	1.03	1.10	1.19	1.30	1.44	1.60	1.78	1.98	2.19	2.41
1171	0.12	0.22	0.32	0.46	0.57	0.67	0.76	0.85	0.93	0.99	1.03	1.07	1.11	1.15	1.18	1.21	1.26	1.31	1.37	1.45	1.54	1.65	1.77	1.91	2.05	2.20	2.36
1173	0.08	0.15	0.22	0.31	0.39	0.45	0.51	0.56	0.61	0.64	0.67	0.70	0.73	0.75	0.79	0.83	0.89	0.97	1.06	1.18	1.32	1.48	1.67	1.88	2.10	2.34	2.58
1175	0.11	0.19	0.29	0.41	0.50	0.59	0.66	0.73	0.79	0.83	0.87	0.89	0.92	0.94	0.97	1.00	1.05	1.11	1.19	1.30	1.42	1.58	1.76	1.96	2.18	2.41	2.65
1177	0.11	0.19	0.29	0.41	0.51	0.59	0.67	0.74	0.80	0.85	0.89	0.92	0.94	0.97	0.99	1.02	1.06	1.12	1.19	1.28	1.39	1.53	1.69	1.87	2.06	2.27	2.48

Grain Size Data - ALE cont.

Depth	4.66	5.11	5.61	6.16	6.76	7.42	8.15	8.94	9.82	10.78	11.83	12.99	14.26	15.65	17.18	18.86	20.71	22.73	24.95	27.39	30.07	33.01	36.24
1107	2.76	2.98	3.18	3.37	3.53	3.66	3.76	3.81	3.81	3.75	3.61	3.43	3.23	3.01	2.76	2.45	2.08	1.69	1.36	1.12	1.00	0.97	0.98
1109	2.85	2.97	3.07	3.13	3.15	3.14	3.09	3.01	2.87	2.67	2.45	2.23	2.05	1.92	1.81	1.67	1.48	1.27	1.11	1.04	1.07	1.19	1.31
1111	2.67	2.84	2.99	3.12	3.24	3.33	3.40	3.43	3.43	3.38	3.28	3.14	2.97	2.79	2.58	2.31	2.00	1.67	1.38	1.19	1.10	1.10	1.15
1113	2.77	2.94	3.09	3.22	3.31	3.37	3.38	3.35	3.26	3.10	2.87	2.60	2.34	2.11	1.91	1.70	1.49	1.29	1.14	1.07	1.10	1.19	1.30
1115	2.66	2.84	3.00	3.14	3.26	3.36	3.42	3.45	3.44	3.39	3.27	3.12	2.93	2.72	2.49	2.23	1.95	1.68	1.45	1.30	1.25	1.27	1.32
1117	2.71	2.93	3.13	3.32	3.49	3.63	3.73	3.80	3.82	3.77	3.65	3.47	3.25	3.00	2.72	2.40	2.04	1.68	1.38	1.18	1.10	1.11	1.16
1119	2.56	2.78	2.98	3.17	3.33	3.46	3.56	3.61	3.61	3.54	3.41	3.22	3.00	2.76	2.50	2.20	1.87	1.54	1.27	1.08	1.00	1.00	1.04
1121	2.76	2.99	3.20	3.37	3.51	3.59	3.62	3.59	3.47	3.27	3.00	2.70	2.41	2.17	1.97	1.77	1.55	1.32	1.13	1.01	0.98	1.04	1.12
1123	3.05	3.26	3.44	3.60	3.73	3.82	3.87	3.87	3.81	3.69	3.51	3.27	3.00	2.72	2.42	2.10	1.76	1.43	1.15	0.98	0.91	0.92	0.97
1125	2.80	3.00	3.18	3.33	3.46	3.55	3.60	3.60	3.55	3.44	3.26	3.04	2.81	2.57	2.33	2.07	1.78	1.48	1.24	1.09	1.03	1.06	1.11
1127	3.01	3.18	3.31	3.39	3.43	3.43	3.38	3.27	3.09	2.83	2.53	2.23	1.99	1.82	1.69	1.57	1.40	1.21	1.05	0.96	0.97	1.06	1.17
1129	2.46	2.60	2.74	2.87	2.99	3.10	3.19	3.27	3.30	3.28	3.19	3.03	2.82	2.57	2.27	1.94	1.61	1.31	1.11	1.01	1.02	1.08	1.14
1131	2.94	3.05	3.14	3.20	3.24	3.26	3.27	3.25	3.20	3.11	2.97	2.79	2.58	2.35	2.08	1.77	1.43	1.12	0.91	0.81	0.84	0.93	1.02
1133	2.38	2.50	2.60	2.68	2.74	2.76	2.77	2.75	2.70	2.63	2.52	2.42	2.33	2.26	2.19	2.09	1.93	1.76	1.63	1.60	1.70	1.88	2.08
1135	2.69	2.90	3.10	3.27	3.42	3.53	3.61	3.65	3.64	3.57	3.44	3.27	3.07	2.86	2.62	2.34	2.01	1.67	1.38	1.19	1.11	1.13	1.19
1137	2.36	2.62	2.89	3.16	3.42	3.66	3.88	4.07	4.19	4.23	4.17	4.01	3.75	3.42	3.02	2.57	2.10	1.64	1.28	1.05	0.95	0.97	1.05
1139	2.32	2.53	2.73	2.92	3.09	3.24	3.35	3.43	3.45	3.41	3.30	3.13	2.91	2.67	2.39	2.09	1.76	1.45	1.21	1.09	1.11	1.25	1.46
1141	2.95	3.21	3.45	3.67	3.86	4.03	4.15	4.21	4.21	4.10	3.90	3.62	3.29	2.95	2.60	2.22	1.82	1.44	1.13	0.93	0.85	0.86	0.89
1143	2.50	2.76	3.02	3.27	3.51	3.73	3.93	4.10	4.22	4.27	4.25	4.15	3.99	3.78	3.49	3.12	2.66	2.16	1.70	1.34	1.12	1.02	0.97
1145	2.98	3.26	3.52	3.77	3.98	4.16	4.29	4.37	4.37	4.28	4.10	3.83	3.52	3.17	2.79	2.39	1.95	1.53	1.19	0.96	0.85	0.84	0.86
1147	2.62	2.87	3.11	3.33	3.52	3.69	3.82	3.90	3.91	3.84	3.68	3.45	3.18	2.90	2.59	2.26	1.90	1.54	1.25	1.06	0.99	1.00	1.06
1149	2.80	3.04	3.26	3.45	3.61	3.73	3.80	3.82	3.77	3.63	3.42	3.15	2.86	2.58	2.31	2.03	1.73	1.44	1.21	1.07	1.04	1.08	1.14
1151	2.58	2.83	3.07	3.31	3.53	3.73	3.90	4.03	4.11	4.12	4.05	3.91	3.72	3.49	3.20	2.86	2.45	2.01	1.62	1.30	1.10	0.99	0.92
1153	2.67	2.91	3.15	3.38	3.59	3.77	3.92	4.02	4.06	4.01	3.86	3.63	3.35	3.04	2.70	2.34	1.95	1.58	1.28	1.09	1.02	1.04	1.09
1155	2.58	2.83	3.08	3.31	3.51	3.68	3.82	3.92	3.95	3.91	3.79	3.60	3.37	3.10	2.80	2.46	2.08	1.69	1.35	1.11	0.98	0.95	0.98
1157	2.50	2.76	3.01	3.27	3.50	3.72	3.90	4.05	4.15	4.18	4.13	4.01	3.83	3.60	3.32	2.97	2.54	2.10	1.69	1.37	1.18	1.08	1.02
1159	2.74	2.98	3.22	3.44	3.63	3.78	3.90	3.95	3.93	3.82	3.61	3.34	3.05	2.75	2.46	2.16	1.86	1.56	1.33	1.18	1.12	1.12	1.14
1161	2.56	2.78	2.99	3.18	3.36	3.51	3.64	3.73	3.77	3.75	3.65	3.49	3.28	3.04	2.76	2.44	2.09	1.74	1.46	1.28	1.22	1.25	1.30
1163	2.68	2.89	3.09	3.27	3.42	3.53	3.62	3.66	3.66	3.59	3.47	3.30	3.11	2.90	2.65	2.35	1.99	1.60	1.26	1.04	0.93	0.94	0.99
1165	2.48	2.71	2.93	3.14	3.34	3.52	3.68	3.80	3.87	3.88	3.82	3.69	3.50	3.26	2.97	2.63	2.23	1.83	1.49	1.26	1.14	1.13	1.15
1167	2.69	2.89	3.07	3.22	3.34	3.43	3.48	3.49	3.44	3.34	3.18	3.00	2.82	2.65	2.47	2.25	1.99	1.70	1.46	1.31	1.27	1.30	1.36
1169	2.63	2.85	3.05	3.24	3.40	3.52	3.62	3.67	3.67	3.61	3.47	3.29	3.08	2.85	2.61	2.32	1.99	1.67	1.41	1.25	1.21	1.24	1.29
1171	2.51	2.65	2.79	2.92	3.03	3.14	3.23	3.31	3.36	3.36	3.29	3.17	3.00	2.79	2.54	2.23	1.89	1.58	1.35	1.25	1.26	1.34	1.40
1173	2.83	3.06	3.28	3.48	3.65	3.79	3.89	3.94	3.94	3.86	3.70	3.47	3.20	2.91	2.59	2.24	1.87	1.51	1.23	1.07	1.01	1.05	1.11
1175	2.88	3.11	3.32	3.51	3.66	3.78	3.86	3.88	3.84	3.72	3.52	3.27	3.00	2.74	2.48	2.19	1.87	1.55	1.28	1.11	1.05	1.07	1.11
1177	2.69	2.89	3.07	3.22	3.35	3.43	3.47	3.46	3.39	3.25	3.04	2.80	2.55	2.32	2.10	1.89	1.67	1.46	1.29	1.19	1.17	1.22	1.28

Grain Size Data - ALE cont.

Depth	39.78	43.67	47.94	52.63	57.77	63.42	69.62	76.43	83.90	92.10	101.10	110.99	121.84	133.75	146.82	161.18	176.94	194.23	213.22	234.07	256.95
1107	0.95	0.87	0.74	0.62	0.53	0.49	0.48	0.48	0.45	0.41	0.37	0.37	0.42	0.47	0.49	0.42	0.27	0.11	0.02	0.00	0.00
1109	1.39	1.40	1.34	1.29	1.25	1.25	1.25	1.21	1.10	0.94	0.77	0.65	0.58	0.55	0.50	0.39	0.23	0.09	0.02	0.00	0.00
1111	1.17	1.15	1.09	1.01	0.94	0.90	0.88	0.85	0.80	0.72	0.64	0.58	0.53	0.49	0.42	0.31	0.17	0.06	0.01	0.00	0.00
1113	1.38	1.39	1.34	1.26	1.19	1.13	1.08	1.01	0.92	0.80	0.69	0.62	0.59	0.56	0.51	0.40	0.24	0.10	0.02	0.00	0.00
1115	1.36	1.34	1.28	1.19	1.10	1.04	0.98	0.91	0.83	0.75	0.67	0.61	0.56	0.48	0.37	0.22	0.09	0.02	0.00	0.00	0.00
1117	1.20	1.19	1.12	1.02	0.93	0.86	0.80	0.75	0.69	0.61	0.55	0.51	0.49	0.47	0.41	0.30	0.17	0.06	0.01	0.00	0.00
1119	1.08	1.10	1.11	1.12	1.16	1.23	1.29	1.29	1.23	1.11	0.97	0.86	0.79	0.72	0.61	0.45	0.25	0.09	0.02	0.00	0.00
1121	1.19	1.21	1.19	1.15	1.14	1.14	1.15	1.13	1.04	0.90	0.75	0.64	0.60	0.60	0.60	0.54	0.38	0.19	0.05	0.01	0.00
1123	1.00	0.98	0.90	0.81	0.72	0.66	0.61	0.55	0.48	0.41	0.35	0.34	0.37	0.41	0.42	0.37	0.24	0.11	0.02	0.00	0.00
1125	1.13	1.09	1.00	0.92	0.86	0.84	0.83	0.81	0.72	0.59	0.47	0.39	0.39	0.44	0.48	0.46	0.33	0.16	0.04	0.01	0.00
1127	1.25	1.25	1.20	1.13	1.07	1.03	0.99	0.93	0.84	0.73	0.62	0.55	0.51	0.49	0.44	0.34	0.20	0.08	0.01	0.00	0.00
1129	1.16	1.13	1.10	1.09	1.12	1.19	1.23	1.19	1.07	0.88	0.71	0.61	0.59	0.60	0.58	0.48	0.29	0.12	0.02	0.00	0.00
1131	1.06	1.01	0.92	0.83	0.79	0.79	0.82	0.81	0.73	0.58	0.41	0.31	0.30	0.34	0.40	0.40	0.28	0.13	0.03	0.00	0.00
1133	2.22	2.23	2.12	1.94	1.75	1.58	1.46	1.35	1.22	1.07	0.92	0.80	0.71	0.63	0.53	0.38	0.21	0.08	0.01	0.00	0.00
1135	1.22	1.19	1.10	0.99	0.90	0.86	0.85	0.86	0.83	0.75	0.63	0.53	0.45	0.41	0.38	0.31	0.19	0.08	0.02	0.00	0.00
1137	1.12	1.14	1.10	1.02	0.94	0.87	0.83	0.79	0.75	0.69	0.62	0.55	0.49	0.43	0.36	0.25	0.14	0.05	0.01	0.00	0.00
1139	1.69	1.87	1.99	2.03	2.02	1.96	1.85	1.69	1.50	1.29	1.09	0.93	0.78	0.63	0.46	0.27	0.11	0.03	0.00	0.00	0.00
1141	0.90	0.83	0.70	0.55	0.41	0.33	0.28	0.27	0.26	0.26	0.26	0.26	0.26	0.25	0.21	0.14	0.06	0.02	0.00	0.00	0.00
1143	0.93	0.84	0.72	0.57	0.45	0.36	0.32	0.31	0.32	0.33	0.33	0.33	0.32	0.28	0.21	0.12	0.05	0.01	0.00	0.00	0.00
1145	0.86	0.80	0.68	0.54	0.43	0.36	0.32	0.31	0.31	0.30	0.30	0.30	0.29	0.28	0.23	0.14	0.06	0.01	0.00	0.00	0.00
1147	1.10	1.10	1.06	1.00	0.96	0.92	0.89	0.84	0.75	0.63	0.53	0.47	0.45	0.44	0.41	0.33	0.19	0.07	0.01	0.00	0.00
1149	1.18	1.17	1.10	1.02	0.95	0.90	0.86	0.81	0.72	0.61	0.51	0.45	0.44	0.47	0.49	0.44	0.32	0.16	0.05	0.01	0.00
1151	0.84	0.74	0.61	0.50	0.41	0.37	0.36	0.35	0.32	0.28	0.25	0.24	0.26	0.29	0.30	0.26	0.16	0.07	0.01	0.00	0.00
1153	1.11	1.08	1.00	0.90	0.82	0.76	0.72	0.68	0.63	0.56	0.49	0.44	0.40	0.36	0.29	0.18	0.08	0.02	0.00	0.00	0.00
1155	1.03	1.06	1.05	1.03	1.00	0.96	0.90	0.83	0.74	0.65	0.59	0.56	0.53	0.48	0.38	0.23	0.09	0.02	0.00	0.00	0.00
1157	0.96	0.85	0.71	0.56	0.45	0.39	0.36	0.35	0.34	0.30	0.27	0.26	0.28	0.31	0.31	0.27	0.17	0.07	0.01	0.00	0.00
1159	1.10	1.01	0.87	0.74	0.64	0.59	0.58	0.56	0.51	0.43	0.34	0.29	0.28	0.32	0.35	0.33	0.24	0.11	0.03	0.00	0.00
1161	1.31	1.26	1.15	1.02	0.92	0.85	0.81	0.78	0.74	0.67	0.59	0.52	0.48	0.44	0.37	0.27	0.15	0.05	0.01	0.00	0.00
1163	1.05	1.06	1.03	0.99	0.98	0.98	1.00	1.00	0.95	0.86	0.74	0.64	0.57	0.51	0.42	0.31	0.17	0.06	0.01	0.00	0.00
1165	1.17	1.14	1.06	0.96	0.89	0.84	0.82	0.80	0.75	0.67	0.57	0.48	0.42	0.37	0.31	0.23	0.12	0.04	0.01	0.00	0.00
1167	1.37	1.31	1.20	1.06	0.94	0.86	0.82	0.77	0.72	0.65	0.57	0.52	0.48	0.44	0.38	0.28	0.15	0.05	0.01	0.00	0.00
1169	1.31	1.24	1.13	1.00	0.91	0.85	0.83	0.79	0.71	0.60	0.48	0.40	0.37	0.38	0.37	0.31	0.19	0.08	0.02	0.00	0.00
1171	1.39	1.28	1.12	0.95	0.83	0.76	0.72	0.68	0.61	0.51	0.41	0.35	0.32	0.33	0.32	0.26	0.16	0.06	0.01	0.00	0.00
1173	1.15	1.13	1.05	0.96	0.89	0.84	0.80	0.76	0.70	0.61	0.53	0.47	0.43	0.40	0.34	0.24	0.12	0.04	0.01	0.00	0.00
1175	1.11	1.04	0.91	0.77	0.65	0.58	0.53	0.50	0.46	0.41	0.36	0.33	0.33	0.32	0.28	0.20	0.10	0.03	0.01	0.00	0.00
1177	1.31	1.30	1.25	1.19	1.16	1.15	1.15	1.11	1.03	0.91	0.78	0.67	0.58	0.51	0.41	0.28	0.15	0.05	0.01	0.00	0.00

Grain Size Data - ALE cont.

Depth	282.07	309.64	339.92	373.15	409.63	449.67	493.63	541.89	594.87	653.03	716.87	786.95	863.88	948.34
1107	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1109	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1111	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1113	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1117	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1119	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1121	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1123	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1127	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1129	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1131	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1133	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1135	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1137	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1139	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1141	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1143	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1145	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1147	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1149	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1151	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1153	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1155	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1157	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1159	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1161	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1163	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1165	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1167	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1169	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1171	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1173	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1175	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1177	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Grain Size Data - ALE cont.

Depth	Size fraction (microns)																									
	0.38	**0.41**	**0.45**	**0.50**	**0.54**	**0.60**	**0.66**	**0.72**	**0.79**	**0.87**	**0.95**	**1.05**	**1.15**	**1.26**	**1.38**	**1.52**	**1.67**	**1.83**	**2.01**	**2.21**	**2.42**	**2.66**	**2.92**	**3.21**	**3.52**	**3.86**	**4.24**
1179	0.09	0.16	0.24	0.34	0.42	0.50	0.56	0.62	0.68	0.72	0.75	0.77	0.80	0.82	0.85	0.88	0.92	0.97	1.04	1.12	1.23	1.35	1.50	1.67	1.86	2.07	2.29
1181	0.09	0.16	0.24	0.34	0.42	0.50	0.56	0.62	0.67	0.71	0.74	0.77	0.79	0.81	0.83	0.86	0.90	0.95	1.02	1.11	1.22	1.35	1.51	1.69	1.89	2.11	2.34
1183	0.08	0.15	0.22	0.31	0.39	0.45	0.51	0.56	0.61	0.64	0.66	0.68	0.70	0.72	0.74	0.77	0.81	0.86	0.93	1.01	1.11	1.23	1.36	1.50	1.66	1.82	1.98
1185	0.09	0.16	0.23	0.33	0.40	0.47	0.53	0.59	0.63	0.67	0.69	0.71	0.74	0.76	0.78	0.82	0.86	0.92	1.00	1.09	1.20	1.33	1.47	1.63	1.80	1.97	2.14
1187	0.08	0.15	0.22	0.31	0.39	0.45	0.51	0.56	0.61	0.65	0.67	0.70	0.72	0.75	0.77	0.80	0.84	0.90	0.96	1.04	1.13	1.23	1.35	1.48	1.62	1.76	1.90
1189	0.07	0.13	0.19	0.27	0.33	0.39	0.44	0.49	0.54	0.57	0.60	0.63	0.65	0.67	0.70	0.72	0.76	0.80	0.85	0.91	0.98	1.07	1.16	1.26	1.38	1.49	1.61
1191	0.10	0.18	0.27	0.38	0.48	0.56	0.63	0.70	0.76	0.80	0.83	0.86	0.89	0.92	0.95	0.98	1.03	1.08	1.16	1.25	1.37	1.50	1.65	1.82	2.00	2.19	2.38
1193	0.08	0.15	0.22	0.31	0.38	0.44	0.50	0.55	0.58	0.61	0.63	0.64	0.65	0.66	0.67	0.69	0.73	0.77	0.84	0.93	1.04	1.17	1.33	1.51	1.71	1.93	2.16
1195	0.09	0.16	0.23	0.32	0.40	0.47	0.53	0.58	0.62	0.66	0.68	0.69	0.71	0.72	0.74	0.76	0.79	0.83	0.89	0.96	1.05	1.16	1.29	1.44	1.59	1.76	1.94
1197	0.09	0.15	0.23	0.32	0.40	0.47	0.53	0.59	0.65	0.69	0.72	0.75	0.78	0.81	0.84	0.88	0.93	0.98	1.05	1.13	1.22	1.32	1.43	1.54	1.66	1.78	1.89
1199	0.08	0.14	0.21	0.29	0.37	0.43	0.48	0.53	0.58	0.61	0.64	0.66	0.69	0.71	0.74	0.77	0.81	0.86	0.93	1.01	1.11	1.22	1.35	1.49	1.64	1.79	1.95
1201	0.09	0.16	0.23	0.33	0.41	0.47	0.53	0.59	0.63	0.66	0.69	0.71	0.72	0.74	0.76	0.78	0.81	0.86	0.93	1.01	1.12	1.24	1.39	1.55	1.73	1.93	2.13
1203	0.07	0.13	0.19	0.26	0.33	0.38	0.43	0.48	0.52	0.55	0.58	0.60	0.62	0.64	0.65	0.68	0.71	0.74	0.79	0.85	0.92	1.00	1.10	1.21	1.33	1.46	1.60
1205	0.08	0.14	0.21	0.30	0.37	0.43	0.49	0.54	0.59	0.63	0.65	0.68	0.71	0.73	0.75	0.78	0.82	0.87	0.92	0.99	1.07	1.16	1.26	1.37	1.48	1.60	1.71
1207	0.09	0.16	0.24	0.34	0.42	0.49	0.55	0.60	0.64	0.67	0.69	0.71	0.72	0.73	0.74	0.76	0.79	0.84	0.91	0.99	1.10	1.24	1.40	1.59	1.80	2.02	2.25
1209	0.10	0.18	0.27	0.38	0.47	0.55	0.62	0.68	0.73	0.76	0.78	0.80	0.82	0.83	0.84	0.87	0.90	0.95	1.02	1.11	1.23	1.36	1.52	1.69	1.88	2.08	2.27
1211	0.09	0.17	0.24	0.35	0.43	0.50	0.56	0.62	0.67	0.71	0.74	0.76	0.79	0.82	0.85	0.89	0.94	1.01	1.10	1.20	1.33	1.48	1.65	1.84	2.04	2.24	2.44
1213	0.08	0.15	0.22	0.31	0.38	0.44	0.49	0.54	0.58	0.61	0.63	0.64	0.66	0.67	0.68	0.71	0.74	0.79	0.85	0.93	1.03	1.14	1.27	1.41	1.56	1.71	1.86
1215	0.08	0.15	0.22	0.31	0.39	0.46	0.52	0.58	0.63	0.66	0.69	0.72	0.74	0.76	0.78	0.80	0.83	0.88	0.94	1.01	1.11	1.23	1.37	1.54	1.73	1.94	2.16
1217	0.08	0.14	0.21	0.30	0.37	0.43	0.48	0.54	0.58	0.62	0.64	0.67	0.69	0.72	0.74	0.77	0.82	0.87	0.93	1.00	1.09	1.19	1.30	1.42	1.55	1.68	1.80
1219	0.09	0.16	0.24	0.34	0.42	0.49	0.55	0.61	0.65	0.68	0.70	0.71	0.72	0.73	0.74	0.76	0.79	0.84	0.90	0.99	1.10	1.23	1.39	1.57	1.77	1.98	2.20
1221	0.08	0.15	0.22	0.31	0.39	0.46	0.52	0.58	0.64	0.68	0.72	0.76	0.80	0.83	0.87	0.92	0.97	1.03	1.09	1.17	1.25	1.34	1.44	1.54	1.65	1.75	1.84
1223	0.09	0.17	0.25	0.35	0.43	0.50	0.57	0.62	0.67	0.71	0.73	0.75	0.76	0.78	0.79	0.82	0.85	0.89	0.95	1.03	1.13	1.24	1.37	1.51	1.66	1.82	1.98
1225	0.09	0.15	0.23	0.32	0.40	0.46	0.52	0.57	0.61	0.64	0.65	0.66	0.67	0.68	0.69	0.70	0.72	0.76	0.82	0.90	0.99	1.11	1.26	1.43	1.62	1.82	2.04
1227	0.07	0.13	0.19	0.28	0.34	0.40	0.45	0.50	0.54	0.56	0.59	0.60	0.62	0.63	0.65	0.67	0.70	0.74	0.78	0.85	0.92	1.01	1.12	1.23	1.35	1.48	1.61
1229	0.08	0.15	0.22	0.31	0.39	0.46	0.52	0.57	0.62	0.66	0.69	0.72	0.75	0.78	0.81	0.84	0.89	0.94	1.01	1.08	1.17	1.27	1.38	1.49	1.61	1.72	1.83
1231	0.09	0.15	0.22	0.32	0.39	0.46	0.52	0.57	0.62	0.65	0.68	0.71	0.73	0.76	0.79	0.83	0.88	0.94	1.02	1.11	1.22	1.34	1.48	1.63	1.78	1.94	2.09
1233	0.10	0.17	0.25	0.36	0.44	0.52	0.58	0.65	0.70	0.73	0.76	0.78	0.80	0.81	0.83	0.84	0.87	0.92	0.97	1.04	1.14	1.25	1.38	1.54	1.71	1.89	2.09
1235	0.09	0.16	0.24	0.33	0.41	0.48	0.54	0.60	0.64	0.67	0.69	0.70	0.71	0.72	0.72	0.74	0.76	0.80	0.85	0.92	1.01	1.13	1.27	1.43	1.62	1.83	2.05
1237	0.08	0.14	0.21	0.30	0.38	0.44	0.50	0.56	0.61	0.65	0.68	0.70	0.71	0.72	0.73	0.74	0.75	0.77	0.80	0.84	0.90	0.98	1.08	1.21	1.36	1.54	1.75
1239	0.08	0.14	0.21	0.29	0.36	0.43	0.48	0.54	0.58	0.62	0.65	0.67	0.69	0.71	0.73	0.75	0.78	0.82	0.88	0.95	1.03	1.14	1.28	1.43	1.61	1.81	2.03
1241	0.07	0.13	0.20	0.28	0.35	0.41	0.46	0.51	0.56	0.59	0.62	0.65	0.67	0.69	0.71	0.73	0.76	0.81	0.86	0.92	1.01	1.11	1.24	1.39	1.56	1.75	1.96
1243	0.09	0.16	0.23	0.33	0.41	0.48	0.54	0.60	0.65	0.69	0.73	0.76	0.78	0.81	0.84	0.88	0.92	0.99	1.06	1.16	1.28	1.42	1.58	1.77	1.98	2.20	2.43
1245	0.08	0.15	0.22	0.31	0.39	0.46	0.52	0.58	0.62	0.66	0.69	0.71	0.73	0.74	0.75	0.76	0.78	0.81	0.84	0.89	0.96	1.04	1.15	1.27	1.43	1.60	1.80
1247	0.08	0.14	0.21	0.29	0.37	0.43	0.49	0.55	0.59	0.63	0.66	0.69	0.71	0.72	0.74	0.75	0.77	0.80	0.84	0.89	0.96	1.05	1.17	1.30	1.47	1.66	1.87
1249	0.08	0.15	0.22	0.31	0.39	0.45	0.51	0.57	0.61	0.65	0.67	0.69	0.71	0.73	0.75	0.77	0.80	0.85	0.90	0.98	1.06	1.17	1.29	1.44	1.59	1.76	1.93

Grain Size Data - ALE cont.

Depth	4.66	5.11	5.61	6.16	6.76	7.42	8.15	8.94	9.82	10.78	11.83	12.99	14.26	15.65	17.18	18.86	20.71	22.73	24.95	27.39	30.07	33.01	36.24
1179	2.52	2.75	2.98	3.21	3.43	3.63	3.81	3.95	4.06	4.10	4.06	3.93	3.73	3.46	3.11	2.70	2.25	1.81	1.45	1.21	1.10	1.10	1.13
1181	2.58	2.82	3.06	3.29	3.50	3.69	3.84	3.95	4.01	3.99	3.88	3.71	3.46	3.18	2.85	2.50	2.13	1.78	1.49	1.29	1.21	1.20	1.22
1183	2.13	2.27	2.40	2.51	2.61	2.68	2.73	2.77	2.78	2.76	2.72	2.67	2.62	2.58	2.53	2.44	2.30	2.13	1.98	1.92	1.97	2.12	2.31
1185	2.30	2.45	2.58	2.70	2.79	2.87	2.92	2.95	2.96	2.94	2.88	2.82	2.76	2.70	2.63	2.51	2.33	2.12	1.94	1.85	1.88	2.00	2.16
1187	2.03	2.16	2.28	2.38	2.47	2.55	2.62	2.68	2.72	2.74	2.74	2.73	2.72	2.71	2.68	2.60	2.46	2.27	2.12	2.04	2.08	2.23	2.41
1189	1.73	1.85	1.97	2.08	2.18	2.27	2.36	2.44	2.52	2.57	2.61	2.63	2.64	2.64	2.61	2.54	2.42	2.27	2.14	2.09	2.13	2.27	2.46
1191	2.57	2.76	2.93	3.09	3.23	3.35	3.45	3.53	3.58	3.59	3.55	3.47	3.37	3.23	3.05	2.78	2.44	2.04	1.67	1.39	1.22	1.14	1.12
1193	2.39	2.62	2.85	3.06	3.26	3.43	3.58	3.70	3.78	3.80	3.75	3.66	3.51	3.33	3.10	2.81	2.46	2.08	1.75	1.53	1.44	1.45	1.53
1195	2.11	2.28	2.44	2.59	2.72	2.83	2.92	2.98	3.02	3.02	2.97	2.90	2.82	2.72	2.60	2.43	2.20	1.95	1.73	1.61	1.63	1.75	1.93
1197	1.99	2.09	2.16	2.22	2.27	2.30	2.32	2.34	2.35	2.34	2.32	2.31	2.31	2.32	2.32	2.27	2.16	2.02	1.91	1.90	2.01	2.21	2.45
1199	2.10	2.24	2.37	2.48	2.58	2.66	2.72	2.75	2.76	2.74	2.68	2.60	2.52	2.43	2.32	2.19	2.02	1.85	1.72	1.67	1.73	1.89	2.08
1201	2.33	2.53	2.72	2.90	3.07	3.21	3.35	3.45	3.53	3.56	3.54	3.47	3.36	3.22	3.02	2.74	2.39	2.01	1.68	1.46	1.39	1.43	1.54
1203	1.74	1.88	2.02	2.16	2.29	2.41	2.53	2.63	2.73	2.80	2.85	2.87	2.88	2.87	2.83	2.75	2.62	2.46	2.32	2.24	2.26	2.35	2.48
1205	1.82	1.92	2.02	2.10	2.17	2.23	2.28	2.32	2.36	2.38	2.39	2.39	2.40	2.42	2.41	2.36	2.26	2.12	2.01	1.99	2.08	2.27	2.51
1207	2.49	2.73	2.96	3.17	3.36	3.52	3.66	3.75	3.79	3.77	3.69	3.54	3.35	3.13	2.88	2.57	2.21	1.84	1.54	1.34	1.28	1.32	1.43
1209	2.47	2.64	2.80	2.94	3.04	3.12	3.16	3.18	3.15	3.08	2.97	2.84	2.72	2.62	2.51	2.36	2.15	1.91	1.70	1.59	1.59	1.70	1.85
1211	2.63	2.81	2.97	3.10	3.19	3.25	3.28	3.27	3.22	3.11	2.95	2.78	2.63	2.50	2.37	2.21	2.00	1.78	1.59	1.49	1.51	1.61	1.72
1213	2.00	2.13	2.25	2.34	2.42	2.48	2.52	2.54	2.55	2.54	2.50	2.47	2.45	2.45	2.43	2.37	2.24	2.07	1.93	1.89	1.97	2.16	2.40
1215	2.40	2.64	2.89	3.13	3.36	3.57	3.77	3.93	4.06	4.13	4.12	4.05	3.90	3.69	3.40	3.01	2.55	2.05	1.60	1.27	1.07	0.99	0.98
1217	1.92	2.02	2.12	2.20	2.27	2.33	2.38	2.42	2.45	2.46	2.45	2.45	2.45	2.46	2.45	2.40	2.29	2.15	2.03	2.00	2.09	2.27	2.49
1219	2.42	2.64	2.85	3.03	3.20	3.34	3.45	3.52	3.56	3.53	3.45	3.32	3.17	2.99	2.78	2.50	2.17	1.82	1.52	1.32	1.26	1.31	1.40
1221	1.93	2.01	2.07	2.13	2.18	2.21	2.25	2.28	2.31	2.33	2.34	2.35	2.38	2.41	2.42	2.39	2.30	2.19	2.10	2.10	2.21	2.40	2.61
1223	2.13	2.27	2.40	2.50	2.58	2.64	2.68	2.70	2.69	2.65	2.59	2.53	2.49	2.46	2.43	2.36	2.21	2.04	1.89	1.83	1.90	2.06	2.27
1225	2.26	2.47	2.68	2.87	3.04	3.19	3.31	3.39	3.43	3.40	3.31	3.17	3.01	2.83	2.62	2.36	2.06	1.75	1.50	1.36	1.36	1.48	1.66
1227	1.74	1.86	1.97	2.07	2.16	2.23	2.30	2.35	2.39	2.41	2.40	2.39	2.39	2.39	2.37	2.31	2.19	2.05	1.92	1.89	1.96	2.14	2.38
1229	1.94	2.03	2.11	2.17	2.23	2.27	2.31	2.34	2.37	2.39	2.39	2.40	2.42	2.45	2.46	2.41	2.30	2.14	2.02	1.98	2.06	2.24	2.46
1231	2.22	2.34	2.45	2.52	2.58	2.61	2.62	2.62	2.58	2.53	2.45	2.38	2.33	2.30	2.28	2.22	2.11	1.98	1.89	1.89	2.00	2.19	2.41
1233	2.29	2.49	2.68	2.87	3.05	3.22	3.37	3.51	3.62	3.69	3.71	3.69	3.62	3.50	3.30	3.00	2.61	2.16	1.75	1.44	1.26	1.20	1.19
1235	2.28	2.52	2.75	2.99	3.22	3.43	3.63	3.82	3.97	4.09	4.15	4.15	4.09	3.97	3.76	3.44	3.00	2.49	1.99	1.57	1.27	1.09	1.00
1237	1.99	2.25	2.52	2.81	3.11	3.41	3.71	4.00	4.26	4.48	4.62	4.67	4.62	4.46	4.18	3.76	3.23	2.64	2.07	1.61	1.28	1.08	0.98
1239	2.26	2.51	2.77	3.03	3.29	3.55	3.79	4.02	4.21	4.35	4.42	4.40	4.29	4.09	3.79	3.38	2.87	2.32	1.82	1.43	1.18	1.06	1.01
1241	2.19	2.44	2.70	2.97	3.24	3.51	3.77	4.03	4.25	4.43	4.54	4.57	4.51	4.35	4.07	3.66	3.13	2.54	1.98	1.53	1.22	1.04	0.94
1243	2.67	2.91	3.14	3.36	3.56	3.74	3.90	4.01	4.07	4.06	3.97	3.80	3.58	3.31	2.98	2.60	2.17	1.74	1.37	1.13	1.01	0.99	1.01
1245	2.02	2.26	2.52	2.79	3.07	3.35	3.63	3.91	4.17	4.38	4.53	4.60	4.59	4.47	4.23	3.85	3.34	2.74	2.15	1.65	1.29	1.07	0.94
1247	2.10	2.35	2.62	2.90	3.17	3.45	3.71	3.96	4.17	4.32	4.39	4.37	4.27	4.06	3.75	3.33	2.80	2.24	1.72	1.31	1.05	0.93	0.89
1249	2.11	2.28	2.45	2.60	2.74	2.86	2.96	3.04	3.07	3.07	3.01	2.92	2.81	2.68	2.53	2.33	2.09	1.83	1.61	1.50	1.52	1.65	1.84

Grain Size Data - ALE cont.

Depth	39.78	43.67	47.94	52.63	57.77	63.42	69.62	76.43	83.90	92.10	101.10	110.99	121.84	133.75	146.82	161.18	176.94	194.23	213.22	234.07	256.95
1179	1.14	1.09	0.99	0.85	0.73	0.64	0.58	0.53	0.47	0.40	0.34	0.30	0.29	0.29	0.27	0.22	0.13	0.05	0.01	0.00	0.00
1181	1.23	1.19	1.09	0.96	0.84	0.73	0.64	0.56	0.47	0.39	0.32	0.29	0.29	0.32	0.32	0.27	0.17	0.07	0.01	0.00	0.00
1183	2.46	2.50	2.41	2.21	1.93	1.63	1.35	1.10	0.90	0.75	0.67	0.65	0.67	0.68	0.64	0.52	0.32	0.13	0.03	0.00	0.00
1185	2.28	2.27	2.14	1.90	1.61	1.32	1.07	0.86	0.70	0.60	0.54	0.53	0.54	0.53	0.47	0.34	0.18	0.06	0.01	0.00	0.00
1187	2.55	2.59	2.48	2.25	1.93	1.59	1.28	1.01	0.80	0.67	0.60	0.60	0.62	0.63	0.58	0.44	0.26	0.10	0.02	0.00	0.00
1189	2.62	2.71	2.69	2.57	2.36	2.11	1.83	1.54	1.27	1.04	0.89	0.83	0.86	0.91	0.92	0.80	0.57	0.29	0.10	0.02	0.00
1191	1.08	0.99	0.85	0.69	0.57	0.50	0.48	0.48	0.48	0.45	0.41	0.39	0.41	0.46	0.49	0.45	0.33	0.17	0.05	0.01	0.00
1193	1.59	1.59	1.49	1.32	1.12	0.93	0.78	0.65	0.55	0.48	0.43	0.42	0.44	0.44	0.41	0.32	0.18	0.07	0.01	0.00	0.00
1195	2.09	2.15	2.09	1.93	1.71	1.49	1.29	1.12	0.97	0.85	0.76	0.74	0.78	0.86	0.91	0.85	0.67	0.39	0.15	0.03	0.00
1197	2.65	2.73	2.67	2.51	2.27	2.00	1.72	1.46	1.22	1.03	0.90	0.85	0.84	0.80	0.70	0.51	0.28	0.10	0.02	0.00	0.00
1199	2.23	2.31	2.28	2.17	2.02	1.85	1.69	1.52	1.34	1.15	0.99	0.88	0.84	0.85	0.85	0.77	0.59	0.33	0.12	0.02	0.00
1201	1.63	1.64	1.53	1.34	1.13	0.95	0.82	0.74	0.69	0.65	0.61	0.59	0.58	0.58	0.54	0.44	0.27	0.11	0.02	0.00	0.00
1203	2.58	2.59	2.49	2.30	2.04	1.75	1.48	1.23	1.02	0.86	0.78	0.78	0.84	0.90	0.91	0.78	0.54	0.27	0.09	0.01	0.00
1205	2.73	2.84	2.83	2.68	2.44	2.12	1.78	1.45	1.16	0.95	0.84	0.84	0.92	1.01	1.02	0.87	0.59	0.29	0.09	0.01	0.00
1207	1.52	1.55	1.48	1.34	1.16	0.97	0.79	0.64	0.52	0.45	0.42	0.43	0.46	0.47	0.43	0.32	0.18	0.06	0.01	0.00	0.00
1209	1.95	1.95	1.83	1.60	1.34	1.08	0.86	0.70	0.59	0.54	0.53	0.57	0.62	0.63	0.58	0.45	0.26	0.10	0.02	0.00	0.00
1211	1.79	1.75	1.61	1.41	1.19	1.01	0.88	0.78	0.69	0.62	0.56	0.55	0.57	0.59	0.58	0.49	0.32	0.15	0.04	0.01	0.00
1213	2.60	2.70	2.66	2.48	2.22	1.91	1.61	1.34	1.11	0.94	0.85	0.82	0.86	0.92	0.91	0.81	0.59	0.32	0.12	0.02	0.00
1215	0.99	0.98	0.92	0.85	0.77	0.71	0.66	0.61	0.55	0.50	0.45	0.43	0.43	0.43	0.39	0.30	0.17	0.06	0.01	0.00	0.00
1217	2.67	2.75	2.70	2.54	2.29	2.00	1.71	1.44	1.20	1.02	0.90	0.86	0.86	0.86	0.79	0.63	0.38	0.16	0.04	0.00	0.00
1219	1.48	1.49	1.43	1.32	1.19	1.08	0.99	0.91	0.83	0.76	0.70	0.68	0.70	0.71	0.68	0.56	0.36	0.16	0.04	0.00	0.00
1221	2.77	2.80	2.68	2.45	2.14	1.81	1.50	1.24	1.03	0.87	0.78	0.75	0.76	0.77	0.71	0.56	0.33	0.13	0.02	0.00	0.00
1223	2.42	2.47	2.37	2.17	1.92	1.65	1.40	1.19	1.00	0.83	0.69	0.61	0.60	0.63	0.66	0.63	0.51	0.32	0.15	0.04	0.01
1225	1.83	1.94	1.95	1.89	1.79	1.66	1.51	1.35	1.17	1.00	0.87	0.77	0.70	0.61	0.48	0.30	0.13	0.03	0.00	0.00	0.00
1227	2.60	2.75	2.79	2.73	2.60	2.42	2.21	1.97	1.70	1.44	1.21	1.06	1.00	1.01	1.00	0.92	0.71	0.41	0.16	0.03	0.00
1229	2.65	2.73	2.67	2.49	2.22	1.92	1.62	1.35	1.11	0.93	0.82	0.78	0.80	0.83	0.81	0.68	0.45	0.21	0.06	0.01	0.00
1231	2.55	2.58	2.47	2.26	2.00	1.74	1.48	1.25	1.04	0.87	0.75	0.69	0.69	0.68	0.63	0.49	0.29	0.11	0.02	0.00	0.00
1233	1.19	1.15	1.06	0.96	0.87	0.82	0.80	0.78	0.73	0.67	0.60	0.57	0.56	0.56	0.53	0.42	0.25	0.10	0.02	0.00	0.00
1235	0.93	0.86	0.78	0.71	0.65	0.62	0.60	0.58	0.54	0.50	0.47	0.45	0.44	0.41	0.34	0.22	0.10	0.03	0.00	0.00	0.00
1237	0.91	0.83	0.74	0.64	0.56	0.52	0.50	0.48	0.45	0.40	0.35	0.32	0.32	0.33	0.31	0.25	0.15	0.06	0.01	0.00	0.00
1239	0.98	0.93	0.85	0.75	0.65	0.59	0.54	0.51	0.47	0.42	0.37	0.33	0.31	0.28	0.24	0.16	0.08	0.02	0.00	0.00	0.00
1241	0.87	0.79	0.68	0.57	0.49	0.45	0.43	0.42	0.39	0.36	0.32	0.30	0.31	0.31	0.29	0.22	0.12	0.04	0.01	0.00	0.00
1243	1.02	0.97	0.88	0.77	0.69	0.63	0.60	0.56	0.50	0.43	0.36	0.32	0.32	0.33	0.31	0.24	0.13	0.05	0.01	0.00	0.00
1245	0.84	0.75	0.65	0.55	0.47	0.42	0.41	0.40	0.39	0.36	0.33	0.32	0.34	0.36	0.35	0.29	0.17	0.07	0.01	0.00	0.00
1247	0.89	0.88	0.85	0.82	0.80	0.80	0.81	0.80	0.76	0.70	0.62	0.56	0.52	0.48	0.42	0.32	0.18	0.07	0.01	0.00	0.00
1249	2.01	2.12	2.13	2.06	1.94	1.78	1.60	1.41	1.22	1.06	0.94	0.89	0.86	0.82	0.71	0.52	0.28	0.10	0.02	0.00	0.00

Grain Size Data - ALE cont.

Depth	282.07	309.64	339.92	373.15	409.63	449.67	493.63	541.89	594.87	653.03	716.87	786.95	863.88	948.34
1179	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1181	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1183	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1185	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1187	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1189	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1191	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1193	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1195	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1197	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1199	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1201	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1203	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1205	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1207	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1209	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1211	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1213	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1215	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1217	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1219	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1221	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1223	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1225	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1227	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1229	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1231	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1233	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1235	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1237	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1239	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1241	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1243	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1245	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1247	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1249	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Grain Size Data - ALE cont.

Depth	Size fraction (microns)																									
	0.38	0.41	0.45	0.50	0.54	0.60	0.66	0.72	0.79	0.87	0.95	1.05	1.15	1.26	1.38	1.52	1.67	1.83	2.01	2.21	2.42	2.66	2.92	3.21	3.52	3.86	4.24
1251	0.09	0.16	0.23	0.33	0.41	0.47	0.53	0.59	0.64	0.67	0.70	0.72	0.74	0.76	0.78	0.81	0.85	0.90	0.97	1.05	1.15	1.28	1.42	1.58	1.76	1.95	2.15
1253	0.08	0.14	0.21	0.30	0.37	0.43	0.49	0.54	0.58	0.61	0.64	0.65	0.67	0.69	0.71	0.74	0.77	0.82	0.88	0.96	1.05	1.16	1.29	1.42	1.57	1.73	1.88
1255	0.08	0.14	0.21	0.30	0.37	0.43	0.49	0.54	0.58	0.61	0.63	0.65	0.66	0.67	0.68	0.69	0.71	0.74	0.79	0.85	0.93	1.03	1.16	1.31	1.48	1.68	1.91
1257	0.09	0.17	0.25	0.35	0.44	0.51	0.58	0.64	0.69	0.73	0.75	0.77	0.79	0.80	0.82	0.83	0.86	0.89	0.94	1.01	1.11	1.22	1.37	1.54	1.74	1.96	2.21
1259	0.08	0.14	0.21	0.29	0.37	0.43	0.48	0.53	0.57	0.60	0.62	0.63	0.64	0.64	0.65	0.65	0.67	0.70	0.74	0.80	0.88	0.99	1.12	1.28	1.46	1.67	1.91
1261	0.08	0.14	0.21	0.30	0.37	0.43	0.49	0.54	0.57	0.60	0.62	0.64	0.65	0.67	0.68	0.71	0.75	0.80	0.87	0.96	1.07	1.21	1.37	1.56	1.76	1.99	2.23
1263	0.10	0.17	0.25	0.36	0.45	0.53	0.60	0.67	0.72	0.77	0.80	0.83	0.86	0.88	0.90	0.92	0.96	1.00	1.06	1.13	1.22	1.33	1.46	1.62	1.79	1.99	2.20
1265	0.08	0.14	0.20	0.29	0.36	0.41	0.46	0.51	0.55	0.57	0.59	0.60	0.60	0.61	0.62	0.63	0.66	0.70	0.75	0.82	0.91	1.03	1.17	1.33	1.51	1.71	1.92
1267	0.09	0.16	0.23	0.33	0.41	0.48	0.53	0.59	0.63	0.66	0.69	0.71	0.73	0.74	0.77	0.80	0.85	0.91	0.99	1.09	1.21	1.34	1.50	1.67	1.85	2.04	2.23
1269	0.09	0.16	0.23	0.33	0.41	0.48	0.54	0.59	0.64	0.67	0.69	0.71	0.72	0.73	0.75	0.77	0.79	0.83	0.89	0.96	1.06	1.17	1.31	1.46	1.64	1.83	2.02
1271	0.10	0.17	0.25	0.36	0.44	0.51	0.58	0.63	0.68	0.71	0.73	0.74	0.76	0.76	0.78	0.79	0.83	0.87	0.94	1.02	1.14	1.28	1.44	1.63	1.84	2.06	2.30
1273	0.08	0.14	0.21	0.30	0.37	0.43	0.48	0.52	0.56	0.58	0.60	0.60	0.61	0.61	0.62	0.63	0.65	0.69	0.74	0.82	0.91	1.04	1.19	1.36	1.56	1.78	2.01
1275	0.09	0.16	0.24	0.34	0.43	0.50	0.56	0.62	0.67	0.70	0.73	0.76	0.78	0.80	0.83	0.86	0.91	0.98	1.06	1.16	1.29	1.44	1.62	1.81	2.02	2.25	2.48
1277	0.06	0.11	0.16	0.23	0.28	0.33	0.37	0.42	0.45	0.48	0.50	0.52	0.54	0.56	0.58	0.60	0.64	0.68	0.73	0.79	0.86	0.95	1.05	1.16	1.29	1.43	1.58
1279	0.07	0.13	0.18	0.26	0.33	0.38	0.43	0.48	0.52	0.55	0.58	0.61	0.63	0.66	0.68	0.72	0.76	0.82	0.88	0.96	1.06	1.17	1.30	1.44	1.59	1.74	1.90
1281	0.07	0.13	0.20	0.28	0.35	0.41	0.46	0.51	0.55	0.58	0.60	0.62	0.64	0.66	0.67	0.69	0.73	0.77	0.82	0.88	0.97	1.07	1.18	1.31	1.46	1.61	1.78
1283	0.06	0.12	0.17	0.24	0.30	0.35	0.40	0.44	0.48	0.51	0.54	0.56	0.58	0.60	0.62	0.65	0.69	0.73	0.79	0.86	0.94	1.04	1.15	1.27	1.40	1.54	1.68
1285	0.08	0.15	0.22	0.31	0.39	0.45	0.51	0.56	0.61	0.64	0.66	0.67	0.69	0.70	0.71	0.72	0.74	0.78	0.83	0.90	0.98	1.09	1.22	1.37	1.55	1.74	1.94
1287	0.07	0.12	0.17	0.25	0.31	0.36	0.40	0.45	0.48	0.51	0.53	0.55	0.56	0.58	0.59	0.62	0.65	0.69	0.74	0.81	0.89	0.99	1.11	1.24	1.38	1.54	1.71
1289	0.07	0.12	0.17	0.25	0.31	0.36	0.40	0.45	0.48	0.51	0.54	0.56	0.57	0.59	0.61	0.63	0.66	0.70	0.75	0.82	0.89	0.98	1.09	1.21	1.34	1.48	1.62
1291	0.07	0.12	0.18	0.25	0.31	0.36	0.41	0.46	0.50	0.53	0.56	0.58	0.61	0.63	0.66	0.69	0.73	0.77	0.83	0.90	0.98	1.08	1.18	1.30	1.43	1.57	1.71
1293	0.07	0.12	0.18	0.25	0.31	0.37	0.42	0.46	0.50	0.54	0.56	0.59	0.61	0.64	0.66	0.69	0.73	0.77	0.82	0.89	0.97	1.06	1.16	1.27	1.39	1.52	1.65
1295	0.08	0.13	0.20	0.28	0.35	0.40	0.45	0.50	0.54	0.57	0.59	0.61	0.63	0.64	0.66	0.68	0.72	0.77	0.83	0.90	1.00	1.11	1.24	1.39	1.55	1.73	1.91
1297	0.08	0.14	0.21	0.29	0.36	0.42	0.48	0.53	0.57	0.60	0.62	0.64	0.66	0.68	0.69	0.71	0.74	0.78	0.83	0.90	0.98	1.08	1.19	1.32	1.47	1.62	1.78
1299	0.07	0.12	0.17	0.24	0.30	0.35	0.40	0.44	0.48	0.50	0.52	0.54	0.56	0.57	0.59	0.61	0.64	0.68	0.73	0.79	0.87	0.96	1.07	1.19	1.32	1.46	1.61
1301	0.06	0.11	0.16	0.22	0.27	0.32	0.36	0.40	0.44	0.46	0.48	0.50	0.51	0.53	0.54	0.56	0.59	0.62	0.66	0.72	0.78	0.86	0.96	1.07	1.20	1.34	1.49
1303	0.06	0.11	0.17	0.24	0.30	0.35	0.39	0.43	0.47	0.50	0.52	0.54	0.56	0.58	0.59	0.62	0.65	0.69	0.74	0.81	0.89	0.98	1.09	1.21	1.35	1.49	1.65
1305	0.06	0.11	0.17	0.24	0.30	0.35	0.39	0.43	0.47	0.50	0.52	0.53	0.55	0.56	0.58	0.60	0.63	0.67	0.72	0.78	0.86	0.96	1.06	1.19	1.33	1.47	1.63
1307	0.07	0.12	0.18	0.26	0.32	0.38	0.43	0.48	0.52	0.55	0.57	0.60	0.62	0.64	0.66	0.69	0.73	0.77	0.83	0.90	0.99	1.09	1.20	1.33	1.46	1.61	1.76
1309	0.06	0.10	0.15	0.22	0.27	0.32	0.36	0.41	0.44	0.47	0.49	0.51	0.53	0.55	0.57	0.59	0.62	0.66	0.71	0.77	0.84	0.93	1.04	1.15	1.28	1.42	1.57
1309	0.09	0.16	0.23	0.33	0.41	0.48	0.54	0.60	0.66	0.71	0.75	0.79	0.84	0.88	0.94	1.00	1.08	1.17	1.28	1.40	1.55	1.71	1.88	2.07	2.26	2.46	2.64
1311	0.05	0.09	0.14	0.20	0.25	0.29	0.33	0.36	0.39	0.42	0.44	0.46	0.47	0.49	0.51	0.53	0.56	0.60	0.65	0.71	0.77	0.85	0.94	1.04	1.15	1.26	1.38
1313	0.06	0.10	0.14	0.21	0.26	0.30	0.34	0.38	0.41	0.43	0.45	0.47	0.49	0.51	0.53	0.55	0.58	0.62	0.67	0.73	0.80	0.88	0.98	1.08	1.20	1.32	1.45
1315	0.05	0.10	0.14	0.20	0.25	0.29	0.33	0.37	0.40	0.42	0.44	0.46	0.47	0.49	0.50	0.52	0.55	0.59	0.63	0.69	0.76	0.84	0.93	1.03	1.14	1.27	1.39
1317	0.05	0.10	0.14	0.20	0.25	0.29	0.33	0.37	0.40	0.42	0.44	0.45	0.46	0.48	0.49	0.51	0.53	0.56	0.61	0.66	0.72	0.80	0.90	1.01	1.13	1.27	1.41
1319	0.05	0.09	0.14	0.19	0.24	0.28	0.31	0.35	0.38	0.40	0.41	0.42	0.44	0.45	0.46	0.47	0.49	0.52	0.56	0.60	0.66	0.73	0.81	0.91	1.02	1.14	1.26

Grain Size Data - ALE cont.

Depth	**4.66**	**5.11**	**5.61**	**6.16**	**6.76**	**7.42**	**8.15**	**8.94**	**9.82**	**10.78**	**11.83**	**12.99**	**14.26**	**15.65**	**17.18**	**18.86**	**20.71**	**22.73**	**24.95**	**27.39**	**30.07**	**33.01**	**36.24**
1251	2.35	2.54	2.72	2.90	3.05	3.18	3.29	3.37	3.41	3.40	3.34	3.24	3.12	2.98	2.81	2.59	2.30	1.98	1.71	1.54	1.50	1.57	1.69
1253	2.03	2.18	2.31	2.43	2.53	2.62	2.69	2.74	2.78	2.78	2.76	2.73	2.70	2.68	2.64	2.55	2.40	2.22	2.07	2.01	2.08	2.25	2.47
1255	2.15	2.41	2.68	2.95	3.23	3.51	3.78	4.03	4.25	4.43	4.54	4.58	4.54	4.42	4.19	3.85	3.39	2.85	2.30	1.81	1.43	1.17	1.00
1257	2.47	2.75	3.03	3.31	3.59	3.85	4.08	4.27	4.41	4.47	4.42	4.28	4.05	3.74	3.36	2.92	2.43	1.94	1.52	1.22	1.03	0.95	0.90
1259	2.17	2.44	2.73	3.02	3.31	3.59	3.86	4.11	4.32	4.47	4.54	4.52	4.41	4.20	3.90	3.48	2.98	2.44	1.94	1.55	1.30	1.16	1.10
1261	2.47	2.71	2.95	3.18	3.39	3.58	3.74	3.86	3.94	3.95	3.90	3.79	3.62	3.41	3.15	2.83	2.45	2.06	1.70	1.45	1.33	1.30	1.34
1263	2.42	2.65	2.89	3.12	3.34	3.55	3.74	3.91	4.03	4.09	4.07	3.98	3.83	3.62	3.33	2.96	2.51	2.03	1.60	1.29	1.10	1.02	0.98
1265	2.13	2.35	2.56	2.77	2.95	3.12	3.27	3.38	3.46	3.48	3.44	3.36	3.24	3.11	2.94	2.72	2.46	2.17	1.92	1.77	1.73	1.80	1.93
1267	2.41	2.57	2.73	2.87	2.98	3.08	3.16	3.21	3.24	3.23	3.17	3.09	3.00	2.91	2.78	2.59	2.32	2.03	1.77	1.62	1.61	1.71	1.86
1269	2.22	2.42	2.61	2.79	2.95	3.08	3.18	3.26	3.28	3.25	3.17	3.04	2.90	2.75	2.59	2.40	2.17	1.93	1.73	1.63	1.66	1.78	1.95
1271	2.53	2.77	2.99	3.20	3.39	3.54	3.67	3.76	3.79	3.76	3.67	3.53	3.36	3.17	2.95	2.69	2.37	2.04	1.74	1.52	1.41	1.39	1.41
1273	2.25	2.50	2.74	2.98	3.20	3.40	3.58	3.73	3.84	3.89	3.88	3.82	3.70	3.53	3.30	3.00	2.63	2.21	1.82	1.51	1.31	1.22	1.20
1275	2.71	2.93	3.14	3.33	3.50	3.63	3.73	3.79	3.79	3.74	3.63	3.46	3.26	3.04	2.79	2.51	2.20	1.88	1.59	1.37	1.23	1.18	1.16
1277	1.73	1.89	2.05	2.21	2.36	2.52	2.66	2.80	2.93	3.04	3.13	3.18	3.20	3.19	3.14	3.02	2.84	2.61	2.39	2.24	2.17	2.20	2.30
1279	2.06	2.21	2.35	2.49	2.61	2.71	2.80	2.87	2.92	2.93	2.92	2.89	2.85	2.79	2.73	2.62	2.47	2.28	2.12	2.02	2.00	2.07	2.18
1281	1.94	2.11	2.27	2.43	2.58	2.71	2.83	2.93	3.00	3.04	3.04	3.00	2.93	2.85	2.73	2.56	2.36	2.14	1.96	1.86	1.87	1.97	2.13
1283	1.83	1.98	2.13	2.27	2.40	2.53	2.65	2.75	2.85	2.91	2.95	2.96	2.95	2.92	2.86	2.74	2.56	2.35	2.17	2.05	2.04	2.13	2.28
1285	2.16	2.38	2.59	2.81	3.01	3.19	3.35	3.48	3.57	3.60	3.57	3.49	3.36	3.19	2.98	2.73	2.42	2.11	1.85	1.68	1.63	1.67	1.77
1287	1.88	2.04	2.21	2.37	2.52	2.66	2.79	2.89	2.97	3.02	3.03	3.01	2.96	2.90	2.81	2.68	2.51	2.31	2.15	2.06	2.07	2.17	2.31
1289	1.78	1.93	2.08	2.22	2.36	2.50	2.62	2.74	2.84	2.92	2.96	2.98	2.98	2.95	2.89	2.76	2.57	2.34	2.14	2.02	2.02	2.13	2.30
1291	1.85	2.00	2.14	2.28	2.41	2.54	2.66	2.77	2.88	2.96	3.01	3.05	3.06	3.05	3.00	2.89	2.70	2.47	2.25	2.11	2.07	2.14	2.26
1293	1.78	1.92	2.05	2.17	2.29	2.39	2.50	2.59	2.66	2.72	2.75	2.76	2.75	2.74	2.69	2.59	2.43	2.24	2.08	1.99	2.02	2.16	2.36
1295	2.10	2.28	2.46	2.63	2.79	2.93	3.05	3.15	3.22	3.26	3.26	3.22	3.16	3.08	2.97	2.81	2.60	2.36	2.14	2.00	1.97	2.03	2.14
1297	1.94	2.10	2.25	2.40	2.54	2.66	2.78	2.88	2.95	3.00	3.00	2.99	2.95	2.91	2.83	2.71	2.52	2.30	2.11	2.01	2.04	2.17	2.35
1299	1.76	1.92	2.07	2.23	2.37	2.51	2.65	2.77	2.88	2.96	3.02	3.06	3.08	3.07	3.04	2.95	2.79	2.60	2.42	2.30	2.29	2.36	2.47
1301	1.65	1.81	1.99	2.17	2.34	2.52	2.70	2.87	3.03	3.17	3.28	3.36	3.40	3.40	3.35	3.21	2.99	2.71	2.44	2.24	2.15	2.16	2.25
1303	1.81	1.98	2.15	2.31	2.48	2.64	2.79	2.94	3.07	3.17	3.25	3.29	3.30	3.27	3.19	3.04	2.82	2.55	2.31	2.14	2.09	2.13	2.23
1305	1.80	1.96	2.13	2.29	2.45	2.60	2.75	2.88	3.00	3.09	3.16	3.19	3.19	3.17	3.11	2.98	2.78	2.54	2.31	2.17	2.13	2.19	2.29
1307	1.91	2.06	2.20	2.34	2.47	2.58	2.69	2.79	2.87	2.92	2.95	2.94	2.93	2.90	2.83	2.70	2.51	2.28	2.08	1.97	1.98	2.09	2.27
1309	1.73	1.90	2.06	2.23	2.40	2.56	2.72	2.87	3.01	3.12	3.21	3.27	3.29	3.28	3.22	3.09	2.88	2.63	2.39	2.22	2.17	2.22	2.34
1309	2.82	2.98	3.11	3.22	3.29	3.34	3.35	3.33	3.27	3.17	3.03	2.87	2.71	2.56	2.42	2.25	2.05	1.82	1.60	1.43	1.33	1.30	1.29
1311	1.49	1.61	1.72	1.82	1.92	2.01	2.10	2.17	2.24	2.28	2.31	2.32	2.33	2.33	2.32	2.28	2.20	2.12	2.06	2.08	2.20	2.40	2.64
1313	1.58	1.71	1.85	1.97	2.09	2.21	2.32	2.42	2.51	2.58	2.62	2.65	2.66	2.65	2.61	2.53	2.40	2.24	2.12	2.07	2.13	2.27	2.46
1315	1.52	1.64	1.77	1.89	2.00	2.11	2.21	2.30	2.37	2.43	2.47	2.49	2.50	2.49	2.47	2.40	2.28	2.15	2.04	2.00	2.07	2.24	2.46
1317	1.57	1.73	1.90	2.07	2.24	2.40	2.56	2.72	2.87	2.99	3.08	3.15	3.18	3.17	3.11	2.98	2.78	2.54	2.31	2.15	2.10	2.15	2.27
1319	1.40	1.54	1.68	1.83	1.97	2.11	2.26	2.40	2.53	2.64	2.73	2.79	2.83	2.84	2.81	2.71	2.54	2.34	2.14	2.01	1.98	2.05	2.19

Grain Size Data - ALE cont.

Depth	39.78	43.67	47.94	52.63	57.77	63.42	69.62	76.43	83.90	92.10	101.10	110.99	121.84	133.75	146.82	161.18	176.94	194.23	213.22	234.07	256.95
1251	1.78	1.77	1.65	1.46	1.24	1.03	0.87	0.75	0.67	0.62	0.61	0.63	0.66	0.66	0.58	0.43	0.23	0.08	0.01	0.00	0.00
1253	2.65	2.71	2.62	2.39	2.07	1.71	1.37	1.07	0.84	0.69	0.62	0.61	0.64	0.63	0.56	0.42	0.23	0.08	0.02	0.00	0.00
1255	0.87	0.75	0.62	0.50	0.39	0.32	0.28	0.25	0.23	0.21	0.22	0.24	0.29	0.32	0.30	0.23	0.12	0.04	0.01	0.00	0.00
1257	0.85	0.76	0.65	0.54	0.46	0.41	0.39	0.38	0.35	0.32	0.30	0.30	0.32	0.32	0.28	0.19	0.09	0.02	0.00	0.00	0.00
1259	1.04	0.95	0.83	0.69	0.57	0.50	0.46	0.45	0.45	0.45	0.45	0.46	0.44	0.40	0.32	0.19	0.08	0.02	0.00	0.00	0.00
1261	1.38	1.36	1.26	1.10	0.93	0.77	0.65	0.56	0.51	0.47	0.46	0.46	0.46	0.44	0.37	0.26	0.13	0.04	0.01	0.00	0.00
1263	0.94	0.84	0.71	0.58	0.49	0.45	0.45	0.47	0.48	0.47	0.45	0.43	0.41	0.39	0.34	0.26	0.16	0.06	0.01	0.00	0.00
1265	2.04	2.07	1.98	1.80	1.56	1.31	1.09	0.90	0.77	0.69	0.66	0.66	0.68	0.66	0.58	0.43	0.24	0.09	0.02	0.00	0.00
1267	1.96	1.95	1.82	1.59	1.32	1.07	0.87	0.72	0.61	0.55	0.52	0.53	0.55	0.55	0.50	0.39	0.23	0.09	0.02	0.00	0.00
1269	2.08	2.12	2.05	1.89	1.67	1.44	1.23	1.04	0.90	0.79	0.73	0.70	0.66	0.59	0.47	0.29	0.12	0.03	0.00	0.00	0.00
1271	1.40	1.34	1.22	1.07	0.92	0.80	0.71	0.63	0.56	0.50	0.44	0.40	0.35	0.30	0.22	0.12	0.05	0.01	0.00	0.00	0.00
1273	1.21	1.20	1.19	1.16	1.14	1.13	1.11	1.07	0.98	0.86	0.75	0.67	0.61	0.55	0.46	0.32	0.17	0.06	0.01	0.00	0.00
1275	1.15	1.11	1.03	0.93	0.82	0.72	0.63	0.53	0.45	0.37	0.33	0.34	0.38	0.43	0.43	0.35	0.21	0.08	0.02	0.00	0.00
1277	2.41	2.46	2.41	2.26	2.02	1.73	1.42	1.14	0.92	0.77	0.71	0.74	0.81	0.87	0.84	0.69	0.42	0.18	0.04	0.00	0.00
1279	2.28	2.31	2.25	2.10	1.88	1.62	1.35	1.10	0.89	0.75	0.69	0.72	0.78	0.81	0.74	0.56	0.31	0.11	0.02	0.00	0.00
1281	2.28	2.35	2.34	2.23	2.05	1.82	1.56	1.29	1.04	0.85	0.73	0.71	0.76	0.81	0.78	0.63	0.38	0.15	0.03	0.00	0.00
1283	2.42	2.48	2.44	2.29	2.06	1.80	1.52	1.26	1.03	0.84	0.72	0.67	0.70	0.79	0.86	0.83	0.67	0.40	0.16	0.03	0.00
1285	1.85	1.87	1.79	1.64	1.45	1.23	1.02	0.82	0.65	0.53	0.47	0.48	0.52	0.56	0.54	0.42	0.25	0.10	0.02	0.00	0.00
1287	2.43	2.48	2.43	2.28	2.07	1.82	1.56	1.31	1.07	0.85	0.68	0.60	0.60	0.66	0.73	0.71	0.58	0.36	0.15	0.03	0.00
1289	2.46	2.54	2.51	2.38	2.18	1.93	1.68	1.43	1.20	1.01	0.89	0.85	0.86	0.87	0.81	0.65	0.39	0.16	0.03	0.00	0.00
1291	2.38	2.42	2.36	2.20	1.96	1.68	1.39	1.12	0.90	0.75	0.69	0.70	0.77	0.81	0.77	0.61	0.36	0.14	0.03	0.00	0.00
1293	2.55	2.67	2.68	2.59	2.40	2.16	1.88	1.57	1.28	1.04	0.88	0.82	0.83	0.85	0.80	0.64	0.38	0.15	0.03	0.00	0.00
1295	2.23	2.23	2.12	1.90	1.62	1.33	1.05	0.82	0.66	0.56	0.53	0.55	0.59	0.59	0.51	0.36	0.18	0.06	0.01	0.00	0.00
1297	2.49	2.53	2.44	2.22	1.92	1.59	1.28	1.01	0.80	0.67	0.61	0.63	0.69	0.72	0.67	0.53	0.31	0.12	0.02	0.00	0.00
1299	2.56	2.57	2.47	2.27	2.02	1.74	1.47	1.21	0.97	0.78	0.66	0.62	0.65	0.70	0.70	0.60	0.40	0.19	0.06	0.01	0.00
1301	2.34	2.37	2.30	2.15	1.92	1.67	1.42	1.18	0.98	0.80	0.66	0.59	0.59	0.65	0.73	0.75	0.66	0.48	0.26	0.09	0.02
1303	2.32	2.34	2.26	2.10	1.88	1.63	1.38	1.14	0.92	0.73	0.61	0.56	0.59	0.65	0.67	0.60	0.42	0.22	0.07	0.01	0.00
1305	2.38	2.40	2.32	2.15	1.93	1.69	1.45	1.23	1.01	0.83	0.71	0.65	0.66	0.70	0.71	0.62	0.43	0.22	0.07	0.01	0.00
1307	2.43	2.49	2.43	2.26	2.01	1.74	1.48	1.24	1.02	0.83	0.68	0.60	0.60	0.65	0.71	0.69	0.57	0.36	0.15	0.04	0.00
1309	2.45	2.49	2.41	2.23	1.97	1.68	1.41	1.16	0.94	0.77	0.66	0.64	0.68	0.74	0.73	0.62	0.38	0.16	0.03	0.00	0.00
1309	1.26	1.19	1.10	1.01	0.95	0.93	0.92	0.90	0.83	0.69	0.55	0.44	0.39	0.39	0.38	0.33	0.21	0.09	0.02	0.00	0.00
1311	2.85	2.99	3.03	2.98	2.87	2.72	2.54	2.34	2.11	1.86	1.62	1.44	1.34	1.29	1.22	1.07	0.79	0.45	0.17	0.03	0.00
1313	2.62	2.71	2.70	2.61	2.45	2.27	2.07	1.88	1.68	1.50	1.38	1.32	1.33	1.34	1.27	1.06	0.72	0.37	0.12	0.02	0.00
1315	2.67	2.80	2.84	2.78	2.64	2.46	2.26	2.07	1.89	1.75	1.66	1.64	1.66	1.62	1.47	1.15	0.71	0.32	0.08	0.01	0.00
1317	2.38	2.44	2.39	2.26	2.06	1.84	1.61	1.41	1.22	1.06	0.96	0.95	1.02	1.15	1.23	1.18	0.95	0.58	0.25	0.06	0.01
1319	2.32	2.40	2.40	2.32	2.18	2.03	1.88	1.76	1.66	1.58	1.54	1.56	1.65	1.78	1.87	1.79	1.50	1.01	0.50	0.16	0.03

Grain Size Data - ALE cont.

Depth	282.07	309.64	339.92	373.15	409.63	449.67	493.63	541.89	594.87	653.03	716.87	786.95	863.88	948.34
1251	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1253	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1255	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1257	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1259	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1261	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1263	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1265	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1267	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1269	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1271	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1273	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1275	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1277	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1279	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1281	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1283	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1285	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1287	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1289	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1291	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1293	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1295	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1297	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1299	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1301	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1303	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1305	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1307	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1309	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1309	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1311	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1313	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1315	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1317	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1319	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Grain Size Data - ALE cont.

Depth	Size fraction (microns)																									
	0.38	**0.41**	**0.45**	**0.50**	**0.54**	**0.60**	**0.66**	**0.72**	**0.79**	**0.87**	**0.95**	**1.05**	**1.15**	**1.26**	**1.38**	**1.52**	**1.67**	**1.83**	**2.01**	**2.21**	**2.42**	**2.66**	**2.92**	**3.21**	**3.52**	**3.86**	**4.24**
1321	0.04	0.08	0.11	0.16	0.20	0.23	0.26	0.29	0.32	0.33	0.35	0.36	0.37	0.38	0.39	0.40	0.41	0.43	0.46	0.50	0.55	0.60	0.68	0.76	0.86	0.97	1.10
1323	0.05	0.09	0.14	0.19	0.24	0.28	0.32	0.35	0.38	0.40	0.41	0.43	0.44	0.44	0.45	0.47	0.48	0.51	0.54	0.59	0.64	0.71	0.80	0.89	1.00	1.13	1.27
1325	0.05	0.09	0.13	0.18	0.22	0.26	0.30	0.33	0.36	0.38	0.39	0.41	0.42	0.43	0.44	0.45	0.47	0.49	0.53	0.57	0.62	0.69	0.77	0.86	0.97	1.10	1.23
1327	0.05	0.10	0.14	0.20	0.25	0.29	0.33	0.36	0.39	0.41	0.43	0.44	0.46	0.47	0.48	0.49	0.51	0.54	0.58	0.62	0.68	0.76	0.85	0.95	1.07	1.20	1.34
1329	0.04	0.08	0.11	0.16	0.20	0.24	0.27	0.29	0.32	0.34	0.35	0.36	0.37	0.38	0.39	0.40	0.42	0.44	0.46	0.50	0.54	0.60	0.66	0.73	0.81	0.91	1.00
1357	0.04	0.07	0.10	0.14	0.17	0.20	0.23	0.26	0.28	0.30	0.32	0.33	0.34	0.35	0.36	0.38	0.39	0.41	0.44	0.47	0.51	0.57	0.63	0.71	0.80	0.90	1.02
1359	0.04	0.06	0.09	0.13	0.17	0.19	0.22	0.25	0.27	0.28	0.30	0.31	0.32	0.32	0.33	0.34	0.35	0.36	0.38	0.41	0.44	0.49	0.55	0.62	0.70	0.80	0.92
1361	0.03	0.06	0.09	0.13	0.16	0.19	0.21	0.24	0.26	0.28	0.29	0.30	0.31	0.32	0.32	0.33	0.34	0.36	0.38	0.41	0.44	0.48	0.54	0.61	0.69	0.78	0.89
1363	0.04	0.07	0.10	0.14	0.18	0.21	0.24	0.26	0.29	0.30	0.32	0.33	0.34	0.35	0.36	0.36	0.38	0.39	0.41	0.44	0.48	0.53	0.59	0.66	0.75	0.85	0.96
1365	0.04	0.07	0.11	0.15	0.19	0.22	0.25	0.28	0.30	0.32	0.34	0.35	0.36	0.37	0.38	0.39	0.40	0.42	0.44	0.48	0.52	0.58	0.64	0.72	0.82	0.93	1.06
1367	0.04	0.07	0.11	0.15	0.19	0.22	0.25	0.28	0.30	0.32	0.34	0.35	0.36	0.37	0.38	0.39	0.41	0.43	0.45	0.49	0.53	0.58	0.65	0.73	0.82	0.92	1.04
1369	0.04	0.08	0.11	0.16	0.20	0.23	0.27	0.30	0.32	0.34	0.35	0.37	0.38	0.39	0.39	0.40	0.42	0.43	0.46	0.49	0.53	0.59	0.66	0.74	0.83	0.95	1.08
1371	0.04	0.07	0.11	0.16	0.19	0.23	0.26	0.29	0.31	0.33	0.35	0.36	0.38	0.39	0.40	0.41	0.43	0.45	0.47	0.51	0.55	0.61	0.68	0.76	0.85	0.96	1.08
1373	0.04	0.07	0.10	0.15	0.18	0.21	0.24	0.27	0.29	0.31	0.33	0.34	0.35	0.36	0.36	0.37	0.39	0.40	0.43	0.45	0.49	0.54	0.60	0.67	0.76	0.86	0.97
1375	0.04	0.07	0.11	0.16	0.20	0.23	0.26	0.29	0.31	0.33	0.35	0.36	0.37	0.38	0.39	0.40	0.41	0.43	0.45	0.48	0.53	0.58	0.65	0.74	0.83	0.95	1.08
1377	0.04	0.07	0.10	0.14	0.18	0.21	0.24	0.26	0.29	0.30	0.32	0.33	0.34	0.35	0.35	0.36	0.38	0.39	0.42	0.45	0.48	0.53	0.59	0.67	0.75	0.86	0.97
1379	0.04	0.06	0.09	0.13	0.17	0.20	0.22	0.25	0.27	0.29	0.30	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.39	0.42	0.45	0.49	0.55	0.61	0.69	0.78	0.88
1381	0.04	0.07	0.10	0.14	0.17	0.20	0.23	0.25	0.27	0.29	0.30	0.32	0.32	0.33	0.34	0.35	0.36	0.37	0.39	0.42	0.46	0.50	0.56	0.63	0.71	0.81	0.92
1383	0.04	0.07	0.10	0.15	0.19	0.22	0.25	0.28	0.30	0.32	0.33	0.34	0.36	0.36	0.37	0.38	0.40	0.41	0.44	0.47	0.51	0.56	0.62	0.69	0.78	0.88	1.00
1385	0.04	0.07	0.10	0.15	0.18	0.21	0.24	0.27	0.29	0.31	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.41	0.43	0.46	0.50	0.55	0.62	0.69	0.78	0.88	1.00
1387	0.03	0.06	0.09	0.13	0.16	0.19	0.22	0.24	0.26	0.28	0.29	0.31	0.31	0.32	0.33	0.34	0.35	0.36	0.38	0.41	0.45	0.49	0.55	0.62	0.70	0.80	0.92
1389	0.03	0.06	0.09	0.12	0.15	0.18	0.20	0.23	0.25	0.26	0.27	0.28	0.29	0.30	0.30	0.31	0.32	0.33	0.35	0.38	0.41	0.45	0.50	0.57	0.64	0.74	0.84
1391	0.03	0.05	0.08	0.11	0.14	0.16	0.19	0.21	0.23	0.24	0.25	0.26	0.27	0.27	0.28	0.28	0.29	0.30	0.32	0.34	0.37	0.41	0.46	0.52	0.59	0.68	0.78
1393	0.03	0.06	0.08	0.12	0.15	0.17	0.20	0.22	0.24	0.25	0.26	0.27	0.28	0.29	0.29	0.30	0.31	0.32	0.33	0.36	0.38	0.42	0.47	0.53	0.60	0.68	0.78
1395	0.03	0.05	0.08	0.11	0.14	0.16	0.18	0.20	0.22	0.23	0.24	0.25	0.26	0.26	0.26	0.27	0.27	0.28	0.29	0.31	0.34	0.37	0.41	0.46	0.52	0.60	0.69
1397	0.04	0.06	0.10	0.14	0.17	0.20	0.23	0.25	0.28	0.29	0.31	0.32	0.32	0.33	0.34	0.34	0.35	0.37	0.39	0.41	0.44	0.48	0.54	0.60	0.68	0.78	0.88
1399	0.03	0.06	0.08	0.12	0.15	0.17	0.19	0.22	0.24	0.25	0.26	0.27	0.28	0.28	0.29	0.30	0.31	0.32	0.34	0.36	0.39	0.43	0.48	0.54	0.61	0.70	0.80
1401	0.03	0.05	0.08	0.11	0.14	0.16	0.18	0.20	0.22	0.23	0.24	0.25	0.26	0.26	0.27	0.27	0.28	0.29	0.31	0.33	0.35	0.39	0.43	0.49	0.56	0.64	0.73
1403	0.03	0.05	0.07	0.11	0.13	0.16	0.18	0.20	0.21	0.23	0.24	0.24	0.25	0.26	0.26	0.26	0.27	0.28	0.29	0.31	0.34	0.37	0.41	0.47	0.53	0.61	0.69
1405	0.03	0.05	0.08	0.11	0.14	0.16	0.18	0.20	0.22	0.23	0.24	0.25	0.26	0.27	0.27	0.28	0.29	0.30	0.31	0.34	0.36	0.40	0.45	0.50	0.57	0.65	0.75
1407	0.04	0.07	0.11	0.15	0.19	0.23	0.26	0.29	0.31	0.33	0.34	0.36	0.37	0.38	0.38	0.39	0.41	0.43	0.45	0.48	0.53	0.58	0.64	0.72	0.82	0.92	1.05
1409	0.04	0.06	0.09	0.13	0.16	0.19	0.22	0.24	0.27	0.28	0.30	0.31	0.32	0.32	0.33	0.34	0.35	0.36	0.38	0.41	0.44	0.49	0.54	0.61	0.69	0.78	0.89
1411	0.03	0.05	0.08	0.11	0.14	0.17	0.19	0.21	0.23	0.24	0.26	0.27	0.27	0.28	0.28	0.29	0.30	0.31	0.33	0.35	0.38	0.41	0.46	0.51	0.58	0.66	0.75
1413	0.03	0.06	0.08	0.12	0.15	0.17	0.20	0.22	0.24	0.25	0.26	0.27	0.28	0.29	0.29	0.30	0.31	0.32	0.34	0.36	0.39	0.43	0.48	0.54	0.61	0.70	0.80
1415	0.03	0.05	0.08	0.11	0.14	0.16	0.19	0.21	0.22	0.24	0.25	0.26	0.26	0.27	0.27	0.28	0.28	0.29	0.31	0.32	0.35	0.38	0.43	0.48	0.55	0.63	0.72
1417	0.03	0.05	0.08	0.11	0.14	0.16	0.18	0.20	0.22	0.23	0.24	0.25	0.25	0.26	0.26	0.26	0.27	0.28	0.29	0.31	0.34	0.37	0.41	0.47	0.54	0.62	0.71

Grain Size Data - ALE cont.

Depth	4.66	5.11	5.61	6.16	6.76	7.42	8.15	8.94	9.82	10.78	11.83	12.99	14.26	15.65	17.18	18.86	20.71	22.73	24.95	27.39	30.07	33.01	36.24
1321	1.24	1.39	1.55	1.73	1.91	2.10	2.29	2.50	2.70	2.90	3.08	3.24	3.37	3.45	3.48	3.42	3.26	3.04	2.78	2.55	2.39	2.30	2.28
1323	1.41	1.57	1.74	1.91	2.08	2.25	2.43	2.61	2.78	2.93	3.06	3.17	3.23	3.26	3.24	3.13	2.94	2.70	2.44	2.25	2.15	2.15	2.22
1325	1.38	1.54	1.71	1.89	2.08	2.27	2.47	2.66	2.86	3.04	3.21	3.34	3.43	3.47	3.46	3.35	3.15	2.88	2.60	2.36	2.22	2.19	2.23
1327	1.49	1.65	1.82	1.99	2.17	2.34	2.52	2.69	2.86	3.01	3.12	3.21	3.26	3.26	3.22	3.09	2.88	2.62	2.36	2.17	2.09	2.11	2.19
1329	1.11	1.21	1.33	1.44	1.55	1.66	1.78	1.89	1.99	2.08	2.15	2.21	2.25	2.26	2.25	2.19	2.08	1.95	1.83	1.77	1.79	1.90	2.08
1357	1.16	1.31	1.47	1.65	1.84	2.04	2.25	2.47	2.71	2.95	3.18	3.41	3.61	3.77	3.89	3.93	3.90	3.77	3.58	3.36	3.14	2.95	2.79
1359	1.05	1.20	1.36	1.54	1.73	1.94	2.16	2.40	2.65	2.91	3.18	3.43	3.67	3.88	4.03	4.11	4.10	3.99	3.80	3.56	3.32	3.10	2.91
1361	1.01	1.15	1.30	1.46	1.64	1.83	2.04	2.26	2.50	2.75	3.01	3.26	3.50	3.71	3.89	3.99	4.01	3.95	3.81	3.63	3.44	3.26	3.09
1363	1.10	1.24	1.41	1.59	1.78	1.99	2.21	2.44	2.70	2.96	3.22	3.47	3.71	3.91	4.06	4.13	4.10	3.98	3.78	3.54	3.30	3.08	2.89
1365	1.20	1.35	1.52	1.71	1.90	2.11	2.33	2.56	2.80	3.04	3.28	3.49	3.69	3.84	3.94	3.95	3.88	3.71	3.49	3.26	3.05	2.89	2.76
1367	1.17	1.32	1.47	1.64	1.82	2.01	2.21	2.42	2.63	2.85	3.06	3.26	3.44	3.58	3.67	3.68	3.62	3.47	3.28	3.09	2.95	2.86	2.81
1369	1.22	1.38	1.56	1.75	1.96	2.17	2.41	2.65	2.91	3.17	3.42	3.65	3.86	4.02	4.12	4.13	4.03	3.84	3.58	3.31	3.07	2.88	2.72
1371	1.21	1.36	1.52	1.69	1.87	2.06	2.27	2.48	2.70	2.92	3.13	3.33	3.50	3.64	3.72	3.73	3.65	3.50	3.30	3.10	2.95	2.85	2.79
1373	1.10	1.25	1.40	1.58	1.76	1.96	2.18	2.41	2.66	2.91	3.16	3.41	3.64	3.84	3.99	4.06	4.03	3.90	3.71	3.49	3.27	3.08	2.91
1375	1.23	1.39	1.57	1.77	1.97	2.19	2.43	2.67	2.92	3.18	3.42	3.65	3.84	3.99	4.07	4.05	3.93	3.72	3.45	3.17	2.93	2.74	2.60
1377	1.10	1.25	1.41	1.59	1.78	1.99	2.20	2.44	2.69	2.95	3.21	3.47	3.71	3.92	4.08	4.17	4.16	4.05	3.87	3.65	3.42	3.20	2.99
1379	1.00	1.13	1.28	1.44	1.61	1.81	2.01	2.24	2.48	2.74	3.01	3.28	3.54	3.78	3.99	4.12	4.17	4.13	4.01	3.84	3.63	3.42	3.20
1381	1.05	1.19	1.35	1.52	1.71	1.92	2.14	2.38	2.63	2.90	3.18	3.46	3.73	3.97	4.18	4.31	4.36	4.30	4.17	3.97	3.75	3.52	3.27
1383	1.13	1.28	1.44	1.61	1.80	2.01	2.22	2.46	2.70	2.96	3.22	3.47	3.70	3.90	4.05	4.13	4.10	3.98	3.79	3.56	3.34	3.15	2.97
1385	1.13	1.28	1.44	1.61	1.80	2.01	2.22	2.46	2.70	2.96	3.22	3.47	3.70	3.91	4.07	4.15	4.14	4.03	3.85	3.63	3.42	3.22	3.03
1387	1.04	1.19	1.35	1.53	1.72	1.92	2.14	2.38	2.64	2.91	3.18	3.46	3.72	3.95	4.15	4.27	4.30	4.23	4.08	3.86	3.61	3.35	3.09
1389	0.96	1.10	1.25	1.42	1.60	1.80	2.01	2.24	2.49	2.76	3.03	3.31	3.58	3.84	4.06	4.23	4.32	4.33	4.25	4.11	3.92	3.70	3.44
1391	0.90	1.04	1.19	1.35	1.54	1.74	1.95	2.19	2.45	2.73	3.02	3.33	3.64	3.93	4.20	4.42	4.57	4.63	4.59	4.48	4.28	4.03	3.72
1393	0.89	1.02	1.16	1.32	1.50	1.69	1.90	2.12	2.37	2.64	2.92	3.21	3.51	3.79	4.05	4.26	4.40	4.45	4.42	4.30	4.12	3.89	3.61
1395	0.79	0.90	1.02	1.16	1.32	1.48	1.66	1.86	2.08	2.30	2.54	2.79	3.04	3.28	3.49	3.67	3.80	3.86	3.87	3.83	3.77	3.69	3.59
1397	1.01	1.15	1.30	1.47	1.66	1.86	2.08	2.32	2.57	2.84	3.12	3.39	3.66	3.90	4.09	4.22	4.25	4.19	4.04	3.85	3.64	3.42	3.21
1399	0.92	1.05	1.19	1.35	1.53	1.71	1.92	2.14	2.37	2.62	2.88	3.15	3.41	3.65	3.86	4.02	4.11	4.12	4.06	3.95	3.80	3.64	3.46
1401	0.84	0.97	1.11	1.26	1.43	1.62	1.82	2.04	2.29	2.55	2.83	3.12	3.42	3.71	3.98	4.20	4.36	4.45	4.45	4.38	4.25	4.06	3.82
1403	0.80	0.91	1.05	1.19	1.36	1.53	1.73	1.95	2.19	2.45	2.74	3.03	3.34	3.65	3.95	4.22	4.43	4.56	4.62	4.61	4.52	4.36	4.12
1405	0.85	0.97	1.11	1.26	1.43	1.61	1.80	2.02	2.25	2.51	2.78	3.06	3.34	3.63	3.89	4.11	4.28	4.39	4.42	4.39	4.31	4.18	3.98
1407	1.19	1.34	1.51	1.69	1.89	2.10	2.32	2.56	2.80	3.05	3.30	3.53	3.74	3.90	4.01	4.03	3.96	3.78	3.54	3.29	3.07	2.89	2.76
1409	1.02	1.16	1.31	1.49	1.68	1.88	2.10	2.34	2.60	2.87	3.15	3.43	3.70	3.94	4.14	4.27	4.31	4.24	4.10	3.90	3.68	3.45	3.22
1411	0.85	0.97	1.10	1.25	1.41	1.59	1.78	1.99	2.21	2.46	2.72	2.99	3.26	3.53	3.78	4.00	4.15	4.25	4.28	4.26	4.20	4.10	3.94
1413	0.92	1.05	1.20	1.36	1.54	1.74	1.96	2.19	2.45	2.73	3.02	3.31	3.61	3.89	4.14	4.33	4.43	4.45	4.38	4.23	4.03	3.79	3.50
1415	0.83	0.96	1.10	1.26	1.43	1.62	1.84	2.07	2.33	2.60	2.89	3.20	3.51	3.80	4.07	4.29	4.43	4.49	4.46	4.35	4.18	3.96	3.70
1417	0.83	0.95	1.10	1.26	1.44	1.64	1.86	2.10	2.36	2.65	2.96	3.27	3.59	3.90	4.19	4.42	4.57	4.64	4.60	4.48	4.28	4.02	3.69

Grain Size Data - ALE cont.

Depth	39.78	43.67	47.94	52.63	57.77	63.42	69.62	76.43	83.90	92.10	101.10	110.99	121.84	133.75	146.82	161.18	176.94	194.23	213.22	234.07	256.95
1321	2.28	2.26	2.20	2.08	1.94	1.78	1.64	1.53	1.44	1.37	1.34	1.36	1.45	1.55	1.58	1.45	1.14	0.69	0.30	0.07	0.01
1323	2.30	2.34	2.31	2.19	2.02	1.83	1.65	1.50	1.38	1.27	1.19	1.15	1.18	1.26	1.34	1.31	1.13	0.79	0.40	0.14	0.02
1325	2.31	2.35	2.31	2.19	2.01	1.80	1.61	1.44	1.29	1.18	1.10	1.08	1.12	1.19	1.22	1.13	0.89	0.54	0.23	0.06	0.01
1327	2.29	2.33	2.29	2.17	1.99	1.79	1.60	1.43	1.30	1.19	1.12	1.11	1.17	1.26	1.31	1.23	0.97	0.60	0.26	0.06	0.01
1329	2.26	2.43	2.53	2.56	2.54	2.47	2.37	2.24	2.10	1.96	1.85	1.82	1.91	2.14	2.46	2.75	2.82	2.58	2.04	1.27	0.58
1357	2.65	2.52	2.38	2.21	2.02	1.80	1.58	1.37	1.17	1.01	0.88	0.82	0.79	0.79	0.75	0.64	0.45	0.23	0.08	0.01	0.00
1359	2.75	2.59	2.43	2.23	2.01	1.77	1.53	1.30	1.11	0.95	0.85	0.81	0.81	0.84	0.81	0.70	0.50	0.26	0.09	0.02	0.00
1361	2.92	2.74	2.53	2.29	2.04	1.78	1.54	1.33	1.15	1.00	0.88	0.83	0.83	0.88	0.93	0.89	0.73	0.47	0.22	0.06	0.01
1363	2.71	2.52	2.31	2.08	1.83	1.58	1.34	1.14	0.97	0.83	0.75	0.72	0.76	0.82	0.85	0.79	0.61	0.36	0.14	0.03	0.00
1365	2.64	2.51	2.33	2.10	1.85	1.60	1.36	1.16	1.00	0.86	0.77	0.74	0.77	0.82	0.84	0.76	0.57	0.32	0.12	0.02	0.00
1367	2.77	2.70	2.57	2.36	2.11	1.83	1.57	1.35	1.17	1.02	0.90	0.83	0.80	0.83	0.88	0.89	0.80	0.61	0.35	0.13	0.03
1369	2.58	2.41	2.20	1.94	1.65	1.38	1.13	0.94	0.80	0.71	0.67	0.68	0.74	0.78	0.77	0.64	0.42	0.19	0.05	0.01	0.00
1371	2.75	2.67	2.53	2.33	2.09	1.83	1.57	1.34	1.13	0.96	0.83	0.77	0.78	0.82	0.84	0.77	0.59	0.34	0.13	0.02	0.00
1373	2.75	2.58	2.37	2.14	1.90	1.65	1.43	1.23	1.05	0.90	0.80	0.76	0.78	0.83	0.84	0.75	0.56	0.31	0.11	0.02	0.00
1375	2.47	2.34	2.18	1.98	1.76	1.54	1.33	1.14	0.96	0.80	0.69	0.63	0.63	0.69	0.74	0.72	0.58	0.36	0.15	0.03	0.00
1377	2.76	2.52	2.25	1.95	1.66	1.40	1.18	1.00	0.86	0.75	0.67	0.63	0.65	0.70	0.75	0.74	0.61	0.40	0.18	0.05	0.01
1379	2.97	2.71	2.43	2.14	1.85	1.58	1.36	1.17	1.02	0.90	0.81	0.77	0.79	0.84	0.89	0.86	0.71	0.44	0.18	0.04	0.00
1381	2.99	2.69	2.35	2.00	1.65	1.35	1.09	0.90	0.76	0.67	0.62	0.62	0.65	0.69	0.70	0.62	0.46	0.25	0.09	0.02	0.00
1383	2.80	2.60	2.37	2.11	1.83	1.55	1.30	1.08	0.91	0.79	0.72	0.72	0.75	0.78	0.74	0.60	0.38	0.17	0.04	0.00	0.00
1385	2.84	2.63	2.38	2.10	1.80	1.51	1.25	1.03	0.85	0.73	0.67	0.66	0.70	0.74	0.72	0.60	0.39	0.18	0.05	0.01	0.00
1387	2.83	2.56	2.27	1.98	1.70	1.44	1.22	1.05	0.92	0.82	0.76	0.75	0.76	0.79	0.79	0.70	0.53	0.30	0.12	0.02	0.00
1389	3.16	2.85	2.51	2.16	1.82	1.51	1.25	1.05	0.91	0.80	0.73	0.71	0.72	0.76	0.76	0.69	0.53	0.31	0.12	0.02	0.00
1391	3.37	2.97	2.54	2.10	1.69	1.34	1.06	0.87	0.74	0.67	0.64	0.66	0.70	0.72	0.70	0.58	0.38	0.18	0.05	0.01	0.00
1393	3.30	2.95	2.58	2.21	1.86	1.54	1.29	1.09	0.94	0.84	0.78	0.76	0.77	0.79	0.78	0.68	0.50	0.28	0.10	0.02	0.00
1395	3.48	3.34	3.16	2.96	2.72	2.47	2.21	1.94	1.68	1.44	1.25	1.13	1.07	1.04	0.97	0.82	0.58	0.31	0.11	0.02	0.00
1397	2.99	2.74	2.45	2.13	1.79	1.48	1.22	1.01	0.86	0.76	0.70	0.69	0.73	0.79	0.83	0.79	0.63	0.37	0.15	0.03	0.00
1399	3.25	3.02	2.75	2.45	2.15	1.85	1.58	1.34	1.14	0.97	0.86	0.80	0.81	0.85	0.86	0.80	0.62	0.36	0.14	0.03	0.00
1401	3.51	3.15	2.74	2.31	1.90	1.54	1.26	1.05	0.91	0.81	0.75	0.72	0.75	0.81	0.87	0.85	0.70	0.44	0.18	0.04	0.00
1403	3.80	3.40	2.94	2.45	1.98	1.56	1.23	0.99	0.83	0.73	0.69	0.69	0.73	0.77	0.78	0.70	0.53	0.29	0.11	0.02	0.00
1405	3.72	3.38	2.97	2.52	2.07	1.66	1.32	1.06	0.88	0.74	0.66	0.63	0.66	0.71	0.75	0.71	0.57	0.34	0.14	0.03	0.00
1407	2.64	2.50	2.31	2.07	1.79	1.52	1.28	1.08	0.93	0.82	0.76	0.74	0.77	0.81	0.81	0.72	0.53	0.30	0.11	0.02	0.00
1409	2.99	2.72	2.42	2.09	1.76	1.45	1.19	0.99	0.84	0.74	0.68	0.67	0.71	0.76	0.78	0.70	0.53	0.29	0.11	0.02	0.00
1411	3.71	3.40	3.02	2.60	2.16	1.76	1.41	1.15	0.95	0.82	0.75	0.75	0.79	0.84	0.85	0.76	0.57	0.32	0.12	0.02	0.00
1413	3.18	2.82	2.44	2.06	1.71	1.41	1.17	1.00	0.89	0.80	0.75	0.72	0.74	0.79	0.82	0.78	0.63	0.38	0.15	0.03	0.00
1415	3.39	3.02	2.62	2.20	1.80	1.45	1.17	0.98	0.85	0.77	0.74	0.73	0.78	0.85	0.92	0.91	0.78	0.53	0.26	0.08	0.01
1417	3.31	2.89	2.45	2.02	1.64	1.32	1.09	0.93	0.83	0.76	0.71	0.69	0.71	0.78	0.85	0.88	0.79	0.58	0.31	0.11	0.02

Grain Size Data - ALE cont.

Depth	282.07	309.64	339.92	373.15	409.63	449.67	493.63	541.89	594.87	653.03	716.87	786.95	863.88	948.34
1321	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1323	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1325	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1327	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1329	0.16	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1357	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1359	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1361	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1363	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1365	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1367	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1369	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1371	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1373	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1375	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1377	0.00	0.00	0.00	0.01	0.03	0.06	0.08	0.09	0.10	0.10	0.08	0.05	0.01	0.00
1379	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1381	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1383	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1385	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1387	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1389	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1391	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1393	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1395	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1397	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1399	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1401	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1403	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1405	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1407	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1409	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1411	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1413	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1415	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1417	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Grain Size Data - ALE cont.

Depth	Size fraction (microns)																										
	0.38	**0.41**	**0.45**	**0.50**	**0.54**	**0.60**	**0.66**	**0.72**	**0.79**	**0.87**	**0.95**	**1.05**	**1.15**	**1.26**	**1.38**	**1.52**	**1.67**	**1.83**	**2.01**	**2.21**	**2.42**	**2.66**	**2.92**	**3.21**	**3.52**	**3.86**	**4.24**
1419	0.03	0.05	0.08	0.11	0.14	0.16	0.19	0.21	0.22	0.24	0.25	0.26	0.26	0.27	0.27	0.27	0.28	0.29	0.30	0.32	0.35	0.38	0.43	0.48	0.55	0.63	0.73
1421	0.03	0.05	0.08	0.11	0.14	0.16	0.19	0.21	0.23	0.24	0.25	0.26	0.26	0.27	0.27	0.28	0.29	0.30	0.31	0.33	0.36	0.39	0.44	0.49	0.56	0.64	0.74
1423	0.03	0.05	0.07	0.10	0.13	0.15	0.17	0.19	0.21	0.22	0.23	0.24	0.24	0.25	0.25	0.26	0.26	0.27	0.28	0.30	0.33	0.36	0.40	0.46	0.52	0.60	0.69
1425	0.03	0.06	0.08	0.12	0.15	0.17	0.19	0.22	0.23	0.25	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.31	0.32	0.34	0.37	0.40	0.45	0.51	0.58	0.67	0.77
1427	0.03	0.06	0.09	0.12	0.15	0.18	0.21	0.23	0.25	0.26	0.27	0.28	0.29	0.29	0.30	0.30	0.31	0.32	0.33	0.35	0.38	0.42	0.47	0.54	0.62	0.71	0.82
1429	0.03	0.05	0.08	0.12	0.14	0.17	0.20	0.22	0.24	0.26	0.28	0.30	0.32	0.34	0.36	0.38	0.41	0.44	0.48	0.53	0.59	0.66	0.74	0.83	0.93	1.05	1.18
1431	0.04	0.07	0.10	0.14	0.17	0.20	0.23	0.26	0.28	0.30	0.32	0.33	0.35	0.36	0.37	0.38	0.40	0.43	0.46	0.49	0.54	0.60	0.67	0.75	0.85	0.96	1.08
1433	0.04	0.08	0.11	0.16	0.20	0.23	0.26	0.29	0.32	0.34	0.35	0.37	0.38	0.39	0.40	0.41	0.43	0.45	0.48	0.51	0.56	0.62	0.69	0.78	0.88	1.00	1.13
1435	0.05	0.08	0.12	0.17	0.22	0.25	0.29	0.32	0.35	0.37	0.39	0.40	0.41	0.43	0.44	0.45	0.47	0.50	0.53	0.58	0.63	0.70	0.77	0.87	0.97	1.09	1.23
1437	0.04	0.07	0.10	0.15	0.18	0.22	0.25	0.27	0.30	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.40	0.42	0.44	0.47	0.52	0.57	0.63	0.71	0.80	0.90	1.02
1439	0.04	0.07	0.10	0.14	0.18	0.21	0.23	0.26	0.28	0.30	0.31	0.33	0.34	0.34	0.35	0.36	0.37	0.38	0.41	0.43	0.47	0.52	0.57	0.64	0.72	0.82	0.93
1441	0.04	0.07	0.10	0.14	0.18	0.21	0.23	0.26	0.28	0.30	0.31	0.32	0.33	0.34	0.35	0.35	0.36	0.38	0.39	0.42	0.45	0.50	0.55	0.62	0.70	0.80	0.91
1443	0.04	0.07	0.10	0.14	0.18	0.21	0.24	0.26	0.29	0.30	0.32	0.33	0.34	0.34	0.35	0.36	0.37	0.38	0.40	0.43	0.47	0.52	0.57	0.65	0.73	0.83	0.95
1445	0.04	0.07	0.10	0.14	0.18	0.21	0.24	0.27	0.29	0.30	0.32	0.33	0.34	0.34	0.35	0.36	0.37	0.39	0.41	0.44	0.48	0.53	0.59	0.66	0.75	0.86	0.98
1447	0.06	0.10	0.15	0.22	0.27	0.32	0.36	0.40	0.44	0.46	0.48	0.50	0.52	0.54	0.56	0.59	0.62	0.66	0.72	0.78	0.86	0.95	1.05	1.17	1.30	1.44	1.59
1449	0.06	0.11	0.16	0.23	0.28	0.33	0.37	0.41	0.44	0.47	0.49	0.50	0.52	0.54	0.56	0.58	0.62	0.67	0.73	0.81	0.90	1.02	1.15	1.29	1.46	1.63	1.81
1451	0.08	0.14	0.21	0.29	0.36	0.42	0.48	0.52	0.56	0.59	0.61	0.63	0.65	0.66	0.69	0.72	0.76	0.82	0.90	1.00	1.12	1.26	1.43	1.62	1.83	2.05	2.27

Grain Size Data - ALE cont.

Depth	4.66	5.11	5.61	6.16	6.76	7.42	8.15	8.94	9.82	10.78	11.83	12.99	14.26	15.65	17.18	18.86	20.71	22.73	24.95	27.39	30.07	33.01	36.24
1419	0.85	0.98	1.13	1.30	1.49	1.69	1.92	2.16	2.44	2.73	3.04	3.36	3.68	3.99	4.26	4.47	4.59	4.61	4.52	4.35	4.10	3.80	3.45
1421	0.85	0.97	1.12	1.27	1.45	1.64	1.85	2.07	2.32	2.59	2.88	3.17	3.46	3.74	3.99	4.19	4.31	4.35	4.30	4.19	4.02	3.81	3.56
1423	0.80	0.93	1.06	1.22	1.39	1.58	1.79	2.02	2.27	2.55	2.84	3.15	3.47	3.78	4.07	4.32	4.50	4.60	4.62	4.56	4.43	4.22	3.95
1425	0.88	1.01	1.16	1.32	1.51	1.70	1.92	2.16	2.42	2.71	3.00	3.31	3.62	3.92	4.19	4.40	4.54	4.59	4.54	4.42	4.22	3.96	3.65
1427	0.95	1.09	1.26	1.44	1.64	1.86	2.10	2.37	2.65	2.95	3.26	3.58	3.88	4.16	4.38	4.52	4.56	4.49	4.32	4.07	3.77	3.45	3.13
1429	1.33	1.48	1.65	1.83	2.02	2.21	2.42	2.63	2.84	3.05	3.25	3.44	3.60	3.72	3.78	3.78	3.72	3.58	3.39	3.17	2.96	2.76	2.60
1431	1.22	1.37	1.54	1.72	1.91	2.11	2.31	2.53	2.75	2.97	3.19	3.39	3.56	3.70	3.77	3.78	3.72	3.57	3.38	3.16	2.97	2.81	2.68
1433	1.27	1.43	1.61	1.79	1.99	2.19	2.41	2.63	2.85	3.07	3.28	3.47	3.63	3.75	3.80	3.78	3.67	3.48	3.25	3.02	2.82	2.68	2.59
1435	1.37	1.53	1.70	1.87	2.05	2.24	2.43	2.63	2.82	3.01	3.18	3.32	3.43	3.50	3.51	3.45	3.31	3.10	2.87	2.68	2.55	2.50	2.51
1437	1.15	1.29	1.44	1.61	1.79	1.98	2.18	2.40	2.62	2.85	3.08	3.29	3.49	3.66	3.79	3.84	3.81	3.70	3.53	3.35	3.19	3.06	2.96
1439	1.06	1.20	1.35	1.52	1.70	1.89	2.10	2.33	2.57	2.82	3.07	3.32	3.56	3.78	3.95	4.05	4.06	3.98	3.83	3.64	3.44	3.26	3.10
1441	1.04	1.18	1.33	1.51	1.69	1.90	2.12	2.35	2.60	2.87	3.14	3.40	3.66	3.88	4.05	4.15	4.15	4.05	3.87	3.65	3.41	3.19	2.98
1443	1.08	1.22	1.38	1.56	1.75	1.96	2.18	2.41	2.66	2.93	3.19	3.45	3.70	3.91	4.08	4.17	4.16	4.05	3.87	3.64	3.40	3.18	2.97
1445	1.12	1.27	1.44	1.63	1.82	2.04	2.26	2.51	2.76	3.02	3.28	3.54	3.76	3.96	4.09	4.15	4.10	3.95	3.74	3.49	3.24	3.03	2.84
1447	1.74	1.89	2.05	2.20	2.35	2.49	2.62	2.75	2.86	2.95	3.01	3.04	3.05	3.03	2.97	2.84	2.64	2.40	2.18	2.04	2.03	2.13	2.31
1449	2.00	2.19	2.38	2.56	2.72	2.88	3.01	3.13	3.22	3.26	3.26	3.21	3.13	3.03	2.88	2.68	2.44	2.18	1.96	1.84	1.84	1.95	2.11
1451	2.50	2.71	2.92	3.10	3.25	3.38	3.46	3.50	3.48	3.39	3.24	3.04	2.81	2.59	2.36	2.12	1.85	1.58	1.37	1.27	1.29	1.43	1.63

Grain Size Data - ALE cont.

Depth	39.78	43.67	47.94	52.63	57.77	63.42	69.62	76.43	83.90	92.10	101.10	110.99	121.84	133.75	146.82	161.18	176.94	194.23	213.22	234.07	256.95
1419	3.08	2.68	2.29	1.92	1.59	1.33	1.13	1.00	0.91	0.84	0.78	0.75	0.75	0.80	0.85	0.85	0.76	0.56	0.31	0.12	0.02
1421	3.27	2.94	2.58	2.22	1.88	1.59	1.37	1.20	1.08	0.98	0.91	0.87	0.88	0.93	0.96	0.92	0.75	0.46	0.19	0.04	0.00
1423	3.61	3.20	2.75	2.29	1.85	1.48	1.19	0.98	0.84	0.75	0.69	0.67	0.69	0.74	0.79	0.77	0.64	0.42	0.19	0.05	0.01
1425	3.27	2.85	2.41	1.99	1.61	1.30	1.08	0.94	0.84	0.77	0.72	0.71	0.73	0.78	0.81	0.76	0.60	0.35	0.14	0.03	0.00
1427	2.80	2.47	2.13	1.82	1.53	1.29	1.10	0.97	0.87	0.79	0.72	0.69	0.70	0.74	0.78	0.77	0.65	0.43	0.20	0.05	0.01
1429	2.46	2.33	2.18	2.02	1.84	1.63	1.44	1.26	1.11	0.99	0.91	0.85	0.82	0.80	0.76	0.67	0.52	0.30	0.13	0.03	0.00
1431	2.58	2.48	2.34	2.17	1.96	1.73	1.50	1.30	1.13	1.00	0.91	0.86	0.86	0.88	0.86	0.77	0.58	0.33	0.13	0.02	0.00
1433	2.51	2.42	2.28	2.09	1.87	1.64	1.43	1.24	1.09	0.96	0.86	0.80	0.80	0.83	0.85	0.80	0.64	0.39	0.16	0.03	0.00
1435	2.54	2.53	2.46	2.31	2.11	1.88	1.63	1.40	1.18	1.00	0.86	0.80	0.81	0.87	0.90	0.84	0.66	0.38	0.15	0.03	0.00
1437	2.86	2.71	2.51	2.26	1.97	1.67	1.41	1.19	1.02	0.89	0.81	0.78	0.81	0.88	0.93	0.89	0.73	0.46	0.21	0.05	0.01
1439	2.92	2.72	2.47	2.19	1.89	1.60	1.35	1.15	0.99	0.89	0.82	0.81	0.84	0.88	0.89	0.81	0.62	0.36	0.14	0.03	0.00
1441	2.77	2.54	2.29	2.03	1.76	1.52	1.31	1.14	1.01	0.90	0.82	0.78	0.79	0.85	0.91	0.90	0.76	0.51	0.25	0.08	0.01
1443	2.75	2.52	2.27	1.99	1.71	1.45	1.23	1.06	0.93	0.83	0.77	0.75	0.78	0.85	0.89	0.85	0.69	0.42	0.17	0.03	0.00
1445	2.66	2.47	2.25	2.00	1.74	1.49	1.27	1.09	0.95	0.84	0.76	0.73	0.75	0.80	0.84	0.79	0.64	0.38	0.16	0.03	0.00
1447	2.48	2.58	2.57	2.42	2.18	1.90	1.60	1.33	1.10	0.91	0.78	0.71	0.71	0.75	0.81	0.81	0.71	0.52	0.28	0.10	0.02
1449	2.26	2.33	2.28	2.13	1.91	1.66	1.41	1.18	0.98	0.79	0.66	0.58	0.57	0.61	0.66	0.67	0.59	0.42	0.22	0.08	0.01
1451	1.81	1.91	1.88	1.75	1.56	1.35	1.16	0.99	0.83	0.69	0.57	0.52	0.54	0.63	0.73	0.76	0.67	0.45	0.21	0.06	0.01

Grain Size Data - ALE cont.

Depth	282.07	309.64	339.92	373.15	409.63	449.67	493.63	541.89	594.87	653.03	716.87	786.95	863.88	948.34
1419	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1421	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1423	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1425	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1427	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1429	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.07	0.11	0.11	0.07	0.02	0.00
1431	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.04	0.07	0.09	0.08	0.05	0.01	0.00
1433	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1435	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1437	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1439	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1441	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1443	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1445	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1447	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1449	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1451	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00